

Ru8 GFZ: Overview of the scientific activities with particular focus on the shear wave velocity profile estimations at the RAN sites and on the temporary seismic network installation in Norcia.

Parolai S.¹, Picozzi M.¹, Di Giacomo D.¹, Pilz M.¹, Bindi D.^{1,2}, Strollo A.¹

¹Deutsches GeoForschungsZentrum GFZ, Telegrafenberg 14473 Potsdam Germany, parolai@gfz-potsdam.de
²INGV Via Bassini 15, 20133, Milano, Italy

Abstract

The activities carried out by the RU8 GFZ include (1) the field measurements and the preliminary analysis of the array data (Task 3) collected at 11 sites, (2) the installation and de-installation of a seismological network in the area of Norcia (Task 4) and a preliminary analysis of the data, and (3) the preliminary numerical simulations of the 3D seismic response of the Gubbio Basin (Task 4). The responsible of the RU8-GFZ Stefano Parolai also participated as expert consultant to the scientific discussions and meeting promoted within Task 5.

The seismic noise measurements in array configurations were carried out at ten sites of the RAN, three in Basilicata, two in Central Italy (Umbria and Abruzzo) and five in Emilia Romagna. Twelve to seventeen EDL stations equipped with 1Hz short period sensors were used for the measurements. The analysis of the data is ongoing in cooperation with RU1. Additionally, array measurements of seismic noise were also carried out in Onna (Abruzzo) and the S-wave velocity profile estimated.

From 17 January 2009 to 25 May 2009 UR8 installed, together with UR1 a seismological network in the area of Norcia. This site was selected as an interesting basin where complicated ground motion amplifications due to 2 or 3D effects can take place. The network was composed by fifteen EDL 24 bit acquisition systems equipped with Mark-L-4C-3D short period sensors. A large number of local events have been recorded including the mainshock (although clipped within the valley) and the aftershocks of the Abruzzo sequence. During the de-installation of the network in May single station noise measurements were carried out. The analysis of the data is ongoing.

UR8 released to the project the data set of weak motion recordings collected between September and October 2006 in Val D'Agri. While the large amount seismic noise collected by the stations provided interesting results about seismic noise amplitude variation within the valley, the earthquake data analysis, carried out in close cooperation with UR5, highlighted the difficulties in obtaining robust site response results due to the paucity of earthquake data with good signal to noise ratio. UR8 also contributed to the numerical simulation of the Gubbio basin, in a close cooperation with UR3 (PoliMI) and UR1. The results highlighted the strong amplification of ground motion within the basin as well as an extension of the significant ground shaking due to wave diffracted and reflected at the edge of the valley.



Figure 2: array geometry in Onna



Figure 1: Location of the 10 sites where array measurements were carried out (triangles) and of the Norcia test site (square)

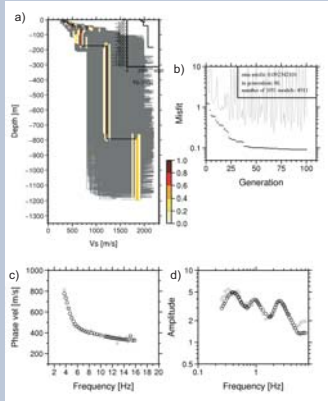


Figure 3: S-wave velocity profile in Onna. a) The minimum misfit model (black line), all tested models (gray lines). The colors indicate the density of the models lying within the 10% of the minimum misfit. b) Minimum (black dots) and average (gray line) misfit at each generation. c) Observed (gray filled circles) and calculated (black empty circles) phase velocities. d) observed (gray filled circles) and calculated (black empty circles) horizontal-to-vertical spectral ratio (H/V).

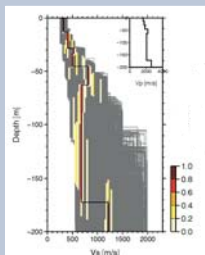


Figure 4: As in Figure 3 but zooming in the uppermost 200 m. The uppermost 100 m are also constrained by the dispersion curve.



Measurements in Onna



Figure 5: array geometry in Modena

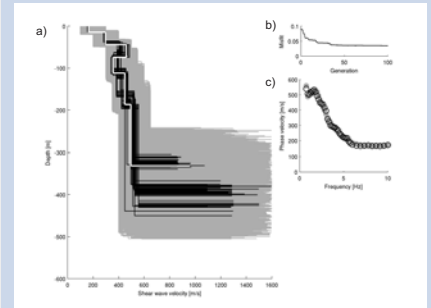


Figure 6: S-wave velocity profile for the RAN station in Modena. a) The minimum misfit model (white line) all tested models (gray lines) and the models lying within the 10% of the minimum misfit (black lines). b) The minimum misfit for each generation. c) The observed (gray circles) and calculated (black empty circle) phase velocities.



Figure 7: Temporary seismic array in Norcia. The recordings of the 6 April 2009 mainshock of the L'Aquila sequence and of an aftershock are shown. Note the variability of ground motion within the basin, also clear in the clipped recordings of the mainshock.

Acknowledgements: Ralf Baiz and Regina Mikereit participated to the measurements and helped with data analysis.