

ACTIVE TECTONIC ALONG THE NORTHERN MARGIN OF LIGURIAN SEA : EVIDENCES FROM SWATH BATHYMETRY AND HIGH-RESOLUTION SEISMIC

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Abstract

During the Malisar-1 cruise, a new structural map was established from detailed bathymetric survey and an extensive set of high-resolution seismic reflection or mud-penetrator profiles along the northern Ligurian margin between 7°25W and 9°10W of longitude. The preliminary results shows evidences of tectonic activity in the prolongation of active faults identified onshore, as well as along the major epicentral zones offshore, specially on the toe of the margin, in good accordance with the concentrations of present (1962-2002) seismicity.

Keywords : Bathymetry, Seismics, Ligurian Sea.

The present seismicity along the northern margin of Ligurian Sea is moderate, but permanent, and several big earthquake (M>6) have been recorded in modern times (M=6.5, 1887, M=6, 1963 ; Larroque et al., 2001). Most of the epicenter have been localized offshore, on the margin, and could not be easily related to the known active or potentially active fault identified onshore. One of the major goal of the Malisar-1 cruise (swath bathymetry, high resolution seismic reflection, mud-penetrator) was to collect evidences of recent deformation offshore along the margin, at different scales. The preliminary results shows evidences of tectonic activity in the prolongation of active faults identified onshore, as well as along the major epicentral zones offshore, specially on the toe of the margin, in good accordance with the concentrations of present (1962-2002) seismicity.

- In the Western part of our study area (west of 8°15'), the continental slope of the northern Ligurian margin presents a sharp and contrasted morphology, with numerous deep rectilinear canyons crosscutting the slope. Frequent oblique structures across these canyons could explain some of the great gravity sliding. The tectonic morphology of the toe of the slope is specially interesting, for example close to the canyon of Taggia : active or recent fault have been identified along this limit, geographically related to the concentration of epicenters (magnitude >5) of a 1985-1986 crisis. (Figure 1 : profile MR06-1, mud-penetrator). These faults could be interpreted as normal and possibly strike-slip faults. However, we have to take into account the significative presence of Messinian salt below this region, that could represents an important bias for the tectonic interpretation of the identified deformations.

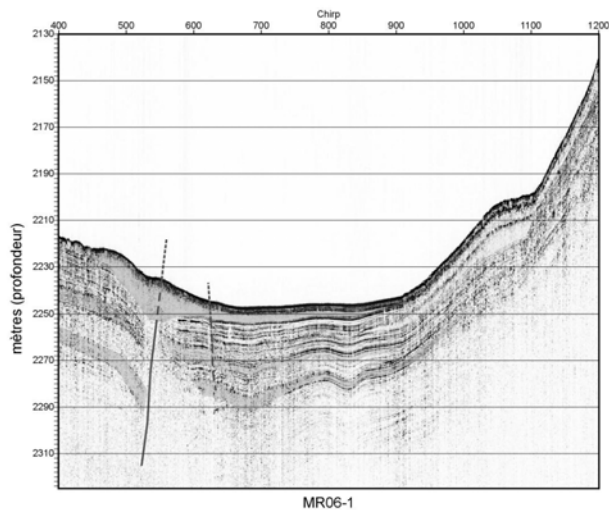


Fig. 1. Mud-penetrator profile MR06-1, at the base of the continental slope off Ventimiglia. West is at the left of the image, line oriented N80°W. Note the metric offset of the last horizons, below a 5m thick debris-flows.

- In the Eastern part of our study area (E of 8°15'), the continental slope is characterized by the presence of a massive NE-SW elongated promontory, off Albenga and Savona. The geographic pattern of the submarine canyons with a systematic eastward or northeastward deviation suggests that this promontory is recently uplifted. The base of the promontory is strongly deformed in the eastern part of the area, and crosscutted by major, rectilinear N60° faults (Fig.2 : bathymetric map of the northern Ligurian margin). This recent, possibly active deformation is recorded in the sedimentation as imaged in our high-resolution seismic profiles and appear to have occurred mostly during the Plio-Quaternary time.

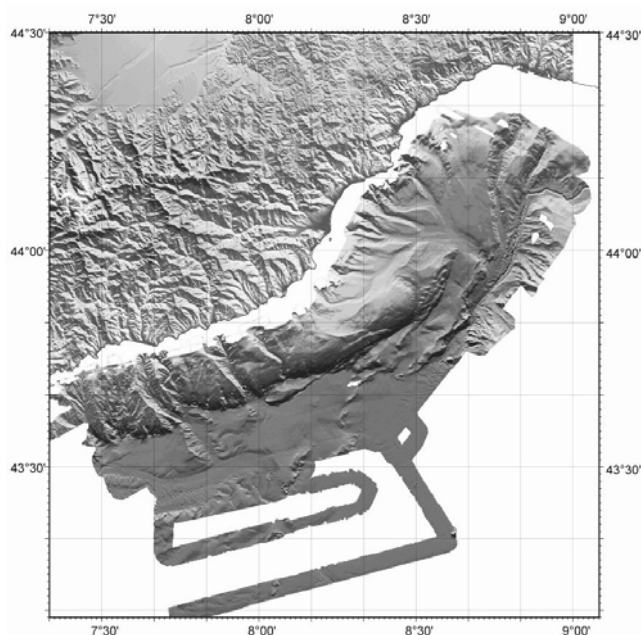


Fig. 2. Bathymetric map (shaded relief) of the North Ligurian margin between 7°25W and 9°10W of longitude. Note the major N60° rectilinear fault at the base of the deformed margin.

This data together allow us to propose a better tectonic framework to analyze the distribution of seismicity of this area.

Reference

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