

UPPER MANTLE STRUCTURE IN SOUTHERN ITALY AND
SURROUNDING REGION.

Giuliano F. Panza^{1,2}, Gildo Calcagnile¹

¹Istituto di Geodesia e Geofisica, Università di Bari, 70122 Bari, Italy; ²Dipartimento di Scienze della Terra, Università della Calabria, 87030 Castiglione Scalo, Italy.

ABSTRACT.- Rayleigh waves phase velocities have been obtained for the path BAI-PLR. Systematic variation in the phase velocities of the profiles available in the area seems correlated with heat-flow data. A brief description of the inversion results is given.

RESUME.- Les vitesses de phase pour le mode fondamental des ondes Rayleigh ont été obtenues pour le profil Bari-Palermo (BAI-PLR) dans l'intervalle 30-95 sec. Ce profil augmente notre connaissance de la structure du manteau supérieur dans le Sud d'Italie, qui précédemment se basait sur les profils Sidi Bou Said (Tunisie)-Napoli (SBS-NPL) et Sidi Bou Said-Palermo (SBS-PLR). La variation systématique dans la vitesse de phase semble être en corrélation avec le flux de la chaleur. On donne une brève description des résultats de l'inversion.

By studying the upper mantle structure we have the possibility of learning something about the depth range of interaction stresses at plate boundaries and possibly something about the thermal regime in the area. In this paper, we report on the Rayleigh wave phase velocity results available in Southern Italy and surrounding region.

Rayleigh wave phase velocities were obtained for the path BAI-PLR in the period range 30-95 sec using the two-station method (1). The dispersion values agree fairly well with those for SBS-NPL and SBS-PLR by Knopoff, Mueller and Panza (2). At short periods the data are inconclusive for what concerns the crust thickness. The crustal differences between the land and the sea portions of the path might be responsible of large

diffraction at periods proper of fundamental crustal waves. A "reversed profile", in which we observe dispersion for surface waves arriving at the same stations from the south, is much to be hoped for since this would test the reality of attributing our observations to the structure between the two stations. Anyway the presence of a low velocity zone seems clear enough while the presence of a lid may not be excluded.

The results of dispersion analysis agree very well with heat flow data. SBS-NPL with a very thin lithosphere (probably without) (2) is associated to a heat flow about 2.0 HFU, while SBS-PLR with a normal lithosphere (lid is present) (2) is associated to a low heat flow value, about 1.0 HFU. BAI-PLR has intermediate features, that is the presence of a lid not clearly developed and heat flow in between the aforementioned ones. On the basis of the results available to day in this region and in North-Central Italy (3) it seems that an asthenosphere with shear velocity in the range 4.1-4.3 km/sec exists, its top starts from just beneath the Moho in the central area and beneath a lid 50 km thick in the peripheral area, the change seems to be gradual and correlated with heat flow data.

- (1)- Panza, G.F.: "Phase velocity determination of fundamental Love and Rayleigh waves". Pure Appl. Geoph., 188, 000-000, 1976.
- (2)- Knopoff, L., Mueller, S. and Panza, G.F.: "The upper mantle structure of the straits of Sicily and the Southern Tyrrhenian Sea". Symp. Géodyn. Géol. Géophys. Marine, CIESM, vol. 23, Fasc. 4a, 47-48, 1975.
- (3)- Calcagnile, G. and Panza, G.F.: "Upper mantle structure of North-Central Italy from Rayleigh waves phase velocities". This symposium.