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# Crustal 3D tomography of the Southern Tyrrhenian Sea: new constrains using passive seismic data from OBS and land stations

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Knowledge of seismicity and crustal structure of the Southern Tyrrhenian Sea has been limited by the uneven station distribution due to the shape of the Italian peninsula, and the lack of seismic station coverage at the sea bottom. A great improvement in our analysis capability is expected when long term recording periods of Ocean Bottom Seismometers (OBS) are available. In this study we integrate traveltime data coming from local seismicity recorded by an OBS network deployed during the EC-TYDE project (December 2000- May 2001), an OBS installed on the SN1 GEOSTAR-type observatory, and land networks. The TYDE network was located around the Eolian Islands, covering an area of about 200 km x 100 km (EW-SN) down to about 3.5 km sea depth, while the SN1 station was installed off-shore Catania (Sicily) in the Ionian sea at 2.1 km sea depth. P and S-wave first arrivals were picked on the OBS waveforms and integrated with data coming from the Italian Seismic Network bulletin. Thanks to the use of the OBS we could expand our dataset and have a more accurate 1D hypocenter location. The final dataset comprised more than 2100 events resulting in about 21000 P phases and 11000 S phases. Here we will present preliminary results leading to a 3D model coming from the inversion of the P phases.
The calculation of the P-wave 3D velocity model is performed by using a quasi-linear (non global) inversion method which requires a reliable initial 1D model. The initial 1D model was calculated using the VELEST code and some a priori information coming both from literature and from previous analysis. Given the great variations in topography/bathymetry in our study area, going from about -3500 m to 2000 m, we decided to include this data in our starting model. Thus topography data was re-sampled on the inversion grid in local coordinates and cells that were (completely or partially) in water or air were assigned an appropriate velocity value. This led to more realistic ray paths and improved the accuracy of traveltime calculation and decreased the misfit rms in the inversion. The velocity model is parametrized by 10 km x10 km (horizontal dimension) x 2 km (vertical dimension) cells, covering from 2 km above sea level to about 20 km depth.
We show data selection procedure and analysis, the calculation of the 3D P velocity model and re-localized hypocenters, and highlight the main features found in the images. This study shows a first 3D model of the Southern Tyrrhenian Sea based on passive local seismicity recorded both by OBS and land stations.