Title

Spatial Study 2022: Water Column, Sediment, and Total Ecosystem Respiration Rates across the Yakima River Basin, Washington, USA

Summary

This dataset supports a broader study examining the drivers of spatial variability in sediment respiration rates in the Yakima River Basin. The dataset provides model results generated using streamMetabolizer (Appling et al.; 2018) using data collected during the same five-week period at 48 sites within multiple rivers throughout the Yakima River Basin in Washington, USA. The contents include model inputs and outputs for total ecosystem respiration; calculated sediment respiration; processing scripts ; median grain size (d50); and annual oxygen consumption.

Samples collected during this study were labeled as "Second Spatial Study" or "SSS." Raw time series sensor data, total suspended solids, and depth data from SSS were published at https://data.ess-dive.lbl.gov/datasets/doi:10.15485/1969566. A subset of data from the SSS samples were published in the contiguous United States (CONUS)-Scale Model-Sample (CM) study data package available at https://data.ess-dive.lbl.gov/view/doi:10.15485/1923689 that presents data from across the CONUS. They include dissolved organic carbon (DOC, measured as non-purgeable organic carbon, NPOC), total nitrogen (TN), grain size, aerobic sediment respiration, dissolved oxygen (DO), and temperature. Parent IDs and Site IDs are consistent between the SSS and CM data packages, and they can be mapped directly so data across packages can be used together. Field metadata for the samples in this data package can be found at either link.

Brief Overview of Methods

In situ dissolved oxygen, temperature, and water pressure sensors were deployed at 48 sites by 2-person teams in multiple rivers within the Yakima River Basin during the week of July 25-28, 2022. Barometric pressure dataloggers were deployed at a subset of the sites at that time. Triplicate 2-hour dark-bottle stream water incubations were carried out and the datalogging sensors were checked and cleaned at the same 48 sites by 2-person teams during the week of August 8-12, 2022. At most sites, reach-average depth data was also collected during the week of August 8-12, 2022 by wading the stream, taking multiple manual measurements along multiple transects. When this wading depth method was not feasible, depth was measured via sonar from a kayak or jetboat, or calculated using public models or gauge data. In situ sensors from July deployments were retrieved by 2-person teams during the week of August 29-September 1, 2022. As a result, the logged deployments consist of approximately one month. The inverse model streamMetabolizer (Appling et al.; 2018) was used to estimate a deployment-period-average ecosystem respiration rate, gross primary production, and gas exchange velocity (K600) for each site. D50 was estimated as described in Gomez-Velez et al. (2015) and published in Gomez-Velez et al. (2023). Annual oxygen consumption was estimated using the methods described in Son et al. (2022).

Critical Details

1 – Each physical site has a "Site_ID" and each sampling event in time at that Site has a "Parent_ID" (i.e., in 2021, Site_ID T07 was sampled and the resulting Parent_ID of the samples was SPS_0053. In 2022, Site_ID T07 was sampled again and the resulting Parent_ID of the samples was SSS013). The files indicate both the Site_ID and the Parent_ID to indicate at which Site the sensor was deployed (Site_ID) and to which sampling event the data is most relevant (Parent_ID). The Parent_ID can be used to match sample data from the CM and SSS data packages to the data presented in this data package. The

identifier most relevant to the data user will depend on the specific analyses being done. If the user is interested in other data from the same sites collected at other times, they can access at https://data.ess-dive.lbl.gov/datasets/doi:10.15485/1898914, https://data.ess-dive.lbl.gov/datasets/doi:10.15485/1892052, https://data.ess-dive.lbl.gov/datasets/doi:10.15485/1898912, and https://data.ess-dive.lbl.gov/datasets/doi:10.15485/1892054

2 – The manual chamber data used to calculate water column respiration and the depth data used in the stream metabolizer inputs were pulled from version 1 of the SSS data package at https://data.ess-dive.lbl.gov/datasets/doi:10.15485/1969566.

Data Package Structure

This dataset is comprised of one main data folder with three subfolders. The main data folder contains of (1) file-level metadata; (2) data dictionary; (3) total/water column/sediment respiration; (4) median grain size (d50); and (5) annual oxygen consumption. The subfolders contain (1) model input files; (2) model output files; and (3) processing scripts. All files are .csv, .pdf, .R, .Rmd, or .html.

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Change History

Version 1	June 2023	Original data package publication