

## 研究資料 (Research record)

### 四万十川上流の森林流域における 2000～2015年の降水と溪流水の水質モニタリング

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#### 要旨

2000年以降、四国の四万十川上流域に位置する高知県高岡郡梶原町の森林において降水と溪流水の水質モニタリングを行ってきた。降水は1カ所で、溪流水は7つの森林流域で採取した。本報告では、2000年から2015年のデータを用い、降水や溪流水成分への降水量の影響について解析し、それらの経年変化の傾向について概観した。降水については、期間降水量が少ないほどECが高く、pHの変動範囲が大きかった。長期的にみると、降水のpH、ECの年平均値および各成分の年流入量には増加減少などの方向性をもった変化は見られなかった。溪流水については、採取日前14日間の積算降水量が増えたと明らかにECが低くなった。また、積算降水量は溪流水のpHに大きく影響することはなかった。長期的にも溪流水のpHの年平均値は安定的に推移していた。一方、溪流水の溶存成分濃度については、2007～2015年にかけて、7つの森林流域すべてにおいて、 $\text{Na}^+$ 、 $\text{Ca}^{2+}$ 、 $\text{Mg}^{2+}$ の濃度が低下する傾向にあり、 $\text{Cl}^-$ と $\text{SO}_4^{2-}$ については明らかな濃度の低下が見られた。この濃度の低下傾向が今後もしばらく続くかどうか注視する必要がある。

キーワード：降水、溪流水、溶存成分濃度、長期的変化

#### 1. はじめに

森林総合研究所では1990年に全国8カ所で酸性雨モニタリングステーションを設置し、1999年までの10年間にわたって降水(林外雨)、林内雨、樹幹流のpH、EC、溶存成分濃度のモニタリングを行ってきた(Matsuura et al. 2001, Yamada et al. 2001, 相澤ら 2003, 酒井ら 2003, 2004, 伊藤・加藤 2004, 金子ら 2004, 山田ら 2004)。しかし、これらの観測地の多くは都市近郊の研究所の構内を利用しているために、分析値は都市の影響を受けたものを含んでおり、都市からより離れた森林域で起きている実態を観測するのに必ずしも最適とはいえなかった。さらに、酸性雨等が森林生態系に及ぼす影響を評価するには、森林から流出する溪流水の水質を明らかにすることも必要であることから、2000年以降は都市からより離れた森林域において降水と溪流水の水質モニタリングを行っていく方針となった。

四国支所では、年降水量の平年値が2500 mmを超える多雨地域としての特徴をもつ四万十川上流(高知県高岡郡梶原町)の森林流域に観測地点を設け、2000年から降水と溪流水の水質モニタリングを行ってきた。現在、

2008年までの降水と溪流水(7地点のうち2地点)の水質データについては森林総合研究所のホームページ内の「森林降水溪流水データベース(FASC-DB)」に公開されている(稲垣ら 2008)。本稿では、未公開となっている地点のデータを含め、2000～2015年までの水質モニタリングデータの概要について報告する。

#### 2. 調査地と方法

##### 2.1 調査地

溪流水の採取は、高知県高岡郡梶原町の下鷹取山および鷹取山国有林(四万十森林管理署管内4048林班および4049林班)の天然林流域(N1～4)、人工林流域(A1～3)で行った(Fig. 1)。四万十川の支流である北川川(M)においても採水を行った。降水については上記の試験流域から約1.3km離れた梶原町中平地区(R)で採取を行った。各流域の面積と森林タイプについてはTable 1に示した。流域面積は5m DEM(国土地理院 2018)とSAGA-GIS ver. 4.1.0(Conrad et al. 2015)を利用して算出した。天然林流域(N1～4)は1990年に植物群落保護林に指定されている林分で(高知営林局 1996)、林冠はモミ(*Abies firma*)が

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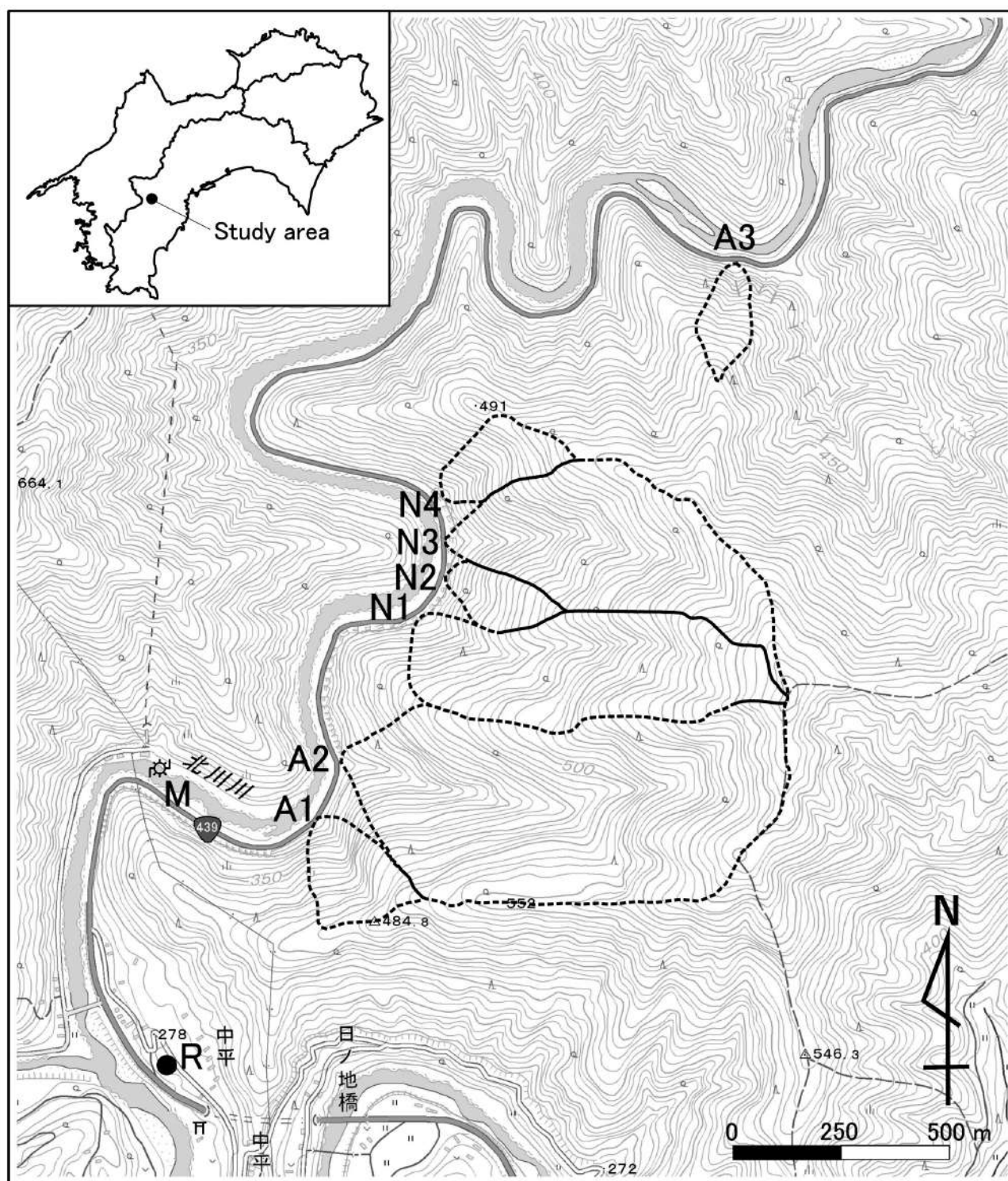


Fig. 1. 降水と渓流水の採水地点

地形図は国土地理院の基本測量成果を利用した。

**Rainwater and streamwater sampling locations**

Geospatial Information Authority of Japan standard map was used

優占し、それに常緑樹主体の広葉樹が混生する森林である。人工林流域のうち A1、A3 は、全域がスギ (*Cryptomeria japonica*) もしくはヒノキ (*Chamaecyparis obtuse*) の常緑針葉樹林だが、A2 は下流域が常緑針葉樹林、上流域がクヌギ (*Quercus acutissima*) の落葉広葉樹人工林である。試験流域の土壌は褐色森林土で (土じょう部 1976)、地質

は四万十帯に属し、白亜紀の約 1 億 4600 万～8000 万年前に海溝で複雑に変形した地層 (付加体) に由来している (産業技術総合研究所地質調査総合センター 2015)。最寄りの梶原観測所 (梶原町西路、北緯 33°23.4′ 東経 132°55.3′、海拔高 415 m) の年平均気温と年降水量の平年値はそれぞれ 13.3℃、2550 mm であった (気象庁 2018)。

Table 1. 鷹取山国有林における調査対象流域の集水面積と森林タイプ

Catchment area and forest types within the research watersheds in the Takatoriyama National forest

サンプリング地点 Sampling location	集水面積* Catchment area (ha)	森林タイプ (樹種) Forest type (Tree species)
A1	4.5	Planted forest ( <i>Cryptomeria japonica</i> , <i>Chamaecyparis obtusa</i> )
A2	39.3	Planted forest ( <i>Cryptomeria japonica</i> , <i>Chamaecyparis obtusa</i> , <i>Quercus acutissima</i> )
A3	2.3	Planted forest ( <i>Cryptomeria japonica</i> , <i>Chamaecyparis obtusa</i> )
N1	18.5	Natural temperate forest mixed with <i>Abies firma</i> and evergreen broad-leaved trees
N2	2.7	Natural temperate forest mixed with <i>Abies firma</i> and evergreen broad-leaved trees
N3	18.7	Natural temperate forest mixed with <i>Abies firma</i> and evergreen broad-leaved trees
N4	3.6	Natural temperate forest mixed with <i>Abies firma</i> and evergreen broad-leaved trees

\*集水面積は 5m の数値標高モデル (国土地理院 2018) と SAGA ver. 4.1.0 (Conrad et al. 2015) を用いて評価した。Catchment area was estimated using 5m DEM (Geographical Survey Institute of Japan 2018) and SAGA ver. 4.1.0 (Conrad et al. 2015) .

## 2.2 降水と渓流水の採取方法

降水および渓流水の採取は、2000 年 3 月～2009 年 12 月の期間は 2 週間に一度、2010 年 1 月以降は約 3 週間に一度の頻度で行った。渓流水の採取については、各採水地点においてポリエチレン製の 250 mL ボトル (ニッコー J ボトル) を用いて採取した。降水の採水方法は直径 21 cm (2005 年 10 月までは直径 24cm) のポリエチレン製の漏斗 (ニッコー ポリロート ジョイント式) を使い、シリコン栓 (アズワン シリコン栓)、ガラス管 (IWAKI ガラス管)、シリコンチューブ (アズワン ラボランシリコンチューブ) を用いて容量 10 L のポリタンク (ニッコー 平角缶) に連結して貯留した。これらの器具は降雨の採取毎にすべて交換した。なお、2011 年 6 月以降の降水採取については、サンプルに虫の混入を防ぐためナイロン製の網 (NBC メッシュテック 目開き 200  $\mu$ m) をロートと柄の結合部に装着して行った。さらに、日光によるタンク内での極端な水温上昇と藻類の発生を抑えるため、キャンプ用の銀マット (厚さ 6 mm) をタンクに巻き付け、ポリタンクの上部にはアルミシールを貼って遮光した。

## 2.3 分析方法および $\text{HCO}_3^-$ 濃度の推定方法について

研究室に持ち帰った降水および渓流水は、pH と電気伝導率 (EC) を測定し、残りの試料は 0.45  $\mu$ m のメンブレンフィルター (ADVANTEC C045A047A) でろ過した後、成分分析に供した。 $\text{Na}^+$ 、 $\text{NH}_4^+$ 、 $\text{Ca}^{2+}$ 、 $\text{Mg}^{2+}$ 、 $\text{K}^+$ 、 $\text{Cl}^-$ 、 $\text{SO}_4^{2-}$ 、 $\text{NO}_3^-$ 、 $\text{PO}_4^{3-}$  の濃度についてはイオンクロマトグラフ法、DIC (溶存無機炭素)、DOC (溶存有機炭素) 濃度については燃焼法または光触媒  $\text{TiO}_2$  酸化法で分析した。pH の測定には東亜ディーケーケー社製の HM-26S (2000～2009 年)、HM-30G (2010～2013 年)、HM-30R (2014 年～) を使い、EC の測定には同社製の CM-40V (2000～2009 年)、CM-25R (2010 年～) を用いた。イオンクロマトグラフ法による溶存イオン濃度の測定には、横河アナリティカルシステムズ IC-7000D (2000～2001

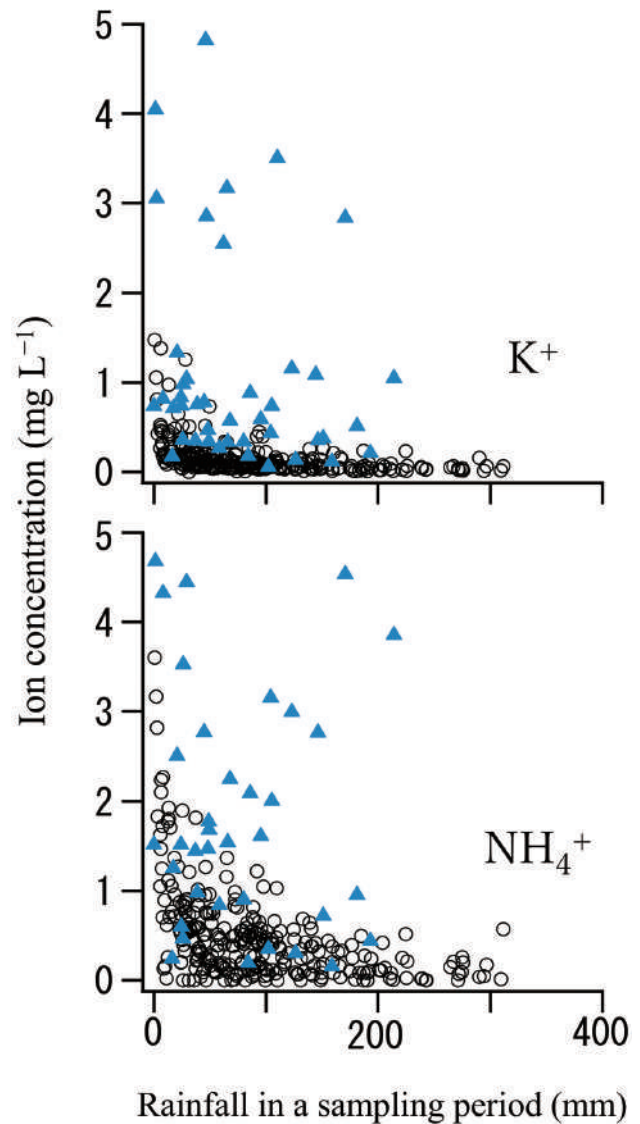


Fig. 2. 降水中の  $\text{K}^+$  と  $\text{NH}_4^+$  の濃度について降水中に  $\text{PO}_4^{3-}$  が検出される場合 (▲) と検出されない場合 (○)  
 $\text{K}^+$  and  $\text{NH}_4^+$  concentrations in rainwater  
 Data are labeled to show the presence (▲) or absence (○) of rainwater  $\text{PO}_4^{3-}$

Table 2. R1 と R2 の計算に用いた各イオンのモル質量、換算係数および当量伝導率

Molar mass, conversion factor and equivalent conductivity for ions used in the calculation of R1 and R2

Ion	Molar mass <sup>*1</sup> (g mol <sup>-1</sup> )	Conversion factor <sup>*1</sup> from mg L <sup>-1</sup> to meq L <sup>-1</sup>	equivalent conductivity <sup>*2</sup> (S cm <sup>2</sup> eq <sup>-1</sup> )
H <sup>+</sup>	1.008	0.9921	349.81
Na <sup>+</sup>	22.990	0.04350	50.10
NH <sub>4</sub> <sup>+</sup>	18.039	0.05544	73.55
K <sup>+</sup>	39.098	0.02558	73.50
Ca <sup>2+</sup>	40.078	0.04990	59.50
Mg <sup>2+</sup>	24.305	0.08229	53.05
Cl <sup>-</sup>	35.453	0.02821	76.35
NO <sub>3</sub> <sup>-</sup>	62.005	0.01613	71.46
SO <sub>4</sub> <sup>2-</sup>	96.064	0.02082	80.02
PO <sub>4</sub> <sup>3-</sup>	94.971	0.03159	92.80
HCO <sub>3</sub> <sup>-</sup>	61.017	0.01639	44.50

\*<sup>1</sup> 出典は日本水道協会 (1993)。換算係数は、1991 年の原子量表に基づくモル質量とイオン価数 (イオン価数/モル質量) から算出されている。この表のモル質量については小数点以下第 4 位を四捨五入して示した。Japan Water Works Association (1993) . The conversion factors (CF) are calculated from the molar mass based on the Standard Atomic Weights 1991 and ionic valency (CF = ionic valency / molar mass) . The molar masses in Table 2 are rounded off to the third decimal places.

\*<sup>2</sup> PO<sub>4</sub><sup>3-</sup> の当量伝導率については EANET (2010a, b) から、それ以外は日本化学会編 (1966) から引用した。The equivalent conductivity of PO<sub>4</sub><sup>3-</sup> was cited from EANET (2010a, b) , and the others were quoted from the Chemical Society of Japan (1966) .

年)、ダイオネクス DX-320 (2002～2012 年)、サーモフィッシュャーサイエンティフィック ICS-1600-cation/2100-anion (2013 年～) を使用した。全有機炭素と無機炭素の測定には島津 SUMIGRAPH GCT-12N (2000～2004 年、燃焼法)、平沼産業 TOC-2000 (2005 年～、TiO<sub>2</sub> 酸化法) を使用した。

2009 年 1 月以降の渓流水および pH5.0 を超える降水についてはアルカリ度 (pH4.8) を測定し、HCO<sub>3</sub><sup>-</sup> 濃度を求めた (EANET 2010a, b)。また、2000～2008 年の降水および渓流水の HCO<sub>3</sub><sup>-</sup> 濃度 (mg L<sup>-1</sup>) については、上記 DIC (mg L<sup>-1</sup>) の分析値と猿橋 (1955) が示した水中の炭酸物質の平衡濃度比と pH の関係を用いて HCO<sub>3</sub><sup>-</sup> 濃度 (mg L<sup>-1</sup>) を推定した (半谷・小倉 1995)。

#### 2.4 分析データの QA/QC について

水質モニタリングにおける QA/QC (精度保証/精度管理) のプログラムは、おもに試料採取から分析に至る過程で生じる問題点を改善し、質の高いデータを維持するために行うもので、これにより、過去から現在に至る長期データの比較や他地域とのデータ比較が適切に行えるようになる (EANET 2016)。本報告では、降水 (R)、渓流水 (N1～4、A1～3)、および北川川本流 (M) の各分析値については電気的中性の原理に基づく陽イオン当量濃度の合計 (C) と陰イオン当量濃度の合計 (A) の比較 (R1) と EC の測定値 (ECobs) と当量伝導率による EC の計算値 (ECcal) の比較 (R2) を、次に示す式 (2.4.1) と (2.4.2) により行った (EANET 2010a, b)。Table 2 には R1 と R2 を算出する際に用いたイオンのモル質量 (g mol<sup>-1</sup>)、

Table 3. 各濃度範囲における R1 と R2 の許容範囲

Allowable R1 and R2 ranges within each concentration range

Cation + Anion (meq L <sup>-1</sup> )	R1 (%)	ECobs (mS m <sup>-1</sup> )	R2 (%)
<0.05	± 30	<0.5	± 20
0.05-0.1	± 15	0.5-3	± 13
> 0.1	± 8	>3	± 9

換算係数および当量伝導率 (S cm<sup>2</sup> eq<sup>-1</sup>) を示した。

$$R1 = (C - A) / (C + A) \times 100 \quad (2.4.1)$$

$$R2 = (ECcal - ECobs) / (ECcal + ECobs) \times 100 \quad (2.4.2)$$

これら R1 と R2 の値がサンプルの濃度により定められた許容範囲 (Table 3) から外れた場合は再分析を行い、改善されない場合は Appendix の QC の欄にそれぞれ R1、R2 と記入した。

また、採取された降水からは PO<sub>4</sub><sup>3-</sup> が検出されることがあった。とくにロートに鳥の糞が付着していた場合に高い濃度の PO<sub>4</sub><sup>3-</sup> が検出され、Fig. 2 に示したように、降水から PO<sub>4</sub><sup>3-</sup> が検出されなかった場合の NH<sub>4</sub><sup>+</sup>、K<sup>+</sup> の濃度は、期間降水量が増えるほど低くなる双曲線的な分布となったが、採取した降水から PO<sub>4</sub><sup>3-</sup> が検出された場合は、NH<sub>4</sub><sup>+</sup>、K<sup>+</sup> の濃度が明らかに高くなっている場合が多かった。このように、降水に PO<sub>4</sub><sup>3-</sup> が検出される場合は、PO<sub>4</sub><sup>3-</sup> も含めて降水に由来しない成分 (NH<sub>4</sub><sup>+</sup>、K<sup>+</sup>) の付加が疑われ、PO<sub>4</sub><sup>3-</sup> が検出された降水のデータ (≥ 0.01mg L<sup>-1</sup>) については、Appendix の QC の欄に P と記入した。

## 2.5 採水タンク容量を超えた場合の分析値と期間降水量の取扱いについて

台風など大雨の時にはポリタンクの容量を超えてしまうこと (overflow) があった。このようなケースでは採取できた分について分析を行った。また、そのときの期間降水量については実際に降ったと推定される量に補正し、これを年平均値 (加重平均) や年間流入量の算出に用いた。2000～2009年の期間降水量の補正值については、降水採取タンクの近くに設置した転倒ます型の降雨記録計のデータを用いた。また、2010年以降については、気象庁の梶原観測所 (梶原町西路, 北緯33°23.4′ 東経132°55.3′) と観測地点Rにおける期間降水量がほぼ同程度となることから、梶原観測所のデータをそのまま用いて補間した (気象庁2018)。

## 2.6 降水中の非海塩由来の成分濃度の計算方法について

降水中の  $\text{Ca}^{2+}$  と  $\text{SO}_4^{2-}$  については各採水期間ごとに  $\text{Na}^+$  との重量比から非海塩由来 (non-sea-salt) の成分濃度を求め、それぞれ  $\text{nss-Ca}^{2+}$ 、 $\text{nss-SO}_4^{2-}$  と表記した。重量比はそれぞれ  $\text{Ca}^{2+}/\text{Na}^+$ : 0.038、 $\text{SO}_4^{2-}/\text{Na}^+$ : 0.251 を用いた (酸性雨調査法研究会1993)。

## 2.7 降水と渓流水の pH、EC、溶存成分濃度の年平均値の計算方法について

降水については、2.4節に記した QA/QC の観点から、(a) EANET が推奨する R1、R2 の許容範囲から外れたデータ、および、(b)  $\text{PO}_4^{3-}$  が検出されたデータについては、年平均値の計算から除外することがある (釣田ら2017)。しかし、この方法を本報告に適用した場合、2010年以前のデータに除外しなければならないものが多くなり (Table 4)、年平均値として妥当な観測数が得られなくなるため、本報告では、降水について pH、EC および溶存成分の年平均値を算出する場合に限り上記 (a) の許容範囲を緩め、 $\text{PO}_4^{3-}$  が検出されなければ、どんな溶存成分濃度 ( $\text{meq L}^{-1}$ ) であっても、 $\text{R1} \leq \pm 30\%$ 、かつ  $\text{R2} \leq \pm 20\%$  を満たしていれば、年平均値の算出に用いた (Table 4)。なお、降水 pH の年平均値を算出する際は、一旦、pH を  $\text{H}^+$  濃度に換算してから加重平均値を算出し、それを再び pH に換算する方法で行った (玉置・平木1986a, b)。

渓流水については、2.4節で述べた R1 と R2 の許容範囲、すなわち EANET (2010a) が示す許容範囲内にあるデータを用いて算術平均値を算出した (Table 5)。

## 2.8 降水による主要な各成分の年間流入量の計算方法

2.6節で算出した降水の各溶存成分濃度の加重平均値と年間の総雨量 (2.5節で示した overflow 時の補正を含めて

**Table 4. 降水の pH、EC および溶存成分濃度の年加重平均値**  
Annual weighted pH and EC averages plus dissolved rainwater ion concentrations

year	Rainfall mm	pH	EC <sub>obs</sub> mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	nss-Ca <sup>2+</sup>	nss-SO <sub>4</sub> <sup>2-</sup>	N <sub>S</sub> <sup>*1</sup>	N <sub>EP</sub> <sup>*2</sup>	N <sub>T</sub> <sup>*3</sup>
				mg L <sup>-1</sup>														
2000	2846	4.70	1.43	0.56	0.05	0.11	0.11	0.04	1.19	0.49	1.42	0.00	0.76	0.09	1.28	5	4	25
2001	2196	4.93	1.09	0.31	0.11	0.14	0.39	0.05	0.77	0.67	1.37	0.05	1.48	0.38	1.29	16	15	24
2002	2277	4.82	1.67	0.78	0.37	0.08	0.34	0.09	1.38	0.75	1.44	0.00	1.42	0.31	1.25	18	11	24
2003	2756	4.82	1.25	0.50	0.18	0.08	0.10	0.03	0.82	0.42	0.92	0.00	1.25	0.08	0.80	22	19	24
2004	2854	5.02	1.01	0.60	0.13	0.10	0.22	0.04	1.00	0.32	0.66	0.13	0.98	0.20	0.51	21	12	24
2005	1665	4.79	1.61	0.74	0.42	0.16	0.36	0.07	1.24	0.65	1.22	0.32	1.70	0.34	1.04	17	6	24
2006	3359	4.96	1.23	0.51	0.32	0.16	0.36	0.05	0.84	0.48	1.05	0.29	1.38	0.34	0.92	21	14	24
2007	2394	4.99	1.17	0.58	0.41	0.08	0.27	0.06	0.96	0.42	0.94	0.43	1.55	0.24	0.79	22	8	23
2008	2106	4.85	1.20	0.38	0.39	0.09	0.28	0.04	0.62	0.53	0.96	0.15	1.44	0.26	0.87	23	6	25
2009	2167	4.87	1.20	0.44	0.40	0.06	0.16	0.05	0.72	0.46	0.84	0.71	1.23	0.15	0.73	18	7	25
2010	2497	5.10	1.09	0.31	0.63	0.17	0.20	0.04	0.50	0.43	0.91	1.06	1.19	0.19	0.83	13	8	18
2011	3492	5.15	0.96	0.39	0.20	0.04	0.16	0.05	0.62	0.31	0.60	0.68	0.47	0.14	0.50	18	16	20
2012	2927	4.97	1.33	0.56	0.27	0.07	0.20	0.07	0.91	0.49	0.93	0.66	0.65	0.18	0.79	18	18	18
2013	2185	4.95	1.13	0.40	0.19	0.08	0.18	0.06	0.59	0.48	0.85	0.51	0.75	0.16	0.75	19	16	19
2014	3656	4.93	1.11	0.45	0.12	0.05	0.12	0.06	0.74	0.38	0.77	0.52	0.65	0.10	0.66	18	18	19
2015	2911	4.93	1.09	0.39	0.18	0.11	0.13	0.06	0.62	0.37	0.79	0.45	0.72	0.11	0.70	18	16	18
Average	2643	4.93	1.19	0.48	0.26	0.09	0.21	0.05	0.80	0.45	0.91	0.41	1.03	0.19	0.79			
CV <sup>*4</sup> (%)		2.2	15.7	27.0	54.8	38.8	42.6	26.2	29.2	24.9	25.5	80.7	34.2	45.8	27.9			

\*<sup>1</sup> N<sub>S</sub>: 本報告用に緩和した R1 と R2 の許容範囲内にある降水のサンプル数 (すべての濃度範囲において  $\text{R1} \leq \pm 30\%$  と  $\text{R2} \leq \pm 20\%$  の条件を満たすサンプルの数)。N<sub>S</sub>: Number of rainwater samples within the mitigated allowable ranges in this report ( $\text{R1} \leq \pm 30\%$  and  $\text{R2} \leq \pm 20\%$  in all concentration ranges) .

\*<sup>2</sup> N<sub>EP</sub>: EANET (2010b) が推奨する R1 と R2 の許容範囲を満たし、かつ、 $\text{PO}_4^{3-} < 0.01 \text{ mg L}^{-1}$  を満たすサンプルの数。N<sub>EP</sub>: Number of samples within the allowable ranges for all of R1, R2 (EANET 2010b) and P ( $\text{PO}_4^{3-} < 0.01 \text{ mg L}^{-1}$ ) .

\*<sup>3</sup> N<sub>T</sub>: 年間の全サンプル数。N<sub>T</sub>: Total number of samples per year.

\*<sup>4</sup> CV: 変動係数。CV: coefficient of variation.



算出)の積から降水による主要な各成分の年間流入量を算出した (Table 6)。

### 3. 結果と考察

#### 3.1 降水の成分特性と年流入量の経年変化

観測地点 R における 2000～2015 年の降水の pH 測定値の範囲は 3.86～6.51、EC の範囲は 0.2～19.1 mS m<sup>-1</sup>であった (EANET が推奨する許容範囲内のデータのみを使用)。とくに期間降水量が 100mm 未満の場合、pH の値は広い範囲となり、期間降水量が多くなるほどその範囲は小さくなった (Fig. 3a)。そして、期間降水量が少ない場合は EC が高くなり (Fig. 3b)、EC が高いほど pH が低

くなるという関係が見られた (Fig. 3c)。このように、降水の pH と EC は採取期間ごとにさまざまな値を示した。一方、年単位で加重平均した降水の pH および EC については、変動係数がそれぞれ 2.2%、15.7%で、それほど大きく変動することなく推移しており、この 16 年の間に上昇または低下といった方向性を持った変化は見られなかった (Table 4)。降水成分の年流入量については、とくに NH<sub>4</sub><sup>+</sup> の変動が大きいことが特徴であったが、いずれの成分についてもこの 16 年の間に増加減少といった明らかな方向性は見られなかった (Fig. 4)。降水中に含まれる非海塩由来の硫酸イオン (nss-SO<sub>4</sub><sup>2-</sup>) や無機態窒素 (NO<sub>3</sub><sup>-</sup>-N、NH<sub>4</sub><sup>+</sup>-N) の量は大気汚染物質の指標として用いられ

Table 5. 降水による溶存成分の年流入量

Annual input of dissolved rainwater ions

Year	Rainfall mm	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup> -N	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup> -N	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	nss-Ca <sup>2+</sup>	nss-SO <sub>4</sub> <sup>2-</sup>
kg ha <sup>-1</sup> y <sup>-1</sup>													
2000	2846	16.1	1.0	3.1	3.3	1.1	33.8	3.2	40.4	0.0	21.5	2.6	36.4
2001	2196	6.9	1.9	3.1	8.6	1.2	16.8	3.3	30.1	1.1	32.5	8.3	28.4
2002	2277	17.7	6.6	1.8	7.7	2.1	31.4	3.9	32.8	0.0	32.4	7.1	28.4
2003	2756	13.7	3.9	2.3	2.7	0.9	22.7	2.6	25.4	0.0	34.4	2.2	21.9
2004	2854	17.2	2.9	3.0	6.3	1.2	28.4	2.1	18.7	3.7	28.1	5.7	14.4
2005	1665	12.3	5.4	2.6	6.1	1.2	20.7	2.4	20.3	5.3	28.3	5.6	17.2
2006	3359	17.0	8.3	5.3	12.2	1.5	28.1	3.7	35.2	9.6	46.4	11.5	30.9
2007	2394	14.0	7.7	1.8	6.4	1.4	23.0	2.3	22.5	10.3	37.2	5.9	19.0
2008	2106	8.1	6.4	1.8	5.8	0.9	13.0	2.5	20.3	3.2	30.4	5.5	18.3
2009	2167	9.5	6.8	1.3	3.6	1.1	15.5	2.3	18.1	15.3	26.6	3.2	15.7
2010	2497	7.6	12.2	4.2	5.0	1.1	12.5	2.4	22.6	26.4	29.7	4.7	20.7
2011	3492	13.5	5.4	1.5	5.4	1.7	21.6	2.5	20.9	23.7	16.2	4.9	17.5
2012	2927	16.5	6.2	2.1	5.8	2.0	26.6	3.2	27.4	19.3	19.0	5.1	23.2
2013	2185	8.8	3.2	1.7	3.9	1.4	12.8	2.3	18.5	11.1	16.5	3.6	16.3
2014	3656	16.5	3.5	1.7	4.4	2.1	27.1	3.1	28.2	19.0	23.8	3.8	24.1
2015	2911	11.3	4.1	3.3	3.7	1.6	18.1	2.4	23.1	13.1	20.9	3.2	20.3
Average	2643	12.7	5.4	2.5	5.6	1.4	21.2	2.7	24.2	10.8	27.1	5.1	21.0
CV (%)		28.3	50.2	41.0	40.5	26.8	29.9	19.3	25.1	84.1	28.2	43.9	27.1

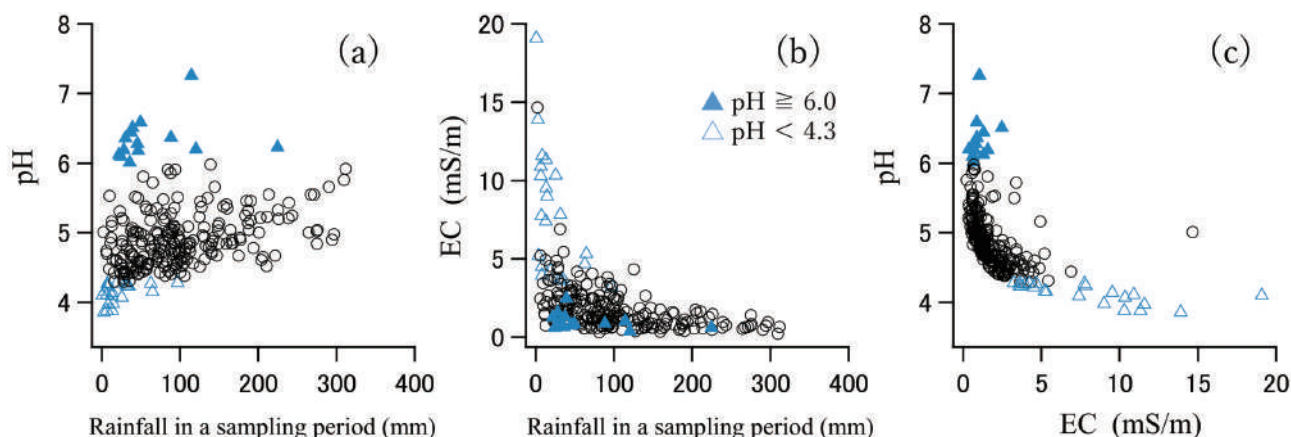


Fig. 3. 降水量が降水の pH、EC に及ぼす影響 (a, b) と降水の pH と EC の関係 (c)

オーバーフローのデータは除外して図示した。

Effects of rainfall quantity on rainwater pH and EC (a, b) , and the relationship between rainwater pH and EC (c)

Overflow data were excluded.

るが、環境省(2014)が公表している全国31カ所における2008～2012年の地点別の5年平均値によると、 $\text{nss-SO}_4^{2-}$ の年流入量は最大値、最小値、中央値の順にそれぞれ43.1、5.5、20.0  $\text{kg ha}^{-1}$ 、 $\text{NO}_3^-$ -Nはそれぞれ7.3、0.7、3.6  $\text{kg ha}^{-1}$ 、 $\text{NH}_4^+$ -Nはそれぞれ6.4、1.0、3.2  $\text{kg ha}^{-1}$ であった。観測地点Rにおける2008～2012年の $\text{nss-SO}_4^{2-}$ の年流入量は15.7～23.2  $\text{kg ha}^{-1}$ 、 $\text{NO}_3^-$ -Nの年流入量は2.3～3.2  $\text{kg ha}^{-1}$ であり、全国31地点の中央値付近のレベルであったが、 $\text{NH}_4^+$ -Nの年流入量は5.4～12.2  $\text{kg ha}^{-1}$ であり、全国31地点の5年平均値の最大値を超える年があった(Table 5)。なお、環境省の全国31地点の一つには梶原(北緯33°22′46″東経132°56′06″、海拔高790 m)

があり、観測地点Rから直線距離にして約6 km離れた場所(山地頂上付近の森林を切開した造成地)で降水成分の観測が行われている。ここでの2008～2012年の年流入量の5年平均値(最小値～最大値)は、 $\text{nss-SO}_4^{2-}$ : 21.4 (17.6～25.6)  $\text{kg ha}^{-1}$ 、 $\text{NO}_3^-$ -N: 2.6 (2.2～3.3)  $\text{kg ha}^{-1}$ 、 $\text{NH}_4^+$ -N: 2.3 (1.9～3.0)  $\text{kg ha}^{-1}$ であり(環境省2014)、観測地点Rと比べて $\text{nss-SO}_4^{2-}$ と $\text{NO}_3^-$ -Nは同程度だったが、 $\text{NH}_4^+$ -Nについては観測地点Rで明らかに高かった。窒素は森林の物質収支を評価する上で重要な成分であり、 $\text{NH}_4^+$ -Nの年流入量については近隣の発生源(例えば農業活動など)の影響も考慮し(野口・山口2010)、適切に評価していく必要があるだろう。

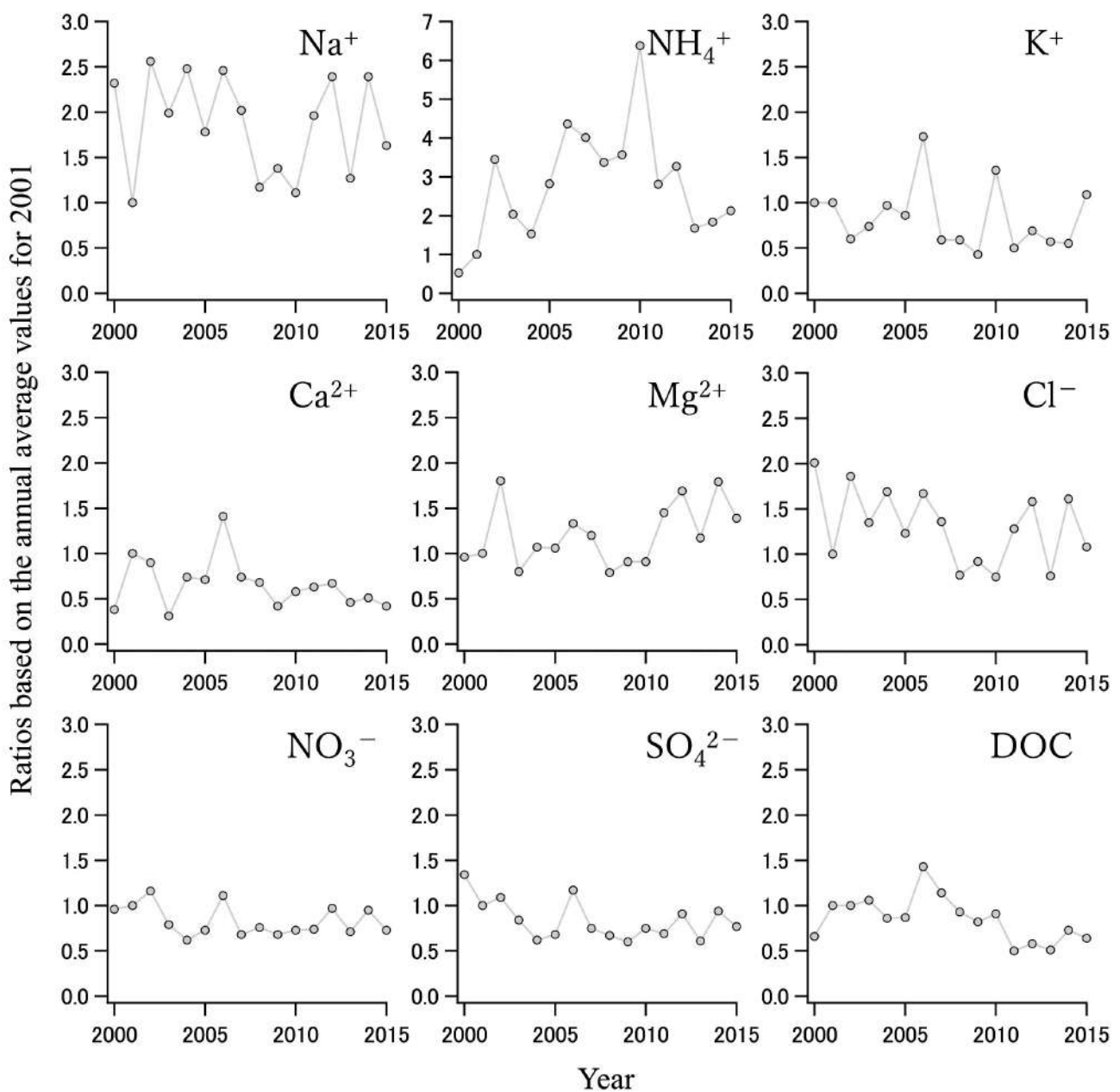


Fig. 4. 2000～2015年における降水成分の年流入量の相対的な変化  
Relative changes in annual input of dissolved ions in rainwater from 2000 to 2015.

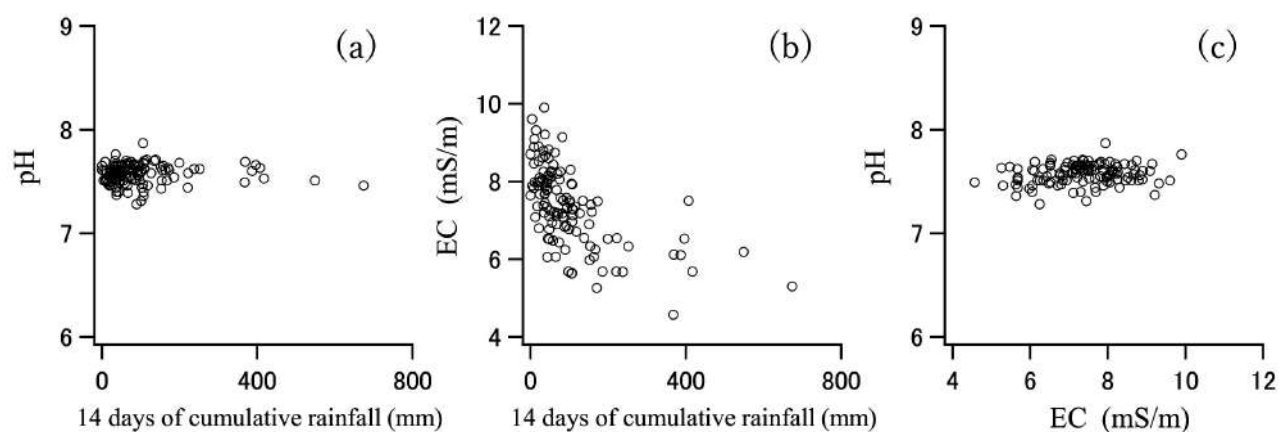


Fig. 5. 降水量が溪流水の pH、EC に及ぼす影響 (a, b) と溪流水の pH と EC の関係 (c)  
 Effect of 14 days of cumulative rainfall before the sampling day on streamwater pH and EC (a, b) , and the relationship between streamwater pH and EC (c) .

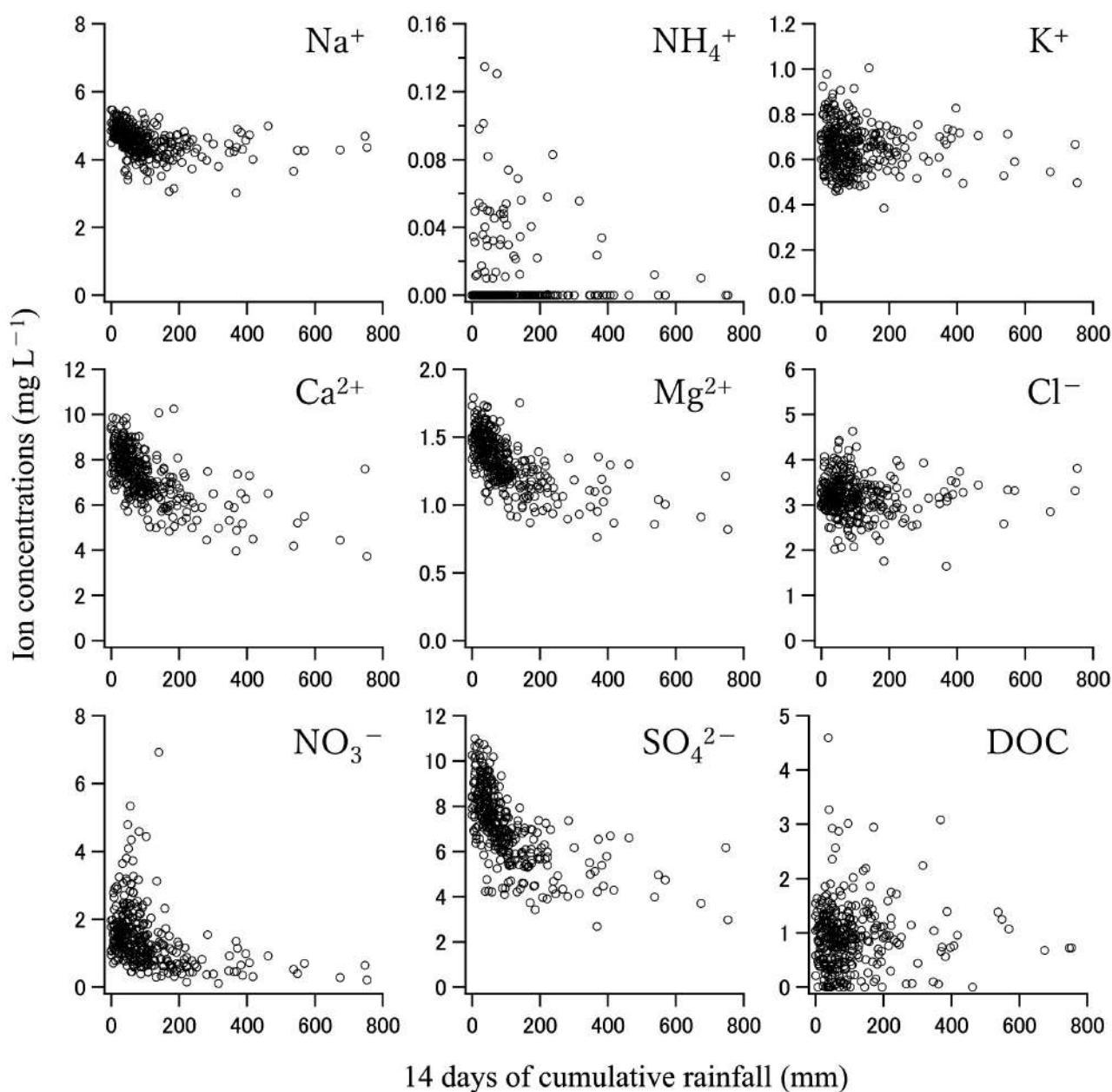


Fig. 6. サンプルング日前 14 日間の積算降水量が溪流水の成分濃度に及ぼす影響  
 Effects of 14 days of cumulative rainfall before the sampling day on ion concentration



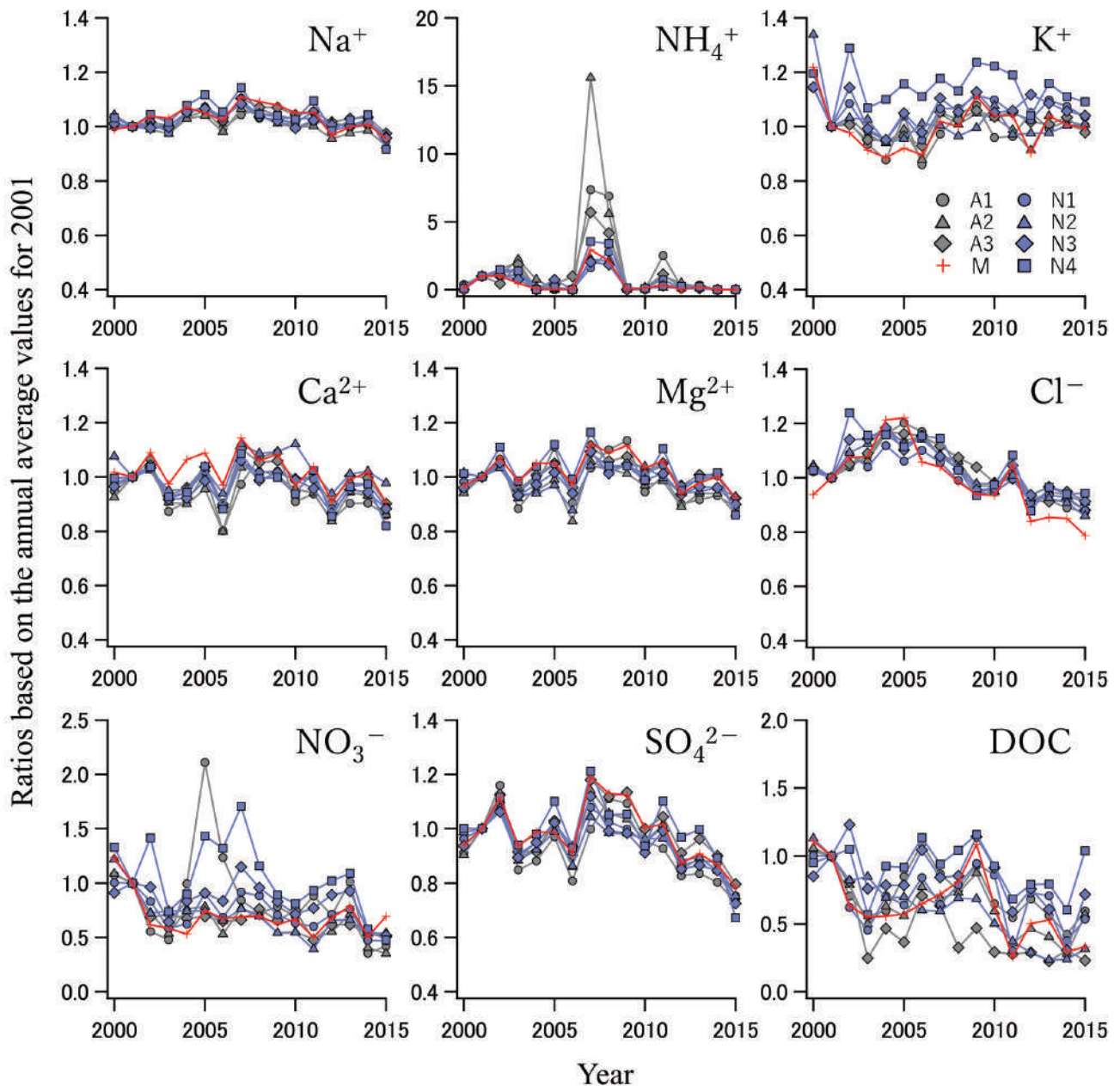


Fig. 7. 2000 ~ 2015 年の7つの森林流域における渓流水質と北川川の水質の経年変化

Relative changes in annual average of ions in streamwater in seven forest watersheds and the Kitagawa River from 2000 to 2015

### 3.2 渓流水の溶存成分濃度の年平均値の変化

N3における渓流水の個々のサンプルについて、Fig. 5にpH、EC、降水量の相互関係について、Fig. 6に同サンプルの各成分濃度と降水量の関係について示した。7つの森林流域における各分析値と降水量の関係については傾向が似ていたため、この報告ではN3のデータを用いた図のみ示した。なお、図中の「14日積算降水量」は採取日を起算日として14日間の積算降水量を梶原観測所の日降水量データを用いて算出した（気象庁 2018）。積算日数については3、7、10、14日間で検討し、10日以上になると積算降水量とECの関係が明瞭に分離することから、この報告においては14日間を用いること

にした。

渓流水（N3）については積算降水量の増加がpHに及ぼす影響はあまり明瞭ではなかった（Fig. 5a）。また、降水の場合とは異なり降水量の増加によりECの値が変化しても渓流水のpHの値はあまり変化しなかった（Fig. 5c）。渓流水のECの値は降水量が増加するほど明らかに小さくなった（Fig. 5b）。これは降水量の増加により渓流水の成分濃度が薄まることを示している。しかし、その薄まり方は成分の種類によって異なり、 $\text{Ca}^{2+}$ 、 $\text{Mg}^{2+}$ 、 $\text{SO}_4^{2-}$ のように積算降水量が0～300mmの範囲において濃度の減少が明瞭な成分と $\text{Na}^+$ 、 $\text{K}^+$ 、 $\text{Cl}^-$ のように濃度の減少があまり明瞭ではない成分があることがわかった（Fig. 6）。

また、 $\text{NO}_3^-$ は、基本的には積算降水量の増加とともに濃度の減少が見られるタイプのイオンと考えられるが、積算降水量が100mm前後となる時に $4 \text{ mg L}^{-1}$ 以上の高濃度で検出される場合があり、篠宮ら(2007)が同地点の経時観測において示したように、まとまった雨があるときに $\text{NO}_3^-$ が生態系から大きく流出する現象をとらえていると考えられた。DOCと積算降水量の間に明瞭な関係は見られなかったものの、濃度の変動幅は大きかった。

Fig. 7には鷹取山における7つの森林流域(A1~3、N1~4)と北川川(M)で採取した溪流水の2000~2015年における成分濃度の経年変化を2001年を1としたときの比率で示した。特徴的だったのは、 $\text{Na}^+$ 、 $\text{Ca}^{2+}$ 、 $\text{Mg}^{2+}$ 、 $\text{Cl}^-$ 、 $\text{SO}_4^{2-}$ の年平均値の相対的な変化の傾向が7つの森林流域すべてにおいて似ており、しかも、それが本流である北川川(M)とも連動していることであった。 $\text{K}^+$ 、 $\text{NO}_3^-$ については一部の森林流域(とくにN4)で連動していなかったものの、それ以外の森林流域ではおおむね相対的な変化の傾向は似ていた。DOCの変化パターンは森林流域によって異なっていた。 $\text{NH}_4^+$ は2007~2008年に人工林の流域で相対的に高い濃度の流出が見られたが、原因については不明である。一方、この16年間の長期的な濃度変化については、2007年以降、7つの森林流域すべてにおいて $\text{Na}^+$ 、 $\text{Ca}^{2+}$ 、 $\text{Mg}^{2+}$ の濃度に低下傾向がみられ、とくに $\text{Cl}^-$ と $\text{SO}_4^{2-}$ については濃度の低下が顕著であった(Fig. 7)。こうした傾向が今後どのように推移していくのか、現在継続中のモニタリングにより確認できるであろう。また長期的な観測を続けることにより、降水や溪流水の水質の変動要因がより明らかになることに期待したい。

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Table 6a. 渓流水の pH、EC および溶存成分の年平均値 (単純平均)

Annual simple averages of pH, EC, and dissolved ion concentrations in streamwater

Sampling location	Year	pH	EC <sub>obs</sub>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	N <sub>E</sub> <sup>*1</sup>	N <sub>T</sub> <sup>*2</sup>
			mS m <sup>-1</sup>					mg L <sup>-1</sup>							
A1	2000	7.67	6.93	4.37	0.00	0.58	7.58	0.93	2.57	0.77	6.88	24.40	0.79	19	19
	2001	7.65	7.28	4.37	0.00	0.51	8.00	0.98	2.52	0.72	7.55	25.94	0.77	24	24
	2002	7.72	8.04	4.43	0.01	0.52	8.52	1.04	2.62	0.40	8.75	27.92	0.54	24	24
	2003	7.61	6.92	4.29	0.01	0.48	6.99	0.87	2.72	0.34	6.41	24.16	0.43	23	24
	2004	7.63	7.25	4.53	0.00	0.45	7.28	0.95	2.93	0.72	6.66	30.28	0.46	14	24
	2005	7.64	7.80	4.62	0.00	0.53	8.10	1.09	3.03	1.52	7.33	31.66	0.65	15	23
	2006	7.63	6.90	4.35	0.00	0.44	6.42	0.89	2.94	0.89	6.10	25.80	0.83	12	21
	2007	7.67	7.36	4.56	0.03	0.50	7.79	1.01	2.70	0.61	7.54	28.38	0.66	18	19
	2008	7.69	7.91	4.66	0.03	0.53	8.59	1.08	2.67	0.52	8.38	29.75	0.57	24	24
	2009	7.68	7.96	4.55	0.00	0.55	8.73	1.11	2.44	0.56	8.26	30.75	0.71	24	24
	2010	7.58	6.88	4.35	0.00	0.49	7.28	0.93	2.44	0.50	7.21	26.07	0.50	19	19
	2011	7.58	7.10	4.44	0.01	0.49	7.50	0.98	2.56	0.63	7.00	27.33	0.42	19	19
	2012	7.53	6.71	4.44	0.00	0.54	6.75	0.88	2.36	0.51	6.24	26.67	0.52	18	18
	2013	7.56	6.75	4.36	0.00	0.51	7.22	0.90	2.31	0.73	6.30	25.73	0.43	18	18
	2014	7.67	6.66	4.39	0.00	0.52	7.23	0.91	2.24	0.25	6.07	26.67	0.32	18	19
	2015	7.65	6.36	4.21	0.00	0.51	6.88	0.87	2.20	0.30	5.51	25.64	0.46	18	18
	Average	7.64	7.22	4.43	0.01	0.51	7.64	0.97	2.56	0.60	7.12	27.30	0.57		
	CV (%)	0.7	6.9	2.7	165.4	7.0	8.7	8.2	9.3	46.3	12.7	8.0	26.2		
A2	2000	7.68	8.25	4.67	0.00	0.69	9.42	1.33	2.46	1.13	8.27	30.56	0.99	19	19
	2001	7.71	8.85	4.68	0.00	0.60	10.18	1.41	2.35	1.04	9.15	33.58	0.93	24	24
	2002	7.70	9.43	4.63	0.00	0.62	10.43	1.47	2.48	0.76	10.13	33.77	0.73	24	24
	2003	7.69	8.47	4.55	0.01	0.59	9.24	1.30	2.50	0.56	8.21	31.48	0.47	23	24
	2004	7.67	8.57	4.81	0.00	0.57	9.17	1.34	2.73	0.80	8.41	37.74	0.59	19	24
	2005	7.72	9.05	4.87	0.00	0.60	9.72	1.39	2.67	0.82	9.29	38.61	0.52	21	24
	2006	7.68	8.12	4.59	0.00	0.53	8.13	1.18	2.70	0.55	7.87	32.30	0.72	20	24
	2007	7.72	9.43	4.98	0.05	0.63	10.53	1.49	2.54	0.80	10.43	36.74	0.64	23	24
	2008	7.72	9.24	4.87	0.02	0.61	10.44	1.45	2.49	0.74	9.68	35.67	0.68	23	24
	2009	7.71	8.98	4.73	0.00	0.63	10.20	1.42	2.25	0.57	9.48	35.17	0.81	24	24
	2010	7.65	8.55	4.66	0.00	0.62	9.72	1.36	2.23	0.57	8.72	34.26	0.55	19	19
	2011	7.64	8.34	4.69	0.00	0.60	9.59	1.39	2.33	0.51	9.30	33.95	0.33	19	19
	2012	7.57	7.83	4.47	0.00	0.55	8.52	1.25	2.14	0.58	7.79	32.08	0.43	18	18
	2013	7.60	8.07	4.56	0.00	0.63	9.61	1.32	2.23	0.74	8.16	32.69	0.38	18	18
	2014	7.65	8.01	4.61	0.00	0.61	9.48	1.32	2.20	0.42	7.75	33.44	0.26	19	19
	2015	7.67	7.59	4.35	0.00	0.60	8.76	1.22	2.13	0.37	6.86	31.62	0.53	18	18
	Average	7.68	8.60	4.68	0.01	0.61	9.62	1.36	2.41	0.69	8.80	34.05	0.61		
	CV (%)	0.6	6.4	3.3	217.9	6.0	7.1	6.3	8.0	29.7	10.8	6.6	33.5		
A3	2001	7.75	9.59	4.18	0.01	0.48	12.23	1.32	2.42	0.94	9.81	37.16	0.56	19	19
	2002	7.78	10.32	4.25	0.00	0.48	12.76	1.38	2.55	0.64	11.04	38.20	0.46	24	24
	2003	7.72	9.43	4.19	0.01	0.45	11.37	1.26	2.64	0.66	8.97	35.63	0.14	21	24
	2004	7.72	9.64	4.39	0.00	0.45	11.75	1.33	2.84	0.63	8.99	43.20	0.26	19	24
	2005	7.77	10.28	4.45	0.00	0.46	12.68	1.39	2.82	0.65	10.10	46.13	0.21	23	24
	2006	7.74	9.46	4.26	0.01	0.44	11.00	1.27	2.80	0.61	8.86	39.72	0.40	21	24
	2007	7.75	10.64	4.61	0.03	0.50	13.51	1.47	2.71	0.62	11.57	43.58	0.35	24	24
	2008	7.76	10.26	4.47	0.02	0.49	12.88	1.40	2.61	0.71	10.97	40.02	0.18	24	24
	2009	7.73	10.31	4.47	0.00	0.51	12.96	1.42	2.52	0.61	11.12	40.38	0.26	24	24
	2010	7.72	9.64	4.35	0.00	0.50	12.15	1.35	2.38	0.70	9.80	38.98	0.16	19	19
	2011	7.71	9.49	4.40	0.01	0.50	12.23	1.39	2.42	0.45	10.24	40.12	0.16	19	19
	2012	7.63	8.89	4.24	0.00	0.49	11.04	1.28	2.22	0.58	8.93	37.87	0.16	18	18
	2013	7.63	9.08	4.30	0.00	0.48	12.28	1.33	2.21	0.58	9.43	39.13	0.13	19	19
	2014	7.63	9.17	4.32	0.00	0.49	12.20	1.33	2.23	0.49	8.83	39.09	0.17	19	19
	2015	7.65	8.66	4.07	0.00	0.47	11.04	1.22	2.14	0.48	7.81	36.34	0.13	18	18
	Average	7.72	9.71	4.34	0.01	0.48	12.20	1.35	2.52	0.63	9.86	39.83	0.25		
	CV (%)	0.7	5.9	3.1	152.7	4.0	6.1	4.9	9.1	18.0	10.6	6.8	52.0		
N1	2000	7.81	9.59	5.30	0.00	0.77	11.04	1.55	3.38	1.46	8.82	35.12	1.11	19	19
	2001	7.79	9.83	5.28	0.01	0.67	11.29	1.57	3.28	1.45	9.15	36.85	1.11	24	24
	2002	7.78	10.53	5.37	0.01	0.73	11.65	1.66	3.57	1.21	10.01	38.49	0.69	24	24
	2003	7.75	9.49	5.16	0.01	0.66	10.38	1.48	3.41	0.85	8.30	35.54	0.50	22	24
	2004	7.74	9.81	5.56	0.00	0.64	10.64	1.57	3.67	0.90	8.68	43.48	0.78	18	24
	2005	7.80	10.46	5.66	0.00	0.70	11.52	1.65	3.48	1.31	9.35	45.88	0.71	22	24
	2006	7.78	9.65	5.38	0.00	0.64	10.00	1.48	3.61	0.99	8.37	39.16	0.93	21	24
	2007	7.81	10.62	5.82	0.02	0.72	11.92	1.71	3.47	1.33	9.88	42.91	0.71	22	24
	2008	7.75	10.19	5.44	0.04	0.72	11.48	1.63	3.25	1.28	9.38	39.53	0.87	24	24
	2009	7.76	10.16	5.42	0.00	0.75	11.52	1.64	3.09	1.02	9.14	40.48	1.05	24	24
	2010	7.74	9.72	5.34	0.00	0.74	11.15	1.59	3.11	0.92	8.69	39.77	0.95	19	19
	2011	7.71	9.67	5.57	0.01	0.71	11.19	1.64	3.27	0.87	9.23	40.55	0.33	19	19
	2012	7.66	8.97	5.19	0.00	0.69	9.97	1.52	2.98	1.03	7.91	37.29	0.81	18	18
	2013	7.65	9.22	5.30	0.00	0.74	11.01	1.56	3.07	1.10	8.11	38.33	0.78	18	18
	2014	7.71	9.25	5.41	0.00	0.72	11.01	1.58	3.05	0.69	7.99	39.64	0.42	19	19
	2015	7.73	8.78	4.99	0.00	0.70	10.04	1.45	2.89	0.68	6.89	36.44	0.59	18	18
	Average	7.75	9.79	5.39	0.01	0.71	11.03	1.58	3.29	1.08	8.81	39.37	0.78		
	CV (%)	0.6	5.4	3.6	140.5	5.2	5.4	4.5	7.1	22.5	8.9	7.2	29.2		

\*<sup>1</sup> N<sub>E</sub>: EANET (2010a) が推奨する R1 と R2 の許容範囲内にある渓流水のサンプル数。N<sub>E</sub>: Number of streamwater samples within the allowable ranges for R1, R2 (EANET 2010a).

\*<sup>2</sup> N<sub>T</sub>: 年間の全サンプル数。N<sub>T</sub>: Total number of samples per year.

Table 6b. 渓流水の pH、EC および溶存成分の年平均値 (単純平均)

Annual simple averages of pH, EC, and dissolved ion concentrations in streamwater

Sampling location	Year	pH	EC <sub>obs</sub> mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	N <sub>E</sub> <sup>*1</sup>	N <sub>T</sub> <sup>*2</sup>
N2	2000	7.38	6.07	4.47	0.00	0.55	5.42	1.09	3.09	0.66	5.70	19.64	0.92	19	19
	2001	7.42	5.89	4.28	0.01	0.41	5.03	1.08	2.95	0.54	5.78	18.68	0.81	24	24
	2002	7.44	6.22	4.30	0.02	0.42	5.16	1.11	3.23	0.39	6.22	19.45	0.67	24	24
	2003	7.39	5.86	4.28	0.02	0.42	4.79	1.01	3.32	0.41	5.10	18.26	0.69	23	24
	2004	7.45	5.95	4.51	0.00	0.39	4.80	1.01	3.50	0.40	5.33	22.17	0.57	19	24
	2005	7.56	6.22	4.59	0.00	0.39	5.18	1.04	3.32	0.41	5.72	24.18	0.57	23	24
	2006	7.37	6.01	4.44	0.00	0.41	4.73	0.94	3.37	0.36	4.99	21.23	0.49	17	20
	2007	7.25	6.39	4.67	0.03	0.41	5.65	1.12	3.21	0.42	6.02	22.70	0.48	24	24
	2008	7.32	6.31	4.49	0.03	0.40	5.47	1.11	3.05	0.38	5.68	21.53	0.56	24	24
	2009	7.27	6.27	4.43	0.00	0.41	5.50	1.13	2.89	0.30	5.68	22.39	0.56	24	24
	2010	7.46	6.10	4.41	0.00	0.44	5.64	1.12	2.89	0.30	5.56	22.42	0.41	19	19
	2011	7.58	5.72	4.41	0.00	0.40	5.13	1.07	2.98	0.21	5.57	21.31	0.30	19	19
	2012	7.50	5.61	4.33	0.00	0.40	4.72	1.01	2.73	0.36	5.11	21.16	0.23	18	18
	2013	7.51	5.58	4.30	0.00	0.40	5.09	1.02	2.73	0.36	5.16	20.58	0.19	18	18
	2014	7.39	5.56	4.37	0.00	0.41	5.14	1.03	2.68	0.29	4.89	21.24	0.19	19	19
	2015	7.26	5.59	4.14	0.00	0.41	4.92	1.00	2.54	0.29	4.36	20.83	0.26	18	18
	Average	7.41	5.98	4.40	0.01	0.42	5.17	1.06	3.04	0.38	5.47	21.10	0.51		
	CV (%)	1.3	4.6	2.9	135.0	8.7	5.9	5.0	8.9	27.1	8.4	7.1	43.0		
N3	2000	7.61	7.26	4.50	0.00	0.71	7.33	1.28	3.18	1.54	7.04	23.61	0.92	19	19
	2001	7.64	7.53	4.45	0.01	0.62	7.59	1.33	3.07	1.69	7.52	24.93	1.08	25	25
	2002	7.64	8.00	4.43	0.01	0.71	7.85	1.40	3.50	1.63	7.98	25.42	1.33	24	24
	2003	7.59	7.32	4.44	0.01	0.61	6.97	1.24	3.51	1.09	6.73	22.96	0.82	23	24
	2004	7.58	7.50	4.69	0.00	0.59	7.01	1.30	3.63	1.41	7.14	28.36	0.85	19	24
	2005	7.64	7.97	4.75	0.01	0.65	7.49	1.35	3.38	1.53	7.69	30.68	0.85	23	24
	2006	7.59	7.55	4.60	0.00	0.61	6.75	1.25	3.53	1.41	7.02	26.38	1.13	18	24
	2007	7.59	8.14	4.82	0.02	0.68	8.05	1.46	3.31	1.94	8.42	28.21	0.91	24	24
	2008	7.62	7.73	4.62	0.02	0.65	7.50	1.35	3.17	1.62	7.46	26.63	0.92	24	24
	2009	7.58	7.76	4.55	0.00	0.70	7.72	1.40	2.93	1.40	7.40	27.75	1.24	24	24
	2010	7.55	7.29	4.43	0.00	0.65	7.51	1.32	2.94	1.21	6.85	27.29	0.99	19	19
	2011	7.45	7.18	4.55	0.00	0.66	7.27	1.35	3.21	1.30	7.45	26.59	0.64	20	20
	2012	7.44	6.78	4.48	0.00	0.69	6.58	1.25	2.87	1.51	6.41	25.89	0.82	18	18
	2013	7.47	6.94	4.47	0.00	0.67	7.24	1.28	2.96	1.57	6.51	25.46	0.66	18	18
	2014	7.50	6.81	4.51	0.00	0.65	7.16	1.28	2.91	0.94	6.36	26.10	0.33	19	19
	2015	7.51	6.62	4.27	0.00	0.64	6.71	1.20	2.80	0.88	5.45	25.14	0.78	18	18
	Average	7.57	7.44	4.54	0.01	0.66	7.33	1.32	3.19	1.43	7.15	26.37	0.91		
	CV (%)	0.9	6.0	2.9	128.0	5.4	5.6	5.0	8.2	19.1	9.8	7.0	26.3		
N4	2000	7.88	11.85	5.23	0.00	0.83	15.04	1.92	3.64	1.44	13.59	42.55	1.44	19	19
	2001	7.87	11.87	5.07	0.01	0.69	15.12	1.90	3.55	1.08	13.57	43.25	1.52	24	24
	2002	7.85	12.97	5.29	0.01	0.90	15.68	2.11	4.40	1.53	15.15	43.48	1.60	24	24
	2003	7.82	11.67	5.14	0.01	0.74	14.01	1.87	4.11	0.80	12.76	40.78	0.86	23	24
	2004	7.84	11.95	5.47	0.00	0.76	14.27	1.97	4.11	0.97	13.31	50.42	1.40	24	24
	2005	7.90	13.07	5.66	0.00	0.80	15.71	2.13	3.96	1.55	14.95	54.57	1.39	23	24
	2006	7.85	11.73	5.35	0.00	0.77	13.33	1.88	4.10	1.43	12.62	45.00	1.72	19	24
	2007	7.88	13.42	5.79	0.03	0.82	16.41	2.21	4.06	1.85	16.44	49.63	1.43	22	24
	2008	7.83	12.31	5.30	0.03	0.79	15.03	1.98	3.65	1.25	14.27	45.23	1.58	23	24
	2009	7.85	12.18	5.28	0.00	0.86	15.10	1.97	3.32	0.96	14.30	45.79	1.76	24	24
	2010	7.72	11.34	5.20	0.00	0.85	14.18	1.88	3.46	0.88	12.72	44.09	1.40	19	19
	2011	7.76	12.20	5.55	0.00	0.83	15.49	2.10	3.84	1.01	14.96	47.63	1.04	19	19
	2012	7.65	10.47	4.99	0.00	0.72	12.93	1.80	3.12	1.10	13.15	42.89	1.20	18	18
	2013	7.64	11.23	5.18	0.00	0.81	14.58	1.89	3.42	1.18	13.55	43.28	1.20	18	18
	2014	7.68	11.14	5.29	0.00	0.77	14.73	1.93	3.34	0.62	12.14	45.80	0.91	19	19
	2015	7.72	9.99	4.64	0.00	0.76	12.39	1.63	3.35	0.52	9.14	40.17	1.58	18	18
	Average	7.80	11.90	5.29	0.01	0.79	14.69	1.96	3.73	1.15	13.63	45.44	1.39		
	CV (%)	1.1	7.4	4.9	149.6	6.4	7.1	6.9	9.8	30.6	11.7	8.0	18.8		
M	2000	8.29	8.61	3.23	0.00	0.49	12.28	1.14	2.11	0.91	5.37	38.98	1.01	19	19
	2001	8.09	8.73	3.26	0.02	0.40	12.08	1.18	2.25	0.74	5.71	39.16	0.91	24	24
	2002	8.04	9.69	3.38	0.02	0.40	13.16	1.26	2.42	0.45	6.37	42.35	0.58	24	24
	2003	8.02	8.79	3.36	0.01	0.37	11.76	1.16	2.43	0.43	5.35	38.88	0.50	22	24
	2004	8.06	9.49	3.49	0.00	0.36	12.86	1.24	2.73	0.39	5.65	49.59	0.51	14	24
	2005	8.02	9.75	3.42	0.00	0.37	13.15	1.24	2.75	0.55	5.64	49.50	0.52	18	24
	2006	8.08	8.96	3.33	0.00	0.36	11.72	1.15	2.39	0.50	5.21	43.54	0.59	16	24
	2007	8.18	9.95	3.61	0.06	0.41	13.81	1.32	2.34	0.51	6.80	47.60	0.65	19	24
	2008	8.12	9.40	3.56	0.04	0.40	12.80	1.28	2.22	0.51	6.46	42.99	0.74	23	24
	2009	8.13	9.50	3.52	0.00	0.45	13.10	1.31	2.12	0.46	6.42	43.48	0.99	24	24
	2010	7.89	8.69	3.42	0.00	0.42	11.70	1.22	2.11	0.49	5.73	39.86	0.58	19	19
	2011	7.76	8.80	3.43	0.01	0.42	12.53	1.25	2.36	0.37	5.81	42.22	0.23	19	19
	2012	7.70	8.01	3.15	0.00	0.37	11.02	1.11	1.89	0.50	4.99	39.39	0.46	18	18
	2013	7.79	8.37	3.25	0.00	0.42	11.97	1.15	1.92	0.58	5.19	39.81	0.48	19	19
	2014	7.91	8.34	3.28	0.00	0.41	12.29	1.18	1.92	0.37	4.96	41.19	0.27	19	19
	2015	7.86	7.88	3.12	0.00	0.40	10.94	1.09	1.77	0.51	4.49	37.42	0.30	18	18
	Average	8.00	8.95	3.37	0.01	0.41	12.35	1.21	2.23	0.52	5.68	42.07	0.60		
	CV (%)	2.0	6.9	4.1	156.6	8.4	6.3	5.7	12.3	25.7	10.8	8.7	39.0		

\*<sup>1</sup> N<sub>E</sub>: EANET (2010a) が推奨する R1 と R2 の許容範囲内にある渓流水のサンプル数。N<sub>E</sub>: Number of streamwater samples within the allowable ranges for R1, R2 (EANET 2010a) .

\*<sup>2</sup> N<sub>T</sub>: 年間の全サンプル数。N<sub>T</sub>: Total number of samples per year.

