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*Supplement of*

# Complex dissolved organic matter (DOM) on the roof of the world – Tibetan DOM molecular characteristics indicate sources, land use effects, and processing along the fluvial–limnic continuum

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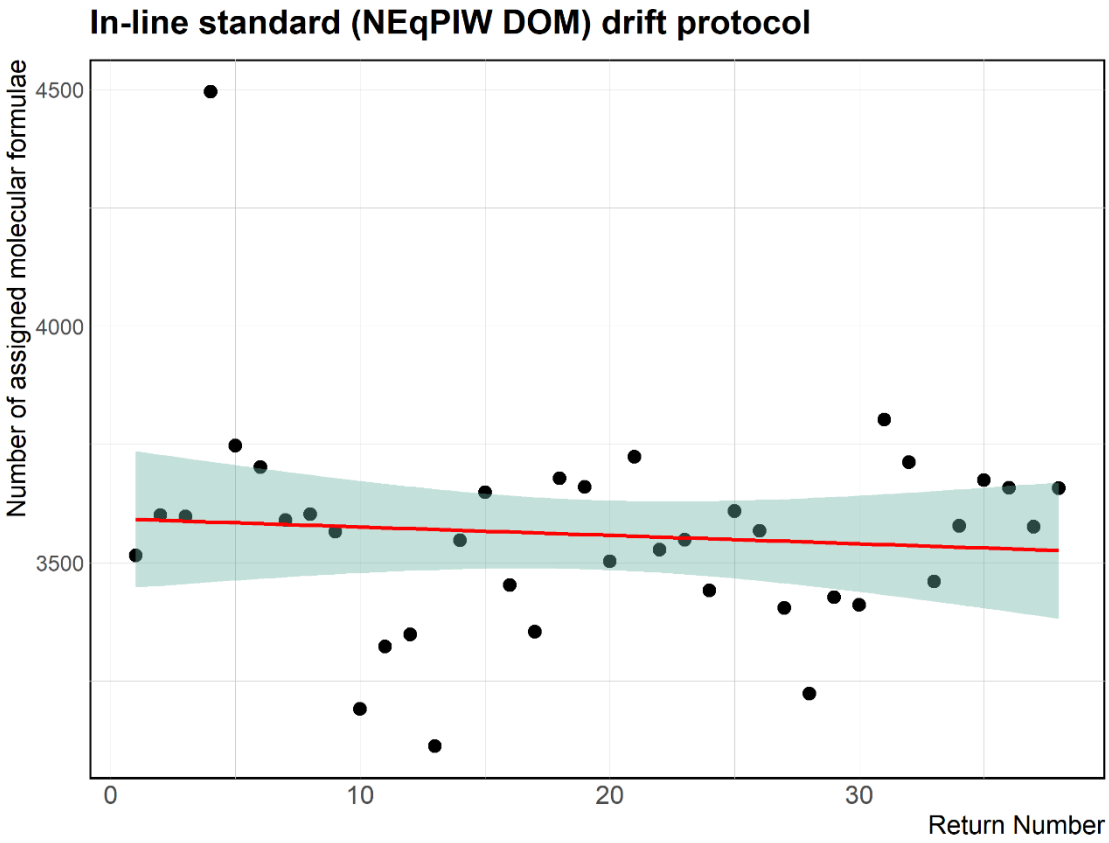


Figure S1: Linear model (red) with confidence interval of 95% (green) for the in-line standard (NEqPIW DOM (Green et al., 2015); n=*38*)

