

UPPER MANTLE STRUCTURE OF NORTH-CENTRAL ITALY FROM  
RAYLEIGH WAVES PHASE VELOCITIES.

Gildo Calcagnile<sup>1</sup>, Giuliano F. Panza<sup>2,1</sup>

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

ABSTRACT.- Rayleigh waves phase velocities for the fundamental mode in the period range 25-250 sec were obtained in North-Central Italy. The different paths show remarkable similarities except at short period, reflecting crustal differences. The path TRI-AQU shows systematically higher values. Preliminary results of inversion are discussed.

RESUME.- Dans ce travail nous exposons les résultats que nous avons obtenu pour les profils Bologna-Olbia (BLO-OLB), Bolzano-Olbia (BOZ-OLB), Trieste-Olbia (TRI-OLB), Grosseto-Olbia (GRO-OLB) et Aquila-Trieste (AQU-TRI) de l'Italie du centre-nord. Les vitesses de phase des ondes de Rayleigh pour le mode fondamental ont été obtenues dans l'intervalle 25-250 sec. Les trois premiers profils montrent des analogies remarquables, à l'exception des courtes périodes, qui reflètent des différences dans les couches crustales. Le profil TRI-AQU est caractérisé par des vitesses de phase plus hautes. On présente les résultats préliminaires de l'inversion.

Although the mantle under the stable parts of the world appear to have systematically similar properties, the less stable part have been less thoroughly studied. By studying the upper mantle structure underneath the less stable areas, 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 these areas. One of the most accessible areas for this kind of study is the Italian peninsula. In this paper, we report on the preliminary results of Rayleigh wave phase velocity dispersion

for North-Central Italy. The two-station method was used.

The records for the station pairs TRI-OLB, BOZ-OLB, BLO-OLB, (GRO-OLB preliminary) and AQU-TRI were analyzed by time-windowing and frequency-filtering techniques. The phase velocities obtained for the aforementioned paths are very similar at long periods to paths over rift zones in Western USA (paths R1 and R3 by Biswas and Knopoff(1)). The presence of very long periods up to 250 sec in our data may be understood if we consider that the events we used are deep ones (>100km) and the deep events give a good excitation of very long period fundamental (and higher) mode(2); this means that we may get good information about the deep structure down to about 500km.

The comparison of the dispersion data with heatflow values available in the area shows that a thinner lithosphere corresponds to a higher heat flow. Even if it is obvious that a more detailed analysis is required, the general picture (dispersion results-heat flow data) is fairly well consistent.

Moreover we may remark that the obtained results are in fairly good agreement with the tectonic of the sampled regions; in fact the region with normal lithosphere (the Apulian plate) shows no significant seismic activity except at its border while the regions with very thin lid, if any, are characterized by higher (crustal) seismicity.

- (1)- Biswas, N.N. and Knopoff, L.: "The structure of the upper mantle under the United States from the dispersion of Rayleigh waves." *Geophys. J. R. astr. Soc.*, 36, 515-539, 1974.
- (2)- Calcagnile, G. and Panza, G.F.: "Vertical and SV components of Sa." *Geophys. J. R. astr. Soc.*, 38, 317-325, 1974.