Geophysical Research Abstracts
Vol. 18, EGU2016-8295, 2016
EGU General Assembly 2016

Interplay between down-slope and along-slope sedimentary processes during the late Quaternary along the Capo Vaticano margin (southern Tyrrhenian Sea, Italy)

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Late Quaternary along-slope and down-slope sedimentary processes and structures in the upper slope-shelf sector of the Calabro-Tyrrhenian continental margin off Capo Vaticano have been investigated using very high-resolution single-channel seismic profiles and multibeam bathymetric data.
The results show that a competition among along-slope bottom currents-vs down-slope mass-wasting mostly contributed in shaping the seafloor and controlling deposition of sedimentary units during the Late Quaternary.
Along-slope processes mostly formed elongated drifts located on the upper continental slope and outer shelf, between -90 and -300 m. The contourite deposits and associated erosive elements indicate the presence of a northwestward geostrophic flow that can be related to the modified-LIW issued by the Messina Strait. According to the proposed stratigraphic reconstruction it is likely that the activity of bottom-currents off Capo Vaticano was intensified around the LGM period and during the post-glacial sea-level rise, whereas they were less intense during the Holocene.
Gravity-driven down-slope processes formed mass-transport deposits and turbidite systems with erosive channels, locally indenting the present-day shelf. Several slide events affected the upper 10–20 m of the stratigraphic record, dismantling considerable volume of contourite sediment. High-resolution seismic profiles indicate that failure processes appear to be dominated by translational sliding with glide plains mainly developed within contourite deposits. The most striking feature is the Capo Vaticano slide complex, which displays a large spatial coverage (area of about 18 km2) and is composed by several intersecting slide scars and overlapping deposits; these characteristics are peculiar for the Tyrrhenian continental margins, where slide events developed in open-slope areas are usually less complex and smaller in size.
The presence of high-amplitude reflectors within contourite deposits (representing potential weak layers in the slope stratigraphy) along with high post-glacial sedimentation rates estimated for contourite deposits (about 100 cm/ka) and steep seaward flank of the drifts can act as a relevant predisposing/triggering factor for medium-large scale slope instability on the Tyrrhenian margins.
This study highlights how a complex spatial and temporal interplay of along- and across slope processes can occur over a narrow area in a relatively short time-span (the post-glacial period). This is particularly relevant for the Mediterranean Sea, where mixed turbidite-contourite systems are poorly represented because the rare occurrence (or knowledge) of contourite deposits.