

17. - CRUSTAL STRUCTURE OF ITALY
SOME GENERAL FEATURES FROM EXPLOSION SEISMOLOGY

by GIESE, P. and C. MORELLI

The crustal structure of the Italian area has been investigated since 1956 by explosion seismology in a program organized by Italian geophysicists in close co-operation with German and French geophysical institutions. The main activity of research was concentrated on the Alpine area and on Southern Italy.

The complicated tectonic structure of Italy is reflected in a corresponding complex pattern of different crustal types. A typical continental crust of normal thickness (30 - 35 km) with a moderate low velocity layer and a normal upper mantle velocity of 8.2 km/sec is existing in Puglia and probably in Gargano, in Southern Calabria, in the channel of Sicily and probably in SE-Sicily. In these regions, a well expressed reflection from the crust/mantle boundary can be recorded.

A continental crust, but of greater thickness is typical for the Alpine area. The three wave types characterizing a continental crust could be observed. The main features of the Alpine crust are the following:

- 1) The crust gets thinner when going away to the west and the north from the axis of the Alps, and in the same direction, the crust-mantle boundary gets sharper. The maximum depth of about 60 km has been found in the Western Alps, at the western side of the gravity high of Ivrea.
- 2) In general, there exists under the Alps a velocity inversion getting accentuated under their axis. Near the Mediterranean coast, the inversion is scarcely existent.
- 3) The gravity high of Ivrea is caused by high velocity material (7,2 km/sec) in a depth range between 5 and 20 km which is connected eastwards to the crust-mantle transition of the Po-plain bloc.

From west the low velocity layer (4 - 5 km/sec) is extending under the high velocity material between 20 and 40 km depth.

For the Po-plain area and the Apennines the velocity distribution is anomalous. The crust shows a normal thickness (25 - 35 km) and a moderate velocity inversion. The most significant velocity change is detected between 6.8 and 7.5 km/sec, indicated by strong reflections whereas near 8.0 km/sec no remarkable change could be observed.

A crust of normal thickness but with a very complex and less significantly expressed crust/mantle boundary exists in Northern Calabria and Western Sicily. The profile along the northern coast of Sicily shows no clear reflection from the top of the upper mantle. Here it becomes difficult to answer the question in which depth the crust/mantle boundary is to be found.

The results obtained have been compiled in a contour map showing the depth of the crust/mantle boundary knowing that its definition is not unique for the whole area under investigation. Therefore, in addition, the velocity values at the depth contoured are given as well.

The crustal thickness variations derived from seismic data are in agreement with the contour map of Bouguer anomalies. Therefore, the contour map of crustal thickness has been completed in areas not yet investigated by deep refraction seismics using gravity data.

Intervention à la suite du papier 4-18. présenté par P. GIESE.

GASPARINI - What criteria were used to identify oceanic crust in the Tyrrhenian abyssal plain and the Ionian Sea ?

Réponse : GIESE - I think the main criterion for oceanic crust is its thinness (10 km only).