## Appendix 1a. 四万十川上流域の採水地点 R における降水分析データ

## Analytical rainwater data at sampling location R in the upper reaches of the Shimanto River

Date	Rainfall <sup>†</sup> mm	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup> mg L <sup>-1</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation $\mu$ eq L <sup>-1</sup>	Anion $\mu$ eq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC <sup>*</sup>
2000/1/6	32.6	7.23	8.22	0.74	14.72	5.66	0.92	0.57	1.42	1.22	9.92	4.06	n/a	n/a	1.09	0.46	11.78	40.7	17.8	R1,R2,P
2000/1/20	45.9	7.16	7.57	0.86	23.44	4.82	0.76	0.58	1.51	1.23	9.54	4.83	n/a	n/a	1.55	0.46	15.20	53.8	33.5	R1,R2,P
2000/2/7	62.1	6.99	6.06	0.64	10.87	2.55	0.69	0.51	0.90	1.10	6.25	3.37	n/a	n/a	0.77	0.31	8.20	42.6	15.0	R1,R2,P
2000/2/21	0.0	4.83	5.19	4.21	1.52	0.73	0.95	0.63	7.19	3.15	0.96	3.99	n/a	n/a	0.40	0.37	5.60	4.4	3.8	P
2000/3/3	7.0	6.32	12.53	3.49	19.95	7.25	2.66	0.74	4.89	7.70	17.54	14.06	n/a	n/a	1.64	1.11	20.81	19.3	24.8	R1,R2,P
2000/3/24	144.3	7.56	3.93	0.61	7.43	1.08	0.44	0.12	0.94	0.87	2.13	2.52	21.01	3.45	0.50	0.50	6.43	-0.6	24.1	R2,P
2000/4/17	110.2	9.37	7.19	1.82	25.02	3.50	2.02	0.55	2.72	1.52	7.16	7.28	76.58	0.73	1.70	1.73	21.76	-0.9	50.3	R2,P
2000/4/27	65.6	6.53	1.51	0.44	1.54	0.33	0.35	0.07	0.97	1.01	0.49	1.83	1.92	0.17	0.14	0.13	1.85	2.9	10.0	P
2000/5/15	26.0	7.00	5.01	1.70	3.53	0.98	2.35	0.40	3.00	2.68	1.06	5.36	7.81	1.56	0.44	0.40	5.60	5.2	5.5	P
2000/5/29	84.0	6.00	0.71	0.08	0.20	0.18	0.57	n.d.	0.47	0.86	0.12	1.41	n.d.	1.26	0.05	0.06	0.81	-10.9	6.5	R1,P
2000/6/12	158.7	5.49	0.47	0.03	0.16	0.11	0.19	n.d.	0.38	0.55	0.14	0.81	n.d.	1.04	0.03	0.04	0.58	-23.2	10.4	R1,P
2000/6/26	126.5	6.01	0.48	n.d.	0.31	0.14	0.12	n.d.	0.34	0.46	0.27	0.73	n.d.	1.25	0.03	0.04	0.55	-19.9	6.7	R1,P
2000/7/10	192.2	4.86	0.70	0.02	0.10	0.09	0.05	n.d.	0.63	0.65	n.d.	0.95	n.d.	0.95	0.02	0.05	0.92	-31.7	14.1	R1
2000/7/25	16.2	5.42	1.06	0.38	0.24	0.18	0.66	0.01	0.91	0.55	0.11	1.69	n.d.	1.87	0.07	0.07	1.12	-0.8	2.8	P
2000/8/7	(436.0)	5.42	0.97	0.95	0.01	0.12	0.10	0.07	1.71	0.40	n.d.	0.71	n.d.	0.00	0.06	0.07	0.96	-7.4	-0.4	
2000/8/22	24.4	4.42	2.13	0.31	0.20	0.38	0.45	n.d.	0.72	1.00	n.d.	3.08	n.d.	2.39	0.09	0.10	2.46	-3.0	7.2	
2000/9/4	43.7	5.02	1.13	0.75	0.09	0.11	0.24	0.05	1.47	0.66	n.d.	1.15	n.d.	1.65	0.07	0.08	1.23	-6.9	4.0	
2000/9/18	(497.0)	5.01	0.94	0.61	0.02	0.07	0.08	0.06	1.25	0.31	0.21	0.83	n.d.	0.00	0.05	0.06	1.05	-14.5	5.6	R1,P
2000/10/3	(349.0)	4.40	1.97	0.07	0.04	0.06	0.08	n.d.	0.53	0.52	n.d.	2.18	n.d.	1.38	0.05	0.07	1.99	-15.3	0.4	R1
2000/10/18	38.4	4.69	1.59	0.61	0.29	0.22	0.19	0.07	1.24	0.80	n.d.	1.88	n.d.	1.57	0.08	0.09	1.76	-1.9	5.1	
2000/11/6	(250.0)	5.85	0.70	0.29	0.38	0.22	0.07	0.02	0.73	0.50	0.25	0.91	n.d.	1.42	0.05	0.06	0.78	-9.3	5.2	R1,P
2000/11/21	44.6	7.08	2.69	0.55	2.77	0.78	0.33	0.09	1.19	1.23	1.30	1.86	5.72	2.79	0.22	0.23	3.04	-1.3	6.1	P
2000/12/5	24.1	4.86	1.73	0.22	1.51	0.83	0.24	0.05	0.75	1.24	1.18	1.75	n.d.	2.16	0.14	0.11	2.33	11.3	14.8	R1,P
2000/12/18	20.5	5.43	2.56	0.56	2.50	1.33	0.83	0.22	1.32	1.38	2.27	3.54	0.95	3.76	0.26	0.22	3.63	8.4	17.3	R1,P
2001/1/9	46.7	7.29	8.42	2.95	9.24	2.85	1.16	0.55	4.89	2.23	3.88	5.31	22.43	8.72	0.82	0.77	10.50	2.7	11.0	P
2001/1/23	51.4	4.59	2.28	0.92	0.28	0.04	0.59	0.12	1.68	1.35	n.d.	2.32	n.d.	1.37	0.12	0.12	2.34	1.5	1.4	
2001/2/6	95.3	6.64	2.07	0.55	1.61	0.59	1.18	0.17	0.91	1.22	0.93	2.06	4.90	3.63	0.20	0.20	2.63	0.8	11.9	P
2001/2/20	31.8	4.76	3.41	2.12	0.59	0.10	1.11	0.30	3.42	2.19	n.d.	3.98	n.d.	2.34	0.22	0.21	3.44	2.3	0.4	
2001/3/6	80.0	5.09	2.82	2.02	0.90	0.34	0.78	0.30	3.47	1.23	0.40	3.08	0.17	2.09	0.22	0.20	3.05	5.0	3.9	P
2001/3/21	39.3	6.51	2.47	1.20	0.23	0.21	1.99	0.27	2.03	2.15	n.d.	3.01	1.56	3.19	0.19	0.18	2.41	3.1	-1.2	
2001/4/10	42.8	5.52	1.86	0.50	0.31	0.25	1.33	0.19	0.99	1.91	n.d.	3.30	n.d.	2.66	0.13	0.13	1.85	1.0	-0.5	
2001/4/23	37.2	5.03	1.57	0.38	0.13	0.27	1.05	0.16	0.92	1.80	n.d.	2.49	n.d.	0.00	0.11	0.11	1.71	-0.6	4.5	
2001/5/8	193.1	6.12	0.94	0.37	0.44	0.21	0.18	0.08	0.85	0.75	0.20	1.12	n.d.	0.00	0.06	0.07	0.93	-3.1	-0.6	P
2001/5/22	24.4	5.72	0.94	0.18	0.60	0.74	0.38	0.07	0.62	0.69	0.66	1.02	1.06	2.41	0.09	0.09	1.29	-0.8	15.7	P
2001/6/5	69.2	5.01	0.68	0.05	n.d.	0.13	0.23	0.00	0.41	0.52	n.d.	1.08	n.d.	0.46	0.03	0.04	0.77	-22.3	6.7	R1
2001/6/20	160.1	5.35	0.57	0.10	0.08	0.21	0.17	0.04	0.47	0.44	n.d.	0.98	n.d.	1.15	0.03	0.04	0.63	-15.6	5.0	R1
2001/7/3	110.0	5.09	0.47	n.d.	n.d.	0.10	0.12	0.01	0.34	n.d.	n.d.	0.74	n.d.	0.50	0.02	0.02	0.54	-18.1	7.1	
2001/7/24	148.8	5.03	0.61	0.05	n.d.	0.14	0.22	n.d.	0.44	n.d.	n.d.	0.96	n.d.	1.62	0.03	0.03	0.68	-11.1	5.5	
2001/8/7	26.1	4.88	1.36	0.63	n.d.	0.28	0.43	0.07	1.06	1.05	n.d.	1.49	n.d.	4.04	0.08	0.08	1.40	-1.8	1.6	
2001/8/21	130.8	5.08	0.57	0.14	n.d.	0.15	0.18	0.01	0.53	0.43	n.d.	0.76	n.d.	1.23	0.03	0.04	0.69	-15.1	9.5	R1
2001/9/4	66.4	4.70	1.25	0.08	0.09	0.04	0.49	0.02	0.56	1.22	n.d.	1.17	n.d.	1.78	0.06	0.06	1.36	-3.8	4.5	
2001/9/26	(432.5)	5.64	0.20	0.01	n.d.	0.01	0.11	n.d.	0.36	n.d.	n.d.	0.35	n.d.	1.14	0.01	0.02	0.25	-33.5	11.1	R1
2001/10/10	83.9	4.96	0.75	0.08	0.11	0.17	0.20	0.00	0.44	0.39	n.d.	0.93	n.d.	1.88	0.03	0.04	0.83	-4.2	4.9	
2001/10/24	146.2	6.45	1.94	0.32	2.76	0.35	0.01	n.d.	0.42	0.12	0.46	0.79	4.93	2.31	0.18	0.13	2.01	17.1	1.8	R1,P
2001/11/7	105.8	4.73	1.22	0.35	0.11	0.06	0.22	0.04	0.60	0.39	n.d.	1.21	n.d.	1.41	0.06	0.05	1.24	6.9	0.6	
2001/11/21	1.4	6.65	5.51	1.34	4.68	4.05	2.17	0.53	1.73	4.51	3.66	7.15	6.97	11.63	0.57	0.50	7.50	6.8	15.3	R2,P
2001/12/4	31.8	4.40	2.31	0.55	0.56	0.08	0.37	0.07	1.01	0.75	n.d.	2.44	n.d.	2.54	0.12	0.09	2.59	13.8	5.8	R1
2001/12/20	41.0	4.66	2.05	1.09	0.33	0.06	0.34	0.12	1.88	1.15	n.d.	1.44	n.d.	1.78	0.12	0.10	2.07	6.5	0.6	
2002/1/8	25.3	4.07	10.34	6.33	1.90	0.52	1.62	0.85	11.25	6.77	n.d.	8.10	n.d.	4.88	0.63	0.60	10.61	2.8	1.3	
2002/1/22	40.4	4.50	3.35	1.49	0.95	0.13	0.72	0.19	2.64	1.42	n.d.	2.85	n.d.	1.52	0.20	0.16	3.34	13.1	-0.1	R1
2002/2/7	45.2	4.59	2.35	0.88	0.43	0.06	0.44	0.11	1.50	1.63	n.d.	1.43	n.d.	2.36	0.12	0.10	2.20	9.8	-3.4	R1
2002/2/19	18.2	4.60	4.55	2.32	1.37	0.19	1.44	0.33	4.02	3.08	n.d.	4.68	n.d.	2.30	0.31	0.26	4.54	7.9	-0.1	
2002/3/5	45.8	4.40	2.71	0.12	0.51	0.11	0.34	0.03	0.26	0.97	n.d.	2.40	n.d.	2.94	0.10	0.07	2.32	13.7	-7.7	R1
2002/3/19	46.1	4.52	3.00	1.25	0.76	0.13	0.46	0.15	2.06	1.17	n.d.	3.05	n.d.	0.79	0.17	0.14	2.95	8.1	-0.9	R1
2002/4/9	144.4	5.66	0.93	0.37	0.41	0.06	0.38	0.05	0.64	0.63	n.d.	1.00	n.d.	0.74	0.07	0.05	0.85	14.7	-4.7	R1
2002/4/23	78.8	5.18	1.58	0.75	0.56	0.08	0.48	0.10	1.38	1.10	n.d.	1.55	n.d.	0.17	0.10	0.09	1.51	8.0	-2.5	R1
2002/5/8	104.7	4.56	2.39	0.70	0.46	0.09	0.15	0.08	1.32	0.94	n.d.	2.24	n.d.	1.53	0.10	0.10	2.16	0.3	-5.1	
2002/5/28	120.4	6.20	0.38	0.06	0.31	0.05	0.14	0.01	0.11	0.31	n.d.	0.46	n.d.	1.18	0.03	0.02	0.35	24.9	-3.9	
2002/6/11	39.3	4.90	1.41	0.18	0.84	0.10	0.45	0.03	0.36	0.79	n.d.	2.14	n.d.	2.52	0.09	0.07	1.51	16.6	3.3	R1
2002/6/25	90.1	4.99	0.71	0.04	0.08	0.05	0.19	0.01	0.09	0.40	n.d.	0.59	n.d.	1.43	0.03	0.02	0.63	13.5	-5.9	
2002/7/9	214.2	6.69	2.63	0.32	3.85	1.05	0.04	0.01	0.62	0.20	0.52	0.83	6.87	2.83	0.26	0.17	2.81	21.3	3.3	R1,P
2002/7/23	165.6	4.85	1.26	0.70	0.16	0.05	0.34	0.08	1.28	0.37	n.d.	1.05	n.d.	1.01	0.08	0.06	1.34	9.9	3.4	R1
2002/8/6	190.5	5.46	1.13	1.24	n.d.	0.05	0.19	0.12	2.28	n.d.	n.d.	0.56	n.d.	1.25	0.08	0				



## Appendix 1b. 四万十川上流域の採水地点 R における降水分析データ

## Analytical rainwater data at sampling location R in the upper reaches of the Shimanto River

Date	Rainfall <sup>†</sup> mm	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup> mg L <sup>-1</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μ eq L <sup>-1</sup>	Anion μ eq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC <sup>*</sup>
2003/1/21	6.5	3.88	10.30	2.59	2.24	0.46	1.61	0.36	3.81	8.50	n.d.	9.43	n.d.	6.04	0.49	0.44	10.15	5.2	-0.8	
2003/2/4	73.8	4.77	1.60	0.93	0.07	0.06	0.17	0.08	1.52	0.39	n.d.	1.10	n.d.	1.30	0.08	0.07	1.47	3.8	-4.1	
2003/2/18	38.0	4.53	1.94	0.33	0.22	0.09	0.19	0.03	0.51	1.13	n.d.	1.30	n.d.	2.17	0.07	0.06	1.73	8.0	-5.7	R1
2003/3/4	85.5	4.44	2.29	0.39	0.28	0.09	0.15	0.04	0.72	0.73	n.d.	1.94	n.d.	1.89	0.08	0.07	2.10	5.9	-4.3	
2003/3/18	89.4	4.70	1.17	0.11	0.06	0.05	0.10	0.01	0.17	0.43	n.d.	0.71	n.d.	1.92	0.03	0.03	0.99	13.8	-8.4	
2003/4/7	98.0	4.72	1.34	0.18	0.39	0.09	0.17	0.03	0.32	0.68	n.d.	1.42	n.d.	1.75	0.06	0.05	1.32	10.8	-0.6	R1
2003/4/21	84.2	5.01	1.09	0.42	0.12	0.08	0.19	0.04	0.69	0.47	n.d.	1.16	n.d.	1.79	0.05	0.05	0.96	-1.7	-6.2	
2003/5/8	101.3	4.64	1.49	0.32	0.06	0.06	0.15	0.03	0.55	0.55	n.d.	1.34	n.d.	1.40	0.05	0.05	1.36	-0.8	-4.5	
2003/5/22	(245.8)	5.09	0.62	0.17	0.01	0.02	0.04	0.01	0.27	0.17	n.d.	0.41	n.d.	0.00	0.02	0.02	0.49	1.2	-11.9	
2003/6/4	243.2	5.25	0.77	0.57	n.d.	0.03	0.04	0.03	0.91	0.16	n.d.	0.39	n.d.	0.00	0.04	0.04	0.63	-1.1	-9.9	
2003/6/19	205.8	4.65	1.55	0.53	0.14	0.06	0.10	0.04	0.87	0.46	n.d.	1.19	n.d.	1.31	0.06	0.06	1.45	5.1	-3.4	
2003/7/3	167.6	4.85	1.08	0.13	0.33	0.14	0.06	0.01	0.26	0.35	n.d.	1.10	n.d.	1.80	0.05	0.04	0.98	11.7	-4.7	
2003/7/17	93.7	5.91	0.75	0.08	0.65	0.45	0.02	n.d.	0.17	0.31	n.d.	1.01	n.d.	2.28	0.05	0.03	0.66	26.7	-6.8	R1
2003/8/1	94.6	4.49	1.77	0.14	0.19	0.03	0.12	n.d.	0.28	0.41	n.d.	1.60	n.d.	0.98	0.06	0.05	1.65	7.4	-3.7	
2003/8/14	(254.4)	5.14	1.01	0.90	0.09	0.06	0.03	0.04	1.48	0.18	n.d.	0.47	n.d.	0.00	0.06	0.05	0.94	2.9	-3.5	
2003/9/4	81.4	5.21	0.33	0.04	n.d.	0.01	0.03	n.d.	0.07	0.09	n.d.	0.13	n.d.	2.39	0.01	0.01	0.28	22.1	-7.8	
2003/9/18	179.4	5.60	0.34	0.15	0.01	0.01	0.02	n.d.	0.24	0.08	n.d.	0.11	n.d.	0.00	0.01	0.01	0.21	2.2	-23.1	R2
2003/10/8	49.6	4.99	0.92	0.21	0.22	0.24	0.11	n.d.	0.40	0.26	n.d.	1.09	n.d.	2.44	0.04	0.04	0.87	6.1	-3.0	
2003/10/22	155.5	5.38	0.75	0.44	0.44	0.08	0.03	n.d.	0.72	0.21	n.d.	0.58	n.d.	2.05	0.05	0.04	0.72	17.8	-2.3	R1
2003/11/12	109.5	6.07	0.82	0.20	1.03	0.13	0.01	n.d.	0.29	0.42	n.d.	0.73	n.d.	2.39	0.07	0.03	0.75	40.1	-4.4	R1
2003/11/26	24.0	4.63	1.64	0.70	0.20	0.05	0.16	0.05	1.11	1.07	n.d.	0.84	n.d.	3.59	0.08	0.07	1.63	8.4	-0.4	R1
2003/12/10	174.8	4.67	1.61	0.83	0.10	0.04	0.09	0.05	1.42	0.36	n.d.	0.95	n.d.	1.72	0.07	0.07	1.53	5.0	-2.7	
2003/12/24	28.7	4.43	4.47	3.26	0.66	0.28	0.57	0.35	5.16	2.14	n.d.	2.85	n.d.	1.77	0.28	0.24	4.48	7.8	0.1	
2004/1/7	5.9	4.35	0.97	7.40	1.63	0.53	2.35	0.94	12.53	7.14	n.d.	6.73	n.d.	3.60	0.66	0.61	9.68	4.4	81.9	R2
2004/1/21	26.3	4.49	4.87	4.27	0.40	0.30	0.86	0.47	7.29	1.40	n.d.	2.55	n.d.	1.43	0.33	0.28	4.89	7.8	0.2	
2004/2/5	12.7	4.09	7.40	3.79	1.12	0.42	1.08	0.46	6.15	4.77	n.d.	4.25	n.d.	3.50	0.41	0.34	7.28	9.5	-0.8	R1
2004/2/20	0.7	4.10	19.09	15.26	3.60	1.47	5.29	2.10	26.55	13.72	n.d.	17.31	n.d.	0.00	1.42	1.33	20.50	3.1	3.6	
2004/3/4	72.6	4.66	2.48	0.73	0.90	0.19	0.79	0.11	1.11	1.14	n.d.	3.12	n.d.	1.59	0.16	0.11	2.50	15.6	0.3	R1
2004/3/24	62.6	4.80	2.32	1.34	0.40	0.15	0.92	0.18	2.24	1.35	n.d.	2.32	n.d.	1.86	0.16	0.13	2.41	9.3	1.9	R1
2004/4/6	88.3	5.28	0.89	0.42	0.13	0.10	0.34	0.04	0.68	0.43	n.d.	0.83	0.22	1.00	0.05	0.05	0.82	6.4	-4.3	
2004/4/21	92.7	5.36	0.81	0.25	0.41	0.22	0.14	0.01	0.40	0.36	n.d.	0.78	0.24	1.01	0.05	0.04	0.74	16.5	-4.7	R1
2004/5/14	(243.6)	5.09	0.52	0.14	0.04	0.10	0.13	0.01	0.25	0.20	n.d.	0.46	0.11	0.57	0.03	0.02	0.55	10.6	2.7	
2004/5/31	151.2	6.06	0.73	0.12	0.72	0.38	0.04	0.00	0.21	0.22	0.27	0.60	1.29	1.17	0.06	0.05	0.78	5.7	3.0	P
2004/6/11	71.3	4.98	0.58	0.10	0.01	0.04	0.21	0.02	0.19	0.26	n.d.	0.41	n.d.	1.11	0.03	0.02	0.61	21.2	2.6	
2004/6/28	(247.8)	5.10	0.75	0.43	0.05	0.08	0.17	0.03	0.73	0.18	n.d.	0.44	0.19	0.50	0.04	0.04	0.73	8.0	-0.9	
2004/7/12	99.3	4.70	1.38	0.72	0.13	0.05	0.31	0.05	1.17	0.44	n.d.	0.97	n.d.	1.29	0.08	0.06	1.49	13.7	3.8	R1
2004/7/26	7.6	4.22	4.51	0.32	1.72	0.30	1.14	0.08	0.51	3.21	n.d.	5.79	n.d.	4.80	0.24	0.19	4.74	12.7	2.5	R1
2004/8/9	(249.5)	5.07	0.59	0.10	0.05	0.10	0.11	0.01	0.19	0.24	n.d.	0.38	0.13	1.01	0.02	0.02	0.54	11.5	-5.0	
2004/8/27	(244.2)	5.50	0.87	0.83	0.09	0.18	0.11	0.03	1.33	0.13	n.d.	0.33	0.19	0.92	0.06	0.05	0.78	6.4	-5.8	
2004/9/13	(245.7)	5.10	1.37	1.47	0.01	0.09	0.17	0.08	2.43	0.07	n.d.	0.49	0.14	1.02	0.09	0.08	1.33	4.2	-1.7	
2004/9/27	87.5	4.76	1.06	0.29	0.04	0.11	0.27	0.02	0.45	0.41	n.d.	0.59	n.d.	1.53	0.05	0.03	1.03	22.9	-1.0	R1
2004/10/12	238.6	5.21	0.63	0.44	0.02	0.06	0.13	0.02	0.75	0.11	n.d.	0.23	0.07	1.10	0.04	0.03	0.59	10.4	-3.1	
2004/10/25	242.4	5.50	0.31	0.21	n.d.	0.03	0.45	0.03	0.35	0.07	n.d.	0.13	n.d.	1.72	0.04	0.01	0.41	46.2	13.2	R1
2004/11/8	78.7	5.48	0.59	0.22	0.46	0.07	0.12	0.01	0.38	0.33	n.d.	0.47	0.48	0.58	0.05	0.03	0.64	17.0	3.9	R1
2004/11/22	149.3	4.85	1.23	0.77	0.08	0.06	0.25	0.06	1.25	0.22	n.d.	0.60	n.d.	0.81	0.07	0.05	1.20	16.2	-1.1	R1
2004/12/6	127.5	5.37	0.38	0.19	0.07	0.03	0.12	0.02	0.31	0.10	n.d.	0.16	0.26	0.77	0.02	0.02	0.39	15.2	0.7	
2004/12/21	7.7	4.26	3.94	0.99	0.70	0.19	0.76	0.14	1.71	2.08	n.d.	2.91	n.d.	3.18	0.19	0.14	3.83	14.6	-1.5	R1
2005/1/7	44.0	4.47	2.86	1.06	0.51	0.11	0.67	0.11	1.78	1.33	n.d.	1.53	n.d.	0.72	0.15	0.10	2.67	19.4	-3.4	R1
2005/1/21	13.3	3.88	11.33	5.00	1.80	0.45	1.34	0.61	8.15	8.18	n.d.	7.34	n.d.	2.08	0.58	0.51	11.07	5.8	-1.2	
2005/2/7	52.7	4.44	4.19	2.53	0.80	0.22	0.55	0.26	4.60	1.31	n.d.	2.09	n.d.	0.66	0.24	0.19	3.94	11.4	-3.0	R1
2005/2/18	48.6	6.01	0.99	0.15	1.77	0.34	0.30	0.02	0.21	0.45	0.53	0.77	2.32	1.50	0.13	0.08	1.50	22.0	20.8	R1,R2,P
2005/3/7	79.1	4.74	1.28	0.24	0.21	0.04	0.42	0.04	0.31	0.60	n.d.	1.02	n.d.	1.42	0.06	0.04	1.22	24.3	-2.3	R1
2005/3/23	131.6	4.62	1.28	0.37	0.35	0.13	0.44	0.05	0.65	0.60	n.d.	1.35	n.d.	2.20	0.09	0.06	1.67	22.5	13.2	R1
2005/4/6	49.8	4.60	2.45	0.79	0.75	0.18	0.73	0.11	1.31	1.26	n.d.	2.30	n.d.	2.80	0.15	0.11	2.46	17.9	0.2	R1
2005/4/26	67.4	4.82	1.34	0.49	0.17	0.15	0.50	0.06	0.78	0.44	n.d.	1.14	n.d.	2.28	0.08	0.05	1.32	20.5	-1.0	R1
2005/5/10	135.0	5.50	0.56	0.08	0.43	0.10	0.11	0.01	0.12	0.16	n.d.	0.55	0.36	1.44	0.04	0.02	0.52	25.1	-4.3	R1
2005/5/24	28.3	4.40	2.63	0.54	0.58	0.15	0.73	0.08	0.96	1.05	n.d.	2.33	n.d.	1.59	0.14	0.09	2.73	21.0	1.9	R1
2005/6/6	24.2	6.10	0.61	0.15	0.52	0.33	0.20	0.02	0.19	0.25	n.d.	0.66	1.30	2.64	0.06	0.04	0.68	11.7	5.8	R1
2005/6/21	39.8	4.43	2.34	0.50	0.36	0.09	0.57	0.06	0.75	0.56	n.d.	2.27	n.d.	1.76	0.11	0.08	2.36	19.3	0.5	R1
2005/7/5	123.1	6.60	2.37	0.16	3.00	1.15	0.11	0.01	0.28	0.79	0.23	2.71	5.40	4.48	0.21	0.17	2.58	9.5	4.3	R1,P
2005/7/19	151.2	4.99	0.80	0.05	0.18	0.26	0.20	0.01	0.09	0.17	n.d.	0.74	n.d.	1.11	0.04	0.02	0.72	32.1	-5.7	R1
2005/8/9	45.8	5.00	1.49	0.14	0.95	0.52	0.40	0.03	0.22	0.72	n.d.	2.10	0.13	2.96	0.10	0.06	1.48	24.5	-0.1	R1
2005/8/22	63.8	4.97	0.81	0.11	0.12	0.06	0.25	0.01	0.19	0.22	n.d.	0.48	n.d.	1.76	0.04	0.02	0.68	32.9	-8.5	R1
2																				

## Appendix 1c. 四万十川上流域の採水地点 R における降水分析データ

## Analytical rainwater data at sampling location R in the upper reaches of the Shimanto River

Date	Rainfall <sup>†</sup> mm	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup> mg L <sup>-1</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μ eq L <sup>-1</sup>	Anion μ eq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC <sup>*</sup>
2006/1/25	53.8	4.96	0.99	0.31	0.09	0.06	0.26	0.03	0.54	0.20	n.d.	0.64	n.d.	1.44	0.05	0.03	0.83	18.6	-8.3	R1
2006/2/8	47.5	4.59	1.84	0.44	0.25	0.27	0.13	0.03	0.65	0.54	n.d.	1.35	n.d.	1.42	0.07	0.06	1.62	14.4	-6.3	R1
2006/2/22	56.1	4.49	2.27	0.52	0.39	0.20	0.56	0.06	0.71	0.83	n.d.	1.97	n.d.	1.80	0.11	0.07	2.20	21.1	-1.6	R1
2006/3/8	108.5	4.84	1.41	0.79	0.08	0.16	0.36	0.06	1.34	0.40	n.d.	0.79	n.d.	1.62	0.08	0.06	1.34	14.0	-2.8	R1
2006/3/22	65.0	5.72	3.38	0.90	1.37	0.33	2.44	0.21	1.40	3.72	n.d.	5.80	0.48	5.24	0.26	0.23	3.43	7.3	0.7	
2006/4/12	(327.0)	5.15	1.33	0.42	0.47	0.12	0.61	0.07	0.66	0.76	n.d.	1.71	0.18	1.09	0.09	0.07	1.29	13.2	-1.5	R1
2006/4/25	98.5	5.04	0.66	0.03	0.05	0.08	0.27	0.02	0.09	0.27	n.d.	0.49	0.11	0.91	0.03	0.02	0.59	22.4	-5.6	
2006/5/11	290.4	5.66	0.48	0.35	0.04	0.16	0.21	0.02	0.35	0.16	n.d.	0.42	0.24	1.68	0.04	0.03	0.45	17.9	-2.4	R1
2006/5/24	166.4	4.90	0.84	0.23	0.03	0.16	0.27	0.03	0.34	0.29	n.d.	0.61	n.d.	1.06	0.04	0.03	0.83	24.1	-0.2	R1
2006/6/13	96.9	4.28	3.24	0.78	0.29	0.40	0.73	0.12	1.37	1.17	n.d.	3.04	n.d.	3.14	0.16	0.12	3.39	13.5	2.2	R1
2006/6/27	(396.0)	5.36	3.82	0.05	0.02	0.13	0.13	0.01	0.09	0.10	n.d.	0.28	0.17	0.86	0.02	0.01	0.33	17.0	-84.2	R2
2006/7/13	188.1	5.04	0.77	0.17	0.27	0.07	0.24	0.02	0.31	0.27	n.d.	0.71	0.07	1.02	0.05	0.03	0.78	23.3	0.5	R1
2006/7/25	224.5	6.23	0.61	0.09	0.52	0.23	0.00	n.d.	0.09	0.16	n.d.	0.54	0.92	0.75	0.04	0.03	0.49	10.8	-11.1	
2006/8/9	8.8	4.59	1.43	0.33	0.13	0.17	0.69	0.04	0.43	0.97	n.d.	0.83	n.d.	4.65	0.09	0.05	1.61	32.5	6.2	R1
2006/8/23	(522.5)	5.70	0.99	0.66	0.54	0.19	0.12	0.02	1.17	0.21	n.d.	0.59	0.85	1.24	0.07	0.06	0.95	8.2	-1.7	R1
2006/9/5	84.6	4.45	1.98	0.09	0.50	0.06	0.51	0.02	0.17	0.79	n.d.	1.83	n.d.	1.81	0.10	0.06	2.05	26.3	1.9	R1
2006/9/20	(396.0)	4.95	1.04	0.67	0.03	0.06	0.28	0.04	1.18	0.16	n.d.	0.51	n.d.	0.81	0.06	0.05	1.02	13.5	-0.8	R1
2006/10/4	15.6	4.43	2.66	0.51	1.05	0.23	0.76	0.07	0.67	1.94	n.d.	2.69	n.d.	2.76	0.17	0.11	2.95	22.3	5.1	R1
2006/10/19	12.5	5.10	0.75	0.13	0.26	0.15	0.28	0.01	0.30	0.51	n.d.	0.35	0.19	2.73	0.05	0.03	0.72	26.9	-1.7	R1
2006/11/7	8.1	7.21	4.24	1.18	4.32	0.82	0.15	0.02	2.02	1.05	0.54	3.01	11.69	6.10	0.32	0.35	4.30	-3.5	0.7	P
2006/11/21	38.6	5.07	1.10	0.36	0.59	0.21	0.25	0.02	0.58	0.61	n.d.	0.87	0.19	1.36	0.08	0.05	1.09	23.2	-0.5	R1
2006/12/8	89.5	4.80	1.11	0.36	0.15	0.15	0.38	0.03	0.61	0.49	n.d.	0.73	n.d.	1.17	0.07	0.04	1.16	23.6	2.0	R1
2006/12/21	32.7	4.23	3.59	0.52	0.55	0.19	1.15	0.08	0.83	1.36	n.d.	2.82	n.d.	3.96	0.18	0.10	3.60	26.7	0.1	R1
2007/1/10	31.6	4.24	7.84	5.53	1.21	0.51	1.50	0.65	10.12	2.47	n.d.	6.32	n.d.	2.10	0.51	0.46	8.04	5.1	1.2	
2007/1/23	11.5	4.93	1.42	0.29	0.62	0.08	0.70	0.05	0.31	0.95	n.d.	1.71	n.d.	2.37	0.10	0.06	1.43	25.0	0.4	R1
2007/2/7	2.7	3.86	13.90	4.90	2.82	0.81	3.07	0.79	7.14	16.83	n.d.	11.91	n.d.	4.53	0.74	0.72	13.88	1.7	-0.1	
2007/2/21	74.1	4.43	2.47	0.66	0.81	0.10	0.26	0.08	0.98	1.14	n.d.	2.38	n.d.	1.53	0.13	0.10	2.63	16.2	3.2	R1
2007/3/12	72.9	4.89	1.11	0.45	0.26	0.06	0.21	0.05	0.60	0.46	n.d.	0.73	n.d.	1.76	0.06	0.04	1.05	22.6	-2.9	R1
2007/3/28	107.4	4.77	1.38	0.21	0.66	0.07	0.31	0.03	0.31	0.55	n.d.	1.29	n.d.	1.21	0.08	0.04	1.37	29.8	-0.3	R1
2007/4/10	12.6	5.16	4.92	2.32	1.77	0.40	2.76	0.49	3.69	4.13	n.d.	7.70	0.25	2.54	0.39	0.34	5.15	8.1	2.3	R1
2007/4/24	52.7	5.81	1.56	0.62	0.74	0.14	0.78	0.12	0.82	0.81	n.d.	2.34	0.78	1.65	0.12	0.10	1.52	11.0	-1.3	R1
2007/5/9	97.0	5.51	0.63	0.11	0.44	0.04	0.14	0.02	0.14	0.32	n.d.	0.69	0.38	1.12	0.04	0.03	0.58	16.7	-4.1	R1
2007/5/23	38.7	6.02	1.45	0.27	0.98	0.75	0.47	0.05	0.46	0.64	0.27	1.99	1.63	2.50	0.11	0.10	1.50	6.6	1.6	P
2007/6/13	87.5	4.92	0.99	0.35	0.12	0.04	0.29	0.04	0.53	0.20	n.d.	0.83	n.d.	1.25	0.05	0.04	0.93	18.9	-2.9	R1
2007/6/26	89.7	5.05	0.90	0.22	0.68	0.10	0.16	0.01	0.35	0.54	n.d.	0.81	0.15	1.56	0.07	0.04	0.99	27.9	4.5	R1
2007/7/10	(338.0)	5.15	0.53	0.05	0.27	0.03	0.16	0.01	0.09	0.16	n.d.	0.42	0.30	1.47	0.03	0.02	0.55	28.6	2.5	R1
2007/7/18	(524.0)	5.58	1.80	0.06	0.10	0.01	0.04	n.d.	0.11	0.03	n.d.	0.03	0.36	1.03	0.01	0.01	0.22	12.7	-78.3	R2
2007/7/26	22.9	4.45	2.21	0.12	0.87	0.16	0.29	0.02	0.24	0.72	n.d.	2.43	n.d.	2.38	0.11	0.07	2.28	22.6	1.6	R1
2007/8/9	225.8	5.20	1.47	1.49	0.21	0.07	0.20	0.13	2.73	0.02	n.d.	0.59	0.34	0.90	0.11	0.10	1.47	5.2	0.1	
2007/8/29	23.2	5.31	1.03	0.54	0.57	0.33	0.25	0.05	0.82	0.50	n.d.	0.72	0.44	2.69	0.08	0.05	1.06	22.8	1.8	R1
2007/9/12	37.2	6.44	1.31	0.32	1.82	0.14	0.11	0.01	0.49	0.75	n.d.	1.61	3.76	4.42	0.12	0.12	1.62	1.5	10.7	
2007/9/26	(402.0)	5.46	0.53	0.51	0.11	0.03	0.14	0.03	0.81	n.d.	n.d.	0.16	0.64	1.44	0.04	0.04	0.58	6.2	4.6	
2007/10/11	97.1	4.96	0.99	0.32	0.45	0.07	0.33	0.03	0.40	0.67	n.d.	0.77	n.d.	2.10	0.07	0.04	1.05	29.8	2.9	R1
2007/10/25	5.7	4.74	2.46	0.85	1.05	0.26	0.73	0.11	0.99	1.64	n.d.	3.12	n.d.	3.94	0.17	0.12	2.48	16.2	0.4	R1
2007/11/13	30.2	6.36	0.87	0.33	0.91	0.19	0.11	0.02	0.51	0.39	n.d.	0.52	4.20	2.36	0.08	0.10	1.08	-13.1	11.1	R1
2007/11/27	0.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007/12/10	9.6	4.48	3.43	1.23	0.89	0.21	1.00	0.15	1.63	1.90	n.d.	4.10	n.d.	2.12	0.20	0.16	3.43	11.3	0.1	R1
2007/12/25	36.9	4.50	2.35	0.79	0.60	0.08	0.49	0.09	0.83	1.58	n.d.	2.16	n.d.	2.05	0.13	0.09	2.44	17.1	1.8	R1
2008/1/8	83.1	4.59	3.49	2.65	0.64	0.11	0.59	0.31	4.52	0.92	n.d.	2.65	n.d.	2.26	0.23	0.20	3.58	8.4	1.3	R1
2008/1/22	82.4	4.58	1.20	0.14	0.58	0.09	0.38	0.03	0.23	0.54	n.d.	1.53	n.d.	1.60	0.09	0.05	1.69	30.3	16.9	R1
2008/2/6	69.6	4.59	1.77	0.45	0.38	0.04	0.29	0.04	0.59	1.01	n.d.	0.99	n.d.	0.82	0.09	0.05	1.67	23.1	-2.9	R1
2008/2/19	6.2	4.70	5.20	2.70	1.47	1.38	2.28	0.37	4.25	6.59	n.d.	5.13	n.d.	2.99	0.40	0.33	5.50	8.9	2.8	R1
2008/3/5	46.2	5.50	3.26	1.78	1.26	0.22	2.07	0.29	2.03	3.09	n.d.	4.97	0.49	1.44	0.28	0.22	3.45	13.0	2.9	R1
2008/3/18	27.8	4.34	3.72	1.45	0.87	0.16	0.63	0.18	2.54	1.08	n.d.	3.72	n.d.	2.52	0.21	0.17	3.84	10.8	1.6	R1
2008/4/4	140.3	4.70	1.51	0.46	0.38	0.04	0.38	0.06	0.74	0.62	n.d.	1.17	n.d.	1.24	0.09	0.06	1.52	21.4	0.3	R1
2008/4/9	25.3	5.21	0.86	0.22	0.45	0.04	0.18	0.03	0.33	0.45	n.d.	0.75	0.24	1.13	0.05	0.04	0.78	18.5	-4.5	R1
2008/4/21	72.4	4.71	1.25	0.27	0.50	0.07	0.31	0.04	0.42	0.54	n.d.	1.16	n.d.	1.13	0.08	0.04	1.41	27.7	5.7	R1
2008/5/8	50.7	4.88	0.84	0.20	0.17	0.06	0.33	0.02	0.31	0.33	n.d.	0.68	n.d.	1.84	0.05	0.03	0.91	28.9	3.7	R1
2008/5/22	77.4	4.89	1.34	0.48	0.55	0.10	0.39	0.06	0.70	0.54	n.d.	1.32	n.d.	1.57	0.09	0.06	1.37	23.7	1.1	R1
2008/6/5	264.5	5.00	0.53	0.09	0.15	0.05	0.11	0.01	0.15	0.20	n.d.	0.29	0.15	1.14	0.03	0.02	0.58	29.6	5.2	
2008/6/19	93.0	5.08	0.72	0.05	0.43	0.06	0.20	n.d.	0.08	0.31	n.d.	0.87	0.13	1.13	0.05	0.03	0.75	24.5	2.1	R1
2008/7/7	193.7	4.78	0.96	0.08	0.24	0.04	0.22	0.01	0.15	0.32	n.d.	0.76	n.d.	1.62	0.05	0.03	0.97	29.2	0.1	R1
2008/7/23	62.3	5.18	0.57	0.14	0.14	0.13	0.12	0.01	0.22	0.18	n.d.	0.38	0.15	2.77	0.03	0.02	0.52</			

## Appendix 1d. 四万十川上流域の採水地点 R における降水分析データ

## Analytical rainwater data at sampling location R in the upper reaches of the Shimanto River

Date	Rainfall <sup>†</sup> mm	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μ eq L <sup>-1</sup>	Anion μ eq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC <sup>*</sup>
2009/1/9	6.3	4.11	10.91	7.74	2.10	0.50	1.41	0.99	11.84	8.49	n.d.	7.61	n.d.	3.95	0.70	0.63	10.98	5.0	0.3	
2009/1/27	64.8	4.15	5.32	1.67	1.15	0.15	0.55	0.20	2.91	2.27	n.d.	3.73	n.d.	2.53	0.25	0.20	5.08	12.9	-2.3	R1
2009/2/9	49.2	5.54	1.28	0.44	1.68	0.34	0.12	0.04	0.70	0.47	0.53	1.10	6.10	1.63	0.13	0.17	1.98	-11.2	21.7	R1,R2,P
2009/2/23	112.7	4.73	1.76	0.87	0.55	0.07	0.34	0.10	1.42	0.46	n.d.	1.44	n.d.	1.78	0.11	0.08	1.82	19.2	1.7	R1
2009/3/9	81.5	4.76	1.04	0.15	0.45	0.06	0.19	0.02	0.26	0.47	n.d.	0.77	n.d.	2.21	0.06	0.03	1.14	33.1	4.2	R1
2009/3/23	124.6	5.23	1.12	0.58	0.57	0.08	0.37	0.07	0.88	0.45	n.d.	1.03	1.22	1.25	0.09	0.07	1.22	9.3	4.2	R1
2009/4/13	15.8	4.30	3.66	0.88	0.77	0.17	0.60	0.15	1.41	1.45	n.d.	3.49	n.d.	4.37	0.18	0.14	3.57	13.1	-1.2	R1
2009/4/27	70.1	5.35	0.83	0.39	0.49	0.12	0.18	0.04	0.58	0.39	n.d.	0.69	1.32	1.85	0.06	0.06	0.92	4.5	5.0	
2009/5/11	39.8	5.00	1.01	0.18	0.59	0.05	0.35	0.04	0.30	0.57	n.d.	1.17	0.92	1.63	0.07	0.06	1.15	11.7	6.4	R1
2009/5/25	25.7	4.83	1.62	0.54	0.84	0.08	0.29	0.06	0.85	0.85	n.d.	1.85	n.d.	1.48	0.11	0.08	1.69	16.6	2.2	R1
2009/6/8	71.8	5.00	1.21	0.28	0.83	0.10	0.26	0.04	0.47	0.84	n.d.	1.07	0.81	2.02	0.09	0.06	1.30	16.5	3.5	R1
2009/6/24	141.1	4.80	0.93	0.10	0.38	0.04	0.19	0.01	0.17	0.32	n.d.	0.72	n.d.	1.53	0.05	0.03	0.99	35.4	3.2	R1
2009/7/8	164.4	5.04	0.66	0.09	0.32	0.04	0.15	0.01	0.15	0.21	n.d.	0.44	0.71	0.68	0.04	0.03	0.70	17.1	3.5	R1
2009/7/22	88.2	5.86	0.57	0.08	0.70	0.16	0.05	0.01	0.14	0.24	n.d.	0.47	1.73	1.87	0.05	0.05	0.67	5.4	8.1	
2009/8/5	116.4	4.56	1.62	0.29	0.20	0.03	0.05	0.02	0.45	0.31	n.d.	1.00	n.d.	1.21	0.06	0.04	1.43	18.4	-6.2	R1
2009/8/12	(422.5)	5.65	0.20	0.07	0.10	0.01	0.01	0.00	0.12	0.01	n.d.	0.02	0.96	0.27	0.01	0.02	0.24	-24.4	8.4	
2009/8/27	17.3	6.08	1.49	0.71	1.25	0.71	0.15	0.20	0.94	0.51	0.34	1.57	n.d.	3.90	0.14	0.08	1.58	29.6	2.9	R1,P
2009/9/10	39.4	4.69	2.07	0.81	1.01	0.17	0.14	0.07	1.22	0.98	n.d.	1.80	0.51	2.76	0.13	0.10	2.11	14.4	1.0	R1
2009/9/25	3.3	4.16	5.20	0.68	1.83	0.43	0.43	0.08	0.98	2.36	n.d.	6.23	0.98	5.00	0.24	0.21	5.13	6.1	-0.7	
2009/10/5	133.9	5.14	0.45	0.08	0.10	0.01	0.01	0.00	0.11	0.13	n.d.	0.18	n.d.	1.48	0.02	0.01	0.38	31.8	-7.8	R1
2009/10/9	73.8	5.34	0.23	0.02	0.05	0.01	0.10	0.00	0.03	0.08	n.d.	0.07	n.d.	1.54	0.01	0.00	0.24	57.0	2.6	R1
2009/10/23	0.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009/11/6	37.1	6.44	1.63	1.06	1.45	0.35	0.11	0.07	1.61	0.53	0.32	1.09	3.46	2.01	0.15	0.14	1.90	1.0	7.6	P
2009/11/24	190.5	5.18	0.41	0.10	0.08	0.01	0.05	0.00	0.14	0.10	n.d.	0.14	0.61	1.26	0.02	0.02	0.41	0.0	0.2	
2009/12/8	13.8	4.61	2.24	0.67	0.71	0.14	0.56	0.13	0.97	1.41	n.d.	2.49	n.d.	1.52	0.13	0.10	2.32	13.7	1.7	R1
2009/12/22	62.5	4.27	6.47	2.56	0.58	0.12	0.24	0.28	4.43	1.75	n.d.	1.98	n.d.	1.55	0.24	0.19	4.36	9.5	-3.4	R1
2010/1/6	13.3	4.14	9.53	7.99	1.93	0.98	2.79	1.37	13.49	8.23	n.d.	9.92	n.d.	4.91	0.80	0.72	12.16	5.5	12.1	
2010/1/20	7.0	4.27	7.75	5.47	1.25	0.32	1.65	0.72	8.28	8.09	n.d.	4.39	n.d.	2.74	0.51	0.46	7.87	5.6	0.8	
2010/2/4	80.8	4.38	2.67	0.48	0.51	0.05	0.34	0.06	0.74	0.80	n.d.	2.28	n.d.	1.13	0.11	0.08	2.53	16.7	-2.7	R1
2010/2/18	53.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010/3/5	104.5	4.65	1.66	0.46	0.42	0.06	0.36	0.04	0.66	0.50	n.d.	1.20	n.d.	1.21	0.09	0.05	1.58	26.2	-2.2	R1
2010/3/19	112.5	4.79	1.07	0.22	0.35	0.04	0.24	0.02	0.31	0.44	n.d.	0.82	n.d.	1.44	0.06	0.03	1.09	28.8	1.1	R1
2010/4/6	132.9	4.81	1.87	0.46	0.69	0.09	0.53	0.10	0.71	0.80	n.d.	2.09	n.d.	1.01	0.11	0.08	1.73	17.9	-3.9	R1
2010/4/30	311.5	5.92	0.65	0.22	0.57	0.06	0.17	0.04	0.34	0.25	n.d.	0.52	1.63	0.20	0.06	0.05	0.71	4.3	4.1	
2010/5/20	88.5	6.37	0.89	0.26	0.82	0.15	0.30	0.05	0.38	0.49	n.d.	0.75	2.03	1.08	0.08	0.07	0.95	8.0	3.6	
2010/6/4	185.1	5.46	0.58	0.11	0.49	0.05	0.10	0.01	0.20	0.21	n.d.	0.36	1.02	2.11	0.04	0.03	0.59	12.7	0.8	
2010/6/24	202.5	5.22	0.55	0.06	0.11	0.02	0.05	n.d.	0.09	n.d.	n.d.	0.37	0.71	0.92	0.02	0.02	0.42	-10.6	-13.6	
2010/7/16	(414.0)	6.34	0.78	0.06	1.13	0.48	0.01	n.d.	0.14	0.24	n.d.	0.72	1.93	1.59	0.08	0.05	0.90	17.9	7.6	R1
2010/8/5	170.6	7.41	3.95	0.36	4.53	2.84	0.04	0.01	0.65	0.12	1.02	0.55	19.22	6.05	0.34	0.38	4.43	-5.0	5.7	P
2010/8/24	64.9	7.47	5.04	0.45	7.25	3.17	0.06	0.01	0.78	0.18	1.63	0.54	34.77	8.41	0.51	0.66	6.97	-13.0	16.0	R1,R2,P
2010/9/9	105.0	6.90	1.73	0.70	2.00	0.74	0.07	0.05	1.11	0.13	0.74	0.43	4.47	4.74	0.17	0.14	2.03	9.3	7.9	R1,P
2010/10/5	181.2	6.67	0.93	0.21	0.95	0.51	0.05	0.01	0.29	2.04	0.24	0.47	5.08	2.22	0.08	0.14	1.37	-28.5	19.6	R1,P
2010/10/22	103.9	7.04	2.65	0.43	3.16	0.44	0.19	0.03	0.56	5.23	0.32	0.74	5.49	1.19	0.22	0.22	2.88	0.3	4.2	P
2010/11/16	87.1	5.05	1.56	0.83	0.54	0.12	0.26	0.08	1.49	0.58	n.d.	1.03	0.63	1.19	0.10	0.08	1.45	7.9	-3.7	
2010/12/7	77.9	5.27	1.01	0.28	0.18	0.04	0.20	0.04	0.41	0.42	n.d.	0.60	0.61	0.83	0.04	0.04	0.69	0.9	-19.1	
2011/1/5	79.9	4.51	1.70	0.54	0.41	0.05	0.20	0.07	0.91	0.85	n.d.	1.24	n.d.	0.05	0.09	0.07	1.96	18.3	7.2	R1
2011/1/24	2.0	5.01	14.67	11.13	3.17	1.05	7.51	1.77	16.75	20.20	n.d.	18.55	n.d.	3.98	1.22	1.18	16.28	1.4	5.2	
2011/2/15	72.2	4.65	4.05	1.88	0.99	0.20	0.51	0.23	3.05	2.22	n.d.	2.80	n.d.	0.70	0.21	0.18	3.26	7.3	-10.8	
2011/3/15	85.8	6.82	2.38	0.69	2.09	0.88	0.55	0.13	1.03	1.51	0.60	2.09	5.69	2.10	0.21	0.21	2.73	-0.7	6.8	P
2011/3/28	51.3	4.85	3.03	1.57	0.64	0.13	0.68	0.22	2.59	1.50	n.d.	2.45	n.d.	2.92	0.17	0.15	2.56	7.8	-8.5	
2011/4/20	57.0	4.47	3.90	0.95	0.51	0.10	0.33	0.13	1.53	0.68	n.d.	2.69	n.d.	0.08	0.13	0.11	2.62	9.4	-19.7	R1
2011/5/10	159.1	4.84	1.76	0.39	0.38	0.04	0.41	0.08	0.59	0.63	n.d.	1.70	n.d.	0.62	0.08	0.06	1.39	12.8	-11.7	R1
2011/6/2	275.9	5.04	0.82	0.15	0.20	0.02	0.08	0.02	0.23	0.23	n.d.	0.50	0.41	0.33	0.03	0.03	0.66	9.2	-11.3	
2011/6/18	(348.5)	5.38	0.73	0.04	0.21	0.05	0.09	0.01	0.07	0.37	n.d.	0.49	0.51	0.48	0.02	0.03	0.46	-3.8	-22.7	R2
2011/6/30	267.3	5.55	0.64	0.29	0.21	0.06	0.06	0.04	0.44	0.12	n.d.	0.34	0.81	0.08	0.03	0.03	0.52	0.3	-10.7	
2011/7/13	92.8	4.84	1.33	0.09	0.43	0.06	0.06	0.04	0.45	0.32	n.d.	1.14	n.d.	0.73	0.05	0.04	1.07	9.6	-10.9	
2011/7/23	(542.0)	5.84	0.53	0.49	0.07	0.02	0.21	0.04	0.77	0.01	n.d.	0.12	1.12	0.66	0.04	0.04	0.54	-2.1	0.6	
2011/8/5	53.2	4.66	1.88	0.37	0.10	0.04	0.11	0.05	0.51	0.85	n.d.	1.22	n.d.	1.62	0.05	0.05	1.35	0.7	-16.3	
2011/8/25	114.3	7.26	1.03	0.34	0.25	0.14	0.28	0.07	0.63	0.36	n.d.	0.92	1.42	0.00	0.05	0.07	0.75	-11.3	-15.5	R1
2011/9/22	(807.5)	6.04	0.30	0.15	0.12	0.03	0.05	0.01	0.24	0.03	n.d.	0.08	1.02	0.40	0.02	0.03	0.28	-17.2	-2.5	
2011/10/5	11.1	4.85	1.50	0.67	0.02	0.17	0.21	0.10	1.01	0.52	n.d.	1.10	n.d.	1.23	0.07	0.06	1.24	6.0	-9.5	
2011/10/29	225.2	5.33	0.48	0.09	0.02	0.01	0.06	0.01	0.13	0.14	n.d.	0.30	0.51	0.01	0.01	0.02	0.35	-18.6	-15.4	
2011/11/14	31.3	4.81	2.62	1.87	n.d.	n.d.	0.32	0.21	2.99	0.98	n.d.	1.05	n.d.	0.						

## Appendix 1e. 四万十川上流域の採水地点 R における降水分析データ

## Analytical rainwater data at sampling location R in the upper reaches of the Shimanto River

Date	Rainfall <sup>†</sup> mm	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup> mg L <sup>-1</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μ eq L <sup>-1</sup>	Anion μ eq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC <sup>*</sup>
2012/6/25	(534.0)	6.35	0.39	0.09	0.53	0.12	0.03	0.01	0.14	0.24	n.d.	0.19	1.42	0.46	0.04	0.04	0.48	5.6	10.4	
2012/7/13	296.6	4.98	0.96	0.16	0.17	0.07	0.12	0.03	0.22	0.25	n.d.	0.64	0.71	0.04	0.04	0.04	0.77	2.3	-11.3	
2012/7/30	100.1	4.60	1.84	0.45	0.11	0.04	0.10	0.06	0.64	0.63	n.d.	1.24	n.d.	1.37	0.06	0.05	1.50	6.8	-10.3	
2012/8/23	239.0	5.43	0.97	0.84	0.02	0.04	0.18	0.08	1.36	0.06	n.d.	0.47	0.71	1.32	0.06	0.06	0.85	-2.1	-6.6	
2012/9/12	187.1	5.32	0.88	0.57	0.09	0.03	0.20	0.05	0.89	0.12	n.d.	0.43	0.69	0.55	0.05	0.05	0.74	2.0	-8.3	
2012/10/9	(423.0)	5.86	0.92	0.95	0.07	0.04	0.12	0.11	1.53	0.01	n.d.	0.32	1.12	0.08	0.06	0.07	0.84	-4.8	-4.9	
2012/10/29	55.9	5.38	0.89	0.44	0.08	0.04	0.16	0.06	0.74	0.37	n.d.	0.71	0.81	0.71	0.04	0.06	0.73	-14.2	-9.4	
2012/11/12	9.7	5.53	2.02	1.77	0.16	0.11	0.46	0.21	2.56	1.82	n.d.	1.53	0.31	1.55	0.13	0.14	1.84	-2.6	-4.7	
2012/12/7	99.5	4.89	2.53	1.40	0.48	0.23	0.38	n.d.	2.49	1.30	n.d.	1.93	n.d.	0.85	0.13	0.13	2.11	-2.5	-9.0	
2012/12/26	94.4	4.72	3.41	1.95	0.51	0.09	0.74	0.26	3.47	1.98	n.d.	2.74	n.d.	1.47	0.19	0.19	3.08	1.5	-5.1	
2013/1/18	84.2	5.91	0.70	0.18	0.48	0.26	0.11	0.04	0.29	0.90	n.d.	0.53	1.14	0.87	0.05	0.05	0.72	-1.2	1.4	
2013/2/8	18.8	4.27	4.23	0.73	0.96	0.10	0.35	0.11	1.19	1.81	n.d.	4.06	n.d.	0.91	0.17	0.15	3.72	6.3	-6.4	
2013/2/25	92.6	4.74	1.43	0.16	0.16	0.03	0.14	0.03	0.24	0.28	n.d.	1.05	n.d.	0.00	0.04	0.03	1.05	14.1	-15.2	
2013/3/15	57.9	4.55	2.69	0.77	0.48	0.11	0.46	0.13	1.15	1.12	n.d.	2.30	n.d.	1.75	0.12	0.10	2.31	11.4	-7.6	R1
2013/4/5	90.0	5.03	2.12	0.98	0.28	0.09	0.72	0.19	1.53	1.00	n.d.	1.63	0.71	1.23	0.12	0.10	1.73	7.1	-10.1	
2013/4/25	176.6	4.93	1.53	0.63	0.40	0.06	0.42	0.11	0.98	0.89	n.d.	1.30	0.61	0.61	0.09	0.08	1.46	7.7	-2.3	
2013/5/14	36.0	4.73	1.42	0.26	0.00	0.05	0.23	0.05	0.43	0.42	n.d.	1.19	n.d.	1.45	0.05	0.04	1.14	3.4	-10.6	
2013/6/5	99.3	4.92	1.06	0.50	0.00	0.03	0.22	0.07	0.81	0.37	n.d.	0.61	n.d.	0.77	0.05	0.04	0.94	10.3	-5.9	
2013/6/27	221.4	4.67	1.27	0.05	0.25	0.02	0.08	0.01	0.12	0.44	n.d.	1.11	n.d.	1.11	0.04	0.03	1.15	12.6	-4.8	
2013/7/17	141.4	4.88	0.81	0.13	0.05	0.15	0.06	0.04	0.25	0.35	n.d.	0.71	n.d.	1.22	0.03	0.03	0.79	7.9	-1.5	
2013/8/9	28.3	6.19	1.58	0.20	0.83	1.25	0.17	0.05	0.38	2.75	n.d.	1.59	1.32	3.34	0.10	0.11	1.47	-4.6	-3.3	
2013/8/27	62.2	5.32	0.58	0.07	0.19	0.05	0.10	0.02	0.12	0.27	n.d.	0.42	0.61	1.20	0.03	0.03	0.47	-0.9	-10.1	
2013/9/6	274.7	5.02	0.72	0.22	0.09	0.02	0.05	0.03	n.d.	0.15	n.d.	0.61	0.41	0.50	0.03	0.02	0.60	14.6	-9.4	
2013/9/17	35.7	6.01	0.65	0.09	0.58	0.21	0.10	0.06	0.15	0.28	n.d.	0.85	1.42	1.73	0.05	0.05	0.69	2.0	3.3	
2013/10/10	271.3	5.55	0.66	0.53	n.d.	0.03	0.08	0.06	0.84	0.13	n.d.	0.26	0.81	0.11	0.04	0.04	0.57	-10.8	-7.9	
2013/10/22	46.2	6.18	0.77	0.33	n.d.	0.19	0.58	0.08	0.53	0.29	n.d.	0.66	1.87	0.00	0.06	0.06	0.73	-6.6	-2.2	
2013/10/30	309.6	5.76	0.21	0.17	0.01	0.02	0.09	0.02	0.24	0.11	n.d.	0.03	0.98	0.55	0.02	0.02	0.28	-19.0	14.0	
2013/11/18	30.3	4.27	3.63	0.57	0.53	0.08	0.22	0.07	0.81	1.14	n.d.	3.02	n.d.	0.80	0.13	0.10	3.13	9.6	-7.4	R1
2013/12/13	109.0	4.62	3.00	1.82	0.48	0.11	0.26	0.23	2.81	1.19	n.d.	1.87	n.d.	0.89	0.16	0.14	2.68	9.0	-5.6	R1
2014/1/7	90.9	4.61	3.22	2.10	0.47	0.11	0.43	0.27	3.74	2.05	n.d.	1.63	n.d.	0.88	0.19	0.17	3.08	4.4	-2.2	
2014/1/27	28.3	4.30	4.35	1.31	0.90	0.12	0.45	0.19	2.17	2.99	n.d.	3.19	n.d.	1.37	0.20	0.18	3.97	5.8	-4.5	
2014/2/20	116.4	4.89	1.18	0.23	0.18	0.05	0.25	0.05	0.38	0.57	n.d.	0.88	n.d.	0.18	0.05	0.04	0.97	13.3	-10.1	
2014/3/14	136.8	4.79	1.40	0.29	0.26	0.09	0.15	0.05	0.48	0.60	n.d.	1.27	n.d.	0.90	0.06	0.05	1.20	6.7	-7.6	
2014/4/3	100.3	4.43	2.53	0.29	0.55	0.08	0.15	0.05	0.50	0.85	n.d.	2.57	n.d.	1.19	0.09	0.08	2.29	7.2	-4.9	
2014/4/23	95.0	4.54	2.74	0.35	0.58	0.10	0.55	0.10	0.64	1.90	n.d.	2.71	n.d.	0.80	0.11	0.11	2.35	4.0	-7.8	
2014/5/9	40.1	4.96	1.55	0.86	0.33	0.10	0.26	0.12	1.50	0.55	n.d.	1.33	n.d.	0.71	0.09	0.08	1.46	7.7	-3.0	
2014/5/27	149.7	5.14	0.62	0.14	0.03	0.04	0.10	0.03	0.24	0.18	n.d.	0.62	0.43	0.39	0.02	0.03	0.55	-13.2	-5.7	
2014/6/17	183.3	5.25	0.48	0.07	0.08	0.02	0.07	0.01	0.12	0.20	n.d.	0.52	0.61	0.49	0.02	0.03	0.45	-19.1	-2.5	
2014/7/9	294.2	4.90	0.72	0.07	0.05	0.01	0.07	0.01	0.06	0.25	n.d.	0.55	0.20	0.49	0.02	0.02	0.65	4.4	-5.4	
2014/7/24	148.4	5.10	0.88	0.39	0.15	0.03	n.d.	n.d.	0.64	0.23	n.d.	0.63	0.59	0.57	0.03	0.04	0.74	-13.4	-8.7	
2014/8/12	(1236.5)	5.69	0.33	0.26	0.01	0.02	0.05	0.03	0.34	0.02	n.d.	0.15	1.02	0.77	0.02	0.03	0.34	-21.7	1.1	
2014/8/27	271.9	5.67	0.75	0.12	0.07	0.02	0.08	0.02	0.20	0.13	n.d.	0.50	0.31	0.59	0.02	0.02	0.33	-13.5	-39.0	R2
2014/9/18	210.8	4.52	1.64	0.05	0.02	0.03	0.10	0.01	0.10	0.24	n.d.	1.26	n.d.	0.38	0.04	0.03	1.37	10.3	-9.0	
2014/10/9	112.8	4.86	1.15	0.33	0.13	0.04	0.14	0.05	0.48	0.42	n.d.	0.69	n.d.	0.31	0.05	0.03	0.94	14.9	-10.0	
2014/10/30	211.5	5.23	0.97	0.79	0.08	0.09	0.07	0.09	1.44	0.12	n.d.	0.40	0.85	0.25	0.06	0.06	0.94	-5.8	-1.7	
2014/11/20	44.9	4.50	2.98	1.40	0.13	0.08	0.43	0.18	2.44	0.92	n.d.	1.98	n.d.	0.81	0.14	0.13	2.64	4.6	-6.1	
2014/12/2	58.8	4.54	2.74	1.32	0.16	0.08	0.25	0.16	2.17	0.61	n.d.	1.78	n.d.	0.81	0.12	0.11	2.35	6.4	-7.7	
2014/12/22	125.5	4.51	4.34	2.77	0.46	0.13	0.26	0.34	4.91	1.47	n.d.	2.18	n.d.	1.13	0.22	0.21	3.69	3.0	-8.1	
2015/1/15	91.7	4.53	3.82	1.56	1.22	0.40	0.44	0.23	2.96	2.06	n.d.	3.29	n.d.	1.39	0.22	0.19	3.59	7.7	-3.1	
2015/2/6	97.6	4.58	3.25	0.87	1.05	0.09	0.23	0.12	1.42	1.90	n.d.	2.98	n.d.	1.22	0.15	0.13	2.69	4.7	-9.5	
2015/2/27	59.7	4.56	2.39	0.72	0.46	0.07	0.38	0.11	1.07	1.06	n.d.	1.86	n.d.	0.86	0.11	0.09	2.14	14.1	-5.6	R1
2015/3/20	203.9	4.61	1.74	0.43	0.42	0.07	0.24	0.07	0.67	0.64	n.d.	1.36	n.d.	0.82	0.09	0.06	1.68	20.2	-1.7	R1
2015/4/8	105.7	4.38	2.59	0.36	0.40	0.06	0.13	0.04	0.61	0.71	n.d.	2.42	n.d.	0.68	0.09	0.08	2.38	6.9	-4.3	
2015/4/30	131.2	4.94	1.09	0.46	0.25	0.06	0.14	0.06	0.75	0.41	n.d.	0.87	0.51	0.43	0.06	0.05	1.07	4.1	-0.8	
2015/5/20	142.7	4.93	0.77	0.09	0.16	0.03	0.09	0.02	1.14	0.34	n.d.	0.61	0.41	0.46	0.03	0.03	0.74	4.3	-2.3	
2015/6/8	139.4	4.83	0.63	0.05	0.07	0.03	0.09	0.01	0.07	0.26	n.d.	0.53	n.d.	0.98	0.03	0.02	0.73	22.2	7.0	
2015/7/2	(366.5)	5.04	0.62	0.04	0.10	0.10	0.07	0.01	0.06	0.21	n.d.	0.45	0.51	0.27	0.02	0.02	0.56	1.3	-5.6	
2015/7/24	(355.0)	6.10	0.47	0.28	n.d.	0.28	0.08	0.04	0.43	n.d.	n.d.	0.23	1.02	1.02	0.03	0.03	0.39	-9.7	-9.9	
2015/8/11	63.1	4.76	1.43	0.44	n.d.	0.34	0.17	0.08	0.68	0.31	n.d.	1.30	n.d.	2.01	0.06	0.05	1.24	7.8	-6.9	
2015/8/26	187.0	5.14	0.91	0.72	n.d.	0.24	0.09	0.08	1.17	0.01	n.d.	0.50	0.79	0.55	0.06	0.06	0.91	-0.9	0.2	
2015/9/25	(441.0)	5.09	0.56	0.13	0.02	0.04	0.06	0.02	0.21	0.12	n.d.	0.25	0.61	0.38	0.02	0.02	0.50	-4.0	-5.8	
2015/10/15	60.7	4.90	1.07	0.23	0.16	0.06	0.14	0.05	0.35	0.30	n.d.	0.99	n.d.	1.25	0.04	0.04	0.91	11.6	-8.5	
2015/11/4	45.5	6.28	0.80	0.35	0.25	0.16	0.29	0.06	0.48	0.35	n.d.	0.43	1.42	0.98	0.05	0.05	0.66	1.1	-9.9	
2015/11/18	126.1	5.45																		

## Appendix 2a. 四万十川上流域の採水地点 A1 における渓流水分析データ

## Analytical data of streamwater at sampling location A1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2000/3/24	7.52	6.16	3.73	n.d.	0.54	6.44	0.82	2.58	0.72	n.d.	6.25	19.55	0.64	0.56	0.54	6.29	2.7	1.0	
2000/4/17	7.73	7.47	4.45	n.d.	0.63	8.38	1.04	2.67	0.49	n.d.	8.25	23.95	0.74	0.71	0.65	7.78	4.8	2.0	
2000/4/27	7.74	7.76	4.58	0.01	0.66	9.19	1.14	2.65	0.63	n.d.	8.50	26.87	0.16	0.77	0.70	8.37	4.5	3.8	
2000/5/15	7.72	8.10	4.67	n.d.	0.60	9.20	1.12	2.59	1.53	0.22	8.10	29.78	0.92	0.77	0.76	8.67	0.5	3.4	
2000/5/29	7.67	7.71	4.39	n.d.	0.60	8.79	1.07	2.56	2.60	0.14	7.33	28.84	0.81	0.73	0.74	8.36	-0.7	4.0	
2000/6/12	7.61	6.04	3.81	n.d.	0.52	6.30	0.77	2.57	0.56	0.12	6.05	20.14	0.15	0.56	0.54	6.27	1.4	1.9	
2000/6/26	7.64	6.76	4.33	0.01	0.54	7.36	0.92	2.53	0.48	n.d.	6.99	24.30	0.88	0.65	0.62	7.18	1.8	3.0	
2000/7/10	7.62	6.34	4.20	n.d.	0.51	6.91	0.85	2.63	0.46	0.12	6.31	24.09	0.67	0.61	0.61	6.90	-0.1	4.2	
2000/7/25	7.64	7.60	4.65	n.d.	0.58	8.57	1.06	2.53	1.03	n.d.	8.07	28.19	0.83	0.73	0.72	8.19	0.9	3.7	
2000/8/7	7.66	5.93	4.12	0.00	0.53	6.14	0.75	2.59	0.39	n.d.	5.39	19.70	0.87	0.56	0.51	6.09	4.4	1.3	
2000/8/22	7.70	7.13	4.65	n.d.	0.78	7.97	0.95	2.71	0.58	n.d.	7.40	25.48	0.87	0.70	0.66	7.69	3.0	3.7	
2000/9/4	7.71	7.68	4.70	n.d.	0.61	8.48	1.02	2.56	1.18	n.d.	8.26	26.62	0.80	0.73	0.70	8.11	1.9	2.7	
2000/9/18	7.66	5.28	4.06	n.d.	0.49	5.27	0.67	2.65	0.31	n.d.	4.29	19.03	0.77	0.51	0.48	5.55	2.7	2.5	
2000/10/3	7.70	6.24	4.34	n.d.	0.54	6.59	0.82	2.51	0.44	0.19	5.40	22.78	0.69	0.60	0.57	6.57	2.5	2.6	
2000/10/18	7.72	6.93	4.46	n.d.	0.61	7.41	0.91	2.51	0.46	0.25	6.43	24.57	1.43	0.65	0.62	7.22	2.5	2.0	
2000/11/6	7.66	5.87	4.14	n.d.	0.56	6.22	0.78	2.53	0.43	n.d.	4.99	22.43	0.85	0.57	0.55	6.25	1.7	3.2	
2000/11/21	7.74	7.08	4.52	n.d.	0.60	7.82	0.96	2.49	0.63	n.d.	6.82	24.98	1.05	0.68	0.63	7.40	3.7	2.2	
2000/12/5	7.64	7.51	4.54	0.02	0.58	8.06	0.99	2.49	0.82	n.d.	7.60	25.54	0.84	0.70	0.66	7.69	2.7	1.2	
2000/12/18	7.69	8.01	4.69	n.d.	0.62	8.98	1.10	2.58	0.94	n.d.	8.35	26.80	1.10	0.76	0.70	8.30	3.9	1.8	
2001/1/9	7.65	8.04	4.55	n.d.	0.58	9.01	1.11	2.66	1.15	n.d.	8.71	25.63	1.05	0.75	0.70	8.29	4.1	1.5	
2001/1/23	7.53	6.57	4.20	0.04	0.19	7.02	0.87	2.51	0.84	n.d.	6.62	20.41	1.00	0.61	0.56	6.66	4.7	0.7	
2001/2/6	7.64	6.42	4.14	n.d.	0.44	6.75	0.82	2.64	0.58	n.d.	6.45	21.85	0.74	0.60	0.58	6.65	1.7	1.8	
2001/2/20	7.67	7.10	4.50	n.d.	0.45	7.97	0.97	2.60	0.60	n.d.	7.64	23.59	0.70	0.68	0.63	7.48	4.2	2.6	
2001/3/6	7.68	6.46	4.18	0.01	0.51	6.91	0.86	2.60	0.58	n.d.	6.68	21.76	0.81	0.61	0.58	6.77	2.8	2.3	
2001/3/21	7.74	7.11	4.28	n.d.	0.57	7.84	0.97	2.60	0.59	n.d.	7.49	24.86	0.71	0.67	0.65	7.48	2.0	2.6	
2001/4/10	7.70	8.07	4.69	n.d.	0.59	9.07	1.12	2.53	0.93	n.d.	9.04	31.42	0.39	0.76	0.79	8.77	-1.6	4.1	
2001/4/23	7.64	8.24	4.80	n.d.	0.60	9.62	1.20	2.65	1.72	n.d.	9.25	28.66	0.46	0.80	0.76	8.94	2.4	4.1	
2001/5/8	7.60	6.15	3.84	n.d.	0.71	6.66	0.83	2.79	0.52	n.d.	5.92	20.99	0.58	0.59	0.55	6.49	2.8	2.7	
2001/5/22	7.65	7.59	4.44	n.d.	0.55	8.63	1.03	2.55	0.73	n.d.	8.00	27.95	0.73	0.72	0.71	8.09	1.0	3.2	
2001/6/5	7.67	7.97	4.60	n.d.	0.54	9.15	1.10	2.51	0.82	n.d.	8.39	29.08	0.67	0.76	0.74	8.46	1.7	3.0	
2001/6/20	7.62	6.78	4.20	n.d.	0.50	7.55	0.92	2.33	1.59	n.d.	6.28	23.94	0.38	0.65	0.61	7.13	2.7	2.5	
2001/7/3	7.60	7.01	4.31	n.d.	0.48	7.99	0.97	2.60	0.50	n.d.	7.38	25.21	0.00	0.68	0.65	7.51	2.2	3.4	
2001/7/24	7.52	7.11	4.42	n.d.	0.53	7.67	0.93	2.50	0.57	n.d.	7.48	26.64	1.26	0.67	0.67	7.54	-0.5	2.9	
2001/8/7	7.60	7.97	4.69	n.d.	0.54	8.86	1.09	2.46	0.98	n.d.	8.85	28.73	0.40	0.75	0.74	8.44	0.6	2.9	
2001/8/21	7.57	7.08	4.14	n.d.	0.51	7.82	0.96	2.20	2.19	n.d.	7.08	23.80	1.56	0.66	0.63	7.38	2.1	2.1	
2001/9/4	7.69	8.48	4.73	n.d.	0.51	9.55	1.16	2.44	0.82	n.d.	9.59	30.28	0.98	0.79	0.78	8.90	0.8	2.4	
2001/9/26	7.72	6.92	4.62	n.d.	0.48	7.44	0.91	2.48	0.32	n.d.	6.78	26.06	0.55	0.66	0.64	7.31	1.2	2.7	
2001/10/10	7.72	6.58	4.15	n.d.	0.44	7.09	0.87	2.35	0.66	n.d.	6.25	24.22	0.78	0.62	0.60	6.86	1.1	2.1	
2001/10/24	7.70	6.45	4.25	n.d.	0.50	6.85	0.82	2.56	n.d.	n.d.	5.96	25.49	0.72	0.61	0.61	6.82	-0.6	2.8	
2001/11/7	7.65	6.52	3.93	n.d.	0.47	6.57	0.80	2.39	n.d.	n.d.	5.84	24.60	0.93	0.58	0.59	6.53	-1.3	0.1	
2001/11/21	7.71	7.54	4.45	n.d.	0.52	8.15	0.99	2.43	0.09	n.d.	7.46	28.01	0.69	0.70	0.68	7.74	0.8	1.3	
2001/12/4	7.72	8.22	4.46	0.05	0.53	8.80	1.07	2.52	n.d.	n.d.	8.63	30.50	0.79	0.74	0.75	8.38	-0.9	1.0	
2001/12/20	7.71	8.43	4.40	n.d.	0.48	9.07	1.11	2.53	0.49	n.d.	9.41	28.93	1.49	0.75	0.75	8.51	-0.1	0.5	
2002/1/8	7.67	8.74	4.52	0.05	0.47	9.43	1.17	2.57	0.30	n.d.	10.49	29.56	0.89	0.78	0.78	8.89	-0.1	0.9	
2002/1/22	7.68	9.49	4.58	n.d.	0.49	9.90	1.25	2.81	0.90	n.d.	10.78	30.97	0.72	0.81	0.83	9.34	-1.1	-0.8	
2002/2/7	7.70	9.36	4.77	n.d.	0.53	10.11	1.25	2.57	0.13	n.d.	10.94	32.93	0.71	0.83	0.84	9.48	-0.8	0.6	
2002/2/19	7.79	9.78	4.86	n.d.	0.54	10.54	1.32	2.62	0.36	n.d.	11.64	33.05	0.41	0.86	0.86	9.82	-0.2	0.2	
2002/3/5	7.77	9.62	4.58	0.03	0.53	10.01	1.23	2.47	0.39	n.d.	11.07	33.97	0.80	0.81	0.86	9.52	-2.9	-0.5	
2002/3/19	7.72	8.36	4.69	n.d.	0.52	9.05	1.15	2.64	0.32	n.d.	9.49	26.37	0.65	0.76	0.71	8.42	3.6	0.3	
2002/4/9	7.74	6.90	3.88	n.d.	0.49	6.94	0.85	2.57	0.12	n.d.	7.14	21.21	0.17	0.60	0.57	6.67	2.3	-1.7	
2002/4/23	7.70	7.27	3.89	n.d.	0.50	7.41	0.91	2.59	0.22	n.d.	7.35	23.35	0.33	0.63	0.61	7.05	1.1	-1.5	
2002/5/8	7.74	6.32	3.79	n.d.	0.48	6.15	0.77	2.67	n.d.	n.d.	6.38	23.25	0.80	0.55	0.59	6.41	-3.7	0.7	
2002/5/28	7.78	7.22	4.41	n.d.	0.54	7.28	0.93	2.65	n.d.	n.d.	8.04	25.64	0.73	0.65	0.66	7.41	-1.3	1.3	
2002/6/11	7.87	8.32	4.48	n.d.	0.66	8.91	1.09	2.47	0.86	n.d.	9.09	29.71	0.98	0.75	0.76	8.54	-0.9	1.3	
2002/6/25	7.92	8.86	4.49	n.d.	0.62	9.54	1.16	2.36	0.97	n.d.	9.40	32.26	0.77	0.78	0.81	8.97	-1.5	0.6	
2002/7/9	7.58	6.09	3.65	n.d.	0.46	6.10	0.74	2.41	0.27	n.d.	5.59	21.12	0.97	0.54	0.53	6.04	0.1	-0.4	
2002/7/23	7.68	6.20	3.94	n.d.	0.47	6.05	0.74	2.66	0.13	n.d.	5.91	21.10	0.70	0.55	0.55	6.18	0.0	-0.2	
2002/8/6	7.72	6.88	4.22	n.d.	0.49	6.84	0.84	2.58	n.d.	n.d.	6.75	25.49	0.43	0.61	0.63	6.95	-2.0	0.5	
2002/8/27	7.70	7.68	4.46	n.d.	0.56	8.06	0.99	2.61	0.39	n.d.	7.93	28.10	0.34	0.69	0.71	7.88	-1.0	1.3	
2002/9/10	7.72	6.70	4.39	n.d.	0.50	6.84	0.82	2.67	n.d.	n.d.	6.17	24.90	0.64	0.61	0.61	6.86	0.0	1.2	
2002/9/24	7.74	7.43	4.57	n.d.	0.52	7.85	0.97	2.70	n.d.	n.d.	7.63	26.64	0.57	0.68	0.67	7.64	0.9	1.4	
2002/10/8	7.72	7.58	4.39	n.d.	0.50	8.11	0.97	2.65	0.31	n.d.	7.59	27.02	0.55	0.69	0.68	7.72	0.5	0.9	
2002/10/22	7.78	8.21	4.63	n.d.	0.52	9.00	1.08	2.64	0.33	n.d.	9.01	29.59	0.39	0.75	0.75	8.51	0.0	1.8	
2002/11/5	7.65	8.58	4.66	n.d.	0.50	9.55	1.15	2.72	0.65	n.d.	10.02	29.44	0.37	0.79	0.78	8.92	0.5	2.0	
2002/11/19	7.74	9.07	5.01	0.04	0.53	10.20	1.24	2.60	0.52	n.d.	10.75	31.39	0.00	0.84	0.82	9.48	1.5	2.2	
2002/12/3	7.58	9.48	4.82	0.04	0.51	10.60	1.29	2.79	1.30	n.d.	11.35	31.79	0.00	0.86	0.86	9.83	0.2	1.8	
2002/12/17	7.66	8.84																	

## Appendix 2b. 四万十川上流域の採水地点 A1 における渓流水分析データ

## Analytical data of streamwater at sampling location A1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2003/2/18	7.62	7.78	4.21	n.d.	0.43	7.84	0.95	2.61	0.48	n.d.	7.67	27.82	0.05	0.66	0.70	7.67	-2.5	-0.7	
2003/3/4	7.56	7.07	4.13	n.d.	0.46	7.33	0.87	2.77	0.38	n.d.	6.66	23.52	0.02	0.63	0.61	7.01	1.7	-0.4	
2003/3/18	7.57	6.17	3.88	n.d.	0.46	6.14	0.74	2.82	0.25	n.d.	5.73	19.97	0.38	0.55	0.53	6.13	1.6	-0.4	
2003/4/7	7.65	6.45	3.99	0.03	0.46	6.55	0.78	2.77	0.23	n.d.	6.03	22.47	0.09	0.58	0.58	6.52	0.2	0.6	
2003/4/21	7.61	7.13	4.30	n.d.	0.51	7.28	0.88	2.67	0.22	n.d.	7.08	24.00	0.09	0.64	0.62	7.11	1.3	-0.1	
2003/5/8	7.64	7.40	4.41	n.d.	0.54	7.58	0.95	2.48	0.74	n.d.	7.13	26.56	0.54	0.66	0.67	7.47	-0.3	0.5	
2003/5/22	7.68	6.51	4.26	n.d.	0.46	6.22	0.77	2.73	0.05	n.d.	5.85	22.09	0.52	0.57	0.56	6.38	0.8	-1.0	
2003/6/4	7.57	5.94	4.17	n.d.	0.46	5.40	0.69	2.81	n.d.	n.d.	4.87	20.82	0.36	0.52	0.52	5.83	-0.3	-0.9	
2003/6/19	7.54	4.81	3.52	n.d.	0.43	4.25	0.53	2.69	0.21	n.d.	3.63	16.94	0.57	0.42	0.43	4.78	-1.5	-0.3	
2003/7/3	7.59	5.92	4.05	0.04	0.44	5.60	0.69	2.84	0.16	n.d.	4.57	21.40	0.20	0.53	0.53	5.90	-0.2	-0.2	
2003/7/17	7.68	6.33	4.17	0.05	0.47	6.18	0.77	2.81	0.24	n.d.	5.31	22.05	1.16	0.57	0.56	6.31	1.1	-0.1	
2003/8/1	7.60	6.94	4.32	n.d.	0.48	6.81	0.84	2.71	0.46	n.d.	6.13	22.88	1.10	0.61	0.59	6.75	1.9	-1.4	
2003/8/14	7.55	5.69	3.94	0.04	0.47	5.23	0.68	2.47	0.33	n.d.	4.16	21.13	1.11	0.50	0.51	5.62	-0.5	-0.6	
2003/9/4	7.68	6.98	4.42	n.d.	0.47	6.54	0.85	2.79	0.24	n.d.	6.19	15.56	2.84	0.60	0.47	6.16	12.6	-6.2	R1
2003/9/18	7.66	6.52	4.35	0.02	0.57	6.49	0.83	2.79	0.26	n.d.	5.32	23.46	0.60	0.60	0.58	6.58	1.6	0.5	
2003/10/8	7.68	7.74	4.49	n.d.	0.50	7.69	0.97	2.72	0.54	n.d.	7.27	27.68	0.44	0.67	0.69	7.65	-1.4	-0.6	
2003/10/22	7.63	6.87	4.42	n.d.	0.47	6.98	0.88	2.74	0.30	n.d.	5.99	23.72	0.60	0.62	0.60	6.86	2.4	-0.1	
2003/11/12	7.69	7.05	4.58	n.d.	0.54	7.49	0.94	2.75	0.53	n.d.	6.36	26.68	0.10	0.66	0.66	7.40	0.7	2.4	
2003/11/26	7.64	7.72	4.82	n.d.	0.51	8.37	1.06	2.73	0.62	n.d.	7.78	26.47	0.40	0.73	0.68	7.98	3.2	1.7	
2003/12/10	7.58	7.04	4.18	n.d.	0.42	6.53	0.82	2.78	0.25	n.d.	6.23	24.72	0.43	0.59	0.62	6.76	-2.6	-2.1	
2003/12/24	7.53	7.57	4.76	n.d.	0.48	8.00	1.00	2.81	0.28	n.d.	6.86	29.17	0.02	0.70	0.70	7.85	-0.3	1.8	
2004/1/7	7.56	8.18	4.72	n.d.	0.46	8.32	1.03	2.70	0.37	n.d.	8.36	31.00	0.00	0.72	0.76	8.32	-3.2	0.8	
2004/1/21	7.58	8.26	4.46	n.d.	0.39	8.07	1.04	2.89	1.15	n.d.	8.19	29.82	0.32	0.69	0.76	8.19	-4.6	-0.4	
2004/2/5	7.56	8.48	4.50	n.d.	0.38	8.56	1.11	2.93	1.38	n.d.	8.86	29.77	0.29	0.72	0.78	8.52	-3.6	0.2	
2004/2/20	7.68	8.64	4.81	n.d.	0.44	9.54	1.23	2.88	1.26	n.d.	9.84	36.55	0.31	0.80	0.91	9.57	-6.3	5.1	
2004/3/4	7.60	6.93	4.31	n.d.	0.37	7.16	0.95	2.90	1.30	n.d.	6.56	27.52	0.55	0.63	0.69	7.43	-4.4	3.5	
2004/3/24	7.63	8.06	4.49	n.d.	0.43	8.20	1.05	3.01	2.09	n.d.	7.63	30.73	0.80	0.70	0.78	8.35	-5.3	1.8	
2004/4/6	7.69	6.93	4.25	n.d.	0.42	6.89	0.90	2.92	0.31	n.d.	6.87	27.57	0.55	0.61	0.68	7.26	-5.3	2.4	
2004/4/21	7.60	6.51	4.08	n.d.	0.45	6.37	0.83	2.89	0.29	n.d.	6.35	28.95	0.78	0.57	0.69	7.05	-9.3	4.0	R1
2004/5/14	7.48	4.69	3.29	n.d.	0.31	3.41	0.46	2.85	0.16	n.d.	3.76	19.12	0.62	0.36	0.47	4.64	-13.9	-0.5	R1
2004/5/31	7.65	6.90	4.40	n.d.	0.45	6.50	0.84	2.80	n.d.	n.d.	6.57	29.73	0.56	0.60	0.70	7.21	-8.2	2.2	R1
2004/6/11	7.70	7.28	4.46	n.d.	0.48	7.42	0.94	2.56	0.63	n.d.	6.90	31.86	1.42	0.65	0.75	7.77	-6.7	3.3	
2004/6/28	7.70	6.48	4.49	n.d.	0.59	6.14	0.81	2.95	0.12	n.d.	5.98	30.27	0.65	0.58	0.71	7.12	-9.5	4.7	R1
2004/7/12	7.67	7.02	4.50	n.d.	0.45	6.67	0.93	2.76	0.26	n.d.	6.49	31.65	0.54	0.62	0.74	7.47	-8.8	3.1	R1
2004/7/26	7.66	7.64	4.81	n.d.	0.53	7.80	1.00	2.80	0.60	n.d.	7.83	33.85	0.54	0.69	0.81	8.35	-7.5	4.4	
2004/8/9	7.63	6.03	4.38	n.d.	0.42	5.67	0.74	2.88	0.14	n.d.	5.09	29.79	0.37	0.55	0.68	6.70	-10.8	5.3	R1
2004/8/27	7.59	6.06	4.30	n.d.	0.42	5.66	0.75	2.90	0.08	n.d.	4.93	29.97	0.06	0.54	0.68	6.66	-11.1	4.8	R1
2004/9/13	7.46	4.18	3.86	n.d.	0.36	2.57	0.40	3.23	0.08	n.d.	2.10	18.05	0.25	0.34	0.43	4.22	-12.2	0.5	R1
2004/9/27	7.63	6.17	4.82	n.d.	0.50	5.87	0.84	3.25	0.09	n.d.	4.40	29.36	0.27	0.58	0.67	6.84	-6.5	5.1	
2004/10/12	7.70	6.39	4.73	n.d.	0.46	6.09	0.83	3.19	0.10	n.d.	4.71	29.81	0.50	0.59	0.68	6.95	-7.0	4.2	
2004/10/25	7.60	5.96	4.51	n.d.	0.46	5.33	0.75	3.13	0.04	n.d.	3.85	31.02	0.49	0.54	0.68	6.56	-11.7	4.8	R1
2004/11/8	7.65	6.38	4.52	n.d.	0.50	6.21	0.83	3.04	0.16	n.d.	4.54	31.00	0.25	0.59	0.69	6.98	-8.1	4.5	R1
2004/11/22	7.59	6.38	4.53	n.d.	0.49	6.45	0.83	2.98	0.20	n.d.	4.49	31.27	0.48	0.60	0.69	7.05	-7.2	5.0	
2004/12/6	7.55	5.38	4.05	n.d.	0.43	5.05	0.64	3.00	0.13	n.d.	3.50	24.54	0.19	0.49	0.56	5.78	-6.6	3.6	
2004/12/21	7.62	6.73	4.44	n.d.	0.48	6.55	0.85	2.95	0.40	n.d.	5.07	30.27	0.17	0.60	0.69	7.11	-6.9	2.7	
2005/1/7	7.52	6.90	4.38	n.d.	0.42	6.74	0.87	2.91	0.94	n.d.	5.67	25.10	0.52	0.61	0.63	6.93	-1.4	0.2	
2005/2/7	7.41	8.30	4.62	n.d.	0.40	8.10	1.09	5.37	2.00	n.d.	6.80	24.59	1.05	0.70	0.73	8.27	-1.7	-0.2	
2005/2/18	7.57	6.27	3.99	n.d.	0.39	5.66	0.72	2.86	0.40	n.d.	5.14	13.23	1.11	0.53	0.41	5.43	12.3	-7.2	R1
2005/3/7	7.61	6.70	4.32	n.d.	0.42	6.46	0.83	3.01	0.20	n.d.	5.90	13.37	0.85	0.59	0.43	5.93	15.6	-6.1	R1
2005/3/23	7.61	6.70	3.53	n.d.	0.39	4.37	0.56	2.84	0.22	n.d.	4.23	22.41	0.59	0.43	0.54	5.36	-11.5	-11.1	R1
2005/4/6	7.54	6.71	4.40	n.d.	0.47	6.41	0.83	3.00	0.11	n.d.	5.91	30.85	0.63	0.59	0.72	7.21	-9.5	3.6	R1
2005/4/26	7.68	6.96	4.59	n.d.	0.49	7.15	0.92	2.92	0.30	n.d.	6.57	32.18	0.11	0.65	0.75	7.72	-7.6	5.2	
2005/5/10	7.61	6.18	4.20	n.d.	0.45	6.14	0.79	2.98	0.15	n.d.	5.34	28.31	0.72	0.57	0.66	6.78	-7.8	4.7	
2005/5/24	7.67	7.18	4.46	n.d.	0.54	7.04	0.95	2.81	0.34	n.d.	6.66	32.66	0.19	0.64	0.76	7.72	-8.7	3.6	R1
2005/6/6	7.69	7.69	4.68	n.d.	0.56	8.02	1.05	2.64	1.14	n.d.	7.05	35.37	0.30	0.70	0.82	8.42	-7.5	4.5	
2005/6/21	7.75	8.53	4.95	n.d.	0.62	8.74	1.14	2.40	1.70	n.d.	7.97	39.87	1.07	0.76	0.91	9.24	-9.1	4.0	R1
2005/7/5	7.55	6.83	4.32	n.d.	0.58	6.84	0.87	2.37	3.72	n.d.	4.50	29.76	1.09	0.62	0.71	7.32	-7.0	3.5	
2005/7/19	7.68	6.78	4.37	n.d.	0.52	6.65	0.89	2.86	0.21	n.d.	6.41	29.89	0.38	0.61	0.71	7.30	-7.5	3.7	
2005/8/9	7.63	7.77	4.75	n.d.	0.59	7.89	1.04	2.58	2.23	n.d.	6.89	33.87	0.50	0.70	0.81	8.37	-7.1	3.7	
2005/8/22	7.66	8.65	4.96	n.d.	0.64	9.13	1.16	2.46	5.39	n.d.	7.21	28.96	1.08	0.78	0.78	8.89	0.2	1.4	
2005/9/15	7.61	6.20	4.48	n.d.	0.52	5.95	0.80	2.94	0.09	n.d.	5.03	20.76	0.58	0.57	0.53	6.18	3.8	-0.1	
2005/9/28	7.66	7.94	4.80	n.d.	0.59	7.90	1.04	2.68	0.34	n.d.	8.18	33.15	1.04	0.70	0.79	8.35	-6.1	2.5	
2005/10/11	8.28	10.10	5.27	n.d.	0.64	13.15	1.47	2.76	0.68	n.d.	10.42	20.08	0.47	1.02	0.63	9.69	23.4	-2.1	R1
2005/10/25	7.78	9.81	5.22	n.d.	0.69	10.65	1.42	2.65	0.67	n.d.	11.73	23.85	0.43	0.89	0.72	9.39	10.6	-2.2	R1
2005/11/8	7.71	7.65	5.11	n.d.	0.70	9.51	1.45	3.28	1.56	n.d.	8.20	38.54	0.68	0.83	0.92	9.76	-4.9	12.1	
2005/11/22	7.66	9.78	4.83	n.d.	0.52	10.89	1.49	2.68	0.62	n.d.	11.74	40.66	0.00	0.89	1.00	10.60	-5.7	4.0	
2005/12/9																			



