
40 years of optical images reveal irrigation effects on mass-movements

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Abstract

We document the impact of irrigation on the triggering of rockfalls and landslides in the valleys of the western coast of Peru, based on a series of remote sensing optical images. We first process Digital Elevation models from 1978 and 2016 using KH9 spy satellite and SPOT6 images, and show elevation changes caused by very large landslides. We then quantify the motion of these large landslides over the period 2013-2017 by processing of time-series of displacement from Sentinel-2 and Landsat-8 images. Those landslides present long periods of quiescence followed by short periods of rapid activity. We show that the landslide activity is triggered by rockfalls from the valley walls. The time-series of landslide motion reveal a dynamic poro-elastic effect due to the seismic shaking produced by rockfalls. Those landslides affect the fertile valleys floors, leading to the destruction of villages and crops, inducing an accelerate loss of traditional agriculture fields.

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