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Geophysical survey on carbonate mounds area in the northern Ionian sea (Apulian continental slope): multibeam and high resolution seismic data

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This work focuses on the first interpretation of detailed geophysical data acquired within a seabed mounds area on the Apulian continental slope (northern Ionian sea), at a water depth ranging from 300 m to 1200m, where deep living cold water corals have been discovered recently (Mastrototaro and Tursi, 2001). Multibeam bathymetric data and high resolution seismic profiles have been acquired during the latest summer (thanks to the first oceanographic cruise of the national research project APLABES) in order to collect suitable geophysical data that could describe the geomorphological features of this peculiar environment.

During the latest years some other oceanographic cruises were carried out by Italian researchers within the same area: in March 2002 a geophysical exploration by chirp sonar showed that the Apulian plateau is characterized by the widespread occurrence of transparent mounds related to the presence of deep coral colonies (Fusi et al., *in press*); later, during August 2002, some researchers involved in CORAL2 project (granted by CNR) extended the research on the Apulian Plateau to get a preliminary knowledge about the sedimentary characterization and the oceanographic parameters in some restricted areas were they recovered coral samples (Taviani et al., 2003; Taviani et al., 2005). As partially showed in the results of the previous cruises the mounds that characterize the Apulian plateau area are acoustically transparent and occur with a wide variability in their shape, size and sedimentological features, so that the high resolution multibeam system (integrated with an high accurate motion sensor and gyro), and the chirp sonar have been essential to describe their 3D geometry, dimension,

distribution and their geomorphology related to their sedimentary environment.

The high resolution bathymetric map, partially processed already on-board, shows that the seabed morphology of the western part of the Apulian continental slope is relative steep with south-western well marked scarps and, in particular, NWN to SSE trending normal faults are well observable and clearly exert an obvious control on the morphology. On the eastern side the seafloor dips more gently, but the seafloor is alike displaced by NWN-SSE faults even if with less steep escarpments. Over the whole area the mounds are clearly placeable, and they are mainly spread at water depths between 600 and 800m.

As the main aim of this investigation was the spatial and morphological study of the mounds, the analysis was undertaken within a GIS (Geographical Information System) that gives a good overview of the mounds pattern (interpreted also in conjunction with the different seismic facies identified on the high-resolution seismic data). In particular these structures occur with a wide variability in their geometry, from conical to irregular prolonged shapes, ranging in relief from few meters to more than 30 m occasionally. Concerning their spatial distribution, it seems that they are not normally distributed: a lot of this structures appear to be aligned along the ridges of the major NON to SSE trending faults.

Still the origin and formation mechanisms of the carbonate mounds are not completely understood. They have been linked to peculiar oceanographic condition (Freiwald, 2002; Roberts et al. 2003) and to sedimentation processes in the area (Kenyon et al., 1998; De Mol et al., 2002), but also to the presence of hydrocarbons and the leakage of shallow gas (Hovland et al., 1994; Hovland and Thomsen 1997; Henriet et al., 1998), or to a combination of all of these (Masson et al., 2003)

Thus the chirp sonar profiles will be essential to plan the future sampling operations and also to recognize with high accuracy the most interesting faults. Actually, one of the objectives of the project is to identify possible sites with local micro-seepage of light hydrocarbons through seabed, since some acoustical signatures (in particular acoustic wipe-out) localized mainly in the northern part of the investigated area could be related to the presence of hydrocarbon seeps.