Geophysical Research Abstracts
Vol. 21, EGU2019-13852, 2019
EGU General Assembly 2019
© Author(s) 2019. CC Attribution 4.0 license.

Modeling landslides hazard under global change in a Pyrenean valley

Séverine Bernardie (1), Rosalie Vandromme (1), Thomas Houet (2), Marine Grémont (3), Yannick Thiery (1), Gilles Grandjean (1), Isabelle Bouroullec (4), and Florian Masson (1)

(1) BRGM, DRP/RIG, Orléans, France (s.bernardie@brgm.fr), (2) LBLETG-Rennes COSTEL UMR 6554 CNRS / Université Rennes 2, Place du Recteur Henri Le Moal, 35043 Rennes Cedex, (3) BRGM, 34000 Montpellier, France, (4) BRGM, 31000 Toulouse, France

The hypothesis of global warming is validated by various studies (IPCC, 2014). The IPCC also points out that "There is high confidence that changes in heatwaves, glacial retreat, and/or permafrost degradation will affect slope instabilities in high mountains, and medium confidence that temperature-related changes will influence bedrock stability. There is also high confidence that changes in heavy precipitation will affect landslides in some regions". Nevertheless, the quantification of the impacts of the climate change on natural hazard related to hydro-geohazard remains a tricky issue, as the uncertainty of the climatic parameters, especially the precipitations, remains high, all the more in mountainous context with higher spatial variability. Moreover, in mountainous areas, a range of socioeconomic sectors have experienced considerable change in the last two centuries, resulting in pressures on natural resources and traditions imposed by increasingly-industrialized societies.
In this context, this study aims at quantifying the evolution of landslide hazard under future possible global change trajectories, at the scale of a valley.
In this methodology, four prospective socio-economic scenarios are built up to 2040 and 2100 ; the land use is then deduced from these scenarios and spatially validated and modeled with LUCC models. Climate change analysis is performed with considering two GHG emissions scenarios RCP 4.5 and RCP 8.5. The impact of future land use and climate is then quantified through hazard computations that integrate these scenarios.
For that, we use a large-scale slope stability assessment tool ALICE, which combines a mechanical stability model, a vegetation module that interfere with the first model, to take into account the effects of vegetation on the mechanical soil properties, and a hydrogeological model, which simulates the evolution of the water table level according to meteorological parameters.
The evolution of landslide hazard is computed according to all scenarios. A fine analysis of the different input scenarios is realised, for quantifying the influence of the forest and the type of forest on slope stability, as well as the effect of climate scenarios on the stability, at the scale of a valley. The analysis is performed for each combination of scenarios, permitting to provide future possible landslide hazard maps.