## Appendix 2c. 四万十川上流域の採水地点 A1 における渓流水分析データ

## Analytical data of streamwater at sampling location A1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2006/2/8	7.61	7.69	4.55	n.d.	0.46	7.97	1.11	3.33	1.02	n.d.	7.57	24.98	0.94	0.70	0.68	7.85	1.6	1.0	
2006/2/22	7.60	7.12	4.22	n.d.	0.52	6.34	0.93	2.93	0.30	n.d.	6.81	30.66	1.06	0.59	0.73	7.34	-10.8	1.5	R1
2006/3/8	7.63	7.04	4.28	n.d.	0.47	6.65	0.91	2.98	0.14	n.d.	6.84	29.34	0.71	0.60	0.71	7.33	-8.0	2.0	
2006/3/22	7.65	7.07	4.32	n.d.	0.50	5.91	0.87	2.93	0.21	n.d.	6.72	29.69	0.86	0.57	0.71	7.11	-11.4	0.3	R1
2006/4/12	7.40	4.57	3.52	n.d.	0.36	3.41	0.46	3.10	0.12	n.d.	3.52	17.04	0.61	0.37	0.44	4.56	-8.8	-0.1	R1
2006/4/25	7.55	6.61	4.33	n.d.	0.47	5.94	0.82	3.02	0.13	n.d.	6.08	27.24	0.72	0.56	0.66	6.82	-7.9	1.5	
2006/5/11	7.48	4.38	3.39	n.d.	0.39	2.82	0.41	2.79	0.12	n.d.	2.98	16.67	0.56	0.33	0.42	4.16	-11.2	-2.6	R1
2006/5/24	7.62	5.77	4.12	n.d.	0.43	5.07	0.69	2.96	0.04	n.d.	4.78	29.39	1.09	0.50	0.67	6.37	-14.2	4.9	R1
2006/6/13	7.56	5.97	4.19	n.d.	0.46	5.31	0.74	2.96	0.38	n.d.	4.85	30.48	0.53	0.52	0.69	6.61	-14.0	5.1	R1
2006/6/27	7.47	4.81	3.75	n.d.	0.32	3.49	0.50	2.92	0.04	n.d.	3.54	17.52	0.80	0.39	0.44	4.64	-6.9	-1.8	
2006/7/13	7.62	5.95	4.24	n.d.	0.41	4.74	0.66	2.88	0.12	n.d.	4.86	21.41	0.75	0.49	0.54	5.70	-4.8	-2.1	
2006/7/25	7.62	5.41	3.95	n.d.	0.42	4.49	0.60	2.86	0.09	n.d.	4.05	19.87	0.68	0.46	0.49	5.28	-3.8	-1.2	
2006/8/9	7.70	6.54	4.44	n.d.	0.48	5.99	0.78	2.88	0.33	n.d.	5.65	24.39	0.40	0.57	0.60	6.56	-3.0	0.1	
2006/8/23	7.55	4.74	4.00	n.d.	0.42	3.30	0.46	2.91	0.05	n.d.	2.98	20.15	0.02	0.39	0.48	4.73	-10.1	-0.1	R1
2006/9/5	7.62	5.91	4.25	n.d.	0.43	5.02	0.69	2.76	0.18	n.d.	4.24	26.90	0.27	0.50	0.61	6.08	-9.6	1.4	R1
2006/9/20	7.61	5.25	4.10	n.d.	0.41	4.36	0.58	2.78	0.08	n.d.	3.35	23.82	0.00	0.45	0.54	5.42	-8.6	1.6	R1
2006/10/4	7.62	6.30	4.48	n.d.	0.45	5.72	0.77	2.76	0.30	n.d.	4.76	26.23	0.44	0.56	0.61	6.43	-4.9	1.0	
2006/10/19	7.70	6.63	4.43	n.d.	0.45	6.04	0.80	2.66	1.01	n.d.	4.97	27.59	1.18	0.57	0.65	6.72	-6.2	0.7	
2006/12/8	7.60	8.19	4.34	n.d.	0.49	7.83	1.04	3.17	6.31	n.d.	6.24	25.76	1.06	0.68	0.74	8.15	-4.6	-0.3	
2007/2/21	7.56	6.46	4.11	n.d.	0.41	6.89	0.90	2.86	1.69	n.d.	6.38	22.57	0.80	0.61	0.61	6.93	-0.3	3.5	
2007/3/12	7.57	6.04	3.81	n.d.	0.36	5.91	0.76	2.70	1.17	n.d.	5.08	19.14	0.42	0.53	0.51	5.95	1.7	-0.8	
2007/3/28	7.57	6.22	4.06	0.04	0.45	6.24	0.82	2.82	0.42	n.d.	6.00	19.44	0.39	0.57	0.53	6.27	3.6	0.4	
2007/4/10	7.66	6.94	4.27	0.06	0.45	7.25	0.95	2.75	0.52	n.d.	7.19	25.82	0.67	0.64	0.66	7.34	-1.4	2.8	
2007/5/9	7.68	6.95	4.35	0.08	0.51	7.21	0.95	2.73	0.42	n.d.	7.68	21.67	0.68	0.64	0.60	7.13	3.6	1.3	
2007/5/23	7.68	7.31	3.74	0.02	0.39	6.67	0.82	2.55	0.60	n.d.	7.19	29.29	0.64	0.57	0.71	7.19	-10.7	-0.8	R1
2007/6/26	7.66	7.35	4.73	0.03	0.55	8.38	1.09	2.59	1.34	n.d.	7.65	30.12	0.76	0.73	0.75	8.29	-1.2	6.0	
2007/7/10	7.61	5.72	4.61	0.04	0.51	6.22	0.81	2.94	0.14	n.d.	5.20	22.22	1.49	0.59	0.56	6.45	3.1	6.0	
2007/7/26	7.72	6.53	4.39	0.11	0.52	6.17	0.83	2.63	0.13	n.d.	5.80	27.75	0.35	0.59	0.65	6.86	-5.3	2.5	
2007/8/9	7.66	6.29	4.14	0.04	0.47	6.10	0.79	2.68	0.08	n.d.	5.25	25.86	0.57	0.56	0.61	6.51	-4.0	1.7	
2007/8/29	7.75	7.54	4.57	0.04	0.54	7.86	1.01	2.66	0.29	n.d.	7.56	26.75	0.67	0.69	0.68	7.70	1.0	1.1	
2007/9/12	7.73	8.13	4.86	0.04	0.56	8.53	1.10	2.62	0.58	n.d.	8.47	29.33	1.00	0.74	0.74	8.38	0.3	1.5	
2007/9/26	7.72	6.99	4.62	n.d.	0.52	7.24	0.93	2.64	0.15	n.d.	6.16	30.35	0.14	0.65	0.70	7.49	-3.7	3.4	
2007/10/11	7.72	7.00	4.50	0.05	0.53	7.43	0.96	2.53	0.39	n.d.	6.32	32.26	0.97	0.66	0.74	7.72	-5.4	4.9	
2007/10/25	7.70	7.79	4.62	n.d.	0.48	8.02	1.03	2.60	0.27	n.d.	7.52	34.64	0.80	0.70	0.80	8.30	-6.9	3.2	
2007/11/13	7.76	8.57	4.97	n.d.	0.52	9.44	1.20	2.67	0.41	n.d.	9.72	34.56	1.26	0.80	0.85	9.27	-3.1	3.9	
2007/11/27	7.64	9.05	5.38	n.d.	0.55	10.29	1.35	2.72	0.73	n.d.	10.65	34.94	0.05	0.87	0.88	9.91	-0.6	4.6	
2007/12/10	7.55	9.22	5.08	n.d.	0.49	10.50	1.34	2.78	1.02	n.d.	11.50	32.92	0.43	0.87	0.87	9.94	-0.3	3.7	
2007/12/25	7.71	9.74	5.10	0.04	0.52	10.54	1.39	2.77	1.13	n.d.	11.57	40.59	0.48	0.88	1.00	10.58	-6.6	4.1	
2008/1/8	7.64	9.34	5.01	0.04	0.50	10.21	1.34	3.06	2.43	n.d.	9.98	31.68	0.07	0.85	0.85	9.73	0.0	2.0	
2008/1/22	7.65	7.96	4.62	0.05	0.48	8.59	1.10	2.77	0.89	n.d.	8.11	27.33	0.72	0.73	0.71	8.19	1.8	1.4	
2008/2/6	7.48	6.87	3.80	0.03	0.39	6.37	0.81	2.64	0.52	n.d.	6.96	23.65	0.48	0.56	0.62	6.67	-4.6	-1.4	
2008/2/19	7.71	8.17	4.73	n.d.	0.47	8.90	1.14	2.71	0.23	n.d.	9.53	30.30	0.00	0.76	0.78	8.67	-1.3	3.0	
2008/3/5	7.66	8.60	5.27	0.02	0.52	10.29	1.32	2.76	0.31	n.d.	10.63	32.98	0.00	0.87	0.84	9.69	1.2	6.0	
2008/3/18	7.73	8.93	4.81	n.d.	0.51	9.43	1.21	2.69	0.39	n.d.	10.78	32.53	0.00	0.79	0.84	9.27	-2.9	1.9	
2008/4/4	7.68	7.30	4.30	n.d.	0.49	7.71	0.98	2.71	0.17	n.d.	7.88	27.26	0.61	0.67	0.69	7.65	-1.8	2.4	
2008/4/21	7.77	7.54	4.58	n.d.	0.55	8.31	1.05	2.73	0.21	n.d.	8.28	30.74	0.05	0.71	0.76	8.26	-2.8	4.6	
2008/5/8	7.74	8.56	4.90	0.03	0.60	9.38	1.20	2.71	0.28	n.d.	9.81	32.56	0.00	0.80	0.82	9.13	-1.4	3.2	
2008/5/22	7.69	8.99	4.85	n.d.	0.64	9.85	1.24	2.62	0.41	n.d.	10.12	32.09	0.35	0.82	0.82	9.28	0.2	1.6	
2008/6/5	7.58	5.40	3.75	0.05	0.45	5.11	0.66	2.66	0.28	n.d.	4.74	20.95	1.50	0.49	0.52	5.65	-3.4	2.3	
2008/6/19	7.66	6.85	4.81	0.03	0.52	7.70	0.94	2.79	0.18	n.d.	7.12	25.57	0.33	0.69	0.65	7.53	2.7	4.7	
2008/7/7	7.66	6.44	4.99	n.d.	0.54	7.38	0.91	2.85	0.18	n.d.	6.31	23.13	0.00	0.67	0.59	7.15	6.4	5.3	
2008/7/23	7.72	7.97	4.63	n.d.	0.53	8.25	1.00	2.61	0.30	n.d.	8.23	29.89	0.95	0.71	0.74	8.14	-2.2	1.1	
2008/8/6	7.64	9.02	5.13	0.04	0.61	9.93	1.20	2.63	0.98	n.d.	9.95	32.69	0.81	0.84	0.83	9.44	0.1	2.3	
2008/8/20	7.76	10.30	5.47	n.d.	0.67	11.21	1.36	2.65	1.08	n.d.	11.62	35.28	0.08	0.93	0.91	10.45	0.8	0.7	
2008/9/4	7.79	10.03	5.12	0.06	0.73	11.24	1.38	2.44	1.33	n.d.	11.68	38.58	1.58	0.92	0.97	10.66	-2.4	3.0	
2008/9/22	7.66	7.01	4.24	0.03	0.48	7.34	0.90	2.63	0.38	n.d.	6.77	25.91	1.24	0.64	0.65	7.23	-0.6	1.5	
2008/10/6	7.68	5.91	3.96	0.16	0.48	5.97	0.76	2.55	0.67	n.d.	4.58	23.79	1.20	0.55	0.57	6.25	-1.3	2.8	
2008/10/22	7.78	7.50	4.59	0.07	0.54	8.34	1.03	2.61	0.19	n.d.	7.18	31.75	0.36	0.72	0.75	8.15	-1.9	4.2	
2008/11/6	7.59	8.00	4.77	0.04	0.56	9.04	1.13	2.60	0.19	n.d.	8.21	32.68	1.08	0.77	0.78	8.67	-1.0	4.0	
2008/11/20	7.75	7.15	4.30	0.02	0.50	7.77	0.97	2.54	0.28	n.d.	6.68	29.38	0.75	0.67	0.70	7.60	-2.1	3.1	
2008/12/4	7.76	7.57	4.45	n.d.	0.52	8.25	1.01	2.56	0.24	n.d.	7.11	30.86	0.85	0.70	0.73	7.98	-2.0	2.6	
2008/12/19	7.72	8.46	4.47	0.03	0.53	9.55	1.20	2.57	0.38	n.d.	8.94	32.45	0.67	0.80	0.80	8.97	0.1	2.9	
2009/1/9	7.71	9.50	5.01	n.d.	0.52	11.15	1.41	2.55	0.35	n.d.	11.19	36.60	0.86	0.90	0.91	10.24	-0.4	3.8	
2009/1/27	7.68	9.16	4.75	n.d.	0.49	10.78	1.37	2.50	0.44	n.d.	10.42	35.69	0.89	0.87	0.88	9.86	-0.5	3.7	
2009/2/9	7.74	8.32	4.51	n.d.	0.51	9.24	1.16	2.48	0.30	n.d.	8.82	32.12	0.09	0.77	0.78	8.71	-1.3	2.3	
2009/2/23	7.42	5.39	3.50	n.d.	0.44	5.36	0.68	2.60	0.52	n.d.	5.09	18.51							

## Appendix 2d. 四万十川上流域の採水地点 A1 における渓流水分析データ

## Analytical data of streamwater at sampling location A1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2009/5/11	7.80	8.87	4.93	n.d.	0.63	10.17	1.27	2.46	0.52	n.d.	10.34	34.83	0.65	0.84	0.86	9.62	-1.3	4.0	
2009/5/25	7.87	9.96	5.24	n.d.	0.67	11.82	1.46	2.52	0.87	n.d.	12.45	38.98	1.29	0.96	0.98	10.97	-1.4	4.8	
2009/6/8	7.82	10.31	5.17	n.d.	0.68	12.03	1.49	2.24	0.94	n.d.	11.16	40.57	1.00	0.97	0.98	10.89	-0.5	2.7	
2009/6/24	7.82	8.33	4.39	n.d.	0.65	9.23	1.15	2.01	1.07	n.d.	7.30	33.25	2.23	0.76	0.77	8.52	-0.5	1.1	
2009/7/8	7.68	7.28	4.25	n.d.	0.56	7.65	0.98	2.43	0.19	n.d.	6.80	28.34	0.56	0.66	0.68	7.48	-1.2	1.3	
2009/7/22	7.63	6.92	4.06	n.d.	0.59	7.47	0.96	2.03	1.78	n.d.	5.40	26.78	1.21	0.64	0.64	7.13	0.5	1.5	
2009/8/12	7.61	5.56	4.26	n.d.	0.50	5.01	0.69	2.52	0.08	n.d.	4.08	22.20	0.04	0.51	0.52	5.66	-1.6	0.9	
2009/8/27	7.70	7.70	4.73	n.d.	0.57	7.98	1.03	2.41	0.17	n.d.	7.18	31.11	0.67	0.70	0.73	7.96	-1.9	1.7	
2009/9/10	7.76	8.74	4.90	n.d.	0.62	9.32	1.20	2.37	0.48	n.d.	9.47	33.12	0.52	0.79	0.81	9.03	-1.3	1.7	
2009/9/25	7.77	9.76	5.29	n.d.	0.66	10.97	1.40	2.44	0.71	n.d.	10.93	37.67	1.03	0.91	0.93	10.32	-0.9	2.8	
2009/10/9	7.70	6.62	4.15	n.d.	0.50	7.02	0.88	2.37	0.32	n.d.	5.99	26.81	0.83	0.62	0.64	6.97	-1.6	2.6	
2009/10/23	7.73	7.86	4.64	n.d.	0.52	8.65	1.12	2.53	0.60	n.d.	8.35	30.65	0.78	0.74	0.76	8.41	-1.2	3.4	
2009/11/6	7.72	8.59	4.76	n.d.	0.54	9.69	1.27	2.44	1.24	n.d.	9.13	32.57	1.17	0.81	0.81	9.14	-0.2	3.1	
2009/11/24	7.44	7.12	4.34	n.d.	0.49	7.27	0.95	2.41	0.28	n.d.	6.58	27.30	0.00	0.64	0.66	7.25	-1.1	0.9	
2009/12/8	7.56	7.31	4.41	n.d.	0.47	7.84	1.03	2.55	0.81	n.d.	7.85	27.21	0.15	0.68	0.69	7.76	-1.1	3.0	
2009/12/22	7.63	7.67	4.45	n.d.	0.46	8.25	1.09	2.67	0.71	n.d.	8.38	27.76	0.45	0.71	0.72	8.06	-0.7	2.5	
2010/1/6	7.60	8.06	4.57	n.d.	0.44	8.77	1.15	2.55	0.54	n.d.	9.07	29.74	1.02	0.74	0.76	8.48	-1.0	2.5	
2010/1/20	7.69	8.29	4.39	n.d.	0.42	9.05	1.17	2.43	0.96	n.d.	9.17	30.26	0.93	0.75	0.77	8.60	-1.4	1.9	
2010/2/4	7.68	6.77	4.19	n.d.	0.44	7.09	0.93	2.54	0.39	n.d.	7.15	24.95	0.33	0.62	0.64	7.11	-0.9	2.5	
2010/2/18	7.73	7.42	4.49	n.d.	0.51	8.25	1.07	2.71	0.31	n.d.	8.55	28.12	0.00	0.71	0.72	8.09	-0.9	4.3	
2010/3/5	7.63	6.41	4.05	n.d.	0.49	6.68	0.85	2.56	0.22	n.d.	6.31	24.49	0.86	0.59	0.61	6.75	-1.3	2.6	
2010/3/19	7.69	6.44	4.18	n.d.	0.49	6.96	0.85	2.59	0.18	n.d.	6.27	24.92	0.52	0.61	0.62	6.88	-0.3	3.3	
2010/4/6	7.52	6.40	4.09	n.d.	0.49	6.50	0.81	2.43	0.12	n.d.	5.80	24.55	0.71	0.58	0.59	6.56	-1.1	1.3	
2010/4/30	7.45	5.18	3.99	n.d.	0.47	5.71	0.72	2.56	0.16	n.d.	5.11	21.90	0.84	0.53	0.54	5.99	-1.0	7.2	
2010/5/20	7.68	6.83	4.54	n.d.	0.55	7.82	0.97	2.32	0.30	n.d.	7.04	28.61	0.68	0.68	0.69	7.63	-0.4	5.5	
2010/6/4	7.46	7.03	4.52	n.d.	0.53	7.30	0.91	2.59	0.15	n.d.	6.80	26.99	0.00	0.65	0.66	7.33	-0.7	2.1	
2010/6/24	7.35	6.16	4.10	n.d.	0.48	6.12	0.77	2.34	0.22	n.d.	5.02	23.18	0.00	0.56	0.55	6.20	0.5	0.3	
2010/7/16	7.70	5.91	4.08	n.d.	0.46	5.71	0.72	2.53	0.18	n.d.	4.71	22.81	0.38	0.53	0.55	6.00	-1.2	0.8	
2010/8/5	7.73	6.52	4.28	n.d.	0.50	6.50	0.83	2.30	0.28	0.26	5.20	25.38	0.00	0.59	0.60	6.64	-0.9	0.9	
2010/8/24	7.59	7.03	4.56	n.d.	0.54	7.35	0.94	2.48	0.42	n.d.	6.96	27.76	0.30	0.66	0.68	7.46	-1.5	2.9	
2010/9/9	7.50	7.15	4.52	n.d.	0.57	7.71	0.98	2.18	1.97	n.d.	6.15	28.21	0.72	0.68	0.68	7.59	-0.6	3.0	
2010/10/5	7.48	6.00	4.04	n.d.	0.45	5.96	0.77	2.13	0.46	n.d.	4.91	23.09	1.34	0.55	0.55	6.09	0.0	0.7	
2010/10/22	7.71	7.41	4.59	n.d.	0.51	7.65	0.98	2.46	0.50	n.d.	6.76	27.82	0.26	0.67	0.67	7.54	0.1	0.8	
2010/11/16	7.42	7.80	4.67	n.d.	0.48	8.40	1.09	2.44	1.06	n.d.	17.24	22.11	0.53	0.72	0.81	9.21	-5.4	8.3	
2010/12/7	7.43	8.00	4.72	n.d.	0.46	8.86	1.11	2.24	1.05	n.d.	8.81	30.41	0.00	0.75	0.76	8.52	-0.7	3.2	
2011/1/5	7.66	8.26	4.65	n.d.	0.44	9.07	1.17	2.63	0.77	n.d.	9.68	29.83	0.07	0.76	0.78	8.74	-0.9	2.8	
2011/1/24	7.50	8.59	4.70	0.08	0.41	9.65	1.25	2.49	1.20	n.d.	9.98	30.96	0.43	0.80	0.80	9.14	0.0	3.1	
2011/2/15	7.60	9.02	4.72	n.d.	0.44	10.40	1.35	4.08	3.48	n.d.	9.77	28.30	1.08	0.85	0.84	9.76	0.5	4.0	
2011/3/15	7.52	6.73	4.27	0.03	0.45	7.67	0.99	2.54	1.06	n.d.	7.55	26.23	0.04	0.66	0.68	7.58	-1.0	5.9	
2011/3/28	7.55	8.21	4.59	0.02	0.41	9.08	1.16	2.57	0.95	n.d.	10.48	28.82	0.00	0.76	0.78	8.80	-1.2	3.4	
2011/4/20	7.63	8.34	4.60	n.d.	0.53	9.69	1.26	2.47	1.86	n.d.	8.84	31.51	0.96	0.80	0.80	9.05	0.1	4.1	
2011/5/10	7.55	6.25	4.00	n.d.	0.44	6.52	0.85	2.47	0.62	n.d.	5.94	23.88	0.01	0.58	0.59	6.60	-1.2	2.7	
2011/6/2	7.52	6.07	3.94	n.d.	0.47	5.87	0.78	2.49	0.18	n.d.	5.65	22.54	0.01	0.54	0.56	6.17	-1.8	0.9	
2011/6/18	7.38	5.18	3.83	n.d.	0.59	4.70	0.61	2.67	0.11	n.d.	4.20	19.46	0.68	0.47	0.48	5.32	-1.7	1.3	
2011/6/30	7.44	5.87	4.13	0.02	0.48	5.67	0.74	2.48	n.d.	n.d.	4.85	23.03	0.62	0.54	0.55	6.03	-1.0	1.3	
2011/7/13	7.57	7.03	4.44	n.d.	0.53	7.15	0.92	2.46	0.19	n.d.	6.55	27.18	0.55	0.64	0.65	7.22	-1.2	1.3	
2011/8/5	7.66	7.07	4.54	0.03	0.56	7.09	0.94	2.46	0.22	n.d.	6.25	28.06	0.39	0.64	0.66	7.27	-1.4	1.4	
2011/8/25	7.65	7.66	4.76	n.d.	0.71	8.01	1.04	2.62	0.36	n.d.	7.20	30.38	0.00	0.71	0.73	8.02	-1.2	2.3	
2011/9/22	7.53	5.12	4.17	n.d.	0.44	4.39	0.62	2.22	0.06	n.d.	2.98	20.74	0.16	0.46	0.47	5.06	-0.3	-0.6	
2011/10/5	7.59	6.88	4.69	0.02	0.54	7.12	0.94	2.47	0.15	n.d.	5.91	28.95	0.54	0.65	0.67	7.30	-1.4	3.0	
2011/10/28	7.58	6.59	4.40	n.d.	0.45	6.48	0.87	2.32	0.18	n.d.	5.32	27.15	0.42	0.60	0.62	6.73	-2.2	1.1	
2011/11/14	7.62	7.23	4.79	n.d.	0.50	7.94	1.05	2.33	0.26	n.d.	7.26	30.87	0.06	0.70	0.73	7.94	-1.6	4.7	
2011/12/9	7.70	7.11	4.60	n.d.	0.49	7.51	0.98	2.41	0.17	n.d.	6.57	29.04	0.97	0.67	0.68	7.50	-1.1	2.7	
2011/12/27	7.69	7.65	4.59	n.d.	0.47	8.51	1.11	2.40	0.22	n.d.	8.10	32.27	0.97	0.73	0.77	8.35	-2.8	4.3	
2012/1/12	7.63	8.63	5.02	n.d.	0.49	9.31	1.23	2.40	0.28	n.d.	9.25	34.31	0.27	0.80	0.83	9.08	-1.9	2.5	
2012/2/9	7.48	6.54	4.19	n.d.	0.41	6.74	0.89	2.30	0.40	n.d.	6.51	25.07	0.38	0.60	0.62	6.84	-1.3	2.2	
2012/2/24	7.41	5.84	3.90	n.d.	0.42	5.66	0.75	2.33	0.23	n.d.	5.57	21.41	0.92	0.52	0.54	5.96	-1.1	1.0	
2012/3/20	7.54	6.14	4.02	0.02	0.45	5.97	0.80	2.38	0.19	n.d.	6.00	24.46	0.99	0.55	0.60	6.41	-4.0	2.1	
2012/4/10	7.53	6.71	4.30	n.d.	0.52	6.44	0.86	2.40	0.16	n.d.	6.35	25.93	0.76	0.59	0.63	6.81	-2.9	0.7	
2012/5/11	7.60	6.81	4.34	n.d.	0.48	6.47	0.86	2.39	0.14	n.d.	6.26	26.44	1.21	0.59	0.63	6.83	-3.2	0.2	
2012/6/1	7.58	7.39	5.79	n.d.	1.69	8.38	1.10	3.23	0.37	n.d.	8.34	31.87	0.04	0.80	0.79	9.00	0.6	9.8	
2012/6/13	7.63	8.30	4.83	n.d.	0.56	8.38	1.09	2.03	0.50	n.d.	7.73	32.09	0.75	0.73	0.75	8.25	-1.3	-0.3	
2012/6/25	7.29	4.96	3.95	n.d.	0.47	4.21	0.59	2.51	0.17	n.d.	4.17	19.46	0.18	0.44	0.48	5.13	-4.0	1.7	
2012/7/13	7.41	4.88	3.75	n.d.	0.42	4.02	0.55	2.18	0.11	n.d.	3.38	19.15	1.09	0.42	0.45	4.78	-3.2	-1.1	
2012/7/30	7.49	6.19	4.56	n.d.	0.61	5.92	0.81	2.43	0.36	n.d.	5.46	26.63	0.93	0.58	0.62	6.63	-4.1	3.5	
2012/8/23	7.55	6.56	4.23	n.d.	0.48	6.07	0.84	1.98	1.32	n.d.	4.41	25.83	0.13	0.57	0.59	6.38	-2.1	-1.4	
2012/9/12	7.45	6.08	4.48	n.d.															

## Appendix 2e. 四万十川上流域の採水地点 A1 における渓流水分析データ

## Analytical data of streamwater at sampling location A1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2012/12/7	7.64	7.56	4.52	n.d.	0.41	8.41	1.02	2.34	1.75	n.d.	7.76	28.46	0.69	0.71	0.72	8.08	-0.8	3.3	
2012/12/26	7.50	7.09	4.40	n.d.	0.39	7.67	0.92	2.36	0.62	n.d.	7.39	27.05	0.00	0.66	0.67	7.50	-1.1	2.8	
2013/1/18	7.61	6.56	4.10	n.d.	0.38	6.91	0.83	2.31	0.56	n.d.	6.28	25.10	0.00	0.60	0.62	6.82	-1.3	1.9	
2013/2/8	7.53	5.56	3.71	n.d.	0.39	5.62	0.70	2.32	0.50	n.d.	5.08	20.50	0.00	0.51	0.52	5.75	-0.6	1.7	
2013/2/25	7.76	5.94	3.99	n.d.	0.42	6.15	0.78	2.36	0.27	n.d.	5.69	23.09	0.59	0.56	0.57	6.29	-1.1	2.8	
2013/3/15	7.65	6.69	4.34	n.d.	0.46	7.51	0.94	2.30	0.21	n.d.	6.80	26.78	0.00	0.65	0.65	7.28	0.3	4.2	
2013/4/5	7.48	7.28	4.46	0.01	0.51	7.86	0.98	2.33	0.42	n.d.	7.72	27.48	0.00	0.68	0.68	7.67	-0.2	2.6	
2013/4/25	7.57	5.74	3.57	n.d.	0.43	5.37	0.68	2.34	0.56	n.d.	4.94	19.43	0.00	0.49	0.50	5.56	-0.6	-1.6	
2013/6/5	7.67	8.48	4.95	0.01	0.58	9.78	1.19	2.27	0.66	n.d.	9.52	32.57	1.03	0.82	0.81	9.14	0.6	3.8	
2013/6/27	7.41	4.95	3.72	n.d.	0.44	5.08	0.64	2.33	0.24	n.d.	4.28	18.67	0.09	0.48	0.46	5.29	1.6	3.3	
2013/7/17	7.57	7.06	4.53	n.d.	0.52	7.85	0.94	2.32	0.64	n.d.	7.16	28.06	0.75	0.68	0.68	7.64	-0.4	3.9	
2013/8/9	7.56	8.87	5.24	n.d.	0.84	9.75	1.18	2.29	2.43	n.d.	8.07	32.39	0.62	0.83	0.80	9.19	1.8	1.8	
2013/8/27	7.57	9.19	5.21	n.d.	0.67	10.47	1.27	2.25	4.30	n.d.	8.79	32.03	1.26	0.87	0.84	9.71	1.8	2.7	
2013/9/6	7.50	5.72	4.15	n.d.	0.47	5.58	0.72	2.59	0.30	n.d.	4.87	21.05	1.29	0.53	0.52	5.90	0.6	1.6	
2013/9/17	7.36	6.80	4.42	n.d.	0.50	7.25	0.91	2.30	0.48	n.d.	6.83	26.23	0.09	0.64	0.64	7.21	-0.3	2.9	
2013/10/10	7.53	5.27	3.79	n.d.	0.44	5.06	0.64	2.15	0.24	n.d.	3.27	20.50	0.36	0.48	0.47	5.23	1.4	-0.4	
2013/10/22	7.60	6.75	4.45	n.d.	0.50	7.18	0.89	2.32	0.41	n.d.	5.91	26.23	0.11	0.64	0.63	7.03	1.0	2.0	
2013/10/30	7.65	6.30	4.50	n.d.	0.50	6.32	0.81	2.43	0.13	n.d.	4.86	24.86	0.02	0.59	0.58	6.47	1.0	1.3	
2013/11/18	7.52	6.84	4.64	n.d.	0.53	7.87	0.99	2.13	0.31	n.d.	6.38	28.98	1.10	0.69	0.67	7.55	1.3	5.0	
2013/12/13	7.48	7.50	4.66	n.d.	0.50	8.40	1.06	2.26	0.44	n.d.	7.04	29.13	0.45	0.72	0.69	7.91	2.0	2.6	
2014/1/7	7.59	7.55	4.52	n.d.	0.50	8.25	1.03	2.57	0.26	n.d.	5.50	28.98	0.46	0.71	0.67	7.59	2.9	0.3	
2014/1/27	7.65	8.13	4.83	n.d.	0.50	9.38	1.18	2.63	0.59	n.d.	6.51	24.46	0.20	0.79	0.62	7.95	11.9	-1.1	R1
2014/2/20	7.62	6.38	4.22	n.d.	0.47	7.18	0.90	2.65	0.48	n.d.	4.60	24.86	0.41	0.63	0.59	6.74	3.5	2.7	
2014/3/14	7.50	5.81	3.79	n.d.	0.45	6.04	0.74	2.37	0.36	n.d.	5.92	21.66	0.43	0.54	0.55	6.14	-1.1	2.8	
2014/4/3	7.42	5.85	3.93	n.d.	0.45	5.99	0.73	2.34	0.24	n.d.	5.59	22.27	0.46	0.54	0.55	6.13	-0.9	2.3	
2014/4/23	7.72	6.82	4.18	n.d.	0.50	7.26	0.90	2.30	0.33	n.d.	6.96	26.08	0.58	0.63	0.64	7.15	-0.9	2.3	
2014/5/9	7.71	7.82	4.81	n.d.	0.59	9.09	1.12	2.32	0.24	n.d.	8.89	31.11	0.25	0.77	0.76	8.63	0.4	4.9	
2014/5/27	7.74	7.03	4.27	n.d.	0.49	7.61	0.91	2.25	0.47	n.d.	7.09	27.15	0.29	0.65	0.66	7.38	-0.8	2.4	
2014/6/17	7.65	6.61	4.29	n.d.	0.50	7.33	0.88	2.31	0.24	n.d.	6.36	26.99	0.31	0.64	0.64	7.14	-0.5	3.9	
2014/7/9	7.61	5.70	4.00	n.d.	0.48	5.98	0.72	2.36	0.17	n.d.	5.10	22.72	0.08	0.54	0.55	6.09	-0.3	3.3	
2014/7/24	7.65	6.66	4.64	n.d.	0.54	7.43	0.90	2.36	0.33	n.d.	6.55	26.38	0.37	0.66	0.64	7.27	1.5	4.4	
2014/8/12	7.73	5.26	4.37	n.d.	0.46	4.73	0.65	2.19	0.04	n.d.	3.16	21.50	0.46	0.49	0.48	5.30	1.2	0.4	
2014/8/27	7.70	5.80	4.39	n.d.	0.50	5.92	0.77	2.14	0.10	n.d.	3.83	24.46	0.07	0.56	0.54	6.04	1.8	2.0	
2014/9/18	7.60	6.52	4.49	n.d.	0.55	6.74	0.87	2.06	0.10	n.d.	5.42	25.93	0.22	0.62	0.60	6.71	1.6	1.5	
2014/10/9	7.70	7.10	4.73	n.d.	0.64	8.04	1.06	2.08	0.30	n.d.	7.10	29.65	0.42	0.71	0.70	7.83	0.9	4.9	
2014/10/30	7.72	7.29	4.59	n.d.	0.58	7.65	1.01	1.87	0.20	n.d.	5.88	29.59	0.22	0.68	0.66	7.39	1.2	0.7	
2014/11/20	7.76	7.12	4.54	n.d.	0.54	8.24	1.07	1.79	0.21	n.d.	6.50	31.57	0.13	0.71	0.71	7.80	0.3	4.6	
2014/12/2	7.87	7.95	5.06	n.d.	0.62	9.41	1.22	2.14	0.30	n.d.	8.39	32.94	0.25	0.81	0.78	8.84	1.7	5.3	
2014/12/22	7.69	6.52	4.27	n.d.	0.52	7.28	0.93	2.21	0.21	n.d.	6.33	26.23	0.44	0.64	0.63	7.06	0.9	4.0	
2015/1/15	7.86	7.16	4.41	n.d.	0.53	8.08	1.03	2.47	0.57	n.d.	6.28	28.37	0.05	0.69	0.67	7.62	1.4	3.1	
2015/2/6	7.89	6.90	4.33	n.d.	0.52	7.52	0.96	2.23	0.31	n.d.	6.72	27.15	0.16	0.66	0.65	7.31	0.3	2.9	
2015/2/27	7.81	8.05	4.61	n.d.	0.59	9.31	1.26	2.39	0.33	n.d.	8.50	31.32	0.65	0.78	0.76	8.68	1.3	3.8	
2015/3/20	7.57	4.90	3.72	n.d.	0.50	5.28	0.69	2.29	0.27	n.d.	4.49	19.49	0.62	0.50	0.48	5.47	1.4	5.5	
2015/4/8	7.75	6.00	3.99	n.d.	0.49	6.55	0.82	2.24	0.17	n.d.	5.64	24.16	0.47	0.58	0.58	6.47	0.1	3.8	
2015/4/30	7.67	6.79	4.42	n.d.	0.56	7.57	0.93	2.19	0.28	n.d.	6.38	27.15	0.85	0.66	0.64	7.27	1.3	3.4	
2015/5/20	7.66	6.62	4.23	n.d.	0.53	7.39	0.90	2.25	0.36	n.d.	6.24	26.69	0.72	0.64	0.64	7.12	0.3	3.6	
2015/6/8	7.61	6.22	4.02	n.d.	0.48	6.96	0.85	2.21	0.32	n.d.	5.60	25.62	0.09	0.60	0.60	6.72	0.0	3.9	
2015/7/2	7.43	5.03	3.57	n.d.	0.43	4.62	0.58	2.19	0.12	n.d.	3.55	19.06	1.09	0.45	0.45	4.95	-0.5	-0.8	
2015/7/24	7.59	5.10	3.90	n.d.	0.45	5.32	0.67	2.21	0.22	n.d.	3.80	21.50	0.00	0.50	0.50	5.51	0.4	3.9	
2015/8/11	7.61	6.75	4.60	n.d.	0.57	7.43	0.92	2.16	0.24	n.d.	6.15	27.76	0.14	0.66	0.65	7.26	1.0	3.6	
2015/8/26	7.65	5.95	3.95	n.d.	0.49	5.92	0.75	2.14	0.37	n.d.	4.17	22.97	0.12	0.54	0.53	5.91	1.1	-0.3	
2015/9/25	7.44	5.62	3.82	n.d.	0.44	4.64	0.60	2.18	0.12	n.d.	2.91	20.74	0.28	0.46	0.46	5.04	-0.6	-5.5	
2015/10/15	7.67	6.54	4.50	n.d.	0.50	7.25	0.91	2.12	0.17	n.d.	5.45	28.21	0.22	0.64	0.64	7.06	0.5	3.9	
2015/11/4	7.65	7.24	4.63	n.d.	0.52	8.14	1.02	2.10	0.52	n.d.	6.75	29.59	0.55	0.71	0.69	7.77	0.9	3.5	
2015/11/18	7.60	6.74	4.27	n.d.	0.57	7.46	0.93	1.98	0.57	n.d.	5.19	27.76	1.36	0.65	0.63	7.04	1.7	2.2	
2015/12/8	7.69	6.27	4.31	n.d.	0.49	7.15	0.90	2.13	0.30	n.d.	5.74	26.54	0.42	0.63	0.62	6.93	0.9	5.0	
2015/12/24	7.59	6.58	4.49	n.d.	0.52	7.33	0.92	2.18	0.19	n.d.	5.68	27.45	0.38	0.65	0.63	7.10	1.4	3.8	

\* 分析値の品質管理: R1 はイオンバランス、R2 は電気伝導率比較が EANET (2010a) の推奨する許容範囲から外れていることを示す。Data quality control abbreviations: R1 and R2 indicate an analytical value that is outside the allowable range for respective R1 (ion balance) and R2 (comparison of electric conductivity) recommendations (EANET 2010a).

表中の n.d. は検出限界以下、n/a は欠測値を示す。Table abbreviations: n.d. indicates that it is below the detection limit; n/a indicates a missing value.

## Appendix 3a. 四万十川上流域の採水地点 A2 における渓流水分析データ

## Analytical data of streamwater at sampling location A2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2000/3/24	7.65	7.76	4.19	n.d.	0.72	9.02	1.24	2.84	1.97	n.d.	7.75	26.88	1.47	0.75	0.71	8.36	2.7	3.7	
2000/4/17	7.78	9.22	4.81	n.d.	0.72	10.91	1.50	2.49	0.93	n.d.	10.14	33.37	0.13	0.90	0.84	9.85	3.0	3.3	
2000/4/27	7.77	9.26	4.84	n.d.	0.72	11.64	1.61	2.49	1.33	n.d.	9.70	35.78	0.07	0.94	0.88	10.26	3.4	5.1	
2000/5/15	7.74	9.96	5.18	n.d.	0.72	11.53	1.56	2.46	1.25	n.d.	11.01	36.94	1.50	0.95	0.92	10.57	1.2	3.0	
2000/5/29	7.72	9.77	5.06	n.d.	0.74	11.55	1.56	2.39	2.12	n.d.	10.38	37.34	1.57	0.94	0.93	10.57	0.8	3.9	
2000/6/12	7.70	8.01	4.32	n.d.	0.64	9.20	1.25	2.27	1.04	n.d.	7.65	30.88	1.71	0.77	0.75	8.47	1.3	2.8	
2000/6/26	7.67	8.34	4.64	n.d.	0.64	9.50	1.32	2.33	1.00	n.d.	8.20	33.19	0.98	0.80	0.80	8.93	0.3	3.4	
2000/7/10	7.64	7.77	4.50	n.d.	0.64	8.98	1.24	2.31	0.85	n.d.	7.42	30.74	0.74	0.76	0.74	8.38	1.7	3.8	
2000/7/25	7.27	6.56	4.81	n.d.	0.52	5.97	1.26	3.07	0.99	n.d.	6.10	21.70	0.04	0.62	0.59	6.85	3.3	2.1	
2000/8/7	7.66	6.92	4.27	n.d.	0.68	7.52	1.05	2.43	0.74	n.d.	6.28	25.97	0.54	0.66	0.64	7.30	2.1	2.7	
2000/8/22	7.67	8.78	4.91	n.d.	0.85	10.24	1.39	2.47	1.30	n.d.	8.68	32.32	0.70	0.86	0.80	9.36	3.6	3.2	
2000/9/4	7.68	9.28	5.16	n.d.	0.86	11.30	1.55	2.51	1.86	n.d.	9.48	33.65	1.09	0.94	0.85	10.11	5.0	4.3	
2000/9/18	7.63	5.99	4.06	n.d.	0.58	6.38	0.93	2.39	0.63	n.d.	5.00	22.87	1.08	0.59	0.56	6.38	2.6	3.2	
2000/10/3	7.73	7.30	4.46	n.d.	0.70	8.10	1.15	2.24	0.88	0.41	6.63	26.83	1.24	0.71	0.67	7.78	3.1	3.2	
2000/10/18	7.73	8.30	4.80	n.d.	0.71	9.20	1.29	2.35	0.97	n.d.	8.25	32.19	1.23	0.79	0.78	8.82	0.7	3.0	
2000/11/6	7.74	7.11	4.34	n.d.	0.65	7.98	1.13	2.30	0.69	n.d.	6.37	28.20	1.13	0.70	0.67	7.62	1.8	3.5	
2000/11/21	7.79	8.52	4.77	n.d.	0.70	9.75	1.37	2.45	0.97	n.d.	8.56	29.36	1.55	0.82	0.74	8.87	5.1	2.0	
2000/12/5	7.69	8.83	4.81	n.d.	0.68	9.74	1.35	2.44	0.99	n.d.	9.41	30.55	1.09	0.82	0.78	9.09	2.6	1.5	
2000/12/18	7.74	9.12	4.86	0.02	0.68	10.45	1.44	2.48	1.01	n.d.	10.11	31.90	0.86	0.87	0.82	9.59	3.0	2.5	
2001/1/9	7.71	9.57	4.84	n.d.	0.63	11.07	1.54	2.58	1.11	n.d.	11.22	31.38	1.10	0.91	0.84	9.97	3.9	2.1	
2001/1/23	7.66	8.87	4.78	n.d.	0.50	10.40	1.45	2.61	1.20	n.d.	9.94	30.35	1.21	0.86	0.80	9.43	3.7	3.0	
2001/2/6	7.75	8.55	4.79	n.d.	0.53	9.82	1.36	2.46	0.85	n.d.	9.22	30.35	1.22	0.82	0.77	9.03	3.2	2.7	
2001/2/20	7.76	8.98	4.91	0.03	0.50	10.74	1.47	2.54	0.90	n.d.	10.41	31.72	0.75	0.88	0.82	9.71	3.6	3.9	
2001/3/6	7.75	8.51	4.54	n.d.	0.57	9.74	1.35	2.66	0.90	n.d.	9.02	34.17	0.51	0.81	0.84	9.25	-1.7	4.2	
2001/3/21	7.80	9.08	4.83	n.d.	0.63	10.51	1.44	2.56	0.87	n.d.	9.91	36.28	0.18	0.87	0.89	9.87	-1.0	4.2	
2001/4/10	7.80	10.01	5.22	n.d.	0.67	11.72	1.57	2.46	1.05	n.d.	11.19	39.20	0.68	0.96	0.96	10.80	-0.2	3.8	
2001/4/23	7.77	10.09	5.18	n.d.	0.69	11.87	1.63	2.51	1.07	n.d.	11.46	37.23	0.71	0.97	0.94	10.78	1.7	3.3	
2001/5/8	7.68	7.40	4.02	n.d.	0.58	8.61	1.19	2.40	0.93	n.d.	6.67	28.71	1.45	0.72	0.69	7.89	1.8	3.2	
2001/5/22	7.66	9.30	4.87	n.d.	0.68	10.79	1.45	2.39	1.15	n.d.	9.40	36.74	1.73	0.89	0.88	9.92	0.2	3.2	
2001/6/5	7.69	9.58	5.05	n.d.	0.63	11.36	1.53	2.40	1.15	n.d.	10.13	35.84	0.82	0.93	0.88	10.21	2.4	3.2	
2001/6/20	7.70	7.98	4.24	n.d.	0.60	9.26	1.26	2.03	1.62	n.d.	7.39	30.43	1.23	0.77	0.74	8.41	2.0	2.6	
2001/7/3	7.60	8.76	4.80	n.d.	0.60	10.70	1.45	2.38	1.00	n.d.	8.72	33.38	0.00	0.88	0.81	9.48	3.9	4.0	
2001/7/24	7.72	9.14	4.91	n.d.	0.67	10.55	1.43	2.32	1.21	n.d.	9.06	36.21	0.91	0.87	0.87	9.74	0.5	3.2	
2001/8/7	7.63	9.90	5.15	n.d.	0.71	11.51	1.57	2.34	1.44	n.d.	9.86	37.84	0.85	0.95	0.91	10.43	1.6	2.6	
2001/8/21	7.58	7.13	3.78	n.d.	0.64	8.01	1.11	1.77	3.31	n.d.	6.03	26.10	1.95	0.67	0.66	7.48	1.2	2.4	
2001/9/4	7.73	9.69	4.87	n.d.	0.67	11.37	1.57	2.11	1.71	n.d.	9.67	38.42	0.52	0.93	0.92	10.31	0.4	3.1	
2001/9/26	7.67	8.10	4.63	n.d.	0.55	9.12	1.29	2.32	0.74	n.d.	8.11	31.23	0.71	0.78	0.76	8.60	1.2	3.0	
2001/10/10	7.70	7.66	4.29	n.d.	0.54	8.67	1.23	2.07	0.92	n.d.	7.16	31.31	0.76	0.73	0.74	8.18	-0.1	3.3	
2001/10/24	7.72	7.90	4.57	n.d.	0.61	9.00	1.25	2.22	0.16	n.d.	7.48	32.47	0.94	0.77	0.75	8.44	0.9	3.3	
2001/11/7	7.75	8.07	4.21	n.d.	0.56	8.71	1.23	2.10	0.20	n.d.	7.35	32.13	0.91	0.73	0.74	8.19	-0.6	0.7	
2001/11/21	7.74	8.95	4.67	n.d.	0.59	10.09	1.44	2.24	0.58	n.d.	9.35	33.79	1.10	0.84	0.82	9.32	1.2	2.0	
2001/12/4	7.71	9.56	4.59	0.05	0.61	10.31	1.49	2.45	0.42	n.d.	10.14	35.05	1.13	0.86	0.86	9.67	-0.4	0.6	
2001/12/20	7.69	9.50	4.53	n.d.	0.54	10.35	1.48	2.46	0.55	n.d.	10.78	35.71	1.02	0.85	0.89	9.80	-2.2	1.6	
2002/1/8	7.65	9.81	4.74	0.09	0.55	10.89	1.55	2.59	0.76	n.d.	11.82	34.30	1.26	0.90	0.89	10.20	0.1	1.9	
2002/1/22	7.70	10.28	4.65	n.d.	0.56	11.09	1.58	2.79	1.06	n.d.	11.78	34.73	0.98	0.90	0.91	10.32	-0.6	0.2	
2002/2/7	7.67	10.21	4.73	n.d.	0.55	11.17	1.60	2.54	0.69	n.d.	11.84	35.69	0.84	0.91	0.91	10.35	-0.3	0.7	
2002/2/19	7.67	10.53	4.86	n.d.	0.55	11.53	1.66	2.58	0.94	n.d.	12.73	36.70	0.26	0.94	0.95	10.77	-0.9	1.1	
2002/3/5	7.67	10.01	4.49	n.d.	0.56	10.66	1.50	2.39	1.07	n.d.	11.28	34.10	1.07	0.86	0.88	9.91	-0.8	-0.5	
2002/3/19	7.73	10.59	5.27	n.d.	0.63	11.89	1.73	2.54	0.74	n.d.	12.46	33.40	0.96	0.98	0.89	10.70	4.8	0.5	
2002/4/9	7.73	9.37	4.49	n.d.	0.64	10.10	1.43	2.48	0.56	n.d.	9.69	30.69	0.50	0.83	0.78	9.17	3.1	-1.1	
2002/4/23	7.69	9.59	4.43	n.d.	0.65	10.47	1.47	2.50	0.65	n.d.	9.74	31.75	1.40	0.85	0.80	9.39	2.9	-1.1	
2002/5/8	7.69	8.65	4.32	n.d.	0.64	9.35	1.30	2.45	0.35	n.d.	8.47	34.17	0.67	0.78	0.81	8.88	-2.1	1.3	
2002/5/28	7.72	8.93	4.56	n.d.	0.63	9.71	1.37	2.41	0.38	n.d.	9.34	33.75	0.69	0.81	0.82	9.17	-0.6	1.3	
2002/6/11	7.73	9.89	4.75	n.d.	0.73	11.17	1.55	2.22	2.00	n.d.	9.97	35.96	1.18	0.91	0.89	10.16	1.1	1.3	
2002/6/25	7.86	10.06	4.59	n.d.	0.71	11.27	1.56	1.99	1.53	n.d.	9.70	39.48	0.88	0.91	0.93	10.26	-1.2	1.0	
2002/7/9	7.61	6.90	3.60	n.d.	0.62	7.49	1.03	1.82	0.65	n.d.	5.83	26.63	2.05	0.63	0.62	6.96	0.9	0.4	
2002/7/23	7.72	7.68	4.17	n.d.	0.64	8.04	1.14	2.40	0.51	n.d.	7.21	28.38	0.59	0.69	0.69	7.77	0.2	0.6	
2002/8/6	7.63	8.26	4.43	n.d.	0.65	8.72	1.23	2.39	0.39	n.d.	7.94	30.65	0.79	0.75	0.74	8.33	0.3	0.4	
2002/8/27	7.69	9.39	4.77	n.d.	0.72	10.49	1.47	2.40	0.55	n.d.	9.29	35.90	0.55	0.87	0.86	9.68	0.7	1.5	
2002/9/10	7.69	7.88	4.56	n.d.	0.60	8.43	1.18	2.48	0.16	n.d.	7.58	29.36	0.55	0.73	0.71	8.09	1.4	1.3	
2002/9/24	7.75	8.90	4.80	n.d.	0.66	9.95	1.43	2.52	0.21	n.d.	9.47	32.29	0.77	0.84	0.80	9.25	2.3	1.9	
2002/10/8	7.80	9.24	4.68	n.d.	0.64	10.38	1.42	2.50	0.62	n.d.	9.56	34.77	0.48	0.85	0.85	9.58	0.3	1.8	
2002/10/22	7.80	9.92	4.88	n.d.	0.65	11.30	1.56	2.48	0.58	n.d.	10.70	35.75	0.46	0.92	0.89	10.21	1.8	1.4	
2002/11/5	7.70	9.89	4.76	n.d.	0.60	11.39	1.59	2.86	0.96	n.d.	11.55	36.02	0.22	0.92	0.93	10.50	-0.3	3.0	
2002/11/19	7.74	10.21	5.00	n.d.	0.61	11.84	1.67	2.63	0.85	n.d.	12.00	35.87	0.37	0.96	0.93	10.73	1.9	2.5	
2002/12/3	7.61	10.37	4.80	n.d.	0.60	11.69	1.63	2.78	1.11	n.d.	11.96	35.89	0.00	0.94	0.93	10.68	0.4</		

## Appendix 3b. 四万十川上流域の採水地点 A2 における渓流水分析データ

## Analytical data of streamwater at sampling location A2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2003/2/18	7.68	9.88	5.00	n.d.	0.54	11.43	1.57	2.66	0.54	n.d.	11.00	35.72	0.09	0.93	0.90	10.34	1.8	2.3	
2003/3/4	7.66	8.80	4.46	n.d.	0.52	9.86	1.35	2.87	0.54	n.d.	8.37	31.69	0.39	0.81	0.78	8.97	1.7	1.0	
2003/3/18	7.69	8.13	4.35	n.d.	0.53	8.92	1.22	2.82	0.35	n.d.	7.73	29.53	0.35	0.75	0.73	8.32	1.2	1.2	
2003/4/7	7.75	8.39	4.49	0.03	0.56	9.33	1.27	2.77	0.38	n.d.	8.12	30.37	0.30	0.78	0.75	8.63	2.0	1.4	
2003/4/21	7.76	9.07	4.75	n.d.	0.62	9.98	1.36	2.65	0.47	n.d.	8.94	32.87	0.50	0.83	0.81	9.22	1.6	0.8	
2003/5/8	7.69	9.00	4.61	n.d.	0.65	9.96	1.37	2.24	0.80	n.d.	8.50	35.19	0.69	0.83	0.83	9.24	-0.2	1.3	
2003/5/22	7.74	7.58	4.34	n.d.	0.55	7.76	1.09	2.55	0.30	n.d.	6.90	27.90	0.33	0.68	0.68	7.60	0.1	0.1	
2003/6/4	7.68	6.66	4.13	n.d.	0.54	6.46	0.97	2.52	0.08	n.d.	5.75	24.17	0.48	0.60	0.59	6.62	0.6	-0.3	
2003/6/19	7.59	5.37	3.42	0.02	0.50	5.22	0.76	2.07	0.28	n.d.	4.05	20.79	0.63	0.49	0.49	5.40	-0.2	0.3	
2003/7/3	7.69	7.28	4.30	0.04	0.55	7.55	1.09	2.38	0.32	n.d.	5.94	28.71	0.01	0.67	0.67	7.41	0.2	0.9	
2003/7/17	7.75	7.99	4.53	0.04	0.62	8.44	1.21	2.37	0.50	n.d.	6.98	33.33	0.33	0.74	0.77	8.31	-2.1	2.0	
2003/8/1	7.74	8.92	4.74	n.d.	0.67	9.48	1.34	2.31	0.79	n.d.	8.21	28.34	1.28	0.81	0.71	8.58	6.1	-1.9	
2003/8/14	7.55	5.35	3.25	0.02	0.57	5.30	0.79	1.49	0.69	n.d.	3.59	21.49	2.22	0.49	0.48	5.31	0.7	-0.4	
2003/9/4	7.77	8.67	4.93	0.11	0.72	9.29	1.33	2.46	0.86	n.d.	8.05	18.89	4.05	0.81	0.56	7.94	18.3	-4.4	R1
2003/9/18	7.73	8.25	4.70	n.d.	0.76	8.88	1.27	2.45	0.58	n.d.	7.31	31.88	0.53	0.77	0.75	8.49	1.2	1.5	
2003/10/8	7.73	9.32	4.83	n.d.	0.79	10.06	1.43	2.46	0.85	n.d.	9.59	36.24	0.01	0.85	0.88	9.68	-1.5	1.9	
2003/10/22	7.79	8.69	4.81	n.d.	0.62	9.67	1.35	2.46	0.48	n.d.	8.23	33.73	0.54	0.82	0.80	9.04	1.1	2.0	
2003/11/12	7.76	9.05	4.95	n.d.	0.66	10.29	1.46	2.46	0.79	n.d.	8.44	35.17	0.57	0.87	0.83	9.49	1.8	2.4	
2003/11/26	7.72	9.51	5.11	n.d.	0.62	10.96	1.54	2.48	0.92	n.d.	9.86	35.39	0.48	0.91	0.87	10.02	2.3	2.6	
2003/12/10	7.65	8.52	4.38	0.02	0.49	8.78	1.22	2.53	0.59	n.d.	8.11	31.85	0.25	0.74	0.77	8.48	-1.9	-0.2	
2003/12/24	7.62	9.11	5.00	n.d.	0.54	10.35	1.45	2.61	0.64	n.d.	9.00	35.29	0.28	0.87	0.85	9.61	1.0	2.7	
2004/1/7	7.56	9.42	4.91	n.d.	0.51	10.43	1.46	2.58	0.70	n.d.	10.30	37.80	0.24	0.87	0.92	10.01	-2.8	3.1	
2004/1/21	7.65	9.84	4.92	n.d.	0.47	10.62	1.51	2.79	0.79	n.d.	10.68	43.86	0.34	0.88	1.03	10.64	-8.0	3.9	
2004/2/5	7.58	9.86	5.08	n.d.	0.48	10.78	1.53	2.81	0.98	n.d.	10.86	35.92	0.29	0.90	0.91	10.21	-0.7	1.8	
2004/2/20	7.67	9.90	5.26	0.05	0.54	11.28	1.61	2.71	0.88	n.d.	11.42	41.39	0.34	0.94	1.01	10.93	-3.4	4.9	
2004/3/4	7.73	9.67	4.82	n.d.	0.47	10.27	1.50	2.88	1.29	n.d.	10.64	39.51	0.62	0.86	0.97	10.27	-6.2	3.0	
2004/3/24	7.75	9.96	4.99	n.d.	0.55	10.96	1.56	2.86	1.35	n.d.	10.63	40.31	0.65	0.91	0.98	10.61	-4.1	3.1	
2004/4/6	7.76	9.35	4.78	n.d.	0.53	10.21	1.44	2.74	0.82	n.d.	9.76	39.90	0.77	0.85	0.95	10.02	-5.5	3.5	
2004/4/21	7.71	8.49	4.53	n.d.	0.58	9.09	1.29	2.74	1.11	n.d.	8.13	37.54	1.03	0.77	0.88	9.17	-6.6	3.8	
2004/5/14	7.55	5.90	3.53	n.d.	0.41	5.28	0.77	2.63	0.94	n.d.	4.96	24.99	0.71	0.49	0.60	6.07	-10.2	1.5	R1
2004/5/31	7.72	8.31	4.62	n.d.	0.62	8.54	1.23	2.59	0.73	n.d.	7.99	37.87	0.78	0.74	0.87	8.93	-7.9	3.6	
2004/6/11	7.74	8.35	4.60	n.d.	0.62	9.14	1.30	2.24	1.27	n.d.	8.04	37.21	1.24	0.78	0.86	9.08	-5.0	4.2	
2004/6/28	7.71	7.66	4.80	n.d.	0.62	8.18	1.20	2.75	0.63	n.d.	7.26	35.20	0.77	0.73	0.82	8.56	-5.5	5.5	
2004/7/12	7.72	8.70	4.88	n.d.	0.63	9.15	1.33	2.53	0.90	n.d.	8.14	40.29	0.30	0.79	0.92	9.42	-7.1	4.0	
2004/7/26	7.69	9.53	5.24	n.d.	0.71	10.59	1.50	2.58	1.29	n.d.	9.58	43.44	0.49	0.90	1.01	10.54	-5.6	5.0	
2004/8/9	7.64	6.86	4.40	n.d.	0.52	6.95	1.02	2.48	0.55	n.d.	5.84	35.30	0.54	0.64	0.78	7.71	-10.1	5.8	R1
2004/8/27	7.68	7.29	4.49	n.d.	0.52	7.56	1.09	2.50	0.50	n.d.	6.09	37.25	0.43	0.68	0.82	8.13	-9.4	5.4	R1
2004/9/13	7.43	4.63	3.91	n.d.	0.48	3.67	0.64	3.09	0.26	n.d.	2.66	20.11	0.62	0.42	0.48	4.91	-6.6	3.0	
2004/9/27	7.68	7.57	4.98	n.d.	0.64	8.01	1.23	2.86	0.52	n.d.	6.06	35.71	0.54	0.73	0.80	8.41	-4.4	5.3	
2004/10/12	7.67	7.75	4.86	n.d.	0.57	8.13	1.22	2.90	0.47	n.d.	6.60	37.60	0.40	0.73	0.84	8.64	-7.0	5.4	
2004/10/25	7.62	6.59	4.35	n.d.	0.59	6.00	1.02	2.80	0.26	n.d.	5.06	32.83	0.71	0.59	0.73	7.16	-10.6	4.1	R1
2004/11/8	7.67	7.69	4.79	n.d.	0.62	8.12	1.27	2.76	0.35	n.d.	6.68	38.40	0.73	0.73	0.85	8.68	-7.4	6.0	
2004/11/22	7.62	7.73	4.73	n.d.	0.57	8.31	1.27	2.70	0.36	n.d.	6.57	37.61	0.55	0.74	0.84	8.62	-6.1	5.4	
2004/12/6	7.55	6.64	4.10	n.d.	0.52	6.25	0.96	2.57	0.49	n.d.	4.93	30.90	0.81	0.58	0.69	6.95	-8.4	2.3	R1
2004/12/21	7.59	8.46	4.77	n.d.	0.57	8.74	1.31	2.72	0.47	n.d.	7.84	37.34	0.42	0.77	0.86	8.98	-5.7	3.0	
2005/1/7	7.63	8.83	4.78	n.d.	0.52	9.32	1.37	2.73	0.54	n.d.	8.96	33.37	0.76	0.80	0.82	9.08	-1.3	1.4	
2005/1/21	7.76	9.22	4.89	n.d.	0.50	9.74	1.43	2.80	0.53	n.d.	10.01	34.06	0.54	0.83	0.85	9.49	-1.5	1.5	
2005/2/7	7.50	9.21	4.73	n.d.	0.48	9.61	1.42	3.17	0.88	n.d.	9.23	32.98	0.26	0.81	0.84	9.32	-1.4	0.6	
2005/2/18	7.74	8.57	4.48	n.d.	0.51	8.87	1.27	2.73	0.82	n.d.	7.98	33.71	0.76	0.75	0.81	8.73	-3.5	0.9	
2005/3/7	7.64	8.69	4.67	n.d.	0.48	9.12	1.32	2.69	0.50	n.d.	8.69	34.30	0.94	0.78	0.83	8.98	-3.0	1.6	
2005/3/23	7.59	8.69	3.74	n.d.	0.46	6.23	0.90	2.51	0.95	n.d.	5.41	29.75	0.79	0.56	0.69	6.86	-10.2	-11.7	R1
2005/4/6	7.67	8.38	4.74	n.d.	0.55	8.70	1.25	2.70	0.44	n.d.	8.05	38.72	0.57	0.76	0.89	9.07	-7.8	3.9	
2005/4/26	7.74	9.07	5.10	n.d.	0.63	10.02	1.45	2.69	0.72	n.d.	9.23	43.28	0.59	0.86	0.99	10.19	-7.2	5.8	
2005/5/10	7.71	8.18	4.78	n.d.	0.60	8.95	1.28	2.67	0.62	n.d.	7.73	39.60	0.66	0.77	0.90	9.19	-7.2	5.8	
2005/5/24	7.78	9.19	4.97	n.d.	0.65	9.89	1.43	2.57	0.81	n.d.	9.15	43.38	0.61	0.84	0.99	10.10	-7.8	4.7	
2005/6/6	7.74	9.73	5.22	n.d.	0.68	10.75	1.54	2.57	0.96	n.d.	10.09	45.19	0.00	0.91	1.04	10.77	-6.8	5.1	
2005/6/21	7.77	10.28	5.32	n.d.	0.73	11.46	1.62	2.55	1.06	n.d.	10.62	49.03	0.00	0.96	1.11	11.42	-7.7	5.3	
2005/7/5	7.66	8.34	4.43	n.d.	0.72	9.08	1.29	2.09	1.97	n.d.	7.70	37.65	1.33	0.77	0.87	9.06	-6.0	4.2	
2005/7/19	7.79	8.53	4.77	n.d.	0.69	9.20	1.29	2.55	0.81	n.d.	8.04	39.72	0.69	0.79	0.90	9.34	-6.7	4.5	
2005/8/9	7.67	9.78	5.29	n.d.	0.76	10.92	1.53	2.56	1.38	0.19	10.13	44.99	0.48	0.92	1.05	10.94	-6.5	5.6	
2005/8/22	7.69	10.16	5.25	n.d.	0.80	11.54	1.61	2.43	3.07	n.d.	10.04	29.36	1.01	0.96	0.81	10.12	8.4	-0.2	R1
2005/9/15	7.63	7.35	4.64	n.d.	0.63	7.49	1.12	2.65	0.43	n.d.	6.76	22.68	0.72	0.68	0.59	7.24	7.0	-0.7	
2005/9/28	7.96	9.06	4.97	n.d.	0.65	9.91	1.35	2.59	0.64	n.d.	8.67	42.27	0.61	0.84	0.96	9.90	-6.6	4.4	
2005/10/11	7.68	9.58	5.25	n.d.	0.67	10.11	1.45	2.62	0.91	n.d.	9.78	15.54	0.43	0.87	0.55	8.34	22.8	-6.9	R1
2005/10/25	7.73	9.67	4.76	n.d.	0.59	10.07	1.42	2.60	1.03	n.d.	10.86	40.10	0.31	0.84	0.97	10.17	-7.3	2.5	
2005/11/8	7.77	8.48	4.63	n.d.	0.60	8.95	1.30	2.54	1.01	n.d.	8.85	35.51	0.44	0.77	0.85	9.			

## Appendix 3c. 四万十川上流域の採水地点 A2 における渓流水分析データ

## Analytical data of streamwater at sampling location A2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2006/1/25	7.74	9.64	5.10	n.d.	0.49	10.53	1.55	2.96	0.54	n.d.	11.14	37.53	1.16	0.89	0.94	10.30	-2.8	3.3	
2006/2/8	7.79	9.87	5.13	n.d.	0.53	11.08	1.61	3.19	0.63	n.d.	11.32	37.15	0.86	0.92	0.94	10.57	-1.2	3.4	
2006/2/22	7.74	9.74	4.80	n.d.	0.55	10.03	1.46	2.91	0.51	n.d.	10.22	42.58	1.16	0.84	1.00	10.26	-8.5	2.6	R1
2006/3/8	7.75	8.95	4.63	n.d.	0.52	9.10	1.31	2.88	0.41	n.d.	9.10	38.47	0.80	0.78	0.91	9.37	-7.8	2.3	
2006/3/22	7.73	8.88	4.59	n.d.	0.49	9.02	1.33	2.78	0.54	n.d.	8.95	38.43	0.72	0.77	0.90	9.30	-7.9	2.3	
2006/4/12	7.47	5.64	3.64	n.d.	0.46	4.95	0.73	2.91	0.48	n.d.	4.86	16.96	0.69	0.48	0.47	5.40	0.9	-2.2	
2006/4/25	7.70	7.93	4.54	n.d.	0.54	7.86	1.14	2.85	0.37	n.d.	7.72	34.39	0.65	0.70	0.81	8.37	-7.5	2.7	
2006/5/11	7.57	5.27	3.45	n.d.	0.42	4.44	0.67	2.46	0.38	n.d.	3.88	20.88	1.08	0.44	0.50	5.18	-6.5	-0.8	
2006/5/24	7.68	7.03	4.36	n.d.	0.54	6.81	1.00	2.69	0.36	n.d.	6.05	37.02	0.64	0.63	0.81	7.84	-13.1	5.5	R1
2006/6/13	7.72	8.19	4.78	n.d.	0.60	8.55	1.23	2.74	0.48	n.d.	8.09	40.72	1.85	0.75	0.92	9.20	-10.1	5.8	R1
2006/6/27	7.56	5.93	3.89	n.d.	0.49	5.45	0.81	2.40	0.20	n.d.	4.74	22.60	0.96	0.52	0.54	5.89	-1.8	-0.3	
2006/7/13	7.68	7.26	4.41	n.d.	0.56	6.97	1.03	2.49	0.43	n.d.	6.26	27.74	0.68	0.64	0.66	7.24	-1.8	-0.1	
2006/7/25	7.67	6.60	4.18	n.d.	0.52	6.15	0.90	2.46	0.38	n.d.	5.32	25.41	0.53	0.58	0.60	6.54	-2.3	-0.4	
2006/8/9	7.76	8.28	4.80	n.d.	0.65	8.37	1.17	2.60	0.64	n.d.	7.41	32.18	0.55	0.74	0.77	8.38	-1.8	0.6	
2006/8/23	7.56	5.40	3.76	n.d.	0.44	4.42	0.71	2.29	0.28	n.d.	3.89	23.54	0.54	0.45	0.54	5.42	-8.2	0.2	R1
2006/9/5	7.66	7.42	4.55	n.d.	0.60	7.21	1.05	2.47	0.40	n.d.	6.01	32.36	0.37	0.66	0.73	7.64	-5.3	1.5	
2006/9/20	7.66	6.19	4.14	n.d.	0.49	5.57	0.83	2.38	0.28	n.d.	4.41	27.19	0.93	0.54	0.61	6.28	-6.1	0.7	
2006/10/4	7.67	7.97	4.79	n.d.	0.56	8.08	1.14	2.55	0.45	n.d.	6.88	33.22	0.47	0.72	0.77	8.22	-3.2	1.5	
2006/10/19	7.72	8.48	4.88	n.d.	0.55	8.60	1.24	2.54	0.60	n.d.	8.17	33.96	0.43	0.76	0.81	8.71	-3.2	1.4	
2006/11/7	7.70	9.23	5.04	n.d.	0.60	9.58	1.34	2.64	0.70	n.d.	9.38	38.81	0.00	0.82	0.92	9.68	-5.4	2.4	
2006/11/21	7.73	9.63	5.14	n.d.	0.61	9.10	1.36	2.80	0.94	n.d.	9.91	38.96	0.79	0.80	0.94	9.73	-7.7	0.5	
2006/12/8	7.69	9.65	4.81	n.d.	0.56	10.08	1.44	3.10	1.27	n.d.	9.93	36.84	1.38	0.85	0.92	9.93	-4.1	1.4	
2006/12/21	7.71	9.67	4.94	n.d.	0.51	9.90	1.41	2.71	0.75	n.d.	11.01	37.76	0.00	0.84	0.94	9.99	-5.6	1.6	
2007/1/10	7.69	9.92	5.09	n.d.	0.47	9.44	1.52	3.06	0.97	n.d.	12.27	34.73	0.61	0.83	0.93	10.01	-5.5	0.5	
2007/1/23	7.73	10.27	5.11	0.04	0.56	11.15	1.59	2.72	0.84	n.d.	12.03	31.03	0.45	0.93	0.85	10.19	4.4	-0.4	
2007/2/7	7.53	10.27	5.28	0.06	0.58	11.79	1.67	2.64	0.87	n.d.	12.84	34.24	0.68	0.97	0.92	10.82	3.0	2.6	
2007/2/21	7.74	9.24	5.00	n.d.	0.56	11.14	1.57	2.78	0.95	n.d.	11.72	36.01	0.53	0.92	0.93	10.48	-0.6	6.3	
2007/3/12	7.72	9.91	4.90	n.d.	0.54	11.04	1.53	2.62	0.61	n.d.	11.75	32.93	0.60	0.90	0.87	10.11	2.0	1.0	
2007/3/28	7.84	8.76	4.57	0.04	0.56	9.75	1.37	2.52	0.78	n.d.	9.44	28.33	0.59	0.81	0.74	8.88	4.5	0.7	
2007/4/10	7.77	9.64	5.01	0.13	0.58	10.93	1.52	2.58	0.52	n.d.	11.26	39.22	0.67	0.91	0.96	10.52	-2.5	4.4	
2007/4/24	7.78	10.22	5.31	0.09	0.65	11.80	1.65	2.60	0.98	n.d.	11.99	40.45	0.73	0.98	1.00	11.16	-1.2	4.4	
2007/5/9	7.70	9.11	4.62	0.41	0.96	10.10	1.41	2.43	0.77	n.d.	9.53	31.51	1.04	0.87	0.80	9.47	4.3	1.9	
2007/5/23	7.73	10.10	4.47	n.d.	0.54	10.16	1.37	2.36	0.75	n.d.	10.90	40.42	0.73	0.83	0.97	10.05	-7.8	-0.3	
2007/6/13	7.70	10.32	5.21	0.06	0.67	11.79	1.61	2.49	1.41	n.d.	11.55	43.72	0.62	0.97	1.05	11.30	-4.1	4.5	
2007/6/26	7.75	9.84	5.49	0.11	0.76	12.19	1.67	2.43	1.09	n.d.	10.95	42.48	0.00	1.01	1.01	11.31	0.0	6.9	
2007/7/10	7.69	6.88	4.73	0.06	0.62	8.18	1.15	2.52	0.42	n.d.	6.46	30.23	1.13	0.73	0.71	7.98	1.4	7.4	
2007/7/26	7.73	7.78	4.63	0.13	0.66	7.95	1.16	2.44	0.48	n.d.	7.41	34.71	1.23	0.72	0.80	8.40	-5.4	3.8	
2007/8/9	7.71	7.40	4.53	0.07	0.60	7.85	1.14	2.48	0.35	n.d.	6.56	31.11	0.55	0.70	0.72	7.89	-1.4	3.2	
2007/8/29	7.72	9.28	4.94	n.d.	0.70	10.05	1.40	2.47	0.89	n.d.	9.26	31.40	0.30	0.85	0.79	9.28	3.5	0.0	
2007/9/12	7.73	9.89	5.26	0.03	0.75	11.04	1.55	2.44	1.23	n.d.	10.30	37.45	0.88	0.93	0.92	10.37	0.6	2.4	
2007/9/26	7.76	8.41	4.86	n.d.	0.66	9.20	1.29	2.43	0.56	n.d.	7.79	39.02	0.18	0.79	0.88	9.21	-5.1	4.6	
2007/10/11	7.79	8.36	4.71	n.d.	0.67	9.39	1.32	2.18	0.78	n.d.	7.60	41.79	1.45	0.80	0.92	9.39	-6.9	5.8	
2007/10/25	7.75	9.46	4.66	n.d.	0.57	10.05	1.41	2.39	0.65	n.d.	9.93	40.84	0.13	0.83	0.95	9.94	-6.7	2.5	
2007/11/13	7.76	10.08	5.25	n.d.	0.64	11.65	1.67	2.50	0.84	n.d.	11.45	50.72	0.90	0.96	1.15	11.70	-9.0	7.4	R1
2007/11/27	7.66	10.27	5.44	n.d.	0.65	12.15	1.73	2.54	0.78	n.d.	12.41	39.27	0.07	1.00	0.99	11.24	0.8	4.5	
2007/12/10	7.69	10.62	5.55	n.d.	0.63	12.80	1.84	2.67	0.78	n.d.	13.31	39.24	1.55	1.05	1.01	11.68	1.9	4.7	
2007/12/25	7.68	10.85	5.27	n.d.	0.61	12.27	1.73	2.73	0.97	n.d.	12.72	44.98	0.05	1.00	1.09	11.76	-4.5	4.0	
2008/1/8	7.66	9.80	4.88	0.05	0.55	11.47	1.65	3.48	1.37	n.d.	10.83	34.81	1.41	0.94	0.92	10.56	1.1	3.8	
2008/1/22	7.72	9.07	4.61	0.06	0.55	10.34	1.47	2.73	0.75	n.d.	9.54	32.53	1.20	0.85	0.82	9.48	2.0	2.2	
2008/2/6	7.65	8.90	4.20	n.d.	0.46	8.98	1.26	2.51	0.52	n.d.	9.54	32.18	0.10	0.75	0.81	8.75	-3.8	-0.8	
2008/2/19	7.71	9.60	5.02	n.d.	0.51	10.80	1.54	2.57	0.46	n.d.	11.39	35.96	0.00	0.90	0.91	10.20	-0.5	3.0	
2008/3/5	7.76	9.97	5.40	n.d.	0.56	12.24	1.76	2.66	0.57	n.d.	12.56	35.59	0.00	1.00	0.93	11.01	3.9	5.0	
2008/3/18	7.73	11.16	5.77	n.d.	0.63	12.13	1.74	3.52	1.06	n.d.	11.23	41.70	1.13	1.02	1.03	11.53	-0.9	1.6	
2008/4/4	7.73	8.82	4.64	0.05	0.55	9.83	1.37	2.53	0.41	n.d.	9.71	34.26	1.11	0.82	0.84	9.36	-1.2	3.0	
2008/4/21	7.76	8.95	4.78	0.06	0.60	10.17	1.41	2.55	0.50	n.d.	9.66	36.03	0.24	0.85	0.87	9.66	-1.2	3.8	
2008/5/8	7.71	9.73	5.17	n.d.	0.65	11.06	1.55	2.54	0.68	n.d.	10.83	37.12	0.64	0.92	0.92	10.35	0.2	3.1	
2008/5/22	7.75	10.05	5.03	n.d.	0.66	11.17	1.56	2.43	0.77	n.d.	10.88	37.39	0.66	0.92	0.92	10.37	0.1	1.6	
2008/6/5	7.70	5.97	3.60	0.05	0.50	6.10	0.85	1.91	0.41	n.d.	5.02	24.68	1.22	0.55	0.57	6.18	-2.0	1.7	
2008/6/19	7.63	8.28	5.10	0.04	0.64	10.14	1.37	2.46	0.57	n.d.	8.60	32.55	0.86	0.86	0.79	9.26	4.1	5.6	
2008/7/7	7.67	7.89	4.25	n.d.	0.54	7.74	1.08	2.27	0.30	n.d.	7.13	12.46	0.34	0.67	0.42	6.42	23.0	-10.3	R1
2008/7/23	7.70	9.38	4.92	n.d.	0.66	10.30	1.39	2.35	0.98	n.d.	9.31	37.21	0.66	0.86	0.89	9.74	-1.5	1.9	
2008/8/6	7.63	10.14	5.30	0.02	0.73	11.53	1.56	2.46	1.31	n.d.	10.54	38.19	0.63	0.95	0.94	10.63	1.0	2.4	
2008/8/20	7.72	11.16	5.59	n.d.	0.78	12.28	1.69	2.49	1.27	n.d.	11.46	39.52	0.12	1.01	0.98	11.22	1.9	0.3	
2008/9/4	7.76	10.83	5.26	n.d.	0.76	12.44	1.68	2.26	1.95	n.d.	11.42	42.97	1.18	1.01	1.04	11.46	-1.5	2.8	
2008/9/22	7.71	8.20	4.48	n.d.	0.62	8.98	1.21	2.25	0.75	n.d.	8.05	31.24	0.81	0.76	0.76	8.48	0.2	1.7	
2008/10/6	7.77	6.99	4.04	0.06	0.58	7.54	1.03	1.94											



