Spatial variation in sediment fluxes along the western slopes of the Peruvian Andes

Miluska Rosas Barturen$^{1,2}$, Veerle Vanacker$^{2}$, François Clapuyt$^{2}$, and Willem Viveen$^{1}$

$^{1}$Pontificia Universidad Catolica del Peru, Engineering, Lima, Peru (miluska.rosas@pucp.pe)
$^{2}$Earth and Life Institute, Georges Lemaître Centre for Earth and Climate Research, Université catholique de Louvain, Belgium

Knowledge of sediment production mechanisms and their potential controlling factors contributes to our understanding of geomorphological processes. Previous studies highlighted the link between sediment yield and anthropogenic (e.g. agricultural practices) and natural factors (e.g. climate, topography, river runoff, lithology and vegetation cover). The rugged western slopes of the Peruvian Andes shows different climate regimes with arid climates and desertic vegetation in the south and tropical climates and abundant vegetation in the north. In this region, agricultural and water regulation projects are concentrated.

However, the number of studies on sediment yield and its controlling factors are limited along the Peruvian Andes. Most studies on the western slopes have focused on the Northern part of Peru and showed a 3 to 60 times increase of sediment yield during El Niño (ENSO) events compared to normal years. The storm events rapidly mobilized sediment that was accumulated in the mountain and piedmont areas during dry normal years. In the central part of Peru where the main reservoirs, irrigation systems, and water supply plants are located, few studies were realized. They concluded that the relation between sediment production and both environmental and anthropogenic controlling factors needs to be further explored.

In this study, we identify the spatial patterns of sediment yield along the western slopes of the Peruvian Andes and analyze the main environmental controlling factors. Our study presents data on sediment yield of 20 catchments. The data contains information on suspended sediment load from gauging stations, reservoir sedimentation and water turbidity. We used satellite-based data to derive topographic information (SRTM v.3 DEM by NASA), daily precipitation covering the period 1981 to 2016 (PISCO product by Senamhi), daily discharge covering 1970 to 2020 (GloFAS-ERA5 global river dataset), lithological strength (global lithological map GLIM), and vegetative cover (MODIS Land cover type product). Our first results show a significant influence of the lithology, maximum discharge and topographic relief on sediment yield. The results of the analyses for the Peruvian Andes will be compared with previous studies in the Northern and Southern Andes.