EGU21-14812
https://doi.org/10.5194/egusphere-egu21-14812
EGU General Assembly 2021

Using satellite soil moisture and rainfall data for the monitoring and the prediction of natural hazards

Valerio Vivaldi[1], Massimiliano Bordoni[1], Luca Brocca[2], Luca Ciabatta[2], and Claudia Meisina[1]
[1]University of Pavia, Geosciences, Pavia, Italy (valerio.vivaldi@unipv.it)
[2]National Research Council, Research Institute for Geo-Hydrological Protection, Perugia, Italy

Rainfall-induced shallow landslides affect buildings, roads, facilities, cultivations, causing several damages and, sometimes, loss of human lives. It is necessary assessing the most prone zones in a territory where these phenomena could occur and the triggering conditions of these events, which generally correspond to intense and concentrated rainfalls. The most adopted methodologies for the determination of the spatial and temporal probability of occurrence are physically-based models, that quantify the hydrological and the mechanical responses of the slopes according to particular rainfall scenarios. Whereas, they are limited to be applied in a reliable way in little catchments, where geotechnical and hydrological characteristics of the materials are homogeneous. Data-driven models could constraints these, when the predisposing factors of shallow instabilities, allowing to estimate only the susceptibility of a territory, are combined with triggering factors of shallow landslides to allow these methods to estimate also the probability of occurrence and, then, the hazard. This work presents the implementation of a data-driven model able to assses the spatio-temporal probability of occurrence of shallow landslides in large areas by means of a data-driven techniques. The models are based on Multivariate Adaptive Regression Technique (MARS), that links geomorphological, hydrological, geological and land use predisposing factors to triggering factors of shallow failures. These triggering factors correspond to soil saturation degree and rainfall amounts, which are available thanks to satellite measures (ASCAT and GPM). The methodological approach is testing in different catchments of Oltrepò Pavese hilly area (northern Italy), that is representative of Italian Apeninnes environment. This work was made in the frame of the project ANDROMEDA, funded by Fondazione Cariplo.