

The Upper Mantle Structure of the Southern Alpine Foreland

by

G.F. PANZA, St. MUELLER* and L. KNOPOFF**

**Institut für Geophysik, ETH Höggerberg, Zurich (Suisse)*

***Institute of Geophysics, University of California, Los Angeles (U.S.A.)*

Abstract

Rayleigh wave phase velocities have been determined for the path Torino-Bolzano in the period range 30-180 sec. Inversion of the data has been performed by the "hedgehog" method.

Assuming that the S-wave velocity in the mantle lid cannot be larger than 4.7 km/sec, a crustal thickness of 50 km and an S-wave velocity of about 4.3 km/sec is obtained for the low-velocity channel in the upper mantle. The lid thickness varies between 90 and 130 km; thus the top of the asthenosphere channel lies at a depth of 140 to 180 km below the surface. This is considerably deeper than in the central Alps to the north and, if substantiated, has strong implications for the tectonic history of this region.

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Intervention

H. Closs — It seems that you found a relatively thick crust or lithosphere in the southern foreland of the Alps. Can this be considered as an indication of a plate subducted from the North under the Alps resp. as the southern end of a southward subducted plate?

Réponse — The preliminary results presented in our communication were based on the analysis of records from only one earthquake. Subsequent to the date of this presentation, records from a second earthquake were obtained and analysed. The second analysis gave results inconsistent with the first regarding the question of the thickening of the crust and lithosphere. Until additional suitable events have been recorded and analyzed, we cannot give a definite answer to the question.

Hsü K. : Concerning Prof. CLOSS remarks on heat-flow work, I would like to add that the heat-flow measurements in Swiss lakes still indicate a very high heat-flow of 2-5-3 H.F.U., after all corrections were made (VON HENREN *et al*, 1974, *Z für Geophysik*).

Morelli C. : The surface waves dispersion method is based on certain premises, the main one being : horizontal and homogeneous stratifications along all the path. This is not the case, especially for the profile Tunisia-Napoli. How has the author taken into account this problem?

Zarudzki E. : What new parameters and/or measurements could expand the use of the method, outlined by you and your co-workers, to obtain deeper information about the mantle conditions i.e. depth of Low velocity Channels, etc...?

Closs H. : The heatflow values which have been shown from the Alps might not be completely corrected. The correction for isostatic uplift reduced many measured values on the Alps to completely normal heatflow of ± 1 H.U.

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