Earth Syst. Sci. Data Discuss.,
https://doi.org/10.5194/essd-2019-45-RC1, 2019

Open Access Earth System Science Data Discussions

Interactive comment on "Co-located contemporaneous mapping of morphological, hydrological, chemical, and biological conditions in a 5th order mountain stream network, Oregon, USA" *by* Adam S. Ward et al.

Anonymous Referee #1

Received and published: 19 June 2019

Review of: Co-located contemporaneous mapping of morphological, hydrological, chemical, and biological conditions in a 5th order mountain stream network, Oregon, USA Ward et al. Summary: This field study was focused on an extensive 62 site, multi-day low flow sampling campaign across a 1st through 5th order river network. This study is unique in that it presents a physical, chemical, and biological dataset at a relatively high resolution spatial extent. This dataset will certainly be used extensively by this group and others to investigate spatial characteristics and drivers of riverine dynamics. My major comment is the lack of context for this study. The introduction is

short and does not present the state of the science for this type of research. As described in further detail in major comments below, I believe this manuscript will provide a larger impact in our community with the addition of a brief explanation of where our scientific community is in regards to our understanding of spatial physical, chemical, and biological characteristics of river networks. In addition to this, I included a handful of minor comments that I believe can improve the manuscript. Major Comments: Introduction: The introduction is short and leaves out important context. There have been a range of studies recently that have investigated spatiotemporal river network dynamics. These studies have mostly focused on hydrology or chemistry across river networks that range stream orders. This manuscript builds on those previous studies by incorporating not just hydrology and chemistry, but biology as well, in this spatial assessment. This manuscript and presentation of this dataset has the potential to be more impactful with a brief introduction of the current state of this work. See below for suggestions for several recent papers, although there are an extensive set of related papers on this topic: Hale, R. B., Godsey, S. (2019). Dynamic stream network intermittence explains emergent dissolved organic carbon chemostasis in headwaters. Hydrological Processes.

McGuire, K. J., Torgersen, C. E., Likens, G. E., Buso, D. C., Lowe, W. H., & Bailey, S. W. (2014). Network analysis reveals multiscale controls on streamwater chemistry. Proceedings of the National Academy of Sciences, 111(19), 7030–7035. https://doi.org/10.1073/pnas.1404820111 Zimmer, M. A., & McGlynn, B. L. (2018). Lateral, vertical, and longitudinal source area connectivity drive runoff and carbon export across watershed scales. Water Resources Research. Minor Comments: Abstract: Is there a reason the authors did not include information from results in the abstract? P 3 L 11: Replace "who typical" with "who typically" P 3 L 22: Remove " " " between "forests" and "(∼400". Section 2.1/Figure 1: How did the authors determine the first order streams? Is this based on the geomorphic channel network, or is this based on permanence of flow? Note: I later saw on P 10 Section 3.1.1. that stream orders were based on a topographic analysis with a 1m DEM (and potentially ground trothed).

Please make reference to this earlier. P 4 L 7: Should “term” be capitalized? Figure 1: It is difficult to differentiate the stream orders with the chosen elevation gradient. Perhaps the gradient can be grey scale to help the reader better identify the stream orders? Figure 2: Can the authors please label which of the four catchments represent which of the major landform units within Figure 2? Right now it is unclear which is which. P 10 L 24-29: It is unclear if the drive point piezometers were installed, purged, and hydraulic conductivity was measured all on the same day. If so, I am concerned that the piezometers were not collecting representative hydraulic conductivity values since the piezometers did not have time to “equilibrate” with the natural streambed. Further, if 3-6 replicates of the falling head test were done in sequential order, is it possible that the addition of water into the streambed may create zones of saturation, which may alter the hydraulic conductivity of the subsurface if it was previously dry. Did the authors see trends in the hydraulic conductivity measurements over the 3-6 replicates? If so, this may suggest these replicates were biased and a geometric mean is not the correct way to summarize the results. Honestly, I am surprised the authors could conduct a falling head test in a streambed – this suggests to me that the material below the streambed was dry, or there was perhaps a strong losing gradient. P 11 L 11-12: When where these pots installed? Were the installed during the synoptic sampling campaign, or taken out during the synoptic sampling campaign? This is important information, as 6 weeks is a large portion of the summer and macroinvertebrate communities may shift across these stream orders through the drying down of these river networks. P 12 L 5: Rinsing the tubing for 5 minutes with hyporheic water seems like it would greatly alter the hyporheic zone. 5 minutes of pumping at 0.5 L/min suggests that the authors extracted 2.5 L of hyporheic water before sample collection. That suggests the water that was sampled may be from preferential flowpaths that supplied water after the immediate region around piezometer was drained. P 13 L 12: Potentially missing “and” between “δ18O” and “δ 2H”. P 13 L 17-20: How quickly after sampling were these samples analyzed? How quickly did it take for samples to “come to room temperature”? Proper superscripts and subscripts needed for the dissolved

nutrients. P 15 L 6: What are EEA rates? I don’t see this defined before in the text. P 18 L 15: Remove second “was” between “was” and “set” P 18 L 16: Potentially missing “.” After “co-added” P 20 L 17: replace “valely” with “valley” P 20 L 17: The authors mention “to place both sensors”, but what are the sensors used here? P 20 L 20: What is the approximate range of masses of NaCl used for this study? Are the metadata available for these dilution gauging experiments?

Interactive comment on Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2019-45, 2019.