Geophysical Research Abstracts
Vol. 17, EGU2015-14567-1, 2015
EGU General Assembly 2015


# Challenges in analysing ambient noise to characterise seismic slope response in complex site conditions: the case of hillslopes in Qiaozhuang (Sichuan, China)

Vincenzo Del Gaudio (1), Janusz Wasowski (2), Yonghong Luo (3), Runqiu Huang (3), and Yungsheng Wang (3)

(1) Università degli Studi di Bari "Aldo Moro", Dipartimento di Scienze della Terra e Geoambientali, Bari, Italy (vincenzo.delgaudio@uniba.it), (2) Consiglio Nazionale delle Ricerche – Istituto di Ricerca per Ia Protezione Idrogeologica, Bari, Italy, (3) State Key Laboratory of Geo-Hazard Prevention and Geo-Environment Protection, Chengdu University of Technology, Chengdu, P.R. China

The Mw 7.9 Wenchuan earthquake of May 12th, 2008 shattered and induced failures on slopes of hills surroundings the centre of the town of Qiaozhuang, located 300 Km NE of the mainshock epicentre. This motivated the initial investigations on the possible occurrence of topographic amplification phenomena, which were conducted through a temporary accelerometer monitoring carried out between April and October 2009 on Weigan hill and Mount Dong, located SW and NE of the Qiaozhuang centre, respectively. In both cases, the amplification factors were found higher at sites closer to the hilltop and lower near the foot of the slope (Luo et al., 2014). However, the general characteristics of slope response also revealed that resonance phenomena were controlled by the local geological setting characterised by Silurian phyllites with sub-vertical schistosity (at Weigan) and by fractured Precambrian limestones (at Dong). To further investigate local slope response, ambient noise recordings, based on the calculation of horizontal to vertical spectral ratio (HVNR or Nakamura method), were also conducted on several sites in the peri-urban area, including those occupied by the accelerometer stations. The latter provided the possibility to validate the outcomes of ambient noise analysis. Data interpretation has been hampered by a contingent factor, i.e. the occurrence of environmental conditions characterised by a strong E-W oriented peak at low frequencies (below 1 Hz), and by the locally complex structural setting. For example, in the case of Weigan hill the sub-vertical schistosity appeared responsible for a considerable amplification of vertical ground motion. The former problem implies the need of a repetition of measurements under different environmental conditions to distinguish permanent, site-specific properties of noise related to slope dynamic response. By altering the H/V ratio, the presence of vertical amplification represents an obstacle for a routine data analysis and a straightforward interpretation of results. Therefore, further developments in advanced techniques of noise data analysis techniques appear necessary to facilitate the extraction of reliable information on seismic response of slopes in geologically complex conditions.

Reference

Luo Y., Del Gaudio V., Huang R., Wang Y. & Wasowski J., 2014: Evidence of hillslope directional amplification from accelerometer recordings at Qiaozhuang (Sichuan — China). Engineering Geology, 183, 193-207, doi: 10.1016/j.enggeo.2014.10.015.