A new a-priori velocity model for seismic tomography investigation of the Southern Italy region

Cristina Totaro, Giancarlo Neri, Barbara Orecchio, Debora Presti, and Silvia Scolaro
Department of Mathematical and Computer Science, Physical Sciences and Earth Sciences, University of Messina, Messina, Italy (ctotaro@unime.it)

By integrating data and constraints available in the literature, we defined a new “a-priori” 3D seismic velocity model imaging the lithospheric structure of Southern Italy, a highly complex area in the Mediterranean region where the Africa-Europe plate convergence and the residual rollback of the Ionian slab coexist. Involving the integration of multiple datasets and constraints (e.g. velocity patterns from seismic profiles and/or tomographies, moho depth estimates, subduction interface geometries) and following a procedure derived to the one already successfully applied in the area about a decade ago, we obtained the simplest 3D velocity structure consistent with all the available collected data. Studies and analyses performed in recent years allowed us to enlarge and improve the previous estimated model by adding further data and useful constraints. The so obtained “a-priori” velocity model has then been used as starting model for a new earthquake tomographic inversion of the study region. Dataset used for the velocity model computation has been selected from the Italian seismic database (www.ingv.it) and consists of ca. 10000 earthquakes with magnitude equal or greater than 2 and occurred in the time period 2000-2020 at depth less than 60 km and with at least 10 station readings. The obtained 3D velocity structure and the related hypocenter locations have been compared with other geophysical and geological observations and interpreted in the frame of the geodynamic models proposed for the region.