DISCOVERY OF WIDESPREAD SUBMARINE SLIDES REWORKED BY BOTTOM CURRENTS ON THE SOUTHERN ADRIATIC CONTINENTAL SLOPE

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Abstract

A recently acquired TOBI side-scan sonar mosaic shows evidence of widespread collapsing of the South Adriatic continental slope. The new seafloor images, accompanied by VHR Chirp sonar profiles, reveal: 1) multiple overlapping slide scars affecting Pleistocene regressive shelf-margin deposits below the shelf edge; 2) extensive blocky slides on the lower slope; 3) evidence of strong bottom currents (presence of sediment drifts and furrows); and 4) a basin wide acoustically-transparent deposit up to 40 m thick, buried under a late-Pleistocene-Holocene mud section, in water depths greater than 1000 m.

Keywords : TOBI, Adriatic Sea, submarine slides, sediment drifts

The southwestern Adriatic slope was investigated to improve the understanding of sediment transport from the north and across the slope area. Little was known on the complex morphology of this area, but several published cores reported high, though not uniform nor steady, sediment accumulation rates throughout the last ca. 30 kyr [1].

The southwestern Adriatic Sea is characterised by high gradients (1-4%) and the presence of tectonic features (Gondola fault, Dauno Seamount) and several incisions, locally breaching the shelf edge and considered active during glacial lowstands, as the Bari canyon [2]. Seismic-stratigraphic correlations indicate that the Bari canyon was downcut repeatedly during the last few eustatic falls. In particular, the recent-most regressive sequence recording the interval from Oxygen Isotope stages 5 to 2 is downcut by the multiple heads of this complex sediment conduit [2]. Preliminary surveys showed evidence of sediment instability affecting lowstand shelf-margin deposits and thick graded turbidite beds at the base of the slope [3]. The TOBI survey, undertaken during the SAGA2003 cruise onboard R/V *Urania* within the Eurostrataform project (EC Contract EVK3-CT-2002-00079), first showed large-scale submarine slides, the 3-dimensional shape of large along-slope sediment drifts, the morphology of the Bari canyon, and helped understanding the extent and nature of mass-failure deposits and the complex relation between mass wasting and sediment deposition by bottom currents.

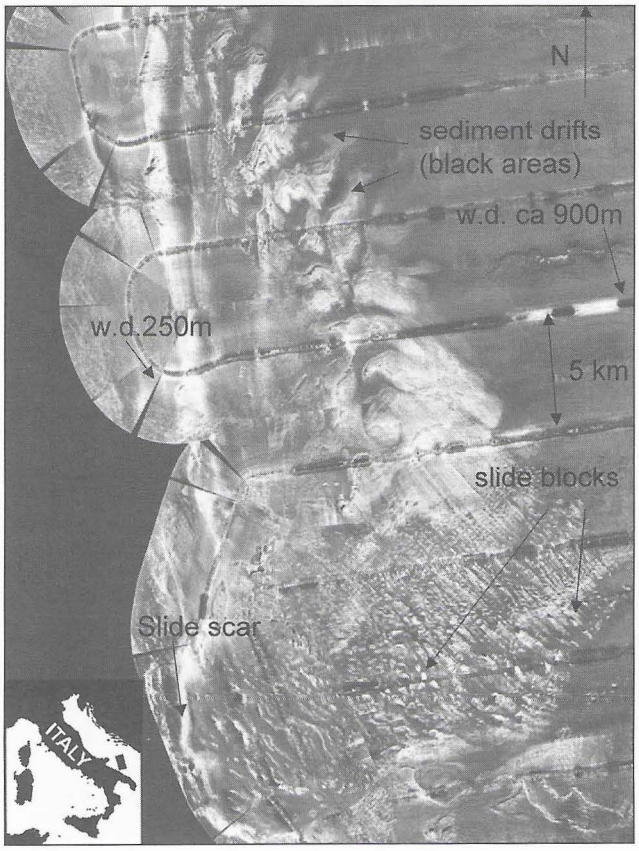

Figure 1 represent part of the TOBI survey with extensive slide scars on the upper slope (left) and relatively recent mass-failure deposits transported to NE on the lower slope and in the adjacent basin. Slide blocks are acoustically-transparent deposits (in seismic lines) with no internal bedding and size up to 200x500 m. Lateral variations in internal seismic-reflector geometry and seafloor morphology of the mass-transport deposits reflects, likely, along margin differences in sediment composition and thickness of the failed section as well as highly variable runout of the failed materials (exceeding at times 40 km). TOBI data show that the entire slope area is swept by bottom currents generating: furrowed areas extending up to 10s of km^2; moats or scours on the downdrift side of seafloor irregularities (slide blocks); and preferential sediment deposition on the inferred updrift side of the same irregularities. The NW-SE pattern of furrows is consistent with the growth of sediment drifts located in 400-600 m w.d. to the north.

Relative sea-level fall has long been considered as a possible predisposing or triggering mechanism for sediment failure. While the evidence of mass-failure events during falling sea level and lowstand is common, the occurrence of mass-failure during the late-Quaternary sea-level rise is increasingly being recognized [4]. Preliminary correlation to published cores in the area indicates that the main mass transport deposit reached the basin floor during the Last Glacial Maximum, but younger failures of smaller size may have affected the slope more recently. Future work will focus on the definition of intervals of growth vs. quiescence of the sediment drifts and their possible relation to paleoceanographic reconfigurations and timing of sediment failure.

References

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