

*Water Resources Research*

Supporting Information for

**Distinct Source Water Chemistry Shapes Contrasting Concentration - Discharge Patterns**

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**Introduction**

The Supporting Information provides a complete list of solute species in the high-frequency water chemistry dataset (Text S1), sampling and measurement (Text S2), and a table with calibrated parameters (Table S1).

Text S1. A complete list of solute species in the high-frequency water chemistry dataset.

The high-frequency water chemistry dataset measured a total of more than 40 solute species including: dissolved organic carbon (DOC), dissolved total nitrogen (DTN), dissolved inorganic carbon (DIC), chloride (Cl), sulfate (SO42-), nitrate (NO3-), sodium (Na), calcium (Ca), magnesium (Mg), zinc (Zn), manganese (Mn), cadmium (Cd), aluminum (Al), silicon (Si), potassium (K), iron (Fe), copper (Cu), lead (Pb), silver (Ag), arsenic (As), selenium (Se), tin (Sn), antimony (Sb), cobalt (Co), boron (B), barium (Ba), chromium (Cr), strontium (Sr), zirconium (Zr), molybdenum (Mo), cesium (Cs), uranium (U), titanium (Ti), germanium (Ge), rubidium (Rb), europium (Eu), thorium (Th), lithium (Li), beryllium (Be), vanadium (V), and nickel (Ni).

Text S2. Sampling and measurement.

Stream water samples were collected using an automatic water sampler (Model 3700; Teledyne ISCO, NE, USA). Samples were pumped via peristaltic pump into uncapped 1-L polyethylene bottles and retrieved at regular intervals. Bulk samples were filtered using 0.45 mm Hydrophilic Polyvinylidene Fluoride (PVDF) syringe filters into individual vials. DTN was analyzed using a Shimadzu total nitrogen measurement unit (TNM-1). Cation concentrations were measured using inductively coupled plasma mass spectrometry (ICP-MS) (Elan DRC II, PerkinElmer SCIEX, USA). Total DOC concentrations were determined using a TOC-VCPH analyzer (Shimadzu Corporation, Japan). DOC was analyzed as non-purgeable organic carbon (NPOC) by purging acidified samples with carbon-free air to remove DIC prior to measurements.

**Table S1**

|  |  |  |  |
| --- | --- | --- | --- |
| Watershed characteristics | Parameters | Calibrated value | Note |
| Landcover:  Evergreen forest |  | 0.10 | Zilitinkevich coefficient |
|  | 1.3 | Rooting depth (m) |
|  | 60 | Reference visible solar radiation (W/m2) |
|  | 105 | Minimum stomatal resistance (s/m) |
|  | 53 | Water vapor exchange coefficient |
| Soil properties:  Needleton-Scout families |  | 65 | Horizontal saturated hydraulic conductivity (m/d) |
|  | 0.39 | Vertical saturated hydraulic conductivity (m/d) |
|  | 4.1 | Infiltration hydraulic conductivity (m/d) |
|  | 14,600 | Horizontal macropore hydraulic conductivity (m/d) |
|  | 223 | Vertical macropore hydraulic conductivity (m/d) |
|  | 0.14 | Macropore depth (m) |
|  | 0.26 | Porosity (m3/m3) |
|  | 0.70 | van Genuchten alpha, inversely proportional to pore diameter (m-1) |
|  | 2.0 | van Genuchten n, inversely proportional to water retention |
|  | 2.7 | soil thickness (m) |

* Soil properties are estimated using pedotransfer function (Wösten et al., 2001) based on soil composition derived from SSURGO database.
* Parameters: bolded values are the most sensitive parameters that reproduce snow pack and discharge data.

Table S1. Hydrology setup and calibration: watershed characteristics and calibrated parameters.