

Monitoring Geomorphological Changes in the Peruvian Coast Using UAVs and PPK Techniques

Edgar Cubas Arteaga¹, María Cárdenas-Gaudry^{1,2}

(1) Faculty of Agricultural Engineering (FIA), Universidad Nacional Agraria La Molina, Lima 15024, Perú;
20190352@lamolina.edu.pe

(2) Faculty of Environmental Sciences, Universidad Científica del Sur, Lima 15067,
Perú; mcardenasga@cientifica.edu.pe

The Peruvian coast is undergoing significant landscape transformations driven by environmental and climatic factors, with extreme precipitation events exerting a pivotal influence on the morphology of river channels and floodplains. This study leverages advanced technologies, including unmanned aerial vehicles (UAVs) and post-processing kinematic (PPK) techniques, to address these dynamic changes. The methodology involves co-registering point clouds using ground control points (GCPs) to produce high-resolution and temporally stable digital elevation models (DEMs). The research focuses on a 0.5 km² area within a coastal basin in Peru, with data collection scheduled across two distinct timeframes. The primary objective is to identify areas exhibiting minimal elevation changes and quantify rates of erosion and sediment deposition over a defined period. Specifically, the study measures erosion in gullies and riverbanks, as well as sediment deposition, enabling the estimation of volumetric changes in cubic meters (m³). These findings are critical for advancing the understanding of regional geomorphological processes and informing the development of effective management and mitigation strategies. By employing UAVs and PPK techniques, this research delivers actionable insights into sediment dynamics, supporting sustainable water resource management and land use planning in Peru's coastal basins. Ultimately, the study contributes to mitigating the adverse impacts of extreme precipitation on the region's landscapes.