

Ligurian Basin: Transition from continental to oceanic crust

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The Ligurian Basin lies between Corsica and the France in the transition from the alpine orogen to the Apennines system. The southeast propagating trench retreat of the Apennines-Calabrian subduction zone pulled Corsica and Sardinia away from the Eurasian continent away leading to back-arc rifting between 30 Ma and 15 Ma. The rifting jumped 15 MA ago leaving Corsica and Sardinia at its present place and forming the Tyrrhenian Sea.

Within the framework of the AlpArray research initiative and its German component “4D Mountain building” (SPP2017 4D-MB) an offshore experiment was conducted in the Ligurian sea to investigate the lithosphere structure of the Ligurian basin. It consisted of 2 active wide-angle seismic profiles and a passive seismological network. The passive seismic network was deployed in June 2017. Recovery and the active seismic experiment took place during the MSM71-cruise in February 2018.

A 127 km long profile runs along the centre of the basin from Southeast to Northwest. 15 ocean bottom seismometer (OBS) and ocean bottom hydrophones were deployed with an average spacing of 8 km. 1079 shots were fired by an 84l G-gun array with an average spacing of 125 m. The shots can be followed up to offsets of 60 km.

First, a model was derived by fitting the observed onsets of the reflected and refracted waves manually. In a second step, the onsets were used as input in a tomography scheme, to improve the fine structure of the subsurface.

We find a 7 - 8 km thick sedimentary layer with a P-wave velocity increasing from 2.5 km/s to 5.5 km/s. A continental crust is observed only in the northern part of the profile. It is at the northern end about 3 km thick and thins towards the south. It terminates in the middle of the profile. The Moho is in the southern part directly under the sedimentary layer at 7-8 km below seafloor. The Moho starts to deepen in the middle of the profile, where the continental crust terminates. The Moho is found at 10 km at the northern end. Mantle velocity are between 7.5 to 8 km/s. There is no indication for an oceanic crust.