A 1D VP VELOCITY MODEL IN THE GARGANO PROMONTORY, APULIA (SOUTHERN ITALY)

Andrea Tallarico¹, Salvatore de Lorenzo¹, Maddalena Michele¹ and Annalisa Romeo¹

On April 2013, a local-scale seismic network (OTRIONS), composed of twelve Lennartz short period (1 Hz) three component seismographs, has been located in the northern part of Apulia (Southern Italy), in order to record the small magnitude earthquakes that occur in the Gargano promontory. In the first two months of data acquisition, the network was able to record more than one hundred very small (M<2) magnitude earthquakes.

In order to obtain reliable locations of the seismic events, a three-layer Vp velocity model was preliminarily computed using the recordings of earthquakes occurred in the area, in the period 2006-2012, and recorded by the national seismic network of INGV. This model was calibrated by means of a multiscale approach, based on a global search of the minimum misfit between observed and theoretical travel times. At each step of the inversion, a grid-search technique was implemented to infer the elastic properties of layers, by using HYPO71 to compute the forward models. This model allowed us to infer a preliminary location of the events recorded by the OTRIONS seismic network. The best fit three-layer model constrain the Moho depth at about 27-30 km of depth, according to previous studies (Piana Agostinetti and Amato, 2009).

In a further step, we used P and S travel times of both INGV and OTRIONS recordings to infer a minimum 1D VP velocity model through the classical VELEST linearized inversion approach (Kissling et al., 1994). Owing to the relatively small number of data and poor coverage of the area, in

¹ Professor, Dipartimento di Scienze della Terra e Geoambientali, Università di Bari "Aldo Moro", Bari Italy, andrea.tallarico@gmail.com
the inversion procedure, the Vp/Vs ratio was fixed to 1.82, as inferred from the analysis of a modified Wadati diagram (figure 1).

To minimize the number of degree of freedoms, the stations delays were not included in the model parameters to be inverted. The final 1D velocity model was obtained by averaging the inversion results arising from nine different initial velocity models. The inferred Vp velocity model (figure 2) shows a gradual increase of P wave velocity with increasing the depth and is well constrained by data until to a depth of about 25-30 km.

The residuals between observed and theoretical travel times for the three-layer velocity model and the 1D velocity model are shown in figure 3. A variance reduction higher than 60% is obtained when using the 1D velocity model.

REFERENCES