## Appendix 3d. 四万十川上流域の採水地点 A2 における溪流水分析データ

## Analytical data of streamwater at sampling location A2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2008/12/19	7.72	9.65	4.95	n.d.	0.58	11.26	1.57	2.37	0.55	n.d.	10.49	38.19	0.54	0.92	0.92	10.32	0.1	3.4	
2009/1/9	7.73	10.06	5.05	n.d.	0.57	11.74	1.64	2.42	0.60	n.d.	11.91	37.76	0.11	0.96	0.94	10.74	0.6	3.3	
2009/1/27	7.83	9.68	4.79	n.d.	0.53	11.38	1.59	2.44	0.61	n.d.	11.14	36.42	1.12	0.92	0.91	10.33	0.7	3.2	
2009/2/9	7.78	9.63	4.79	n.d.	0.55	11.06	1.54	2.29	0.49	n.d.	10.81	37.21	0.98	0.90	0.91	10.17	-0.4	2.7	
2009/2/23	7.51	6.34	3.60	n.d.	0.53	6.90	0.96	2.32	0.57	n.d.	6.10	23.91	1.39	0.59	0.59	6.68	0.0	2.6	
2009/3/9	7.59	8.25	4.57	n.d.	0.57	9.47	1.30	2.41	0.37	n.d.	8.53	32.88	0.09	0.79	0.79	8.86	0.2	3.6	
2009/3/23	7.59	7.52	4.11	n.d.	0.55	8.22	1.13	2.22	0.35	n.d.	7.04	29.28	0.84	0.70	0.69	7.76	0.1	1.6	
2009/4/13	7.76	9.45	4.99	n.d.	0.62	10.72	1.48	2.43	0.36	n.d.	10.18	36.66	0.90	0.89	0.89	9.97	0.2	2.7	
2009/4/27	7.84	9.53	4.82	n.d.	0.61	10.67	1.47	2.27	0.58	n.d.	10.56	37.70	0.68	0.88	0.91	10.04	-1.8	2.6	
2009/5/11	7.78	9.86	5.10	n.d.	0.69	11.51	1.57	2.31	0.65	n.d.	11.25	39.53	0.17	0.94	0.96	10.68	-0.8	4.0	
2009/5/25	7.84	10.45	5.40	n.d.	0.72	12.33	1.69	2.45	0.88	n.d.	12.71	40.57	0.77	1.01	1.01	11.42	-0.2	4.4	
2009/6/8	7.80	10.70	5.26	n.d.	0.71	12.37	1.70	2.19	0.84	n.d.	11.18	42.46	0.63	1.00	1.00	11.22	0.0	2.4	
2009/6/24	7.78	9.23	4.57	n.d.	0.72	10.54	1.43	1.78	0.82	n.d.	8.46	37.70	1.59	0.86	0.86	9.52	0.2	1.6	
2009/7/8	7.64	7.27	4.54	n.d.	0.65	9.53	1.32	2.14	0.40	n.d.	8.26	34.71	0.11	0.80	0.81	8.93	-0.6	10.2	
2009/7/22	7.71	7.61	3.98	n.d.	0.70	8.54	1.17	1.54	1.40	n.d.	6.10	30.56	2.52	0.71	0.69	7.79	1.4	1.1	
2009/8/12	7.58	6.08	3.94	n.d.	0.59	5.82	0.89	2.19	0.20	n.d.	4.78	20.07	1.10	0.55	0.49	5.84	5.4	-2.0	
2009/8/27	7.72	8.87	4.88	n.d.	0.71	9.65	1.38	2.33	0.35	n.d.	8.31	34.83	1.07	0.83	0.82	9.13	0.6	1.4	
2009/9/10	7.75	9.50	5.00	n.d.	0.70	10.28	1.46	2.29	0.67	n.d.	9.35	36.66	0.05	0.87	0.87	9.72	-0.2	1.1	
2009/9/25	7.60	10.15	5.32	n.d.	0.74	11.47	1.61	2.36	0.87	n.d.	10.71	39.35	0.57	0.96	0.95	10.67	0.4	2.5	
2009/10/9	7.79	8.22	4.42	n.d.	0.65	9.09	1.26	2.05	0.44	n.d.	7.54	33.49	0.88	0.77	0.77	8.52	-0.3	1.8	
2009/10/23	7.75	9.52	4.96	n.d.	0.65	10.80	1.52	2.29	0.50	n.d.	10.51	36.72	0.90	0.90	0.89	10.05	0.1	2.7	
2009/11/6	7.77	10.01	5.08	n.d.	0.67	11.54	1.64	2.34	0.46	n.d.	11.53	38.63	0.96	0.95	0.95	10.67	0.1	3.2	
2009/11/24	7.54	8.72	4.61	n.d.	0.61	9.61	1.37	2.15	0.29	n.d.	8.65	34.22	0.57	0.81	0.81	9.00	0.1	1.6	
2009/12/8	7.68	9.44	4.94	n.d.	0.61	10.84	1.54	2.41	0.43	n.d.	10.96	36.60	0.65	0.90	0.90	10.14	-0.3	3.6	
2009/12/22	7.76	9.54	4.70	n.d.	0.55	10.74	1.53	2.49	0.43	n.d.	10.85	36.23	0.92	0.88	0.90	10.02	-0.9	2.5	
2010/1/6	7.71	9.80	4.88	n.d.	0.54	11.38	1.61	2.45	0.42	n.d.	11.33	36.60	0.52	0.93	0.91	10.38	0.8	2.9	
2010/1/20	7.78	10.18	5.04	n.d.	0.56	11.90	1.66	2.30	0.55	n.d.	11.89	38.49	1.16	0.96	0.95	10.81	0.6	3.0	
2010/2/4	7.73	9.19	4.71	n.d.	0.58	10.74	1.51	2.50	0.56	n.d.	10.46	35.06	0.08	0.88	0.87	9.89	0.5	3.7	
2010/2/18	7.76	9.58	4.93	n.d.	0.59	11.41	1.59	2.48	0.57	n.d.	11.47	37.21	0.11	0.93	0.93	10.49	0.1	4.6	
2010/3/5	7.73	8.47	4.53	n.d.	0.61	9.62	1.32	2.26	0.48	n.d.	8.58	33.73	1.13	0.80	0.80	8.97	-0.1	2.9	
2010/3/19	7.76	7.98	4.36	n.d.	0.54	8.89	1.23	2.28	0.39	n.d.	8.04	31.23	0.07	0.75	0.75	8.39	-0.1	2.5	
2010/4/6	7.64	7.53	4.44	n.d.	0.58	8.80	1.23	2.32	0.36	n.d.	7.64	31.17	0.87	0.75	0.74	8.31	0.5	5.0	
2010/4/30	7.49	6.63	4.14	n.d.	0.53	7.37	1.04	2.25	0.33	n.d.	6.41	27.27	0.09	0.65	0.65	7.22	-0.2	4.3	
2010/5/20	7.63	7.82	4.55	n.d.	0.64	9.20	1.28	1.93	0.75	n.d.	7.47	33.67	0.94	0.78	0.77	8.60	0.3	4.8	
2010/6/4	7.70	8.21	4.68	n.d.	0.61	8.93	1.26	2.35	0.51	n.d.	8.14	32.33	0.05	0.77	0.77	8.62	-0.4	2.4	
2010/6/24	7.46	7.72	4.38	n.d.	0.61	8.31	1.16	1.99	0.46	n.d.	6.51	31.60	1.12	0.72	0.72	7.91	-0.1	1.2	
2010/7/16	7.63	7.33	4.38	n.d.	0.60	7.83	1.10	2.09	0.42	n.d.	6.28	30.01	0.68	0.69	0.69	7.61	-0.1	1.8	
2010/8/5	7.79	8.01	4.54	n.d.	0.69	8.53	1.24	2.06	0.53	n.d.	6.60	32.39	0.98	0.74	0.74	8.16	0.5	0.9	
2010/8/24	7.63	8.90	4.98	n.d.	0.77	9.92	1.41	2.30	0.82	n.d.	8.74	36.19	0.78	0.85	0.85	9.48	-0.4	3.1	
2010/9/9	7.63	9.19	4.89	n.d.	0.79	10.47	1.48	2.10	1.27	n.d.	9.07	37.82	0.90	0.88	0.89	9.84	-0.7	3.4	
2010/10/5	7.55	8.00	4.45	n.d.	0.68	8.80	1.24	1.90	0.66	n.d.	6.90	32.94	0.56	0.75	0.75	8.29	0.3	1.8	
2010/10/22	7.72	9.00	5.00	n.d.	0.70	10.32	1.45	2.31	0.57	n.d.	8.97	36.66	0.38	0.87	0.86	9.65	0.4	3.5	
2010/11/16	7.42	9.13	4.94	n.d.	0.64	11.09	1.58	2.33	0.64	n.d.	10.83	38.25	0.07	0.92	0.93	10.35	-0.7	6.3	
2010/12/7	7.58	9.86	4.79	n.d.	0.60	11.09	1.54	2.15	0.57	n.d.	10.32	38.37	0.00	0.90	0.91	10.17	-0.5	1.5	
2011/1/5	7.61	9.19	4.89	n.d.	0.56	11.03	1.55	2.55	0.74	n.d.	11.93	35.81	0.07	0.90	0.92	10.36	-0.8	6.0	
2011/1/24	7.58	8.89	5.03	n.d.	0.55	11.58	1.61	2.31	0.67	n.d.	12.43	36.48	0.30	0.94	0.93	10.65	0.6	9.0	
2011/2/15	7.67	9.94	5.01	0.02	0.56	11.91	1.67	3.00	1.13	n.d.	12.73	36.30	0.27	0.97	0.96	11.02	0.2	5.1	
2011/3/15	7.64	10.10	5.09	n.d.	0.57	11.75	1.63	2.37	0.56	n.d.	12.80	38.80	0.09	0.96	0.98	10.96	-1.1	4.1	
2011/3/28	7.68	10.26	5.27	n.d.	0.56	12.33	1.73	2.43	0.59	n.d.	13.25	38.98	0.03	1.00	0.99	11.31	0.4	4.9	
2011/4/20	7.67	9.91	5.25	n.d.	0.67	12.37	1.74	2.38	0.75	n.d.	13.08	40.08	0.00	1.01	1.01	11.41	-0.1	7.0	
2011/5/10	7.68	9.34	5.16	n.d.	0.72	11.74	1.64	2.44	0.43	n.d.	12.14	40.02	0.62	0.96	0.98	10.98	-1.1	8.1	
2011/6/2	7.63	6.98	4.25	n.d.	0.62	8.35	1.17	2.29	0.31	n.d.	7.16	30.38	0.77	0.71	0.72	7.97	-0.2	6.6	
2011/6/18	7.56	5.73	3.67	n.d.	0.51	5.91	0.85	2.13	0.22	n.d.	4.89	23.18	0.68	0.54	0.55	6.02	-0.7	2.4	
2011/6/30	7.47	6.50	4.16	n.d.	0.58	7.07	1.04	2.20	0.06	n.d.	5.87	28.06	1.32	0.63	0.64	7.07	-0.8	4.2	
2011/7/13	7.59	8.23	4.65	n.d.	0.68	9.10	1.30	2.25	0.55	n.d.	7.90	33.73	0.27	0.78	0.79	8.74	-0.6	3.0	
2011/8/5	7.64	8.29	4.68	n.d.	0.72	8.78	1.31	2.23	0.50	n.d.	7.69	33.55	0.00	0.77	0.78	8.60	-0.8	1.9	
2011/8/25	7.71	8.25	4.96	0.03	0.76	10.01	1.46	2.35	0.86	n.d.	8.78	36.60	0.09	0.86	0.86	9.58	-0.4	7.5	
2011/9/22	7.49	5.12	3.81	n.d.	0.48	4.77	0.76	2.01	0.15	n.d.	3.58	21.35	1.04	0.48	0.48	5.28	-0.5	1.5	
2011/10/5	7.68	8.01	4.49	n.d.	0.60	8.52	1.26	2.35	0.46	n.d.	7.74	32.64	0.42	0.74	0.77	8.40	-2.0	2.4	
2011/10/28	7.63	7.44	4.28	n.d.	0.50	8.01	1.21	2.15	0.25	n.d.	6.98	31.90	0.01	0.70	0.73	7.92	-2.4	3.1	
2011/11/14	7.72	8.71	4.95	n.d.	0.61	9.78	1.48	2.25	0.69	n.d.	9.22	36.51	0.40	0.84	0.86	9.51	-1.4	4.4	
2011/12/9	7.72	8.28	4.72	0.01	0.56	9.39	1.41	2.37	0.25	n.d.	8.46	34.65	0.00	0.80	0.81	9.02	-0.6	4.3	
2011/12/27	7.73	9.25	4.76	n.d.	0.53	9.79	1.51	2.27	0.45	n.d.	10.00	36.05	0.00	0.83	0.87	9.54	-2.2	1.5	
2012/1/12	7.64	9.64	4.97	n.d.	0.51	10.50	1.60	2.29	0.48	n.d.	11.26	36.60	0.55	0.88	0.91	10.09	-1.2	2.3	
2012/2/9	7.56	8.36	4.13	0.02	0.44	9.06	1.35	2.23	0.45	n.d.	9.05	32.13	0.70	0.76	0.79	8.66	-1.9	1.7	
2012/2/24	7.58	7.07	4.07	0.01	0.47	7.62	1.14	2.09	0.38	n.d.	7.23	27.94	0.59	0.66	0.				

## Appendix 3e. 四万十川上流域の採水地点 A2 における渓流水分析データ

## Analytical data of streamwater at sampling location A2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2012/6/13	7.63	9.29	4.86	n.d.	0.66	9.74	1.44	1.80	1.26	n.d.	8.27	36.66	0.00	0.83	0.84	9.29	-0.7	0.0	
2012/6/25	7.44	4.83	3.41	n.d.	0.49	4.42	0.69	1.96	0.25	n.d.	4.13	20.13	0.57	0.44	0.48	5.06	-4.0	2.3	
2012/7/13	7.37	5.40	3.75	n.d.	0.45	5.12	0.80	1.79	0.23	n.d.	4.16	23.24	0.04	0.50	0.52	5.58	-2.5	1.6	
2012/7/30	7.66	7.87	4.61	n.d.	0.59	7.82	1.19	2.07	0.63	n.d.	6.92	32.27	0.02	0.70	0.74	7.98	-2.6	0.7	
2012/8/23	7.58	7.92	4.29	n.d.	0.63	7.92	1.21	1.74	1.27	0.08	5.69	32.88	1.79	0.70	0.73	7.83	-2.3	-0.6	
2012/9/12	7.56	6.41	4.42	n.d.	0.60	7.20	1.13	1.95	0.40	n.d.	5.29	29.73	0.25	0.66	0.66	7.23	0.1	6.0	
2012/10/9	7.58	7.69	4.62	n.d.	0.57	7.97	1.27	2.19	0.51	n.d.	7.00	32.09	0.00	0.72	0.74	8.07	-1.6	2.4	
2012/10/29	7.61	8.08	4.65	n.d.	0.53	9.55	1.28	2.18	0.55	n.d.	8.15	34.71	0.10	0.80	0.81	8.93	-0.7	5.0	
2012/11/12	7.64	8.30	4.76	n.d.	0.57	10.18	1.37	2.40	0.86	n.d.	9.30	35.38	0.31	0.84	0.86	9.51	-0.7	6.8	
2012/12/7	7.59	8.29	4.65	n.d.	0.50	10.94	1.49	2.45	0.47	n.d.	10.46	35.99	1.18	0.88	0.88	9.96	0.0	9.1	
2012/12/26	7.59	8.93	4.53	n.d.	0.49	10.63	1.44	2.43	0.64	n.d.	10.04	34.83	0.34	0.86	0.86	9.67	0.0	4.0	
2013/1/18	7.64	8.21	4.44	n.d.	0.46	10.12	1.36	2.29	0.72	n.d.	9.12	33.75	0.79	0.82	0.82	9.21	0.2	5.8	
2013/2/8	7.64	7.23	4.27	n.d.	0.51	9.47	1.29	2.30	0.61	n.d.	8.31	32.64	0.01	0.78	0.78	8.73	-0.3	9.4	
2013/2/25	7.67	7.56	4.37	n.d.	0.51	9.35	1.28	2.33	0.36	n.d.	8.41	32.21	0.00	0.77	0.77	8.68	0.0	6.9	
2013/3/15	7.73	8.61	4.68	n.d.	0.54	10.50	1.43	2.31	0.08	n.d.	9.28	35.44	0.00	0.86	0.84	9.50	1.1	4.9	
2013/4/5	7.51	9.15	4.78	n.d.	0.61	10.93	1.48	2.24	0.21	n.d.	9.56	36.60	0.00	0.89	0.87	9.81	1.4	3.5	
2013/4/25	7.67	6.20	3.81	n.d.	0.54	7.63	1.03	2.20	0.26	n.d.	5.81	26.43	0.07	0.65	0.62	7.05	2.0	6.4	
2013/6/5	7.68	9.81	5.17	n.d.	0.72	12.31	1.64	2.12	1.25	n.d.	10.52	39.65	0.22	0.99	0.95	10.88	2.2	5.2	
2013/6/27	7.43	5.65	3.84	n.d.	0.56	6.85	0.94	2.12	0.44	n.d.	5.31	24.10	0.00	0.60	0.57	6.53	2.4	7.3	
2013/7/17	7.62	8.77	4.75	n.d.	0.69	9.86	1.33	2.22	0.95	n.d.	8.27	34.59	0.79	0.83	0.82	9.16	0.5	2.2	
2013/8/9	7.64	9.79	5.30	n.d.	0.83	11.91	1.60	2.30	1.70	n.d.	10.48	39.04	0.97	0.98	0.95	10.83	1.4	5.1	
2013/8/27	7.66	9.75	5.28	0.01	0.92	12.60	1.71	2.26	3.38	n.d.	10.49	39.65	1.26	1.02	0.99	11.33	1.8	7.5	
2013/9/6	7.51	6.80	4.10	n.d.	0.68	7.05	1.05	2.24	0.70	n.d.	6.25	25.91	0.96	0.63	0.63	7.07	0.4	1.9	
2013/9/17	7.54	8.48	4.74	n.d.	0.73	9.92	1.40	2.23	0.72	n.d.	9.09	31.17	0.43	0.84	0.77	9.08	3.8	3.4	
2013/10/10	7.52	6.38	4.02	n.d.	0.57	6.84	0.96	1.98	0.40	n.d.	4.60	26.23	0.00	0.61	0.59	6.59	1.9	1.6	
2013/10/22	7.59	8.56	4.86	n.d.	0.67	9.97	1.38	2.24	0.56	n.d.	8.36	34.59	0.24	0.84	0.81	9.21	1.6	3.7	
2013/10/30	7.62	6.79	4.36	n.d.	0.55	7.30	1.06	2.33	0.27	n.d.	5.83	26.84	0.09	0.66	0.63	7.15	1.8	2.6	
2013/11/18	7.51	8.53	4.74	n.d.	0.63	9.89	1.41	2.12	0.38	n.d.	8.31	34.34	0.64	0.83	0.80	9.09	1.8	3.2	
2013/12/13	7.55	9.01	4.64	n.d.	0.61	10.43	1.48	2.32	0.41	n.d.	8.95	35.32	0.30	0.86	0.84	9.48	1.3	2.6	
2014/1/7	7.66	9.23	4.76	n.d.	0.57	10.75	1.50	2.52	0.53	n.d.	7.27	36.72	0.76	0.88	0.83	9.49	2.8	1.4	
2014/1/27	7.63	9.22	4.94	n.d.	0.59	11.31	1.58	2.57	0.75	n.d.	7.98	35.99	0.85	0.92	0.84	9.83	4.7	3.2	
2014/2/20	7.53	8.30	4.58	n.d.	0.56	10.46	1.44	2.55	0.50	n.d.	6.63	34.69	0.63	0.85	0.79	9.08	4.1	4.5	
2014/3/14	7.48	6.94	3.95	n.d.	0.51	8.12	1.09	2.18	0.35	n.d.	7.34	28.67	0.08	0.68	0.69	7.67	-0.7	5.0	
2014/4/3	7.44	8.15	4.55	n.d.	0.58	9.73	1.30	2.25	0.27	n.d.	8.79	34.16	0.35	0.81	0.81	9.03	-0.3	5.1	
2014/4/23	7.73	8.70	4.77	n.d.	0.64	10.64	1.43	2.22	0.44	n.d.	9.72	37.33	0.43	0.87	0.88	9.82	-0.6	6.0	
2014/5/9	7.70	9.21	5.11	n.d.	0.70	11.57	1.56	2.26	0.57	n.d.	10.69	39.04	0.04	0.95	0.94	10.55	0.6	6.8	
2014/5/27	7.78	9.13	4.71	n.d.	0.65	10.84	1.42	2.04	0.65	n.d.	9.47	37.41	0.30	0.88	0.88	9.81	0.0	3.6	
2014/6/17	7.68	8.02	4.60	n.d.	0.61	9.72	1.29	2.20	0.46	n.d.	8.38	34.28	0.31	0.81	0.81	8.99	0.1	5.7	
2014/7/9	7.63	6.66	4.29	n.d.	0.58	8.10	1.09	2.12	0.33	n.d.	6.35	29.28	0.04	0.70	0.68	7.62	1.3	6.7	
2014/7/24	7.67	7.98	4.90	n.d.	0.69	9.73	1.31	2.24	0.71	n.d.	8.16	32.76	0.10	0.82	0.78	8.97	2.6	5.8	
2014/8/12	7.66	5.26	3.89	n.d.	0.54	4.82	0.79	1.99	0.14	n.d.	3.55	20.86	0.08	0.49	0.47	5.28	1.5	0.2	
2014/8/27	7.65	6.53	4.39	n.d.	0.61	7.05	1.07	2.01	0.22	n.d.	4.95	28.12	0.10	0.65	0.62	6.97	1.8	3.3	
2014/9/18	7.68	7.26	4.67	n.d.	0.63	8.24	1.20	2.01	0.44	n.d.	6.42	30.95	0.00	0.73	0.70	7.92	1.7	4.3	
2014/10/9	7.68	7.88	4.76	n.d.	0.68	9.48	1.36	2.05	0.51	n.d.	7.72	34.77	0.24	0.81	0.80	8.89	0.8	6.0	
2014/10/30	7.69	8.04	4.71	n.d.	0.61	9.27	1.33	1.91	0.28	n.d.	7.33	34.47	0.28	0.79	0.78	8.65	1.1	3.7	
2014/11/20	7.71	8.79	4.65	n.d.	0.58	10.08	1.45	1.81	0.28	n.d.	8.68	36.36	0.25	0.84	0.83	9.27	0.4	2.6	
2014/12/2	7.76	9.01	5.08	n.d.	0.68	11.39	1.64	2.40	0.28	n.d.	10.14	37.52	0.11	0.94	0.90	10.31	2.4	6.7	
2014/12/22	7.68	7.94	4.22	n.d.	0.55	8.88	1.27	2.42	0.30	n.d.	7.70	32.03	0.00	0.75	0.76	8.39	-0.9	2.8	
2015/1/15	7.70	7.01	4.05	n.d.	0.56	8.70	1.22	2.64	0.56	n.d.	6.36	29.89	0.93	0.72	0.71	7.97	1.3	6.4	
2015/2/6	7.75	7.84	4.55	n.d.	0.52	9.80	1.36	2.27	0.29	n.d.	8.85	33.86	0.18	0.81	0.81	9.06	0.3	7.2	
2015/2/27	7.76	8.88	4.55	n.d.	0.52	10.17	1.42	2.41	0.54	n.d.	8.85	34.28	0.24	0.84	0.82	9.29	0.8	2.2	
2015/3/20	7.63	6.27	3.97	n.d.	0.56	7.01	0.97	2.36	0.28	n.d.	5.47	24.81	0.33	0.62	0.59	6.74	2.1	3.6	
2015/4/8	7.72	7.46	4.32	n.d.	0.59	8.83	1.21	2.18	0.28	n.d.	7.16	31.42	0.70	0.74	0.73	8.19	0.9	4.6	
2015/4/30	7.65	8.16	4.66	n.d.	0.63	9.60	1.31	2.20	0.41	n.d.	7.85	34.16	0.16	0.81	0.79	8.88	0.8	4.2	
2015/5/20	7.72	7.87	4.40	n.d.	0.65	9.38	1.27	2.11	0.48	n.d.	7.27	33.25	0.61	0.78	0.76	8.57	1.1	4.2	
2015/6/8	7.66	7.86	4.43	n.d.	0.64	9.38	1.27	2.06	0.55	n.d.	7.31	33.43	0.87	0.78	0.77	8.59	0.9	4.4	
2015/7/2	7.51	6.00	3.68	n.d.	0.49	6.13	0.86	2.00	0.23	n.d.	4.45	23.83	0.51	0.55	0.54	6.03	0.6	0.2	
2015/7/24	7.63	6.50	3.99	n.d.	0.53	6.86	0.97	1.93	0.23	n.d.	4.68	27.15	0.27	0.61	0.60	6.63	0.7	1.0	
2015/8/11	7.73	8.35	4.88	n.d.	0.72	9.80	1.35	2.06	0.66	n.d.	7.63	35.99	0.69	0.83	0.82	9.11	0.8	4.4	
2015/8/26	7.67	6.88	4.05	n.d.	0.62	7.27	1.02	1.95	0.36	n.d.	4.95	28.06	0.80	0.64	0.62	6.93	1.2	0.4	
2015/9/25	7.53	5.79	3.74	n.d.	0.52	5.90	0.86	1.91	0.17	n.d.	3.97	24.28	0.46	0.54	0.54	5.90	0.3	1.0	
2015/10/15	7.72	8.19	4.69	n.d.	0.60	9.41	1.32	2.05	0.36	n.d.	7.56	34.65	0.22	0.80	0.79	8.77	0.5	3.4	
2015/11/4	7.68	9.29	4.86	n.d.	0.64	10.68	1.50	2.16	0.43	n.d.	9.07	37.21	0.00	0.88	0.87	9.75	1.0	2.4	
2015/11/18	7.61	8.00	4.24	n.d.	0.74	9.42	1.31	1.90	0.21	n.d.	6.43	34.77	1.48	0.78	0.76	8.47	1.3	2.9	
2015/12/8	7.69	8.33	4.67	n.d.	0.61	10.19	1.42	2.07	0.30	n.d.	8.43	35.69	0.50	0.84	0.82	9.27	1.2	5.3	
2015/12/24	7.71	7.93	4.56	n.d.	0.61	9.19	1.30	2.15	0.24	n.d.	7.24	32.37	0.55	0.78	0.75	8.46	2.2	3.3	

\* 分析値

## Appendix 4a. 四万十川上流域の採水地点 A3 における渓流水分析データ

## Analytical data of streamwater at sampling location A3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2001/3/21	7.89	10.03	4.33	n.d.	0.55	12.98	1.36	2.46	1.00	n.d.	10.60	41.17	0.12	0.96	0.98	10.91	-1.0	4.2	
2001/4/10	7.86	10.56	4.45	n.d.	0.56	13.74	1.43	2.52	0.89	n.d.	11.68	41.97	0.22	1.01	1.02	11.43	-0.3	4.0	
2001/4/23	7.82	10.80	4.44	n.d.	0.56	14.10	1.46	2.61	0.73	n.d.	11.99	41.61	0.01	1.03	1.02	11.58	0.7	3.5	
2001/5/8	7.68	8.13	3.74	n.d.	0.44	10.39	1.16	2.53	1.09	n.d.	7.83	29.72	0.35	0.79	0.74	8.63	3.2	3.0	
2001/5/22	7.71	9.90	4.22	n.d.	0.51	12.86	1.36	2.48	0.99	n.d.	10.44	38.61	0.86	0.95	0.94	10.63	0.7	3.6	
2001/6/5	7.74	10.30	4.43	n.d.	0.50	13.53	1.41	2.54	0.85	n.d.	11.21	38.58	0.70	1.00	0.95	11.02	2.3	3.4	
2001/6/20	7.66	8.74	3.96	n.d.	0.42	11.07	1.19	2.43	1.32	n.d.	8.75	32.46	0.55	0.83	0.80	9.25	1.8	2.8	
2001/7/3	7.68	9.45	4.22	n.d.	0.49	13.03	1.40	2.46	0.98	n.d.	9.70	36.60	0.00	0.96	0.89	10.42	4.0	4.9	
2001/7/24	7.64	9.76	4.30	n.d.	0.51	12.59	1.35	2.40	0.85	n.d.	10.22	38.30	0.45	0.94	0.92	10.47	1.0	3.5	
2001/8/7	7.65	10.35	4.40	n.d.	0.48	13.42	1.42	2.46	0.83	n.d.	11.22	39.46	0.43	0.99	0.96	11.03	1.4	3.2	
2001/8/21	7.61	8.42	3.75	n.d.	0.47	10.21	1.12	2.24	2.51	n.d.	7.96	30.32	1.24	0.78	0.77	8.73	0.7	1.8	
2001/9/4	7.74	10.25	4.33	n.d.	0.47	13.07	1.39	2.45	1.18	n.d.	11.02	39.21	0.44	0.97	0.96	10.88	0.4	3.0	
2001/9/26	7.71	9.25	4.25	n.d.	0.39	11.91	1.33	2.42	1.00	n.d.	9.06	37.02	0.31	0.90	0.88	9.96	1.1	3.7	
2001/10/10	7.72	8.39	3.89	n.d.	0.37	10.57	1.18	2.24	1.17	n.d.	7.78	33.63	0.51	0.80	0.80	8.94	0.5	3.2	
2001/10/24	7.72	8.40	4.07	n.d.	0.46	10.55	1.20	2.31	0.43	n.d.	7.77	33.36	0.98	0.81	0.78	8.90	2.1	2.9	
2001/11/7	7.80	8.78	3.86	n.d.	0.45	10.46	1.18	2.19	0.55	n.d.	7.70	33.88	0.85	0.80	0.79	8.84	0.8	0.3	
2001/11/21	7.84	9.81	4.26	n.d.	0.49	12.39	1.37	2.36	0.52	n.d.	9.45	38.93	0.80	0.93	0.91	10.28	1.0	2.3	
2001/12/4	7.86	10.30	4.20	0.07	0.49	12.46	1.38	2.44	0.31	n.d.	10.62	40.11	0.48	0.93	0.95	10.59	-1.0	1.4	
2001/12/20	7.89	10.61	4.23	0.04	0.48	13.09	1.40	2.53	0.57	n.d.	11.32	41.11	1.34	0.97	0.99	11.02	-1.1	1.9	
2002/1/8	7.88	11.00	4.37	0.06	0.49	13.84	1.46	2.59	n.d.	n.d.	12.60	42.19	1.68	1.02	1.03	11.55	-0.5	2.4	
2002/1/22	7.87	11.35	4.29	n.d.	0.49	13.74	1.47	2.62	0.59	n.d.	12.31	43.02	0.29	1.01	1.04	11.57	-1.9	1.0	
2002/2/7	7.84	11.35	4.43	n.d.	0.52	13.94	1.49	2.60	0.55	n.d.	12.62	43.14	0.17	1.02	1.05	11.72	-1.4	1.6	
2002/2/19	7.90	11.63	4.44	n.d.	0.51	14.39	1.53	2.59	0.53	n.d.	13.13	44.68	0.00	1.05	1.09	12.07	-1.7	1.9	
2002/3/5	7.86	10.70	4.11	n.d.	0.47	12.74	1.34	2.75	1.05	n.d.	11.63	35.53	0.86	0.94	0.92	10.59	1.0	-0.5	
2002/3/19	7.90	11.58	4.80	n.d.	0.53	14.68	1.59	2.61	0.43	n.d.	13.57	38.32	0.35	1.09	0.99	11.86	4.5	1.2	
2002/4/9	7.85	10.04	4.11	n.d.	0.47	11.94	1.32	2.50	0.78	n.d.	11.13	33.26	2.07	0.89	0.86	10.01	2.0	-0.1	
2002/4/23	7.84	10.17	4.05	n.d.	0.47	12.09	1.31	2.44	0.77	n.d.	10.99	34.69	0.71	0.90	0.88	10.11	1.2	-0.3	
2002/5/8	7.84	9.38	3.99	n.d.	0.47	11.30	1.26	2.41	0.68	n.d.	9.76	36.95	0.19	0.85	0.89	9.78	-2.0	2.1	
2002/5/28	7.89	10.04	4.24	n.d.	0.49	12.33	1.38	2.45	0.58	n.d.	10.71	37.72	0.37	0.93	0.92	10.41	0.3	1.8	
2002/6/11	7.92	10.39	4.21	n.d.	0.50	12.90	1.39	2.37	1.24	n.d.	11.12	38.14	0.68	0.95	0.94	10.74	0.5	1.6	
2002/6/25	7.87	10.36	4.09	n.d.	0.46	12.58	1.34	2.40	1.04	n.d.	10.98	38.44	0.77	0.93	0.94	10.57	-0.8	1.0	
2002/7/9	7.38	8.37	3.74	n.d.	0.43	9.78	1.16	2.24	0.88	n.d.	8.19	31.05	0.47	0.76	0.76	8.52	0.0	0.9	
2002/7/23	7.62	8.57	3.88	n.d.	0.47	10.09	1.21	2.44	0.61	n.d.	8.04	32.09	0.58	0.78	0.77	8.73	0.7	0.9	
2002/8/6	7.64	9.29	4.00	n.d.	0.46	11.07	1.26	2.51	0.49	n.d.	8.92	36.87	0.10	0.84	0.87	9.57	-1.6	1.5	
2002/8/27	7.61	10.05	4.22	n.d.	0.49	12.45	1.37	2.52	0.58	n.d.	10.54	37.47	0.41	0.93	0.91	10.41	0.9	1.7	
2002/9/10	7.56	8.94	4.14	n.d.	0.43	10.91	1.25	2.59	0.60	n.d.	8.29	35.37	0.00	0.84	0.84	9.36	0.2	2.3	
2002/9/24	7.75	9.86	4.32	n.d.	0.48	12.49	1.38	2.66	n.d.	n.d.	10.07	37.18	0.48	0.94	0.89	10.30	2.3	2.2	
2002/10/8	7.77	10.02	4.20	n.d.	0.45	12.44	1.33	2.59	0.65	n.d.	10.39	39.03	0.31	0.92	0.94	10.49	-0.8	2.3	
2002/10/22	7.82	10.51	4.37	n.d.	0.50	13.41	1.42	2.68	0.65	n.d.	11.38	39.92	0.03	0.99	0.98	11.11	0.6	2.8	
2002/11/5	7.81	10.69	4.37	n.d.	0.48	13.70	1.43	2.70	0.82	n.d.	11.80	40.36	0.19	1.00	1.00	11.32	0.3	2.9	
2002/11/19	7.89	11.06	4.57	n.d.	0.51	14.32	1.49	2.63	0.57	n.d.	12.10	40.21	0.26	1.05	0.99	11.58	2.7	2.3	
2002/12/3	7.68	11.42	4.44	n.d.	0.50	14.51	1.50	2.66	0.58	n.d.	12.66	40.62	0.00	1.05	1.01	11.73	1.9	1.4	
2002/12/17	7.81	11.01	4.53	n.d.	0.49	14.55	1.48	2.64	0.79	n.d.	12.06	40.54	0.00	1.06	1.00	11.67	2.7	2.9	
2003/1/7	7.81	11.25	4.57	n.d.	0.48	14.26	1.46	2.61	0.51	n.d.	12.20	43.05	0.00	1.04	1.04	11.75	0.1	2.2	
2003/1/21	7.80	11.38	4.68	0.03	0.49	14.56	1.51	2.62	0.55	n.d.	12.87	41.58	0.00	1.07	1.03	11.92	1.8	2.3	
2003/2/4	7.78	10.75	4.44	n.d.	0.47	13.29	1.40	2.56	0.66	n.d.	11.54	39.15	0.00	0.98	0.96	11.02	1.0	1.2	
2003/2/18	7.81	10.92	4.41	n.d.	0.46	13.34	1.38	2.59	0.61	n.d.	12.02	40.00	0.27	0.98	0.99	11.16	-0.3	1.1	
2003/3/4	7.77	9.70	3.99	0.01	0.41	11.19	1.18	2.70	0.84	n.d.	9.58	35.56	0.00	0.84	0.87	9.66	-1.9	-0.2	
2003/3/18	7.74	9.11	4.08	n.d.	0.44	11.02	1.21	2.70	0.78	n.d.	8.91	33.84	0.00	0.84	0.83	9.40	0.5	1.5	
2003/4/7	7.83	9.71	4.29	0.03	0.46	12.05	1.30	2.67	0.74	n.d.	9.80	35.68	0.00	0.91	0.88	10.07	1.8	1.8	
2003/4/21	7.78	9.93	4.34	0.03	0.48	12.15	1.33	2.63	0.63	n.d.	9.97	36.11	0.03	0.92	0.88	10.17	2.0	1.2	
2003/5/8	7.74	9.46	4.22	n.d.	0.46	11.36	1.26	2.54	1.08	n.d.	9.29	34.97	0.17	0.87	0.86	9.70	0.6	1.2	
2003/5/22	7.75	8.92	4.10	n.d.	0.44	10.43	1.20	2.71	0.55	n.d.	7.98	33.51	0.00	0.81	0.80	9.02	0.5	0.5	
2003/6/4	7.64	8.15	3.95	n.d.	0.42	9.20	1.14	2.78	0.49	n.d.	6.68	31.56	0.00	0.74	0.74	8.24	-0.5	0.5	
2003/6/19	7.62	7.45	3.70	n.d.	0.40	8.49	0.99	2.70	0.63	n.d.	6.14	28.31	0.25	0.68	0.68	7.58	-0.1	0.8	
2003/7/3	7.57	8.21	3.95	0.03	0.42	9.66	1.13	2.73	0.57	n.d.	6.78	31.76	0.00	0.76	0.75	8.41	0.8	1.2	
2003/7/17	7.51	8.61	4.05	0.04	0.44	10.11	1.18	2.68	0.59	n.d.	7.49	31.98	0.45	0.79	0.77	8.73	1.7	0.7	
2003/8/1	7.58	9.39	4.18	0.02	0.44	11.15	1.25	2.68	0.59	n.d.	8.64	27.59	0.99	0.85	0.72	8.95	8.7	-2.4	R1
2003/8/14	7.49	6.31	3.25	0.03	0.42	6.81	0.85	2.02	1.51	n.d.	4.31	24.17	0.99	0.56	0.57	6.28	-0.3	-0.2	
2003/9/4	7.65	9.58	4.41	0.15	0.52	11.91	1.36	2.83	0.47	n.d.	8.90	22.85	3.89	0.92	0.65	9.06	17.4	-2.8	R1
2003/9/18	7.66	8.88	4.16	0.02	0.51	10.75	1.26	2.66	0.58	n.d.	7.40	35.13	0.01	0.84	0.81	9.19	1.3	1.7	
2003/10/8	7.79	10.10	4.34	n.d.	0.48	12.34	1.35	2.73	0.48	n.d.	9.69	39.97	0.00	0.93	0.94	10.46	-0.8	1.8	
2003/10/22	7.81	9.32	4.33	n.d.	0.47	11.52	1.30	2.65	0.57	n.d.	8.29	34.46	0.53	0.88	0.82	9.55	3.5	1.2	
2003/11/12	7.83	9.62	4.49	0.02	0.48	12.26	1.36	2.69	0.71	n.d.	8.99	30.91	1.41	0.93	0.78	9.72	8.8	0.5	R1
2003/11/26	7.75	10.29	4.33	n.d.	0.45	12.25	1.32	2.70	0.56	n.d.	9.91	38.85	0.27	0.92	0.93	10.37	-0.5	0.4	
2003/12/10	7.79	9.43	4.11	n.d.															

## Appendix 4b. 四万十川上流域の採水地点 A3 における渓流水分析データ

## Analytical data of streamwater at sampling location A3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2004/2/20	7.91	11.38	4.90	n.d.	0.51	14.72	1.59	2.92	0.40	n.d.	12.45	52.59	0.31	1.09	1.21	12.81	-5.2	5.9	
2004/3/4	7.89	11.13	4.62	n.d.	0.46	13.59	1.47	2.90	0.76	n.d.	11.97	48.03	0.50	1.01	1.13	11.98	-5.5	3.7	
2004/3/24	7.87	11.24	4.72	n.d.	0.48	14.29	1.52	2.96	0.87	n.d.	12.35	48.05	0.44	1.06	1.14	12.33	-3.9	4.6	
2004/4/6	7.87	10.64	4.52	n.d.	0.46	13.15	1.42	2.79	0.75	n.d.	11.32	46.34	0.31	0.98	1.09	11.55	-5.0	4.1	
2004/4/21	7.75	9.83	4.10	n.d.	0.39	11.31	1.23	2.72	0.95	n.d.	9.73	44.30	0.55	0.85	1.02	10.41	-8.9	2.9	R1
2004/5/14	7.61	7.41	3.56	n.d.	0.36	7.72	0.98	2.60	0.79	n.d.	6.22	32.65	0.46	0.63	0.75	7.63	-8.7	1.5	R1
2004/5/31	7.71	9.50	4.25	n.d.	0.44	11.22	1.27	2.80	0.57	n.d.	9.04	44.07	0.24	0.86	1.00	10.29	-7.4	4.0	
2004/6/11	7.68	9.43	4.22	n.d.	0.43	11.43	1.27	2.53	1.24	n.d.	8.90	42.32	0.88	0.87	0.97	10.21	-5.5	4.0	
2004/6/28	7.66	8.84	4.23	n.d.	0.42	10.43	1.24	2.82	0.54	n.d.	8.06	41.69	0.35	0.82	0.94	9.69	-7.0	4.6	
2004/7/12	7.66	9.62	4.36	n.d.	0.43	11.45	1.29	2.72	0.57	n.d.	9.12	37.70	0.42	0.88	0.89	9.92	-0.9	1.5	
2004/7/26	7.56	10.14	4.61	n.d.	0.48	12.80	1.42	2.87	0.52	n.d.	10.59	45.24	0.24	0.97	1.05	11.26	-4.1	5.2	
2004/8/9	7.65	7.96	4.02	n.d.	0.41	9.19	1.12	2.65	0.66	n.d.	6.53	40.38	0.18	0.74	0.88	8.85	-9.1	5.3	R1
2004/8/27	7.62	8.27	4.16	n.d.	0.41	9.50	1.16	2.52	0.57	n.d.	6.45	42.42	0.36	0.76	0.91	9.09	-8.9	4.7	R1
2004/9/13	7.58	6.15	3.83	n.d.	0.44	6.32	0.96	3.05	0.67	n.d.	3.37	30.36	0.43	0.57	0.66	6.72	-7.5	4.4	
2004/9/27	7.50	8.51	4.25	n.d.	0.45	10.20	1.25	2.91	0.61	n.d.	6.59	30.82	0.02	0.81	0.73	8.63	4.8	0.7	
2004/10/12	7.65	8.71	4.40	n.d.	0.44	10.75	1.30	2.97	0.55	n.d.	6.96	42.68	0.11	0.85	0.94	9.78	-5.1	5.8	
2004/10/25	7.66	7.98	4.04	n.d.	0.44	9.08	1.18	2.93	0.65	n.d.	5.62	41.12	0.13	0.74	0.88	8.81	-9.1	5.0	R1
2004/11/8	7.72	8.73	4.24	n.d.	0.45	10.77	1.25	2.84	0.65	n.d.	6.78	45.66	0.17	0.84	0.98	9.90	-7.9	6.3	
2004/11/22	7.74	8.75	4.30	n.d.	0.47	10.98	1.27	2.82	0.66	n.d.	6.65	45.66	0.26	0.85	0.98	9.96	-6.9	6.5	
2004/12/6	7.64	7.74	3.85	n.d.	0.43	8.79	1.06	2.70	0.83	n.d.	5.35	37.78	0.16	0.70	0.82	8.32	-7.6	3.6	
2004/12/21	7.69	9.62	4.35	n.d.	0.47	11.62	1.31	2.84	0.58	n.d.	7.97	44.97	0.00	0.89	0.99	10.35	-5.5	3.6	
2005/1/7	7.57	10.17	4.46	0.05	0.47	12.41	1.37	2.90	0.53	n.d.	9.16	39.85	0.00	0.94	0.93	10.48	0.3	1.5	
2005/1/21	7.65	10.71	4.55	n.d.	0.46	13.05	1.42	2.93	0.44	n.d.	10.00	42.24	0.85	0.98	0.99	11.00	-0.6	1.3	
2005/2/7	7.68	10.86	4.44	n.d.	0.44	12.90	1.40	2.98	0.52	n.d.	10.26	41.40	0.00	0.96	0.98	10.92	-1.1	0.3	
2005/2/18	7.84	9.76	4.21	n.d.	0.42	11.63	1.24	2.79	0.75	n.d.	8.90	40.57	0.33	0.88	0.94	10.12	-3.5	1.8	
2005/3/7	7.80	9.98	4.39	n.d.	0.45	12.13	1.32	2.79	0.59	n.d.	9.31	41.21	0.41	0.92	0.96	10.45	-2.2	2.3	
2005/3/23	7.72	9.98	4.65	n.d.	0.39	9.02	1.02	2.66	0.96	n.d.	6.58	37.02	0.00	0.70	0.83	8.47	-8.6	-8.2	R1
2005/4/6	7.69	9.58	4.31	n.d.	0.46	11.54	1.30	2.80	0.58	0.28	8.60	46.18	0.38	0.88	1.03	10.57	-7.9	4.9	
2005/4/26	7.77	10.21	4.63	n.d.	0.48	13.06	1.44	2.89	0.57	n.d.	10.14	50.94	0.00	0.98	1.14	11.70	-7.2	6.8	
2005/5/10	7.74	9.32	4.41	n.d.	0.46	11.78	1.32	2.80	0.73	n.d.	8.83	45.79	0.43	0.90	1.03	10.62	-6.5	6.5	
2005/5/24	7.82	10.20	4.46	n.d.	0.48	12.58	1.39	2.80	0.55	n.d.	10.01	49.57	0.00	0.95	1.11	11.35	-7.8	5.4	
2005/6/6	7.79	10.44	4.50	n.d.	0.48	13.04	1.44	2.85	0.46	n.d.	10.72	49.75	0.00	0.98	1.13	11.65	-7.1	5.5	
2005/6/21	7.77	10.85	4.60	n.d.	0.49	13.62	1.47	2.83	0.43	n.d.	11.37	51.42	0.22	1.01	1.17	12.08	-7.0	5.4	
2005/7/5	7.60	9.06	4.08	n.d.	0.45	10.92	1.20	2.68	1.33	n.d.	8.33	41.13	0.29	0.83	0.94	9.86	-6.3	4.2	
2005/7/19	7.76	9.51	4.25	n.d.	0.46	11.52	1.31	2.71	0.63	n.d.	8.88	45.69	0.07	0.88	1.02	10.47	-7.4	4.8	
2005/8/9	7.73	10.41	4.56	n.d.	0.48	13.25	1.44	2.83	0.52	n.d.	10.90	50.34	0.25	0.99	1.14	11.80	-7.0	6.3	
2005/8/22	7.76	10.73	4.60	n.d.	0.49	13.50	1.46	2.77	0.91	n.d.	11.11	48.74	0.24	1.01	1.12	11.85	-5.5	5.0	
2005/9/15	7.90	9.54	4.26	n.d.	0.46	12.40	1.34	2.75	0.64	n.d.	7.89	45.73	0.61	0.93	1.00	10.60	-3.9	5.3	
2005/9/28	7.86	10.43	4.43	n.d.	0.46	13.30	1.44	2.74	0.55	n.d.	9.84	49.49	0.36	0.99	1.10	11.53	-5.5	5.0	
2005/10/11	7.71	10.50	4.58	n.d.	0.47	12.97	1.43	2.82	0.58	n.d.	10.76	46.13	0.00	0.98	1.07	11.39	-4.5	4.1	
2005/10/25	7.80	10.89	4.38	n.d.	0.43	13.13	1.39	2.85	0.50	n.d.	11.66	48.01	0.02	0.97	1.12	11.66	-7.0	3.4	
2005/11/8	7.76	9.68	4.42	n.d.	0.45	11.89	1.33	2.80	1.14	n.d.	9.65	41.62	0.00	0.91	0.98	10.54	-3.9	4.2	
2005/11/22	7.84	10.86	4.74	n.d.	0.46	13.61	1.49	2.84	0.64	n.d.	11.64	47.50	0.00	1.02	1.11	11.90	-4.3	4.6	
2005/12/9	7.94	11.28	4.53	n.d.	0.46	13.63	1.46	2.81	0.60	n.d.	12.04	49.58	0.17	1.01	1.15	12.06	-6.6	3.3	
2005/12/21	7.89	11.38	4.61	n.d.	0.47	13.88	1.49	2.87	0.67	n.d.	12.19	48.03	0.10	1.03	1.13	12.10	-4.8	3.0	
2006/1/12	7.84	11.35	4.76	n.d.	0.47	13.92	1.51	2.87	0.53	n.d.	12.17	42.33	2.07	1.04	1.04	11.71	0.1	1.6	
2006/1/25	7.86	11.03	4.82	n.d.	0.46	13.94	1.52	2.94	0.58	n.d.	12.30	45.89	0.65	1.04	1.10	12.04	-2.7	4.4	
2006/2/8	7.84	11.00	4.85	n.d.	0.48	14.28	1.54	3.11	0.63	n.d.	12.53	44.31	0.94	1.06	1.09	12.12	-1.1	4.8	
2006/2/22	7.79	10.80	4.44	n.d.	0.46	12.71	1.39	2.83	0.59	n.d.	11.23	48.27	0.41	0.95	1.11	11.50	-7.8	3.1	
2006/3/8	7.83	10.21	4.33	n.d.	0.44	11.93	1.34	2.80	0.61	n.d.	10.25	45.25	0.39	0.90	1.04	10.83	-7.1	3.0	
2006/3/22	7.83	10.14	4.41	n.d.	0.46	11.77	1.35	2.85	0.73	n.d.	10.41	45.38	0.68	0.90	1.05	10.87	-7.7	3.5	
2006/4/12	7.62	7.41	3.78	n.d.	0.44	7.72	1.05	2.91	0.82	n.d.	5.81	32.93	0.73	0.65	0.76	7.75	-7.7	2.2	
2006/4/25	7.74	9.39	4.26	n.d.	0.46	10.75	1.28	2.83	0.76	n.d.	8.89	41.91	0.51	0.84	0.96	10.00	-7.0	3.1	
2006/5/11	7.68	7.03	3.59	n.d.	0.40	7.30	0.99	2.67	0.69	n.d.	5.04	38.20	1.11	0.61	0.82	7.74	-14.4	4.8	R1
2006/5/24	7.68	8.18	3.99	n.d.	0.43	9.20	1.15	2.84	0.63	n.d.	6.77	44.49	0.09	0.74	0.96	9.24	-13.1	6.1	R1
2006/6/13	7.73	9.85	4.40	n.d.	0.49	11.82	1.36	2.95	0.57	n.d.	9.86	53.98	0.74	0.91	1.18	11.44	-13.2	7.5	R1
2006/6/27	7.62	7.36	3.77	n.d.	0.43	8.12	1.03	2.75	0.54	n.d.	5.48	28.15	0.00	0.66	0.66	7.38	0.2	0.2	
2006/7/13	7.60	8.17	3.94	n.d.	0.42	9.11	1.12	2.75	0.62	n.d.	6.73	30.81	0.56	0.73	0.73	8.17	-0.2	0.0	
2006/7/25	7.61	7.72	3.84	n.d.	0.42	8.57	1.06	2.73	0.62	n.d.	5.83	29.34	0.11	0.69	0.69	7.70	0.3	-0.2	
2006/8/9	7.77	9.45	4.29	n.d.	0.46	11.17	1.28	2.85	0.44	n.d.	8.35	37.35	0.00	0.86	0.87	9.68	-0.7	1.2	
2006/8/23	7.62	6.99	3.73	n.d.	0.40	7.30	0.98	2.55	0.63	n.d.	4.69	30.82	0.07	0.62	0.68	7.13	-5.2	1.0	
2006/9/5	7.61	8.64	3.95	0.12	0.45	9.42	1.13	2.68	0.60	n.d.	7.15	38.25	0.18	0.75	0.86	8.91	-6.7	1.5	
2006/9/20	7.66	7.42	3.84	n.d.	0.40	8.07	1.02	2.60	0.53	n.d.	4.80	33.04	0.19	0.66	0.72	7.58	-4.3	1.1	
2006/10/4	7.65	9.10	4.27	n.d.	0.45	10.64	1.24	2.76	0.47	n.d.	7.58	38.47	0.05	0.83	0.87	9.44	-2.6	1.8	
2006/10/19	7.82	9.75	4.27	n.d.	0.42	11.25	1.29	2.72	0.43	n.d.	9.09	40.93	0.18	0.86	0.94	10.05	-4.4	1.5	
2006/11/7	7.84	10.40	4.41	n.d.	0.43	12.26	1.36	2.80	0.42										

## Appendix 4c. 四万十川上流域の採水地点 A3 における渓流水分析データ

## Analytical data of streamwater at sampling location A3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2007/1/23	7.87	11.64	4.72	n.d.	0.51	14.67	1.56	2.85	0.43	n.d.	12.86	45.38	0.21	1.08	1.10	12.28	-0.9	2.7	
2007/2/7	7.71	11.72	4.82	n.d.	0.53	15.16	1.61	2.88	0.36	n.d.	13.50	44.86	0.23	1.11	1.10	12.53	0.4	3.4	
2007/2/21	7.88	11.06	4.70	n.d.	0.51	14.63	1.53	2.81	0.79	n.d.	12.57	45.07	0.02	1.07	1.09	12.21	-0.9	5.0	
2007/3/12	7.81	11.59	4.69	n.d.	0.52	14.48	1.53	2.75	0.58	n.d.	13.02	41.34	0.59	1.07	1.04	11.93	1.4	1.4	
2007/3/28	7.73	10.45	4.39	0.06	0.48	13.03	1.39	2.64	0.99	n.d.	11.12	33.47	0.34	0.97	0.87	10.52	5.5	0.4	
2007/4/10	7.86	11.22	4.70	0.14	0.52	14.32	1.53	2.69	0.56	n.d.	12.84	46.56	0.36	1.07	1.12	12.28	-2.3	4.5	
2007/4/24	7.80	11.41	4.83	0.11	0.54	14.81	1.58	2.78	0.65	n.d.	13.41	46.70	0.00	1.10	1.13	12.60	-1.5	5.0	
2007/5/9	7.77	10.68	4.52	0.08	0.50	13.56	1.45	2.68	0.88	n.d.	11.83	38.25	0.32	1.01	0.96	11.21	2.4	2.4	
2007/5/23	7.77	11.28	4.20	n.d.	0.44	13.13	1.35	2.63	0.54	n.d.	12.83	46.70	0.33	0.96	1.12	11.66	-7.5	1.6	
2007/6/13	7.78	11.39	4.66	0.03	0.49	14.67	1.53	2.70	0.57	n.d.	13.52	48.45	0.07	1.08	1.16	12.58	-3.8	5.0	
2007/6/26	7.69	10.94	4.94	0.06	0.53	15.16	1.61	2.72	0.84	n.d.	12.92	46.66	0.49	1.12	1.12	12.65	-0.1	7.2	
2007/7/10	7.62	8.00	4.55	0.04	0.50	10.79	1.34	2.63	0.81	n.d.	7.33	38.33	0.63	0.86	0.87	9.57	-0.4	8.9	
2007/7/26	7.61	9.25	4.18	0.03	0.47	10.99	1.28	2.55	0.59	n.d.	8.70	40.66	0.76	0.85	0.93	9.87	-4.4	3.2	
2007/8/9	7.68	8.71	4.15	0.05	0.46	10.70	1.26	2.59	0.58	n.d.	7.74	37.52	0.59	0.83	0.86	9.39	-1.5	3.8	
2007/8/29	7.71	10.27	4.64	0.06	0.52	13.44	1.48	2.71	0.46	n.d.	10.75	33.86	0.19	1.01	0.86	10.67	7.9	1.9	
2007/9/12	7.75	10.58	4.55	n.d.	0.50	13.27	1.43	2.66	0.54	n.d.	11.35	41.79	0.62	0.99	1.01	11.23	-0.7	3.0	
2007/9/26	7.67	9.37	4.34	n.d.	0.49	11.56	1.31	2.54	0.65	n.d.	8.69	41.85	0.02	0.89	0.95	10.17	-3.4	4.1	
2007/10/11	7.67	9.02	4.29	0.07	0.49	11.31	1.29	2.48	1.10	n.d.	8.38	45.43	1.06	0.87	1.01	10.35	-7.1	6.9	
2007/10/25	7.79	10.27	4.54	n.d.	0.48	12.59	1.39	2.59	0.58	n.d.	10.37	49.00	0.21	0.95	1.10	11.35	-7.3	5.0	
2007/11/13	7.85	10.82	4.80	0.04	0.57	13.88	1.51	2.76	0.50	n.d.	11.77	46.94	0.99	1.04	1.10	11.99	-2.7	5.1	
2007/11/27	7.77	11.09	4.94	n.d.	0.54	14.89	1.62	2.77	0.44	n.d.	12.65	44.36	0.03	1.10	1.08	12.30	1.3	5.2	
2007/12/10	7.73	11.53	5.01	0.03	0.53	15.22	1.64	2.81	0.45	n.d.	13.29	45.53	0.00	1.13	1.11	12.64	0.8	4.6	
2007/12/25	7.80	11.77	4.73	n.d.	0.52	14.68	1.57	2.73	0.40	n.d.	13.31	51.89	0.39	1.08	1.21	12.81	-5.7	4.2	
2008/1/8	7.78	11.10	4.65	0.04	0.50	14.33	1.50	2.88	1.03	n.d.	12.12	40.78	0.00	1.06	1.02	11.77	1.8	2.9	
2008/1/22	7.80	10.31	4.61	0.06	0.50	13.55	1.44	2.84	1.03	n.d.	11.34	37.46	0.21	1.01	0.95	11.13	3.3	3.8	
2008/2/6	7.66	10.04	4.06	n.d.	0.42	11.42	1.22	2.52	0.73	n.d.	10.62	37.64	0.00	0.86	0.92	10.03	-3.6	-0.1	
2008/2/19	7.84	10.97	4.76	0.02	0.50	14.13	1.51	2.64	0.55	n.d.	12.41	43.59	0.00	1.05	1.06	11.88	-0.3	4.0	
2008/3/5	7.81	11.13	5.11	0.04	0.54	15.51	1.64	2.73	0.54	n.d.	13.32	43.27	0.00	1.15	1.07	12.58	3.4	6.1	
2008/3/18	7.83	11.25	4.58	n.d.	0.50	14.01	1.48	2.69	0.53	n.d.	13.15	42.61	0.00	1.03	1.06	11.84	-1.1	2.6	
2008/4/4	7.83	10.07	4.38	0.05	0.48	12.62	1.38	2.56	0.66	n.d.	11.03	40.35	0.81	0.95	0.97	10.82	-1.3	3.6	
2008/4/21	7.82	10.38	4.49	0.05	0.49	13.03	1.42	2.59	0.67	n.d.	11.18	41.05	0.00	0.98	0.99	11.07	-0.6	3.2	
2008/5/8	7.76	10.83	4.72	0.05	0.51	14.05	1.52	2.64	0.58	n.d.	12.36	43.06	0.00	1.05	1.05	11.82	0.0	4.4	
2008/5/22	7.83	11.07	4.63	n.d.	0.51	14.01	1.50	2.64	0.59	n.d.	12.71	43.18	0.00	1.04	1.06	11.82	-0.9	3.3	
2008/6/5	7.68	7.90	3.77	0.04	0.43	9.30	1.08	2.50	0.85	n.d.	7.19	31.96	0.00	0.73	0.76	8.32	-1.9	2.6	
2008/6/19	7.62	9.45	4.83	0.04	0.50	13.09	1.45	2.70	0.83	n.d.	10.24	36.84	0.07	1.00	0.91	10.75	4.8	6.4	
2008/7/7	7.65	9.03	3.96	n.d.	0.42	10.39	1.16	2.49	0.74	n.d.	8.54	35.55	0.00	0.80	0.84	9.17	-2.8	0.8	
2008/7/23	7.70	10.27	4.40	n.d.	0.46	12.62	1.36	2.60	0.67	n.d.	10.77	39.31	0.00	0.95	0.95	10.69	-0.4	2.0	
2008/8/6	7.63	10.79	4.67	0.02	0.50	13.87	1.48	2.71	0.57	n.d.	12.15	40.99	0.35	1.03	1.01	11.55	1.0	3.4	
2008/8/20	7.77	11.78	4.59	n.d.	0.50	13.50	1.46	2.72	0.45	n.d.	13.01	42.26	0.12	1.01	1.05	11.63	-2.0	-0.6	
2008/9/4	7.80	11.33	4.67	n.d.	0.50	14.16	1.51	2.69	0.84	n.d.	13.41	43.31	0.07	1.05	1.08	12.05	-1.5	3.1	
2008/9/22	7.65	9.40	4.21	n.d.	0.47	11.39	1.28	2.47	1.15	n.d.	9.46	34.07	0.77	0.87	0.84	9.67	1.5	1.4	
2008/10/6	7.72	8.36	3.91	0.08	0.47	9.99	1.14	2.37	0.92	n.d.	7.22	33.34	0.44	0.78	0.78	8.69	0.0	1.9	
2008/10/22	7.74	9.73	4.38	0.08	0.51	12.15	1.37	2.54	0.70	n.d.	9.46	40.14	0.44	0.93	0.94	10.42	-0.6	3.4	
2008/11/6	7.70	10.23	4.50	n.d.	0.52	12.94	1.42	2.54	0.63	n.d.	10.33	42.41	0.61	0.97	0.99	10.97	-1.1	3.5	
2008/11/20	7.80	9.85	4.36	n.d.	0.50	12.26	1.35	2.45	0.68	n.d.	9.67	40.59	0.44	0.92	0.95	10.45	-1.2	2.9	
2008/12/4	7.90	10.34	4.48	n.d.	0.51	13.11	1.40	2.47	0.61	n.d.	10.15	43.43	0.03	0.98	1.00	11.04	-1.3	3.3	
2008/12/19	7.83	10.71	4.64	n.d.	0.52	13.80	1.49	2.56	0.57	n.d.	11.29	43.35	0.00	1.03	1.03	11.52	0.0	3.6	
2009/1/9	7.84	11.19	4.70	n.d.	0.53	14.43	1.55	2.64	0.42	n.d.	12.49	44.35	0.47	1.07	1.07	12.02	-0.1	3.6	
2009/1/27	7.83	11.23	4.72	n.d.	0.53	14.60	1.56	2.65	0.51	n.d.	12.87	43.80	0.38	1.08	1.07	12.11	0.3	3.8	
2009/2/9	7.85	10.94	4.59	n.d.	0.52	13.96	1.48	2.55	0.59	n.d.	12.35	42.64	0.03	1.03	1.04	11.67	-0.3	3.2	
2009/2/23	7.66	8.09	3.82	n.d.	0.45	10.06	1.11	2.58	1.07	n.d.	8.11	30.54	0.06	0.77	0.76	8.64	0.7	3.3	
2009/3/9	7.64	9.55	4.37	n.d.	0.50	12.11	1.34	2.53	0.75	n.d.	10.12	37.70	0.00	0.92	0.91	10.30	0.3	3.8	
2009/3/23	7.65	8.83	4.01	n.d.	0.46	10.67	1.19	2.44	0.71	n.d.	8.49	34.40	0.56	0.82	0.82	9.18	-0.2	2.0	
2009/4/13	7.79	10.66	4.55	n.d.	0.52	13.48	1.47	2.55	0.53	n.d.	11.53	42.64	0.00	1.00	1.02	11.37	-0.7	3.2	
2009/4/27	7.86	10.95	4.58	n.d.	0.51	13.82	1.47	2.55	0.56	n.d.	12.53	42.70	0.06	1.02	1.04	11.66	-0.9	3.1	
2009/5/11	7.76	11.16	4.73	n.d.	0.54	14.33	1.54	2.70	0.59	n.d.	13.79	43.92	0.12	1.06	1.09	12.21	-1.5	4.5	
2009/5/25	7.85	11.44	4.87	n.d.	0.55	15.00	1.60	2.76	0.55	n.d.	14.78	44.04	0.40	1.11	1.12	12.65	-0.5	5.0	
2009/6/8	7.79	11.56	4.76	n.d.	0.52	14.71	1.56	2.59	0.46	n.d.	13.55	44.59	0.01	1.08	1.09	12.31	-0.5	3.1	
2009/6/24	7.75	10.18	4.33	n.d.	0.49	12.63	1.36	2.46	0.91	n.d.	10.83	38.49	0.63	0.94	0.94	10.62	0.1	2.1	
2009/7/8	7.65	9.76	4.27	n.d.	0.50	11.94	1.34	2.36	0.59	n.d.	9.80	38.19	0.17	0.90	0.91	10.15	-0.1	2.0	
2009/7/22	7.60	8.84	4.01	n.d.	0.48	10.85	1.21	2.25	1.27	n.d.	8.48	33.49	1.15	0.83	0.81	9.20	1.1	2.0	
2009/8/12	7.63	8.02	4.00	n.d.	0.47	9.05	1.18	2.45	0.52	n.d.	6.16	32.13	0.53	0.73	0.73	8.12	0.2	0.6	
2009/8/27	7.60	10.23	4.53	n.d.	0.52	12.79	1.45	2.46	0.42	n.d.	9.93	40.20	0.05	0.97	0.94	10.68	1.4	2.2	
2009/9/10	7.67	10.74	4.58	n.d.	0.52	13.29	1.46	2.53	0.46	n.d.	11.24	41.79	0.48	1.00	1.00	11.20	-0.1	2.1	
2009/9/25	7.61	11.16	4.73	n.d.	0.54	14.24	1.54	2.62	0.43	n.d.	12.51	43.92	0.00	1.06	1.06				

## Appendix 4d. 四万十川上流域の採水地点 A3 における渓流水分析データ

## Analytical data of streamwater at sampling location A3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2009/12/22	7.80	10.66	4.50	n.d.	0.49	13.33	1.44	2.51	0.48	n.d.	11.68	42.15	0.06	0.99	1.01	11.28	-1.0	2.8	
2010/1/6	7.80	11.08	4.69	n.d.	0.51	14.32	1.53	2.49	0.44	n.d.	12.26	43.19	0.11	1.06	1.04	11.82	0.8	3.2	
2010/1/20	7.92	11.53	4.75	n.d.	0.52	15.24	1.58	2.46	0.48	n.d.	12.89	46.18	0.00	1.11	1.10	12.45	0.3	3.8	
2010/2/4	7.85	10.73	4.60	n.d.	0.51	13.94	1.48	2.59	0.75	n.d.	12.46	41.73	0.00	1.03	1.03	11.65	0.1	4.1	
2010/2/18	7.81	10.91	4.69	n.d.	0.52	14.26	1.53	2.63	0.71	n.d.	13.25	42.09	0.06	1.05	1.05	11.95	0.2	4.5	
2010/3/5	7.82	9.78	4.32	n.d.	0.48	12.49	1.33	2.34	0.82	n.d.	10.08	38.43	0.00	0.93	0.92	10.40	0.7	3.1	
2010/3/19	7.86	9.56	4.39	n.d.	0.48	12.25	1.33	2.37	0.76	n.d.	9.79	38.25	0.00	0.92	0.91	10.29	0.8	3.7	
2010/4/6	7.72	9.17	4.18	n.d.	0.49	11.38	1.30	2.29	0.72	n.d.	8.80	36.66	0.63	0.87	0.86	9.67	0.5	2.7	
2010/4/30	7.55	8.33	3.81	0.01	0.45	9.80	1.17	2.39	0.69	n.d.	7.34	34.22	0.28	0.76	0.79	8.65	-1.9	1.9	
2010/5/20	7.59	8.89	4.28	n.d.	0.49	11.61	1.30	2.29	0.72	n.d.	8.95	38.55	0.01	0.88	0.89	9.92	-0.5	5.5	
2010/6/4	7.80	9.52	4.35	n.d.	0.49	11.68	1.33	2.53	0.64	n.d.	9.45	38.80	0.00	0.89	0.91	10.11	-1.1	3.0	
2010/6/24	7.56	8.75	4.10	n.d.	0.48	10.50	1.21	2.21	0.74	n.d.	7.58	34.83	0.00	0.81	0.80	9.00	0.7	1.4	
2010/7/16	7.60	8.15	4.01	n.d.	0.48	9.72	1.16	2.34	0.68	n.d.	7.25	32.88	0.05	0.77	0.77	8.54	0.0	2.3	
2010/8/5	7.74	8.77	4.11	n.d.	0.49	10.40	1.23	2.17	1.00	n.d.	7.40	35.50	0.29	0.81	0.81	9.02	-0.1	1.4	
2010/8/24	7.66	9.56	4.38	n.d.	0.51	11.67	1.34	2.47	0.56	n.d.	9.63	38.49	0.32	0.90	0.91	10.11	-0.8	2.8	
2010/9/9	7.66	8.70	4.33	n.d.	0.51	11.87	1.33	2.33	0.93	n.d.	9.83	38.37	0.15	0.90	0.91	10.19	-0.6	7.9	
2010/10/5	7.57	8.74	4.09	n.d.	0.48	10.62	1.20	2.07	0.97	n.d.	7.53	35.32	0.67	0.82	0.81	9.04	0.5	1.7	
2010/10/22	7.87	9.86	4.50	n.d.	0.53	12.28	1.39	2.47	0.60	n.d.	9.83	40.14	0.55	0.94	0.94	10.50	-0.3	3.1	
2010/11/16	7.44	10.24	4.61	n.d.	0.51	13.37	1.45	2.47	0.50	n.d.	11.05	43.92	0.00	1.00	1.03	11.34	-1.3	5.1	
2010/12/7	7.79	10.84	4.54	n.d.	0.49	13.40	1.42	2.30	0.55	n.d.	10.93	43.07	0.00	1.00	1.01	11.20	-0.6	1.6	
2011/1/5	7.67	10.65	4.65	n.d.	0.51	14.18	1.51	2.52	0.52	n.d.	12.56	44.41	0.08	1.05	1.07	11.91	-1.0	5.6	
2011/1/24	7.67	10.63	4.77	n.d.	0.52	14.86	1.55	2.48	0.43	n.d.	12.90	44.78	0.00	1.09	1.08	12.23	0.5	7.0	
2011/2/15	7.72	11.00	4.77	n.d.	0.52	14.87	1.57	2.77	0.72	n.d.	13.22	43.98	0.12	1.09	1.09	12.33	0.3	5.7	
2011/3/15	7.98	11.56	4.74	0.08	0.50	14.78	1.53	2.50	0.49	n.d.	13.82	46.18	0.00	1.09	1.12	12.48	-1.7	3.8	
2011/3/28	7.77	11.69	4.85	n.d.	0.52	15.21	1.60	2.54	0.48	n.d.	14.25	45.51	0.00	1.11	1.12	12.67	-0.3	4.0	
2011/4/20	7.79	10.44	4.79	n.d.	0.58	15.39	1.61	2.47	n.d.	n.d.	14.02	46.97	0.39	1.12	1.13	12.72	-0.3	9.9	
2011/5/10	7.69	10.47	4.72	n.d.	0.54	14.77	1.56	2.53	0.56	n.d.	14.28	44.59	0.37	1.08	1.11	12.44	-1.1	8.6	
2011/6/2	7.59	8.53	4.59	n.d.	0.69	9.07	1.29	2.82	0.33	n.d.	7.45	36.36	0.01	0.78	0.84	8.92	-3.7	2.3	
2011/6/18	7.57	7.39	3.74	0.01	0.45	9.05	1.10	2.27	0.36	n.d.	6.67	31.72	1.33	0.72	0.73	8.03	-0.8	4.1	
2011/6/30	7.62	8.02	3.94	n.d.	0.47	9.85	1.19	2.31	0.49	n.d.	7.10	33.86	0.00	0.77	0.78	8.60	-0.2	3.5	
2011/7/13	7.68	8.28	4.21	n.d.	0.50	11.51	1.33	2.35	0.50	n.d.	9.22	38.25	0.02	0.88	0.89	9.90	-0.8	8.9	
2011/8/5	7.69	9.45	4.18	n.d.	0.51	11.27	1.31	2.39	0.57	n.d.	8.92	37.94	0.00	0.87	0.88	9.76	-1.1	1.6	
2011/8/25	7.69	9.40	4.42	n.d.	0.52	12.54	1.42	2.47	0.44	n.d.	10.08	40.51	0.00	0.95	0.95	10.62	-0.1	6.1	
2011/9/22	7.60	6.48	3.70	n.d.	0.45	7.67	1.05	2.06	0.45	n.d.	4.42	30.26	0.08	0.64	0.65	7.07	-0.9	4.3	
2011/10/5	7.74	9.27	4.10	n.d.	0.47	11.27	1.30	2.43	0.45	n.d.	8.78	38.80	0.00	0.86	0.89	9.77	-2.0	2.6	
2011/10/28	7.76	8.68	4.12	n.d.	0.44	10.14	1.24	2.13	0.43	n.d.	7.48	36.78	0.06	0.80	0.83	8.97	-1.7	1.6	
2011/11/14	7.76	9.06	4.45	n.d.	0.46	11.95	1.39	2.29	0.38	n.d.	9.70	40.87	0.47	0.92	0.94	10.34	-1.4	6.6	
2011/12/9	7.71	9.17	4.40	0.01	0.46	11.75	1.37	2.25	0.48	n.d.	9.23	39.12	0.00	0.90	0.90	10.07	-0.1	4.7	
2011/12/27	7.73	10.09	4.52	0.02	0.45	12.33	1.45	2.31	0.38	n.d.	10.43	41.48	0.00	0.94	0.97	10.68	-1.3	2.8	
2012/1/12	7.73	10.69	4.63	n.d.	0.49	13.10	1.49	2.37	0.38	n.d.	11.35	43.49	0.00	0.99	1.02	11.26	-1.6	2.6	
2012/2/9	7.69	9.93	4.42	0.02	0.46	12.20	1.40	2.34	0.66	n.d.	10.53	39.59	0.27	0.93	0.94	10.51	-0.8	2.8	
2012/2/24	7.60	8.37	3.79	n.d.	0.40	10.01	1.14	2.19	0.77	n.d.	8.40	33.25	0.08	0.77	0.79	8.76	-1.6	2.3	
2012/3/20	7.63	9.40	4.17	n.d.	0.45	10.72	1.27	2.16	0.57	n.d.	9.28	37.82	0.51	0.83	0.88	9.57	-3.0	0.9	
2012/4/10	7.62	8.69	4.23	n.d.	0.45	10.96	1.31	2.13	0.56	n.d.	9.21	38.55	0.39	0.85	0.89	9.70	-2.5	5.5	
2012/5/11	7.62	8.81	4.51	n.d.	0.81	10.71	1.29	2.39	0.32	n.d.	8.73	37.88	0.03	0.86	0.88	9.65	-1.0	4.6	
2012/6/1	7.66	9.48	4.45	n.d.	0.48	12.28	1.43	2.27	0.43	n.d.	10.60	42.09	0.00	0.94	0.98	10.70	-2.4	6.1	
2012/6/13	7.68	10.42	4.68	n.d.	0.64	12.32	1.44	2.32	0.58	n.d.	10.15	42.40	0.00	0.95	0.98	10.78	-1.4	1.7	
2012/6/25	7.51	6.32	3.67	n.d.	0.46	7.04	0.96	2.22	0.60	n.d.	5.71	27.39	0.01	0.60	0.64	6.89	-3.1	4.3	
2012/7/13	7.48	6.95	3.78	n.d.	0.54	7.40	0.99	2.00	0.51	n.d.	5.29	29.59	0.00	0.63	0.66	7.09	-2.4	1.0	
2012/7/30	7.64	8.60	4.14	n.d.	0.44	9.59	1.22	2.16	0.49	n.d.	7.60	34.16	0.00	0.77	0.79	8.64	-1.1	0.3	
2012/8/23	7.52	8.22	3.95	n.d.	0.44	9.59	1.20	1.86	1.26	n.d.	6.53	35.01	1.37	0.76	0.78	8.51	-1.4	1.7	
2012/9/12	7.60	7.83	4.15	n.d.	0.46	9.58	1.24	2.09	0.57	n.d.	6.98	35.32	0.05	0.77	0.79	8.64	-1.3	4.9	
2012/10/9	7.62	8.19	4.35	n.d.	0.47	10.53	1.31	2.26	0.54	n.d.	8.07	37.27	0.00	0.83	0.85	9.35	-1.0	6.6	
2012/10/29	7.74	9.18	4.22	n.d.	0.43	12.32	1.25	2.23	0.50	n.d.	9.46	40.38	0.00	0.91	0.93	10.27	-0.9	5.6	
2012/11/12	7.69	9.82	4.33	n.d.	0.43	13.03	1.32	2.30	0.51	n.d.	10.34	42.09	0.00	0.96	0.98	10.82	-1.0	4.8	
2012/12/7	7.65	9.53	4.44	n.d.	0.45	13.75	1.38	2.36	0.50	n.d.	11.24	43.25	0.18	1.00	1.02	11.33	-0.7	8.6	
2012/12/26	7.60	9.51	4.44	n.d.	0.45	13.63	1.36	2.39	0.63	n.d.	11.22	42.09	0.04	1.00	1.00	11.22	-0.2	8.3	
2013/1/18	7.76	9.17	4.33	n.d.	0.44	12.99	1.32	2.27	0.55	n.d.	10.19	40.26	0.00	0.96	0.94	10.65	0.6	7.5	
2013/2/8	7.71	8.57	4.20	n.d.	0.47	12.26	1.27	2.22	0.58	n.d.	9.69	38.74	0.00	0.91	0.91	10.18	0.1	8.6	
2013/2/25	7.80	8.68	4.21	n.d.	0.47	12.16	1.29	2.14	0.58	n.d.	9.47	38.86	0.00	0.91	0.90	10.12	0.2	7.6	
2013/3/15	7.80	9.00	4.40	n.d.	0.48	13.20	1.37	2.19	0.00	n.d.	10.20	41.54	0.00	0.98	0.95	10.77	1.1	8.9	
2013/4/5	7.51	10.29	4.46	n.d.	0.50	13.52	1.42	2.22	0.47	n.d.	11.15	42.09	0.07	1.00	0.99	11.16	0.3	4.0	
2013/4/25	7.71	8.20	3.85	n.d.	0.44	10.42	1.12	2.21	0.51	n.d.	7.56	33.06	0.00	0.79	0.77	8.71	1.3	3.0	
2013/5/14	7.67	10.03	4.31	n.d.	0.45	13.17	1.36	2.17	0.59	n.d.	11.01	48.13	0.97	0.97	1.09	11.41	-5.9	6.4	
2013/6/5	7.65	9.55	4.71	n.d.	0.51	14.59	1.49	2.26	0.54	n.d.	11.92	42.88	0.25	1.07	1.02	11.77	2.2	10.4	
2013/6/27	7.54	7.01	3.81	n.d.	0.44	9.54	1.06	2.14	0.82	n.d.	6.76								



## Appendix 4e. 四万十川上流域の採水地点 A3 における渓流水分析データ

## Analytical data of streamwater at sampling location A3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2013/9/17	7.57	9.50	4.41	n.d.	0.50	12.77	1.38	2.25	0.71	n.d.	10.42	39.77	0.00	0.96	0.94	10.65	0.6	5.7	
2013/10/10	7.47	7.37	3.91	n.d.	0.47	9.40	1.14	2.04	0.75	n.d.	5.72	32.33	0.00	0.74	0.72	8.07	1.8	4.5	
2013/10/22	7.48	9.25	4.42	n.d.	0.51	12.50	1.40	2.25	0.58	n.d.	9.47	39.65	0.09	0.94	0.92	10.40	1.3	5.9	
2013/10/30	7.53	7.86	4.13	n.d.	0.48	9.97	1.25	2.34	0.56	n.d.	6.77	33.73	0.00	0.79	0.77	8.65	1.5	4.8	
2013/11/18	7.51	9.22	4.42	n.d.	0.53	12.92	1.39	2.16	0.52	n.d.	9.30	41.42	0.00	0.96	0.94	10.60	1.2	7.0	
2013/12/13	7.56	10.21	4.47	0.01	0.51	13.19	1.43	2.20	0.51	n.d.	9.92	41.97	0.48	0.98	0.96	10.86	1.0	3.1	
2014/1/7	7.63	10.48	4.56	n.d.	0.51	13.68	1.45	2.55	0.51	n.d.	7.92	43.19	0.21	1.01	0.95	10.86	3.1	1.8	
2014/1/27	7.62	10.25	4.71	n.d.	0.53	14.60	1.52	2.60	0.47	n.d.	8.51	44.47	0.59	1.07	0.99	11.40	4.1	5.3	
2014/2/20	7.53	9.71	4.54	n.d.	0.52	13.64	1.43	2.60	0.67	n.d.	7.83	40.93	0.49	1.01	0.92	10.69	4.7	4.8	
2014/3/14	7.48	8.22	3.93	n.d.	0.44	10.84	1.15	2.28	0.75	n.d.	8.77	34.16	0.30	0.82	0.82	9.19	0.0	5.6	
2014/4/3	7.47	9.26	4.23	n.d.	0.48	12.16	1.29	2.22	0.56	n.d.	9.89	38.39	0.11	0.91	0.91	10.18	0.1	4.7	
2014/4/23	7.79	10.13	4.42	n.d.	0.50	13.27	1.40	2.25	0.56	n.d.	11.13	41.48	0.34	0.98	0.98	11.04	-0.1	4.3	
2014/5/9	7.75	10.02	4.61	n.d.	0.53	14.25	1.49	2.30	0.49	n.d.	11.94	43.62	0.21	1.05	1.04	11.71	0.5	7.8	
2014/5/27	7.79	10.20	4.43	n.d.	0.49	13.49	1.38	2.24	0.64	n.d.	11.27	41.97	0.00	0.99	1.00	11.16	-0.2	4.5	
2014/6/17	7.66	8.99	4.30	n.d.	0.47	12.33	1.32	2.25	0.60	n.d.	9.89	39.65	0.00	0.92	0.93	10.36	-0.3	7.1	
2014/7/9	7.56	8.11	4.12	n.d.	0.48	10.85	1.21	2.22	0.68	n.d.	7.79	34.57	0.00	0.83	0.80	9.11	1.8	5.8	
2014/7/24	7.57	9.15	4.46	n.d.	0.51	12.55	1.37	2.38	0.59	n.d.	9.44	39.45	0.06	0.95	0.92	10.42	1.4	6.5	
2014/8/12	7.71	6.89	3.79	n.d.	0.46	7.89	1.06	2.05	0.35	n.d.	4.55	29.22	0.32	0.66	0.64	7.09	1.6	1.4	
2014/8/27	7.52	7.65	3.99	n.d.	0.48	9.70	1.17	2.03	0.36	n.d.	5.58	33.67	0.15	0.77	0.73	8.22	2.3	3.6	
2014/9/18	7.46	8.52	4.14	n.d.	0.49	10.63	1.29	2.03	0.28	n.d.	7.23	37.52	0.18	0.83	0.83	9.13	0.1	3.4	
2014/10/9	7.59	8.93	4.33	n.d.	0.51	12.13	1.33	2.14	0.50	n.d.	8.80	39.71	0.00	0.92	0.90	10.10	0.7	6.2	
2014/10/30	7.68	9.15	4.25	n.d.	0.49	11.77	1.30	1.94	0.35	n.d.	8.10	39.61	0.01	0.89	0.88	9.78	0.8	3.3	
2014/11/20	7.68	9.26	4.37	n.d.	0.48	12.57	1.40	1.95	0.23	n.d.	9.20	41.48	0.06	0.94	0.93	10.39	0.8	5.8	
2014/12/2	7.74	9.94	4.71	n.d.	0.54	13.84	1.48	2.21	0.30	n.d.	10.79	42.40	0.12	1.03	0.99	11.29	2.2	6.3	
2014/12/22	7.65	9.30	4.19	n.d.	0.48	11.54	1.25	2.17	0.50	n.d.	9.14	37.27	0.09	0.87	0.87	9.74	0.2	2.3	
2015/1/15	7.65	8.62	3.95	n.d.	0.46	11.11	1.18	2.52	0.73	n.d.	7.92	34.83	0.00	0.83	0.82	9.25	1.0	3.5	
2015/2/6	7.68	8.97	4.37	n.d.	0.49	12.64	1.36	2.11	0.35	n.d.	9.90	40.26	0.05	0.95	0.93	10.47	0.7	7.7	
2015/2/27	7.74	9.92	4.39	n.d.	0.49	12.72	1.36	2.30	0.33	n.d.	9.95	40.14	0.00	0.95	0.94	10.54	0.8	3.0	
2015/3/20	7.66	7.78	3.80	n.d.	0.45	9.57	1.08	2.17	0.50	n.d.	6.75	31.11	0.02	0.74	0.72	8.15	1.6	2.3	
2015/4/8	7.68	8.82	4.09	n.d.	0.45	11.43	1.24	2.09	0.54	n.d.	8.35	37.21	0.00	0.86	0.85	9.53	0.6	3.9	
2015/4/30	7.64	9.38	4.19	n.d.	0.47	12.03	1.31	2.05	0.42	n.d.	8.90	39.22	0.43	0.90	0.89	9.98	0.5	3.1	
2015/5/20	7.71	9.22	4.18	n.d.	0.46	12.12	1.29	2.17	0.52	n.d.	9.03	38.86	0.55	0.90	0.89	10.02	0.6	4.2	
2015/6/8	7.65	8.86	4.11	n.d.	0.46	11.89	1.27	2.11	0.56	n.d.	8.92	37.88	0.07	0.89	0.88	9.84	0.7	5.2	
2015/7/2	7.53	7.13	3.59	n.d.	0.42	8.16	0.99	2.02	0.43	n.d.	5.53	28.67	0.48	0.66	0.65	7.21	0.5	0.6	
2015/7/24	7.60	7.55	3.78	n.d.	0.45	9.11	1.07	2.11	0.45	n.d.	5.57	32.03	0.09	0.72	0.71	7.85	0.8	1.9	
2015/8/11	7.66	9.46	4.27	n.d.	0.50	11.99	1.32	2.15	0.30	n.d.	8.47	39.96	0.14	0.90	0.90	9.98	0.5	2.7	
2015/8/26	7.47	7.45	3.67	n.d.	0.44	8.65	1.00	2.00	0.73	n.d.	5.50	29.34	0.07	0.69	0.66	7.46	1.6	0.1	
2015/9/25	7.44	7.03	3.72	n.d.	0.43	7.84	1.02	2.01	0.44	n.d.	4.49	29.83	0.00	0.65	0.65	7.07	0.1	0.3	
2015/10/15	7.72	9.24	4.27	n.d.	0.47	11.80	1.30	2.14	0.38	n.d.	8.04	39.59	0.14	0.89	0.88	9.82	0.6	3.1	
2015/11/4	7.73	9.96	4.45	n.d.	0.52	12.94	1.39	2.22	0.34	n.d.	9.48	42.09	0.06	0.97	0.96	10.68	0.6	3.5	
2015/11/18	7.58	8.29	3.86	n.d.	0.45	10.53	1.13	2.03	0.64	n.d.	6.65	34.65	0.01	0.80	0.77	8.69	1.5	2.4	
2015/12/8	7.76	9.38	4.36	n.d.	0.50	12.48	1.34	2.12	0.42	n.d.	9.02	40.32	0.00	0.94	0.92	10.28	1.1	4.6	
2015/12/24	7.75	8.86	4.24	n.d.	0.49	11.67	1.28	2.14	0.48	n.d.	8.05	38.13	0.22	0.89	0.86	9.68	1.4	4.4	

\* 分析値の品質管理：R1 はイオンバランス、R2 は電気伝導率比較が EANET (2010a) の推奨する許容範囲から外れていることを示す。Data quality control abbreviations: R1 and R2 indicate an analytical value that is outside the allowable range for respective R1 (ion balance) and R2 (comparison of electric conductivity) recommendations (EANET 2010a).  
 表中の n.d. は検出限界以下、n/a は欠測値を示す。Table abbreviations: n.d. indicates that it is below the detection limit; n/a indicates a missing value.