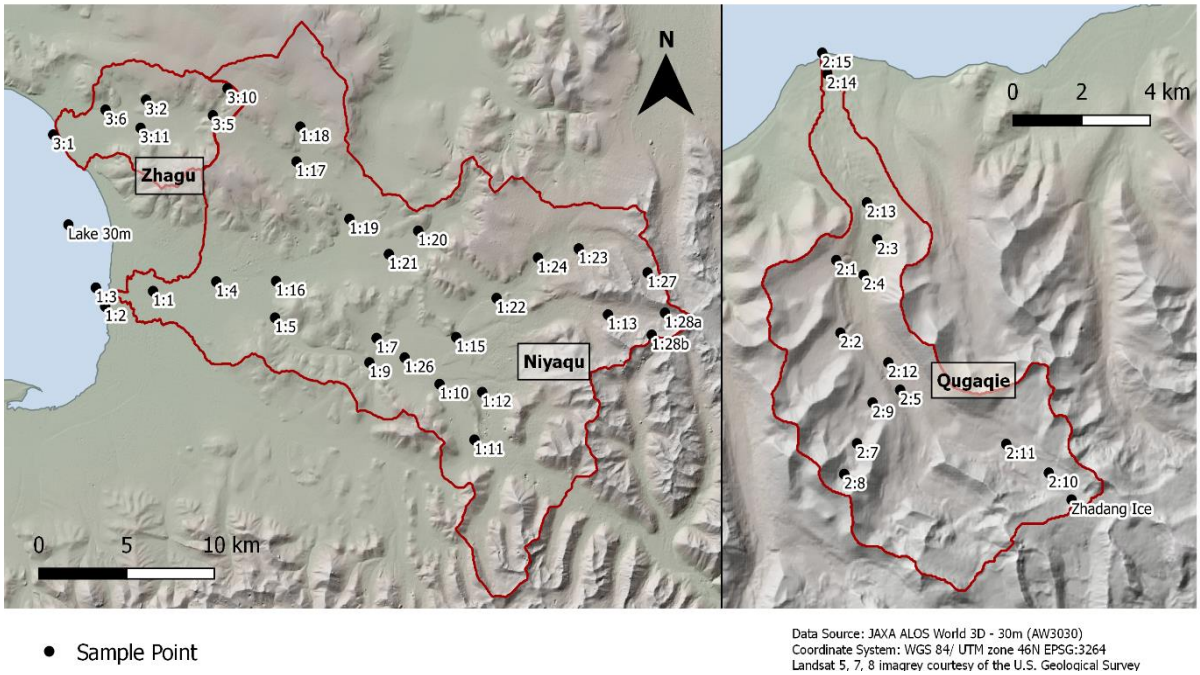


Figure S2: Individual IDs for the samples

Table S1: Multiple pairwise comparisons (Kruskal-Wallis H) with Bonferroni post-hoc correction for the independent factor: Site. Significance level α = 0.05 (p value) are only reported when significant within groups, *n.s.* = not significant. Degrees of freedom: 2. Significant differences of sites are given for significant tests, letters (*a,b*) denote significant differences between groups.

| **Parameter** | **p value** | **Niyaqu** | **Qugaqie** | **Zhagu** |
|---|---|---|---|---|
| N molecular count | *n.s.* | | | |
| S molecular count | *0.005* | *a* | *b* | *a,b* |
| P molecular count | *n.s.* | | | |
| $Ai_{mod}$ | *n.s.* | | | |
| DBE | *n.s.* | | | |
| Total molecular count | *n.s.* | | | |
| AROR | *n.s.* | | | |
| AROP | *n.s.* | | | |
| HUSOR | 0.000 | *a* | *b* | *a* |
| HUSOP | 0.000 | *a* | *b* | *a,b* |
| USOR | 0.020 | *a* | *b* | *a,b* |
| USOP | 0.007 | *a* | *a* | *b* |
| USN | *n.s.* | | | |
| SAT | *n.s.* | | | |
| $I_{DEG}$ | 0.004 | *a* | *a* | *b* |
| $I_{TERR}$ | *n.s.* | | | |
| $I_OS$ | 0.04 | *a* | *a* | *b* |
| CHO | 0.04 | *a,b* | *a* | *b* |
| OC | *n.s.* | | | |
| HC | 0.009 | *a* | *b* | *a, b* |

Table S2: Multiple pairwise comparisons (Kruskal-Wallis H) with Bonferroni post-hoc correction for the independent factor: Sample categories. Significance level α = 0.05 (p value) are only reported when significant within groups, *n.s.* = not significant. Degrees of freedom: 2. Significant differences of sites are given for significant tests, letters (*a,b*) denote significant differences between groups.

