

ESC2018-S29-169

THE CENTRAL ITALY 2016-2017 SEISMIC SEQUENCE - SITE RESPONSE ANALYSIS BASED ON SEISMOLOGICAL DATA IN THE ARQUATA DEL TRONTO-MONTEGALLO MUNICIPALITIES

Laurenzano Giovanna (1), Barnaba Carla (1), Romano Maria Adelaide (1), Priolo Enrico (1), Bertoni Michele (1), Bragato Pier Luigi (1), Comelli Paolo (1), Dreossi Ilaria (1), Garbin Marco (1)*
(1)OGS, Italy

* glaurenzano@inogs.it

In this study we evaluate the local seismic response for thirteen sites located in the municipalities of Arquata del Tronto and Montegalzo, two areas that suffered heavy damage during the Mw 6.0 and Mw 5.4 earthquakes, which struck Central Italy on August 24th, 2016. The study has been performed within the framework of OGS intervention set up during the seismic sequence that followed the mainshock of August 24th, 2016 and was coordinated by "CMS - Centro di Microzonazione Sismica e sue applicazioni" on request of "DPC - Department of Civil Protection" with the final goal of performing a Level 3 seismic microzonation of the most damaged municipalities. The equipment of the mobile stations consisted of a 1 Hz three-component velocimetric sensor (Lennartz 3Dlite) possibly buried in the soil, a datalogger set for continuous data acquisition with a sample rate of 100 Hz, a GPS antenna and a battery connected to photovoltaic panels when power supply was not available. Five stations were also equipped with a strong-motion sensor. Particular care was devoted to the selection of the reference site, as it is crucial for spectral analyses. In the considered area the bedrock is represented by the arenaceous lithofacies of pre-evaporitic member of Umbria-Marche-Romagna-stratigraphic-succession named "Laga Formation" (Messinian p.p.), despite large carbonate blocks of paleo-landslides diffusely outcrop. Among the stations deployed on geological bedrock, a site located in Uscerno hamlet was identified as the reference one in virtue of its flat Horizontal-to-Vertical Spectral Ratio of ambient noise recordings. The other sites are located on Quaternary sediments of diverse origin (alluvial, colluvial deposits, landslides, anthropic reports) laid on the different members of Laga Formation. From a morphological point of view, three sites are located on the top of topographic irregularities (reliefs, ridges); four

sites are set along narrow valleys while the remaining ones are on the flank of hills. The input dataset is made by ground motion recordings of 348 events occurred during the seismic sequence in a period of about five months (October 2016-February 2017). The estimation of the seismic response is performed by the Generalized Inversion Technique (GIT), using GITANES (GIT ANALYSIS of Earthquake Spectra), a Matlab package that has recently been developed at OGS. The interpretation is further improved through the information provided by a non-reference-site method (i.e., the so-called Receiver-Function Technique, EHV) and by the Horizontal-to-Vertical Spectral Ratios (NHV) of ambient noise recordings. We also provide an independent estimate of the local amplification by comparing the Peak Ground Velocity and the Spectral Amplitudes observed at each site to the values estimated by well-established Ground Motion Prediction Equations for a rock-class site. Results obtained by the adopted methodologies are all highly consistent each other, and emphasize the different seismic behavior of several sites at a local scale. Thus, sites located on Quaternary deposits overlying the bedrock, such as Castro, Pretare, Spelonga, Pescara del Tronto, and Capodacqua feature some relevant amplifications in a medium (2-10 Hz) frequency range; two sites at Spelonga show amplifications also at low frequencies; three sites located on stiff formations (Uscerno, Balzo and Colle d'Arquata, respectively) feature either nearly neutral response or low amplification level. Some differences between reference site (GIT) and single-station methods (EHV and NHV) can be ascribed to the amplification level of the vertical component. A probable topographic effect was identified at the rock site of Rocca di Arquata.