

The OGS multichannel seismic coverage of the Mediterranean Sea (MS-lines)

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From 1969 to 1982 the Osservatorio Geofisico Sperimentale (OGS), with seat in Trieste, collected 39,500 km of multichannel seismic reflection lines in the Mediterranean Sea (Figure 1). These lines can be regarded as the only comprehensive seismic dataset of the Mediterranean and the Black seas collected by a public research institution.

Unfortunately, only part of the dataset is known to the Italian and European scientists: some lines have been published (FINETTI, 1976; FINETTI and MORELLI, 1972; 1973; FINETTI, 1982), others have been made available to scientists for detailed studies. Nevertheless, a systematic analysis of all the lines according to the latest re-processing techniques has never been done. Recently, a test performed on a few lines from the central Tyrrhenian Sea has shown that the application of widely used re-processing steps like deconvolution in the FX domain allows to outline details that could not be resolved with the 20 year old processing technique, thus improving greatly the data quality.

Since about half of the Mediterranean and Black seas data set is recorded on 21traces tapes (an obsolete format) OGS has started a program, partly supported by public funding, of systematic copying and re-formatting in standard SEG Y format of all the lines, so that they can be re-examined and re-interpreted in the frame of new national and international cooperation.

The geological themes covered by the lines are numerous, as complex and variegated is the geological structure of the Mediterranean Sea:

Black Sea lines: The Black Sea has gained recent growing attention for geological and oceanographic research. The structural relationship of the basin with the Alpine-Himalayan orogen is important in terms of paleoceanographic reconstruction of the Paleo-Thethys ocean. The development of shale diapirism in the fine grained sediments of the Danube Cone is an additional theme of growing interest.

Levantine and Ionian seas lines: The Eastern Mediterranean is a unique geological laboratory where lithospheric, tectonic, paleoceanographic, and geochemical themes can be addressed, as demonstrated by the numerous drilling proposals submitted to the Ocean Drilling Program, mostly based on existing published and unpublished MS lines, and MAST-II proposals submitted to the EEC: nature of the Ionian and Levantine lithosphere, incipient continent-continent collision as the last stage of the Alpine-Himalayan orogenesis, evolution of a salt-bearing accretionary complex, origin of sedimentary melanges of diapiric origin, relation between convergent plate margins and back-arc extension, mechanics of emplacement of ophiolites; climatically induced stagnation of a marginal sea, paleoclimatic reconstruction in the post-Messinian; brine migration below the seafloor, deep fluid circulation in accretionary prisms are the highlights.

Tyrrhenian Sea: The evolution of the Tyrrhenian back-arc basin has been addressed by ODP Leg 107 based on drill sites located on the existing versions of MS lines. The lithospheric theme of mechanism of emplacement and composition of upper mantle peridotites in an back-arc extensional setting has been introduced by this leg to the attention of the scientific community.

Sardinia Channel: The geological structure of this area has been recently interpreted as the off-shore extension of the Apenninic orogenic belt, in continuity with the northern African Meghrebian fold belt. Its evolution is thus critical in the study of a collisional processes where not only the sedimentary cover, but also the crystalline basement can be easily reached by seismic investigation. An ODP drilling proposal based on the present version of MS lines has been filed to ODP.

West Sardinian Margin: This continental margin offers the possibility to investigate the crustal structure developed during the opening of the Balearic Sea. MS lines are presently employed within ECORS-CROP programs.

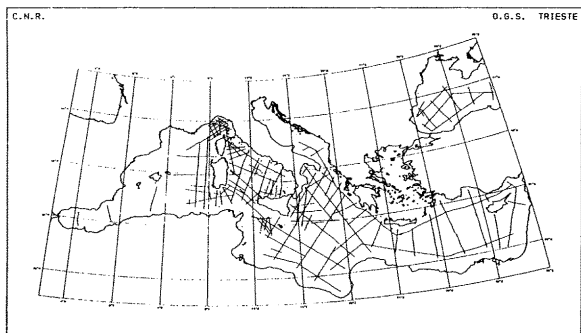


Figure 1. Location of Mediterranean Sea (MS) and Black Sea (BS) MCS lines collected by OGS from 1969 to 1982.

REFERENCES

- FINETTI I., 1982.- Structure, stratigraphy and evolution of Central Mediterranean. *Boll. Geofis. Teor. Appl.*, 24(96):247-312.
- FINETTI I., 1976.- Mediterranean Ridge: a young submerged chain associated with the Hellenic Arc. *Boll. Geofis. Teor. Appl.*, 18(69):31-65.
- FINETTI I. and MORELLI C., 1973.- Geophysical exploration of the Mediterranean Sea. *Boll. Geofis. Teor. Appl.*, 15(60):261-241.
- FINETTI I. and MORELLI C., 1972.- Wide scale digital seismic exploration of the Mediterranean Sea. *Boll. Geofis. Teor. Appl.*, 14(56):291-342.