Session NH4.4 :
Earthquake site effect evaluation: recent advances and new perspectives

A new database of historical earthquake-induced landslides in Italy

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The study of the incidence of the coseismic phenomena is becoming an increasingly demanding and fundamental need in terms of civil protection agencies. Especially landslides triggered by earthquakes can cause significant impacts and losses across wide areas affected by earthquake shaking.

In this context, we present a new database of historical earthquake-induced landslides (HEILs) created within the project "Multi-scale, integrated approach for the definition of earthquake-induced landslide hazard in Italy", funded by the Italian Ministry for the Environment. The goal of this project was to develop a multidisciplinary approach for assessing the earthquake-induced landslide hazard at national, regional and local scales, and integrating existing databases with the results from previous projects and research activities.

The Catalogue of Strong Earthquakes in Italy (CFTI) database holds a central role in this research. In fact, the CFTI collects the results of over three decades of research on historical seismicity in Italy. What makes CFTI different from all other earthquake catalogues is that its database does not only contain parametric data and macroseismic intensities assigned to individual localities, but also synthetic descriptions of the seismic scenario for each investigated earthquake sequence. It provides a complete account of the effects on the built and natural environment for each localities recorded by historical sources. In addition, for every investigated earthquake sequence, CFTI supplies the relevant bibliography in an organized form, allowing the reader to navigate upstream from the parameters of a specific earthquake to the original sources used to investigate that event.

CFTI also provides descriptions of the effects induced by earthquakes on the natural environment, such as ground cracks, chasms, landslides, rockfalls, changes in the discharge rate of rivers and springs, tsunami effects, overflowing of lakes, etc. Specifically, its latest version, CFTI5Med, documents about 600 landslides associated with strong historical earthquakes.

We thus reviewed and integrated data relating to HEILs, already included in the CFTI database, by identifying new landslides. We focused on the review of historical sources, newly found or already archived in the CFTI database, the analysis of recent scientific articles and technical reports. Moreover, we carried out a comparison with other digital archives such as the CEDIT and the EEE catalogue (http://eeecatalogue.isprambiente.it/). The goal was reaching a more accurate localization and definition of the slope movement types of the HEILs, when the descriptions of the historical sources allowed it, through the geographical comparison with data of different origins, such as aerial photographs, geomorphological and instability maps. These effects were associated, where possible, with the individual landslides registered in the IFFI database (https://www.progettoiffi.isprambiente.it/).

The final result is a dataset with about 1,000 landslides divided into classes of location accuracy. The dataset is addressed to a large audience of potential users: researchers and scholars, administrators and technicians of local institutions, and civil protection authorities.

The results are collected in a new independent database, CFTI Landslides, connected to the CFTI5Med, which is publicly accessible online through a dedicated open-source geographic interface, designed to be interoperable with both INGV and external databases.

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