

Impacts of streambed dynamics on nutrient and fine sediment transport in mountain rivers

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Summary

- The armor layer protects the finer bed subsurface from erosion, but when dislodged during high flow events it can release fine sediment enriched in Phosphorus (P) and Organic Carbon (OC).
- **Hysteresis and seasonal variations** in particulate and soluble reactive phosphorus (PP and SRP) and in particulate and dissolved organic carbon (POC and DOC) could be **controlled by armor layer motion**
- By monitoring summer monsoon and snowmelt flows and conducting field experiments in a mountain stream in NM, our preliminary results suggest that the **quantity of fine sediment in the riverbed is related to local hyporheic flux and near-bed flow velocity**.
- Particulate constituents such as POC, PP and suspended sediment (SS) often show clockwise hysteresis, whereas DOC tend to show counter-clockwise hysteresis, suggesting them **coming from different sources**.
- We are currently investigating these sources and constraining the exact timing of armor layer motion in each event.

Methods

1. Capturing Hysteresis:

Study Site: La Jara Creek,
Valles Caldera National Preserve, NM

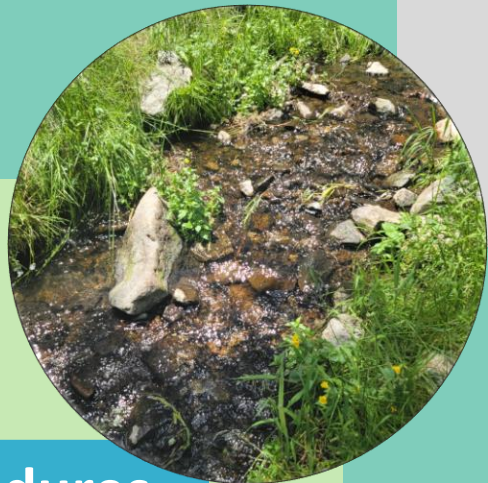
Turbidity and fDOM*
Collected using a YSI EXO2 Sonde

Water samples (SS, SRP, PP, DOC & POC)
Stage-triggered portable ISCO samplers

Flow depth and Discharge
Pressure transducers in stilling wells

* Fluorescent dissolved organic matter – a reliable proxy for DOC

Laboratory Procedures
SS – Laser diffraction method (LISST portable XR)
POC – Eurovector elemental analyzer coupled to an Isoprime IRMS
DOC – OI Analytical Aurora 1030 TOC Analyzer
SRP & PP – SpectraMax M2e



2. Fine sediment deposition and hyporheic flux:

Sediment traps with open and closed bottoms were installed next to subsurface temperature probes during the spring of 2023

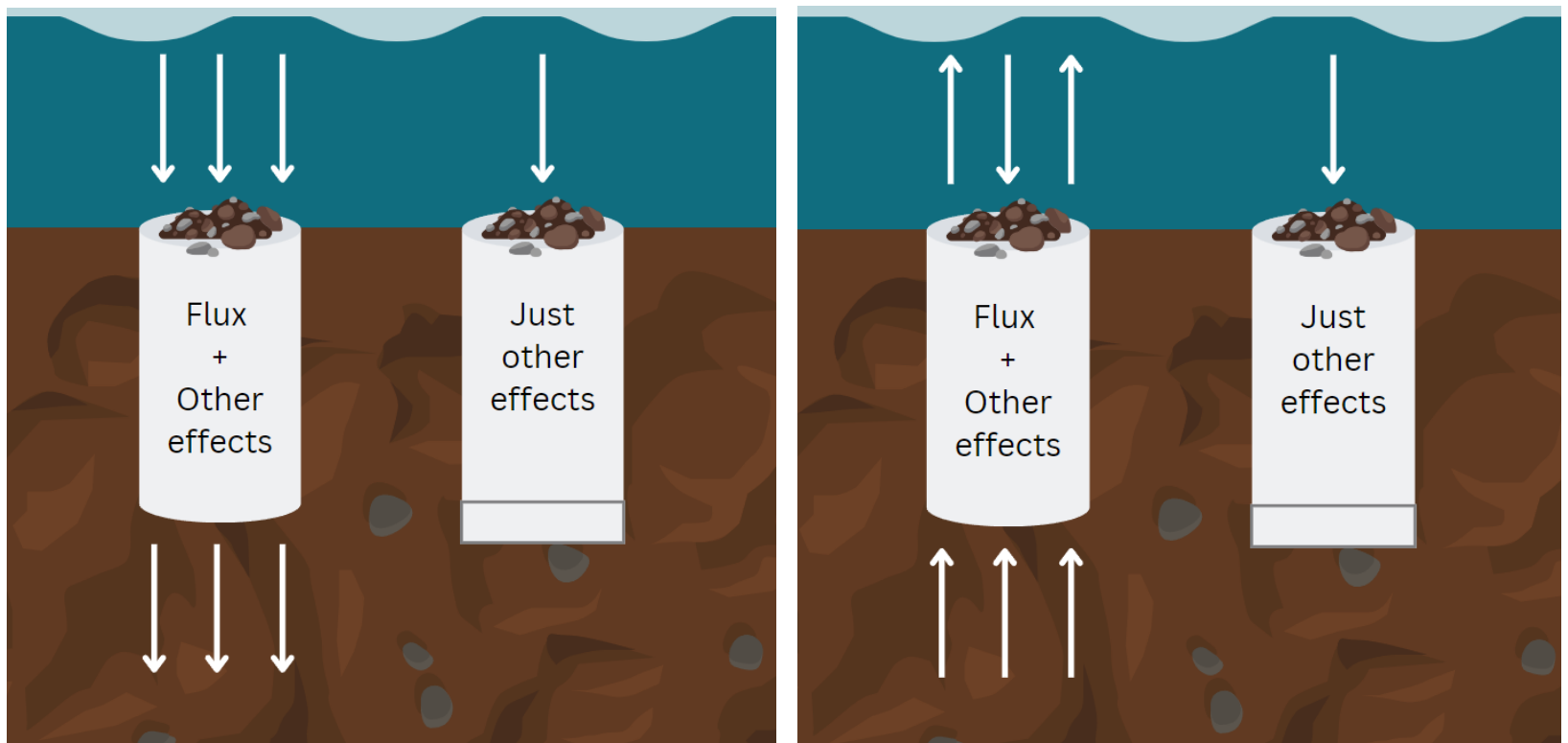


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