Geophysical Research Abstracts, Vol. 6, 03902, 2004
SRef-ID: 1607-7962/gra/EGU04-A-03902

GEOPHYSICAL INVESTIGATIONS OF THE LARGE GRAVITATIONNAL MASS MOVEMENT OF SECHILIENNE (ALPS, FRANCE)

O. Meric (1), D. Jongmans (1), S. Garambois (1), J. M. Vengeon (1) and J. L. Chatelain (2)

(1) LIRIGM, Univ. Joseph Fourier, (2) LGIT, Univ. Joseph Fourier & CNRS & IRD (ombeline.meric@ujf-grenoble.fr/+33 (0) 4 76 82 80 70)

The Séchilienne movement, which is located in the French Alps near the city of Grenoble, is a large gravitational rock movement, highly heterogeneous and fractured, which may generate secondary hazard of flood due to the damming of the Romanche valley. Furthermore, due to the existence of the active seismic strike-slip Belledonne fault in the vicinity of the landslide, an earthquake triggered the rock fall has to be considered. Although this area has been extensively instrumented since 1988 (displacement and deformation measurements), the thickness and western extension of this potentially moving mass are still unknown, leading the volume estimations for a rock avalanche scenario highly variable and poorly constrained. Based on available surface data, it ranges from 3 to 20 hm3 inside a global slowly moving zone between 50 to 100 hm3. In order to reduce this lack of information, classical geophysical experiments have been conducted through the landslide, i.e. electromagnetic profiling and seismic and electrical tomography, to study their potential in characterizing properties and extensions of the moving mass. To better assess the hydrological properties within the massif, spontaneous potential (SP) measurements have been acquired on different profiles. Finally, an innovative method based on the seismic noise has been tested.
This combined study shows clearly the potential and limits of the different tested geophysical methods to better characterize this landslide. It particularly indicates that resistivity variations, and, at a lower degree, seismic velocity variations appear well correlated with deformation fluctuations of the massif. Indeed, highly disturbed zones present higher resistivities and lower seismic velocities. Furthermore, it is noticeable that the spectral amplitude of the seismic noise and the positive SP anomaly increase

with the measured superficial displacement rate. Consequently, this study suggests that some geophysical measurements are adapted to give information at depth, to propose geometrical limits and to study water flows within the massif. In this type of movement, time monitoring of selected geophysical observables (for example, electrical resistivity, seismic noise and SP) should be conducted together with surface displacement and meteorological measurements to better understand the behaviour of the landslide.