| Parameter | p value | Glacial effluent | Stream water | Brackish water |
|---|---|---|---|---|
| N molecular count | *n.s.* | | | |
| S molecular count | *n.s.* | | | |
| P molecular count | *n.s.* | | | |
| $Ai_{mod}$ | *n.s.* | | | |
| DBE | *n.s.* | | | |
| Total molecular count | *n.s.* | | | |
| AROR | *n.s.* | | | |
| AROP | 0.05 | *a* | *a,b* | *b* |
| HUSOR | *n.s.* | | | |
| HUSOP | *n.s.* | | | |
| USOR | *n.s.* | | | |
| USOP | *n.s.* | | | |
| USN | *n.s.* | | | |
| SAT | *n.s.* | | | |
| $I_{DEG}$ | *n.s.* | | | |
| $I_{TERR}$ | *n.s.* | | | |
| IoS | *n.s.* | | | |
| CHO | *n.s.* | | | |
| OC | *n.s.* | | | |
| HC | *n.s.* | | | |

Table S3: Loadings of the samples for the three NMDS dimensions. SCN = Niyaqu catchment, SCQ = Qugaqie catchment, SCZ =Zhagu catchment.

| Sample ID | NMDS 1 | NMDS 2 | NMDS 3 |
|---|---|---|---|
| SCN_1_2 | 0,087685 | -1,1772 | 0,346675 |
| SCN_1_4 | 0,072454 | -1,06426 | 0,291306 |
| SCN_1_1 | -0,11736 | -0,622 | 0,06511 |
| SCN_1_16 | 0,074152 | -1,206 | 0,336504 |
| SCN_1_17 | 0,059853 | -1,17546 | 0,293232 |
| SCN_1_18 | 0,054424 | -1,16704 | 0,402607 |
| SCN_1_19 | -0,02776 | -0,96675 | 0,213587 |
| SCN_1_20 | -0,03149 | -1,06611 | 0,11981 |
| SCN_1_3 | -0,3843 | -0,09443 | -0,07249 |
| SCN_1_22 | -0,00024 | -1,01415 | 0,179729 |
| SCN_1_23 | 0,147413 | -1,29735 | 0,56202 |
| SCN_1_24 | 0,00635 | -0,95761 | 0,152191 |
| SCN_1_27 | 0,052577 | -1,09517 | 0,232781 |
| SCN_1_28a | 0,344206 | -0,21461 | 0,159075 |
| SCN_1_28b | 0,658598 | -0,4567 | 0,205128 |
| SCQ_2_1 | 0,122104 | -1,2393 | 0,527872 |
| SCQ_2_2 | 0,004387 | -0,11855 | -0,10717 |
| SCQ_2_3 | -0,01154 | -0,4253 | -0,0564 |
| SCQ_2_5 | 0,157962 | -0,98272 | 0,342997 |
| SCQ_2_7 | 0,263631 | -1,07548 | 0,495036 |

| | | | |
|---|---|---|---|
| SCQ_2_10 | 0,235255 | -0,96557 | 0,4106 |
| SCQ_2_11 | 0,143729 | -1,16501 | 0,428035 |
| SCQ_2_12 | 0,15865 | -1,09184 | 0,404203 |
| SCN_1_5 | 0,011563 | -0,36718 | -0,08663 |
| SCQ_2_14 | -0,02347 | -0,1637 | -0,19761 |
| SCQ_2_15 | -0,02501 | -0,24661 | -0,1092 |
| SCN_1_6 | 0,237413 | -1,22035 | 1,052236 |
| SCZ_3_2 | 0,031523 | -0,38182 | -0,08328 |
| SCZ_3_5 | -0,08282 | -0,92493 | 0,022167 |
| SCZ_3_6 | -0,06704 | -0,28087 | -0,15221 |
| SCQ_Zhadang_Ice | 0,303771 | -0,83211 | 0,430128 |
| SCN_1_21 | 0,312109 | -0,00836 | 0,147803 |
| SCQ_2_4 | -0,28489 | -0,35436 | -0,13942 |
| SCQ_2_8 | 0,134136 | -0,22386 | 0,011247 |
| SCQ_2_9 | 0,152178 | -0,37412 | 0,042017 |
| SCQ_2_13 | 0,483425 | -0,64943 | 0,133389 |
| SCN_1_7 | 0,254065 | -0,9631 | 1,056203 |
| SCN_1_9 | 0,339653 | -0,95607 | 1,101475 |
| SCN_1_10 | 0,296664 | -0,8365 | 0,993272 |
| SCN_1_11 | 0,286045 | -0,86696 | 0,971239 |
| SCN_1_12 | -0,23311 | -0,79461 | 0,000412 |
| SCN_1_13 | -0,19292 | -0,94946 | 0,060638 |
| SCN_1_15 | -0,15378 | -1,00839 | 0,110429 |

