Semi-Automatic Monitoring of Fluvial Sediment Dynamics: Insights from Grain Size and Shape Evolution along the Inaouène River, Northern Morocco (Oral)

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ABSTRACT

Accurate characterization of fluvial bedload is essential for understanding river morphodynamics, managing sediment budgets, and implementing ecological restoration strategies. This study utilizes semi-automatic image analysis to characterize the spatial evolution of pebble size and shape along a 120 km reach of the Middle Inaouène River (Northern Morocco), a highly dynamic Mediterranean hydrosystem. The methodology employs high-resolution digital photography processed through specialized image-analysis software (*Basegrain*), enabling a statistically robust evaluation of thousands of particles across multiple sampling stations. We analyzed key morphometric parameters, including median diameter (D50*D*), sphericity, and Zingg shape classification. The results reveal a complex downstream fining trend influenced by local lithological inputs and hydraulic sorting. Specifically, the evolution of pebble shape—from angular to spherical geometries—provides quantitative evidence of transport distances and energy conditions within the fluvial system. This approach offers a high-resolution, time-efficient alternative to traditional manual Wolman sampling, providing a more comprehensive dataset for large-scale river reaches. By integrating digital image processing with fluvial geomorphology, this research provides water managers and engineers with a reliable tool for assessing riverbed stability and the impacts of hydrological changes in North African river systems.

Keywords: Fluvial Dynamics, Image Analysis, Basegrain, Bedload Monitoring, Inaouène River.