## Appendix 5a. 四万十川上流域の採水地点 N1 における渓流水分析データ

## Analytical data of streamwater at sampling location N1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2000/3/24	7.64	7.77	4.15	n.d.	0.62	8.57	1.21	3.50	1.39	n.d.	6.83	25.88	1.12	0.72	0.69	8.04	2.6	1.7	
2000/4/17	7.85	10.26	5.50	n.d.	0.74	12.14	1.69	3.59	1.03	n.d.	10.16	37.61	0.11	1.00	0.95	11.01	2.9	3.5	
2000/4/27	7.80	9.66	5.22	n.d.	0.81	11.80	1.64	3.46	1.39	n.d.	8.92	36.13	0.48	0.97	0.90	10.54	4.0	4.3	
2000/5/15	7.87	11.18	5.94	n.d.	0.73	13.10	1.78	3.54	1.44	n.d.	11.09	42.35	1.37	1.08	1.05	11.96	1.3	3.4	
2000/5/29	7.82	9.78	5.27	n.d.	0.79	11.40	1.54	3.33	2.01	n.d.	8.64	35.84	0.15	0.95	0.89	10.36	2.8	2.9	
2000/6/12	7.82	8.48	4.52	n.d.	0.71	9.80	1.33	3.26	1.09	n.d.	7.11	32.94	1.55	0.81	0.80	9.02	1.0	3.1	
2000/6/26	7.81	9.82	5.34	n.d.	0.78	11.39	1.57	3.39	1.36	n.d.	9.10	38.55	0.65	0.95	0.94	10.60	0.6	3.8	
2000/7/10	7.79	9.39	5.21	n.d.	0.75	10.91	1.51	3.42	1.16	n.d.	8.67	34.37	1.06	0.91	0.86	10.00	3.2	3.1	
2000/7/25	7.77	10.68	5.79	n.d.	0.84	12.49	1.72	3.37	2.73	n.d.	9.89	40.20	1.16	1.04	1.00	11.50	1.7	3.7	
2000/8/7	7.82	8.62	5.09	n.d.	0.85	9.66	1.37	3.48	1.01	n.d.	7.75	28.64	2.01	0.84	0.75	8.99	5.9	2.1	
2000/8/22	7.82	10.49	5.73	n.d.	0.94	12.27	1.69	3.41	2.18	n.d.	9.95	38.47	0.83	1.03	0.97	11.26	2.8	3.5	
2000/9/4	7.84	10.68	5.76	n.d.	0.86	12.97	1.79	3.34	2.93	n.d.	9.96	38.67	1.32	1.07	0.98	11.59	4.1	4.1	
2000/9/18	7.78	7.53	4.89	0.02	0.70	8.27	1.24	3.32	0.66	n.d.	6.23	27.37	1.43	0.75	0.68	8.03	4.5	3.2	
2000/10/3	7.82	8.46	4.94	n.d.	0.71	9.54	1.38	2.97	1.27	n.d.	7.50	30.60	1.64	0.82	0.76	8.91	3.8	2.6	
2000/10/18	7.87	9.91	5.48	n.d.	0.80	10.69	1.53	3.30	1.36	n.d.	9.30	36.98	1.23	0.92	0.91	10.30	0.2	1.9	
2000/11/6	7.83	8.73	5.14	n.d.	0.77	9.79	1.42	3.25	0.92	n.d.	7.46	33.53	1.08	0.85	0.81	9.29	2.3	3.1	
2000/11/21	7.84	9.81	5.42	n.d.	0.77	11.25	1.60	3.31	1.38	n.d.	8.94	34.94	1.56	0.95	0.87	10.28	4.1	2.3	
2000/12/5	7.75	10.30	5.52	n.d.	0.73	11.52	1.64	3.38	1.19	n.d.	9.91	36.30	1.14	0.97	0.92	10.64	2.8	1.6	
2000/12/18	7.77	10.59	5.68	0.02	0.71	12.21	1.72	3.60	1.15	n.d.	10.20	37.94	1.28	1.02	0.95	11.13	3.2	2.5	
2001/1/9	7.78	10.89	5.75	0.02	0.65	12.73	1.79	3.91	1.34	n.d.	10.78	37.34	1.87	1.05	0.97	11.46	4.1	2.5	
2001/1/23	7.72	9.88	5.45	n.d.	0.54	11.45	1.61	3.63	1.48	n.d.	9.78	33.26	1.18	0.95	0.87	10.40	4.4	2.6	
2001/2/6	7.80	9.30	5.31	0.02	0.57	10.77	1.50	3.33	1.02	n.d.	9.13	34.07	1.24	0.91	0.86	9.96	2.7	3.4	
2001/2/20	7.78	10.27	6.18	0.08	0.62	12.38	1.72	3.81	1.03	n.d.	11.63	36.57	1.04	1.05	0.97	11.47	4.1	5.5	
2001/3/6	7.79	9.47	5.01	n.d.	0.59	10.86	1.52	3.59	1.04	n.d.	9.13	36.43	0.99	0.90	0.91	10.16	-0.3	3.5	
2001/3/21	7.84	10.36	5.47	n.d.	0.65	11.98	1.66	3.52	0.98	n.d.	10.17	38.31	0.84	0.99	0.95	10.95	1.7	2.8	
2001/4/10	7.85	11.11	6.07	n.d.	0.75	12.96	1.76	3.45	1.22	n.d.	11.16	40.94	1.17	1.07	1.02	11.81	2.6	3.1	
2001/4/23	7.80	11.21	5.90	n.d.	0.72	13.09	1.80	3.52	1.32	n.d.	10.69	43.64	0.28	1.08	1.06	11.97	0.9	3.3	
2001/5/8	7.72	7.33	4.36	n.d.	0.72	8.19	1.15	3.54	0.83	n.d.	6.39	26.58	1.82	0.71	0.68	7.88	2.1	3.6	
2001/5/22	7.81	9.98	5.35	n.d.	0.70	11.62	1.57	3.12	1.31	n.d.	8.98	39.20	1.54	0.96	0.94	10.61	1.1	3.1	
2001/6/5	7.82	10.63	5.67	n.d.	0.72	12.63	1.71	3.30	1.28	n.d.	9.94	40.95	0.78	1.04	0.99	11.37	2.2	3.4	
2001/6/20	7.77	7.96	4.32	n.d.	0.64	9.08	1.25	2.76	1.95	n.d.	6.40	30.59	0.77	0.76	0.74	8.42	1.1	2.8	
2001/7/3	7.82	10.24	5.50	n.d.	0.72	12.65	1.72	3.33	1.42	n.d.	9.44	38.80	0.40	1.03	0.95	11.12	4.1	4.1	
2001/7/24	7.81	10.62	5.63	n.d.	0.80	12.34	1.68	3.25	1.84	n.d.	9.74	41.88	0.94	1.02	1.01	11.36	0.4	3.4	
2001/8/7	7.82	11.44	6.03	n.d.	0.80	13.41	1.81	3.24	2.56	n.d.	10.50	43.95	0.77	1.10	1.07	12.19	1.4	3.2	
2001/8/21	7.61	6.68	3.64	n.d.	0.67	7.00	0.99	2.34	4.56	n.d.	4.73	20.94	2.54	0.61	0.58	6.78	2.1	0.7	
2001/9/4	7.80	10.07	5.16	n.d.	0.72	11.54	1.59	2.85	3.07	n.d.	8.46	38.54	0.94	0.95	0.94	10.57	0.6	2.4	
2001/9/26	7.76	9.96	5.52	n.d.	0.66	11.36	1.60	3.27	1.26	n.d.	9.52	37.20	1.03	0.96	0.92	10.55	1.9	2.9	
2001/10/10	7.79	8.09	4.49	n.d.	0.64	9.12	1.29	2.63	1.60	n.d.	6.51	30.95	1.38	0.77	0.74	8.47	2.0	2.3	
2001/10/24	7.80	9.04	5.04	n.d.	0.71	10.42	1.48	3.12	0.60	n.d.	7.90	36.35	0.77	0.88	0.86	9.68	1.2	3.4	
2001/11/7	7.81	9.33	4.72	n.d.	0.64	10.15	1.48	2.99	0.65	n.d.	7.87	34.98	1.48	0.85	0.83	9.39	1.0	0.3	
2001/11/21	7.81	10.37	5.37	0.06	0.66	11.60	1.68	3.24	0.88	n.d.	9.76	39.42	0.97	0.97	0.95	10.79	0.8	2.0	
2001/12/4	7.81	10.84	5.39	0.09	0.68	11.68	1.70	3.54	0.71	n.d.	10.38	41.43	0.85	0.98	1.01	11.15	-1.3	1.4	
2001/12/20	7.78	10.84	5.30	0.06	0.60	11.85	1.70	3.46	0.86	n.d.	10.73	42.20	1.05	0.98	1.03	11.26	-2.3	1.9	
2002/1/8	7.76	11.17	5.60	0.06	0.60	12.51	1.80	3.52	0.58	n.d.	11.58	42.69	1.05	1.03	1.05	11.72	-0.7	2.4	
2002/1/22	7.79	11.61	5.68	n.d.	0.63	12.63	1.80	4.08	1.29	n.d.	11.08	41.80	0.64	1.04	1.05	11.81	-0.5	0.9	
2002/2/7	7.73	11.43	5.65	n.d.	0.61	12.44	1.80	3.68	1.09	n.d.	11.44	42.30	0.26	1.03	1.05	11.73	-1.1	1.3	
2002/2/19	7.83	11.76	5.82	0.06	0.60	12.85	1.86	3.78	1.19	n.d.	11.92	41.06	0.27	1.07	1.05	11.96	0.9	0.9	
2002/3/5	7.77	11.37	5.75	n.d.	0.63	12.13	1.73	3.45	1.30	n.d.	11.04	40.38	0.90	1.01	1.01	11.41	0.2	0.2	
2002/3/19	7.79	11.78	6.32	n.d.	0.71	13.30	1.96	3.83	1.08	n.d.	12.39	39.55	0.42	1.12	1.03	12.21	4.0	1.8	
2002/4/9	7.77	10.03	4.97	n.d.	0.70	10.76	1.53	3.63	0.82	n.d.	9.26	33.33	0.64	0.90	0.85	9.93	2.4	-0.5	
2002/4/23	7.77	10.16	4.88	n.d.	0.71	10.99	1.53	3.52	0.76	n.d.	9.17	34.57	1.12	0.90	0.87	10.02	2.0	-0.7	
2002/5/8	7.78	9.49	4.74	n.d.	0.75	10.32	1.46	3.65	0.46	n.d.	8.77	36.73	0.41	0.86	0.89	9.85	-2.0	1.9	
2002/5/28	7.79	10.57	5.32	0.06	0.76	11.44	1.66	3.55	0.71	n.d.	10.26	40.78	0.44	0.96	0.99	10.98	-1.6	1.9	
2002/6/11	7.82	10.38	5.31	0.11	0.87	11.59	1.62	3.13	2.47	n.d.	9.34	38.16	1.90	0.97	0.95	10.81	1.2	2.0	
2002/6/25	7.97	9.76	4.79	n.d.	0.78	10.60	1.50	2.76	2.23	n.d.	7.95	37.19	1.21	0.88	0.89	9.88	-0.5	0.6	
2002/7/9	7.66	6.91	3.74	0.04	0.81	7.53	1.08	2.60	0.95	n.d.	5.71	25.40	1.92	0.65	0.62	7.16	2.0	1.8	
2002/7/23	7.80	9.14	4.88	n.d.	0.81	9.79	1.39	3.58	0.60	n.d.	8.18	33.59	0.81	0.84	0.83	9.38	0.3	1.3	
2002/8/6	7.75	10.06	5.28	n.d.	0.84	10.77	1.54	3.58	0.87	n.d.	9.30	36.66	0.89	0.92	0.91	10.28	0.3	1.1	
2002/8/27	7.74	10.92	5.51	n.d.	0.90	12.22	1.72	3.51	1.35	n.d.	9.99	40.13	0.92	1.01	0.99	11.25	1.4	1.5	
2002/9/10	7.80	9.72	5.47	n.d.	0.79	10.69	1.54	3.61	0.73	n.d.	9.08	37.90	0.69	0.92	0.92	10.32	-0.3	3.0	
2002/9/24	7.80	10.50	5.53	n.d.	0.81	11.89	1.72	3.56	1.22	n.d.	9.88	39.50	0.42	1.00	0.97	11.07	1.2	2.7	
2002/10/8	7.85	10.49	5.30	n.d.	0.76	11.88	1.66	3.45	1.27	n.d.	9.65	40.96	0.30	0.98	0.99	11.04	-0.5	2.5	
2002/10/22	7.86	11.05	5.71	n.d.	0.78	12.61	1.79	3.47	1.55	n.d.	10.44	41.08	0.58	1.04	1.01	11.58	1.5	2.3	
2002/11/5	7.76	10.83	5.37	n.d.	0.66	12.22	1.72	4.02	2.15	n.d.	10.56	38.26	0.53	1.00	0.99	11.34	0.3	2.3	
2002/11/19	7.76	11.31	5.88	n.d.	0.70	13.03	1.86	3.69	1.37	n.d.	11.42	41.78	0.00	1.08	1.05	12.00	1.3	3.0	
2002/12/3	7.67	11.61	5.72	n.d.	0.67	12.98													

## Appendix 5b. 四万十川上流域の採水地点 N1 における溪流水分析データ

## Analytical data of streamwater at sampling location N1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2003/2/18	7.77	10.86	5.79	n.d.	0.60	12.46	1.73	3.65	0.75	n.d.	10.28	39.85	0.00	1.03	0.98	11.32	2.4	2.1	
2003/3/4	7.68	9.30	4.89	n.d.	0.56	10.37	1.43	3.66	0.77	n.d.	7.62	33.07	0.63	0.86	0.82	9.43	2.7	0.7	
2003/3/18	7.75	8.87	4.67	n.d.	0.59	9.71	1.36	3.83	0.54	n.d.	7.42	31.86	0.25	0.81	0.79	9.05	1.3	1.0	
2003/4/7	7.78	9.33	4.87	0.02	0.60	10.42	1.45	3.73	0.56	n.d.	8.13	33.33	0.40	0.87	0.83	9.56	2.2	1.2	
2003/4/21	7.85	10.51	5.49	n.d.	0.71	11.70	1.60	3.69	0.50	n.d.	9.57	38.27	0.33	0.97	0.94	10.74	1.8	1.1	
2003/5/8	7.78	9.10	4.83	n.d.	0.73	9.93	1.37	2.79	1.19	n.d.	7.41	33.65	1.52	0.84	0.80	9.17	2.0	0.4	
2003/5/22	7.84	9.49	5.26	n.d.	0.70	10.12	1.46	3.66	0.32	n.d.	8.39	38.37	0.00	0.87	0.91	9.94	-2.2	2.3	
2003/6/4	7.80	8.59	5.07	n.d.	0.68	8.73	1.34	3.65	0.22	n.d.	7.38	31.78	0.38	0.78	0.78	8.77	0.2	1.0	
2003/6/19	7.63	5.46	3.44	n.d.	0.61	5.23	0.79	2.63	0.40	n.d.	3.78	19.60	1.43	0.49	0.48	5.43	1.1	-0.2	
2003/7/3	7.77	8.72	4.93	0.04	0.70	9.41	1.39	3.43	0.50	n.d.	6.97	33.36	0.29	0.82	0.80	9.02	1.4	1.7	
2003/7/17	7.80	9.34	5.06	0.06	0.76	10.21	1.47	3.37	0.92	n.d.	7.72	37.35	-0.40	0.87	0.88	9.79	-0.5	2.3	
2003/8/1	7.83	10.12	5.32	n.d.	0.80	10.96	1.56	3.20	1.45	n.d.	8.35	24.88	1.26	0.93	0.70	9.31	14.3	-4.2	R1
2003/8/14	7.50	4.62	2.85	0.02	0.61	4.38	0.68	1.40	1.44	n.d.	2.68	17.20	2.54	0.42	0.40	4.51	1.9	-1.2	
2003/9/4	7.83	10.34	5.94	0.17	0.89	11.44	1.66	3.55	1.57	n.d.	9.34	40.43	0.99	1.00	0.98	11.10	0.8	3.6	
2003/9/18	7.81	9.63	5.52	n.d.	0.85	10.54	1.54	3.54	0.96	n.d.	8.13	38.11	0.44	0.91	0.91	10.17	0.3	2.7	
2003/10/8	7.79	10.63	5.68	n.d.	0.71	11.62	1.65	3.44	1.62	n.d.	9.60	40.48	0.29	0.98	0.99	11.03	-0.2	1.8	
2003/10/22	7.86	9.99	5.64	n.d.	0.71	11.31	1.61	3.45	0.88	n.d.	8.70	28.33	2.65	0.96	0.76	9.79	11.9	-1.0	R1
2003/11/12	7.82	10.12	5.62	n.d.	0.75	11.62	1.67	3.35	1.24	n.d.	8.60	39.39	0.49	0.98	0.94	10.72	2.2	2.9	
2003/11/26	7.79	10.75	5.54	n.d.	0.63	11.60	1.64	3.42	1.25	n.d.	9.58	40.17	0.34	0.97	0.97	10.90	-0.2	0.7	
2003/12/10	7.72	9.95	5.21	n.d.	0.56	10.47	1.50	3.46	0.59	n.d.	8.76	36.67	0.42	0.89	0.89	9.96	-0.2	0.0	
2003/12/24	7.70	10.43	5.90	n.d.	0.61	11.98	1.71	3.61	0.70	n.d.	9.39	40.69	0.30	1.01	0.98	11.09	1.8	3.1	
2004/1/7	7.70	10.86	5.84	n.d.	0.57	12.02	1.71	3.58	0.78	n.d.	10.34	44.37	0.49	1.01	1.06	11.51	-2.3	2.9	
2004/1/21	7.74	11.17	5.78	n.d.	0.53	11.84	1.71	4.01	0.95	n.d.	10.53	44.11	0.22	1.00	1.07	11.57	-3.6	1.7	
2004/2/5	7.69	11.36	6.20	n.d.	0.56	12.81	1.85	3.86	0.87	n.d.	11.06	45.38	0.22	1.08	1.10	12.15	-1.0	3.4	
2004/2/20	7.79	11.55	6.46	n.d.	0.57	13.52	1.95	3.77	0.81	n.d.	11.59	52.44	0.38	1.13	1.22	13.04	-3.8	6.1	
2004/3/4	7.79	11.08	5.79	n.d.	0.54	12.12	1.74	4.16	1.66	n.d.	10.42	44.76	0.78	1.01	1.09	11.81	-3.8	3.2	
2004/3/24	7.80	10.88	5.88	n.d.	0.61	11.92	1.70	3.92	1.73	n.d.	10.04	45.40	0.80	1.01	1.09	11.70	-4.1	3.6	
2004/4/6	7.84	10.39	5.46	n.d.	0.58	11.41	1.62	3.78	0.98	n.d.	9.89	43.80	0.54	0.95	1.05	11.16	-4.6	3.6	
2004/4/21	7.77	9.47	4.93	n.d.	0.64	9.98	1.39	3.72	0.78	n.d.	8.11	42.17	1.06	0.84	0.98	10.09	-7.4	3.1	
2004/5/14	7.66	6.74	3.95	n.d.	0.54	6.30	0.94	3.64	0.34	n.d.	5.21	28.49	0.86	0.58	0.68	7.01	-8.5	2.0	R1
2004/5/31	7.86	10.27	5.41	n.d.	0.70	10.70	1.52	3.64	0.77	n.d.	9.42	46.39	0.81	0.91	1.07	10.98	-8.0	3.3	R1
2004/6/11	7.82	8.96	5.00	n.d.	0.70	9.69	1.39	2.84	1.60	n.d.	7.73	39.62	2.76	0.83	0.92	9.68	-4.7	3.9	
2004/6/28	7.85	9.58	5.36	n.d.	0.70	9.54	1.44	3.57	0.79	n.d.	8.46	44.89	0.74	0.85	1.03	10.31	-9.6	3.6	R1
2004/7/12	7.84	10.20	5.63	n.d.	0.81	11.05	1.60	3.46	1.54	n.d.	9.07	22.67	0.32	0.95	0.68	9.45	16.3	-3.8	R1
2004/7/26	7.77	11.18	6.18	n.d.	0.89	12.57	1.78	3.60	2.11	n.d.	10.29	49.69	0.87	1.06	1.16	12.38	-4.5	5.1	
2004/8/9	7.77	8.28	5.11	n.d.	0.69	8.62	1.29	3.40	0.67	n.d.	6.88	41.84	0.66	0.78	0.94	9.37	-9.3	6.2	R1
2004/8/27	7.80	8.99	5.37	n.d.	0.72	9.67	1.42	3.33	0.67	n.d.	7.20	43.99	0.62	0.85	0.98	10.00	-6.8	5.3	
2004/9/13	7.57	5.83	4.72	n.d.	0.54	5.03	0.90	3.74	0.10	n.d.	3.30	26.14	0.98	0.54	0.60	6.29	-5.2	3.8	
2004/9/27	7.73	9.15	5.59	n.d.	0.80	9.81	1.54	3.72	0.79	n.d.	7.60	43.42	0.80	0.88	0.99	10.28	-5.8	5.8	
2004/10/12	7.79	9.23	5.56	n.d.	0.72	9.95	1.57	3.75	0.77	n.d.	8.00	44.33	1.02	0.89	1.01	10.45	-6.6	6.2	
2004/10/25	7.73	8.42	5.31	n.d.	0.67	8.41	1.39	3.71	0.31	n.d.	6.90	41.84	0.45	0.78	0.94	9.43	-9.1	5.6	R1
2004/11/8	7.74	9.15	5.54	n.d.	0.69	10.01	1.55	3.61	0.52	n.d.	7.87	46.13	0.66	0.89	1.03	10.50	-7.6	6.9	
2004/11/22	7.71	9.26	5.47	n.d.	0.64	10.26	1.57	3.62	0.47	n.d.	7.79	43.83	0.65	0.90	0.99	10.38	-5.0	5.7	
2004/12/6	7.59	7.97	4.74	n.d.	0.61	8.25	1.27	3.47	0.24	n.d.	5.97	38.37	0.72	0.74	0.86	8.72	-7.3	4.5	
2004/12/21	7.61	10.05	5.64	n.d.	0.63	10.65	1.61	3.61	0.44	n.d.	8.61	44.69	0.55	0.93	1.02	10.74	-4.9	3.3	
2005/1/7	7.60	10.22	5.65	0.02	0.57	10.97	1.63	3.67	0.56	n.d.	9.23	39.59	0.79	0.94	0.95	10.60	-0.5	1.8	
2005/1/21	7.74	10.64	5.77	n.d.	0.53	11.58	1.71	3.70	0.59	n.d.	9.79	40.99	1.05	0.98	0.99	11.03	-0.3	1.8	
2005/2/7	7.56	10.44	5.54	n.d.	0.50	10.73	1.60	4.29	0.84	n.d.	9.30	36.62	0.48	0.92	0.93	10.43	-0.4	0.0	
2005/2/18	7.71	9.36	5.13	n.d.	0.58	9.77	1.42	3.69	0.79	n.d.	7.79	37.13	0.66	0.84	0.89	9.64	-2.6	1.5	
2005/3/7	7.73	10.07	5.49	n.d.	0.54	11.10	1.63	3.64	0.41	n.d.	9.26	40.66	0.70	0.94	0.97	10.64	-1.5	2.8	
2005/4/6	7.73	9.92	5.51	n.d.	0.61	10.67	1.57	3.63	0.31	n.d.	8.97	48.32	0.47	0.92	1.09	11.00	-8.4	5.2	R1
2005/4/26	7.71	10.45	5.97	n.d.	0.71	11.91	1.74	3.64	0.68	n.d.	9.74	50.87	0.89	1.01	1.15	11.92	-6.2	6.6	
2005/5/10	7.72	9.49	5.40	n.d.	0.71	10.86	1.58	3.57	0.46	n.d.	8.42	46.70	0.66	0.93	1.05	10.85	-6.3	6.7	
2005/5/24	7.80	10.69	5.78	n.d.	0.76	11.79	1.72	3.48	0.91	n.d.	9.49	51.30	1.04	1.00	1.15	11.83	-7.0	5.1	
2005/6/6	7.85	11.15	6.07	n.d.	0.80	12.53	1.80	3.46	1.28	n.d.	10.04	54.12	0.52	1.06	1.21	12.49	-6.9	5.7	
2005/6/21	7.74	11.62	6.31	n.d.	0.99	13.06	1.86	3.49	1.89	n.d.	10.16	55.40	0.40	1.10	1.25	12.95	-6.1	5.4	
2005/7/5	7.67	8.31	4.50	n.d.	0.79	8.91	1.27	2.78	2.44	n.d.	6.16	37.33	1.56	0.77	0.86	8.96	-5.7	3.8	
2005/7/19	7.86	9.99	5.49	n.d.	0.83	10.86	1.55	3.42	1.09	n.d.	8.77	46.29	0.67	0.93	1.06	10.95	-6.3	4.6	
2005/8/9	8.19	11.92	6.17	n.d.	0.89	13.89	1.81	3.41	2.21	n.d.	10.22	58.56	0.54	1.13	1.30	13.39	-7.0	5.8	
2005/8/22	7.76	10.73	5.68	n.d.	0.89	12.04	1.69	2.90	5.34	n.d.	8.14	46.90	1.40	1.01	1.11	11.74	-4.5	4.5	
2005/9/15	7.71	9.05	5.43	n.d.	0.77	9.59	1.43	3.44	0.71	0.36	8.19	39.09	0.71	0.85	0.93	9.95	-4.4	4.7	
2005/9/28	8.00	10.91	5.91	n.d.	0.77	12.62	1.70	3.39	1.20	n.d.	9.90	51.74	1.08	1.05	1.17	12.21	-5.5	5.6	
2005/10/11	8.17	11.69	6.09	n.d.	0.79	14.22	1.87	3.38	1.62	n.d.	10.11	57.15	0.43	1.15	1.27	13.28	-5.0	6.4	
2005/10/25	7.81	11.22	5.97	n.d.	0.66	12.49	1.78	3.45	1.62	n.d.	10.73	48.19	0.00	1.05	1.14	12.14	-4.1	4.0	
2005/11/8	7.78	9.13	4.55	n.d.	0.53	8.16	1.09	2.67	0.79	n.d.	7.93	31.50	0.46	0.71	0.77	8.27	-4.1	-4.9	
2005/11/22	7.77	10.83	6.04	n.d.	0.65	12.33	1.82	3											

## Appendix 5c. 四万十川上流域の採水地点 N1 における渓流水分析データ

## Analytical data of streamwater at sampling location N1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2006/2/8	7.81	10.55	5.87	n.d.	0.56	11.81	1.73	4.19	1.19	n.d.	10.48	39.39	1.35	1.00	1.00	11.31	0.0	3.5	
2006/2/22	7.66	10.62	5.45	n.d.	0.57	11.14	1.60	3.80	0.87	n.d.	9.62	45.39	1.13	0.94	1.07	11.13	-6.3	2.4	
2006/3/8	7.84	10.23	5.30	n.d.	0.57	10.73	1.54	3.78	0.49	n.d.	9.48	44.28	0.99	0.91	1.04	10.80	-6.7	2.7	
2006/3/22	7.76	10.09	5.21	n.d.	0.59	10.61	1.56	3.72	0.71	n.d.	9.30	44.34	0.63	0.90	1.04	10.74	-7.1	3.1	
2006/4/12	7.62	6.73	4.36	n.d.	0.55	6.07	0.95	3.70	0.26	n.d.	5.41	28.26	1.07	0.58	0.68	7.06	-7.9	2.4	
2006/4/25	7.79	9.68	5.29	n.d.	0.64	10.04	1.50	3.96	0.35	n.d.	9.03	42.05	0.97	0.87	0.99	10.37	-6.6	3.5	
2006/5/11	7.58	6.02	3.99	n.d.	0.51	5.32	0.83	3.39	0.18	n.d.	4.33	30.27	2.04	0.52	0.68	6.59	-13.6	4.5	R1
2006/5/24	7.80	8.75	5.10	n.d.	0.66	8.89	1.35	3.62	0.30	n.d.	7.61	45.26	1.43	0.79	1.01	9.85	-11.9	5.9	R1
2006/6/13	7.80	9.74	5.36	n.d.	0.75	10.29	1.53	3.65	0.65	n.d.	9.04	53.09	1.23	0.89	1.17	11.27	-13.6	7.3	R1
2006/6/27	7.70	7.32	4.57	n.d.	0.60	7.06	1.08	3.34	0.19	n.d.	5.52	27.69	0.88	0.66	0.67	7.36	-0.8	0.2	
2006/7/13	7.81	9.06	5.20	n.d.	0.75	9.20	1.37	3.38	0.68	n.d.	7.57	34.46	0.86	0.82	0.83	9.19	-0.7	0.7	
2006/7/25	7.81	8.29	4.98	n.d.	0.70	8.22	1.24	3.33	0.52	n.d.	6.57	32.00	0.93	0.75	0.76	8.40	-1.1	0.7	
2006/8/9	7.80	10.48	5.97	n.d.	0.87	11.03	1.61	3.63	1.51	n.d.	8.89	39.97	1.04	0.96	0.97	10.79	-0.1	1.5	
2006/8/23	7.79	6.81	4.54	n.d.	0.61	6.10	0.96	3.12	0.31	n.d.	4.55	30.12	0.81	0.60	0.68	7.00	-6.6	1.4	
2006/9/5	7.78	9.26	4.90	n.d.	0.72	9.10	1.34	3.29	0.79	n.d.	7.41	39.41	0.98	0.80	0.91	9.40	-6.4	0.8	
2006/9/20	7.82	7.85	4.95	n.d.	0.61	7.50	1.17	3.28	0.33	n.d.	5.47	33.55	0.61	0.70	0.76	8.03	-4.1	1.2	
2006/10/4	7.81	9.96	5.67	n.d.	0.72	10.25	1.54	3.43	1.15	n.d.	8.37	39.96	0.78	0.90	0.94	10.26	-2.3	1.5	
2006/10/19	7.83	10.47	5.87	n.d.	0.70	10.99	1.64	3.43	1.45	n.d.	9.06	42.63	0.79	0.96	1.01	10.91	-2.6	2.1	
2006/11/7	7.81	11.00	5.97	n.d.	0.70	11.59	1.72	3.49	1.81	n.d.	9.71	44.74	0.48	1.00	1.06	11.46	-3.2	2.1	
2006/11/21	7.76	11.18	6.01	n.d.	0.69	12.08	1.77	3.81	2.52	n.d.	9.46	45.31	0.86	1.03	1.09	11.79	-2.9	2.6	
2006/12/8	7.76	10.00	5.25	n.d.	0.62	10.43	1.51	3.77	2.61	n.d.	7.99	38.36	1.45	0.89	0.94	10.26	-2.9	1.3	
2006/12/21	7.78	10.94	5.70	n.d.	0.59	11.43	1.69	3.52	1.43	n.d.	10.03	45.04	0.90	0.97	1.07	11.37	-4.7	1.9	
2007/1/10	7.77	11.23	5.99	n.d.	0.54	11.55	1.79	4.12	1.34	n.d.	11.34	42.59	0.50	1.00	1.07	11.65	-3.6	1.9	
2007/1/23	7.79	11.52	6.05	n.d.	0.60	12.72	1.86	3.69	1.17	n.d.	11.03	42.84	0.40	1.07	1.05	11.91	0.6	1.7	
2007/2/7	7.67	11.57	6.21	0.05	0.61	13.09	1.90	3.55	0.99	n.d.	11.54	42.36	0.42	1.10	1.05	12.10	2.2	2.2	
2007/2/21	7.78	10.74	5.84	n.d.	0.61	12.24	1.78	3.77	1.65	n.d.	10.11	40.29	0.81	1.03	1.00	11.43	1.1	3.1	
2007/3/12	7.82	11.02	5.77	0.04	0.59	12.29	1.77	3.63	1.22	n.d.	10.56	38.79	0.46	1.03	0.98	11.32	2.5	1.3	
2007/3/28	7.75	9.39	5.09	0.05	0.62	10.39	1.49	3.45	1.35	n.d.	8.42	31.08	0.97	0.88	0.80	9.55	4.6	0.9	
2007/4/10	7.85	11.12	5.95	0.08	0.66	12.75	1.80	3.52	0.89	n.d.	10.88	47.85	0.57	1.06	1.12	12.19	-2.7	4.6	
2007/4/24	7.83	11.20	6.01	n.d.	0.72	12.51	1.77	3.49	1.47	n.d.	10.40	44.07	0.73	1.05	1.06	11.80	-0.5	2.6	
2007/5/9	7.85	9.71	5.26	n.d.	0.70	11.15	1.55	3.40	1.15	n.d.	8.61	36.07	0.76	0.93	0.88	10.19	2.5	2.4	
2007/5/23	7.83	11.20	5.40	0.03	0.65	11.69	1.60	3.28	1.06	n.d.	10.23	51.22	0.63	0.97	1.16	11.75	-9.1	2.4	R1
2007/6/13	7.87	11.49	5.81	0.03	0.73	13.07	1.79	3.39	1.34	n.d.	10.78	53.45	0.49	1.07	1.22	12.66	-6.3	4.8	
2007/6/26	7.81	10.47	6.07	0.05	0.89	13.16	1.79	3.30	1.67	n.d.	9.63	48.09	1.10	1.09	1.11	12.21	-0.7	7.7	
2007/7/10	7.77	8.18	5.59	n.d.	0.80	9.86	1.44	3.53	0.53	n.d.	7.22	38.77	0.83	0.87	0.89	9.78	-1.1	8.9	
2007/7/26	7.83	9.58	5.42	0.07	0.83	9.98	1.48	3.32	0.79	n.d.	8.92	42.48	0.15	0.88	0.99	10.36	-5.8	3.9	
2007/8/9	7.83	9.29	5.54	0.04	0.80	10.11	1.52	3.50	0.59	n.d.	8.50	36.92	0.62	0.89	0.89	9.97	0.2	3.5	
2007/8/29	7.84	11.10	6.27	0.07	0.91	12.32	1.78	3.37	1.72	n.d.	10.09	36.99	0.63	1.06	0.94	11.30	6.1	0.9	
2007/9/12	7.91	11.32	6.10	n.d.	0.87	12.63	1.82	3.27	2.49	n.d.	10.19	44.87	0.92	1.07	1.08	12.00	-0.6	2.9	
2007/9/26	7.82	10.10	5.77	n.d.	0.81	11.28	1.61	3.28	1.11	n.d.	8.82	45.13	0.98	0.97	1.03	11.06	-3.3	4.5	
2007/10/11	7.86	9.00	5.10	n.d.	0.77	10.05	1.43	2.86	1.68	n.d.	7.13	42.84	1.76	0.86	0.96	9.99	-5.3	5.2	
2007/10/25	7.81	10.83	5.55	n.d.	0.66	11.70	1.65	3.32	1.22	n.d.	9.93	48.02	0.05	0.98	1.11	11.54	-6.2	3.2	
2007/11/13	7.87	11.27	5.81	n.d.	0.67	12.67	1.79	3.35	1.65	n.d.	10.72	46.39	0.60	1.05	1.10	12.02	-2.5	3.2	
2007/11/27	7.74	11.52	6.53	n.d.	0.73	13.38	1.95	3.47	1.47	n.d.	11.26	42.02	1.14	1.13	1.04	12.24	3.9	3.0	
2007/12/10	7.75	11.75	6.54	n.d.	0.69	13.99	2.02	3.57	1.30	n.d.	11.88	34.94	0.63	1.17	0.94	12.04	10.7	1.2	R1
2007/12/25	7.75	11.99	6.23	n.d.	0.66	13.42	1.90	3.67	1.80	n.d.	11.34	52.20	0.79	1.11	1.22	12.99	-4.7	4.0	
2008/1/8	7.68	10.60	5.58	0.03	0.61	11.66	1.69	4.00	3.04	n.d.	9.36	36.78	0.70	0.98	0.96	11.00	1.1	1.9	
2008/1/22	7.72	9.25	5.05	0.06	0.61	10.47	1.49	3.52	1.80	n.d.	8.00	32.65	1.53	0.88	0.83	9.68	3.1	2.3	
2008/2/6	7.63	9.50	4.74	n.d.	0.52	9.93	1.41	3.36	0.90	n.d.	8.84	35.82	0.64	0.83	0.88	9.61	-2.9	0.6	
2008/2/19	7.70	10.91	5.95	0.04	0.60	12.71	1.83	3.53	0.75	n.d.	11.11	41.70	0.17	1.06	1.03	11.74	1.7	3.7	
2008/3/5	7.76	11.10	6.42	0.05	0.65	13.54	1.95	3.66	0.98	n.d.	11.60	43.27	0.01	1.13	1.07	12.40	2.9	5.5	
2008/3/18	7.77	10.31	5.00	n.d.	0.55	11.35	1.62	2.60	0.62	n.d.	12.40	38.50	0.36	0.93	0.97	10.78	-2.2	2.2	
2008/4/4	7.76	9.98	5.29	0.06	0.63	11.02	1.60	3.50	0.60	n.d.	9.74	38.78	1.00	0.93	0.95	10.54	-0.9	2.7	
2008/4/21	7.79	10.25	5.42	0.04	0.69	11.51	1.64	3.44	0.63	n.d.	9.68	40.63	0.64	0.96	0.97	10.85	-0.5	2.8	
2008/5/8	7.75	11.08	6.04	0.10	0.78	12.98	1.84	3.55	0.81	n.d.	11.07	37.30	0.00	1.09	0.95	11.58	6.5	2.2	
2008/5/22	7.79	10.98	5.67	n.d.	0.75	12.21	1.73	3.22	1.03	n.d.	10.16	43.13	1.66	1.02	1.03	11.41	-0.4	1.9	
2008/6/5	7.71	6.48	3.85	0.07	0.68	6.48	0.95	2.76	0.59	n.d.	4.82	25.78	2.09	0.59	0.61	6.68	-1.6	1.5	
2008/6/19	7.75	9.50	5.86	0.04	0.83	11.92	1.69	3.36	0.73	n.d.	9.14	38.08	1.51	1.01	0.92	10.83	4.7	6.6	
2008/7/7	7.75	9.16	4.81	n.d.	0.73	9.44	1.34	3.11	0.64	n.d.	7.75	35.37	1.15	0.81	0.84	9.19	-1.8	0.2	
2008/7/23	7.80	10.82	5.65	n.d.	0.85	11.93	1.68	3.17	1.75	n.d.	9.67	42.34	1.26	1.00	1.01	11.25	-0.6	1.9	
2008/8/6	7.75	11.67	6.21	0.03	0.92	13.45	1.87	3.34	2.42	n.d.	10.73	45.56	0.61	1.12	1.10	12.46	0.8	3.3	
2008/8/20	7.75	12.10	6.12	n.d.	0.91	13.26	1.85	3.26	2.63	n.d.	11.07	45.94	1.17	1.10	1.12	12.45	-0.6	1.4	
2008/9/4	7.78	11.52	5.79	0.03	0.89	12.96	1.81	2.89	3.78	n.d.	9.93	44.26	0.86	1.07	1.07	12.02	-0.1	2.1	
2008/9/22	7.82	9.26	4.94	n.d.	0.78	10.15	1.42	3.07	1.50	n.d.	7.90	35.21	1.29	0.86	0.85	9.58	0.4	1.7	
2008/10/6	7.76	7.84	4.39	0.09	0.73	8.42	1.20	2.73	0.96	n.d.	5.25	32.41	1.07	0.73	0.73	8.09	0.0	1.6	
2008/10/22	7.77																		

## Appendix 5d. 四万十川上流域の採水地点 N1 における渓流水分析データ

## Analytical data of streamwater at sampling location N1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
							mg L <sup>-1</sup>												
2009/1/9	7.73	11.30	6.00	n.d.	0.65	13.05	1.86	3.29	0.81	n.d.	11.00	44.41	0.57	1.08	1.06	11.99	0.9	3.0	
2009/1/27	7.68	11.00	5.74	n.d.	0.62	12.89	1.83	3.45	1.18	n.d.	10.71	42.70	1.01	1.06	1.04	11.78	1.0	3.4	
2009/2/9	7.83	10.72	5.57	n.d.	0.63	12.24	1.73	3.20	0.92	n.d.	10.23	41.73	0.90	1.01	1.00	11.27	0.5	2.5	
2009/2/23	7.48	6.64	3.74	n.d.	0.59	7.05	1.02	3.27	1.05	n.d.	5.25	23.18	1.31	0.61	0.60	6.86	1.3	1.6	
2009/3/9	7.66	9.49	5.12	n.d.	0.66	10.94	1.55	3.24	0.51	n.d.	8.69	38.19	0.44	0.91	0.91	10.15	0.3	3.4	
2009/3/23	7.67	8.52	4.54	n.d.	0.64	9.42	1.33	3.02	0.56	n.d.	7.02	33.55	0.87	0.79	0.79	8.82	0.2	1.7	
2009/4/13	7.85	11.08	5.86	n.d.	0.73	12.78	1.79	3.28	0.64	n.d.	10.59	44.53	1.04	1.06	1.05	11.78	0.2	3.1	
2009/4/27	7.88	10.62	5.50	n.d.	0.70	12.16	1.70	3.05	1.06	n.d.	9.97	43.07	0.99	1.00	1.02	11.26	-0.6	2.9	
2009/5/11	7.82	10.98	5.82	n.d.	0.81	12.86	1.78	3.19	1.06	n.d.	10.72	44.65	0.97	1.06	1.06	11.87	0.0	3.9	
2009/5/25	7.83	11.81	6.19	n.d.	0.84	13.88	1.92	3.27	1.41	n.d.	11.68	47.70	1.03	1.14	1.14	12.76	0.0	3.9	
2009/6/8	7.82	11.53	5.98	n.d.	0.85	13.47	1.85	2.91	1.57	n.d.	9.92	47.46	1.15	1.11	1.09	12.19	0.7	2.8	
2009/6/24	7.84	8.73	4.53	n.d.	0.81	9.72	1.35	2.43	1.45	n.d.	6.15	35.26	2.12	0.81	0.80	8.90	1.0	1.0	
2009/7/8	7.77	9.82	5.14	n.d.	0.83	11.04	1.54	2.98	0.61	n.d.	8.13	40.44	0.14	0.92	0.93	10.24	-0.2	2.1	
2009/7/22	7.73	7.60	4.09	n.d.	0.83	8.33	1.18	2.21	2.25	n.d.	5.14	29.28	2.57	0.71	0.69	7.77	1.9	1.1	
2009/8/12	7.72	7.69	4.96	n.d.	0.79	7.53	1.19	3.15	0.24	n.d.	5.80	29.95	1.46	0.71	0.70	7.84	0.4	1.0	
2009/8/27	7.79	10.72	5.82	n.d.	0.90	11.93	1.73	3.12	0.74	n.d.	9.47	42.70	1.23	1.01	1.00	11.19	0.9	2.1	
2009/9/10	7.77	11.35	5.98	n.d.	0.91	12.65	1.82	3.08	1.56	n.d.	10.06	44.65	0.07	1.06	1.05	11.80	0.6	2.0	
2009/9/25	7.72	11.89	6.33	n.d.	0.93	13.61	1.94	3.21	1.86	n.d.	10.91	47.64	1.30	1.14	1.13	12.64	0.4	3.1	
2009/10/9	7.82	8.92	4.73	n.d.	0.77	10.13	1.40	2.73	1.08	n.d.	7.11	36.66	1.46	0.85	0.84	9.37	0.2	2.4	
2009/10/23	7.83	10.91	5.82	n.d.	0.77	12.48	1.79	3.13	1.03	n.d.	10.27	44.10	0.47	1.04	1.04	11.62	0.1	3.2	
2009/11/6	7.82	11.34	5.93	n.d.	0.77	12.96	1.87	3.13	0.98	n.d.	10.66	45.69	1.03	1.08	1.07	12.00	0.2	2.8	
2009/11/24	7.59	9.91	5.37	n.d.	0.71	11.09	1.60	3.04	0.51	n.d.	8.93	39.53	1.13	0.94	0.93	10.38	0.5	2.3	
2009/12/8	7.74	10.78	5.81	n.d.	0.69	12.46	1.79	3.32	0.70	n.d.	10.82	43.31	0.74	1.04	1.04	11.63	0.0	3.8	
2009/12/22	7.78	10.56	5.52	n.d.	0.61	11.84	1.71	3.36	0.80	n.d.	10.22	41.18	1.17	0.99	1.00	11.10	-0.4	2.5	
2010/1/6	7.76	10.95	5.77	n.d.	0.60	12.58	1.80	3.33	0.73	n.d.	10.67	42.21	0.28	1.04	1.02	11.55	1.1	2.7	
2010/1/20	7.86	11.37	5.98	n.d.	0.61	13.22	1.85	3.20	0.82	n.d.	11.21	45.08	0.37	1.09	1.08	12.09	0.6	3.1	
2010/2/4	7.77	10.07	5.38	n.d.	0.62	11.67	1.66	3.56	1.09	n.d.	9.93	38.31	1.12	0.97	0.95	10.82	0.9	3.6	
2010/2/18	7.80	10.42	5.52	n.d.	0.63	12.04	1.71	3.44	0.86	n.d.	10.75	41.12	0.71	1.00	1.01	11.28	-0.5	3.9	
2010/3/5	7.76	9.30	4.98	n.d.	0.68	10.63	1.49	3.15	0.60	n.d.	8.30	37.21	1.33	0.89	0.88	9.86	0.3	2.9	
2010/3/19	7.82	9.45	5.00	n.d.	0.63	10.65	1.52	3.26	0.45	n.d.	8.68	37.33	1.39	0.89	0.89	9.96	-0.1	2.6	
2010/4/6	7.75	9.54	5.09	0.03	0.68	10.58	1.53	3.15	0.40	n.d.	8.41	37.76	0.56	0.89	0.89	9.94	0.3	2.0	
2010/4/30	7.47	7.94	4.81	n.d.	0.64	9.17	1.35	3.27	0.25	n.d.	7.22	33.79	0.56	0.79	0.80	8.88	-0.4	5.6	
2010/5/20	7.67	8.40	5.15	n.d.	0.93	9.97	1.42	2.83	0.80	n.d.	6.94	37.76	1.59	0.86	0.86	9.49	0.4	6.1	
2010/6/4	7.83	10.02	5.53	n.d.	0.77	11.17	1.61	3.32	0.63	n.d.	9.15	40.38	0.89	0.95	0.96	10.63	-0.3	2.9	
2010/6/24	7.69	9.06	4.98	n.d.	0.78	9.84	1.41	2.85	0.60	n.d.	6.96	36.54	1.58	0.84	0.83	9.27	0.6	1.2	
2010/7/16	7.62	8.89	4.96	n.d.	0.81	9.81	1.42	3.04	0.61	n.d.	7.10	36.48	1.05	0.84	0.84	9.33	0.1	2.4	
2010/8/5	7.90	9.42	5.17	n.d.	0.85	10.16	1.47	2.81	1.04	n.d.	7.11	38.00	2.26	0.87	0.87	9.63	0.5	1.1	
2010/8/24	7.64	10.47	5.81	n.d.	0.92	12.07	1.73	3.22	1.44	n.d.	9.35	43.86	1.00	1.02	1.03	11.39	-0.3	4.2	
2010/9/9	7.67	8.51	5.40	n.d.	0.93	11.58	1.65	2.74	2.15	n.d.	8.29	42.03	1.06	0.97	0.97	10.79	-0.1	11.8	
2010/10/5	7.71	8.86	4.80	n.d.	0.79	9.85	1.42	2.55	1.27	n.d.	6.53	35.50	1.44	0.84	0.81	9.11	1.6	1.4	
2010/10/22	7.97	10.76	5.76	n.d.	0.80	12.18	1.71	3.17	1.07	n.d.	9.26	44.41	0.50	1.02	1.03	11.36	-0.4	2.7	
2010/11/16	7.50	10.33	5.80	n.d.	0.71	12.47	1.79	3.15	1.37	n.d.	9.96	44.53	0.00	1.04	1.05	11.63	-0.4	5.9	
2010/12/7	7.84	10.89	5.58	n.d.	0.67	12.15	1.71	3.00	1.28	n.d.	9.35	43.25	0.45	1.01	1.01	11.20	-0.1	1.4	
2011/1/5	7.72	10.37	5.78	n.d.	0.60	12.55	1.78	3.49	0.92	n.d.	10.89	43.43	0.69	1.04	1.05	11.71	-0.6	6.1	
2011/1/24	7.78	10.60	6.03	0.04	0.59	13.22	1.87	3.20	0.82	n.d.	11.22	45.75	0.43	1.09	1.09	12.17	0.3	6.9	
2011/2/15	7.79	11.08	6.04	0.03	0.59	13.11	1.85	4.34	1.78	n.d.	10.84	42.58	0.00	1.09	1.07	12.19	0.5	4.8	
2011/3/15	7.79	11.52	6.06	n.d.	0.64	13.02	1.83	3.36	0.97	n.d.	11.42	45.69	0.56	1.08	1.10	12.17	-0.8	2.8	
2011/3/28	7.56	11.66	6.12	n.d.	0.62	13.37	1.89	3.42	1.05	n.d.	11.70	45.81	0.05	1.10	1.11	12.39	-0.1	3.1	
2011/4/20	7.78	10.90	6.41	n.d.	0.74	13.86	1.94	3.23	1.20	n.d.	11.57	49.23	0.00	1.15	1.16	12.85	-0.4	8.2	
2011/5/10	7.76	10.54	6.06	n.d.	0.82	12.93	1.79	3.45	1.05	n.d.	11.21	46.00	0.50	1.08	1.10	12.18	-1.1	7.2	
2011/6/2	7.63	8.23	4.94	n.d.	0.75	9.79	1.40	3.35	0.35	n.d.	7.74	35.56	0.89	0.84	0.84	9.38	-0.4	6.5	
2011/6/18	7.42	6.48	4.21	0.01	0.67	7.20	1.08	2.97	0.05	n.d.	5.28	28.00	0.00	0.65	0.65	7.22	-0.4	5.4	
2011/6/30	7.63	8.09	5.03	n.d.	0.80	9.23	1.38	3.24	0.37	n.d.	7.21	34.77	0.62	0.81	0.82	9.06	-0.3	5.7	
2011/7/13	7.77	9.73	5.47	n.d.	0.89	11.23	1.62	3.14	1.01	n.d.	8.92	40.81	0.00	0.95	0.96	10.66	-0.3	4.5	
2011/8/5	7.66	9.89	5.35	n.d.	0.89	10.53	1.58	3.03	0.98	n.d.	8.42	38.98	1.04	0.91	0.92	10.16	-0.3	1.3	
2011/8/25	7.89	9.88	5.80	0.05	0.94	12.19	1.77	3.16	1.65	n.d.	9.35	44.10	0.00	1.03	1.03	11.49	0.0	7.6	
2011/9/22	7.66	6.45	4.82	0.01	0.60	6.62	1.10	2.86	0.17	n.d.	4.19	29.24	0.08	0.65	0.65	7.08	-0.2	4.7	
2011/10/5	7.76	9.86	5.63	0.03	0.76	10.65	1.62	3.37	0.97	n.d.	9.39	38.98	0.74	0.93	0.94	10.50	-0.7	3.1	
2011/10/28	7.78	9.10	5.36	n.d.	0.64	9.85	1.54	3.01	0.62	n.d.	7.92	38.49	0.00	0.87	0.89	9.73	-1.3	3.4	
2011/11/14	7.75	9.87	5.75	n.d.	0.69	11.22	1.73	3.08	1.48	n.d.	9.32	41.66	0.00	0.97	0.99	10.90	-0.9	4.9	
2011/12/9	7.71	9.01	5.46	0.01	0.64	10.73	1.66	3.25	0.42	n.d.	8.78	39.71	0.53	0.93	0.93	10.33	-0.3	6.8	
2011/12/27	7.68	10.47	5.60	n.d.	0.55	11.31	1.76	3.17	0.71	n.d.	9.94	41.60	0.22	0.97	0.99	10.91	-1.2	2.0	
2012/1/12	7.70	10.84	5.88	n.d.	0.57	11.74	1.82	3.20	0.72	n.d.	10.46	43.37	0.00	1.01	1.03	11.34	-1.2	2.3	
2012/2/9	7.61	9.38	5.01	0.02	0.51	9.99	1.55	3.18	0.94	n.d.	8.62	35.87	0.00	0.86	0.87	9.68	-0.9	1.6	
2012/2/24	7.65	7.68	4.41	n.d.	0.52	8.19	1.27	2.95	0.61	n.d.	6.71	29.40	0.99	0.72	0.71	8.01	0.3	2.1	
2012/3/20	7.69	9.13	5.19	n.d.	0.93	9.57	1.49	3											

## Appendix 5e. 四万十川上流域の採水地点 N1 における渓流水分析データ

## Analytical data of streamwater at sampling location N1 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2012/6/25	7.55	5.51	3.90	n.d.	0.56	5.32	0.89	2.57	0.31	n.d.	4.49	19.56	1.43	0.52	0.49	5.69	3.1	1.6	
2012/7/13	7.58	6.51	4.37	n.d.	0.60	6.60	1.06	2.64	0.27	n.d.	4.83	28.67	1.06	0.62	0.65	6.98	-2.2	3.5	
2012/7/30	7.63	9.61	5.42	n.d.	0.88	9.78	1.52	3.00	1.14	0.02	7.79	39.10	0.75	0.87	0.91	9.85	-2.0	1.2	
2012/8/23	7.62	8.20	4.69	n.d.	0.78	8.81	1.41	2.19	2.26	n.d.	5.31	35.38	2.42	0.78	0.79	8.60	-0.6	2.4	
2012/9/12	7.57	7.50	4.77	n.d.	0.76	8.50	1.40	2.55	0.91	n.d.	5.75	34.83	1.09	0.77	0.78	8.47	-0.7	6.1	
2012/10/9	7.69	8.89	5.48	n.d.	0.72	9.87	1.64	3.02	0.90	n.d.	8.14	39.04	0.81	0.88	0.91	9.94	-1.4	5.6	
2012/10/29	7.71	9.78	5.45	n.d.	0.66	11.40	1.61	2.90	1.56	n.d.	8.62	41.42	1.49	0.96	0.97	10.66	-0.5	4.3	
2012/11/12	7.72	9.72	5.56	n.d.	0.67	11.85	1.67	3.31	2.07	n.d.	8.90	41.54	0.84	0.99	0.99	11.05	-0.3	6.4	
2012/12/7	7.69	9.85	5.41	n.d.	0.57	11.82	1.68	3.20	1.39	n.d.	9.45	40.38	0.00	0.98	0.97	10.90	0.3	5.1	
2012/12/26	7.64	9.25	5.28	n.d.	0.53	11.44	1.61	3.35	1.35	n.d.	9.23	38.74	0.35	0.95	0.94	10.59	0.2	6.8	
2013/1/18	7.71	8.69	5.06	n.d.	0.51	10.92	1.54	3.16	1.03	n.d.	8.47	37.82	0.00	0.91	0.90	10.08	0.2	7.4	
2013/2/8	7.69	8.26	4.79	n.d.	0.54	10.36	1.48	3.12	0.88	n.d.	7.88	36.05	0.00	0.86	0.86	9.58	0.2	7.4	
2013/2/25	7.73	8.86	5.06	n.d.	0.57	11.00	1.57	3.08	0.57	n.d.	8.63	38.43	0.38	0.91	0.91	10.13	0.4	6.7	
2013/3/15	7.77	9.72	5.50	n.d.	0.62	12.11	1.70	3.14	0.14	n.d.	9.21	42.03	0.17	1.00	0.97	10.95	1.4	5.9	
2013/4/5	7.62	10.59	5.57	n.d.	0.68	12.37	1.73	3.03	0.55	n.d.	9.26	43.31	0.24	1.02	1.00	11.19	1.1	2.7	
2013/4/25	7.76	7.03	4.28	n.d.	0.64	8.87	1.25	3.15	0.31	n.d.	5.80	31.11	0.78	0.75	0.72	8.18	1.6	7.6	
2013/6/5	7.75	9.98	5.84	n.d.	0.83	13.34	1.81	2.94	1.36	n.d.	9.19	45.14	1.14	1.09	1.04	11.80	2.6	8.3	
2013/6/27	7.52	6.63	4.26	n.d.	0.73	7.75	1.11	3.05	0.45	n.d.	5.14	27.33	1.50	0.68	0.65	7.41	2.5	5.6	
2013/7/17	7.69	10.64	5.68	n.d.	0.89	12.00	1.66	2.99	1.61	n.d.	8.88	42.09	1.33	1.01	0.99	11.07	1.0	2.0	
2013/8/9	7.74	11.73	6.29	n.d.	1.01	14.04	1.92	3.07	2.57	n.d.	10.09	47.58	0.00	1.16	1.12	12.68	1.8	3.9	
2013/8/27	7.58	11.20	5.94	n.d.	1.00	13.42	1.84	2.86	5.21	n.d.	8.90	43.19	1.76	1.11	1.06	12.12	2.2	3.9	
2013/9/6	7.62	8.02	4.75	n.d.	0.82	8.37	1.24	3.07	0.80	n.d.	6.65	30.68	1.13	0.75	0.74	8.31	0.4	1.8	
2013/9/17	7.70	9.96	5.51	n.d.	0.84	11.44	1.63	2.92	1.23	n.d.	9.10	40.26	1.16	0.97	0.95	10.69	0.7	3.5	
2013/10/10	7.53	7.43	4.82	n.d.	0.74	8.22	1.19	3.18	0.42	n.d.	5.16	31.11	0.72	0.74	0.71	8.01	1.6	3.8	
2013/10/22	7.53	9.60	5.72	n.d.	0.79	11.59	1.63	3.06	0.87	n.d.	8.81	40.51	0.07	0.98	0.95	10.73	1.8	5.6	
2013/10/30	7.57	8.40	5.25	n.d.	0.69	9.35	1.40	3.17	0.39	n.d.	7.39	33.43	0.97	0.83	0.80	9.06	1.9	3.8	
2013/11/18	7.56	9.15	5.66	0.02	0.73	11.52	1.68	2.93	0.80	n.d.	8.91	40.75	1.64	0.98	0.95	10.71	1.6	7.9	
2013/12/13	7.63	10.04	5.40	n.d.	0.68	11.45	1.68	3.34	0.64	n.d.	8.59	39.04	1.12	0.96	0.92	10.51	2.0	2.3	
2014/1/7	7.72	10.41	5.63	n.d.	0.66	12.11	1.74	3.54	0.59	n.d.	7.10	43.56	1.16	1.01	0.97	10.90	1.9	2.3	
2014/1/27	7.65	9.77	5.94	n.d.	0.66	12.82	1.84	3.62	0.76	n.d.	7.58	43.80	0.86	1.07	0.99	11.35	3.7	7.5	
2014/2/20	7.58	9.30	5.22	n.d.	0.62	11.31	1.60	3.48	0.65	n.d.	6.26	38.43	0.69	0.94	0.87	9.98	3.9	3.5	
2014/3/14	7.54	7.79	4.26	n.d.	0.59	8.83	1.25	3.14	0.47	n.d.	6.87	30.99	0.37	0.74	0.75	8.34	-0.2	3.4	
2014/4/3	7.55	9.33	5.26	n.d.	0.67	11.27	1.56	3.08	0.29	n.d.	9.08	39.96	0.05	0.94	0.94	10.43	0.1	5.6	
2014/4/23	7.82	10.04	5.61	n.d.	0.75	12.37	1.72	3.02	0.52	n.d.	9.77	44.23	0.13	1.02	1.02	11.35	0.0	6.1	
2014/5/9	7.79	10.33	6.04	n.d.	0.79	13.28	1.84	3.03	0.67	n.d.	10.38	46.36	0.05	1.10	1.07	12.05	1.1	7.7	
2014/5/27	7.84	9.67	5.22	n.d.	0.76	11.72	1.59	2.73	0.71	n.d.	8.60	42.09	0.74	0.96	0.96	10.63	0.2	4.7	
2014/6/17	7.75	9.75	5.49	n.d.	0.78	11.79	1.62	3.01	0.57	n.d.	9.03	42.09	0.48	0.98	0.97	10.84	0.4	5.3	
2014/7/9	7.73	8.20	4.99	n.d.	0.79	9.95	1.39	2.98	0.39	n.d.	6.98	35.99	0.19	0.85	0.83	9.27	1.4	6.1	
2014/7/24	7.77	9.55	5.87	n.d.	0.91	11.91	1.65	3.08	1.27	n.d.	9.21	41.12	0.02	1.01	0.97	11.05	1.8	7.3	
2014/8/12	7.81	6.93	5.01	n.d.	0.70	6.82	1.12	2.76	0.19	n.d.	4.93	27.94	0.78	0.67	0.64	7.21	2.1	2.0	
2014/8/27	7.72	8.16	5.31	n.d.	0.78	9.17	1.40	2.84	0.38	n.d.	6.42	34.47	0.72	0.82	0.78	8.88	2.4	4.2	
2014/9/18	7.68	9.25	5.51	n.d.	0.77	10.38	1.55	2.81	0.83	n.d.	7.85	39.04	0.23	0.90	0.90	9.96	0.5	3.7	
2014/10/9	7.69	9.17	5.35	n.d.	0.78	10.79	1.58	2.68	1.14	n.d.	7.87	38.74	0.59	0.92	0.89	10.05	1.6	4.6	
2014/10/30	7.71	9.53	5.58	n.d.	0.72	11.01	1.63	2.67	0.79	n.d.	8.25	40.99	0.25	0.94	0.93	10.36	0.7	4.2	
2014/11/20	7.69	9.84	5.63	n.d.	0.67	11.60	1.71	2.64	0.93	n.d.	8.71	47.83	0.03	0.98	1.05	11.16	-3.6	6.3	
2014/12/2	7.74	9.62	5.94	n.d.	0.76	12.07	1.78	3.17	1.11	n.d.	9.27	41.42	0.37	1.03	0.98	11.18	2.4	7.5	
2014/12/22	7.72	9.12	4.88	n.d.	0.58	9.93	1.47	3.56	0.84	n.d.	7.74	34.16	0.22	0.84	0.84	9.41	0.5	1.6	
2015/1/15	7.62	7.58	4.46	n.d.	0.59	8.79	1.29	3.89	1.48	n.d.	5.74	29.28	2.46	0.75	0.73	8.36	1.4	4.9	
2015/2/6	7.66	8.75	5.34	n.d.	0.61	11.31	1.64	3.08	0.43	n.d.	9.00	39.65	0.12	0.95	0.93	10.46	0.9	8.9	
2015/2/27	7.79	9.87	5.39	n.d.	0.62	11.22	1.61	3.33	0.90	n.d.	8.31	39.04	0.39	0.94	0.92	10.38	1.2	2.5	
2015/3/20	7.65	7.54	4.36	n.d.	0.63	8.23	1.19	3.23	0.29	n.d.	5.56	29.28	0.09	0.71	0.69	7.82	1.6	1.8	
2015/4/8	7.75	8.83	4.98	n.d.	0.69	10.63	1.51	2.94	0.42	n.d.	7.62	37.76	0.78	0.89	0.87	9.73	1.2	4.9	
2015/4/30	7.72	10.03	5.51	n.d.	0.75	11.77	1.66	2.99	0.45	n.d.	8.58	42.09	0.56	0.98	0.96	10.75	1.2	3.5	
2015/5/20	7.80	9.22	4.91	n.d.	0.75	10.51	1.48	2.79	0.62	n.d.	6.89	38.00	0.41	0.88	0.86	9.57	1.4	1.9	
2015/6/8	7.75	9.09	4.87	n.d.	0.76	10.63	1.49	2.73	0.76	n.d.	7.09	38.49	0.63	0.88	0.87	9.68	1.0	3.1	
2015/7/2	7.56	7.20	4.25	n.d.	0.66	7.52	1.10	2.83	0.29	n.d.	4.82	28.47	0.42	0.67	0.65	7.28	1.2	0.6	
2015/7/24	7.81	7.80	4.68	n.d.	0.71	8.53	1.24	2.72	0.40	n.d.	5.40	32.57	0.48	0.75	0.73	8.13	1.4	2.1	
2015/8/11	7.76	10.57	5.80	n.d.	0.88	11.89	1.68	2.79	1.29	n.d.	8.30	43.52	1.16	1.01	0.99	11.00	1.0	2.0	
2015/8/26	7.78	7.72	4.38	n.d.	0.76	8.16	1.18	2.61	0.73	n.d.	4.97	30.50	0.15	0.71	0.69	7.73	1.8	0.1	
2015/9/25	7.64	7.33	4.60	n.d.	0.68	7.47	1.13	2.62	0.24	n.d.	4.30	31.05	0.44	0.68	0.68	7.42	0.5	0.6	
2015/10/15	7.82	9.61	5.58	n.d.	0.71	11.30	1.64	2.82	0.73	n.d.	8.28	41.12	0.29	0.96	0.94	10.49	1.2	4.4	
2015/11/4	7.77	10.33	5.64	n.d.	0.71	12.00	1.73	2.78	1.42	n.d.	8.54	43.01	0.73	1.00	0.98	11.00	1.0	3.2	
2015/11/18	7.68	8.06	4.60	n.d.	0.74	9.56	1.37	2.29	0.73	n.d.	5.44	35.69	1.19	0.81	0.77	8.67	2.2	3.6	
2015/12/8	7.76	9.54	5.22	n.d.	0.63	10.58	1.55	2.72	0.56	n.d.	7.76	37.94	0.38	0.90	0.87	9.79	1.7	1.3	
2015/12/24	7.78	9.00	5.34	n.d.	0.67	10.63	1.54	2.81	0.48	n.d.	7.36	38.49	0.02	0.91	0.87	9.81	2.0	4.3	

\* 分析値の品質管理: R1 はイオンバランス、R2 は電気伝導率比較が EANET (2010a) の推奨する許容範囲から外れていることを示す。Data quality control abbreviations: R1 and R2 indicate an analytical value that is outside the allowable range for respective R1 (ion balance) and R2 (comparison of electric conductivity) recommendations (EANET 2010a).