Table S4: Scores of the internal variables for the two major NMDS dimensions.

| **Internal variable** | **NMDS 1** | **NMDS 2** |
|---|---|---|
| ARO | -0. 84985682690839 | 0. 527013637164355 |
| USAT | 0. 854196719207775 | 0. 519949963837554 |
| HUSAT | -0. 407913273347075 | 0. 913020679627397 |
| SAT | 0. 818688729963233 | 0. 574237549652745 |
| IDEG | -0. 999240657827933 | 0. 0389629021455057 |
| IOS | -0. 991295354085005 | 0. 131656830318386 |
| ITERR | -0. 999524929030953 | 0. 0308207113102116 |
| AImod | -0. 994525776528508 | -0. 104491529897732 |
| N | 0. 0535023920603983 | 0. 998567721310786 |
| P | -0. 0509217017689782 | 0. 998702648584127 |
| S | 0. 483014615080082 | 0. 875612289554595 |

Table S5: Scores of the external variables for the two major NMDS dimensions

| **External variable** | **NMDS 1** | **NMDS 2** |
|---|---|---|
| FDOM | -0. 783975814707886 | -0. 620791367492418 |
| DIC | 0. 8054726857903 | -0. 592632898551675 |
| DOC | -0. 837542331836805 | -0. 546372439258577 |

| | | |
|---|---|---|
| δ13C | -0. 781167390095403 | -0. 624321638782076 |
| Plant Cover | -0. 84121127196077 | -0. 540706571003297 |
| NO3 | -0. 571521267093232 | 0. 820587253898174 |

Table S6: Goodness of fit ($R^2$) and p value of the internal variable vectors. Significant < α (0.05) variables are marked bold.

| **Internal variable** | **$R^2$** | **p value** |
|---|---|---|
| ARO | 0.919 | **0.001** |
| USAT | 0.882 | **0.001** |
| HUSAT | 0.932 | **0.001** |
| SAT | 0.549 | **0.001** |
| IDEG | 0.626 | **0.001** |
| IOS | 0.052 | 0.31 |
| ITERR | 0.349 | **0.001** |
| AImod | 0.664 | **0.001** |
| N | 0.887 | **0.001** |
| P | 0.554 | **0.001** |
| S | 0.77 | **0.001** |

Table S7: Goodness of fit ($R^2$) and p value of the external variable vectors. Significant < α (0.05) variables are marked bold.

| **External variable** | **$R^2$** | **p value** |
|---|---|---|
| FDOM | 0.197 | **0.019** |
| DIC | 0.209 | **0.006** |
| DOC | 0.116 | 0.089 |
| δ13C | 0.016 | 0.7 |
| Plant Cover | 0.051 | 0.345 |
| NO3 | 0.095 | 0.118 |

Table S8: Extraction efficiency of SPE-DOC samples; SCN =Niyaqu, SCQ= Qugaqie, SCZ = Zhagu, SCL= Lake Nam Co.

| **Sample ID** | **Extraction efficiency [%]** |
|---|---|
| SCN_1_1 | 61.1 |
| SCN _1_2 | 77.1 |
| SCN_1_3 | 50.2 |
| SCN_1_4 | 45.2 |
| SCN_1_5 | 45.9 |
| SCN_1_6 | 98.2 |
| SCN_1_7 | 57.7 |
| SCN_1_9 | 67.0 |
| SCN_1_10 | 74.9 |
| SCN_1_11 | 56.2 |
| SCN_1_12 | 60.9 |
| SCN_1_1 | 27.3 |
| SCN_1_15 | 16.8 |
| SCN_1_16 | 78.9 |
| SCN_1_17 | 83.2 |
| SCN_1_18 | 63.8 |
| SCN_1_19 | 83.3 |
| SCN_1_20 | 92.7 |

