EGU2020-17972
https://doi.org/10.5194/egusphere-egu2020-17972
EGU General Assembly 2020

Forecasting landslides using a spatiotemporal analysis of remote sensing data

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Forecasting landslides is highly dependent in the weather conditions and the land-soil characteristics and its state. The uncertainty present in the evaluation of precipitation and its continuous variation is always a challenge for having accurate forecast, of primary importance for risks reduction. Currently, the landslides generate an impact on the imbalance of ecosystems and their occurrence is increasing which leads to an increase in the vulnerability of man on earth. The complexity of the landslide systems requires detailed analysis of the highly dynamic information of the rain and in turn the form as the hydrology response. Being able to combine hydrological models forced by satellite information systems and put them with a soil cohesion analysis system could help improve monitoring and in a particular case forecast landslide events.

The Combeima river located at the village of Juntas with canyon type land relief currently, faces a vital challenge in the face of winter times where precipitation threaten urban zones. Current researchers have explored risk factors, however, results still are quite far from optimal.

This study develops a methodology to identify the water volume that can cause landslides over the canyon type land relief, and use it as a trigger for forecasting. Remote sensing data at the present time and projected from past data will be used to simulate forecasting situations (hidcasting). A coupled Mike SHE models and data from Google earth platform are used to analyze a period of twenty years. Local information from events and its analysis in the satellite images are used to validate the events. Finally, the results of past conditions that led to the generation of floods are used to identify the state of the soil and the volumes. A calibration and validation of a neural network model is done feeding the volumes and states. The results of the model allow us to specifically characterize the saturation limits of the soil and the maximum rainfall intensities that a soil may contain before collapsing. With this information a high performance and a design of a system to forecast in real time was proposed. This work is part of an ongoing research and partial results will be presented.