Radial furrows observed offshore Catania (East Sicily): evidence for downslope sea-bottom currents?

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Résumé

Ultra high-resolution micro-bathymetric data (1m grid) were acquired on the Eastern Sicily margin (offshore Catania) between 1500 m and 2000 m water depth. They image a remarkable field of furrows at the seafloor (see detailed map). These features have a typical length of 2 - 3 km, an average spacing of 20 - 30 m and a vertical amplitude (depth of grooves) of 2 - 3 m. They commonly intersect and/or define the lateral boundaries of small-scale submarine landslides and shallow erosional sea-bottom features. They exhibit a radial pattern, emanating from a point beyond the outlet of a linear E-W oriented submarine canyon (the South Simeto Canyon), at the base of the Malta Escarpment (see regional map). These intriguing features could be interpreted as evidence of strong sea-bottom currents flowing downslope. Similar, but much larger scale bedforms exist on the seafloor offshore the Cap de Creus (E Pyrenees shelf at the French - Spanish border in the Mediterranean), where they have been attributed to dense shelf water cascading (Cannals et al., 2006, Nature, doi:10.1038/nature0527). Dense shelf waters have not yet been documented in East Sicily. Long-term physical oceanographic observations are being performed in the study area related to the deployment of a submarine fiber-optic cable, dedicated to monitoring of deformation at the seafloor (Gutscher et al., 2023, EPSL). The observations include temperature and salinity at 13 seafloor geodetic stations, and current velocities and directions using a 300 kHz ADCP lander in 1920 m depth. These instruments were deployed in Feb. 2023 during the FocusX3 marine expedition onboard the R/V Atalante and will operate until Autumn 2025. We hope to be able to deploy a downward looking ADCP mooring line in Feb. 2024 in the furrows field during a scheduled Meteor cruise led by Geomar in order to monitor sea-bottom currents here over a 1.5 year duration.

Mots-Clés: East Sicily, morpho, bathymetry, bedforms, furrows, sea, bottom currents

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