| | |
|---|---|
| SCN_1_21 | 91.5 |
| SCN_1_22 | 68.4 |
| SCN_1_23 | 84.7 |
| SCN_1_24 | 55.5 |
| SCN_1_2 | 79.6 |
| SCN_1_27 | 84.7 |
| SCN_1_28a | >50%; initial DOC < 25 μM $L^{-1}$ |
| SCN_1_28b | >50%; initial DOC < 25 μM $L^{-1}$ |
| SCQ_2_1 | 46.8 |
| SCQ_2_2 | 43.7 |
| SCQ_2_3 | 52.8 |
| SCQ_2_4 | 50.6 |
| SCQ_2_5 | 45.5 |
| SCQ_2_6 | 55.9 |
| SCQ_2_7 | 37.7 |
| SCQ_2_8 | 43.8 |
| SCQ_2_9 | 52.5 |
| SCQ_2_10 | 37.8 |
| SCQ_2_11 | 54.7 |
| SCQ_2_12 | 43.7 |
| SCQ_2_13 | 84.1 |
| SCQ_2_14 | 44.1 |
| SCQ_2_15 | 67.5 |
| SCQ_Zhadang_Ice | >50%; initial DOC < 25 μM $L^{-1}$ |
| SCZ_3_1 | 34.1 |
| SCZ_3_2 | 73.0 |
| SCZ_3_5 | 50.1 |
| SCZ_3_6 | 15.0 |
| SCZ_3_10 | 91.3 |
| SCL_SC2 | 41.0 |
| IHSS Standard | 60.6 |

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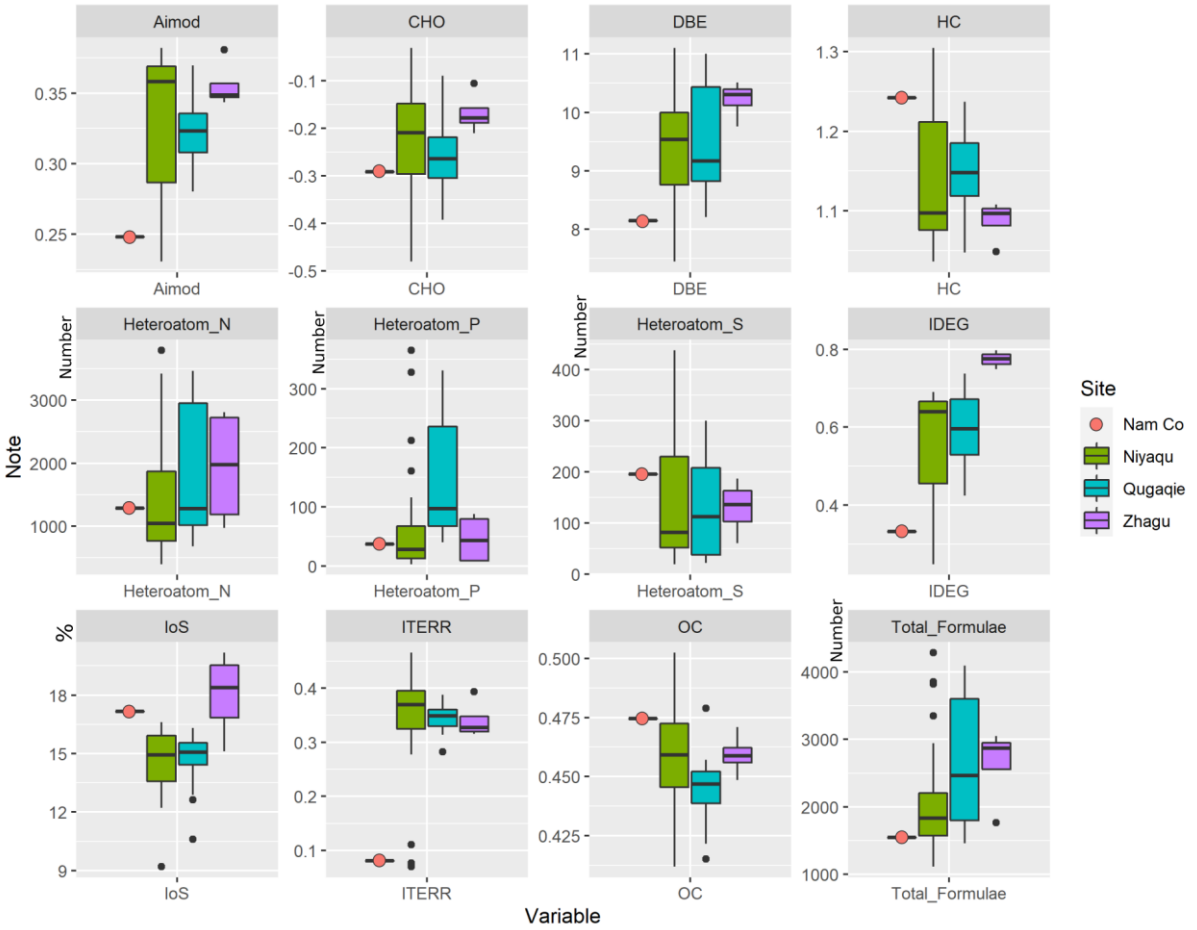


54 Figure S3: Boxplots corresponding to Table 1 of the main text body. Sites with n<3 are expressed as
55 individual points.