## Appendix 6a. 四万十川上流域の採水地点 N2 における渓流水分析データ

## Analytical data of streamwater at sampling location N2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2000/3/24	7.28	5.02	4.03	0.03	0.94	4.11	0.84	3.57	0.76	n.d.	5.17	12.68	0.80	0.47	0.43	5.29	5.1	2.6	
2000/4/17	7.38	5.68	4.23	n.d.	0.48	4.90	1.03	3.14	0.63	n.d.	6.09	17.21	0.05	0.53	0.51	5.94	1.8	2.2	
2000/4/27	7.38	5.83	4.35	n.d.	0.51	5.31	1.13	3.11	0.81	n.d.	5.80	17.06	0.12	0.56	0.50	6.09	5.6	2.2	
2000/5/15	7.35	6.52	4.68	n.d.	0.47	5.71	1.19	3.12	0.64	n.d.	6.53	21.18	1.93	0.60	0.58	6.70	1.4	1.4	
2000/5/29	7.35	6.10	4.43	n.d.	0.50	5.35	1.10	3.02	0.77	n.d.	5.88	19.77	0.07	0.56	0.54	6.29	1.7	1.5	
2000/6/12	7.38	5.42	4.03	n.d.	0.45	4.68	0.98	3.01	0.55	n.d.	4.65	18.50	1.01	0.50	0.49	5.62	0.7	1.8	
2000/6/26	7.34	5.96	4.39	n.d.	0.47	5.31	1.13	3.08	0.60	n.d.	5.35	20.75	0.31	0.56	0.55	6.25	1.1	2.4	
2000/7/10	7.35	5.87	4.39	n.d.	0.47	5.27	1.11	2.95	0.55	n.d.	5.24	20.17	0.91	0.56	0.53	6.14	2.3	2.2	
2000/7/25	7.63	9.21	4.96	n.d.	0.74	10.62	1.47	2.37	1.77	n.d.	9.23	34.89	1.28	0.89	0.86	9.81	1.5	3.2	
2000/8/7	7.37	5.69	4.35	n.d.	0.54	4.96	1.02	3.06	0.42	n.d.	4.82	17.91	1.23	0.53	0.49	5.79	4.7	0.8	
2000/8/22	7.38	6.59	5.06	n.d.	0.74	5.98	1.24	3.25	0.69	n.d.	6.04	21.78	1.09	0.64	0.59	6.93	4.4	2.5	
2000/9/4	7.38	6.94	5.07	n.d.	0.53	6.55	1.37	3.05	0.87	n.d.	6.04	24.29	0.96	0.67	0.62	7.28	3.8	2.4	
2000/9/18	7.40	5.15	4.22	n.d.	0.50	4.42	0.92	3.83	0.44	0.19	4.11	16.50	1.17	0.49	0.48	5.55	1.6	3.7	
2000/10/3	7.43	5.85	4.56	n.d.	0.50	5.07	1.05	2.90	0.48	n.d.	4.83	20.70	1.49	0.55	0.53	6.05	2.0	1.7	
2000/10/18	7.41	6.20	4.66	n.d.	0.55	5.20	1.09	2.97	0.45	n.d.	5.35	21.02	0.97	0.57	0.55	6.25	1.7	0.4	
2000/11/6	7.44	5.63	4.39	n.d.	0.55	4.82	1.01	2.94	0.44	0.21	4.65	19.46	0.89	0.53	0.51	5.87	1.5	2.1	
2000/11/21	7.38	5.81	4.41	n.d.	0.53	4.91	1.03	2.93	0.63	n.d.	5.62	17.20	1.21	0.54	0.49	5.86	4.2	0.5	
2000/12/5	7.34	5.74	4.26	0.01	0.50	4.68	0.98	3.03	0.59	n.d.	6.33	15.00	1.10	0.51	0.47	5.71	4.1	-0.2	
2000/12/18	7.30	6.05	4.38	0.02	0.49	5.09	1.07	3.36	0.52	n.d.	6.59	17.09	0.90	0.55	0.52	6.16	2.4	0.9	
2001/1/9	7.31	5.80	4.25	0.01	0.41	4.90	1.03	3.30	0.53	n.d.	6.87	13.70	1.09	0.53	0.47	5.83	5.6	0.2	
2001/1/23	7.36	5.42	4.36	0.02	0.34	4.52	0.95	3.16	0.60	n.d.	6.77	13.98	0.69	0.50	0.47	5.68	3.6	2.3	
2001/2/6	7.38	5.37	4.14	n.d.	0.30	4.45	0.93	2.93	0.54	n.d.	5.68	14.97	0.87	0.49	0.45	5.42	3.4	0.5	
2001/2/20	7.34	5.47	4.05	n.d.	0.30	4.68	0.98	3.01	0.52	n.d.	6.25	14.92	1.09	0.50	0.47	5.60	3.2	1.2	
2001/3/6	7.41	5.30	3.95	n.d.	0.39	4.41	0.95	2.99	0.59	n.d.	5.72	16.73	0.46	0.48	0.49	5.55	-0.7	2.3	
2001/3/21	7.45	5.79	4.17	n.d.	0.41	4.88	1.04	3.02	0.57	n.d.	6.21	16.57	1.10	0.52	0.50	5.85	2.5	0.5	
2001/4/10	7.43	6.24	4.48	n.d.	0.46	5.30	1.15	3.01	0.59	n.d.	6.65	18.57	1.12	0.57	0.54	6.32	2.6	0.6	
2001/4/23	7.42	6.23	4.44	n.d.	0.42	5.41	1.17	3.13	0.50	n.d.	6.69	18.57	0.56	0.57	0.54	6.37	2.7	1.1	
2001/5/8	7.41	5.28	3.87	n.d.	0.48	4.52	0.98	2.93	0.53	n.d.	4.61	17.08	1.02	0.49	0.47	5.41	2.1	1.2	
2001/5/22	7.34	6.19	4.46	n.d.	0.49	5.47	1.15	2.87	0.55	n.d.	5.76	21.60	0.84	0.57	0.56	6.41	1.0	1.8	
2001/6/5	7.33	6.44	4.57	n.d.	0.44	5.80	1.23	2.85	0.49	n.d.	6.00	21.35	0.22	0.60	0.56	6.56	3.2	1.0	
2001/6/20	7.38	5.84	4.18	n.d.	0.40	5.22	1.12	2.57	0.85	n.d.	4.89	19.95	0.64	0.54	0.51	5.95	2.8	0.9	
2001/7/3	7.39	6.08	4.47	n.d.	0.43	5.71	1.21	2.98	0.59	n.d.	5.56	19.86	0.10	0.59	0.53	6.37	4.9	2.3	
2001/7/24	7.37	6.30	4.59	n.d.	0.49	5.50	1.18	2.95	0.69	n.d.	5.68	21.52	0.75	0.58	0.57	6.47	1.6	1.3	
2001/8/7	7.37	6.78	4.91	n.d.	0.48	5.80	1.26	2.94	0.84	n.d.	6.40	22.88	0.51	0.62	0.60	6.90	1.2	0.9	
2001/8/21	7.39	5.63	3.97	n.d.	0.48	4.90	1.06	2.54	1.41	n.d.	4.45	19.58	1.18	0.52	0.51	5.75	0.8	1.1	
2001/9/4	7.48	6.50	4.60	n.d.	0.41	5.80	1.25	2.78	0.66	n.d.	5.62	23.46	1.24	0.60	0.59	6.67	1.0	1.3	
2001/9/26	7.52	6.04	4.51	n.d.	0.36	5.14	1.09	2.98	0.45	n.d.	5.52	21.17	0.62	0.55	0.55	6.21	-0.2	1.4	
2001/10/10	7.60	5.69	4.21	n.d.	0.38	5.03	1.08	2.68	0.46	n.d.	4.55	21.36	1.03	0.53	0.53	5.90	0.4	1.8	
2001/10/24	7.57	5.70	4.45	0.05	0.46	4.95	1.05	3.03	0.04	n.d.	4.86	20.17	0.37	0.54	0.52	5.95	2.2	2.1	
2001/11/7	7.49	5.46	3.89	n.d.	0.39	4.37	0.93	2.78	0.08	n.d.	4.77	17.30	0.96	0.47	0.46	5.29	1.2	-1.6	
2001/11/21	7.45	5.73	4.10	0.06	0.38	4.56	0.98	2.90	0.31	n.d.	5.85	17.66	0.91	0.50	0.50	5.70	0.1	-0.3	
2001/12/4	7.43	6.14	4.17	0.10	0.40	4.92	1.06	3.32	0.34	n.d.	6.42	18.44	1.12	0.53	0.54	6.12	-0.4	-0.1	
2001/12/20	7.49	5.82	3.99	0.06	0.34	4.57	1.00	3.17	0.32	n.d.	6.89	16.90	1.08	0.50	0.51	5.85	-1.9	0.3	
2002/1/8	7.41	5.86	4.00	0.14	0.33	4.81	1.03	3.20	0.23	n.d.	7.23	16.86	0.95	0.51	0.52	6.02	-0.6	1.3	
2002/1/22	7.41	6.25	4.17	0.07	0.36	4.97	1.08	3.61	0.39	n.d.	7.08	18.02	0.64	0.53	0.55	6.27	-1.8	0.2	
2002/2/7	7.48	5.97	4.20	n.d.	0.36	4.68	1.05	3.33	0.29	n.d.	7.20	16.97	0.83	0.51	0.53	6.02	-1.4	0.4	
2002/2/19	7.46	6.06	4.06	n.d.	0.33	4.78	1.06	3.28	0.46	n.d.	7.31	17.22	0.31	0.51	0.53	6.06	-2.3	0.0	
2002/3/5	7.37	6.02	4.09	n.d.	0.38	4.78	1.04	2.90	0.38	n.d.	6.12	16.77	1.15	0.51	0.49	5.75	2.2	-2.3	
2002/3/19	7.54	6.29	4.70	n.d.	0.40	5.23	1.18	3.25	0.33	n.d.	7.43	17.85	0.18	0.57	0.54	6.44	2.6	1.2	
2002/4/9	7.59	5.87	3.90	n.d.	0.40	4.72	1.03	3.07	0.31	n.d.	5.60	17.12	0.12	0.50	0.49	5.65	1.2	-1.9	
2002/4/23	7.55	6.24	4.05	n.d.	0.43	5.18	1.13	3.07	0.30	n.d.	5.63	20.08	0.36	0.54	0.54	6.09	0.1	-1.2	
2002/5/8	7.58	5.69	3.93	n.d.	0.44	4.50	1.03	3.21	0.14	n.d.	5.22	20.09	0.61	0.49	0.53	5.77	-3.9	0.7	
2002/5/28	7.66	6.07	4.23	0.07	0.44	4.95	1.11	3.13	0.26	n.d.	5.96	20.29	0.55	0.54	0.55	6.16	-1.1	0.8	
2002/6/11	7.60	6.56	4.44	n.d.	0.48	5.50	1.20	2.85	0.85	n.d.	6.34	21.28	1.16	0.58	0.58	6.54	0.3	-0.2	
2002/6/25	7.54	6.81	4.45	0.05	0.45	5.73	1.26	2.64	0.68	n.d.	5.95	24.51	1.08	0.60	0.61	6.75	-1.2	-0.4	
2002/7/9	7.27	5.19	3.61	0.05	0.49	4.36	0.95	2.42	0.25	n.d.	3.74	17.83	1.64	0.47	0.44	5.08	2.8	-1.0	
2002/7/23	7.43	5.86	4.08	n.d.	0.46	4.71	1.01	3.27	0.23	n.d.	4.95	20.05	0.52	0.51	0.53	5.83	-2.0	-0.2	
2002/8/6	7.43	6.38	4.44	n.d.	0.50	5.26	1.10	3.28	0.40	n.d.	5.47	22.24	0.43	0.56	0.58	6.39	-1.6	0.1	
2002/8/27	7.35	6.88	4.74	n.d.	0.52	6.01	1.28	3.23	0.48	n.d.	5.87	23.42	0.65	0.62	0.60	6.91	1.6	0.2	
2002/9/10	7.43	6.38	4.69	n.d.	0.48	5.49	1.12	3.39	0.31	n.d.	5.41	21.54	0.90	0.58	0.57	6.47	1.4	0.7	
2002/9/24	7.36	6.42	4.66	n.d.	0.49	5.62	1.18	3.36	0.20	n.d.	6.16	19.98	0.90	0.59	0.55	6.52	3.4	0.8	
2002/10/8	7.40	6.60	4.64	n.d.	0.46	5.70	1.18	3.37	0.36	n.d.	6.03	22.72	0.78	0.59	0.60	6.73	-0.3	1.0	
2002/10/22	7.49	6.79	4.80	n.d.	0.46	5.85	1.23	3.31	0.19	n.d.	6.67	23.52	0.45	0.61	0.62	6.97	-0.6	1.3	
2002/11/5	7.32	6.21	4.26	n.d.	0.37	5.13	1.08	3.51	0.55	n.d.	7.06	18.09	0.43	0.54	0.55	6.31	-1.1	0.8	
2002/11/19	7.34	6.33	4.50	n.d.	0.40	5.45	1.14	3.33	0.56	n.d.	7.08	17.85	0.25	0.57	0.54	6.44	2.6	0.8	
2002/12/3	7.19	6.55	4.29	n.d.	0.38	5.50	1.15	3.86	0.68	n.d.	7.17	16.94	0.52	0.57	0.55	6.48	1.7	-0.5	
2002/12/17	7.30																		

## Appendix 6b. 四万十川上流域の採水地点 N2 における渓流水分析データ

## Analytical data of streamwater at sampling location N2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2003/2/18	7.33	5.88	4.30	n.d.	0.33	4.84	1.01	3.16	0.40	n.d.	6.09	15.90	0.52	0.52	0.48	5.78	3.7	-0.8	
2003/3/4	7.31	5.56	4.07	n.d.	0.35	4.52	0.96	3.33	0.45	n.d.	5.04	16.22	0.24	0.49	0.47	5.51	1.9	-0.5	
2003/3/18	7.34	5.33	3.81	n.d.	0.36	4.27	0.91	3.46	0.31	n.d.	4.50	15.51	0.35	0.46	0.45	5.23	1.3	-1.0	
2003/4/7	7.38	5.50	3.98	0.02	0.39	4.48	0.96	3.44	0.32	n.d.	4.82	16.20	0.56	0.49	0.47	5.46	2.0	-0.3	
2003/4/21	7.44	6.01	4.22	0.03	0.40	4.97	1.05	3.42	0.30	n.d.	5.31	18.74	0.64	0.53	0.52	5.96	1.0	-0.4	
2003/5/8	7.43	6.25	4.38	n.d.	0.42	5.16	1.10	2.84	0.64	n.d.	5.26	20.87	0.76	0.55	0.54	6.13	0.7	-1.0	
2003/5/22	7.44	5.87	4.25	n.d.	0.43	4.69	0.99	3.46	0.16	n.d.	4.76	18.73	0.21	0.51	0.51	5.75	0.5	-1.0	
2003/6/4	7.39	5.73	4.25	n.d.	0.46	4.53	0.95	3.59	0.13	n.d.	4.29	19.12	0.20	0.50	0.51	5.67	-0.5	-0.5	
2003/6/19	7.48	4.74	3.70	n.d.	0.45	3.53	0.74	3.26	0.14	n.d.	3.07	15.40	0.40	0.41	0.41	4.62	-0.1	-1.3	
2003/7/3	7.37	5.88	4.33	0.04	0.47	4.91	1.02	3.43	0.22	n.d.	4.03	19.87	0.66	0.53	0.51	5.83	2.0	-0.4	
2003/7/17	7.40	6.08	4.43	0.03	0.46	5.09	1.05	3.35	0.39	n.d.	4.33	21.11	3.54	0.55	0.54	6.06	0.9	-0.1	
2003/8/1	7.43	6.57	4.66	n.d.	0.47	5.51	1.15	3.20	0.52	n.d.	4.94	14.98	1.45	0.58	0.45	5.91	13.3	-5.3	R1
2003/8/14	7.40	4.82	3.62	0.04	0.54	3.85	0.80	2.07	0.38	n.d.	2.95	18.05	1.61	0.43	0.42	4.70	1.2	-1.3	
2003/9/4	7.43	6.80	5.07	0.19	0.58	6.06	1.25	3.50	0.73	n.d.	5.47	24.78	0.79	0.65	0.63	7.19	1.6	2.8	
2003/9/18	7.33	6.32	4.69	0.03	0.53	5.30	1.11	3.46	0.44	n.d.	4.70	20.27	0.76	0.57	0.53	6.25	3.6	-0.6	
2003/10/8	7.47	6.48	4.74	n.d.	0.48	5.44	1.15	3.43	0.65	n.d.	5.96	20.30	0.68	0.58	0.56	6.53	1.7	0.3	
2003/10/22	7.50	6.11	4.67	n.d.	0.45	5.17	1.07	3.47	0.35	n.d.	5.08	20.17	0.60	0.56	0.54	6.21	1.8	0.8	
2003/11/12	7.56	6.21	4.66	n.d.	0.49	5.37	1.13	3.31	0.57	n.d.	5.23	20.99	0.41	0.58	0.56	6.38	1.8	1.3	
2003/11/26	7.38	6.20	4.34	n.d.	0.40	4.95	1.03	3.38	0.71	n.d.	5.91	18.64	0.45	0.53	0.54	6.09	-0.4	-0.9	
2003/12/10	7.45	5.66	4.11	n.d.	0.34	4.37	0.90	3.50	0.37	n.d.	5.26	16.53	0.56	0.48	0.49	5.53	-0.6	-1.2	
2003/12/24	7.41	5.84	4.50	n.d.	0.36	4.85	1.01	3.53	0.39	n.d.	5.69	17.40	0.38	0.53	0.51	5.95	2.0	0.9	
2004/1/7	7.36	5.91	4.30	n.d.	0.33	4.67	0.97	3.51	0.45	n.d.	6.47	18.24	0.20	0.51	0.54	6.03	-3.0	1.0	
2004/1/21	7.42	6.03	4.26	n.d.	0.27	4.69	0.98	3.65	0.38	n.d.	6.62	18.01	0.46	0.51	0.54	6.05	-3.4	0.1	
2004/2/5	7.38	6.06	4.20	n.d.	0.30	4.54	0.99	3.66	0.57	n.d.	6.86	17.72	0.38	0.50	0.55	6.04	-4.6	-0.1	
2004/2/20	7.51	6.10	4.56	0.03	0.34	5.02	1.11	3.64	0.55	n.d.	7.13	21.41	0.68	0.55	0.61	6.64	-5.2	4.3	
2004/3/4	7.48	5.87	4.23	n.d.	0.27	4.71	0.98	3.53	0.53	n.d.	6.48	19.40	0.39	0.51	0.56	6.12	-5.1	2.1	
2004/3/24	7.40	6.35	4.55	n.d.	0.34	5.28	1.10	3.57	0.79	n.d.	6.33	21.50	0.78	0.56	0.60	6.59	-3.1	1.9	
2004/4/6	7.52	6.03	4.29	n.d.	0.33	4.84	1.03	3.36	0.58	n.d.	5.92	20.84	0.60	0.52	0.57	6.18	-4.4	1.2	
2004/4/21	7.53	5.87	4.11	n.d.	0.36	4.85	0.98	3.40	0.41	n.d.	5.03	24.29	0.75	0.51	0.61	6.22	-8.4	2.9	R1
2004/5/14	7.40	4.69	3.41	n.d.	0.30	3.20	0.67	3.47	0.18	n.d.	3.47	17.48	0.50	0.37	0.46	4.66	-10.7	-0.3	R1
2004/5/31	7.50	6.25	4.53	n.d.	0.39	5.11	1.07	3.50	0.29	n.d.	5.39	25.83	0.76	0.55	0.64	6.62	-7.5	2.8	
2004/6/11	7.45	6.32	4.57	n.d.	0.47	5.41	1.16	2.94	0.48	n.d.	5.16	25.82	1.29	0.58	0.62	6.63	-3.7	2.4	
2004/6/28	7.51	6.17	4.51	n.d.	0.42	4.86	1.05	3.54	0.26	n.d.	4.89	26.24	0.71	0.54	0.64	6.48	-8.6	2.5	R1
2004/7/12	7.45	6.54	4.83	n.d.	0.45	5.35	1.16	3.41	0.47	n.d.	5.19	27.11	0.43	0.58	0.66	6.86	-5.8	2.4	
2004/7/26	7.51	6.93	5.18	n.d.	0.52	5.85	1.26	3.53	0.76	n.d.	6.13	28.66	0.53	0.63	0.71	7.48	-5.5	3.8	
2004/8/9	7.48	5.64	4.45	n.d.	0.41	4.59	0.95	3.41	0.17	n.d.	4.24	26.01	0.35	0.51	0.61	6.18	-9.1	4.6	R1
2004/8/27	7.50	6.02	4.59	n.d.	0.40	5.08	1.04	3.30	0.13	n.d.	4.16	18.47	0.80	0.55	0.48	5.81	6.2	-1.8	
2004/9/13	7.46	4.50	4.26	n.d.	0.42	3.01	0.66	3.81	0.05	n.d.	2.42	18.45	0.64	0.40	0.46	4.77	-7.0	2.9	
2004/9/27	7.45	6.31	5.09	n.d.	0.48	5.36	1.12	3.60	0.28	n.d.	4.27	27.65	0.01	0.59	0.65	6.82	-4.4	3.9	
2004/10/12	7.50	6.14	4.93	n.d.	0.43	5.00	1.06	3.63	0.33	n.d.	4.58	27.35	0.38	0.56	0.65	6.68	-7.3	4.2	
2004/10/25	7.47	5.58	4.41	n.d.	0.42	4.14	0.87	3.55	0.10	n.d.	4.24	24.32	0.68	0.48	0.59	5.90	-10.1	2.8	R1
2004/11/8	7.42	5.64	4.58	n.d.	0.41	4.67	0.93	3.49	0.23	n.d.	4.67	22.84	0.50	0.52	0.57	6.09	-5.0	3.8	
2004/11/22	7.44	5.40	4.43	0.01	0.39	4.46	0.89	3.44	0.29	n.d.	4.64	21.34	0.47	0.50	0.55	5.86	-4.7	4.1	
2004/12/6	7.39	4.85	3.95	n.d.	0.38	3.65	0.74	3.34	0.14	n.d.	3.66	18.97	0.74	0.42	0.48	5.07	-6.5	2.2	
2004/12/21	7.38	5.73	4.41	n.d.	0.41	4.50	0.93	3.52	0.37	n.d.	5.24	21.69	0.71	0.50	0.57	6.04	-6.2	2.6	
2005/1/7	7.37	5.68	4.30	0.01	0.33	4.50	0.89	3.45	0.33	n.d.	5.80	17.00	0.48	0.49	0.50	5.72	-0.8	0.3	
2005/1/21	7.40	5.71	4.24	n.d.	0.29	4.43	0.89	3.52	0.31	n.d.	6.23	14.81	0.78	0.49	0.48	5.59	1.0	-1.0	
2005/2/7	7.18	5.85	4.27	n.d.	0.29	4.42	0.90	4.07	0.51	n.d.	6.04	15.46	0.76	0.49	0.50	5.76	-1.5	-0.8	
2005/2/18	7.48	5.67	4.19	n.d.	0.31	4.42	0.88	3.18	0.38	n.d.	5.29	19.61	0.21	0.48	0.53	5.71	-4.4	0.3	
2005/3/7	7.49	5.51	4.15	n.d.	0.30	4.41	0.89	3.36	0.22	n.d.	5.55	17.63	0.89	0.48	0.50	5.62	-2.2	1.0	
2005/3/23	7.45	5.51	3.65	n.d.	0.34	3.67	0.75	3.16	0.24	n.d.	4.03	18.73	0.38	0.41	0.48	5.02	-8.0	-4.6	R1
2005/4/6	7.39	5.58	4.20	n.d.	0.35	4.45	0.91	3.41	0.17	n.d.	5.14	22.01	0.53	0.49	0.57	5.92	-7.4	2.9	
2005/4/26	7.56	6.23	4.66	n.d.	0.40	5.42	1.09	3.37	0.25	n.d.	5.74	27.37	0.19	0.57	0.67	6.88	-7.6	5.0	
2005/5/10	7.48	5.73	4.40	n.d.	0.38	4.87	1.00	3.27	0.20	n.d.	4.87	24.13	1.13	0.53	0.59	6.21	-5.9	4.0	
2005/5/24	7.55	6.27	4.62	n.d.	0.42	5.25	1.09	3.21	0.34	n.d.	5.63	26.66	0.16	0.56	0.65	6.74	-7.1	3.6	
2005/6/6	7.63	6.64	4.88	n.d.	0.48	5.61	1.19	3.20	0.47	n.d.	6.01	28.60	0.42	0.60	0.69	7.17	-6.9	3.9	
2005/6/21	7.62	6.96	5.05	n.d.	0.54	5.97	1.26	3.15	0.65	n.d.	6.16	30.15	0.65	0.63	0.72	7.50	-6.5	3.7	
2005/7/5	7.41	5.98	4.38	n.d.	0.42	5.04	1.05	2.79	0.72	n.d.	4.65	24.98	1.09	0.54	0.60	6.27	-5.1	2.3	
2005/7/19	7.60	6.21	4.58	n.d.	0.48	5.06	1.07	3.30	0.47	0.33	4.96	26.20	0.58	0.55	0.64	6.66	-7.7	3.5	
2005/8/9	8.41	7.88	5.07	n.d.	0.53	7.85	1.31	3.31	0.79	n.d.	6.19	37.56	0.93	0.73	0.85	8.68	-7.4	4.8	
2005/8/22	7.68	6.94	5.18	n.d.	0.53	5.96	1.25	3.11	1.00	0.32	5.79	29.97	1.32	0.64	0.73	7.57	-6.4	4.4	
2005/9/15	7.52	6.06	4.70	n.d.	0.40	5.02	1.04	3.29	0.20	n.d.	4.78	22.77	0.81	0.55	0.57	6.23	-1.6	1.4	
2005/9/28	7.63	6.74	5.05	n.d.	0.47	5.46	1.15	3.21	0.25	n.d.	5.46	29.75	0.37	0.60	0.70	7.11	-7.5	2.7	
2005/10/11	7.98	8.14	5.33	n.d.	0.46	7.93	1.39	3.27	0.34	n.d.	6.01	38.54	0.35	0.75	0.85	8.77	-6.2	3.7	
2005/10/25	7.54	6.40	4.72	n.d.	0.34	5.25	1.08	3.32	0.24	n.d.	6.54	24.26	0.25	0.56	0.63	6.73	-5.6	2.5	
2005/11/8	7.48	5.49	4.40	n.d.	0.35	4.28	0.89	3.17	0.34	n.d.	5.10	20.47	0.40	0.49	0.54	5.75	-4.8	2.3	
2005/11/22	7.44	5.77																	



## Appendix 6c. 四万十川上流域の採水地点 N2 における溪流水分析データ

## Analytical data of streamwater at sampling location N2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
							mg L <sup>-1</sup>												
2006/1/25	7.48	5.64	4.36	n.d.	0.28	4.39	0.94	3.52	0.20	n.d.	6.59	15.99	0.46	0.49	0.50	5.76	-0.9	1.1	
2006/4/12	7.29	4.54	3.65	n.d.	0.47	3.18	0.63	3.55	0.19	n.d.	3.57	15.81	0.95	0.38	0.44	4.64	-6.8	1.1	
2006/4/25	7.48	6.21	4.28	n.d.	0.43	5.15	0.99	3.44	0.22	n.d.	5.28	24.26	0.61	0.54	0.61	6.39	-6.3	1.5	
2006/5/11	7.22	4.20	3.49	n.d.	0.43	2.72	0.57	3.31	0.13	n.d.	2.88	17.29	1.90	0.35	0.44	4.37	-11.9	2.0	R1
2006/5/24	7.38	5.75	4.24	n.d.	0.45	4.50	0.92	3.40	0.17	n.d.	4.53	26.90	1.42	0.50	0.63	6.22	-12.1	3.9	R1
2006/6/13	7.36	6.65	4.64	n.d.	0.47	5.73	1.15	3.40	0.26	n.d.	5.44	33.28	0.75	0.59	0.76	7.40	-12.1	5.3	R1
2006/6/27	7.41	5.08	3.99	n.d.	0.41	3.71	0.77	3.37	0.09	n.d.	3.46	17.30	0.69	0.43	0.45	4.96	-2.2	-1.2	
2006/7/13	7.25	6.17	4.49	n.d.	0.49	5.01	1.02	3.24	0.25	n.d.	4.47	21.08	0.78	0.54	0.53	6.01	0.7	-1.3	
2006/7/25	7.40	5.77	4.28	n.d.	0.49	4.53	0.93	3.28	0.25	n.d.	3.99	19.87	0.27	0.50	0.51	5.63	-0.4	-1.3	
2006/8/9	7.33	6.99	4.88	n.d.	0.46	6.10	1.17	3.34	0.43	n.d.	5.29	25.56	0.51	0.62	0.63	6.99	-0.4	0.0	
2006/8/23	7.47	4.89	4.08	n.d.	0.45	3.35	0.70	3.25	0.09	n.d.	3.08	19.62	0.62	0.41	0.48	4.93	-7.2	0.4	
2006/9/5	7.22	6.48	4.64	n.d.	0.49	5.18	1.05	3.19	0.27	n.d.	4.31	25.25	0.75	0.56	0.60	6.38	-3.3	-0.8	
2006/9/20	7.52	5.64	4.38	n.d.	0.46	4.19	0.86	3.21	0.13	n.d.	3.55	22.73	0.01	0.48	0.54	5.62	-5.6	-0.2	
2006/10/4	7.32	6.94	4.96	n.d.	0.47	5.94	1.16	3.30	0.32	n.d.	4.79	26.53	0.01	0.62	0.63	6.92	-1.0	-0.1	
2006/10/19	7.46	6.58	4.75	n.d.	0.44	5.25	1.04	3.28	0.41	n.d.	5.49	25.05	0.57	0.57	0.62	6.63	-4.9	0.4	
2006/11/7	7.39	6.49	4.82	n.d.	0.40	5.20	1.02	3.36	0.40	n.d.	6.20	23.28	0.07	0.56	0.61	6.62	-4.1	1.0	
2006/11/21	7.25	6.62	4.68	n.d.	0.39	5.19	1.00	3.49	0.76	n.d.	6.25	22.59	0.01	0.56	0.61	6.60	-4.8	-0.1	
2006/12/8	7.28	6.36	4.47	n.d.	0.35	4.99	0.94	3.61	1.43	n.d.	5.62	19.29	0.64	0.53	0.56	6.22	-2.7	-1.1	
2006/12/21	7.28	6.09	4.38	n.d.	0.33	4.73	0.90	3.32	0.45	n.d.	6.22	20.82	0.38	0.51	0.57	6.14	-5.7	0.4	
2007/1/10	7.22	6.04	4.37	n.d.	0.29	4.52	0.92	3.57	0.31	n.d.	6.89	17.48	0.63	0.50	0.54	5.98	-3.6	-0.5	
2007/1/23	7.37	6.25	4.34	0.04	0.34	5.28	0.99	3.37	0.32	n.d.	6.63	18.44	0.57	0.54	0.54	6.24	0.4	-0.1	
2007/2/7	7.15	6.14	4.36	0.08	0.34	5.39	1.05	3.36	0.22	n.d.	6.87	16.93	0.41	0.56	0.52	6.24	3.6	0.8	
2007/2/21	7.24	5.87	4.34	n.d.	0.34	5.12	1.00	3.25	0.54	n.d.	6.10	17.68	0.66	0.54	0.52	6.04	1.7	1.4	
2007/3/12	7.30	5.93	4.24	0.04	0.33	5.01	0.98	3.21	0.46	n.d.	6.32	16.07	0.56	0.53	0.49	5.89	3.2	-0.4	
2007/3/28	7.48	5.70	4.05	0.05	0.37	4.96	0.98	3.09	0.61	n.d.	5.26	16.41	0.64	0.52	0.48	5.68	4.1	-0.1	
2007/4/10	7.31	6.15	4.52	0.04	0.37	5.51	1.08	3.28	0.32	n.d.	6.59	21.93	0.73	0.57	0.59	6.62	-1.9	3.7	
2007/4/24	7.23	6.63	4.54	n.d.	0.38	5.90	1.16	3.15	0.70	n.d.	6.16	22.26	0.51	0.60	0.59	6.73	0.4	0.8	
2007/5/9	7.33	6.19	4.28	0.03	0.40	5.55	1.11	3.10	0.52	n.d.	5.45	19.60	0.54	0.57	0.53	6.22	3.3	0.2	
2007/5/23	7.26	6.73	4.23	n.d.	0.34	5.64	1.09	2.92	0.33	n.d.	6.04	24.68	0.51	0.56	0.62	6.61	-4.6	-0.9	
2007/6/13	7.24	6.99	4.84	0.03	0.40	6.56	1.29	3.01	0.42	n.d.	6.33	28.18	0.45	0.66	0.69	7.46	-2.1	3.3	
2007/6/26	7.26	6.73	5.06	0.06	0.45	6.83	1.37	3.06	0.51	n.d.	5.90	28.09	0.73	0.69	0.68	7.59	0.8	6.0	
2007/7/10	7.20	5.50	4.82	0.06	0.51	5.33	1.10	3.42	0.19	n.d.	4.43	22.92	0.25	0.58	0.57	6.40	1.3	7.6	
2007/7/26	7.24	6.33	4.65	n.d.	0.47	5.42	1.09	3.15	0.35	n.d.	4.98	25.44	0.69	0.57	0.62	6.59	-3.4	2.0	
2007/8/9	7.12	6.26	4.73	0.04	0.48	5.50	1.13	3.23	0.19	n.d.	4.74	22.60	0.72	0.59	0.56	6.42	2.1	1.3	
2007/8/29	7.23	7.14	5.35	n.d.	0.50	6.69	1.32	3.25	0.43	n.d.	6.13	22.56	0.06	0.69	0.60	7.25	7.2	0.7	
2007/9/12	7.28	7.44	5.23	n.d.	0.50	6.81	1.34	3.09	0.51	n.d.	6.26	30.73	0.55	0.69	0.73	7.85	-2.8	2.7	
2007/9/26	7.33	6.92	5.10	n.d.	0.52	6.33	1.28	3.21	0.31	n.d.	5.28	33.22	0.00	0.66	0.75	7.68	-6.6	5.2	
2007/10/11	7.21	6.45	4.79	0.06	0.50	5.83	1.20	2.90	0.33	n.d.	4.63	31.10	0.00	0.61	0.69	7.12	-6.1	4.9	
2007/10/25	7.20	6.42	4.76	n.d.	0.40	5.48	1.07	3.09	0.31	n.d.	5.90	23.63	0.73	0.58	0.60	6.62	-2.0	1.5	
2007/11/13	7.26	6.32	4.77	0.04	0.39	5.46	1.08	3.17	0.42	n.d.	6.64	23.12	0.26	0.58	0.61	6.75	-2.7	3.3	
2007/11/27	7.24	6.35	5.00	n.d.	0.39	5.49	1.11	3.21	0.50	n.d.	6.92	21.72	0.12	0.59	0.60	6.76	-0.5	3.2	
2007/12/10	7.13	6.31	4.90	n.d.	0.38	5.47	1.10	3.32	0.56	n.d.	7.15	17.38	0.91	0.59	0.54	6.48	4.4	1.3	
2007/12/25	7.24	6.50	4.73	0.09	0.50	5.53	1.08	3.55	0.58	n.d.	6.96	22.68	0.41	0.59	0.63	6.92	-3.1	3.2	
2008/1/8	7.22	6.07	4.42	0.03	0.34	5.00	1.02	3.25	0.84	n.d.	6.19	16.80	0.75	0.54	0.51	6.02	2.5	-0.4	
2008/1/22	7.21	5.78	4.17	0.03	0.34	4.85	0.97	3.07	0.67	n.d.	5.66	16.84	0.28	0.51	0.49	5.76	2.3	-0.2	
2008/2/6	7.28	5.45	3.77	n.d.	0.30	4.23	0.85	2.99	0.30	n.d.	5.46	16.51	0.16	0.45	0.47	5.30	-2.2	-1.4	
2008/2/19	7.31	5.88	4.43	0.03	0.33	5.10	1.03	3.16	0.27	n.d.	6.68	18.70	0.24	0.54	0.54	6.19	0.3	2.6	
2008/3/5	7.30	6.05	4.79	0.04	0.35	5.59	1.14	3.30	0.34	n.d.	7.03	19.34	0.00	0.59	0.56	6.62	2.6	4.5	
2008/3/18	7.35	6.34	4.29	n.d.	0.33	5.29	1.09	3.09	0.39	n.d.	6.57	20.13	0.46	0.55	0.56	6.32	-1.0	-0.2	
2008/4/4	7.32	5.74	4.10	0.04	0.34	4.83	0.99	3.11	0.27	n.d.	5.60	18.10	0.86	0.51	0.51	5.79	0.6	0.5	
2008/4/21	7.33	6.19	4.35	0.03	0.38	5.32	1.09	3.10	0.26	n.d.	5.57	21.37	0.55	0.56	0.56	6.27	-0.2	0.7	
2008/5/8	7.28	6.55	4.69	n.d.	0.40	5.76	1.19	3.10	0.28	n.d.	6.29	22.21	0.12	0.60	0.59	6.70	1.1	1.1	
2008/5/22	7.34	6.87	4.60	0.03	0.41	6.08	1.22	2.93	0.39	n.d.	6.15	25.42	0.91	0.62	0.63	6.99	-1.4	0.8	
2008/6/5	7.19	4.88	3.72	0.07	0.41	3.73	0.81	2.88	0.27	n.d.	3.67	15.52	0.29	0.43	0.42	4.77	1.4	-1.1	
2008/6/19	7.25	6.33	5.05	n.d.	0.46	6.25	1.26	3.20	0.29	n.d.	5.42	22.66	1.06	0.65	0.58	6.87	5.5	4.1	
2008/7/7	7.24	6.19	4.26	n.d.	0.40	5.02	1.02	3.00	0.21	n.d.	4.70	20.57	1.57	0.53	0.52	5.90	0.7	-2.4	
2008/7/23	7.36	7.05	4.83	n.d.	0.43	6.29	1.24	3.04	0.52	n.d.	5.79	25.48	0.71	0.64	0.63	7.08	0.4	0.2	
2008/8/6	7.27	7.45	5.20	0.03	0.47	6.80	1.35	3.15	0.58	n.d.	6.58	26.19	1.11	0.69	0.66	7.59	1.9	1.0	
2008/8/20	7.57	7.98	5.08	n.d.	0.45	6.71	1.32	3.09	0.54	n.d.	6.90	27.48	0.00	0.68	0.69	7.64	-1.0	-2.2	
2008/9/4	7.46	7.82	5.16	0.02	0.46	7.15	1.42	2.76	0.71	n.d.	6.43	30.24	0.60	0.71	0.72	7.92	-0.6	0.6	
2008/9/22	7.32	6.39	4.49	0.04	0.44	5.63	1.13	3.03	0.32	n.d.	4.89	22.44	0.75	0.58	0.56	6.38	2.0	-0.1	
2008/10/6	7.43	5.74	4.21	0.07	0.49	4.85	1.01	2.96	0.18	n.d.	3.42	22.60	0.91	0.52	0.53	5.80	-0.3	0.5	
2008/10/22	7.23	6.60	4.69	0.09	0.45	6.00	1.21	3.02	0.25	n.d.	4.99	23.74	0.56	0.62	0.58	6.70	3.1	0.7	
2008/11/6	7.34	6.41	4.66	0.04	0.41	5.84	1.14	3.05	0.28	n.d.	5.64	24.00	0.67	0.60	0.60	6.72	-0.1	2.3	
2008/11/20	7.33	5.67	4.11	0.02	0.37	4.77	0.97	2.87	0.27	n.d.	5.13	20.36	0.59	0.51	0.53	5.81	-1.8	1.2	
2008/12/4	7.35	5.94	4.25	0.03	0.37	5.11	1.03	2.90	0.33	n.d.	5.45	20.67	0.16	0.54	0.54	6.05</			

## Appendix 6d. 四万十川上流域の採水地点 N2 における渓流水分析データ

## Analytical data of streamwater at sampling location N2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2009/2/23	7.09	4.62	3.43	n.d.	0.34	3.87	0.82	2.86	0.44	n.d.	4.34	14.21	0.84	0.42	0.41	4.75	0.9	1.4	
2009/3/9	7.14	5.55	4.05	n.d.	0.36	4.78	1.00	3.05	0.20	n.d.	5.03	18.97	0.12	0.51	0.51	5.71	0.1	1.4	
2009/3/23	7.26	5.36	3.86	n.d.	0.36	4.48	0.93	2.90	0.25	n.d.	4.60	18.36	0.18	0.48	0.48	5.41	-0.5	0.5	
2009/4/13	7.40	6.52	4.47	n.d.	0.39	5.79	1.18	3.02	0.26	n.d.	6.13	23.06	0.00	0.59	0.59	6.67	-0.4	1.1	
2009/4/27	7.46	6.46	4.35	n.d.	0.38	5.87	1.12	2.88	0.44	n.d.	6.36	23.36	0.55	0.58	0.60	6.69	-1.6	1.8	
2009/5/11	7.38	6.66	4.55	n.d.	0.41	6.14	1.24	2.88	0.39	n.d.	6.43	24.71	0.31	0.62	0.63	6.97	-0.7	2.3	
2009/5/25	7.33	7.05	4.84	n.d.	0.42	6.54	1.34	2.84	0.42	n.d.	6.99	25.93	0.67	0.66	0.66	7.38	0.0	2.3	
2009/6/8	7.35	7.18	4.82	n.d.	0.42	6.69	1.34	2.61	0.40	n.d.	6.12	27.65	1.01	0.66	0.66	7.35	0.3	1.2	
2009/6/24	7.26	6.45	4.40	n.d.	0.45	5.78	1.21	2.38	0.39	n.d.	4.74	25.13	1.39	0.59	0.58	6.47	0.6	0.2	
2009/7/8	7.22	6.45	4.39	n.d.	0.45	5.86	1.21	2.84	0.15	n.d.	4.78	25.19	0.84	0.59	0.59	6.57	0.0	1.0	
2009/7/22	7.16	5.93	4.22	n.d.	0.47	5.18	1.10	2.48	0.31	n.d.	4.19	22.63	1.03	0.54	0.53	5.95	1.1	0.1	
2009/8/12	7.24	5.47	4.27	n.d.	0.51	4.22	0.91	3.05	0.11	n.d.	3.75	19.70	0.95	0.48	0.49	5.41	-0.5	-0.5	
2009/8/27	7.13	7.25	4.94	n.d.	0.49	6.58	1.34	2.99	0.28	n.d.	5.38	27.94	0.01	0.67	0.66	7.32	0.5	0.5	
2009/9/10	7.25	7.32	5.00	n.d.	0.48	6.55	1.33	2.91	0.41	n.d.	6.00	27.33	0.13	0.67	0.66	7.37	0.3	0.4	
2009/9/25	7.23	7.70	5.28	n.d.	0.49	7.09	1.44	3.04	0.37	n.d.	6.49	29.52	0.81	0.71	0.71	7.91	0.2	1.3	
2009/10/9	7.38	6.03	4.36	n.d.	0.45	5.21	1.09	2.77	0.19	n.d.	4.49	22.98	1.16	0.55	0.55	6.10	-0.1	0.6	
2009/10/23	7.23	6.44	4.68	n.d.	0.41	5.62	1.14	2.96	0.22	n.d.	6.23	22.57	0.82	0.59	0.59	6.61	0.1	1.3	
2009/11/6	7.24	6.45	4.67	n.d.	0.40	5.53	1.13	2.92	0.26	n.d.	6.60	22.02	0.65	0.58	0.58	6.59	-0.2	1.1	
2009/11/24	7.16	5.72	4.25	n.d.	0.37	4.84	1.00	2.90	0.22	n.d.	5.30	19.95	0.06	0.52	0.52	5.86	-0.4	1.2	
2009/12/8	7.26	6.02	4.42	n.d.	0.36	5.12	1.05	3.12	0.25	n.d.	6.53	19.58	0.04	0.54	0.55	6.23	-0.5	1.7	
2009/12/22	7.27	5.86	4.21	n.d.	0.34	4.80	0.99	2.95	0.28	n.d.	6.23	18.73	0.02	0.51	0.52	5.91	-1.1	0.4	
2010/1/6	7.27	5.99	4.28	n.d.	0.32	4.99	1.02	2.94	0.21	n.d.	6.57	18.30	0.01	0.53	0.52	6.01	0.5	0.2	
2010/1/20	7.25	6.08	4.35	n.d.	0.34	5.28	1.07	2.91	0.26	n.d.	6.87	19.22	0.17	0.55	0.54	6.25	0.5	1.4	
2010/2/4	7.35	5.76	4.12	n.d.	0.33	5.03	1.03	2.98	0.38	n.d.	6.30	18.18	0.18	0.52	0.52	5.96	0.4	1.7	
2010/2/18	7.34	5.95	4.20	n.d.	0.34	5.24	1.07	3.05	0.35	n.d.	6.54	19.70	0.42	0.54	0.55	6.23	-0.9	2.3	
2010/3/5	7.39	5.64	4.05	n.d.	0.37	5.01	1.01	2.86	0.27	n.d.	4.92	19.86	0.05	0.52	0.51	5.80	0.6	1.4	
2010/3/19	7.32	5.45	3.99	n.d.	0.35	4.64	0.95	2.99	0.22	n.d.	4.94	18.30	0.09	0.49	0.49	5.56	0.1	1.0	
2010/4/6	7.39	5.36	4.05	n.d.	0.41	4.31	0.95	3.03	0.22	n.d.	4.59	17.89	0.00	0.48	0.48	5.41	0.2	0.4	
2010/4/30	7.36	4.96	3.90	0.01	0.40	4.22	0.90	3.10	0.18	n.d.	4.26	18.06	0.12	0.46	0.47	5.29	-1.1	3.2	
2010/5/20	7.43	5.84	4.34	n.d.	0.43	5.43	1.13	2.49	0.39	n.d.	4.70	23.85	0.52	0.56	0.57	6.23	-0.2	3.3	
2010/6/4	7.56	6.42	4.61	n.d.	0.45	5.80	1.20	3.10	0.28	n.d.	5.56	24.34	0.05	0.60	0.61	6.74	-0.6	2.4	
2010/6/24	7.38	6.06	4.33	n.d.	0.46	5.19	1.08	2.79	0.22	n.d.	4.34	22.53	0.92	0.55	0.54	6.04	0.6	-0.2	
2010/7/16	7.56	8.01	4.59	n.d.	0.82	11.40	1.53	2.72	0.45	n.d.	8.40	34.22	1.78	0.92	0.82	9.74	5.5	9.8	
2010/8/5	7.45	6.66	4.69	n.d.	0.52	5.84	1.22	2.76	0.34	n.d.	4.51	26.35	0.24	0.61	0.61	6.69	0.0	0.2	
2010/8/24	7.55	6.68	4.93	n.d.	0.50	6.32	1.29	3.00	0.40	n.d.	5.55	27.45	0.77	0.65	0.66	7.23	-0.6	3.9	
2010/9/9	7.57	6.30	4.92	n.d.	0.53	6.64	1.35	2.64	0.45	n.d.	5.44	29.40	0.37	0.67	0.68	7.40	-0.5	8.0	
2010/10/5	7.39	5.83	4.30	0.01	0.45	4.97	1.03	2.56	0.21	n.d.	4.12	19.40	0.60	0.53	0.48	5.63	5.2	-1.7	
2010/10/22	7.71	7.11	5.08	n.d.	0.48	6.61	1.34	3.16	0.21	n.d.	5.72	27.61	0.41	0.67	0.66	7.42	0.7	2.1	
2010/11/16	7.62	5.66	4.69	n.d.	0.56	5.22	1.06	3.05	0.28	n.d.	6.33	21.15	1.00	0.57	0.57	6.43	-0.2	6.4	
2010/12/7	7.91	6.17	4.28	n.d.	0.35	5.03	1.02	2.70	0.31	n.d.	5.95	20.19	0.05	0.53	0.54	6.02	-0.6	-1.3	
2011/1/5	7.49	5.26	4.31	n.d.	0.33	5.04	1.03	3.08	0.20	n.d.	6.93	18.36	0.31	0.53	0.54	6.13	-0.3	7.6	
2011/1/24	7.64	5.31	4.31	0.02	0.32	5.08	1.03	2.90	0.16	n.d.	6.80	18.85	0.00	0.54	0.53	6.12	0.1	7.1	
2011/2/15	7.55	5.64	4.32	n.d.	0.32	5.13	1.04	3.39	0.68	n.d.	6.62	17.69	0.99	0.54	0.53	6.18	0.3	4.6	
2011/3/15	7.62	6.43	4.34	n.d.	0.33	5.38	1.10	2.88	0.19	n.d.	6.64	21.17	0.02	0.56	0.57	6.38	-1.1	-0.4	
2011/3/28	7.49	6.19	4.30	n.d.	0.32	5.25	1.07	2.96	0.21	n.d.	6.75	19.60	0.11	0.55	0.55	6.24	-0.3	0.4	
2011/4/20	7.49	5.84	4.51	n.d.	0.36	5.82	1.21	2.84	n.d.	n.d.	6.58	23.22	0.00	0.59	0.60	6.71	-0.2	6.9	
2011/5/10	7.64	5.69	4.73	n.d.	0.42	6.28	1.30	3.11	0.19	n.d.	7.03	23.85	0.00	0.64	0.63	7.14	0.7	11.3	
2011/6/2	7.65	5.36	3.98	n.d.	0.40	4.89	1.02	2.98	0.15	n.d.	4.50	20.68	0.08	0.51	0.52	5.76	-0.7	3.6	
2011/6/18	7.46	4.70	3.78	n.d.	0.41	3.87	0.83	3.04	n.d.	n.d.	3.46	17.57	1.13	0.44	0.45	4.93	-1.0	2.4	
2011/6/30	7.52	5.44	4.23	0.02	0.46	4.72	1.01	3.02	n.d.	n.d.	4.00	21.41	1.10	0.51	0.52	5.73	-0.4	2.6	
2011/7/13	7.67	5.83	4.64	n.d.	0.48	5.83	1.21	2.90	0.26	n.d.	4.96	25.62	0.43	0.60	0.61	6.71	-0.4	7.0	
2011/8/5	7.68	6.90	4.77	n.d.	0.51	6.14	1.27	2.92	0.30	n.d.	5.07	27.45	0.01	0.63	0.64	7.02	-0.9	0.9	
2011/8/25	7.63	6.89	4.99	n.d.	0.51	6.57	1.34	2.97	0.37	n.d.	5.56	28.67	0.56	0.67	0.68	7.42	-0.6	3.7	
2011/9/22	7.52	4.78	4.16	n.d.	0.45	3.61	0.78	2.80	0.08	n.d.	3.31	18.18	0.09	0.44	0.45	4.89	-1.1	1.2	
2011/10/5	7.57	6.28	4.53	n.d.	0.44	5.26	1.08	3.14	0.29	n.d.	5.48	23.24	0.36	0.56	0.59	6.42	-2.5	1.1	
2011/10/28	7.60	5.47	4.41	n.d.	0.40	4.57	0.99	2.81	0.16	n.d.	4.68	20.86	0.00	0.51	0.52	5.75	-1.0	2.5	
2011/11/14	7.59	5.78	4.83	n.d.	0.40	5.13	1.11	2.95	0.40	n.d.	5.90	21.47	0.00	0.57	0.56	6.36	0.3	4.8	
2011/12/9	7.58	5.24	4.38	n.d.	0.37	4.54	0.98	2.91	0.21	n.d.	5.34	19.40	0.23	0.51	0.51	5.76	-0.7	4.7	
2011/12/27	7.55	5.67	4.31	n.d.	0.35	4.38	0.95	2.94	0.19	n.d.	6.24	17.63	0.33	0.49	0.50	5.70	-1.2	0.3	
2012/1/12	7.49	6.02	4.36	0.01	0.32	4.57	0.99	2.94	0.20	n.d.	6.54	18.24	0.04	0.51	0.52	5.88	-1.2	-1.1	
2012/2/9	7.45	5.33	4.04	0.01	n.d.	4.25	0.93	2.76	0.28	n.d.	5.77	17.45	0.82	0.46	0.49	5.41	-2.5	0.8	
2012/2/24	7.47	4.71	3.52	n.d.	0.29	3.63	0.80	2.70	0.20	n.d.	4.66	15.05	0.06	0.41	0.42	4.73	-1.9	0.2	
2012/3/20	7.46	5.32	3.95	n.d.	0.37	4.07	0.92	2.77	0.17	n.d.	5.02	18.10	0.00	0.46	0.48	5.31	-2.4	-0.1	
2012/4/10	7.48	5.31	4.20	n.d.	0.38	4.53	1.02	2.86	0.13	n.d.	5.28	20.07	0.02	0.50	0.52	5.75	-2.0	4.0	
2012/5/11	7.52	5.61	4.56	n.d.	0.75	4.74	1.04	3.09	0.17	n.d.	5.01	21.66	0.26	0.54	0.55	6.10	-0.9	4.2	
2012/6/1	7.61	6.22	4.75	n.d.	0.41	5.64	1.23	2.68	0.34	n.d.	5.93	25.07	0.00	0.60	0.62	6.76	-1.3	4.1	
2012/6/13	7.56	6.84	4.80	n.d.	0.48	5.70	1.24												

## Appendix 6e. 四万十川上流域の採水地点 N2 における渓流水分析データ

## Analytical data of streamwater at sampling location N2 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2012/8/23	7.56	6.26	4.64	n.d.	0.51	5.66	1.25	2.15	0.73	n.d.	3.84	28.30	0.00	0.60	0.62	6.59	-1.3	2.5	
2012/9/12	7.55	6.01	4.57	n.d.	0.51	5.04	1.14	2.46	0.28	n.d.	3.90	25.62	0.61	0.56	0.58	6.17	-1.6	1.3	
2012/10/9	7.60	5.95	4.65	n.d.	0.44	4.98	1.10	2.73	0.37	n.d.	4.65	23.85	0.56	0.55	0.57	6.20	-1.6	2.1	
2012/10/29	7.56	5.83	4.47	n.d.	0.37	5.28	1.00	2.66	0.48	n.d.	5.66	22.77	0.00	0.55	0.57	6.28	-2.2	3.7	
2012/11/12	7.67	5.52	4.47	n.d.	0.35	5.20	0.98	2.81	0.62	n.d.	6.06	21.35	0.00	0.54	0.57	6.26	-1.9	6.3	
2012/12/7	7.52	5.39	4.19	n.d.	0.33	4.69	0.90	2.86	0.60	n.d.	6.51	17.89	0.04	0.50	0.52	5.84	-2.0	4.0	
2012/12/26	7.41	4.92	4.03	n.d.	0.30	4.61	0.88	2.84	0.51	n.d.	6.33	17.45	0.34	0.49	0.51	5.69	-2.1	7.2	
2013/1/18	7.54	5.07	3.84	n.d.	0.30	4.46	0.87	2.74	0.45	n.d.	5.62	16.96	0.00	0.47	0.48	5.41	-1.1	3.2	
2013/2/8	7.38	4.67	3.74	n.d.	0.32	4.34	0.87	2.73	0.40	n.d.	5.23	16.96	0.09	0.46	0.47	5.29	-1.1	6.2	
2013/2/25	7.68	4.77	3.80	n.d.	0.33	4.40	0.89	2.72	0.25	n.d.	5.26	16.88	0.26	0.47	0.47	5.31	0.0	5.3	
2013/3/15	7.67	5.30	4.06	n.d.	0.35	4.87	0.97	2.75	0.37	n.d.	5.96	18.71	0.07	0.51	0.51	5.81	-0.5	4.6	
2013/4/5	7.43	6.08	4.23	n.d.	0.37	5.30	1.06	2.71	0.40	n.d.	5.94	20.80	0.00	0.55	0.55	6.17	-0.2	0.7	
2013/4/25	7.20	4.56	3.71	0.01	0.40	4.34	0.89	2.76	0.51	n.d.	4.49	17.14	0.11	0.46	0.46	5.22	0.2	6.7	
2013/6/5	7.30	6.59	4.88	n.d.	0.42	6.63	1.31	2.57	0.44	n.d.	5.78	26.90	0.00	0.66	0.64	7.21	1.6	4.5	
2013/6/27	7.55	4.26	3.73	n.d.	0.43	3.97	0.82	2.68	0.20	n.d.	3.45	16.47	0.00	0.44	0.42	4.81	2.1	6.1	
2013/7/17	7.52	6.73	4.66	n.d.	0.45	6.02	1.19	2.66	0.41	n.d.	5.18	25.25	0.74	0.61	0.60	6.74	0.8	0.1	
2013/8/9	7.56	7.06	5.09	n.d.	0.47	6.58	1.30	2.76	0.60	n.d.	6.27	26.78	0.36	0.67	0.66	7.38	0.9	2.2	
2013/8/27	7.57	7.00	5.28	n.d.	0.48	6.98	1.37	2.74	0.76	n.d.	6.36	28.18	0.07	0.70	0.68	7.71	1.4	4.8	
2013/9/6	7.51	5.22	4.10	n.d.	0.43	4.17	0.86	2.83	0.25	n.d.	4.24	18.06	0.73	0.47	0.47	5.25	0.0	0.3	
2013/9/17	7.72	5.88	4.58	0.01	0.41	5.53	1.10	2.74	0.28	n.d.	5.75	22.81	0.00	0.58	0.58	6.45	0.1	4.6	
2013/10/10	7.44	4.97	4.11	n.d.	0.44	4.25	0.88	2.76	0.17	n.d.	3.28	19.03	0.63	0.47	0.46	5.17	1.5	2.0	
2013/10/22	7.44	5.99	4.67	n.d.	0.44	5.65	1.12	2.79	0.25	n.d.	5.12	23.36	0.00	0.59	0.57	6.45	1.4	3.7	
2013/10/30	7.54	5.18	4.28	n.d.	0.42	4.40	0.89	2.91	0.14	n.d.	4.38	18.50	0.17	0.49	0.48	5.43	1.2	2.4	
2013/11/18	7.62	5.61	4.44	n.d.	0.39	4.99	1.00	2.62	0.30	n.d.	5.30	19.95	0.02	0.53	0.52	5.89	1.7	2.5	
2013/12/13	7.54	5.57	4.18	n.d.	0.37	4.72	0.94	2.67	0.31	n.d.	5.36	17.69	0.18	0.50	0.48	5.59	2.3	0.2	
2014/1/7	7.59	5.71	4.17	n.d.	0.35	4.90	0.98	3.06	0.20	n.d.	4.48	18.38	0.45	0.52	0.48	5.63	3.2	-0.7	
2014/1/27	7.73	5.56	4.35	n.d.	0.36	5.14	1.04	3.13	0.19	n.d.	4.84	18.91	0.30	0.54	0.50	5.88	3.7	2.8	
2014/2/20	7.62	5.08	4.05	n.d.	0.37	4.84	0.98	3.01	0.31	n.d.	4.05	17.89	0.63	0.51	0.47	5.48	4.2	3.8	
2014/3/14	7.58	4.38	3.57	n.d.	0.34	3.89	0.80	2.76	0.35	n.d.	4.73	15.19	0.30	0.42	0.43	4.88	-0.8	5.4	
2014/4/3	7.58	5.33	3.97	n.d.	0.35	4.69	0.94	2.75	0.26	n.d.	5.25	18.91	0.24	0.49	0.50	5.61	-0.8	2.6	
2014/4/23	7.40	5.40	4.25	n.d.	0.39	5.32	1.07	2.66	0.23	n.d.	5.62	21.55	0.44	0.55	0.55	6.16	0.0	6.6	
2014/5/9	7.32	5.43	4.54	n.d.	0.41	5.73	1.15	2.55	0.20	n.d.	6.04	23.18	0.09	0.59	0.58	6.54	0.7	9.3	
2014/5/27	7.30	5.79	4.30	n.d.	0.37	5.47	1.09	2.46	0.34	n.d.	5.28	23.59	0.05	0.56	0.57	6.28	-1.1	4.0	
2014/6/17	7.13	5.16	4.46	n.d.	0.41	5.69	1.13	2.69	0.20	n.d.	5.30	25.07	0.06	0.58	0.60	6.55	-1.6	11.9	
2014/7/9	7.04	5.43	4.28	n.d.	0.45	4.99	1.02	2.79	0.20	n.d.	4.18	21.35	0.01	0.53	0.52	5.82	1.1	3.5	
2014/7/24	7.23	6.12	4.87	n.d.	0.46	6.13	1.22	2.81	0.44	n.d.	5.29	25.01	0.08	0.63	0.61	6.86	1.9	5.7	
2014/8/12	7.32	5.17	4.32	n.d.	0.49	3.99	0.81	2.51	0.10	n.d.	3.44	18.91	0.41	0.47	0.45	5.08	1.4	-0.9	
2014/8/27	7.11	5.69	4.66	n.d.	0.51	5.30	1.07	2.51	0.14	n.d.	3.76	23.99	0.00	0.57	0.54	6.09	2.2	3.4	
2014/9/18	7.17	6.45	4.78	n.d.	0.49	5.88	1.18	2.53	0.26	n.d.	4.38	26.57	0.20	0.61	0.60	6.64	0.7	1.4	
2014/10/9	7.15	6.18	4.81	n.d.	0.49	6.00	1.20	2.42	0.33	n.d.	4.58	26.84	0.31	0.62	0.61	6.73	0.9	4.3	
2014/10/30	7.39	5.81	4.50	n.d.	0.42	5.10	1.02	2.43	0.24	n.d.	4.92	22.02	0.00	0.54	0.54	6.00	0.8	1.6	
2014/11/20	7.48	5.59	4.43	n.d.	0.38	4.83	0.97	2.42	0.41	n.d.	5.41	18.91	0.00	0.52	0.50	5.75	2.5	1.4	
2014/12/2	7.53	5.71	4.68	n.d.	0.40	5.28	1.06	2.74	0.59	n.d.	5.86	19.93	0.10	0.56	0.54	6.22	2.6	4.2	
2014/12/22	7.67	5.69	3.97	n.d.	0.36	4.47	0.90	2.69	0.51	n.d.	5.40	17.28	0.03	0.48	0.48	5.45	0.0	-2.1	
2015/1/15	7.45	4.94	3.96	n.d.	0.36	4.67	0.96	3.11	0.99	n.d.	4.31	17.14	0.48	0.49	0.47	5.49	2.0	5.3	
2015/2/6	7.55	5.23	4.01	n.d.	0.34	4.61	0.94	2.63	0.19	n.d.	5.50	18.24	0.03	0.49	0.49	5.55	0.0	3.0	
2015/2/27	7.26	5.77	4.12	n.d.	0.34	5.02	1.02	2.80	0.50	n.d.	5.30	19.11	0.33	0.52	0.51	5.84	1.1	0.6	
2015/3/20	7.37	4.92	3.74	n.d.	0.40	3.89	0.81	2.57	0.22	n.d.	3.93	17.08	0.09	0.43	0.44	4.88	-0.5	-0.4	
2015/4/8	7.40	5.21	3.99	n.d.	0.38	4.68	0.95	2.52	0.31	n.d.	4.71	19.22	0.37	0.50	0.49	5.51	0.6	2.8	
2015/4/30	7.18	6.21	4.34	n.d.	0.41	5.68	1.15	2.56	0.28	n.d.	4.94	23.85	0.25	0.58	0.57	6.36	0.6	1.2	
2015/5/20	7.24	5.84	4.16	n.d.	0.41	5.23	1.06	2.44	0.36	n.d.	4.57	22.45	0.25	0.54	0.54	5.97	0.2	1.1	
2015/6/8	7.09	5.92	4.21	n.d.	0.43	5.45	1.11	2.39	0.28	n.d.	4.36	23.22	0.33	0.56	0.54	6.07	1.2	1.3	
2015/7/2	7.15	4.82	3.68	n.d.	0.44	3.88	0.80	2.48	0.13	n.d.	3.08	17.93	0.28	0.43	0.43	4.76	0.1	-0.6	
2015/7/24	7.10	5.40	4.02	n.d.	0.47	4.57	0.94	2.44	0.14	n.d.	3.35	20.74	0.10	0.49	0.48	5.35	1.2	-0.5	
2015/8/11	7.16	6.74	4.80	n.d.	0.50	6.31	1.26	2.43	0.27	n.d.	4.77	27.45	0.05	0.64	0.62	6.92	1.4	1.3	
2015/8/26	7.16	5.49	4.03	n.d.	0.47	4.62	0.94	2.45	0.23	n.d.	3.31	20.74	0.68	0.50	0.48	5.37	1.4	-1.1	
2015/9/25	7.05	5.09	3.98	n.d.	0.46	4.15	0.85	2.49	0.09	n.d.	2.84	19.68	0.76	0.46	0.45	5.01	1.0	-0.7	
2015/10/15	7.31	6.00	4.43	n.d.	0.41	5.25	1.05	2.50	0.18	n.d.	4.75	22.57	0.00	0.55	0.54	6.06	0.8	0.5	
2015/11/4	7.33	5.98	4.46	n.d.	0.38	5.23	1.04	2.52	0.30	n.d.	5.44	21.35	0.04	0.55	0.54	6.09	1.0	0.9	
2015/11/18	7.08	5.96	4.34	n.d.	0.46	5.71	1.16	2.40	0.38	n.d.	3.82	25.01	0.27	0.58	0.56	6.26	1.6	2.4	
2015/12/8	7.40	5.44	4.10	n.d.	0.38	4.75	0.96	2.46	0.23	n.d.	4.88	19.15	0.28	0.50	0.49	5.56	1.5	1.1	
2015/12/24	7.39	5.57	4.14	n.d.	0.39	4.85	0.98	2.50	0.20	n.d.	4.56	19.93	0.02	0.51	0.50	5.62	1.7	0.5	

\* 分析値の品質管理: R1 はイオンバランス、R2 は電気伝導率比較が EANET (2010a) の推奨する許容範囲から外れていることを示す。Data quality control abbreviations: R1 and R2 indicate an analytical value that is outside the allowable range for respective R1 (ion balance) and R2 (comparison of electric conductivity) recommendations (EANET 2010a).

表中の n.d. は検出限界以下、n/a は欠測値を示す。Table abbreviations: n.d. indicates that it is below the detection limit; n/a indicates a missing value.

## Appendix 7a. 四万十川上流域の採水地点 N3 における渓流水分析データ

## Analytical data of streamwater at sampling location N3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2000/3/24	7.46	5.97	3.51	n.d.	0.58	5.72	0.99	3.26	1.57	n.d.	5.87	16.57	1.57	0.53	0.51	6.08	2.3	0.9	
2000/4/17	7.62	7.35	4.47	n.d.	0.64	7.44	1.29	3.27	1.07	n.d.	8.38	22.15	0.15	0.69	0.65	7.71	3.1	2.4	
2000/4/27	7.62	7.17	4.42	n.d.	0.68	7.64	1.33	3.24	1.72	n.d.	7.24	21.92	0.08	0.70	0.63	7.64	5.4	3.2	
2000/5/15	7.66	8.37	4.83	n.d.	0.74	8.69	1.47	3.19	1.53	n.d.	9.22	27.59	0.24	0.78	0.76	8.83	1.6	2.6	
2000/5/29	7.61	7.58	4.41	n.d.	0.74	7.79	1.32	3.15	2.42	0.12	7.33	24.56	0.14	0.71	0.69	8.00	1.5	2.7	
2000/6/12	7.63	6.63	4.00	n.d.	0.60	6.65	1.15	3.13	1.14	n.d.	5.93	23.06	0.10	0.62	0.61	6.94	0.6	2.3	
2000/6/26	7.61	7.40	4.56	n.d.	0.67	7.57	1.33	3.20	1.23	n.d.	7.03	25.52	1.35	0.70	0.67	7.81	2.0	2.7	
2000/7/10	7.59	7.05	4.47	n.d.	0.67	7.22	1.26	3.25	1.08	n.d.	6.54	24.57	1.14	0.68	0.65	7.50	2.1	3.1	
2000/7/25	7.53	8.24	4.78	n.d.	0.80	8.70	1.51	3.10	2.78	n.d.	7.60	27.10	0.47	0.79	0.73	8.67	3.5	2.5	
2000/8/7	7.66	6.53	4.57	n.d.	0.83	6.27	1.11	3.50	0.98	n.d.	5.78	21.64	0.73	0.62	0.59	6.90	2.8	2.8	
2000/8/22	7.65	8.10	4.99	n.d.	0.91	8.47	1.46	3.30	1.88	n.d.	7.74	26.99	1.51	0.78	0.73	8.60	3.8	3.0	
2000/9/4	7.67	8.43	5.01	n.d.	0.80	9.01	1.55	3.33	3.02	n.d.	8.02	28.03	1.36	0.82	0.77	9.04	3.0	3.5	
2000/9/18	7.59	5.77	4.26	n.d.	0.59	5.49	1.00	3.32	0.70	n.d.	4.73	18.61	1.07	0.56	0.51	6.05	4.6	2.4	
2000/10/3	7.68	6.52	4.38	n.d.	0.65	6.29	1.12	2.77	1.24	n.d.	5.74	22.91	1.12	0.61	0.59	6.80	1.7	2.1	
2000/10/18	7.70	7.38	4.72	n.d.	0.73	7.02	1.23	3.05	1.22	n.d.	7.18	24.95	1.20	0.68	0.66	7.60	0.9	1.5	
2000/11/6	7.64	6.46	4.41	0.00	0.68	6.24	1.13	3.03	0.88	0.25	5.74	22.46	1.13	0.61	0.60	6.86	1.5	3.0	
2000/11/21	7.66	7.25	4.54	n.d.	0.71	7.29	1.28	3.01	1.63	n.d.	7.01	22.70	1.26	0.68	0.63	7.50	4.2	1.7	
2000/12/5	7.53	7.67	4.59	n.d.	0.71	7.67	1.33	3.10	1.47	n.d.	8.09	23.68	1.34	0.71	0.67	7.91	3.1	1.5	
2000/12/18	7.55	7.98	4.64	n.d.	0.74	8.16	1.42	3.17	1.71	n.d.	8.63	23.51	1.55	0.74	0.68	8.22	4.4	1.5	
2001/1/9	7.57	8.05	4.63	n.d.	0.67	8.34	1.44	3.30	1.91	n.d.	9.37	22.98	1.37	0.75	0.70	8.41	4.0	2.2	
2001/1/23	7.54	7.21	4.27	0.01	0.52	7.29	1.28	3.29	2.06	n.d.	8.16	20.01	1.08	0.67	0.62	7.52	3.4	2.1	
2001/2/6	7.58	6.77	4.26	n.d.	0.49	6.99	1.20	3.10	1.18	n.d.	7.50	20.28	1.26	0.65	0.60	7.15	4.1	2.8	
2001/2/20	7.60	7.34	4.40	0.01	0.46	7.49	1.30	3.15	1.10	n.d.	8.45	21.27	0.97	0.68	0.63	7.60	4.0	1.8	
2001/3/6	7.56	6.85	4.07	n.d.	0.55	6.81	1.21	3.28	1.36	n.d.	7.30	21.15	0.76	0.63	0.61	7.16	1.4	2.2	
2001/3/21	7.66	7.44	4.38	n.d.	0.58	7.45	1.30	3.29	1.21	n.d.	8.17	23.39	1.59	0.68	0.67	7.76	1.3	2.1	
2001/4/10	7.66	8.13	4.76	n.d.	0.68	8.15	1.40	3.17	1.35	n.d.	9.21	25.23	1.36	0.75	0.72	8.41	2.1	1.7	
2001/4/23	7.59	8.26	4.76	n.d.	0.68	8.47	1.49	3.26	1.74	n.d.	9.13	26.62	1.06	0.77	0.75	8.70	1.5	2.6	
2001/5/8	7.61	6.06	3.78	n.d.	0.63	5.85	1.05	3.31	0.82	n.d.	5.29	20.14	1.27	0.56	0.55	6.30	1.1	1.9	
2001/5/22	7.66	7.77	4.49	n.d.	0.64	7.97	1.36	3.07	1.64	n.d.	7.29	27.10	1.43	0.72	0.71	8.10	0.9	2.1	
2001/6/5	7.67	8.19	4.74	n.d.	0.66	8.75	1.49	3.07	1.42	n.d.	8.14	28.16	0.91	0.78	0.74	8.64	2.8	2.7	
2001/6/20	7.65	6.51	3.96	n.d.	0.59	6.59	1.16	2.68	2.14	n.d.	5.46	21.58	0.75	0.61	0.58	6.74	2.8	1.8	
2001/7/3	7.63	7.69	4.74	n.d.	0.63	8.08	1.39	3.21	1.33	n.d.	7.37	28.25	0.00	0.74	0.73	8.29	0.8	3.8	
2001/7/24	7.69	8.05	4.79	n.d.	0.64	8.35	1.44	3.12	1.67	n.d.	7.59	28.78	0.91	0.76	0.74	8.50	1.0	2.7	
2001/8/7	7.67	8.87	5.14	n.d.	0.79	9.14	1.58	3.08	2.39	n.d.	8.48	30.38	0.94	0.83	0.80	9.24	1.9	2.1	
2001/8/19	7.67	9.38	5.43	n.d.	0.74	9.85	1.72	3.15	3.20	n.d.	9.34	33.18	0.88	0.89	0.88	10.02	0.5	3.3	
2001/8/21	7.54	5.89	3.40	n.d.	0.65	5.72	1.03	2.21	4.79	n.d.	4.26	17.47	2.36	0.53	0.51	6.02	1.9	1.1	
2001/9/4	7.72	8.05	4.53	n.d.	0.65	8.19	1.43	2.68	3.12	n.d.	7.15	27.94	0.94	0.74	0.73	8.33	0.5	1.7	
2001/9/26	7.68	7.36	4.62	n.d.	0.55	7.25	1.29	3.17	1.16	n.d.	7.24	24.60	0.95	0.68	0.66	7.64	1.6	1.9	
2001/10/10	7.71	6.55	4.06	n.d.	0.56	6.34	1.15	2.51	1.62	n.d.	5.41	24.23	1.25	0.60	0.61	6.77	-0.4	1.6	
2001/10/24	7.76	6.90	4.51	0.04	0.65	6.96	1.24	3.02	0.58	n.d.	6.10	25.47	1.31	0.66	0.64	7.32	2.0	3.0	
2001/11/7	7.68	6.96	4.17	0.07	0.59	6.62	1.19	2.86	0.66	n.d.	6.29	24.56	0.90	0.63	0.62	7.07	0.3	0.8	
2001/11/21	7.65	7.64	4.49	n.d.	0.60	7.40	1.34	3.02	0.95	n.d.	7.61	26.29	0.58	0.69	0.69	7.82	0.0	1.2	
2001/12/4	7.64	8.25	4.52	0.10	0.70	7.95	1.42	3.37	1.16	n.d.	8.61	27.72	1.08	0.73	0.75	8.46	-0.9	1.2	
2001/12/20	7.61	8.14	4.38	0.05	0.59	7.85	1.41	3.28	1.71	n.d.	9.00	26.58	1.18	0.72	0.74	8.38	-1.9	1.4	
2002/1/8	7.54	8.52	4.66	0.10	0.67	8.43	1.55	3.45	1.45	n.d.	10.25	27.69	1.29	0.77	0.79	9.00	-0.9	2.7	
2002/1/22	7.56	8.82	4.53	0.08	0.70	8.55	1.55	4.00	2.47	n.d.	9.57	24.76	1.54	0.77	0.76	8.91	1.0	0.5	
2002/2/7	7.56	8.50	4.43	n.d.	0.61	8.12	1.47	3.55	1.96	n.d.	9.57	24.43	1.32	0.73	0.73	8.50	0.2	0.0	
2002/2/19	7.62	8.86	4.74	0.05	0.64	9.00	1.63	3.74	2.14	n.d.	10.79	26.70	0.51	0.81	0.80	9.36	0.4	2.7	
2002/3/5	7.56	6.77	3.54	n.d.	0.72	6.48	1.15	2.70	1.95	n.d.	6.84	19.35	2.93	0.59	0.57	6.69	2.0	-0.6	
2002/3/19	7.70	8.74	4.88	n.d.	0.68	8.76	1.63	3.55	1.44	n.d.	10.17	24.82	0.33	0.80	0.74	8.94	3.8	1.1	
2002/4/9	7.70	7.50	4.02	0.07	0.65	7.03	1.29	3.45	1.14	n.d.	7.36	21.81	1.04	0.65	0.63	7.37	2.0	-0.9	
2002/4/23	7.68	7.41	3.86	n.d.	0.68	7.06	1.27	3.28	0.96	n.d.	6.80	21.98	1.05	0.64	0.61	7.17	2.6	-1.6	
2002/5/8	7.70	7.13	4.21	n.d.	0.68	6.82	1.23	3.65	0.44	n.d.	6.83	24.49	0.89	0.64	0.65	7.37	-0.9	1.7	
2002/5/28	7.78	7.86	4.50	n.d.	0.69	7.53	1.37	3.55	0.68	n.d.	7.75	27.52	0.57	0.70	0.72	8.09	-1.5	1.4	
2002/6/11	7.77	8.58	4.65	n.d.	0.89	8.55	1.53	3.31	3.64	n.d.	7.76	27.71	1.70	0.78	0.77	8.84	0.6	1.5	
2002/6/25	7.87	7.94	4.21	n.d.	0.73	7.75	1.39	2.75	2.52	n.d.	6.68	28.24	1.49	0.70	0.72	8.02	-1.2	0.5	
2002/7/9	7.63	5.26	3.05	n.d.	0.75	4.84	0.87	2.22	1.50	n.d.	3.73	17.95	2.95	0.46	0.46	5.20	0.7	-0.5	
2002/7/23	7.74	7.00	4.22	n.d.	0.71	6.52	1.17	3.64	0.55	n.d.	6.15	24.18	0.93	0.62	0.64	7.13	-1.0	1.0	
2002/8/6	7.74	7.80	4.54	n.d.	0.77	7.48	1.32	3.74	0.82	n.d.	6.81	28.15	2.19	0.70	0.72	8.02	-1.6	1.4	
2002/8/27	7.72	8.44	4.70	n.d.	0.80	8.41	1.49	3.45	1.06	n.d.	7.62	29.74	0.94	0.77	0.76	8.63	0.4	1.1	
2002/9/10	7.63	7.50	4.72	n.d.	0.72	7.29	1.30	3.74	0.72	n.d.	6.68	26.14	0.76	0.69	0.68	7.80	0.7	2.0	
2002/9/24	7.60	8.09	4.78	n.d.	0.74	8.18	1.47	3.63	1.01	n.d.	7.87	26.29	1.13	0.76	0.71	8.38	2.9	1.8	
2002/10/8	7.65	7.95	4.54	n.d.	0.69	7.87	1.36	3.44	1.31	n.d.	7.55	26.58	0.94	0.72	0.71	8.14	0.6	1.2	
2002/10/22	7.65	8.54	4.68	n.d.	0.70	8.43	1.47	3.41	1.77	n.d.	8.40	28.76	0.92	0.76	0.77	8.73	-0.5	1.1	
2002/11/5	7.56	8.53	4.56	n.d.	0.67	8.52	1.44	3.80	2.79	n.d.	8.78	25.34	0.87	0.76	0.75	8.73	0.6	1.2	
2002/11/19	7.51	8.79	4.87	n.d.	0.71	9.04	1.60	3.76	1.89	n.d.	9.48	27.60	0.34	0.81	0.79	9.20	1.7	2.3	
2002/12/3	7.37	9.21	4.71																

## Appendix 7b. 四万十川上流域の採水地点 N3 における溪流水分析データ

## Analytical data of streamwater at sampling location N3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2003/2/4	7.53	7.52	4.22	n.d.	0.53	7.17	1.27	3.73	1.02	n.d.	8.11	21.82	0.39	0.66	0.65	7.57	0.9	0.3	
2003/2/18	7.55	7.81	4.33	n.d.	0.51	7.48	1.29	3.62	0.99	n.d.	8.19	22.77	0.53	0.68	0.66	7.75	1.4	-0.4	
2003/3/4	7.56	7.04	4.06	n.d.	0.51	6.82	1.19	3.88	1.10	n.d.	6.41	20.61	0.36	0.63	0.60	7.06	2.4	0.1	
2003/3/18	7.61	6.90	4.11	n.d.	0.54	6.65	1.18	3.98	0.75	n.d.	6.25	20.91	0.45	0.62	0.60	7.00	2.0	0.7	
2003/4/7	7.66	7.09	4.21	0.03	0.55	6.81	1.19	3.81	0.73	n.d.	6.58	21.75	0.46	0.64	0.61	7.17	2.0	0.5	
2003/4/21	7.68	7.78	4.58	n.d.	0.61	7.47	1.31	3.84	0.62	n.d.	7.24	25.02	0.56	0.70	0.68	7.83	1.2	0.3	
2003/5/8	7.66	7.33	4.39	n.d.	0.67	7.16	1.29	3.12	1.53	n.d.	6.29	24.40	1.40	0.67	0.64	7.45	2.2	0.8	
2003/5/22	7.65	7.12	4.45	n.d.	0.61	6.50	1.18	3.93	0.39	n.d.	6.16	23.66	0.44	0.63	0.63	7.18	-0.2	0.4	
2003/6/4	7.58	6.54	4.41	n.d.	0.62	5.69	1.09	3.98	0.15	n.d.	5.38	21.13	1.75	0.58	0.57	6.56	0.7	0.1	
2003/6/19	7.63	5.77	3.88	n.d.	0.56	4.99	0.91	3.39	0.30	n.d.	4.21	19.35	0.93	0.51	0.51	5.71	0.2	-0.6	
2003/7/3	7.59	6.87	4.24	n.d.	0.57	6.07	1.11	3.47	0.47	n.d.	5.36	15.07	2.69	0.59	0.46	6.11	12.3	-5.8	R1
2003/7/17	7.64	7.21	4.51	0.06	0.68	6.83	1.23	3.44	0.84	n.d.	5.92	25.58	0.00	0.66	0.65	7.39	0.4	1.2	
2003/8/1	7.67	7.92	4.69	0.03	0.72	7.57	1.34	3.21	1.54	n.d.	6.54	23.15	0.95	0.71	0.63	7.65	6.0	-1.7	
2003/8/14	7.49	4.57	3.02	0.02	0.67	3.96	0.76	1.65	1.35	n.d.	2.68	14.72	3.08	0.41	0.37	4.33	5.8	-2.7	
2003/9/4	7.57	8.18	5.04	0.03	0.80	7.88	1.42	3.53	1.57	n.d.	6.92	26.29	1.63	0.75	0.70	8.24	3.6	0.3	
2003/9/18	7.65	7.22	4.71	n.d.	0.71	6.80	1.24	3.43	1.02	n.d.	6.08	24.53	0.84	0.66	0.64	7.38	1.7	1.1	
2003/10/8	7.59	8.10	4.90	n.d.	0.69	7.80	1.40	3.38	1.76	n.d.	7.76	26.56	0.44	0.74	0.72	8.29	1.0	1.1	
2003/10/22	7.71	7.35	4.77	n.d.	0.63	7.08	1.27	3.39	0.99	n.d.	6.66	25.37	0.77	0.68	0.67	7.62	1.2	1.8	
2003/11/12	7.63	7.62	4.88	n.d.	0.70	7.71	1.38	3.24	1.50	n.d.	6.92	26.28	0.47	0.73	0.69	8.03	2.7	2.6	
2003/11/26	7.55	8.00	4.66	n.d.	0.64	7.50	1.34	3.29	1.83	n.d.	7.83	19.88	1.85	0.70	0.61	7.62	7.0	-2.4	
2003/12/10	7.55	7.20	4.36	0.02	0.49	6.48	1.06	3.33	0.76	n.d.	6.55	22.80	0.55	0.61	0.62	7.00	-0.2	-1.4	
2003/12/24	7.50	7.59	4.86	n.d.	0.57	7.43	1.34	3.52	1.18	n.d.	7.43	24.73	0.32	0.71	0.68	7.89	2.1	2.0	
2004/1/7	7.60	7.97	4.72	n.d.	0.52	7.52	1.36	3.47	1.29	n.d.	8.68	27.28	0.42	0.71	0.75	8.28	-2.8	1.9	
2004/1/21	7.56	8.39	4.77	n.d.	0.49	7.93	1.44	3.87	1.74	n.d.	9.11	27.07	0.39	0.73	0.77	8.64	-2.4	1.5	
2004/2/5	7.48	8.66	4.93	n.d.	0.51	8.63	1.52	3.96	1.90	n.d.	9.78	26.34	0.63	0.78	0.78	9.02	0.4	2.0	
2004/2/20	7.54	8.89	5.21	n.d.	0.55	8.93	1.64	3.85	1.85	n.d.	10.65	31.79	0.60	0.82	0.88	9.74	-3.5	4.6	
2004/3/4	7.57	8.33	4.57	n.d.	0.51	7.91	1.43	4.21	3.16	n.d.	8.87	26.64	0.75	0.72	0.79	8.76	-4.4	2.5	
2004/3/24	7.59	8.16	4.55	n.d.	0.58	7.81	1.40	3.98	3.13	n.d.	8.40	25.41	1.04	0.72	0.75	8.50	-2.5	2.0	
2004/4/6	7.65	7.51	4.35	n.d.	0.51	6.97	1.25	3.64	1.30	n.d.	7.77	25.74	0.80	0.65	0.71	7.77	-4.0	1.7	
2004/4/21	7.61	7.18	4.18	n.d.	0.58	6.60	1.18	3.58	1.44	n.d.	6.52	28.20	1.07	0.62	0.72	7.58	-7.4	2.7	
2004/5/14	7.55	5.61	3.67	n.d.	0.46	4.20	0.81	3.63	0.50	n.d.	4.51	21.29	1.06	0.45	0.55	5.63	-10.5	0.2	R1
2004/5/31	7.63	7.53	4.69	n.d.	0.62	6.74	1.26	3.70	0.88	n.d.	7.06	29.62	0.98	0.66	0.75	7.92	-6.5	2.6	
2004/6/11	7.65	7.19	4.36	n.d.	0.67	6.93	1.27	2.81	2.46	n.d.	6.08	27.19	2.87	0.66	0.69	7.57	-2.5	2.6	
2004/6/28	7.64	7.17	4.57	n.d.	0.75	6.23	1.21	3.66	0.66	n.d.	6.24	30.24	0.87	0.63	0.74	7.62	-8.2	3.0	R1
2004/7/12	7.65	7.76	4.85	n.d.	0.73	7.09	1.31	3.45	1.36	n.d.	6.96	31.86	0.79	0.69	0.79	8.26	-6.4	3.1	
2004/7/26	7.51	8.60	5.21	n.d.	0.80	8.27	1.51	3.52	2.20	n.d.	8.17	33.29	1.13	0.78	0.85	9.21	-4.0	3.4	
2004/8/9	7.66	6.48	4.31	n.d.	0.56	5.42	1.05	3.31	0.66	n.d.	5.29	29.95	0.61	0.56	0.70	6.97	-11.6	3.6	R1
2004/8/27	7.68	6.78	4.86	n.d.	0.66	6.44	1.20	3.31	0.56	n.d.	5.32	10.77	0.23	0.65	0.39	6.07	24.9	-5.6	R1
2004/9/13	7.52	5.06	4.35	n.d.	0.50	3.73	0.82	3.81	0.21	n.d.	2.98	21.43	0.72	0.46	0.52	5.41	-7.0	3.4	
2004/9/27	7.58	7.18	5.08	n.d.	0.72	6.83	1.31	3.69	0.80	n.d.	5.62	31.08	0.77	0.69	0.74	7.93	-3.8	5.0	
2004/10/12	7.65	7.07	4.82	n.d.	0.63	6.10	1.22	3.57	0.82	n.d.	5.67	30.95	0.76	0.63	0.74	7.58	-7.9	3.5	
2004/10/25	7.57	6.27	4.57	n.d.	0.61	5.12	1.06	3.66	0.35	n.d.	5.01	27.70	0.78	0.56	0.67	6.78	-9.0	3.9	R1
2004/11/8	7.64	6.86	4.82	n.d.	0.63	6.51	1.21	3.56	0.61	n.d.	5.98	30.38	0.73	0.65	0.73	7.68	-6.0	5.7	
2004/11/22	7.55	6.82	4.71	n.d.	0.57	6.58	1.23	3.46	0.64	n.d.	5.89	29.07	0.69	0.65	0.71	7.55	-4.3	5.1	
2004/12/6	7.50	6.02	4.31	n.d.	0.53	5.14	0.98	3.37	0.33	n.d.	4.59	26.60	0.51	0.54	0.63	6.46	-8.0	3.5	
2004/12/21	7.55	7.41	4.64	n.d.	0.56	6.89	1.26	3.48	0.71	n.d.	6.86	28.87	0.48	0.66	0.73	7.79	-4.4	2.5	
2005/1/7	7.47	7.53	4.66	n.d.	0.54	6.95	1.27	3.46	1.02	n.d.	7.57	24.68	0.33	0.67	0.68	7.66	-0.6	0.9	
2005/1/21	7.61	7.86	4.68	0.13	0.53	7.34	1.35	3.57	1.15	n.d.	8.45	23.62	1.21	0.70	0.68	7.98	1.5	0.8	
2005/2/7	7.44	7.89	4.43	n.d.	0.46	6.51	1.20	4.43	1.77	n.d.	7.81	22.50	0.73	0.63	0.68	7.61	-4.3	-1.8	
2005/2/18	7.70	6.91	4.18	n.d.	0.50	6.31	1.14	3.42	1.19	n.d.	6.36	24.20	0.81	0.60	0.64	7.07	-3.4	1.2	
2005/3/7	7.64	7.25	4.57	n.d.	0.48	6.92	1.24	3.53	0.63	n.d.	7.38	25.46	0.91	0.66	0.68	7.60	-1.7	2.4	
2005/3/23	7.54	7.25	3.64	n.d.	0.48	5.03	0.92	3.15	0.71	n.d.	4.69	22.88	1.09	0.50	0.57	5.99	-7.0	-9.5	
2005/4/6	7.52	7.04	4.54	n.d.	0.53	6.40	1.18	3.52	0.46	n.d.	6.83	28.98	0.80	0.63	0.72	7.57	-7.1	3.6	
2005/4/26	7.65	7.77	4.91	n.d.	0.63	7.67	1.39	3.44	0.94	n.d.	7.76	33.89	0.69	0.73	0.83	8.69	-6.6	5.6	
2005/5/10	7.64	7.03	4.45	n.d.	0.58	5.93	1.12	3.28	0.53	n.d.	6.13	31.06	0.91	0.60	0.74	7.38	-10.6	2.4	R1
2005/5/24	7.69	7.98	4.91	n.d.	0.68	7.54	1.40	3.33	0.98	n.d.	7.63	34.43	1.29	0.72	0.83	8.66	-7.1	4.1	
2005/6/6	7.67	8.48	5.13	n.d.	0.74	8.20	1.51	3.26	1.38	n.d.	8.32	36.21	0.52	0.78	0.88	9.24	-6.4	4.3	
2005/6/21	7.67	9.02	5.23	0.03	0.82	9.00	1.63	3.12	2.24	n.d.	8.70	38.62	0.77	0.83	0.94	9.89	-5.9	4.6	
2005/7/5	7.59	6.73	4.07	n.d.	0.70	5.88	1.06	2.69	2.33	n.d.	5.42	27.06	1.53	0.58	0.67	6.95	-7.6	1.6	
2005/7/19	7.68	7.53	4.72	0.02	0.75	6.91	1.26	3.32	1.02	n.d.	6.82	31.38	1.11	0.67	0.77	8.04	-6.4	3.3	
2005/8/9	7.69	8.78	5.25	n.d.	0.83	8.58	1.53	3.26	1.90	n.d.	8.50	37.36	1.17	0.80	0.91	9.58	-6.3	4.4	
2005/8/22	7.65	8.97	5.18	n.d.	0.91	8.84	1.59	2.95	5.34	n.d.	7.62	36.11	0.22	0.82	0.92	9.77	-5.7	4.3	
2005/9/15	7.91	7.40	4.69	n.d.	0.67	7.59	1.21	3.31	0.65	n.d.	6.17	34.70	0.72	0.70	0.80	8.28	-6.7	5.6	
2005/9/28	8.02	8.80	5.07	n.d.	0.68	9.35	1.50	3.28	1.06	n.d.	7.90	40.86	1.04	0.83	0.94	9.79	-6.5	5.3	
2005/10/11	7.67	8.92	5.30	n.d.	0.78	8.58	1.56	3.30	1.71	n.d.	8.27	36.75	0.77	0.81	0.90	9.50	-5.2	3.1	
2005/10/25	7.65	8.85	5.20	n.d.	0.62	8.53	1.57	3.38	1.82	n.d.	9.56	32.87	0.42	0.80	0.86	9.39	-4.0	3.0	
2005/11/8	7.62	7.1																	

