DEEP SEISMIC SOUNDINGS BY OBS IN THE IONIAN SEA

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Deep seismic soundings have been recorded in the Ionian Sea within an international joint venture between the I.f.G.-University of Hamburg and the Italian Explosion Group and sponsored by the German Forschungemainschaft and by the Italian CNR - P.F. Geodynamics and Oceanography.
Seismic reflection lines recorded by Nicolich in the area have been utilized for the definition of the structures and velocities of the sedimentary section of the crust.
Profile 1-'80, 300 km, long has been surveyed from the Passero C. towards the Ionian abyssal plain to the NE of the Malta escarpment and of the Malta - Medina Rise. Along this profile 5 OBS have been deployed and land stations have been located along the southern Sicilian coasts to record the shots on sea. 133 shots have been fired on sea with dynamite charges ranging from 25 to 300 kg.
In this area Mesozoic rocks mostly undisturbed are followed by subparallel Tertiary units. Messinian evaporites are well developed in the abyssal plain and along the Ionian side of the Malta escarpment, elsewhere seismic reflection data evidence the termination of olisthosthromes coming from the Calabrian Arc region and including perhaps Messinian evaporites and other relatively thin and compacted sediments. In the Ragusa Platform the Mesozoic series are well developed with a thick Streppenosa black-shales formation and with Triassic dolomites (interval velocity of 6.4 km/s) at 5 km depth. The land stations in Sicily reveal a sedimentary structure in agreement with the reflection seismic and the well data. The top of the crystalline basement is at nearly 10 km depth and the base of the crust at 23 km. In front of the Malta escarpment a Plio-Quaternary thickness of 300 to 500 m has been

computed followed by an interval where the velocities are in the range of 4.2 to 4.5 km/s. By comparison with seismic reflection data these values can be assigned to the Messinian evaporites. At nearly 5.5 km depth a low velocity zone is detected where refraction and reflection data confirm, in correspondence with Tertiary and perhaps Upper Mesozoic sediments, a velocity of 3.5 - 3.6 km/s attributed mainly to pelagic marls. The basement with 6.3 to 6.5 km/s has been fixed at a depth of 10 km. The crustal thickness does not exceed the value of 19 km and becomes thinner towards the Messina abyssal plain where the top of the crystalline units is found at 9 km and the Moho at 17 km depth. The data are in good agreement with those recorded by Hinz in 1969 in the same area (crustal thickness of 19 km).

Profile 2-'80 has been recorded from the Malta escarpment towards the NE and runs parallel to the southern Calabrian sector at a distance of nearly 100 km from the coasts. Here 6 OBS have been deployed and 112 shots have been fired with charges of 25 or 50 kg. The collected data refer to a zone affected by important strike-slip faults with tilted blocks of the Mesozoic sequences and the Tertiary series involved in large olisthosthromes, where the presence of large masses of loose materials is confirmed by refraction and reflection data. The P.Q. thickness in the area does not exceed 300 m with a velocity not higher than 1.9 km/s. The loose materials reach towards the NE thicknesses of at least 3 km with velocities ranging from 2.0 to 3.2 km/s. The OBS data seem very poor due to the high tectonic disturbance in the area. The top of the crystalline units is at nearly 11 km depth and the crustal thickness is still in the range of 20 km.

In conclusion the comparison of both seismic reflection and refraction data reveal a thinned continental crust either in correspondence of the olisthosthromes of the Calabrian Arc or all along the Malta escarpment. Towards the Ionian abyssal plain the crust becomes thin and also the sedimentary structures inferred by the seismic reflection data appear more variable with the development of horst and graben features and of possible intrusion of basalts in the Mesozoic and Tertiary sediments and with a complex structured lower crust probably intruded by mantle material of high density.