56

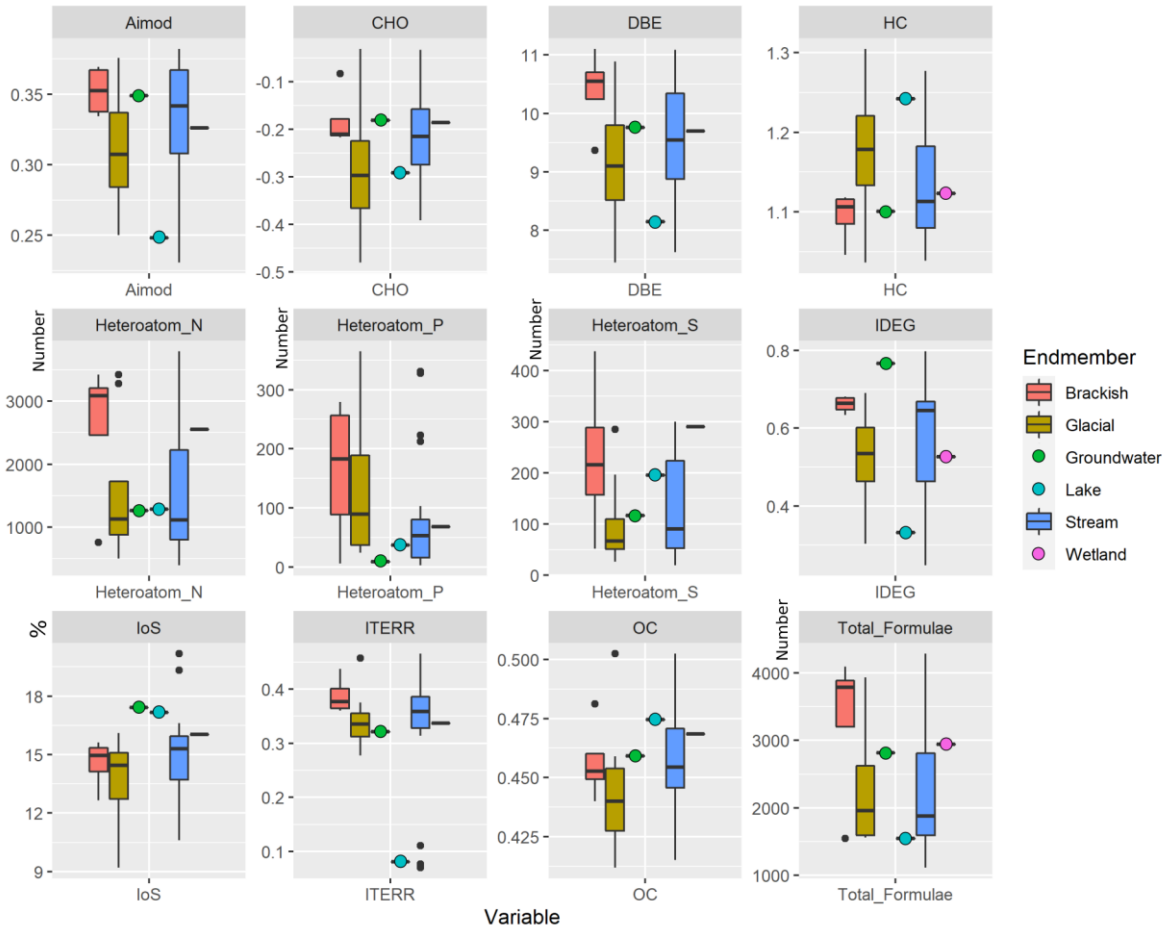


Figure S4: Boxplots corresponding to Table 2 of the main text body. Endmembers and sample categories with n<3 are expressed as individual points.