## Appendix 7c. 四万十川上流域の採水地点 N3 における渓流水分析データ

## Analytical data of streamwater at sampling location N3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
2006/1/12	7.52	8.50	4.74	n.d.	0.53	7.89	1.48	4.07	1.65	n.d.	9.52	25.46	1.24	0.74	0.76	8.63	-1.5	0.8	
2006/1/25	7.60	7.89	4.68	n.d.	0.52	7.56	1.40	3.89	1.07	n.d.	9.12	23.28	1.05	0.71	0.70	8.15	0.8	1.6	
2006/2/8	7.63	7.85	4.66	n.d.	0.56	7.70	1.40	4.23	1.56	n.d.	8.79	23.54	1.50	0.72	0.71	8.29	0.2	2.8	
2006/3/8	7.61	7.32	4.37	n.d.	0.52	6.50	1.19	3.78	0.59	n.d.	7.33	26.62	1.16	0.63	0.70	7.54	-6.0	1.5	
2006/3/22	7.54	7.44	4.25	n.d.	0.54	6.77	1.24	3.70	0.98	n.d.	7.27	27.25	1.69	0.64	0.72	7.69	-5.9	1.6	
2006/4/12	7.48	5.10	3.69	n.d.	0.47	3.81	0.74	3.90	0.42	n.d.	4.18	18.39	1.08	0.42	0.51	5.27	-8.8	1.7	R1
2006/4/25	7.59	7.17	4.50	n.d.	0.52	6.36	1.18	3.87	0.44	n.d.	6.96	27.12	0.87	0.62	0.71	7.50	-6.2	2.3	
2006/5/11	7.48	5.16	3.75	n.d.	0.48	3.88	0.76	3.56	0.31	n.d.	3.75	23.76	1.70	0.43	0.57	5.55	-14.1	3.6	R1
2006/5/24	7.59	6.55	4.38	n.d.	0.58	5.56	1.07	3.71	0.37	n.d.	5.66	30.58	0.83	0.57	0.73	7.20	-12.3	4.7	R1
2006/6/13	7.62	7.23	4.63	n.d.	0.63	6.44	1.23	3.62	0.55	n.d.	6.74	31.95	2.05	0.64	0.77	7.87	-9.5	4.2	R1
2006/6/27	7.53	5.68	4.00	n.d.	0.49	4.49	0.87	3.28	0.31	n.d.	4.29	19.09	0.96	0.48	0.50	5.53	-1.8	-1.4	
2006/7/13	7.59	6.92	4.52	n.d.	0.66	5.99	1.12	3.27	0.66	n.d.	5.60	23.86	0.96	0.60	0.61	6.83	-0.5	-0.6	
2006/7/25	7.62	6.33	4.32	n.d.	0.61	5.33	1.01	3.26	0.59	n.d.	4.91	21.85	0.92	0.55	0.56	6.26	-0.8	-0.6	
2006/8/9	7.64	7.92	5.03	n.d.	0.73	7.34	1.33	3.42	1.25	n.d.	6.70	28.50	1.08	0.71	0.72	8.07	-0.7	0.9	
2006/8/23	7.63	5.48	3.98	0.11	0.49	3.87	0.70	3.04	0.42	n.d.	3.86	23.05	0.90	0.44	0.55	5.49	-10.9	0.1	R1
2006/9/5	7.60	6.94	4.47	n.d.	0.69	5.95	1.13	3.05	0.75	n.d.	5.32	28.35	1.44	0.60	0.67	7.06	-5.6	0.9	
2006/9/20	7.69	6.12	4.36	n.d.	0.54	4.88	0.95	3.08	0.46	n.d.	4.22	24.88	0.65	0.53	0.59	6.15	-5.8	0.3	
2006/10/4	7.62	7.68	4.78	n.d.	0.61	6.66	1.23	3.19	1.08	n.d.	6.37	29.12	1.15	0.66	0.72	7.67	-4.4	-0.1	
2006/10/19	7.63	7.92	4.83	n.d.	0.61	6.97	1.28	3.19	1.37	n.d.	7.52	30.34	1.10	0.68	0.77	8.11	-6.0	1.2	
2006/11/7	7.61	8.70	5.08	n.d.	0.69	8.11	1.49	3.38	1.78	n.d.	8.39	32.24	1.55	0.77	0.83	8.98	-3.8	1.6	
2006/11/21	7.55	9.18	5.09	n.d.	0.77	8.52	1.57	3.63	3.72	n.d.	8.44	31.62	1.18	0.80	0.86	9.39	-3.7	1.1	
2006/12/8	7.55	7.94	4.48	n.d.	0.69	6.92	1.28	3.90	4.34	n.d.	6.87	23.64	1.42	0.66	0.71	7.93	-3.4	-0.1	
2006/12/21	7.54	8.44	4.71	n.d.	0.63	7.61	1.41	3.42	2.78	n.d.	8.70	28.11	0.42	0.72	0.78	8.58	-4.4	0.8	
2007/1/10	7.50	8.64	4.76	n.d.	0.52	7.54	1.46	3.82	3.24	n.d.	10.13	24.65	0.86	0.72	0.78	8.69	-3.9	0.3	
2007/1/23	7.60	9.09	4.91	n.d.	0.62	9.04	1.61	3.62	2.91	n.d.	10.22	26.59	0.82	0.81	0.80	9.33	1.0	1.3	
2007/2/7	7.43	9.22	5.06	0.05	0.63	9.30	1.68	3.48	2.64	n.d.	10.99	25.22	0.84	0.84	0.78	9.46	3.6	1.3	
2007/2/21	7.53	8.04	4.59	0.05	0.63	8.17	1.46	3.80	3.27	n.d.	9.01	27.24	1.16	0.75	0.79	8.89	-3.1	5.0	
2007/3/12	7.55	8.12	4.57	n.d.	0.58	7.98	1.44	3.49	2.36	n.d.	9.29	22.11	0.90	0.73	0.69	8.29	2.7	1.0	
2007/3/28	7.56	6.93	4.08	0.05	0.61	6.63	1.19	3.23	1.82	n.d.	6.97	19.36	1.11	0.62	0.58	6.99	3.5	0.4	
2007/4/10	7.58	7.96	4.72	0.04	0.61	7.97	1.42	3.35	1.27	n.d.	9.27	29.36	1.21	0.74	0.79	8.70	-3.4	4.4	
2007/4/24	7.56	8.42	4.74	n.d.	0.70	8.42	1.51	3.20	2.41	n.d.	9.01	27.92	1.02	0.77	0.77	8.83	-0.4	2.4	
2007/5/9	7.64	7.31	4.28	0.05	0.65	7.27	1.29	3.17	1.83	n.d.	7.01	21.22	0.99	0.67	0.61	7.40	4.7	0.6	
2007/5/23	7.62	8.33	4.36	n.d.	0.63	7.92	1.37	3.07	1.32	n.d.	8.50	30.98	1.06	0.71	0.79	8.51	-5.3	1.0	
2007/6/13	7.66	8.61	5.02	0.05	0.73	9.08	1.58	3.16	1.49	n.d.	8.87	32.84	0.91	0.82	0.84	9.36	-0.8	4.2	
2007/6/26	7.64	7.69	5.05	0.05	0.79	8.44	1.49	3.18	1.52	n.d.	7.76	30.69	1.00	0.79	0.78	8.82	0.5	6.9	
2007/7/10	7.63	6.24	4.80	0.03	0.69	6.50	1.19	3.54	0.65	n.d.	5.39	26.66	0.56	0.65	0.66	7.32	-0.7	8.0	
2007/7/26	7.64	7.26	4.98	n.d.	0.71	6.50	1.30	3.44	0.92	n.d.	6.59	26.77	0.00	0.67	0.69	7.61	-1.6	2.4	
2007/8/9	7.65	6.88	4.64	0.06	0.72	6.37	1.20	3.39	0.63	n.d.	5.97	27.19	1.27	0.64	0.68	7.37	-2.7	3.4	
2007/8/29	7.59	8.40	5.29	n.d.	0.83	8.44	1.52	3.25	1.51	n.d.	7.99	24.62	1.21	0.80	0.69	8.48	7.5	0.5	
2007/9/12	7.65	8.94	5.27	0.04	0.84	9.08	1.61	3.07	2.70	n.d.	8.33	34.30	0.08	0.84	0.87	9.58	-1.6	3.5	
2007/9/26	7.66	7.69	4.89	n.d.	0.74	7.36	1.35	3.17	1.15	n.d.	6.53	32.70	0.74	0.71	0.78	8.27	-4.7	3.6	
2007/10/11	7.67	7.00	4.51	0.05	0.73	6.82	1.23	2.67	2.19	n.d.	5.62	30.19	1.87	0.66	0.72	7.67	-4.5	4.6	
2007/10/25	7.60	7.89	4.88	n.d.	0.65	7.68	1.37	3.11	1.19	n.d.	8.02	31.42	1.06	0.73	0.79	8.50	-4.2	3.7	
2007/11/13	7.61	8.56	5.12	0.02	0.69	8.62	1.56	3.14	1.74	n.d.	9.21	34.35	1.23	0.80	0.87	9.41	-4.3	4.7	
2007/11/27	7.54	9.09	5.46	n.d.	0.71	9.47	1.73	3.26	1.97	n.d.	10.25	32.01	0.21	0.87	0.86	9.86	0.5	4.1	
2007/12/10	7.48	9.32	4.94	n.d.	0.65	9.15	1.67	3.23	2.06	n.d.	10.63	25.28	0.72	0.83	0.76	9.19	4.1	-0.7	
2007/12/25	7.51	9.82	4.82	0.03	0.74	9.53	1.73	3.55	3.80	n.d.	10.49	33.30	1.06	0.85	0.93	10.17	-4.4	1.7	
2008/1/8	7.44	8.30	4.63	n.d.	0.68	8.04	1.45	4.29	4.43	n.d.	8.31	20.89	1.27	0.74	0.71	8.50	2.2	1.2	
2008/1/22	7.54	7.09	4.12	0.05	0.61	6.78	1.23	3.51	2.34	n.d.	6.87	20.24	1.08	0.64	0.61	7.23	2.1	1.0	
2008/2/6	7.44	7.05	4.02	n.d.	0.50	6.42	1.15	3.29	1.38	n.d.	7.24	21.98	0.51	0.60	0.63	7.06	-1.9	0.0	
2008/2/19	7.66	7.75	4.77	0.03	0.53	7.79	1.40	3.31	1.15	n.d.	9.12	25.79	0.84	0.73	0.72	8.33	0.2	3.6	
2008/3/5	7.61	8.10	5.10	0.05	0.61	8.83	1.59	3.58	1.76	n.d.	9.92	26.35	0.79	0.81	0.77	9.11	2.8	5.9	
2008/3/18	7.64	8.24	4.50	n.d.	0.59	7.79	1.41	3.39	1.85	n.d.	9.46	26.13	0.94	0.72	0.75	8.45	-2.4	1.2	
2008/4/4	7.68	7.23	4.33	n.d.	0.54	6.78	1.23	3.37	0.90	n.d.	7.50	24.19	0.76	0.64	0.66	7.44	-1.5	1.4	
2008/4/21	7.60	7.50	4.59	0.04	0.63	7.12	1.30	3.36	0.95	n.d.	7.51	26.11	0.00	0.68	0.69	7.80	-1.1	2.0	
2008/5/8	7.62	8.12	4.68	n.d.	0.63	7.59	1.38	3.25	0.91	n.d.	8.43	26.05	0.00	0.71	0.71	8.11	0.2	-0.1	
2008/5/22	7.66	8.21	4.73	0.03	0.68	7.96	1.43	3.0											

## Appendix 7d. 四万十川上流域の採水地点 N3 における渓流水分析データ

## Analytical data of streamwater at sampling location N3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2008/12/19	7.56	8.02	4.71	n.d.	0.62	8.12	1.45	3.00	1.29	n.d.	8.22	27.74	0.13	0.75	0.73	8.38	0.9	2.2	
2009/1/9	7.57	8.44	4.82	n.d.	0.61	8.50	1.53	3.02	1.32	n.d.	9.38	28.98	0.86	0.78	0.78	8.84	-0.1	2.3	
2009/1/27	7.57	8.23	4.59	n.d.	0.61	8.38	1.52	3.36	2.47	n.d.	9.10	26.23	1.19	0.76	0.75	8.70	0.3	2.8	
2009/2/9	7.61	7.81	4.45	n.d.	0.60	7.81	1.40	2.97	1.68	n.d.	8.24	25.93	1.06	0.71	0.71	8.11	0.5	1.9	
2009/2/23	7.36	5.64	3.38	n.d.	0.56	5.34	0.98	3.12	1.86	n.d.	4.63	17.75	1.15	0.51	0.51	5.81	0.3	1.5	
2009/3/9	7.48	7.04	4.30	n.d.	0.58	7.11	1.27	3.15	0.87	n.d.	6.63	25.01	0.07	0.66	0.65	7.42	0.8	2.6	
2009/3/23	7.54	6.64	4.01	n.d.	0.57	6.40	1.15	2.96	1.04	n.d.	5.53	23.73	2.02	0.60	0.60	6.79	-0.1	1.1	
2009/4/13	7.66	8.13	4.79	n.d.	0.69	8.22	1.45	3.21	0.80	n.d.	8.33	29.13	0.90	0.76	0.75	8.54	0.1	2.5	
2009/4/27	7.66	7.80	4.49	n.d.	0.60	7.74	1.39	2.90	1.77	n.d.	7.98	27.45	0.73	0.71	0.73	8.16	-1.0	2.2	
2009/5/11	7.69	8.23	4.76	n.d.	0.71	8.55	1.52	2.92	1.53	n.d.	8.51	30.50	0.53	0.78	0.78	8.82	-0.5	3.5	
2009/5/25	7.71	8.97	5.06	n.d.	0.78	9.51	1.67	2.98	1.76	n.d.	9.52	33.70	1.67	0.85	0.86	9.69	-0.7	3.9	
2009/6/8	7.74	8.72	4.91	n.d.	0.80	8.99	1.58	2.57	2.13	n.d.	8.05	32.79	1.66	0.81	0.81	9.11	0.1	2.2	
2009/6/24	7.67	7.10	4.04	n.d.	0.72	7.03	1.27	2.32	1.73	n.d.	5.44	26.38	1.86	0.65	0.64	7.19	0.8	0.6	
2009/7/8	7.65	7.47	4.45	n.d.	0.73	7.41	1.32	2.92	0.71	n.d.	6.29	28.55	1.59	0.69	0.69	7.72	-0.1	1.7	
2009/7/22	7.56	6.16	3.65	n.d.	0.79	5.97	1.09	2.02	2.43	n.d.	4.23	22.02	3.27	0.57	0.55	6.22	1.9	0.5	
2009/8/12	7.60	6.11	4.30	n.d.	0.73	5.17	1.02	3.23	0.35	n.d.	4.47	22.42	1.40	0.55	0.56	6.17	-0.9	0.5	
2009/8/27	7.51	8.44	4.98	n.d.	0.84	8.28	1.53	3.04	0.78	n.d.	7.04	32.03	1.51	0.78	0.77	8.63	0.5	1.1	
2009/9/10	7.60	8.90	5.11	n.d.	0.85	8.86	1.62	2.92	1.59	n.d.	7.90	31.20	1.33	0.82	0.78	9.02	2.2	0.6	
2009/9/25	7.51	9.60	5.46	n.d.	0.92	9.86	1.79	3.03	1.98	n.d.	9.03	36.30	1.39	0.90	0.90	10.10	0.0	2.6	
2009/10/9	7.64	6.90	4.12	n.d.	0.71	6.72	1.20	2.55	1.27	n.d.	5.80	25.32	1.40	0.63	0.63	7.06	0.3	1.2	
2009/10/23	7.57	8.13	4.84	n.d.	0.71	8.12	1.46	2.96	1.08	n.d.	8.45	29.28	1.31	0.75	0.76	8.54	-0.2	2.5	
2009/11/6	7.59	8.76	4.97	n.d.	0.77	8.96	1.63	2.96	1.37	n.d.	9.08	31.72	1.37	0.82	0.81	9.22	0.2	2.6	
2009/11/24	7.40	7.24	4.46	n.d.	0.66	7.02	1.28	2.96	0.65	n.d.	6.95	26.23	0.15	0.67	0.67	7.52	-0.1	1.9	
2009/12/8	7.50	7.98	4.75	n.d.	0.63	7.89	1.45	3.14	1.04	n.d.	8.78	28.06	0.71	0.74	0.75	8.44	-0.8	2.8	
2009/12/22	7.54	7.70	4.45	n.d.	0.59	7.45	1.36	3.11	1.44	n.d.	8.15	25.41	0.54	0.69	0.70	7.94	-0.3	1.5	
2010/1/6	7.51	8.08	4.59	n.d.	0.56	8.04	1.46	3.07	1.44	n.d.	8.86	26.54	1.09	0.74	0.73	8.37	0.4	1.8	
2010/1/20	7.56	8.51	4.84	n.d.	0.59	8.71	1.55	3.06	1.62	n.d.	9.86	28.12	0.63	0.79	0.78	8.97	0.6	2.6	
2010/2/4	7.59	7.55	4.23	n.d.	0.57	7.74	1.38	3.39	1.88	n.d.	8.19	24.71	1.09	0.70	0.70	8.04	-0.2	3.2	
2010/2/18	7.56	7.60	4.39	n.d.	0.57	7.71	1.38	3.30	1.25	n.d.	8.68	25.62	0.86	0.70	0.71	8.12	-0.7	3.3	
2010/3/5	7.60	6.94	4.23	n.d.	0.61	6.85	1.21	3.08	0.73	n.d.	6.37	25.16	1.27	0.64	0.64	7.25	-0.2	2.2	
2010/3/19	7.61	6.89	4.29	n.d.	0.56	6.87	1.24	3.21	0.64	n.d.	6.42	24.34	0.88	0.65	0.63	7.23	0.9	2.4	
2010/4/6	7.55	6.96	4.29	n.d.	0.60	6.67	1.22	3.24	0.45	n.d.	6.31	24.86	0.67	0.64	0.64	7.18	-0.2	1.5	
2010/4/30	7.51	6.25	4.15	n.d.	0.57	5.74	1.07	3.31	0.42	n.d.	5.35	22.24	0.46	0.57	0.58	6.46	-0.6	1.6	
2010/5/20	7.47	6.24	4.22	n.d.	0.68	6.64	1.20	2.59	1.10	n.d.	5.40	25.77	1.24	0.63	0.63	7.01	0.5	5.8	
2010/6/4	7.61	7.49	4.68	n.d.	0.72	7.23	1.33	3.43	0.67	n.d.	6.98	27.60	1.05	0.69	0.71	7.88	-0.9	2.5	
2010/6/24	7.51	6.82	4.36	n.d.	0.68	6.48	1.18	2.88	0.63	n.d.	5.47	25.62	1.09	0.63	0.63	6.99	0.2	1.2	
2010/7/16	7.52	6.72	3.15	n.d.	0.38	10.25	1.06	1.76	0.46	n.d.	4.49	32.48	0.70	0.75	0.68	7.82	4.4	7.5	
2010/8/5	7.62	7.28	4.57	n.d.	0.77	6.89	1.26	2.78	1.27	n.d.	5.37	27.76	1.83	0.67	0.67	7.40	0.0	0.8	
2010/8/24	7.46	7.89	5.01	n.d.	0.82	8.15	1.47	3.07	1.42	n.d.	7.11	31.87	1.13	0.77	0.78	8.64	-0.9	4.6	
2010/9/9	7.26	6.59	4.71	n.d.	0.85	8.02	1.45	2.48	2.53	n.d.	6.40	31.35	1.44	0.75	0.76	8.38	-0.8	12.0	
2010/10/5	7.46	6.71	4.20	n.d.	0.72	6.47	1.18	2.45	1.24	n.d.	5.40	24.80	1.51	0.62	0.61	6.87	1.1	1.2	
2010/10/22	7.71	8.10	4.93	0.01	0.75	7.95	1.44	3.08	1.09	n.d.	7.31	32.33	0.86	0.75	0.79	8.58	-2.4	2.9	
2010/11/16	7.50	7.87	4.81	n.d.	0.68	8.22	1.51	2.87	1.69	n.d.	8.34	29.74	0.99	0.76	0.77	8.65	-0.5	4.7	
2010/12/7	7.75	8.08	4.49	n.d.	0.68	8.05	1.45	2.89	2.37	n.d.	7.94	27.51	0.00	0.73	0.74	8.35	-0.2	1.7	
2011/1/5	7.43	7.43	4.67	n.d.	0.60	8.22	1.47	3.28	1.93	n.d.	9.50	26.81	0.51	0.75	0.76	8.68	-0.7	7.8	
2011/1/24	7.42	7.56	4.83	n.d.	0.57	8.82	1.59	3.04	1.81	n.d.	10.13	28.40	0.00	0.80	0.79	9.10	0.3	9.2	
2011/2/15	7.44	8.41	4.71	n.d.	0.63	8.80	1.58	4.39	4.09	n.d.	9.55	24.10	1.46	0.79	0.78	9.21	0.4	4.5	
2011/3/15	7.49	8.57	4.80	n.d.	0.67	8.76	1.55	3.31	1.85	n.d.	9.93	27.60	0.41	0.79	0.78	9.05	0.6	2.7	
2011/3/28	7.71	8.59	4.69	n.d.	0.59	8.86	1.59	3.39	2.13	n.d.	10.22	27.36	0.68	0.79	0.79	9.13	0.0	3.0	
2011/4/20	7.46	8.39	4.93	n.d.	0.73	9.71	1.73	3.26	2.10	n.d.	10.72	31.48	0.05	0.86	0.86	9.88	-0.3	8.1	
2011/5/10	7.33	7.91	4.71	n.d.	0.76	8.49	1.51	3.29	1.28	n.d.	9.17	29.86	0.35	0.77	0.79	8.91	-1.4	6.0	
2011/6/2	7.26	6.21	4.08	n.d.	0.65	6.19	1.13	3.36	0.46	n.d.	5.68	23.49	0.47	0.60	0.61	6.78	-0.8	4.4	
2011/6/18	7.16	5.06	3.79	0.06	0.59	4.97	0.93	3.15	0.11	n.d.	4.13	20.53	2.24	0.51	0.51	5.72	-0.5	6.1	
2011/6/30	7.40	6.39	4.24	n.d.	0.68	5.88	1.10	3.29	0.45	n.d.	5.12	26.90	0.06	0.59	0.65	6.86	-5.0	3.5	
2011/7/13	7.31	7.45	4.67	n.d.	0.77	7.59	1.38	3.12	1.00	n.d.	6.66	29.34	0.58	0.72	0.72	8.06	-0.6	3.9	
2011/7/23	7.51	6.19	4.26	n.d.	0.71	5.20	1.04	3.33	0.40	n.d.	4.96	21.96	1.25	0.55	0.56	6.26	-1.3	0.5	
2011/8/5	7.50	7.72	4.70	n.d.	0.82	7.33	1.38	2.98	1.22	n.d.	6.38	29.22	0.02	0.70	0.72	7.94	-0.7	1.4	
2011/8/25	7.38	7.68	5.08	n.d.	0.87	8.46	1.56	3.11	1.69	n.d.	7.33	32.09	1.33	0.79	0.79	8.89	0.0	7.3	
2011/9/22	7.46	5.30	4.28	0.01	0.55	4.44	0.91	2.85	0.29	n.d.	3.70	20.98	0.68	0.50	0.51	5.55	-0.9	2.3	
2011/10/5	7.50	7.36	4.82	n.d.	0.69	6.88	1.31	3.25	1.17	n.d.	7.11	27.21	1.12	0.68	0.70	7.81	-1.8	2.9	
2011/10/28	7.43	6.02	4.27	n.d.	0.55	5.96	1.15	2.83	0.70	n.d.	5.98	25.04	0.67	0.59	0.63	6.82	-2.8	6.2	
2011/11/14	7.63	7.02	4.62	n.d.	0.60	7.24	1.39	2.87	1.51	n.d.	7.49	28.09	0.34	0.69	0.72	7.96	-2.1	6.3	
2011/12/9	7.51	6.76	4.32	n.d.	0.56	6.64	1.27	3.11	0.82	n.d.	7.00	25.56	0.03	0.64	0.67	7.37	-2.1	4.3	
2011/12/27	7.71	7.51	4.60	n.d.	0.50	6.99	1.37	2.90	1.06	n.d.	8.28	25.77	0.50	0.67	0.69	7.77	-1.4	1.7	
2012/1/12	7.69	7.83	4.78	n.d.	0.53	7.37	1.42	2.93	1.15	n.d.	9.04	26.60	0.43	0.71	0.73	8.16	-1.3	2.1	
2012/2/9	7.46	6.06	4.20	n.d.	0.51	6.52	1.27	2.97	1.61	n.d.	7.49	21.96	0.73	0.63	0.63	7.18	0.0	8.4	
2012/2/24	7.45	5.93	5.37	n.d.	2.00														

## Appendix 7e. 四万十川上流域の採水地点 N3 における渓流水分析データ

## Analytical data of streamwater at sampling location N3 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC *
								mg L <sup>-1</sup>											
2012/6/1	7.50	7.98	4.93	0.01	0.71	7.96	1.52	2.89	1.09	n.d.	7.86	31.81	0.39	0.76	0.78	8.62	-1.9	3.8	
2012/6/13	7.61	7.58	4.56	n.d.	0.69	7.01	1.35	2.43	2.08	n.d.	6.14	28.73	1.31	0.68	0.70	7.68	-1.8	0.6	
2012/6/25	7.19	4.77	3.66	0.01	0.53	4.19	0.86	2.58	0.52	n.d.	3.99	19.73	1.39	0.45	0.49	5.24	-3.7	4.7	
2012/7/13	7.25	5.49	3.97	n.d.	0.52	4.45	0.90	2.56	0.37	n.d.	4.00	21.26	1.14	0.48	0.51	5.49	-2.9	0.0	
2012/7/30	7.43	7.28	4.65	n.d.	0.69	6.45	1.25	2.76	1.27	n.d.	5.92	28.15	1.01	0.64	0.68	7.38	-2.9	0.7	
2012/8/23	7.38	6.81	4.28	n.d.	0.76	6.54	1.27	2.06	3.05	n.d.	4.21	27.76	2.57	0.64	0.65	7.10	-1.0	2.1	
2012/9/12	7.28	6.24	4.31	n.d.	0.69	6.05	1.21	2.28	1.23	n.d.	4.37	27.79	0.58	0.61	0.63	6.78	-1.9	4.2	
2012/10/9	7.38	6.77	4.62	n.d.	0.63	6.26	1.26	2.80	1.09	n.d.	6.08	26.78	0.33	0.63	0.66	7.23	-2.2	3.3	
2012/10/29	7.44	7.30	4.60	n.d.	0.61	7.51	1.30	2.64	2.05	n.d.	6.84	28.73	0.07	0.70	0.72	7.95	-1.6	4.3	
2012/11/12	7.45	7.63	4.70	n.d.	0.69	8.19	1.41	2.98	2.89	n.d.	7.87	29.62	1.61	0.75	0.78	8.65	-2.1	6.3	
2012/12/7	7.62	7.19	4.48	n.d.	0.57	7.94	1.38	3.06	3.07	n.d.	7.98	26.17	0.00	0.72	0.73	8.29	-0.8	7.1	
2012/12/26	7.51	6.94	4.20	n.d.	0.52	7.40	1.28	3.19	2.82	n.d.	7.60	23.85	0.91	0.67	0.68	7.79	-1.1	5.7	
2013/1/18	7.49	6.53	3.97	n.d.	0.47	6.91	1.20	2.95	1.69	n.d.	7.07	23.24	0.00	0.63	0.64	7.24	-0.8	5.1	
2013/2/8	7.48	6.27	3.94	n.d.	0.49	6.63	1.16	2.95	1.31	n.d.	6.59	22.85	0.00	0.61	0.62	6.98	-0.5	5.3	
2013/2/25	7.52	6.25	4.14	n.d.	0.50	6.61	1.17	2.93	0.79	n.d.	6.79	23.52	0.00	0.62	0.62	7.04	-0.3	5.9	
2013/3/15	7.52	6.71	4.39	n.d.	0.53	7.47	1.31	2.95	0.76	n.d.	7.43	26.08	0.34	0.69	0.68	7.71	0.6	6.9	
2013/4/5	7.40	7.69	4.50	0.01	0.62	7.82	1.36	2.86	1.21	n.d.	7.42	27.12	0.89	0.71	0.70	7.99	1.1	1.9	
2013/4/25	7.51	5.68	3.71	0.01	0.60	6.06	1.07	3.01	1.49	n.d.	4.37	21.50	1.36	0.57	0.55	6.31	1.4	5.2	
2013/6/5	7.46	7.54	4.91	n.d.	0.75	9.00	1.56	2.75	1.91	n.d.	7.33	31.45	1.77	0.81	0.78	8.89	2.1	8.2	
2013/6/27	7.29	5.53	3.98	n.d.	0.65	5.46	0.98	2.96	0.58	n.d.	4.46	19.00	0.42	0.54	0.50	5.87	4.4	3.0	
2013/7/17	7.69	8.17	4.84	n.d.	0.78	8.15	1.42	2.95	1.70	n.d.	6.72	29.28	0.83	0.75	0.73	8.33	1.6	1.0	
2013/8/9	7.35	8.62	5.35	0.01	0.98	9.81	1.69	3.00	2.97	n.d.	8.30	34.16	1.45	0.89	0.87	9.87	1.3	6.8	
2013/8/27	7.33	9.08	5.24	0.01	1.00	10.07	1.75	2.94	6.92	n.d.	7.92	30.81	2.15	0.90	0.86	10.09	2.1	5.3	
2013/9/6	7.45	6.03	4.21	n.d.	0.70	5.32	0.99	3.03	0.92	n.d.	4.99	20.44	1.04	0.55	0.54	6.14	0.8	0.9	
2013/9/17	7.68	7.26	4.65	n.d.	0.75	7.48	1.35	2.92	1.55	n.d.	7.36	26.84	0.07	0.71	0.70	7.95	0.4	4.6	
2013/10/10	7.44	5.68	4.32	n.d.	0.63	5.42	0.98	2.95	0.60	n.d.	3.90	22.60	0.30	0.56	0.54	6.10	1.0	3.6	
2013/10/22	7.40	7.30	4.78	n.d.	0.72	7.47	1.33	3.03	1.07	n.d.	6.80	26.84	0.92	0.71	0.68	7.84	1.7	3.6	
2013/10/30	7.48	6.07	4.46	n.d.	0.61	5.98	1.11	3.16	0.48	n.d.	5.51	22.88	0.10	0.60	0.59	6.67	1.1	4.7	
2013/11/18	7.49	7.26	4.73	n.d.	0.68	7.42	1.35	2.85	0.99	n.d.	7.08	25.93	0.00	0.70	0.67	7.75	2.6	3.3	
2013/12/13	7.50	7.31	4.36	n.d.	0.65	7.28	1.32	3.17	1.25	n.d.	7.04	23.79	0.22	0.68	0.65	7.55	2.4	1.6	
2014/1/7	7.52	7.39	4.44	n.d.	0.59	7.42	1.33	3.42	1.13	n.d.	5.84	25.01	0.51	0.69	0.65	7.53	3.1	0.9	
2014/1/27	7.58	7.08	4.66	n.d.	0.59	8.09	1.45	3.50	1.34	n.d.	6.55	25.93	0.38	0.74	0.68	8.05	4.2	6.4	
2014/2/20	7.55	6.43	4.19	n.d.	0.55	7.24	1.28	3.39	1.09	n.d.	5.24	24.25	0.11	0.66	0.62	7.23	3.4	5.8	
2014/3/14	7.47	5.63	3.65	n.d.	0.52	5.87	1.03	3.05	0.86	n.d.	5.71	20.44	0.40	0.55	0.55	6.28	-0.4	5.5	
2014/4/3	7.51	6.84	4.31	n.d.	0.58	6.86	1.20	3.02	0.39	n.d.	6.98	25.32	0.33	0.64	0.65	7.31	-0.6	3.3	
2014/4/23	7.52	7.22	4.57	n.d.	0.65	7.91	1.39	2.92	0.67	n.d.	7.74	28.98	0.29	0.72	0.73	8.19	-0.3	6.3	
2014/5/9	7.44	7.67	4.89	n.d.	0.72	8.51	1.49	2.91	0.79	n.d.	8.46	30.35	0.20	0.78	0.77	8.72	0.7	6.4	
2014/5/27	7.57	7.21	4.41	n.d.	0.66	7.58	1.30	2.62	0.79	n.d.	6.88	28.37	0.85	0.69	0.69	7.78	-0.1	3.8	
2014/6/17	7.50	6.96	4.61	n.d.	0.68	7.63	1.32	3.00	0.64	n.d.	6.89	28.61	0.26	0.71	0.71	7.93	0.0	6.5	
2014/7/9	7.51	6.34	4.37	n.d.	0.68	6.55	1.14	2.96	0.45	n.d.	5.33	25.16	0.85	0.63	0.61	6.94	1.1	4.5	
2014/7/24	7.55	7.37	5.01	n.d.	0.81	8.02	1.40	3.08	1.21	n.d.	6.90	29.07	0.11	0.75	0.73	8.31	1.9	6.0	
2014/8/12	7.64	5.48	4.29	n.d.	0.61	4.56	0.91	2.71	0.24	n.d.	3.76	20.44	0.02	0.51	0.49	5.53	1.2	0.5	
2014/8/27	7.42	6.05	4.59	n.d.	0.69	6.10	1.13	2.61	0.45	n.d.	4.67	25.32	0.82	0.61	0.59	6.67	1.8	4.9	
2014/9/18	7.42	6.98	4.68	n.d.	0.69	6.83	1.25	2.61	1.05	n.d.	5.84	27.15	0.22	0.66	0.66	7.36	0.6	2.6	
2014/10/9	7.41	6.51	4.60	n.d.	0.74	7.31	1.31	2.33	1.32	n.d.	6.16	27.15	0.08	0.69	0.66	7.54	2.3	7.4	
2014/10/30	7.47	6.80	4.70	n.d.	0.66	7.16	1.30	2.50	0.88	n.d.	6.55	27.76	0.02	0.69	0.68	7.59	0.7	5.5	
2014/11/20	7.40	7.37	4.85	n.d.	0.67	7.86	1.43	2.49	1.45	n.d.	7.50	27.76	0.26	0.74	0.70	8.12	2.3	4.8	
2014/12/2	7.45	7.41	4.88	n.d.	0.78	8.12	1.48	2.95	1.72	n.d.	7.72	27.15	0.51	0.76	0.72	8.37	2.9	6.1	
2014/12/22	7.54	6.74	3.96	n.d.	0.57	6.46	1.17	3.23	1.45	n.d.	6.10	21.81	0.06	0.61	0.60	6.87	0.6	1.0	
2015/1/15	7.40	6.05	3.70	n.d.	0.57	6.08	1.09	3.80	1.74	n.d.	4.75	18.91	1.90	0.57	0.54	6.39	2.3	2.7	
2015/2/6	7.46	6.29	4.31	n.d.	0.52	7.00	1.25	2.91	0.63	n.d.	7.17	24.46	0.21	0.65	0.64	7.34	0.8	7.7	
2015/2/27	7.44	7.23	4.26	n.d.	0.53	7.15	1.27	3.19	1.36	n.d.	6.62	23.73	0.76	0.66	0.64	7.38	1.6	1.0	
2015/3/20	7.43	5.98	3.90	n.d.	0.60	5.84	1.05	3.14	0.62	n.d.	4.58	21.17	0.86	0.56	0.54	6.21	2.0	1.9	
2015/4/8	7.47	6.74	4.27	n.d.	0.62	6.78	1.20	2.89	0.64	n.d.	5.99	24.40	0.41	0.64	0.62	7.06	1.8	2.3	
2015/4/30	7.46	7.61	4.62	n.d.	0.67	7.64	1.35	2.94	0.60	n.d.	6.48	28.91	0.74	0.71	0.70	7.88	0.6	1.7	
2015/5/20	7.58	6.73	4.19	n.d.	0.66	6.92	1.22	2.77	0.96	n.d.	5.57	26.90	0.23	0.64	0.65	7.22	-0.5	3.5	
2015/6/8	7.51	6.53	4.17	n.d.	0.69	6.96	1.22	2.62	0.81	n.d.	5.46	26.38	1.13	0.65	0.63	7.13	1.1	4.4	
2015/7/2	7.46	5.81	3.92	n.d.	0.60	5.28	0.96	2.76	0.39	n.d.	3.96	21.50	0.96	0.53	0.52	5.82	0.8	0.1	
2015/7/24	7.56	5.77	4.21	n.d.	0.65	5.89	1.06	2.70	0.67	n.d.	4.12	24.10	0.78	0.58	0.57	6.35	1.1	4.8	
2015/8/11	7.56	8.10	4.99	n.d.	0.81	8.21	1.46	2.74	1.39	n.d.	6.28	31.29	0.44	0.77	0.74	8.39	1.6	1.8	
2015/8/26	7.68	6.32	4.08	n.d.	0.70	5.90	1.06	2.54	0.82	n.d.	4.33	23.42	0.06	0.58	0.56	6.31	1.6	-0.1	
2015/9/25	7.54	5.68	4.20	n.d.	0.59	5.05	0.95	2.56	0.32	n.d.	3.43	22.57	0.60	0.53	0.52	5.75	0.9	0.6	
2015/10/15	7.59	7.10	4.70	n.d.	0.66	7.31	1.31	2.67	0.84	n.d.	6.20	28.06	0.43	0.69	0.68	7.64	1.1	3.6	
2015/11/4	7.54	7.97	4.75	n.d.	0.72	8.14	1.46	2.69	1.58	n.d.	6.91	29.59	0.00	0.75	0.73	8.30	1.4	2.0	
2015/11/18	7.43	6.39	3.77	n.d.	0.77	6.56	1.16	2.08	0.88	n.d.	4.09	25.62	3.01	0.61	0.58	6.52	2.4	1.0	
2015/12/8	7.50	6.80	4.42	n.d.	0.61	7.27	1.30	2.63	0.86	n.d.	6.47	26.38	0.51	0.68	0.66	7.47	1.7	4.7	
2015/12/24	7.51	6.14	4.37	n.d.	0.62														



## Appendix 8a. 四万十川上流域の採水地点 N4 における溪流水分析データ

## Analytical data of streamwater at sampling location N4 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2000/3/24	7.63	7.47	3.58	n.d.	0.68	8.64	1.12	4.30	0.66	n.d.	6.83	23.05	1.52	0.70	0.65	7.78	3.3	2.0	
2000/4/17	8.02	12.51	5.31	n.d.	0.81	16.01	2.02	4.02	1.06	n.d.	15.55	43.81	0.27	1.22	1.17	13.72	1.9	4.6	
2000/4/27	7.84	10.51	4.52	n.d.	0.85	13.83	1.74	4.18	0.92	n.d.	10.64	40.97	0.01	1.05	1.03	11.78	1.3	5.7	
2000/5/15	7.94	14.58	5.94	n.d.	0.86	18.87	2.29	3.95	1.81	n.d.	18.50	53.32	1.35	1.41	1.40	16.09	0.4	4.9	
2000/5/29	7.87	10.99	4.69	n.d.	0.84	14.00	1.71	3.96	1.20	n.d.	11.61	41.20	1.98	1.07	1.05	12.02	0.8	4.5	
2000/6/12	7.81	8.88	4.16	n.d.	0.65	10.69	1.33	3.73	0.66	n.d.	7.77	33.43	1.57	0.84	0.83	9.39	0.9	2.8	
2000/6/26	7.91	12.42	5.44	n.d.	0.82	15.94	2.00	3.65	1.33	n.d.	14.58	45.81	1.10	1.22	1.18	13.66	1.6	4.7	
2000/7/10	7.87	11.92	5.36	n.d.	0.79	14.90	1.90	3.59	1.34	n.d.	14.26	44.38	0.99	1.15	1.15	13.11	0.3	4.8	
2000/7/25	7.91	14.49	6.10	n.d.	0.95	20.11	2.51	3.86	4.31	n.d.	18.09	50.30	0.15	1.50	1.38	16.58	4.2	6.7	
2000/8/7	7.88	10.85	5.36	n.d.	0.97	13.33	1.75	3.77	1.01	n.d.	12.54	38.12	1.39	1.07	1.01	11.87	2.8	4.5	
2000/8/22	7.97	14.08	6.11	n.d.	1.03	18.41	2.31	3.65	2.63	n.d.	18.00	47.44	1.76	1.40	1.30	15.55	3.8	5.0	
2000/9/4	7.96	14.00	5.96	n.d.	0.97	18.22	2.29	3.42	3.19	n.d.	16.63	48.87	1.93	1.38	1.30	15.33	3.2	4.5	
2000/9/18	7.79	8.90	4.72	n.d.	0.72	10.80	1.48	3.30	0.64	n.d.	9.26	31.23	1.70	0.88	0.81	9.62	4.5	3.9	
2000/10/3	7.89	9.63	4.63	n.d.	0.78	11.76	1.57	2.67	0.67	n.d.	9.55	36.50	2.49	0.94	0.88	10.24	3.0	3.1	
2000/10/18	7.98	13.19	5.78	n.d.	0.87	15.78	2.07	3.24	1.40	n.d.	15.28	49.84	1.31	1.23	1.25	14.05	-0.7	3.2	
2000/11/6	7.91	10.87	5.09	0.00	0.81	13.67	1.82	2.96	0.91	0.24	10.87	43.41	1.39	1.07	1.04	11.91	1.4	4.6	
2000/11/21	7.91	11.99	5.20	n.d.	0.82	15.26	2.00	3.26	1.14	n.d.	13.61	41.67	2.67	1.17	1.08	12.83	4.3	3.4	
2000/12/5	7.82	13.50	5.58	n.d.	0.78	16.89	2.20	3.50	1.26	n.d.	16.77	45.80	1.87	1.29	1.22	14.37	2.7	3.1	
2000/12/18	7.84	14.35	5.78	0.01	0.78	18.68	2.42	4.19	1.19	n.d.	17.78	49.36	1.95	1.40	1.32	15.61	3.2	4.2	
2001/1/9	7.84	14.51	5.85	n.d.	0.70	19.23	2.47	4.85	1.37	n.d.	18.88	45.20	1.88	1.44	1.29	15.84	5.2	4.4	
2001/1/23	7.80	11.61	4.99	0.02	0.64	14.99	1.92	4.15	0.90	n.d.	13.83	38.04	2.04	1.14	1.04	12.58	4.5	4.0	
2001/2/6	7.81	9.89	4.30	n.d.	0.57	12.74	1.59	3.63	0.58	n.d.	10.33	34.00	2.14	0.97	0.88	10.57	4.6	3.3	
2001/2/20	7.89	13.00	5.49	n.d.	0.57	17.28	2.15	3.73	0.85	n.d.	16.66	44.87	1.16	1.29	1.20	14.32	3.7	4.8	
2001/3/6	7.82	10.24	4.39	n.d.	0.61	12.84	1.62	3.93	0.61	n.d.	11.09	37.78	0.95	0.98	0.97	11.11	0.5	4.1	
2001/3/21	7.97	12.75	5.24	n.d.	0.71	16.20	1.99	3.99	0.81	n.d.	15.16	47.39	0.77	1.22	1.22	13.89	0.0	4.3	
2001/4/10	8.04	14.54	6.14	n.d.	0.80	19.18	2.28	3.85	1.41	n.d.	18.67	53.51	1.31	1.43	1.40	16.18	1.2	5.3	
2001/4/23	7.94	13.95	5.71	n.d.	0.70	18.83	2.26	4.14	1.42	n.d.	16.44	51.04	1.21	1.39	1.32	15.47	2.7	5.2	
2001/5/8	7.68	7.28	3.68	n.d.	0.72	8.66	1.10	4.15	0.31	n.d.	6.37	25.13	2.43	0.70	0.67	7.81	2.5	3.5	
2001/5/22	7.86	11.68	4.92	n.d.	0.74	15.17	1.85	3.39	1.31	n.d.	12.34	44.73	2.65	1.14	1.11	12.72	1.6	4.3	
2001/6/5	7.85	13.58	5.52	n.d.	0.77	18.43	2.21	3.47	1.63	n.d.	15.80	51.63	1.34	1.36	1.30	15.12	2.3	5.4	
2001/6/20	7.78	8.22	3.72	n.d.	0.65	10.57	1.30	2.96	0.76	n.d.	7.40	29.92	2.05	0.81	0.74	8.78	4.7	3.3	
2001/7/3	7.91	12.72	5.52	n.d.	0.78	17.03	2.05	3.56	1.44	n.d.	14.90	48.98	0.60	1.28	1.24	14.29	1.7	5.8	
2001/7/24	7.95	13.56	5.76	n.d.	0.74	17.43	2.11	3.40	1.91	n.d.	15.67	53.21	0.68	1.31	1.32	14.93	-0.5	4.8	
2001/8/7	8.00	15.17	6.37	n.d.	0.80	19.58	2.34	3.44	3.58	n.d.	18.18	55.55	1.25	1.47	1.44	16.61	0.8	4.5	
2001/8/21	7.63	6.49	3.15	n.d.	0.64	7.48	0.95	2.39	1.26	n.d.	5.56	22.51	3.29	0.61	0.57	6.67	2.8	1.4	
2001/9/4	7.90	11.29	4.77	n.d.	0.71	14.25	1.76	2.90	1.46	n.d.	11.49	42.89	1.51	1.08	1.05	12.01	1.6	3.1	
2001/9/26	7.92	13.12	5.80	n.d.	0.70	16.57	2.14	3.34	1.06	n.d.	16.93	47.38	0.97	1.27	1.24	14.37	1.3	4.5	
2001/10/10	7.79	8.12	3.99	n.d.	0.55	9.62	1.26	2.54	0.50	n.d.	7.08	31.70	1.77	0.77	0.75	8.48	1.6	2.1	
2001/10/24	7.87	10.00	4.87	0.04	0.72	12.50	1.65	3.09	0.22	n.d.	9.86	38.85	1.26	0.99	0.93	10.82	3.1	3.9	
2001/11/7	7.90	10.71	4.51	n.d.	0.65	12.73	1.69	2.86	0.20	n.d.	10.65	41.03	1.26	0.99	0.98	11.03	0.5	1.5	
2001/11/21	7.94	13.71	5.76	n.d.	0.74	16.85	2.27	3.41	0.95	n.d.	16.77	50.43	0.72	1.30	1.29	14.71	0.4	3.5	
2001/12/4	7.94	14.66	5.71	0.10	0.77	17.78	2.34	4.07	0.63	n.d.	17.82	52.49	1.54	1.35	1.36	15.48	-0.1	2.7	
2001/12/20	7.87	14.00	5.44	0.05	0.69	16.87	2.24	3.92	0.81	n.d.	17.91	49.84	1.66	1.28	1.31	14.88	-1.1	3.1	
2002/1/8	7.88	14.73	5.95	0.07	0.68	18.06	2.39	4.07	0.91	n.d.	20.40	51.06	1.39	1.38	1.39	15.96	-0.5	4.0	
2002/1/22	7.84	14.84	5.73	0.10	0.79	18.00	2.41	6.43	1.48	n.d.	17.93	46.30	1.70	1.37	1.34	15.75	1.3	3.0	
2002/2/7	7.81	14.68	5.67	0.06	0.76	17.51	2.36	4.68	0.78	n.d.	18.43	49.29	0.82	1.34	1.34	15.39	0.0	2.4	
2002/2/19	7.87	15.26	6.04	n.d.	0.82	18.53	2.52	5.01	1.35	n.d.	20.52	51.05	0.51	1.42	1.43	16.45	-0.4	3.8	
2002/3/5	7.75	12.02	4.67	n.d.	0.93	14.36	1.99	4.56	1.59	n.d.	12.84	35.72	5.68	1.11	1.01	12.23	4.7	0.9	
2002/3/19	7.94	15.26	6.26	n.d.	0.94	19.25	2.58	4.64	1.07	n.d.	19.44	47.13	0.85	1.47	1.33	16.18	5.2	2.9	
2002/4/9	7.84	10.99	4.36	n.d.	0.92	12.34	1.72	4.66	0.32	n.d.	10.99	34.51	1.17	0.97	0.93	10.93	2.1	-0.3	
2002/4/23	7.85	10.85	4.23	n.d.	0.91	12.52	1.71	4.45	0.38	n.d.	10.43	34.33	2.11	0.97	0.91	10.80	3.2	-0.2	
2002/5/8	7.85	10.84	4.60	0.05	0.92	12.75	1.73	4.69	0.31	n.d.	11.16	39.75	1.19	1.01	1.02	11.54	-0.8	3.1	
2002/5/28	8.01	13.39	5.63	n.d.	0.98	16.47	2.22	4.28	1.08	n.d.	16.85	45.79	1.09	1.27	1.24	14.46	1.4	3.9	
2002/6/11	7.88	12.78	5.07	n.d.	1.04	15.39	2.02	3.55	5.40	n.d.	14.16	40.06	3.83	1.18	1.14	13.42	1.9	2.5	
2002/6/25	7.92	10.11	3.99	n.d.	0.88	11.91	1.56	2.96	1.37	n.d.	9.13	37.49	3.05	0.92	0.91	10.30	0.5	0.9	
2002/7/9	7.59	6.06	2.84	n.d.	0.85	6.86	0.89	2.07	1.46	n.d.	4.31	21.05	4.88	0.56	0.52	6.07	4.1	0.1	
2002/7/23	7.81	11.11	4.84	n.d.	1.04	12.80	1.75	4.12	0.66	n.d.	12.06	38.99	1.22	1.02	1.02	11.63	0.1	2.3	
2002/8/6	7.87	13.21	5.60	n.d.	1.08	15.59	2.11	4.06	1.51	n.d.	15.65	45.99	1.29	1.22	1.22	13.99	0.2	2.9	
2002/8/27	7.89	14.31	5.90	n.d.	1.10	17.69	2.37	3.85	1.98	n.d.	16.38	51.12	1.23	1.36	1.32	15.30	1.6	3.3	
2002/9/10	7.88	12.68	5.77	n.d.	0.98	15.22	2.09	4.07	1.14	n.d.	14.91	43.97	1.07	1.21	1.16	13.58	1.8	3.4	
2002/9/24	7.90	13.70	5.86	n.d.	0.99	16.94	2.32	4.04	1.68	n.d.	16.77	48.23	0.73	1.32	1.28	14.88	1.4	4.1	
2002/10/8	7.88	13.45	5.47	n.d.	0.89	16.49	2.20	3.78	1.67	n.d.	14.97	48.22	0.76	1.27	1.24	14.24	1.2	2.8	
2002/10/22	7.99	14.34	5.71	n.d.	0.88	17.49	2.31	3.80	2.41	n.d.	16.64	50.45	1.27	1.33	1.32	15.16	0.5	2.8	
2002/11/5	7.84	13.49	5.30	n.d.	0.75	16.43	2.18	5.05	2.72	n.d.	15.94	44.29	0.99	1.25	1.24	14.41	0.2	3.3	
2002/11/19	7.87	14.81	6.16	n.d.	0.80	18.40	2.47	4.52	1.95	n.d.	19.26	50.64	0.00	1.41	1.39	16.13	0.7	4.3	</

## Appendix 8b. 四万十川上流域の採水地点 N4 における渓流水分析データ

## Analytical data of streamwater at sampling location N4 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2003/2/18	7.83	13.36	5.24	n.d.	0.63	15.74	2.04	4.80	0.70	n.d.	15.08	44.91	0.41	1.20	1.20	13.73	0.0	1.4	
2003/3/4	7.73	9.58	4.39	n.d.	0.61	11.60	1.50	5.40	0.26	n.d.	8.34	30.44	0.63	0.91	0.83	9.98	4.6	2.0	
2003/3/18	7.74	9.62	4.31	n.d.	0.61	11.15	1.43	5.27	0.22	n.d.	8.86	31.18	0.70	0.88	0.85	9.90	1.7	1.4	
2003/4/7	7.86	10.42	4.62	0.04	0.64	12.54	1.60	5.01	0.33	n.d.	10.64	34.79	0.45	0.98	0.94	10.99	2.0	2.7	
2003/4/21	7.92	13.22	5.58	n.d.	0.80	16.16	2.04	4.73	0.51	n.d.	15.66	45.10	0.20	1.24	1.21	14.03	1.2	3.0	
2003/5/8	7.83	9.87	4.28	n.d.	0.76	11.73	1.49	3.11	0.98	n.d.	9.17	35.92	2.27	0.91	0.88	10.14	1.7	1.3	
2003/5/22	7.87	11.81	5.17	n.d.	0.83	13.60	1.86	4.36	0.29	n.d.	13.06	41.60	0.55	1.08	1.08	12.32	-0.2	2.1	
2003/6/4	7.82	10.56	5.05	n.d.	0.86	11.92	1.74	4.34	0.22	n.d.	11.68	36.92	0.44	0.98	0.97	11.16	0.3	2.8	
2003/6/19	7.72	7.03	3.80	n.d.	0.63	7.50	1.03	3.48	0.11	n.d.	5.39	26.38	1.14	0.64	0.64	7.21	-0.3	1.2	
2003/7/3	7.79	9.64	4.62	n.d.	0.72	11.16	1.53	3.61	0.35	n.d.	8.44	33.00	1.18	0.90	0.82	9.76	4.5	0.6	
2003/7/17	7.90	11.09	4.99	0.04	0.81	13.09	1.77	3.57	0.77	n.d.	10.60	43.63	0.13	1.04	1.05	11.72	-0.5	2.8	
2003/8/1	7.94	12.30	5.26	0.03	0.87	14.78	1.95	3.30	1.36	n.d.	12.17	24.27	0.95	1.15	0.77	11.23	20.1	-4.6	R1
2003/8/14	7.50	4.90	2.84	0.06	0.63	5.11	0.73	1.43	0.61	n.d.	3.18	17.30	4.39	0.46	0.40	4.77	6.8	-1.4	
2003/9/4	7.97	13.99	6.38	0.08	1.03	17.33	2.34	3.83	2.28	n.d.	16.55	50.45	1.75	1.37	1.32	15.31	1.8	4.5	
2003/9/18	7.89	12.40	5.64	0.08	0.97	15.05	2.05	3.56	1.30	n.d.	13.41	45.49	0.76	1.19	1.15	13.27	2.0	3.4	
2003/10/8	7.96	14.44	6.19	n.d.	0.86	17.75	2.36	3.79	2.05	n.d.	17.66	51.55	0.71	1.37	1.35	15.57	0.7	3.8	
2003/10/22	7.92	12.72	5.77	n.d.	0.80	15.73	2.12	3.54	0.97	n.d.	14.35	47.01	0.28	1.23	1.18	13.70	1.9	3.7	
2003/11/12	7.89	12.33	5.55	n.d.	0.85	15.76	2.12	3.57	0.99	n.d.	12.97	44.59	1.30	1.22	1.12	13.27	4.6	3.7	
2003/11/26	7.85	13.99	5.73	n.d.	0.75	16.87	2.24	3.70	1.41	n.d.	16.57	50.16	0.26	1.29	1.29	14.75	0.0	2.7	
2003/12/10	7.82	12.78	5.40	n.d.	0.65	15.15	2.04	3.79	0.61	n.d.	15.04	45.86	0.48	1.18	1.18	13.43	-0.2	2.5	
2003/12/24	7.84	13.79	6.13	n.d.	0.69	17.87	2.39	3.95	0.77	n.d.	16.09	50.03	0.63	1.37	1.28	15.08	3.5	4.5	
2004/1/7	7.85	14.68	6.19	n.d.	0.66	18.17	2.41	3.95	1.02	n.d.	19.19	55.71	0.63	1.39	1.44	16.15	-1.8	4.8	
2004/1/21	7.84	15.22	6.24	n.d.	0.62	18.28	2.45	5.23	1.55	n.d.	18.88	45.54	0.50	1.40	1.31	15.74	3.3	1.7	
2004/2/5	7.86	15.35	6.59	n.d.	0.64	19.18	2.58	4.73	1.39	n.d.	20.28	55.99	0.47	1.47	1.50	17.02	-0.8	5.2	
2004/2/20	7.93	15.91	7.16	n.d.	0.68	20.49	2.73	4.49	2.05	n.d.	21.81	62.88	0.81	1.58	1.64	18.39	-2.1	7.2	
2004/3/4	7.89	13.98	5.75	n.d.	0.62	16.87	2.28	5.73	1.47	n.d.	16.98	51.97	1.27	1.29	1.39	15.40	-3.6	4.8	
2004/3/24	7.88	13.25	5.32	n.d.	0.68	16.00	2.12	5.57	1.56	n.d.	14.32	51.60	1.70	1.22	1.33	14.49	-4.1	4.5	
2004/4/6	7.88	12.89	5.36	n.d.	0.72	15.70	2.09	4.85	0.95	n.d.	14.75	50.83	1.26	1.21	1.29	14.20	-3.4	4.8	
2004/4/21	7.80	10.47	4.62	n.d.	0.71	12.08	1.58	4.68	0.43	n.d.	10.23	42.94	1.51	0.95	1.06	11.31	-5.1	3.9	
2004/5/14	7.72	7.60	3.88	n.d.	0.60	7.81	1.08	4.25	n.d.	n.d.	6.48	30.64	1.55	0.66	0.76	7.98	-6.6	2.4	
2004/5/31	7.85	12.97	5.79	n.d.	0.87	15.48	2.09	4.08	1.07	n.d.	15.99	53.05	1.44	1.22	1.33	14.47	-4.6	5.5	
2004/6/11	7.80	9.54	4.40	n.d.	0.77	11.62	1.55	2.51	1.82	n.d.	9.66	39.82	5.54	0.92	0.95	10.49	-1.9	4.8	
2004/6/28	7.92	12.14	5.43	n.d.	0.89	13.87	1.93	3.90	0.70	n.d.	13.86	53.29	1.53	1.11	1.28	13.43	-7.2	5.0	
2004/7/12	7.94	12.86	5.69	n.d.	0.94	15.35	2.07	3.76	1.46	n.d.	14.52	56.41	1.28	1.21	1.36	14.39	-5.8	5.6	
2004/7/26	7.93	14.94	6.64	n.d.	1.07	18.80	2.45	4.06	3.08	n.d.	18.78	63.15	1.52	1.46	1.59	17.27	-4.4	7.2	
2004/8/9	7.80	9.04	4.66	n.d.	0.67	10.36	1.46	3.16	0.28	n.d.	8.69	44.30	1.43	0.86	1.00	10.25	-7.8	6.3	
2004/8/27	7.85	10.87	5.49	n.d.	0.81	13.38	1.85	3.37	0.57	n.d.	10.98	51.55	1.23	1.08	1.18	12.51	-4.4	7.0	
2004/9/13	7.56	6.02	4.09	n.d.	0.59	5.48	0.91	4.02	n.d.	n.d.	3.75	26.00	1.98	0.54	0.62	6.42	-6.5	3.2	
2004/9/27	7.84	11.10	5.67	n.d.	0.97	13.54	2.00	4.05	0.55	n.d.	10.30	54.27	1.60	1.11	1.23	12.92	-4.9	7.6	
2004/10/12	7.97	11.87	5.60	n.d.	0.93	13.96	2.07	3.84	0.91	n.d.	11.62	57.43	1.33	1.13	1.31	13.50	-7.0	6.4	
2004/10/25	7.87	10.96	5.45	n.d.	0.91	12.79	1.96	3.73	0.35	n.d.	10.86	54.26	1.05	1.06	1.23	12.62	-7.3	7.1	
2004/11/8	7.88	11.86	5.65	n.d.	0.84	14.37	2.09	3.72	0.78	n.d.	12.74	57.22	1.17	1.16	1.32	13.76	-6.6	7.4	
2004/11/22	7.84	11.35	5.39	n.d.	0.75	13.88	1.99	3.72	0.53	n.d.	12.01	54.03	0.83	1.11	1.25	13.11	-5.9	7.2	
2004/12/6	7.68	8.50	4.31	n.d.	0.67	9.29	1.35	3.43	0.13	n.d.	7.23	39.98	1.42	0.78	0.90	9.29	-7.4	4.4	
2004/12/21	7.78	13.34	5.82	n.d.	0.74	15.73	2.23	3.85	0.71	n.d.	15.43	57.15	0.68	1.24	1.38	14.70	-5.3	4.8	
2005/1/7	7.68	13.54	5.83	0.04	0.68	16.37	2.29	4.05	0.83	n.d.	16.15	49.85	1.06	1.28	1.28	14.57	-0.1	3.7	
2005/1/21	7.85	14.17	6.08	n.d.	0.63	16.78	2.35	4.15	0.96	n.d.	17.92	50.48	0.58	1.31	1.33	15.13	-0.8	3.3	
2005/2/7	7.55	11.65	4.62	n.d.	0.53	12.55	1.74	5.68	0.99	n.d.	11.34	36.25	1.41	0.98	1.01	11.46	-1.1	-0.8	
2005/2/18	7.82	10.26	4.53	n.d.	0.61	11.69	1.62	4.25	0.40	n.d.	9.42	40.28	1.70	0.93	0.98	10.75	-2.8	2.3	
2005/3/7	7.96	12.61	5.44	n.d.	0.61	15.72	2.09	4.04	0.40	n.d.	14.59	51.57	0.39	1.21	1.27	13.99	-2.5	5.2	
2005/4/6	7.81	12.32	5.43	n.d.	0.68	14.72	2.02	3.97	0.44	n.d.	14.12	55.58	1.18	1.15	1.32	13.88	-6.8	5.9	
2005/4/26	7.90	13.48	5.90	n.d.	0.81	16.55	2.25	3.99	0.98	n.d.	15.71	62.43	1.30	1.29	1.48	15.48	-6.9	6.9	
2005/5/10	7.86	11.15	4.90	n.d.	0.72	12.90	1.77	3.58	0.51	n.d.	10.83	51.52	1.40	1.02	1.18	12.20	-7.2	4.5	
2005/5/24	7.97	13.88	6.00	n.d.	0.87	16.85	2.30	3.74	1.56	n.d.	15.86	65.07	1.89	1.31	1.53	15.85	-7.5	6.6	
2005/6/6	7.97	14.60	6.42	n.d.	0.98	18.28	2.47	3.76	2.26	n.d.	17.43	67.51	1.21	1.42	1.61	16.99	-6.4	7.6	
2005/6/21	7.98	15.38	6.49	n.d.	0.98	19.13	2.53	3.57	2.98	n.d.	17.35	72.02	0.91	1.47	1.69	17.63	-7.0	6.8	
2005/7/5	7.65	8.18	3.88	n.d.	0.81	9.17	1.24	3.01	1.03	n.d.	6.80	36.38	2.65	0.75	0.84	8.82	-5.7	3.7	
2005/7/19	7.98	12.86	5.70	n.d.	0.94	15.12	2.00	3.54	1.51	n.d.	14.24	58.05	1.32	1.19	1.37	14.32	-7.1	5.4	
2005/8/9	8.07	14.89	6.57	n.d.	1.03	18.44	2.39	3.67	2.89	n.d.	18.35	67.34	1.41	1.43	1.64	17.24	-6.8	7.3	
2005/8/22	7.97	12.85	5.41	n.d.	1.01	15.30	2.01	3.21	4.46	n.d.	13.02	52.36	3.04	1.19	1.29	13.98	-4.1	4.2	
2005/9/15	7.76	11.30	5.36	n.d.	0.92	13.06	1.85	3.33	0.58	n.d.	12.05	48.83	1.44	1.06	1.15	12.38	-4.2	4.6	
2005/9/28	8.13	14.97	6.32	n.d.	0.94	19.29	2.51	3.49	1.74	n.d.	17.46	70.59	1.57	1.47	1.65	17.39	-5.7	7.5	
2005/10/11	8.27	15.33	6.57	n.d.	0.97	20.60	2.58	3.78	2.67	n.d.	18.58	70.60	1.65	1.55	1.69	18.22	-4.4	8.6	
2005/10/25	7.96	15.17	6.55	n.d.	0.79	18.37	2.47	3.82	2.62	n.d.	19.86	60.12	0.89	1.42	1.55	16.93	-4.2	5.5	
2005/11/8	7.84	10.47	5.07	n.d.	0.81	11.97	1.71	3.43	1.17	n.d.	11.69	42.57	1.33	0.98	1.06	11.48	-3.8	4.6	
2005/11/22	7.92																		

## Appendix 8c. 四万十川上流域の採水地点 N4 における溪流水分析データ

## Analytical data of streamwater at sampling location N4 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2006/2/8	7.84	11.96	5.26	n.d.	0.71	14.41	2.01	6.13	0.90	n.d.	13.67	40.63	1.60	1.13	1.14	13.11	-0.3	4.6	
2006/2/22	7.83	12.03	4.97	n.d.	0.67	13.71	1.88	5.31	0.53	n.d.	12.32	49.47	1.93	1.07	1.23	12.97	-6.7	3.7	
2006/3/8	7.92	11.97	4.97	n.d.	0.68	12.88	1.84	4.88	0.49	n.d.	13.78	47.78	1.73	1.03	1.22	12.72	-8.4	3.1	R1
2006/3/22	7.79	11.60	4.73	n.d.	0.66	12.73	1.75	4.72	0.52	n.d.	12.68	48.52	1.50	1.00	1.20	12.43	-9.0	3.4	R1
2006/4/12	7.66	7.65	4.04	n.d.	0.72	7.53	1.14	4.51	0.14	n.d.	7.12	29.20	1.87	0.66	0.76	8.05	-6.5	2.6	
2006/4/25	7.85	11.72	5.16	n.d.	0.75	13.11	1.87	4.49	0.35	n.d.	13.58	47.71	1.62	1.05	1.20	12.73	-6.4	4.1	
2006/5/11	7.59	6.60	3.78	n.d.	0.62	6.24	0.94	3.83	0.08	n.d.	5.20	30.80	2.42	0.57	0.72	7.15	-11.8	4.0	R1
2006/5/24	7.85	10.43	4.94	n.d.	0.77	11.54	1.68	3.92	0.38	n.d.	11.43	52.08	2.14	0.95	1.21	11.97	-12.0	6.9	R1
2006/6/13	7.87	11.76	5.31	n.d.	0.84	13.33	1.91	3.83	0.94	n.d.	12.92	64.30	2.63	1.07	1.45	13.88	-14.7	8.3	R1
2006/6/27	7.70	7.54	4.14	n.d.	0.67	7.88	1.15	3.16	0.12	n.d.	6.36	27.92	1.93	0.68	0.68	7.66	0.2	0.8	
2006/7/13	7.87	10.49	5.03	n.d.	0.84	11.75	1.67	3.21	0.81	n.d.	10.37	39.21	1.65	0.96	0.96	10.84	0.1	1.7	
2006/7/25	7.81	9.31	4.67	n.d.	0.77	10.13	1.45	2.98	0.60	n.d.	8.67	37.01	1.77	0.85	0.88	9.66	-1.9	1.8	
2006/8/9	7.98	13.45	6.06	n.d.	0.92	15.71	2.15	3.53	2.23	n.d.	14.74	49.67	1.46	1.25	1.26	14.19	-0.3	2.7	
2006/8/23	7.78	7.39	4.15	n.d.	0.81	7.21	1.10	2.85	0.26	n.d.	5.82	31.64	1.96	0.65	0.72	7.60	-5.3	1.4	
2006/9/5	7.89	11.29	5.22	n.d.	0.91	12.54	1.82	3.05	0.78	n.d.	10.63	47.85	1.29	1.03	1.10	11.84	-3.7	2.4	
2006/9/20	7.83	9.42	4.89	n.d.	0.70	10.20	1.51	2.92	0.41	n.d.	8.33	39.53	1.48	0.86	0.91	9.83	-2.6	2.2	
2006/10/4	7.98	13.27	6.07	n.d.	0.89	15.66	2.22	3.32	1.68	n.d.	14.28	53.69	1.14	1.25	1.30	14.32	-1.8	3.8	
2006/10/19	7.99	14.08	6.37	n.d.	0.88	16.59	2.32	3.48	2.25	n.d.	16.51	55.73	1.45	1.32	1.39	15.32	-2.7	4.2	
2006/11/7	7.97	14.97	6.80	n.d.	0.89	17.54	2.44	3.86	3.27	n.d.	18.46	59.18	0.98	1.39	1.52	16.52	-4.2	4.9	
2006/11/21	7.87	15.52	6.48	n.d.	0.85	17.71	2.50	5.48	5.84	n.d.	17.23	54.14	2.33	1.39	1.49	16.60	-3.5	3.4	
2006/12/8	7.77	11.04	4.53	n.d.	0.67	12.13	1.72	5.46	3.68	n.d.	9.80	36.54	2.97	0.96	1.02	11.36	-2.8	1.4	
2006/12/21	7.89	13.63	5.62	n.d.	0.70	15.68	2.20	4.09	1.75	n.d.	15.95	51.97	1.61	1.23	1.33	14.50	-4.0	3.1	
2007/1/10	7.84	14.36	5.98	n.d.	0.62	16.21	2.36	5.69	2.07	n.d.	19.56	46.70	1.27	1.28	1.37	15.39	-3.3	3.5	
2007/1/23	7.91	14.77	6.13	0.05	0.68	17.63	2.40	4.72	2.05	n.d.	19.01	48.93	1.11	1.36	1.36	15.75	0.0	3.2	
2007/2/7	7.75	15.15	6.59	n.d.	0.71	18.47	2.50	4.27	1.90	n.d.	20.74	48.96	0.99	1.43	1.39	16.31	1.7	3.7	
2007/2/21	7.88	12.60	5.43	n.d.	0.73	15.76	2.13	4.98	1.72	n.d.	14.89	42.61	1.03	1.22	1.18	13.79	1.7	4.5	
2007/3/12	7.84	13.23	5.38	n.d.	0.69	15.92	2.14	4.54	1.38	n.d.	16.00	39.45	0.98	1.22	1.13	13.65	3.9	1.5	
2007/3/28	7.79	10.29	4.44	0.05	0.69	12.20	1.63	4.41	1.09	n.d.	10.36	31.22	1.51	0.96	0.87	10.53	4.8	1.2	
2007/4/10	7.93	14.27	6.05	0.09	0.82	17.81	2.38	4.32	1.40	n.d.	18.09	56.00	1.21	1.37	1.44	16.03	-2.3	5.8	
2007/4/24	7.90	13.66	5.56	0.12	0.79	16.97	2.24	4.05	2.12	n.d.	15.35	51.56	1.95	1.30	1.31	14.86	-0.5	4.2	
2007/5/9	7.88	10.77	4.65	0.05	0.76	13.00	1.71	4.17	0.83	n.d.	11.16	35.70	1.37	1.01	0.95	11.24	3.3	2.1	
2007/5/23	8.01	14.24	5.58	0.04	0.81	17.37	2.20	3.84	1.46	n.d.	16.58	60.11	1.28	1.31	1.46	15.65	-5.3	4.7	
2007/6/13	7.95	14.71	6.20	0.07	0.92	19.33	2.49	3.76	2.31	n.d.	17.37	61.75	1.30	1.47	1.52	16.86	-1.7	6.8	
2007/6/26	7.87	12.45	5.87	n.d.	1.00	17.05	2.19	3.67	1.73	n.d.	13.88	54.19	1.62	1.31	1.31	14.74	0.1	8.4	
2007/7/10	7.81	8.92	4.23	0.04	0.73	9.72	1.34	3.36	0.45	n.d.	8.47	39.25	2.42	0.80	0.92	9.60	-7.0	3.7	
2007/7/26	7.90	12.31	5.56	0.08	0.98	14.58	2.03	3.39	1.21	n.d.	15.12	49.03	2.12	1.17	1.23	13.61	-2.8	5.0	
2007/8/9	7.89	11.88	5.65	0.07	0.97	14.26	2.01	3.57	0.96	n.d.	13.79	48.65	1.39	1.15	1.20	13.28	-2.1	5.6	
2007/8/29	7.97	15.09	6.86	0.05	1.12	19.17	2.55	3.64	2.99	n.d.	19.27	42.54	0.69	1.50	1.25	15.97	9.0	2.8	R1
2007/9/12	8.07	14.87	6.57	n.d.	1.07	18.47	2.46	3.52	3.53	n.d.	18.60	56.56	2.04	1.44	1.47	16.58	-1.1	5.4	
2007/9/26	7.98	13.16	5.82	0.05	1.00	15.95	2.20	3.33	1.56	n.d.	14.77	65.03	1.81	1.26	1.49	15.27	-8.5	7.4	R1
2007/10/11	7.84	9.47	4.81	n.d.	0.87	11.21	1.56	2.80	0.92	n.d.	8.86	45.15	3.30	0.92	1.02	10.70	-5.1	6.1	
2007/10/25	7.95	14.35	6.34	n.d.	0.87	17.53	2.39	3.43	1.48	n.d.	18.23	60.36	1.37	1.37	1.49	16.14	-4.2	5.9	
2007/11/13	8.00	15.06	6.53	n.d.	0.87	18.91	2.55	3.59	2.65	n.d.	20.29	56.59	0.36	1.46	1.49	16.90	-1.2	5.8	
2007/11/27	7.82	15.72	6.93	n.d.	0.84	19.87	2.70	3.72	2.85	n.d.	21.89	55.04	0.91	1.54	1.51	17.54	0.9	5.5	
2007/12/10	7.80	15.99	6.55	n.d.	0.76	19.20	2.57	4.12	2.70	n.d.	22.35	43.75	0.06	1.47	1.34	16.51	4.7	1.6	
2007/12/25	7.81	16.24	6.43	0.05	0.81	19.57	2.66	5.48	3.85	n.d.	21.05	60.35	1.82	1.50	1.64	18.07	-4.6	5.3	
2008/1/8	7.74	12.46	5.16	0.03	0.68	15.14	2.10	5.83	2.19	n.d.	14.09	39.58	2.03	1.17	1.14	13.42	1.3	3.7	
2008/1/22	7.69	9.37	4.35	0.04	0.65	11.39	1.54	4.65	0.87	n.d.	8.92	30.43	2.85	0.90	0.83	9.95	4.2	3.0	
2008/2/6	7.55	10.37	4.40	0.03	0.58	11.83	1.58	4.17	0.58	n.d.	11.09	35.50	1.21	0.93	0.94	10.68	-0.6	1.5	
2008/2/19	7.88	13.63	6.00	n.d.	0.68	17.60	2.34	4.13	0.76	n.d.	18.94	48.12	1.44	1.35	1.31	15.32	1.4	5.9	
2008/3/5	7.81	13.66	6.31	0.07	0.75	18.66	2.48	4.50	0.98	n.d.	19.12	48.53	1.10	1.43	1.34	15.97	3.5	7.8	
2008/3/18	7.85	13.56	5.51	0.05	0.72	16.43	2.16	4.26	0.96	n.d.	17.19	47.35	1.28	1.26	1.27	14.52	-0.5	3.4	
2008/4/4	7.81	11.54	4.91	n.d.	0.67	13.68	1.83	4.06	0.46	n.d.	13.60	42.32	1.28	1.06	1.10	12.34	-1.6	3.3	
2008/4/21	7.85	11.86	5.17	n.d.	0.77	14.45	1.91	3.90	0.50	n.d.	13.91	44.03	1.25	1.12	1.13	12.82	-0.3	3.9	
2008/5/8	7.86	13.99	5.69	n.d.	0.81	16.69	2.19	3.78	0.90	n.d.	17.69	49.97	0.96	1.28	1.31	14.81	-1.1	2.8	
2008/5/22	7.84	13.15	5.36	0.05	0.82	16.15	2.09	3.48	1.03	n.d.	15.41	46.64	0.00	1.23	1.20	13.89	1.4	2.7	
2008/6/5	7.66	6.58	3.57	0.10	0.63	7.07	0.96	3.02	0.16	n.d.	5.21	24.51	2.96	0.61	0.60	6.78	0.9	1.5	
2008/6/19	7.78	11.35	6.32	0.06	0.96	17.22	2.27	3.86	0.75	n.d.	14.32	43.28	1.95	1.35	1.13	14.15	8.9	11.0	R1
2008/7/7	7.84	10.53	4.67	0.02	0.76	12.02	1.58	3.15	0.60	n.d.	10.55	38.25	2.08	0.95	0.95	10.72	0.4	0.9	
2008/7/23	7.95	13.55	5.77	n.d.	0.95	16.52	2.15	3.26	2.45	n.d.	15.61	50.26	1.84	1.28	1.28	14.53	-0.1	3.5	
2008/8/6	7.83	15.28	6.56	n.d.	1.06	19.30	2.48	3.47	3.70	n.d.	18.64	56.43	1.85	1.48	1.47	16.84	0.3	4.9	
2008/8/20	7.91	16.64	6.64	n.d.	1.03	19.74	2.50	3.45	3.41	n.d.	19.93	58.16	1.85	1.51	1.52	17.29	-0.5	1.9	
2008/9/4	7.93	13.06	5.33	0.03	0.95	15.80	2.04	2.74	3.33	n.d.	14.15	49.50	2.36	1.21	1.24	13.87	-0.9	3.0	
2008/9/22	7.93	11.19	4.96	0.03	0.89	13.44	1.73	3.01	1.17	n.d.	11.54	42.55	1.59	1.05	1.04	11.82	0.6	2.7	
2008/10/6	7.88	8.32	4.26	0.09	0.77	9.73	1.29	2.74	0.33	n.d.	6.20	35.59							

## Appendix 8d. 四万十川上流域の採水地点 N4 における渓流水分析データ

## Analytical data of streamwater at sampling location N4 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2009/1/9	7.91	14.89	6.24	n.d.	0.74	18.86	2.46	3.48	1.08	n.d.	20.16	53.62	1.06	1.43	1.41	16.32	0.7	4.6	
2009/1/27	7.84	13.32	5.54	n.d.	0.70	17.08	2.23	4.18	1.20	n.d.	17.02	47.28	1.16	1.30	1.27	14.71	1.1	5.0	
2009/2/9	7.89	12.52	5.19	n.d.	0.70	15.73	2.05	3.64	0.71	n.d.	15.11	46.36	1.31	1.20	1.19	13.59	0.3	4.1	
2009/2/23	7.53	6.40	3.23	n.d.	0.63	7.12	0.94	4.07	0.29	n.d.	5.39	21.29	2.26	0.59	0.58	6.71	0.8	2.4	
2009/3/9	7.67	10.38	4.59	n.d.	0.70	12.76	1.66	3.64	0.30	n.d.	10.95	39.65	1.22	0.99	0.99	11.18	0.3	3.7	
2009/3/23	7.70	8.45	3.98	n.d.	0.67	9.89	1.30	3.46	0.17	n.d.	7.87	31.96	0.82	0.79	0.79	8.91	0.2	2.6	
2009/4/13	7.95	14.35	6.01	n.d.	0.85	18.14	2.33	3.63	0.94	n.d.	18.83	53.07	0.93	1.38	1.38	15.77	0.0	4.7	
2009/4/27	7.97	12.47	5.21	n.d.	0.79	15.74	2.01	3.30	1.03	n.d.	14.95	47.70	1.96	1.20	1.20	13.63	-0.2	4.5	
2009/5/11	7.96	13.00	5.48	n.d.	0.89	16.56	2.10	3.39	0.98	n.d.	15.98	51.12	1.43	1.26	1.28	14.43	-0.8	5.2	
2009/5/25	8.07	15.13	6.24	n.d.	0.93	19.61	2.48	3.40	2.00	n.d.	19.12	58.81	1.69	1.48	1.49	16.88	-0.4	5.5	
2009/6/8	8.01	13.65	5.64	n.d.	0.93	17.72	2.22	2.95	1.71	n.d.	15.01	53.80	2.42	1.34	1.31	14.89	1.2	4.4	
2009/6/24	7.86	8.62	3.83	n.d.	0.83	10.30	1.31	2.61	0.45	n.d.	7.07	34.53	3.08	0.81	0.79	8.93	1.0	1.8	
2009/7/8	7.86	10.90	4.77	n.d.	0.90	13.43	1.73	3.00	0.44	n.d.	10.74	43.80	1.81	1.04	1.03	11.63	0.5	3.3	
2009/7/22	7.62	6.79	3.28	n.d.	0.85	7.79	1.02	2.06	0.78	n.d.	5.17	26.05	5.00	0.64	0.61	6.93	2.6	1.0	
2009/8/12	7.80	8.97	4.57	n.d.	1.02	9.72	1.40	2.98	0.16	n.d.	8.77	33.92	1.79	0.83	0.83	9.28	0.0	1.7	
2009/8/27	7.84	14.26	6.23	n.d.	1.14	17.65	2.36	3.20	0.96	n.d.	16.84	53.50	1.65	1.38	1.33	15.35	1.5	3.7	
2009/9/10	7.97	14.77	6.35	n.d.	1.12	18.08	2.38	3.18	2.26	n.d.	18.20	53.86	1.92	1.40	1.39	15.91	0.6	3.7	
2009/9/25	7.93	16.13	7.05	n.d.	1.11	20.23	2.62	3.35	2.70	n.d.	20.33	59.35	1.11	1.56	1.53	17.64	0.8	4.5	
2009/10/9	7.86	10.03	4.59	n.d.	0.89	12.05	1.60	2.64	0.46	n.d.	9.29	41.24	2.34	0.96	0.95	10.62	0.2	2.9	
2009/10/23	7.94	14.23	6.18	n.d.	0.92	18.02	2.37	3.21	1.11	n.d.	18.48	53.62	1.23	1.39	1.37	15.72	0.5	5.0	
2009/11/6	7.92	14.61	6.18	n.d.	0.93	18.36	2.42	3.30	1.44	n.d.	19.31	53.68	1.50	1.41	1.40	16.04	0.4	4.7	
2009/11/24	7.68	12.22	5.33	n.d.	0.85	15.04	2.04	3.17	0.46	n.d.	14.35	46.48	1.59	1.17	1.16	13.20	0.6	3.8	
2009/12/8	7.84	13.97	5.95	n.d.	0.83	17.60	2.35	3.49	0.78	n.d.	19.71	51.12	0.82	1.35	1.36	15.56	-0.3	5.4	
2009/12/22	7.83	12.16	5.01	0.03	0.69	14.87	1.99	4.24	0.72	n.d.	14.56	43.13	2.14	1.14	1.14	13.08	0.1	3.7	
2010/1/6	7.88	14.12	5.84	n.d.	0.70	17.83	2.35	3.92	0.71	n.d.	18.55	50.02	1.33	1.36	1.33	15.39	1.0	4.3	
2010/1/20	7.93	14.78	6.28	n.d.	0.72	19.13	2.47	3.79	0.99	n.d.	20.50	53.13	1.19	1.45	1.42	16.48	1.0	5.5	
2010/2/4	7.79	11.21	4.50	n.d.	0.64	13.58	1.79	4.38	0.54	n.d.	13.22	40.14	0.44	1.04	1.07	12.05	-1.4	3.6	
2010/2/18	7.84	12.05	5.05	n.d.	0.70	15.13	1.99	4.14	0.52	n.d.	14.85	44.04	1.16	1.16	1.16	13.23	0.0	4.7	
2010/3/5	7.82	10.24	4.59	n.d.	0.78	12.67	1.63	3.86	0.31	n.d.	10.42	38.61	2.12	0.99	0.96	11.04	1.2	3.8	
2010/3/19	7.79	10.51	4.65	n.d.	0.68	12.76	1.69	3.76	0.29	n.d.	11.48	38.98	0.79	0.99	0.99	11.27	0.3	3.5	
2010/4/6	7.78	11.02	4.90	n.d.	0.80	13.41	1.77	3.85	0.29	n.d.	11.96	41.05	1.00	1.05	1.04	11.83	0.7	3.5	
2010/4/30	7.61	8.80	4.49	0.02	0.72	11.29	1.53	3.61	0.20	n.d.	9.88	35.99	1.08	0.90	0.90	10.21	0.2	7.4	
2010/5/20	7.48	8.50	4.15	n.d.	0.79	10.36	1.38	2.66	0.36	n.d.	7.70	35.32	2.76	0.83	0.82	9.20	0.7	4.0	
2010/6/4	7.95	12.71	5.56	n.d.	0.90	15.55	2.08	3.58	0.95	n.d.	15.32	48.31	1.16	1.21	1.23	13.86	-0.6	4.3	
2010/6/24	7.66	10.18	4.79	n.d.	0.89	12.58	1.68	2.91	0.56	n.d.	9.73	40.81	1.82	1.00	0.96	10.97	1.8	3.7	
2010/7/16	7.51	7.26	4.42	n.d.	0.48	5.10	1.06	3.00	0.20	n.d.	4.31	26.52	0.01	0.55	0.61	6.36	-5.7	-6.6	
2010/8/5	7.74	10.66	4.93	n.d.	0.94	12.72	1.71	2.67	1.79	n.d.	9.79	41.97	4.34	1.01	1.00	11.25	0.9	2.7	
2010/8/24	7.74	12.58	6.11	n.d.	1.04	17.40	2.27	3.16	2.09	n.d.	15.82	54.90	1.11	1.35	1.35	15.25	-0.2	9.6	
2010/9/9	7.73	10.85	5.03	n.d.	0.98	14.28	1.87	2.53	1.82	n.d.	11.00	47.83	2.08	1.11	1.11	12.41	-0.2	6.7	
2010/10/5	7.54	9.90	4.77	n.d.	0.88	12.28	1.64	2.49	0.77	n.d.	8.84	40.63	1.67	0.98	0.93	10.63	2.4	3.6	
2010/10/22	7.67	14.05	7.18	n.d.	1.93	17.40	2.29	4.50	1.35	n.d.	15.30	56.12	1.51	1.42	1.39	15.86	1.1	6.1	
2010/11/16	7.43	13.13	6.07	n.d.	0.82	17.58	2.31	3.44	1.67	n.d.	17.75	53.25	0.00	1.35	1.37	15.48	-0.5	8.2	
2010/12/7	7.73	12.95	5.53	n.d.	0.75	18.38	2.12	3.44	1.27	n.d.	15.28	50.14	1.11	1.35	1.26	14.82	3.6	6.7	
2011/1/5	7.89	13.25	5.87	n.d.	0.70	17.83	2.34	4.58	1.20	n.d.	18.93	49.47	0.84	1.36	1.35	15.61	0.1	8.2	
2011/1/24	7.78	13.93	6.23	n.d.	0.66	18.58	2.41	3.71	1.19	n.d.	19.90	52.77	0.00	1.41	1.40	16.15	0.3	7.4	
2011/2/15	7.62	12.53	5.27	n.d.	0.65	16.66	2.18	8.02	3.04	n.d.	14.58	39.96	2.38	1.26	1.23	14.59	0.9	7.6	
2011/3/15	7.79	14.27	6.18	n.d.	0.76	18.57	2.38	4.27	1.12	n.d.	18.50	53.56	0.98	1.41	1.40	16.08	0.3	6.0	
2011/3/28	7.92	14.00	5.93	n.d.	0.67	17.90	2.31	4.45	1.33	n.d.	18.49	51.97	0.83	1.36	1.38	15.72	-0.9	5.8	
2011/4/20	7.82	14.64	6.68	n.d.	0.83	20.00	2.56	4.28	2.43	n.d.	20.39	56.98	1.70	1.52	1.52	17.42	0.1	8.7	
2011/5/10	7.83	13.13	5.79	n.d.	0.94	17.68	2.24	4.33	1.19	n.d.	17.39	53.07	1.07	1.34	1.37	15.51	-1.1	8.3	
2011/6/2	7.73	10.43	4.87	n.d.	0.87	13.68	1.79	4.24	0.31	n.d.	11.27	43.01	1.25	1.06	1.06	12.03	0.0	7.1	
2011/6/18	7.43	7.15	3.81	0.02	0.70	8.02	1.10	3.31	n.d.	n.d.	6.11	27.82	3.08	0.68	0.68	7.59	-0.1	3.0	
2011/6/30	7.71	9.73	4.85	n.d.	0.93	12.24	1.70	3.41	0.27	n.d.	10.59	40.63	1.16	0.99	0.99	11.10	-0.1	6.6	
2011/7/13	7.78	11.92	5.55	n.d.	1.02	15.72	2.12	3.31	0.91	n.d.	13.83	51.24	0.81	1.23	1.24	13.85	-0.4	7.5	
2011/8/5	7.76	12.45	5.44	n.d.	1.12	15.01	2.10	3.08	0.64	n.d.	13.23	49.96	1.44	1.19	1.19	13.36	-0.2	3.5	
2011/8/25	7.84	13.85	6.09	n.d.	1.31	17.65	2.39	3.33	1.70	n.d.	15.90	56.43	0.00	1.38	1.38	15.54	0.0	5.7	
2011/9/22	7.63	7.57	4.34	n.d.	0.71	8.30	1.25	2.54	0.13	n.d.	6.75	31.23	1.54	0.72	0.73	8.06	-0.1	3.1	
2011/10/5	7.80	13.21	5.98	n.d.	0.92	16.05	2.25	3.37	1.05	n.d.	17.21	50.02	0.06	1.27	1.29	14.59	-0.8	5.0	
2011/10/28	7.78	11.58	5.49	n.d.	0.76	14.05	2.04	2.87	0.60	n.d.	13.00	48.19	0.09	1.13	1.15	12.77	-1.1	4.9	
2011/11/14	7.80	12.93	5.94	n.d.	0.83	16.16	2.31	3.14	1.22	n.d.	16.73	51.79	0.96	1.28	1.31	14.64	-1.1	6.2	
2011/12/9	7.75	11.63	5.21	0.02	0.71	13.88	2.01	3.39	0.17	n.d.	13.20	45.75	1.32	1.10	1.12	12.56	-0.9	3.8	
2011/12/27	7.84	13.65	5.92	0.01	0.64	16.37	2.36	3.42	0.65	n.d.	18.29	51.18	0.19	1.29	1.33	14.90	-1.6	4.4	
2012/1/12	7.76	13.83	6.28	n.d.	0.65	17.18	2.44	3.42	0.78	n.d.	19.73	53.56	0.00	1.35	1.40	15.67	-1.8	6.3	
2012/2/9	7.58	9.31	4.50	0.01	0.56	11.71	1.69	3.59	0.31	n.d.	11.46	36.52	1.20	0.93	0.94	10.69	-0.4	6.9	
2012/2/24	7.55	7.37	3.71	n.d.	0.53	8.56	1.22	3.31	0.13	n.d.	7.44	28.73	1.67	0.70	0.72	8.05	-1.3	4.4	
2012/3/20	7.59	9.67	4																

