IONIAN BASIN DEEP CRUSTAL STRUCTURES AND ITS WESTERN MARGINS

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In the Ionian basin the discussion about the crustal structure had to relay on moderate penetration seismic of the seventies, limited by the source power and by the low coverage (FINETTI, 1982). The vertical reflection seismic was supplemented with spatially averaging refraction velocity-depth measurements with OBS or ESP techniques (MAKRIS *et al.*, 1986; FERRUCCI *et al.*, 1991; DE VOOGD *et al.*, 1992; TRUFFERT *et al.*, 1992). The principal scientific problem to address to is wether the Ionian basin has an oceanic crust or a highly attenuated continental crust. The second topic is the nature of the Ionian basin with respect to its margins.

In our multichannel reflection profiles it is clearly recognisable a band of "layered" high amplitude reflections near the base of the crust, which appears to be the characteristic of the basin. This band shows a quasi-monochromatic (ca. 8 to 10 Hz) frequency of the layering. There is some evidence to suggest that the low frequency band dips down, towards the Malta Escarpment (ME) structures, where the crustal image changes and a clear thickening towards the West appears: landward dipping reflectors separate continental and intermediate crust in the central sector of the ME. There are some similarities with the Gulf of Lions deep seismic profile (DE VOOGD *et al.*, 1991).

The time deepening of the lower crust and Moho in front of the margin of the southern Calabria can be partially due to the velocity pull-down of the sedimentary pile of the arc. In fact a true dip of approximately 15% to 18% over 60 km distance is documented. Moreover the reflecting band maintains its characteristics of reflectivity and thickness till its abrupt termination beneath the Ionian extension of the Calabrian crustal structures.

An unexpected thinning of the crust towards the continent has been revealed by the seismic profiles bordering the Sicilian margin (northern sector of the ME). This important feature seems to be directly related to the presence of the volcanic products in the Hyblean plateau and to the actual volcanism of Mt. Etna.

The data were acquired in the frame of the project named STREAMERS with the financial support of EEC. The survey was afterwards completed with the lines acquired in front of Etna (project ETNASEIS) and, thanks to a further project named PROFILES, the data processing was completed and improved. In the data acquisition we used a 7118 cu.in. tuned air-gun source and a 4.5 km streamer giving us the possibility of a high coverage (4500%). In a second time a single-bubble GI-airgun source with a streamer of only 3000 m and a 24 fold coverage was employed (AVEDIK *et al.*, 1994). Equivalent results were obtained, which include: the penetration through the whole crust of the Ionian sea, the resolution of the deep frame of the basin at the margins, hints regarding the sediment/lower crust relations and the accomplishment of coincident and wide-angle acquisition with sea-land connections and landward extension of the marine coverage. Processing advances include the first sea-bottom multiple cancellation by removal of coherent events, the array simulation, an adaptive AGC.

Abyssal plain and central sector of the ME. South of the Alfeo sea-mount we enter into the Ionian Abyssal Plain with the presence of the Messinian salt and thick pre-evaporitic layers. The pinching out of the upper seismic sequences testifies the importance of the post-Tortonian tectonic evolution of the ME and of the facing area with intermediate crustal structures(CASERO *et al.*, 1988). An initial crustal arching may be recognised with a Moho at depths of 16-17 km and newly formed sin-rift basins record the Pleistocene tectonic reactivation: vertical displace ments and transcurrencies.

Messina rise and the northern sector of the ME. The region is largely occupied by the sea extension of the Hyblean foreland. The recent uplift (of the order of 2 mm/y) of the margin is documented by syn-rift basins and vertical faults cutting the whole crust. The extensional tectonic and the pronounced crustal arching have completely obliterated the collisional features of the Calabrian arc in this region. The evidence for tension is consistent with the abundant volcanism of the Mt. Etna occurring preferentially near locations where major fracture zones are thought to transect the crust which thicks only 15 km.

The Ionian margin of southern Calabria. The lines show the sea ward extension of the Calabria block, the internal structures of the crystalline crust down to the base at about 21-22 km depth and the piggy-back basins developed on the arc. The flexures of the Ionian crust in the Spartivento basin area correlate with the deep refraction data. Its abrupt termination, seen in the seismic lines, can be related to a poor signal/noise ratio or is an effect controlled by a sharp velocity increase beneath the overlapping Calabrian crustal structures. Tectonic discontinuities cannot be excluded.

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