Geophysical Research Abstracts
Vol. 18, EGU2016-15246, 2016
EGU General Assembly 2016

Contribution of a 3D velocity model and of beam forming method for the location of microseismic sources generated in soft rock landslides

Floriane Provost (1), Jean-Philippe Malet (1), Agnès Helmstetter (2), Cécile Doubre (1), Julien Gance (1,3)

(1) Institut de Physique du Globe; UMR 7516, Université de Strasbourg/EOST, CNRS, Strasbourg, France (f.provost@unistra.fr), (2) Institut des Sciences de la Terre; UMR 5275, University J. Fourier/Isterre, CNRS, Grenoble, France (agnes.helmstetter@ujf-grenoble.fr), (3) IRIS instruments, Orléans

Microseismicity monitoring has proven to be an important tool for a better understanding of the deformation occurring in slow-sliding landslides. However locating the seismic sources generated by a landslide remains a challenging problem due to (1) the small sizes of the landslide, (b) the heterogenous and time-changing petro-physical properties of the landslide material, (c) the complexity of the recorded signals with unclear discriminations of the wave onsets, and (d) the difficulties to install and maintain a dense seismological network on-site close to the seismic sources.

We studied the seismic sources generated by the deformation of the clay-rich Super-Sauze landslide (South French Alps). Previous studies show that the most active zone is the uphill part of the landslide within a zone of 300x300m2. Two seismic antennas have been installed on the sides of this zone and a seismic campaign was conducted to build a 3D velocity model of the area. Calibration shots were performed to test the performance of the location method.

We show that the use of a 3D velocity model integrated in a beam forming location method slightly improves the accuracy of the shot location epicenter. However, this approach does not help to interpret with confidence the location of the natural events because the horizontal error remains larger than 50m for more than 50% of the shots. Nevertheless, adding station corrections and constraining the grid search area with additional informations based on the signal and the landslide behavior such as SNR, seismic event typology, and surface kinematics of the landslide allow obtaining reliable results. More than 70% of the calibration shots could be located with a horizontal error of less than 40m. The lack of sensor installed in depth as well as the the lack of calibration shots realized at different depths does not permit us to identify the depth of the sources.