The geological structure of a Peri-Tyrrhenian basin off the gulf of Naples as detected by the MEAS (Multispot Extended Array Sparker)

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The high resolution, single channel seismic reflection profiles presented are a minor part of a marine geophysical survey (about 2,000 km of seismic profiles) (Fig. 1) conducted in 1989 and 1990 in the whole submerged area of the Gulf of Naples (Southern Italy) with the CNR owned R/V *Bannock*. The purpose of the research is the investigation of the shallow geological structure and relationships between volcanism and sedimentation in the Gulf of Naples. During the 1990 campaign we collected a few profiles off the gulf in order to test the capability of the MEAS system in a deep basinal setting where deeper penetration was expected.

The MEAS system, designed by L. MIRABILE, is made by a planar square array of 36"Sparker" type electrodes. The array is related to several accumulators, energizing the electrodes (14-16 kJoules). Energy, accumulated in condensers, is discharged in marine water through the electrodes, producing one vapour bubble for each electrode. Frequency signal of MEAS system is a wide one, having significant energetic contents up to a limit ranging between 500 and 1,000 Hz. Maximum of energy is concentrated around 200 Hz.

Reflections from seaflour and sub-seafloor are picked up by an idrophonic array, tranformed into electric signals and sent to a registration unit. Here they are registered on a VCR magnetic type and on electrosensible paper, after a process of filtering and amplification.

The Gulf of Naples is a peri-Tyrrhenian basin affected by extensional tectonics related to the opening of the Tyrrhenian Sea. The graben like depression which has formed is bordered to the South by the narrow, anti-apenninic trending Sorrentina Peninsula horst and to the North by the Plio-Quaternary volcanic area of Phlaegrean Fields and Procida and Ischia Islands. Consequently, the Gulf of Naples is of particular interest to detect the interaction between the horst and graben structure of the western Apenninic margin and the recent and actual volcanic activity of the area (FUSI *et al*, in press).

The three seismic profiles presented here are located on the confluence between the Napoli Canyon and the Salerno Valley (International Bathymetric Chart of the Mediterranean) or Capri Depression (Carta Geologica d'Italia), a flat floored sedimentary basin at 1000-1200 m water depth. E-W trending profile TIR-1 is located entirely on the sedimentary basin ; NNE-SSW trending profile TIR-2 connects the western edge of the basin to the Ischia volcanic complex; NNW-SSE trending profile ISH-1 connects the eastern edge of the basin to the Ischia volcanic complex across the Banco di Fuori horst.

The deepest penetration recorded is of 1450 ms (TIR-1) (Fig. 2) with the entire reflection free of multiples. This result is of particular interest if it is compared to the average 500 ms penetration obtained in the Gulf of Naples, where multiples of the seafloor also disturb the reflection.

The acoustic basement of the deepest parts of our profiles is interpreted as the Mesozoic carbonates (K horizon of FINETTI and MORELLI, 1974). Near Ischia the acoustic basement is produced instead by volcanic deposits (TIR-2 and ISH-1). A number of acoustic units from the Pleistocene to the Tertiary can thus be identified, including the clastic Messinian facies in the eastern portion of profile TIR-1. The Plio-Quaternary sediments filling up the basin show origin from a delta system identified in the Gulf of Naples and from the volcanic Ischia system.

The structure of the basin is identified by extensional faults producing an overall horst and graben style. Tentatively, a listric fault can be identified on profile TIR-1. The timing of faulting appears as pre- or sin-Messinian in the eastern sector of TIR-1. The deepening of the western sector of the basin, near Ischia, is instead related to the post-Messinian subsidence induced by the growth of the volcanic complex and to the higher volcanic sedimentary input. Of particular interest is the finding of the southern rim of the Ischia volcanic complex 25 km offshore the island (TIR-2).

I summary, the MEAS system has proved to be a powerful and simple tool allowing both high resolution investigation of acoustic units and identification of major geological structures of the Tyrrhenian margin.

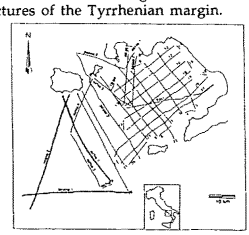

Fig. 1 - Location of seismic profiles

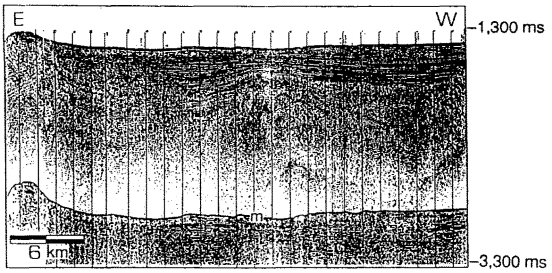

Fig. 2 - Uninterpreted seismic profile TIRR-1. m=multiple

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