## Appendix 8e. 四万十川上流域の採水地点 N4 における渓流水分析データ

## Analytical data of streamwater at sampling location N4 in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μeq L <sup>-1</sup>	Anion μeq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2012/6/25	7.43	5.59	3.49	n.d.	0.60	5.62	0.85	2.38	0.10	n.d.	4.48	23.18	0.03	0.52	0.54	5.88	-2.3	2.5	
2012/7/13	7.53	6.88	4.04	n.d.	0.66	7.57	1.12	2.49	0.15	n.d.	5.61	30.30	1.54	0.66	0.69	7.44	-1.7	3.9	
2012/7/30	7.64	11.39	5.22	n.d.	0.82	12.79	1.82	2.61	1.27	n.d.	11.13	46.36	0.00	1.04	1.09	11.83	-2.3	1.9	
2012/8/23	7.62	9.03	4.22	n.d.	0.80	10.57	1.52	1.91	2.79	n.d.	6.52	37.76	5.09	0.86	0.85	9.44	0.2	2.2	
2012/9/12	7.61	8.28	4.37	n.d.	0.73	9.81	1.46	2.15	0.52	n.d.	6.04	39.96	1.62	0.82	0.85	9.09	-1.8	4.6	
2012/10/9	7.80	11.52	5.58	n.d.	0.77	14.08	2.11	2.87	1.06	n.d.	12.82	50.02	0.19	1.14	1.19	12.99	-2.0	6.0	
2012/10/29	7.72	12.36	5.70	n.d.	0.71	16.75	2.15	2.96	2.13	n.d.	21.90	52.46	1.06	1.28	1.43	15.64	-5.7	11.7	
2012/11/12	7.70	13.27	5.59	n.d.	0.74	17.65	2.30	4.16	3.69	n.d.	22.58	49.96	0.98	1.33	1.47	16.33	-4.8	10.3	
2012/12/7	7.66	12.09	5.59	n.d.	0.64	16.77	2.16	3.93	1.99	n.d.	22.85	48.19	0.82	1.27	1.41	15.66	-5.0	12.9	
2012/12/26	7.79	10.77	4.93	n.d.	0.60	14.85	1.93	4.17	1.39	n.d.	19.61	43.31	1.06	1.13	1.26	13.93	-5.4	12.8	
2013/1/18	7.73	10.34	4.71	n.d.	0.57	13.69	1.77	3.74	0.79	n.d.	11.41	41.48	0.99	1.05	1.04	11.79	0.6	6.6	
2013/2/8	7.69	9.38	4.21	n.d.	0.57	11.82	1.53	3.78	0.56	n.d.	9.27	36.54	0.00	0.91	0.91	10.29	0.3	4.6	
2013/2/25	7.44	10.52	4.83	n.d.	0.61	14.24	1.84	3.52	0.55	n.d.	12.25	43.80	0.00	1.09	1.08	12.26	0.3	7.6	
2013/3/15	8.02	12.21	5.37	n.d.	0.67	16.44	2.09	3.70	1.49	n.d.	26.25	32.17	0.93	1.24	1.20	14.78	1.7	9.5	
2013/4/5	7.49	12.27	5.36	n.d.	0.73	16.63	2.10	3.54	1.46	n.d.	24.09	50.08	1.17	1.25	1.45	15.76	-7.1	12.4	
2013/4/25	7.67	7.31	3.79	0.01	0.64	9.41	1.23	3.74	0.39	n.d.	6.89	29.83	1.42	0.75	0.74	8.46	0.6	7.3	
2013/6/5	7.77	12.10	5.53	0.01	0.88	17.54	2.17	3.22	1.22	n.d.	13.07	51.91	2.39	1.32	1.23	14.33	3.3	8.4	
2013/6/27	7.49	7.48	4.01	n.d.	0.76	9.27	1.22	3.47	0.23	n.d.	6.00	29.34	2.24	0.76	0.71	8.22	3.4	4.7	
2013/7/17	8.03	14.00	5.95	n.d.	0.98	17.53	2.20	3.32	1.86	n.d.	15.08	53.07	1.69	1.34	1.31	14.96	1.2	3.3	
2013/8/9	7.84	15.80	6.90	n.d.	1.07	20.93	2.57	3.53	2.89	n.d.	18.17	61.61	1.32	1.58	1.53	17.66	1.6	5.5	
2013/8/27	7.71	13.23	6.05	0.01	1.06	18.16	2.27	3.48	6.00	n.d.	14.57	49.41	2.52	1.38	1.31	15.38	2.8	7.5	
2013/9/6	7.59	9.33	4.54	n.d.	1.00	10.65	1.51	3.12	0.69	n.d.	9.03	35.50	1.83	0.88	0.87	9.85	0.6	2.7	
2013/9/17	7.67	12.29	5.45	n.d.	1.00	15.25	2.03	3.10	0.88	n.d.	14.48	46.04	1.40	1.19	1.16	13.33	1.4	4.0	
2013/10/10	7.48	8.40	4.58	n.d.	0.77	10.03	1.36	3.12	0.24	n.d.	6.65	34.71	0.56	0.83	0.80	9.05	1.9	3.7	
2013/10/22	7.42	12.24	5.70	n.d.	0.87	16.01	2.10	3.23	0.64	n.d.	14.72	48.74	1.66	1.24	1.21	13.85	1.4	6.2	
2013/10/30	7.45	10.26	5.16	n.d.	0.73	12.78	1.75	3.10	0.32	n.d.	11.95	40.14	0.00	1.03	1.00	11.44	1.3	5.5	
2013/11/18	7.49	12.99	6.01	n.d.	0.82	17.07	2.27	3.16	0.71	n.d.	16.62	50.63	1.57	1.32	1.28	14.75	1.7	6.3	
2013/12/13	7.62	11.99	5.16	n.d.	0.75	14.93	2.02	3.78	0.31	n.d.	13.34	44.10	0.00	1.15	1.11	12.87	1.9	3.5	
2014/1/7	7.60	12.97	5.60	n.d.	0.73	16.63	2.19	4.09	0.45	n.d.	11.08	49.41	0.88	1.27	1.16	13.63	4.5	2.5	
2014/1/27	7.52	13.14	6.18	n.d.	0.74	18.37	2.39	4.33	0.72	n.d.	12.98	51.97	0.83	1.40	1.26	14.95	5.5	6.5	
2014/2/20	7.48	9.43	4.51	n.d.	0.65	12.95	1.68	4.42	0.36	n.d.	7.38	38.43	1.13	1.00	0.91	10.71	4.3	6.3	
2014/3/14	7.43	7.43	3.70	n.d.	0.55	8.95	1.15	3.72	0.10	n.d.	7.23	28.10	1.77	0.72	0.72	8.14	-0.1	4.5	
2014/4/3	7.46	10.76	4.97	n.d.	0.70	14.08	1.78	3.54	0.16	n.d.	12.15	43.92	0.49	1.08	1.08	12.18	0.4	6.2	
2014/4/23	7.85	12.13	5.40	n.d.	0.81	16.26	2.06	3.39	0.35	n.d.	14.44	50.63	0.83	1.24	1.23	13.92	0.2	6.9	
2014/5/9	7.76	13.16	6.04	n.d.	0.85	18.49	2.32	3.38	0.65	n.d.	17.01	55.82	0.84	1.40	1.37	15.69	0.8	8.8	
2014/5/27	7.83	10.08	4.65	n.d.	0.79	14.06	1.73	2.90	0.42	n.d.	11.07	45.20	1.54	1.07	1.06	11.91	0.3	8.3	
2014/6/17	7.83	11.66	5.44	n.d.	0.83	16.36	2.04	3.20	0.56	n.d.	13.82	51.18	1.25	1.24	1.23	13.88	0.7	8.7	
2014/7/9	7.80	9.18	4.68	n.d.	0.77	12.04	1.53	3.07	0.24	n.d.	8.76	39.77	0.98	0.95	0.92	10.46	1.4	6.5	
2014/7/24	7.86	12.60	6.10	n.d.	0.96	17.23	2.18	3.24	1.47	n.d.	15.30	51.18	0.45	1.33	1.27	14.73	2.2	7.8	
2014/8/12	7.85	8.19	4.52	n.d.	0.76	9.20	1.34	2.32	0.20	n.d.	7.29	32.33	1.31	0.79	0.75	8.54	2.3	2.1	
2014/8/27	7.75	10.04	5.22	n.d.	0.83	12.89	1.78	2.49	0.56	n.d.	9.55	43.37	0.75	1.04	0.99	11.26	2.5	5.7	
2014/9/18	7.74	12.13	5.78	n.d.	0.84	15.48	2.10	2.65	1.22	n.d.	13.24	50.69	0.82	1.22	1.20	13.55	0.7	5.5	
2014/10/9	7.64	11.25	5.36	n.d.	0.83	14.62	1.97	2.45	0.92	n.d.	11.47	49.29	0.75	1.15	1.13	12.66	0.7	5.9	
2014/10/30	7.72	12.63	5.86	n.d.	0.78	16.34	2.19	2.67	0.93	n.d.	15.38	52.16	0.73	1.27	1.27	14.28	0.2	6.1	
2014/11/20	7.50	13.00	6.27	n.d.	0.77	17.61	2.36	2.90	1.29	n.d.	17.48	52.52	0.00	1.37	1.33	15.29	1.4	8.1	
2014/12/2	7.63	12.19	5.75	n.d.	0.83	16.69	2.27	3.96	0.94	n.d.	15.56	48.74	0.94	1.29	1.25	14.47	1.6	8.5	
2014/12/22	7.61	9.73	4.41	n.d.	0.64	11.59	1.59	4.67	0.32	n.d.	9.40	35.44	1.08	0.92	0.91	10.41	0.2	3.4	
2015/1/15	7.40	7.89	3.69	n.d.	0.65	9.58	1.30	6.29	1.09	n.d.	6.16	24.71	2.73	0.76	0.73	8.64	2.2	4.6	
2015/2/6	7.51	11.10	5.09	n.d.	0.64	14.80	1.95	3.81	0.43	n.d.	12.88	45.20	0.70	1.14	1.12	12.79	0.6	7.1	
2015/2/27	7.70	10.41	4.44	n.d.	0.64	12.83	1.68	4.65	0.57	n.d.	9.47	37.82	1.34	0.99	0.96	11.04	1.6	2.9	
2015/3/20	7.59	7.65	3.90	n.d.	0.63	8.94	1.19	4.13	0.07	n.d.	5.87	28.37	1.33	0.73	0.70	8.09	1.7	2.8	
2015/4/8	7.71	9.72	4.47	n.d.	0.69	12.37	1.60	3.60	0.25	n.d.	9.28	39.41	1.36	0.96	0.94	10.70	0.9	4.8	
2015/4/30	7.77	12.52	5.56	n.d.	0.79	16.51	2.11	3.55	0.68	n.d.	13.61	52.16	0.66	1.26	1.25	14.10	0.4	5.9	
2015/5/20	7.84	9.43	4.36	n.d.	0.75	11.88	1.52	3.18	0.37	n.d.	7.93	39.10	1.27	0.93	0.90	10.18	1.4	3.8	
2015/6/8	7.76	9.88	4.48	n.d.	0.76	12.60	1.61	2.88	0.55	n.d.	8.40	41.73	1.66	0.98	0.95	10.69	1.4	3.9	
2015/7/2	7.80	7.93	4.00	n.d.	0.66	8.94	1.19	2.93	0.18	n.d.	5.47	31.78	1.42	0.74	0.72	8.05	1.0	0.8	
2015/7/24	7.78	8.12	4.26	n.d.	0.70	9.81	1.30	2.56	0.21	n.d.	5.74	35.87	1.33	0.80	0.78	8.69	1.1	3.4	
2015/8/11	7.89	13.49	6.00	n.d.	0.93	16.78	2.15	2.94	1.57	n.d.	13.69	54.90	0.78	1.30	1.29	14.50	0.2	3.6	
2015/8/26	7.70	7.88	4.06	n.d.	0.93	8.94	1.23	2.72	0.04	n.d.	5.69	31.72	2.12	0.75	0.72	8.10	2.1	1.4	
2015/9/25	7.71	7.98	4.25	n.d.	0.81	9.11	1.28	2.50	0.09	n.d.	5.36	34.77	1.81	0.77	0.75	8.32	0.8	2.1	
2015/10/15	7.88	13.09	5.76	n.d.	0.83	16.14	2.16	2.85	0.81	n.d.	14.01	52.19	0.52	1.25	1.24	13.99	0.6	3.3	
2015/11/4	7.85	13.08	5.73	n.d.	0.83	16.73	2.22	3.16	1.57	n.d.	14.22	51.85	1.33	1.29	1.26	14.35	1.1	4.6	
2015/11/18	7.61	7.56	3.56	n.d.	0.92	9.36	1.25	2.26	0.15	n.d.	4.58	32.64	5.81	0.75	0.70	7.92	3.5	2.3	
2015/12/8	7.73	11.68	5.19	n.d.	0.75	14.86	1.96	2.94	0.48	n.d.	12.18	47.58	0.80	1.15	1.12	12.73	1.1	4.3	
2015/12/24	7.71	10.34	4.77	n.d.	0.76	12.85	1.74	3.29	0.21	n.d.	9.89	41.36	1.40	1.01	0.98	11.16	1.6	3.8	

\* 分析値の品質管理: R1 はイオンバランス、R2 は

## Appendix 9a. 四万十川上流域の採水地点 M (北川川) における水質データ

## Analytical data for mainstream water at sampling location M of the Kitagawa River in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μ eq L <sup>-1</sup>	Anion μ eq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC <sup>*</sup>
									mg L <sup>-1</sup>										
2000/3/24	7.96	7.52	3.12	n.d.	0.54	9.86	0.98	2.53	1.56	n.d.	5.60	28.21	1.09	0.72	0.68	7.85	3.3	2.1	
2000/4/17	8.25	8.94	3.43	n.d.	0.48	12.49	1.22	2.28	0.81	n.d.	6.37	41.44	0.20	0.88	0.89	9.75	-0.2	4.3	
2000/4/27	8.18	8.46	3.23	n.d.	0.51	12.18	1.21	2.20	1.38	n.d.	6.11	34.59	1.28	0.86	0.78	9.12	5.0	3.7	
2000/5/15	8.48	9.73	3.56	n.d.	0.49	13.88	1.25	2.39	1.30	n.d.	7.03	45.33	0.93	0.96	0.98	10.68	-0.7	4.6	
2000/5/29	8.36	8.81	3.25	n.d.	0.48	12.41	1.15	2.30	1.61	n.d.	6.23	40.35	1.11	0.87	0.88	9.65	-0.8	4.5	
2000/6/12	8.29	7.94	3.10	n.d.	0.41	10.89	1.09	2.16	1.05	n.d.	5.46	35.19	0.24	0.78	0.77	8.53	0.7	3.6	
2000/6/26	8.46	8.56	3.31	n.d.	0.48	12.22	1.19	2.05	0.56	n.d.	5.49	40.61	0.76	0.86	0.85	9.34	1.0	4.4	
2000/7/10	8.58	8.65	3.36	n.d.	0.45	12.06	1.17	2.02	0.58	n.d.	5.57	42.08	0.99	0.86	0.87	9.41	-0.9	4.2	
2000/7/25	8.19	10.23	3.58	n.d.	0.54	15.76	1.44	2.08	1.00	0.15	6.03	50.44	0.68	1.07	1.03	11.48	2.0	5.7	
2000/8/7	7.94	7.31	3.04	n.d.	0.53	9.97	0.97	2.09	0.93	n.d.	4.35	32.41	0.90	0.72	0.70	7.79	1.9	3.2	
2000/8/22	8.81	9.27	3.36	n.d.	0.60	13.67	1.21	2.08	0.39	0.15	5.28	43.09	1.04	0.94	0.89	9.99	3.1	3.7	
2000/9/4	8.71	9.51	3.41	n.d.	0.50	14.12	1.27	2.04	0.72	n.d.	5.50	44.23	1.32	0.97	0.91	10.25	3.3	3.7	
2000/9/18	7.83	6.58	2.76	n.d.	0.42	9.16	0.86	2.00	0.98	n.d.	3.51	28.49	0.84	0.66	0.61	6.98	3.7	3.0	
2000/10/3	8.08	8.17	3.00	n.d.	0.48	11.49	1.00	1.92	0.85	0.25	4.24	33.81	2.20	0.80	0.72	8.35	5.3	1.1	
2000/10/18	8.82	8.58	3.13	n.d.	0.49	12.84	1.12	1.94	0.35	n.d.	4.60	42.07	1.03	0.88	0.85	9.36	2.1	4.4	
2000/11/6	7.95	7.58	3.10	n.d.	0.47	10.45	1.02	1.91	0.97	n.d.	4.47	34.25	1.02	0.75	0.72	8.08	1.9	3.2	
2000/11/21	8.42	8.56	3.08	n.d.	0.53	12.32	1.10	2.00	0.88	n.d.	4.88	39.40	1.11	0.85	0.82	9.13	2.1	3.2	
2000/12/5	8.18	9.33	3.28	0.03	0.50	13.22	1.19	2.09	0.56	n.d.	5.54	41.62	1.09	0.91	0.87	9.74	2.7	2.1	
2000/12/18	8.06	9.80	3.23	0.02	0.47	14.36	1.25	2.09	0.80	n.d.	5.80	43.09	1.34	0.97	0.90	10.26	4.0	2.3	
2001/1/9	7.96	9.62	3.27	0.01	0.43	13.73	1.22	2.38	0.79	n.d.	6.60	40.27	1.01	0.94	0.88	10.05	3.4	2.2	
2001/1/23	7.98	9.47	3.45	0.03	0.34	13.55	1.25	3.25	1.07	n.d.	7.01	37.36	1.31	0.94	0.87	10.11	4.0	3.3	
2001/2/6	8.13	8.26	3.17	n.d.	0.32	11.59	1.12	2.31	0.81	n.d.	5.92	34.32	1.05	0.82	0.76	8.76	3.3	3.0	
2001/2/20	8.02	9.16	3.46	n.d.	0.32	12.91	1.21	3.28	0.54	n.d.	6.40	37.89	1.38	0.90	0.86	9.78	2.7	3.3	
2001/3/6	7.96	8.65	3.49	n.d.	0.38	11.65	1.18	3.61	0.92	n.d.	6.24	34.24	0.75	0.84	0.81	9.23	2.0	3.2	
2001/3/21	8.20	8.73	3.33	n.d.	0.41	11.89	1.17	2.43	0.37	n.d.	6.04	38.51	1.06	0.85	0.83	9.23	0.8	2.8	
2001/4/10	8.19	9.47	3.46	n.d.	0.46	13.10	1.25	2.37	0.69	n.d.	6.17	45.71	0.46	0.92	0.96	10.23	-2.0	3.8	
2001/4/23	8.18	9.98	3.72	n.d.	0.53	14.91	1.40	2.44	0.74	n.d.	7.38	47.01	0.38	1.03	1.00	11.22	1.4	5.8	
2001/5/8	7.83	7.24	2.94	n.d.	0.43	9.50	1.01	2.26	0.75	n.d.	4.93	31.08	0.62	0.70	0.69	7.65	0.6	2.7	
2001/5/22	8.07	8.67	3.27	n.d.	0.46	11.97	1.15	2.25	0.71	n.d.	5.54	40.08	0.90	0.85	0.85	9.27	-0.1	3.3	
2001/6/5	8.01	8.96	3.46	n.d.	0.44	12.42	1.22	2.18	0.33	n.d.	5.89	41.51	0.26	0.88	0.87	9.57	0.7	3.3	
2001/6/20	7.78	7.32	2.67	n.d.	0.43	10.34	1.04	1.76	1.41	n.d.	4.42	32.01	1.21	0.73	0.69	7.80	2.8	3.2	
2001/7/3	8.23	8.83	3.43	n.d.	0.43	12.44	1.21	2.14	0.57	n.d.	5.53	43.09	0.00	0.88	0.89	9.64	-0.6	4.4	
2001/7/24	8.67	9.19	3.45	n.d.	0.43	12.75	1.24	2.02	0.61	n.d.	5.53	45.07	0.55	0.90	0.92	9.88	-1.2	3.6	
2001/8/7	8.39	9.58	3.33	n.d.	0.54	13.55	1.28	2.09	1.14	n.d.	5.49	45.18	1.35	0.94	0.93	10.20	0.4	3.1	
2001/8/21	7.73	7.35	2.69	n.d.	0.50	9.90	1.01	1.65	1.69	n.d.	4.58	31.57	1.55	0.71	0.69	7.68	1.5	2.2	
2001/9/4	8.38	9.16	3.37	n.d.	0.44	12.67	1.26	1.93	1.09	n.d.	5.82	41.89	1.16	0.89	0.88	9.69	0.8	2.8	
2001/9/26	8.08	8.58	3.32	n.d.	0.19	11.83	1.16	1.99	0.46	n.d.	5.23	39.26	0.63	0.84	0.82	9.00	1.2	2.4	
2001/10/10	7.95	6.72	2.59	n.d.	0.37	8.92	0.93	1.61	1.22	n.d.	4.10	28.89	1.58	0.64	0.62	6.97	1.6	1.8	
2001/10/24	7.97	7.47	3.19	0.05	0.39	10.10	1.05	1.93	0.57	n.d.	4.90	33.54	0.72	0.74	0.72	7.99	1.8	3.4	
2001/11/7	8.05	8.32	3.16	0.07	0.38	10.83	1.12	1.88	0.43	n.d.	5.06	37.55	1.41	0.78	0.78	8.53	0.2	1.2	
2001/11/21	8.08	9.18	3.44	0.16	0.38	13.03	1.28	2.00	0.16	n.d.	5.71	43.85	0.58	0.92	0.90	9.91	1.5	3.8	
2001/12/4	8.28	9.63	3.25	0.09	0.37	12.87	1.23	2.12	0.28	n.d.	6.02	43.16	1.06	0.90	0.90	9.81	0.1	0.9	
2001/12/20	7.95	9.94	3.29	0.06	0.33	13.37	1.27	2.18	0.33	n.d.	6.63	46.71	0.83	0.93	0.97	10.35	-2.3	2.0	
2002/1/8	8.00	10.57	3.50	0.08	0.33	14.56	1.37	3.19	0.19	n.d.	7.09	47.70	1.30	1.00	1.02	11.15	-0.9	2.7	
2002/1/22	7.86	10.17	3.39	0.12	0.40	13.83	1.32	3.35	0.81	n.d.	6.84	42.81	1.11	0.96	0.95	10.63	0.6	2.2	
2002/2/7	7.92	10.07	3.45	n.d.	0.35	13.11	1.30	2.63	0.27	n.d.	7.68	46.23	0.00	0.92	1.00	10.52	-4.0	2.2	
2002/2/19	7.95	10.40	3.54	0.05	0.34	13.82	1.34	3.07	0.31	n.d.	7.48	42.88	0.33	0.96	0.95	10.61	0.8	1.0	
2002/3/5	7.83	10.26	3.56	n.d.	0.40	13.48	1.30	2.67	0.57	n.d.	7.44	39.77	0.65	0.94	0.89	10.20	2.9	-0.3	
2002/3/19	8.03	10.26	3.86	0.02	0.39	14.33	1.38	2.51	0.22	n.d.	7.70	40.47	0.44	1.01	0.90	10.58	5.8	1.6	
2002/4/9	8.11	9.09	3.34	n.d.	0.39	11.42	1.20	2.41	0.51	n.d.	6.83	34.06	1.39	0.82	0.78	8.91	2.9	-1.0	
2002/4/23	7.85	9.24	3.30	0.13	0.39	11.63	1.24	2.40	0.95	n.d.	7.21	33.98	0.59	0.84	0.79	9.14	3.2	-0.5	
2002/5/8	7.92	7.99	3.11	n.d.	0.39	9.99	1.09	2.31	0.67	n.d.	6.04	32.59	0.72	0.73	0.74	8.15	-0.2	1.0	
2002/5/28	8.26	8.95	3.52	0.05	0.41	12.05	1.25	2.29	0.30	n.d.	6.02	40.29	0.40	0.87	0.86	9.46	0.9	2.7	
2002/6/11	8.04	10.20	3.46	n.d.	0.47	13.80	1.34	2.13	0.62	n.d.	6.98	45.78	0.90	0.96	0.97	10.55	-0.2	1.7	
2002/6/25	8.25	9.74	3.17	n.d.	0.45	12.94	1.25	1.93	1.06	n.d.	6.23	44.20	0.95	0.90	0.93	9.96	-1.5	1.1	
2002/7/9	7.82	7.57	2.84	n.d.	0.41	9.41	1.00	1.98	0.56	n.d.	4.79	32.87	0.69	0.69	0.70	7.61	-1.3	0.3	
2002/7/23</																			

Appendix 9b. 四万十川上流域の採水地点 M (北川川) における水質データ

Analytical data for mainstream water at sampling location M of the Kitagawa River in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μ eq L <sup>-1</sup>	Anion μ eq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2003/2/18	7.98	9.39	3.66	n.d.	0.37	12.99	1.28	2.94	0.28	n.d.	6.17	40.35	0.15	0.92	0.88	9.92	2.5	2.8	
2003/3/4	7.90	8.32	3.29	n.d.	0.33	11.05	1.12	2.89	0.74	n.d.	5.62	33.39	0.00	0.79	0.76	8.63	2.4	1.8	
2003/3/18	8.01	8.06	3.21	n.d.	0.34	10.46	1.08	2.78	0.59	n.d.	5.44	32.66	0.16	0.76	0.74	8.30	1.5	1.5	
2003/4/7	8.01	8.57	3.36	0.05	0.35	11.15	1.16	2.68	0.62	n.d.	6.25	34.88	0.35	0.81	0.79	8.87	1.4	1.7	
2003/4/21	8.26	9.27	3.51	n.d.	0.40	12.10	1.22	2.43	0.53	n.d.	6.41	37.61	0.92	0.87	0.83	9.36	2.4	0.5	
2003/5/8	7.99	9.25	3.43	n.d.	0.45	12.00	1.22	2.32	0.70	n.d.	5.89	40.84	0.44	0.86	0.87	9.47	-0.5	1.2	
2003/5/22	7.98	7.97	3.16	n.d.	0.36	9.97	1.03	2.24	0.30	n.d.	4.60	35.56	2.55	0.73	0.75	8.04	-1.2	0.5	
2003/6/4	7.82	7.22	3.01	n.d.	0.35	9.07	0.93	2.22	0.33	n.d.	4.02	31.46	0.29	0.67	0.67	7.30	0.1	0.5	
2003/6/19	7.80	6.28	2.66	n.d.	0.34	7.66	0.81	2.03	0.33	n.d.	3.46	28.22	0.29	0.57	0.60	6.38	-2.0	0.8	
2003/7/3	7.92	7.80	3.09	n.d.	0.35	10.26	1.03	2.10	0.11	n.d.	4.22	32.94	0.70	0.74	0.69	7.81	3.6	0.1	
2003/7/17	8.46	8.23	3.16	n.d.	0.39	10.91	1.07	2.06	0.36	n.d.	4.26	40.03	1.72	0.78	0.81	8.58	-1.8	2.1	
2003/8/1	8.38	9.34	3.33	0.04	0.42	12.52	1.18	2.01	0.53	n.d.	4.69	26.38	0.91	0.88	0.60	8.25	19.3	-6.2	R1
2003/8/14	7.75	7.41	2.89	n.d.	0.39	9.37	0.95	1.94	0.67	n.d.	3.83	20.90	3.79	0.68	0.49	6.56	16.6	-6.1	R1
2003/9/4	8.49	9.98	3.60	0.12	0.51	14.82	1.33	2.18	0.13	n.d.	4.78	51.83	0.74	1.02	1.01	10.97	0.6	4.7	
2003/9/18	8.09	8.49	3.30	n.d.	0.41	11.40	1.11	2.04	0.49	n.d.	4.45	39.76	0.40	0.81	0.81	8.80	0.3	1.8	
2003/10/8	8.31	9.63	3.43	n.d.	0.39	13.40	1.24	2.09	0.25	n.d.	5.02	44.56	0.64	0.93	0.90	9.91	1.8	1.4	
2003/10/22	8.05	8.31	3.44	n.d.	0.40	11.51	1.14	2.08	0.41	n.d.	4.68	38.36	0.47	0.83	0.79	8.81	2.2	2.9	
2003/11/12	8.09	9.49	3.62	n.d.	0.43	13.21	1.30	2.10	0.65	n.d.	5.84	43.81	0.12	0.93	0.91	10.05	1.4	2.9	
2003/11/26	8.02	9.64	3.44	n.d.	0.36	13.03	1.24	2.10	0.46	n.d.	5.47	43.33	0.62	0.91	0.89	9.80	1.1	0.8	
2003/12/10	7.82	8.49	3.27	n.d.	0.31	10.97	1.10	2.13	0.45	n.d.	5.26	38.78	0.00	0.79	0.81	8.72	-1.5	1.4	
2003/12/24	7.91	9.21	3.50	n.d.	0.32	12.85	1.25	2.76	0.28	n.d.	5.22	42.35	0.32	0.90	0.89	9.77	1.1	2.9	
2004/1/7	7.89	9.61	3.32	n.d.	0.27	12.23	1.19	2.26	0.17	n.d.	5.59	48.59	0.14	0.86	0.98	9.91	-6.5	1.5	
2004/1/21	8.00	10.31	3.61	n.d.	0.31	14.01	1.32	3.50	0.25	n.d.	6.28	48.62	0.25	0.97	1.03	10.96	-2.9	3.0	
2004/2/5	7.88	11.07	3.79	n.d.	0.32	15.25	1.45	4.07	0.24	n.d.	7.62	50.36	0.22	1.05	1.10	11.89	-2.3	3.6	
2004/2/20	7.98	10.77	3.70	n.d.	0.33	14.78	1.37	3.21	0.12	n.d.	6.81	55.68	0.66	1.02	1.15	11.76	-5.9	4.4	
2004/3/4	7.91	9.92	3.53	n.d.	0.32	13.15	1.28	3.37	0.84	n.d.	6.89	45.53	0.84	0.92	1.00	10.58	-3.9	3.2	
2004/3/24	8.03	9.74	3.57	0.02	0.36	12.90	1.26	3.25	0.87	n.d.	6.78	47.80	0.78	0.91	1.03	10.65	-6.0	4.5	
2004/4/6	8.11	9.07	3.52	n.d.	0.35	11.81	1.22	2.81	0.59	n.d.	6.59	43.66	0.63	0.85	0.94	9.83	-5.0	4.0	
2004/4/21	8.13	8.43	3.12	n.d.	0.34	10.24	1.05	2.64	0.97	n.d.	5.73	41.55	0.78	0.74	0.89	8.91	-9.1	2.8	R1
2004/5/14	7.75	6.47	2.71	n.d.	0.30	7.41	0.83	2.33	1.05	n.d.	4.25	30.18	0.67	0.56	0.67	6.74	-8.3	2.1	R1
2004/5/31	8.15	8.80	3.46	n.d.	0.38	11.58	1.18	2.36	0.28	n.d.	5.14	47.88	0.65	0.84	0.96	9.67	-7.1	4.7	
2004/6/11	7.88	9.32	3.52	n.d.	0.41	12.43	1.25	2.24	0.47	n.d.	5.62	49.16	0.75	0.89	0.99	10.14	-5.7	4.2	
2004/6/28	7.98	8.28	3.19	n.d.	0.39	10.35	1.06	2.20	0.52	n.d.	4.70	45.22	0.64	0.75	0.91	8.92	-9.4	3.7	R1
2004/7/12	8.57	8.70	3.25	n.d.	0.40	11.61	1.11	2.15	0.30	n.d.	4.82	49.57	0.84	0.82	0.98	9.63	-8.7	5.1	R1
2004/7/26	8.61	10.21	3.62	n.d.	0.49	14.41	1.31	2.33	0.62	n.d.	5.81	58.46	0.66	1.00	1.16	11.54	-7.3	6.1	
2004/8/9	7.90	7.61	3.19	n.d.	0.36	9.84	1.04	2.10	0.49	n.d.	4.25	44.49	0.38	0.72	0.88	8.60	-10.0	6.1	R1
2004/8/27	8.23	7.89	3.33	n.d.	0.38	10.73	1.08	1.98	0.33	n.d.	3.84	47.91	0.24	0.78	0.93	9.06	-8.6	6.9	R1
2004/9/13	7.59	5.33	2.64	n.d.	0.35	6.01	0.68	2.46	0.54	n.d.	2.31	26.74	0.60	0.48	0.56	5.65	-8.1	2.9	R1
2004/9/27	8.15	8.37	3.32	n.d.	0.39	11.82	1.12	2.29	0.31	n.d.	3.71	49.12	0.47	0.84	0.95	9.52	-6.5	6.5	
2004/10/12	8.22	8.19	3.07	n.d.	0.36	10.63	1.03	2.21	0.29	n.d.	3.71	49.26	0.51	0.76	0.95	9.06	-11.3	5.1	R1
2004/10/25	7.84	7.45	2.99	n.d.	0.37	9.31	0.97	2.21	0.49	n.d.	3.33	44.69	0.34	0.68	0.87	8.26	-12.1	5.1	R1
2004/11/8	8.44	8.35	3.30	n.d.	0.38	11.81	1.11	2.16	0.18	n.d.	3.81	50.80	0.23	0.83	0.98	9.61	-7.8	7.0	
2004/11/22	7.95	8.30	3.32	n.d.	0.35	11.67	1.13	2.21	0.28	n.d.	3.95	49.31	0.41	0.83	0.96	9.51	-7.2	6.8	
2004/12/6	7.66	6.76	2.90	n.d.	0.35	8.37	0.88	2.11	0.76	n.d.	3.57	36.87	0.54	0.62	0.75	7.39	-9.1	4.5	R1
2004/12/21	7.82	8.99	3.31	n.d.	0.35	12.12	1.15	2.18	0.24	n.d.	4.45	49.31	0.42	0.85	0.97	9.72	-6.2	3.9	
2005/1/7	7.75	9.53	3.43	0.01	0.32	13.39	1.23	2.40	0.33	n.d.	5.10	45.61	0.17	0.93	0.93	10.06	0.0	2.7	
2005/1/21	7.94	9.89	3.50	n.d.	0.30	14.05	1.28	2.76	0.34	n.d.	5.62	47.74	0.17	0.97	0.98	10.60	-0.8	3.5	
2005/2/7	7.67	11.05	3.42	n.d.	0.28	14.03	1.25	5.46	0.39	n.d.	5.72	45.21	0.38	0.96	1.02	10.98	-3.1	-0.3	
2005/2/18	8.00	8.55	3.25	n.d.	0.32	11.14	1.07	2.82	0.69	n.d.	5.16	38.81	0.75	0.79	0.83	8.92	-2.5	2.1	
2005/3/7	7.92	8.86	3.46	n.d.	0.31	11.87	1.17	2.46	0.28	n.d.	5.73	41.07	1.00	0.85	0.87	9.36	-1.2	2.7	
2005/3/23	7.69	8.86	2.80	n.d.	0.31	8.47	0.89	2.26	0.92	n.d.	4.30	34.54	0.72	0.63	0.73	7.40	-8.0	-9.0	
2005/4/6	7.95	8.39	3.48	n.d.	0.34	11.28	1.15	2.37	0.18	n.d.	5.22	47.47	0.65	0.82	0.96	9.54	-7.9	6.4	
2005/4/26	8.27	9.51	3.59	n.d.	0.41	12.96	1.26	2.40	0.34	n.d.	5.92	55.73	0.85	0.92	1.11	10.86	-9.5	6.6	R1
2005/5/10	8.02	8.47	3.30	n.d.	0.38	10.99	1.11	2.20	0.36	n.d.	5.43	46.82	0.78	0.79	0.95	9.37	-9.0	5.0	R1
2005/5/24	8.33	9.67	3.60	n.d.	0.44	13.08	1.27	2.33	0.51	n.d.	5.77	55.72	0.84	0.93	1.11	10.89	-8.9	5.9	R1
2005/6/6	8.39	10.76	3.86	n.d.	0.50	14.93	1.40	2.42	0.32	n.d.	6.76	62.66	0.00	1.04	1.24	12.24	-8.8	6.4	R1
2005/6/21	8.27	11.14	3.90	n.d.	0.51	15.70	1.44	2.31	0.19	0.46	6.50	67.20	0.83	1.08	1.32	12.87	-9.8	7.2	R1
2005/7/5	7.76	7.31	2.81	n.d.	0.42	9.47	0.94	1.74	1.24	n.d.	4.63	37.42	1.25	0.68	0.78	7.93	-6.5	4.1	
2005/7/19	8.68	8.78	3.44	n.d.	0.44	11.70	1.14	2.10	0.20	n.d.	5.02	50.60	0.38	0.84	1.00	9.81	-8.6	5.5	R1
2005/8/9	8.38	10.85	3.78	n.d.	0.53	15.40	1.43	2.15	0.47	n.d.	6.13	63.89	0.58	1.06	1.24	12.32	-7.8	6.3	
2005/8/22	8.25	9.65	3.42	n.d.	0.51	13.18	1.25	1.99	1.41	n.d.	5.41	53.04	1.41	0.92	1.06	10.66	-7.0	5.0	
2005/9/15	7.88	8.21	3.26	n.d.	0.42	10.72	1.06	2.09	0.59	n.d.	4.47	41.64	0.46	0.77	0.84	8.74	-4.3	3.1	
2005/9/28	8.42	10.29	3.51	n.d.	0.41	16.98	1.43	2.07	n.d.	n.d.	5.55	68.85	0.00	1.13	1.30	12.90	-7.2	11.3	
2005/10/11	8.29	10.61	3.54	n.d.	0.43	14.84	1.33	2.10	0.10	n.d.	5.55	60.31	0.15	1.01	1.16	11.62	-6.9	4.6	
2005/10/25	8.20	11.14	3.58	n.d.	0.36	15.82	1.42	2.23	0.35	n.d.	6.03	61.43	0.25	1.07	1.20	12.17	-5.7	4.4	
2005/11/8	8.02	9.03	3.38	n.d.	0.37	11.60	1.15</												

## Appendix 9c. 四万十川上流域の採水地点 M (北川川) における水質データ

## Analytical data for mainstream water at sampling location M of the Kitagawa River in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation	Anion	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
														μ eq L <sup>-1</sup>					
2006/1/25	8.00	9.66	3.65	n.d.	0.31	13.02	1.32	3.03	0.58	n.d.	7.05	44.38	0.57	0.93	0.97	10.43	-2.3	3.8	
2006/2/8	8.03	9.40	3.63	n.d.	0.32	12.61	1.28	3.31	0.71	n.d.	7.14	41.00	1.26	0.90	0.93	10.13	-1.3	3.7	
2006/2/22	8.21	9.40	3.47	n.d.	0.33	11.91	1.21	2.58	0.47	n.d.	6.60	47.82	0.57	0.85	1.00	10.08	-8.0	3.5	R1
2006/3/8	8.30	8.80	3.40	n.d.	0.33	10.95	1.14	2.67	0.40	n.d.	6.07	44.43	0.83	0.80	0.94	9.43	-8.1	3.4	R1
2006/3/22	7.89	8.83	3.34	n.d.	0.34	10.92	1.17	2.82	0.64	n.d.	6.06	44.13	0.64	0.79	0.94	9.45	-8.3	3.4	R1
2006/4/12	7.63	5.90	2.66	n.d.	0.34	6.45	0.74	2.52	0.88	n.d.	3.90	26.02	0.59	0.51	0.59	6.08	-7.8	1.5	
2006/4/25	8.02	8.35	3.32	n.d.	0.34	10.21	1.10	2.50	0.40	n.d.	5.33	42.74	0.63	0.75	0.89	8.89	-8.3	3.1	R1
2006/5/11	7.65	5.45	2.58	0.02	0.42	6.06	0.70	2.23	0.67	n.d.	3.28	27.69	1.89	0.48	0.60	5.88	-10.4	3.8	R1
2006/5/24	8.06	7.51	3.10	n.d.	0.36	9.32	0.99	2.27	0.37	n.d.	4.36	47.31	0.83	0.69	0.94	8.65	-15.1	7.1	R1
2006/6/13	8.48	9.14	3.44	n.d.	0.43	12.06	1.22	2.34	0.09	n.d.	5.37	20.17	1.02	0.86	0.51	7.82	25.7	-7.8	R1
2006/6/27	7.77	6.42	2.80	n.d.	0.32	7.57	0.83	1.99	0.45	n.d.	3.61	19.13	0.47	0.58	0.45	5.76	12.1	-5.4	R1
2006/7/13	8.22	7.80	3.14	n.d.	0.37	9.77	1.01	2.03	0.38	n.d.	4.17	35.66	0.67	0.72	0.73	7.87	-1.2	0.5	
2006/7/25	8.05	7.38	3.09	n.d.	0.36	9.15	0.97	2.01	0.51	n.d.	4.01	34.19	0.39	0.68	0.71	7.53	-2.1	1.0	
2006/8/9	8.47	9.79	3.47	n.d.	0.43	13.29	1.25	2.12	0.31	n.d.	4.91	48.03	1.27	0.93	0.95	10.14	-1.4	1.8	
2006/8/23	7.86	6.77	2.98	n.d.	0.36	7.74	0.85	2.00	0.61	n.d.	3.49	33.45	0.79	0.59	0.69	6.91	-7.2	1.0	
2006/9/5	8.13	8.68	3.41	n.d.	0.40	11.13	1.12	2.08	0.25	n.d.	4.51	44.31	0.19	0.81	0.88	9.07	-4.6	2.2	
2006/9/20	7.85	6.73	2.95	n.d.	0.31	8.01	0.86	1.96	0.52	n.d.	3.17	32.61	0.56	0.61	0.66	6.84	-4.5	0.8	
2006/10/4	8.32	9.11	3.34	n.d.	0.41	12.35	1.15	2.05	0.12	n.d.	4.10	46.34	0.51	0.87	0.90	9.49	-2.1	2.1	
2006/10/19	8.43	9.97	3.41	n.d.	0.37	13.68	1.26	2.07	0.15	n.d.	4.72	53.12	0.41	0.94	1.03	10.55	-4.3	2.8	
2006/11/7	8.22	10.75	3.62	n.d.	0.44	14.84	1.35	2.33	0.24	n.d.	5.50	56.35	0.29	1.02	1.11	11.42	-4.1	3.0	
2006/11/21	8.16	10.13	3.33	n.d.	0.37	13.62	1.21	2.43	0.79	n.d.	5.53	53.05	0.88	0.93	1.07	10.77	-6.6	3.1	
2006/12/8	8.00	9.90	3.25	n.d.	0.34	12.97	1.21	2.33	0.89	n.d.	5.91	47.79	0.02	0.90	0.99	10.23	-4.8	1.6	
2006/12/21	8.07	10.26	3.50	n.d.	0.34	13.67	1.30	2.37	0.53	n.d.	6.82	50.12	0.36	0.95	1.04	10.82	-4.5	2.6	
2007/1/10	7.95	10.71	3.83	n.d.	0.31	14.10	1.40	3.35	0.50	n.d.	7.85	46.78	0.61	0.99	1.03	11.19	-1.9	2.2	
2007/1/23	8.12	10.86	3.65	0.06	0.36	14.84	1.38	2.45	0.35	n.d.	7.25	48.94	0.48	1.02	1.03	11.24	-0.1	1.7	
2007/2/7	7.81	11.08	3.78	0.08	0.39	15.76	1.45	2.51	0.22	n.d.	7.60	49.30	0.28	1.08	1.04	11.67	2.0	2.6	
2007/2/21	7.99	10.14	3.68	n.d.	0.39	13.79	1.32	2.76	0.96	n.d.	7.79	42.38	0.61	0.97	0.95	10.64	0.9	2.4	
2007/3/12	8.03	10.05	3.56	0.04	0.35	13.53	1.32	2.40	0.51	n.d.	7.90	40.49	0.68	0.95	0.90	10.30	2.5	1.2	
2007/3/28	8.01	8.80	3.40	n.d.	0.37	11.66	1.18	2.36	1.01	n.d.	6.62	33.09	0.71	0.84	0.76	8.93	4.6	0.7	
2007/4/10	8.15	9.94	3.80	0.12	0.41	13.77	1.34	2.35	0.28	n.d.	7.46	48.99	0.80	0.98	1.03	10.98	-2.5	5.0	
2007/4/24	8.09	10.31	3.67	0.07	0.45	14.04	1.36	2.28	0.88	n.d.	7.68	45.72	0.74	0.99	0.99	10.88	-0.1	2.7	
2007/5/9	8.25	9.34	3.50	0.05	0.44	12.64	1.26	2.33	0.90	n.d.	6.81	38.28	0.67	0.90	0.85	9.70	2.9	1.9	
2007/5/23	8.56	10.50	3.61	n.d.	0.43	14.11	1.32	2.27	0.33	n.d.	7.96	54.68	0.83	0.98	1.13	11.47	-7.1	4.4	
2007/6/13	8.40	10.18	3.91	0.02	0.46	14.79	1.42	2.23	0.24	n.d.	7.46	54.80	1.02	1.04	1.12	11.70	-3.8	7.0	
2007/6/26	8.76	9.40	4.01	0.04	0.50	14.34	1.41	2.23	0.54	n.d.	6.84	49.63	0.76	1.02	1.03	11.16	-0.3	8.6	
2007/7/10	7.84	7.27	2.94	0.03	0.37	9.02	0.95	1.99	0.78	n.d.	4.38	35.38	0.90	0.67	0.74	7.65	-5.2	2.5	
2007/7/26	8.26	8.95	3.23	0.08	0.46	12.27	1.14	1.98	0.47	n.d.	4.81	51.10	0.33	0.86	1.00	9.97	-7.4	5.4	
2007/8/9	8.12	8.35	3.25	0.40	0.44	11.65	1.12	2.06	0.40	n.d.	4.40	42.32	0.00	0.85	0.85	9.21	0.0	4.9	
2007/8/29	8.60	10.60	3.72	0.10	0.55	15.94	1.42	2.10	0.37	n.d.	5.37	42.92	0.82	1.09	0.88	10.83	10.8	1.1	R1
2007/9/12	8.54	10.86	3.66	0.04	0.53	15.42	1.40	2.10	0.55	n.d.	5.99	60.96	1.44	1.06	1.19	12.06	-5.9	5.2	
2007/9/26	8.17	8.82	3.49	n.d.	0.44	12.21	1.18	2.03	0.42	n.d.	4.80	52.93	0.68	0.87	1.03	10.13	-8.5	6.9	R1
2007/10/11	8.11	8.71	3.36	0.02	0.47	11.75	1.19	1.86	1.16	n.d.	4.93	50.44	1.62	0.84	1.00	9.87	-8.5	6.2	R1
2007/10/25	8.13	9.90	3.56	0.04	0.39	13.72	1.31	2.06	0.28	n.d.	5.86	57.46	0.07	0.96	1.13	11.16	-8.0	6.0	R1
2007/11/13	8.22	10.66	3.73	0.04	0.40	15.86	1.49	2.21	0.27	n.d.	6.49	55.53	0.00	1.09	1.11	11.90	-1.1	5.5	
2007/11/27	8.21	10.78	3.80	n.d.	0.38	15.93	1.47	2.17	0.14	n.d.	6.65	48.83	0.91	1.09	1.00	11.43	4.3	2.9	
2007/12/10	7.99	11.22	3.56	0.02	0.34	15.65	1.44	2.24	0.18	n.d.	6.70	40.17	0.60	1.06	0.86	10.68	10.4	-2.5	R1
2007/12/25	8.08	10.92	3.59	0.04	0.38	14.91	1.39	2.51	0.35	n.d.	7.18	57.28	0.67	1.03	1.16	11.85	-6.3	4.1	
2008/1/8	7.89	10.80	3.86	0.04	0.37	14.92	1.47	3.42	1.02	n.d.	8.01	43.61	1.11	1.05	0.99	11.37	2.5	2.6	
2008/1/22	7.93	9.19	3.58	0.05	0.38	12.74	1.29	2.63	1.21	n.d.	7.22	36.88	0.99	0.91	0.85	9.81	3.5	3.3	
2008/2/6	7.79	8.99	3.37	0.02	0.31	11.64	1.19	2.42	0.67	n.d.	6.80	37.11	0.51	0.83	0.83	9.21	0.3	1.2	
2008/2/19	7.92	9.57	3.79	0.05	0.33	13.76	1.39	2.36	0.27	n.d.	7.31	43.33	0.17	0.98	0.93	10.52	2.3	4.7	
2008/3/5	7.93	9.87	4.01	0.03	0.37	14.75	1.46	2.51	0.29	n.d.	7.70	44.22	0.41	1.04	0.96	11.06	4.1	5.7	
2008/3/18	8.03	9.92	3.59	0.04	0.39	13.27	1.30	2.42	0.34	n.d.	7.44	44.37	1.10	0.94	0.96	10.42	-1.0	2.4	
2008/4/4	8.06	8.71	3.49	0.04	0.36	11.62	1.21	2.34	0.32	n.d.	6.62	39.12	1.48	0.84	0.85	9.32	-0.4	3.4	
2008/4/21	8.01	8.77	3.51	0.03	0.39	11.76	1.22	2.32	0.61	n.d.	6.21	39.68	0.55	0.85	0.86	9.38	-0.2	3.3	
2008/5/8	8.30	9.88	3.59	0.04	0.46	13.19	1.32	2.22	0.50	n.d.	6.48	45.8							



## Appendix 9d. 四万十川上流域の採水地点 M (北川川) における水質データ

## Analytical data for mainstream water at sampling location M of the Kitagawa River in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μ eq L <sup>-1</sup>	Anion μ eq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2008/12/19	8.10	9.79	3.60	0.05	0.38	13.65	1.37	2.11	0.28	n.d.	6.63	47.14	0.43	0.96	0.97	10.56	-0.6	3.8	
2009/1/9	7.93	10.32	3.65	n.d.	0.35	14.49	1.42	2.18	0.19	n.d.	7.01	47.70	1.20	1.01	0.99	10.93	0.8	2.9	
2009/1/27	7.95	9.89	3.52	0.01	0.35	13.67	1.38	2.90	0.67	n.d.	7.04	42.76	0.60	0.96	0.94	10.49	1.0	2.9	
2009/2/9	8.14	9.36	3.50	n.d.	0.35	12.54	1.30	2.26	0.42	n.d.	6.94	41.12	0.06	0.89	0.89	9.81	0.3	2.4	
2009/2/23	7.61	6.58	2.65	n.d.	0.39	8.54	0.94	2.21	1.12	n.d.	4.82	25.54	1.29	0.63	0.60	6.87	2.4	2.1	
2009/3/9	7.88	8.07	3.28	n.d.	0.36	10.67	1.14	2.13	0.53	n.d.	5.76	32.27	0.38	0.78	0.72	8.28	4.1	1.3	
2009/3/23	8.19	7.74	3.11	n.d.	0.37	10.04	1.07	1.99	0.61	n.d.	5.22	33.55	0.66	0.73	0.72	8.01	0.6	1.7	
2009/4/13	8.63	9.69	3.68	n.d.	0.44	13.46	1.34	2.10	0.08	n.d.	6.49	45.39	0.95	0.95	0.94	10.32	0.7	3.1	
2009/4/27	8.23	9.57	3.50	n.d.	0.40	13.08	1.32	2.02	0.57	n.d.	6.86	43.31	0.47	0.92	0.92	10.10	0.3	2.7	
2009/5/11	8.69	10.95	3.97	n.d.	0.53	15.70	1.51	2.23	0.45	n.d.	8.33	51.18	0.85	1.09	1.08	11.94	0.5	4.3	
2009/5/25	8.52	11.29	3.97	n.d.	0.51	16.14	1.54	2.24	0.34	n.d.	7.91	53.50	1.28	1.12	1.11	12.17	0.3	3.7	
2009/6/8	8.31	10.65	3.81	n.d.	0.50	14.90	1.46	2.02	0.58	n.d.	7.29	49.23	1.01	1.04	1.02	11.29	0.8	2.9	
2009/6/24	8.18	8.61	3.83	n.d.	0.82	10.26	1.31	2.61	0.45	n.d.	7.05	39.10	3.60	0.81	0.87	9.25	-3.7	3.6	
2009/7/8	8.02	8.82	3.37	n.d.	0.43	11.78	1.23	1.87	0.37	n.d.	5.63	40.51	1.17	0.85	0.84	9.19	0.4	2.0	
2009/7/22	7.72	7.43	2.73	n.d.	0.61	9.89	1.04	1.49	1.21	n.d.	4.20	31.90	2.38	0.71	0.67	7.59	3.0	1.0	
2009/8/12	7.73	6.79	2.99	n.d.	0.43	8.35	0.92	1.95	0.65	n.d.	3.94	29.65	0.69	0.63	0.63	6.92	0.0	1.0	
2009/8/27	8.06	9.79	3.53	n.d.	0.47	13.68	1.32	1.88	0.13	n.d.	5.22	46.97	0.39	0.96	0.93	10.21	1.2	2.1	
2009/9/10	8.50	10.90	3.67	n.d.	0.51	15.34	1.41	1.93	0.12	n.d.	5.87	52.89	0.66	1.05	1.05	11.33	0.4	1.9	
2009/9/25	8.33	11.33	3.86	n.d.	0.52	17.07	1.54	2.04	0.33	n.d.	6.41	56.73	0.78	1.16	1.13	12.36	1.5	4.4	
2009/10/9	8.30	9.45	3.43	n.d.	0.47	12.96	1.27	1.83	0.90	n.d.	5.96	43.62	1.57	0.91	0.91	9.91	0.4	2.4	
2009/10/23	8.15	10.94	3.76	n.d.	0.42	15.66	1.49	1.99	0.17	n.d.	7.24	52.28	0.77	1.08	1.07	11.67	0.6	3.2	
2009/11/6	8.29	11.22	3.78	n.d.	0.43	16.16	1.54	2.10	0.18	n.d.	7.48	53.62	0.10	1.11	1.10	12.00	0.5	3.4	
2009/11/24	7.73	8.95	3.46	n.d.	0.40	12.18	1.26	2.02	0.48	n.d.	6.56	40.87	0.93	0.87	0.87	9.56	0.0	3.3	
2009/12/8	8.10	9.64	3.79	n.d.	0.39	14.41	1.45	2.18	0.16	n.d.	7.67	45.75	1.07	1.01	0.97	10.92	2.0	6.2	
2009/12/22	8.03	9.91	3.55	n.d.	0.35	13.33	1.36	2.61	0.30	n.d.	7.23	43.98	0.89	0.94	0.95	10.40	-0.5	2.4	
2010/1/6	7.89	10.14	3.58	n.d.	0.34	13.81	1.38	2.84	0.31	n.d.	7.03	44.47	0.10	0.97	0.96	10.61	0.4	2.3	
2010/1/20	7.97	10.55	3.69	n.d.	0.35	14.89	1.48	2.47	0.31	n.d.	8.12	47.64	1.03	1.03	1.02	11.33	0.4	3.6	
2010/2/4	7.93	9.22	3.48	n.d.	0.35	12.91	1.31	2.59	0.79	n.d.	7.28	39.59	0.00	0.91	0.89	9.98	1.5	4.0	
2010/2/18	8.07	9.47	3.57	n.d.	0.35	12.87	1.32	2.38	0.38	n.d.	7.55	41.97	0.00	0.92	0.92	10.12	-0.2	3.3	
2010/3/5	8.04	8.25	3.25	n.d.	0.38	10.96	1.13	2.06	0.72	n.d.	5.78	35.56	1.13	0.79	0.77	8.61	1.2	2.1	
2010/3/19	8.00	7.99	3.25	n.d.	0.35	10.63	1.13	2.08	0.55	n.d.	5.51	35.50	0.00	0.77	0.76	8.44	0.6	2.7	
2010/4/6	8.16	8.01	3.22	n.d.	0.36	10.48	1.12	2.03	0.39	n.d.	5.27	35.75	0.93	0.76	0.76	8.34	0.3	2.0	
2010/4/30	7.75	6.32	3.01	n.d.	0.36	8.93	0.97	1.99	0.45	n.d.	4.38	31.54	0.34	0.67	0.67	7.31	-0.4	7.3	
2010/5/20	7.67	7.14	2.94	n.d.	0.41	10.28	1.07	1.60	0.69	n.d.	4.64	35.69	1.10	0.74	0.74	8.04	0.1	5.9	
2010/6/4	8.16	8.81	3.37	n.d.	0.42	11.77	1.18	2.05	0.33	n.d.	5.20	41.48	0.52	0.84	0.85	9.19	-0.6	2.1	
2010/6/24	8.00	8.21	3.25	n.d.	0.43	10.75	1.11	1.77	0.37	n.d.	4.79	37.70	1.08	0.78	0.77	8.44	0.4	1.4	
2010/7/16	7.61	7.87	4.42	n.d.	0.71	6.47	1.18	2.97	0.67	n.d.	5.57	24.20	0.83	0.63	0.61	6.94	1.9	-6.2	
2010/8/5	7.97	8.50	3.24	n.d.	0.48	11.03	1.13	1.87	0.41	n.d.	4.40	39.10	1.11	0.80	0.79	8.60	0.3	0.6	
2010/8/24	7.76	9.04	3.56	n.d.	0.49	13.38	1.31	1.93	0.44	n.d.	5.26	47.03	0.35	0.94	0.94	10.18	0.1	6.0	
2010/9/9	7.74	8.45	3.41	n.d.	0.49	12.48	1.24	1.77	0.66	n.d.	5.18	43.74	0.68	0.89	0.89	9.59	0.0	6.3	
2010/10/5	7.62	8.24	3.21	n.d.	0.42	10.57	1.11	1.58	0.83	n.d.	4.74	36.91	0.68	0.77	0.76	8.32	0.5	0.5	
2010/10/22	7.83	9.58	3.51	n.d.	0.44	12.62	1.26	1.86	0.27	n.d.	5.37	45.63	0.00	0.90	0.92	9.80	-1.0	1.1	
2010/11/16	7.62	9.30	3.61	0.05	0.43	14.02	1.38	2.09	0.16	n.d.	6.43	48.74	0.70	0.98	0.99	10.75	-0.5	7.2	
2010/12/7	8.06	9.94	3.50	n.d.	0.42	13.36	1.33	2.09	0.61	n.d.	6.46	45.02	0.37	0.94	0.94	10.27	-0.1	1.6	
2011/1/5	7.70	9.41	3.78	n.d.	0.36	14.78	1.46	3.51	0.31	n.d.	7.60	44.53	0.32	1.03	0.99	11.22	1.9	8.8	
2011/1/24	7.66	9.45	3.64	0.02	0.33	14.66	1.42	2.41	0.28	n.d.	7.46	47.34	0.00	1.02	1.00	11.08	0.6	8.0	
2011/2/15	7.64	10.77	3.82	n.d.	0.36	15.23	1.49	5.26	0.55	n.d.	7.78	43.98	0.01	1.06	1.04	11.77	0.9	4.5	
2011/3/15	7.89	10.09	3.75	0.08	0.38	13.80	1.35	2.43	0.09	n.d.	7.15	45.39	0.08	0.98	0.96	10.64	0.7	2.7	
2011/3/28	7.86	10.48	4.25	n.d.	0.42	16.19	1.61	2.73	0.18	n.d.	8.17	46.36	1.30	1.14	1.01	11.87	5.9	6.2	
2011/4/20	7.72	10.13	3.92	n.d.	0.48	15.71	1.52	2.46	0.61	n.d.	7.75	51.73	0.05	1.09	1.09	11.93	0.1	8.2	
2011/5/10	7.70	9.49	3.80	n.d.	0.49	14.04	1.41	2.49	0.45	n.d.	7.81	46.30	0.00	0.99	1.00	10.97	-0.2	7.2	
2011/6/2	7.55	6.97	3.12	n.d.	0.48	9.61	1.05	2.10	1.05	n.d.	5.06	32.88	0.65	0.71	0.72	7.90	-0.5	6.2	
2011/6/18	7.50	6.02	2.98	0.02	0.38	8.84	0.98	2.09	0.31	n.d.	4.47	29.28	0.80	0.66	0.64	7.15	2.0	8.6	
2011/6/30	7.74	6.75	2.99	n.d.	0.38	9.13	0.98	1.87	0.45	n.d.	4.00	33.06	0.01	0.68	0.68	7.39	-0.6	4.6	
2011/7/13	7.80	8.61	3.26	0.01	0.43	12.26	1.21	1.88	0.24	n.d.	5.01	43.31	0.00	0.86	0.87	9.39	-0.4	4.3	
2011/8/5	7.75	8.22	3.09	n.d.	0.43	10.81	1.07	1.81	n.d.	n.d.	4.28	39.10	0.33	0.77	0.78	8.39	-0.5	1.0	
2011/8/25	8.12	9.94	3.49	n.d.	0.64	14.48	1.35	2.01	0.45	n.d.	4.97	50.63	0.10	1.00	1.00	10.77	0.2	4.0	
2011/9/22	7.66	5.93	2.81	n.d.	0.41	7.65	0.80	1.71	0.55	n.d.	2.93	28.24	0.73	0.58	0.58	6.29	-0.1	2.9	
2011/10/5	7.82	9.42	3.03	n.d.	0.38	13.15	1.17	1.94	0.29	n.d.	4.88	46.42	0.00	0.89	0.92	9.80	-1.5	2.0	
2011/10/29	7.84	8.32	3.27	n.d.	0.35	10.99	1.13	1.71	0.21	n.d.	4.63	41.42	0.00	0.79	0.83	8.72	-2.1	2.4	
2011/11/14	7.84	9.23	3.30	n.d.	0.36	12.86	1.25	1.81	0.23	n.d.	5.22	47.09	0.06	0.90	0.94	9.88	-2.1	3.4	
2011/12/9	7.76	8.25	3.41	n.d.	0.37	11.36	1.20	1.96	0.44	n.d.	5.19	40.32	0.02	0.82	0.83	8.99	-0.5	4.3	
2011/12/27	7.83	9.68	3.50	n.d.	0.54	12.64	1.28	2.63	0.34	n.d.	5.95	44.78	0.00	0.90	0.94	10.04	-1.9	1.8	
2012/1/12	7.74	10.12	3.46	n.d.	0.39	13.37	1.33	2.28	0.29	n.d.	6.36	46.36	0.00	0.94	0.96	10.34	-1.3	1.1	
2012/2/9	7.69	8.36	3.28	n.d.	n.d.	11.29	1.20	2.63	0.98	n.d.	6.22	36.60	0.35	0.80	0.82	8.98	-0.9	3.6	
2012/2/24	7.60	6.97	2.95	n.d.	0.36	8.86	0.99	2.12	1.02	n.d.	5.04	29.83	0.91						

## Appendix 9e. 四万十川上流域の採水地点 M (北川川) における水質データ

## Analytical data for mainstream water at sampling location M of the Kitagawa River in the upper reaches of the Shimanto River

Date	pH	ECobs mS m <sup>-1</sup>	Na <sup>+</sup>	NH <sub>4</sub> <sup>+</sup>	K <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	DOC	Cation μ eq L <sup>-1</sup>	Anion μ eq L <sup>-1</sup>	EC <sub>cal</sub> mS m <sup>-1</sup>	R1	R2	QC*
								mg L <sup>-1</sup>											
2012/6/13	8.11	9.18	3.34	n.d.	0.44	11.47	1.19	1.78	0.93	n.d.	5.32	41.48	1.15	0.83	0.86	9.14	-1.7	-0.2	
2012/6/25	7.44	5.08	2.56	n.d.	0.31	6.70	0.76	1.50	0.60	n.d.	3.53	25.74	0.00	0.52	0.55	5.80	-2.9	6.6	
2012/7/13	7.56	5.95	2.83	n.d.	0.38	7.43	0.84	1.50	0.47	n.d.	3.37	29.24	0.04	0.57	0.60	6.34	-2.2	3.1	
2012/7/30	7.82	8.87	3.30	n.d.	0.39	11.25	1.13	1.75	0.30	n.d.	4.46	43.19	0.04	0.81	0.86	8.93	-2.8	0.4	
2012/8/23	7.60	6.15	2.48	n.d.	0.44	7.89	0.88	1.28	0.83	n.d.	2.68	30.56	1.72	0.59	0.61	6.40	-1.8	2.0	
2012/9/12	7.65	7.12	3.08	n.d.	0.38	9.62	1.05	1.54	0.46	n.d.	3.76	37.27	0.71	0.71	0.74	7.79	-2.1	4.5	
2012/10/9	7.78	8.44	3.15	n.d.	0.36	11.84	1.16	1.75	0.23	n.d.	4.19	44.53	0.54	0.83	0.87	9.13	-2.2	3.9	
2012/10/29	7.72	9.07	3.16	n.d.	0.34	14.00	1.15	1.77	0.24	n.d.	5.16	48.13	0.43	0.94	0.95	10.19	-0.6	5.8	
2012/11/12	7.75	8.76	3.18	n.d.	0.39	14.20	1.17	2.06	0.40	n.d.	5.45	47.46	0.32	0.95	0.96	10.35	-0.1	8.3	
2012/12/7	7.73	8.53	3.27	n.d.	0.30	14.15	1.22	2.10	0.29	n.d.	6.32	46.67	0.00	0.96	0.96	10.45	-0.2	10.1	
2012/12/26	7.72	8.18	3.18	n.d.	0.31	12.53	1.14	2.20	0.68	n.d.	6.24	40.81	0.33	0.87	0.87	9.54	-0.4	7.7	
2013/1/18	7.74	8.27	3.20	n.d.	0.29	11.89	1.13	2.09	0.48	n.d.	5.85	39.16	0.45	0.83	0.83	9.11	0.2	4.9	
2013/2/8	7.76	7.83	3.10	n.d.	0.32	10.90	1.09	2.11	0.61	n.d.	5.64	35.69	0.00	0.78	0.77	8.51	0.3	4.2	
2013/2/25	7.55	7.61	3.18	n.d.	0.32	11.10	1.12	1.98	0.42	n.d.	5.63	37.15	0.00	0.79	0.79	8.66	0.3	6.5	
2013/3/15	7.96	8.48	3.40	n.d.	0.41	12.37	1.19	2.02	0.06	n.d.	5.43	40.75	0.02	0.87	0.84	9.33	2.0	4.8	
2013/4/5	7.75	9.61	3.48	0.02	0.39	13.20	1.26	1.96	0.34	n.d.	6.37	44.04	0.22	0.92	0.92	10.04	0.5	2.2	
2013/4/25	7.79	6.79	2.76	0.02	0.40	9.25	0.95	2.01	1.14	n.d.	3.88	29.57	1.04	0.67	0.64	7.21	2.3	3.0	
2013/5/14	8.48	9.79	3.48	0.02	0.43	13.64	1.26	1.90	0.48	n.d.	6.44	45.75	1.03	0.95	0.95	10.32	0.1	2.6	
2013/6/5	8.28	7.79	3.38	0.02	0.41	12.14	1.19	1.88	0.36	n.d.	5.47	39.33	1.14	0.86	0.82	9.17	2.7	8.2	
2013/6/27	7.54	5.99	2.77	n.d.	0.40	8.78	0.91	1.87	0.94	n.d.	4.11	27.45	1.21	0.64	0.60	6.88	3.2	6.9	
2013/7/17	8.10	9.59	3.56	n.d.	0.55	12.94	1.24	1.94	0.73	n.d.	5.25	44.41	0.01	0.92	0.90	9.88	0.7	1.5	
2013/8/9	7.83	10.62	3.80	n.d.	0.59	16.26	1.47	1.96	0.62	n.d.	6.37	54.29	0.32	1.11	1.09	11.92	1.1	5.8	
2013/8/27	7.75	9.56	3.43	n.d.	0.56	15.22	1.37	1.88	1.35	n.d.	5.46	49.35	1.53	1.04	1.00	11.04	1.9	7.2	
2013/9/6	7.63	7.54	3.00	n.d.	0.47	9.34	0.96	1.87	1.09	n.d.	4.70	31.11	0.66	0.69	0.68	7.52	0.7	-0.1	
2013/9/17	7.81	8.94	3.35	n.d.	0.45	12.29	1.19	1.80	0.33	n.d.	5.53	42.03	0.84	0.87	0.86	9.40	0.5	2.5	
2013/10/10	7.56	6.16	2.91	n.d.	0.40	8.37	0.89	1.81	0.69	n.d.	3.51	28.79	0.00	0.63	0.61	6.74	1.7	4.5	
2013/10/22	7.61	8.37	3.39	n.d.	0.42	12.24	1.20	1.87	0.33	n.d.	5.06	41.36	0.40	0.87	0.84	9.28	1.6	5.2	
2013/10/30	7.54	7.42	3.10	n.d.	0.44	10.09	1.00	1.89	0.60	n.d.	3.79	34.71	0.00	0.73	0.71	7.83	1.5	2.7	
2013/11/18	7.69	9.07	3.21	n.d.	0.38	14.08	1.25	1.72	0.12	n.d.	4.59	47.70	0.29	0.95	0.93	10.13	1.4	5.5	
2013/12/13	7.68	9.51	3.31	n.d.	0.38	13.44	1.25	2.02	0.29	n.d.	5.50	43.80	0.00	0.93	0.89	9.91	1.8	2.1	
2014/1/7	7.97	9.38	3.37	n.d.	0.35	13.20	1.26	2.26	0.27	n.d.	4.56	42.99	0.95	0.92	0.87	9.68	2.8	1.6	
2014/1/27	7.62	9.29	3.50	n.d.	0.38	14.37	1.34	2.78	0.42	n.d.	4.79	45.69	0.47	0.99	0.93	10.47	2.9	6.0	
2014/2/20	7.56	8.55	3.47	n.d.	0.37	12.67	1.27	2.40	0.43	n.d.	4.80	40.20	0.90	0.90	0.83	9.44	3.7	5.0	
2014/3/14	7.47	6.31	2.74	n.d.	0.33	9.22	0.94	2.02	0.82	n.d.	5.15	29.77	0.29	0.67	0.67	7.37	0.0	7.7	
2014/4/3	7.61	7.81	3.25	n.d.	0.36	11.14	1.12	1.92	0.24	n.d.	5.98	37.70	0.38	0.80	0.80	8.76	-0.1	5.7	
2014/4/23	8.24	8.87	3.48	n.d.	0.44	12.68	1.26	1.90	0.32	n.d.	6.15	42.82	0.47	0.90	0.89	9.75	0.6	4.7	
2014/5/9	8.10	9.19	3.61	n.d.	0.44	13.81	1.35	1.91	0.27	n.d.	6.52	45.93	0.00	0.97	0.95	10.43	1.1	6.3	
2014/5/27	8.25	7.98	3.18	n.d.	0.41	11.77	1.14	1.73	0.46	n.d.	5.62	40.06	0.39	0.83	0.83	9.04	0.0	6.3	
2014/6/17	8.06	8.12	3.32	n.d.	0.39	11.36	1.14	1.80	0.23	n.d.	5.49	39.10	0.00	0.81	0.81	8.85	0.3	4.3	
2014/7/9	7.91	7.23	3.25	n.d.	0.42	10.70	1.10	1.75	0.50	n.d.	4.85	35.87	0.06	0.78	0.75	8.30	2.0	6.9	
2014/7/24	8.54	8.18	3.40	n.d.	0.46	12.79	1.19	1.76	0.18	n.d.	4.83	43.31	0.28	0.90	0.86	9.50	1.8	7.5	
2014/8/12	7.89	6.90	2.77	n.d.	0.42	9.25	0.89	1.56	0.46	n.d.	2.78	32.88	0.33	0.67	0.65	7.07	1.4	1.2	
2014/8/27	7.94	7.79	3.08	n.d.	0.44	11.72	1.08	1.57	0.27	n.d.	3.43	40.87	0.11	0.82	0.79	8.63	1.8	5.1	
2014/9/18	7.90	8.63	3.27	n.d.	0.47	12.65	1.17	1.67	0.10	n.d.	3.99	44.65	0.13	0.88	0.86	9.36	1.0	4.1	
2014/10/9	7.91	8.29	3.20	n.d.	0.45	12.35	1.14	1.52	0.60	n.d.	4.53	42.64	0.00	0.86	0.85	9.21	0.9	5.2	
2014/10/30	7.95	8.71	3.23	n.d.	0.40	12.78	1.19	1.56	0.23	n.d.	4.42	45.14	0.00	0.89	0.88	9.49	0.4	4.3	
2014/11/20	7.82	9.64	3.43	n.d.	0.40	14.86	1.35	1.63	0.07	n.d.	5.08	49.41	0.20	1.01	0.96	10.64	2.5	4.9	
2014/12/2	7.87	9.09	3.65	n.d.	0.45	14.92	1.37	2.07	0.37	n.d.	5.91	47.58	0.11	1.03	0.97	10.85	3.0	8.8	
2014/12/22	7.70	8.44	3.19	n.d.	0.36	11.19	1.13	2.60	0.84	n.d.	5.36	35.93	0.00	0.80	0.79	8.75	0.8	1.8	
2015/1/15	7.58	7.74	3.05	n.d.	0.36	11.02	1.09	1.88	0.48	n.d.	4.84	37.21	0.13	0.78	0.77	8.46	0.6	4.4	
2015/2/6	7.64	7.55	3.35	n.d.	0.34	11.82	1.19	2.04	0.50	n.d.	5.74	39.35	0.19	0.84	0.83	9.15	0.7	9.6	
2015/2/27	7.88	8.98	3.34	n.d.	0.35	12.29	1.21	2.21	0.45	n.d.	5.58	40.14	0.07	0.87	0.84	9.36	1.4	2.1	
2015/3/20	7.70	6.86	2.78	n.d.	0.36	8.62	0.91	2.05	0.71	n.d.	3.95	28.06	0.04	0.64	0.61	6.86	1.9	0.0	
2015/4/8	7.79	7.53	3.17	n.d.	0.35	10.51	1.07	1.86	0.50	n.d.	4.82	35.69	0.33	0.76	0.75	8.21	0.9	4.3	
2015/4/30	7.85	8.16	3.30	n.d.	0.43	11.67	1.16	1.93	0.45	n.d.	4.89	39.96	0.59	0.83	0.82	8.97	0.9	4.7	
2015/5/20	8.06	8.42	3.25	n.d.	0.42	11.95	1.18	1.78	0.64	n.d.	5.19	40.20	0.86	0.85	0.83	9.11	1.1	3.9	
2015/6/8	7.87	8.53	3.21	n.d.	0.42	11.94	1.18	1.74	0.64	n.d.	5.14	40.32	0.81	0.84	0.83	9.09	1.0	3.2	
2015/7/2	7.81	6.53	2.63	n.d.	0.38	8.24	0.86	1.60	0.61	n.d.	3.31	28.98	0.52	0.61	0.60	6.54	0.6	0.1	
2015/7/24	7.85	6.35	2.81	n.d.	0.37	8.52	0.90	1.57	0.47	n.d.	3.22	30.68	0.00	0.63	0.62	6.77	0.7	3.2	
2015/8/11	8.31	9.33	3.38	n.d.	0.47	13.55	1.25	1.67	0.31	n.d.	4.44	47.89	0.40	0.94	0.93	10.03	0.5	3.6	
2015/8/26	7.71	6.81	2.83	n.d.	0.56	8.46	0.87	1.62	1.07	n.d.	3.30	29.34	0.36	0.63	0.61	6.78	1.5	-0.2	
2015/9/25	7.77	6.53	2.80	n.d.	0.39	7.92	0.86	1.50	0.59	n.d.	3.07	28.73	0.00	0.60	0.59	6.41	1.0	-0.9	
2015/10/15	8.22	8.69	3.28	n.d.	0.38	12.66	1.20	1.61	0.15	n.d.	4.47	44.53	0.00	0.88	0.87	9.43	0.7	4.1	
2015/11/4	8.03	9.54	3.33	n.d.	0.41	13.35	1.24	1.84	0.24	n.d.	5.02	45.72	0.08	0.92	0.91	9.90	0.8	1.9	
2015/11/18	7.74	8.05	3.16	n.d.	0.45	11.34	1.13	1.61	0.56	n.d.	4.51	38.74	0.79	0.81	0.78	8.62	1.6	3.4	
2015/12/8	7.89	8.52	3.29	n.d.	0.38	12.13	1.20	1.71	0.36	n.d.	5.04	40.87	0.06	0.86	0.83	9.15	1.7	3.5	

# Monitoring of rainwater and streamwater chemistry from 2000 to 2015 in forested catchments in the upper reaches of the Shimanto River, Shikoku Island, Japan

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## Abstract

We have been monitoring rainwater and streamwater chemistry in forests located in the upper reaches of the Shimanto River within Yusuhara-cho, Takaoka-gun, Kochi Prefecture, since 2000. The rainwater was collected at one location, whereas streamwater was sampled at run-off points of seven forested catchment basins. In this study, we analyzed data collected from 2000 to 2015 to examine changes in rainwater and streamwater chemistry. In particular, we investigated the effects of the volume of rainfall on water chemistry and the long-term changes. During periods with lower total rainfall, electrical conductivity (EC) was higher and variation in the range of pH was greater. In addition, no long-term trend was observed for rainwater pH, EC (annual average), and annual input of various ions. Although streamwater EC decreased with the increase in cumulative rainfall for 14 days before the sampling day, only a little effect on pH was observed. No long-term change in streamwater pH was found. However, the concentration of dissolved ions such as  $\text{Na}^+$ ,  $\text{Ca}^{2+}$ , and  $\text{Mg}^{2+}$  tended to decrease in all seven forest watersheds from 2007 to 2015; the decrease in  $\text{Cl}^-$  and  $\text{SO}_4^{2-}$  was distinct. We recommend continuous monitoring of these decreasing trends to determine how long they continue.

**Key words :** rainwater chemistry, streamwater chemistry, dissolved ion concentration, long-term changes

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