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

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**Project Abstract**:In mountainous watersheds, rivers typically have an armor layer of coarse sediment that protects the finer subsurface from erosion. In theory, armor layer motion during high magnitude flows could release the subsurface fine sediments that are often enriched in Phosphorus (P) and Particulate Organic Carbon (POC). Hysteresis and seasonal variations in POC, soluble reactive phosphorus (SRP), particulate phosphorus (PP), and suspended sediment (SS) may therefore be partly controlled by armor layer motion. In addition, streambed concentrations of these constituents may depend on whether a reach is losing or gaining. We test whether armor layer motion and streambed concentrations influence hysteresis patterns during summer monsoon flows in one gaining and one losing reach of La Jara Creek in Valles Caldera National Preserve, NM. We measure the amount and timing of armor layer motion, streambed and river concentrations of POC, PP, SRP, and fine sediment as well as surface and groundwater exchange in these two reaches. In addition, we are conducting field experiments that isolate the effects of armor layer removal and storms on nutrient and fine sediment concentrations in the water column. We measured hysteresis in SS and PP during six artificial floods, suggesting that the armor layer can control hysteresis because all other potential sources of hysteresis were eliminated. Preliminary results also demonstrate that SS, turbidity, PP, and POC often follow the same hysteresis pattern in a given natural flow event, suggesting that they may have a similar source. Equilibrium experiments suggested that sediments are a potential source of SRP to the water column, which was observed in natural flow events. Hysteresis of these constituents also changes between clockwise and counterclockwise between different natural flow events and may be related to the amount or timing of armor layer breakup or the streambed concentrations, which we are currently investigating. The final results of this work will determine how perturbations, such as the sequence and magnitude of droughts and floods, constrain biogeochemical nutrient cycling and impact subsequent temporal variations in nutrient and fine sediment export from mountainous watersheds.