

Crustal Structure in the Calabrian Arc

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In the summer 1979 a complex DSS experiment was carried out in the Calabrian Arc region in order to get further information on the geological structure of this area. As it is well known, the investigated area is located at the convergence of the Eurasian and African plates, where subduction is still active, as it is shown by the occurrence of intermediate and deep earthquakes and by the presence of andesite volcanics in the Aeolian Islands arc. Moreover the geometry of the crustal structures is made more complex by the occurrence of the spreading of the Tyrrhenian basin adjacent to the Apennine mountain chain.

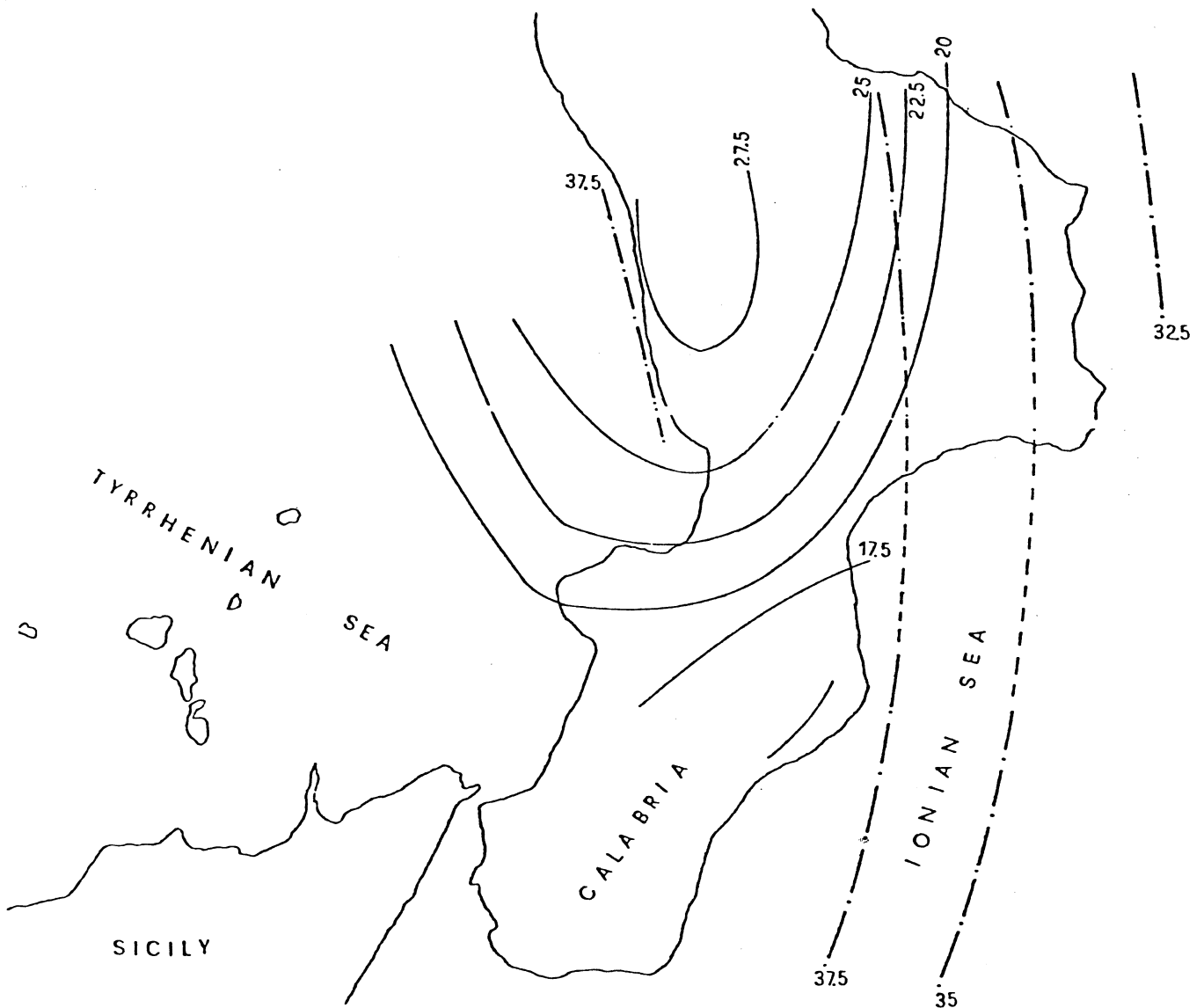
Shots were fired in the Jonian and Tyrrhenian Seas and recorded both on land by Mars 66 portable seismographs as well as by ocean bottom seismographs. Moreover, due to the recent developments of methods of joint interpretation of DSS and earthquake data, several temporary seismic stations and two telemetered networks were installed in Southern Italy and particularly in Calabria. For this reason charges of 200 kg were fired along a SE-NW trending profile and seven shots were also fired with doubled charges in selected points for obtaining records at the more distant stations.

The seismic activity recorded during the period July-September 1979 was mainly clustered in the Aeolian Islands and Etna regions. It was quite low in the surrounding area and data collected did not furnish a reliable velocity model. It was therefore necessary to integrate them by using records of the aftershock sequence occurred during 1978 near the Aeolian Islands. Also records from a DSS carried out in 1972 were used. The method applied in the analysis of data consists in the algebraic linearized inversion of refracted and reflected arrival times: unknowns of the problem are the thicknesses and velocities of a series of horizontal homogeneous layers.

By using a part of records obtained in 1979 along the profile, several record sections were also compiled by assembling the records of different shots at the same station and viceversa, and interpreted with classical DSS methods.

P.F. GEODINAMICA, Pubbl.n° 370.

The results obtained and pre-existing data show the occurrence in Central Calabria of two different discontinuities characterized by high velocities and high velocity gradients: the shallower one is well correlated to the Moho discontinuity beneath the Tyrrhenian basin, while the deeper one to the Moho beneath the Ionian Sea.



The figure shows the trend of the isobathes of the two surfaces respectively by continue and dotted lines.