Sand bodies at the shelf edge in the Gulf of Lions (Western Mediterranean): deglacial history and modern processes

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The outer continental shelf of the Gulf of Lions is covered by thick, mainly regressive, sand deposits that have been studied within the Eurostrataform project. Seismic, sedimentological and geochronological methods allow us to demonstrate that a veneer of transgressive sand bodies, few m to less than 1 m thick, rework these deposits. They take the form of sand ridges and transverse dunes that formed at different periods. In fact, the low-gradient outer shelf of the Gulf of Lions displays a complete record of deglacial history, including not only transgressive deposits that formed during sea-level rise, but also bedforms that still evolve under episodic high-energy events that occur under highstand conditions.

Core lithology, ^{14}C dates and regional sea-level curve suggest that the formation of the sand ridges was favoured during a period of deceleration of sea-level rise, such as the Younger Dryas Event.

The occurrence of modern episodic sand transport is demonstrated by 14C dating, that displays very recent dates at more than 1 m below sea-floor, and by the occurrence of transverse dunes superimposed to the transgressive sand ridges. These bedforms, previously considered as relict, are present at the shelf edge in the Gulf of Lions in areas where numerical models predict the maximum shear stress, following Easterly winds (the most energetic in the area). Furthermore, the direction of sand transport indicated by the lee-side of the dunes is in agreement with the direction of transport vector diagrams predicted from the model.

The occurrence of strong energy events able to remobilize and transport sand from former shoreface deposits situated at the shelf edge is a mechanism for supplying sand to canyon heads. Strong Easterly winds, and other processes such as dense water cascading, can be the source of sand to the deep-sea during modern (highstand) conditions, as observed throughout the canyons and the continental rise.