Geophysical Research Abstracts
Vol. 17, EGU2015-11288, 2015
EGU General Assembly 2015

Near real-time detection and characterization of landslides using broadband seismic networks

Andrea Manconi (1), Velio Coviello (1,2), Francesca De Santis (1,2), and Matteo Picozzi (3)

(1) CNR IRPI, Torino, Italy (andrea.manconi@irpi.cnr.it), (2) Politecnico di Torino, Italy, (3) Università di Napoli Federico, Italy

Broadband seismic networks at regional, national, and global scale are usually deployed for a specific purpose, i.e. earthquake monitoring. However, it has been recently demonstrated that these networks are also capable to efficiently detect failure and transport processes related to landslide phenomena. Indeed, stations located several tens of kilometers away from the source areas can record the ground vibrations produced by large mass movements.

In this work, we propose an integrated approach for the near real-time detection, location, and characterization of landslides, by considering data acquired from the Italian broadband seismic networks and available in the European Integrated Data Archive (EIDA). We use an automatic picking of first arrivals to identify significant seismic events recorded by the monitoring network. Secondly, waveforms relevant to landslide phenomena are selected by analyzing the spectral characteristics of seismic signals, which significantly differ from those related to earthquake events. Afterwards, in order to locate the landslide, we use a modified version of the real-time evolutionary location algorithm proposed for earthquakes, which relies on geometrical characteristics of the seismic network and on the relationships between triggered stations and not-triggered stations. Indeed, a first landslide location is roughly estimated as soon as the first station is triggered. The progressive increase over time in the number of triggered stations allows improving the accuracy on the most likely landslide location. Finally, we analyze the seismic energy released to infer an approximate value of the landslide volume in near real time.

Here we present few examples relevant to recent well-known landslides where our method was successfully applied. Our results show how it is possible to extract precious information for landslide hazard assessment from seismic monitoring data, which in the field of earthquake warning would be discarded. Moreover, we discuss how this method might be implemented to achieve early detection of landslides at national scale, as well as its potential evolution for early warning purposes.