

ESS-DIVE Metadata for grain size methods comparison Data Package

Title:

Data for “Machine learning photogrammetric analysis of images provides a scalable approach to study riverbed grain size distributions”

Alternative Identifiers:

Abstract:

The grain size distribution, often characterized as median grain size (d50) in riverbeds determine hydrologic and biogeochemical function throughout watersheds, but the many methods used to measure or estimate d50 each have their own limitations. Here, we present a new photogrammetric method for estimating d50 from images, and explore how this method may help integrate manual and large-scale modeling d50 methods. This data package includes the data and scripts used in the manuscript entitled Alt+34Machine learning photogrammetric analysis of images provides a scalable approach to study riverbed grain size distributionsAlt+34. Source images can be found at 10.15485/1892052.

This dataset supports a broader study examining the drivers of spatial variability in sediment respiration rates in the Yakima River Basin. We acknowledge the Yakama Nation as owners and caretakers of the lands where we collected the data used in this project. We thank the Confederated Tribes and Bands of the Yakama Nation Tribal Council and Yakama Nation Fisheries for working with us to facilitate sample collection and optimization of data usage according to their values and worldview.

Keywords:

Grain size distribution
Median grain size
Machine learning
Computer vision
Photogrammetry
Freshwater
River
Stream
Riverbed
Hydrology
Biogeochemistry
Respiration

Data variables:

Median grain size (d50)
Stream order
Urban land cover
Elevation
Basin area
Stream length
Stream slope
Precipitation as snow
Evapotranspiration

Image suitability

Commented [PR1]: Aren't presented in <https://data.ess-dive.lbl.gov/view/doi:10.15485/1892052>, should we leave out?

Pub date:

Data usage rights:

Creative Commons Attribution

Project:

River Corridor and Watershed Biogeochemistry SFA

Funding org:

U.S. DOE > Office of Science > Biological and Environmental Research (BER)

DOE Contracts:

DOE Award #54737

Related reference:

[Insert any related references to manuscripts or other data packages.]

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Start date:

2021-08-30

End date:

2021-09-14

Location description:

Yakima River, WA, USA

Coordinates:

Refer to metadata spreadsheet

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Methods:

Images of riverbed grains were collected during a 2021 field campaign (171 images across 40 sites in the Yakima River basin, or YRB). A model using the You Only Look Once (YOLO) algorithm was trained to identify and measure individual grains, which was used to calculate the median grain size (d50) for each image. These values were compared to other d50 data sources in the YRB, including USGS manual measurements, and two continental-scale modeling approaches. We used simple spatial statistics and watershed characteristics to understand the similarities and differences between these d50 data sources, and explore if the YOLO approach can help integrate between sparse, accurate manual measurements, and spatially resolved, generalized model estimates.