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EUROSTRATAFORM: Persistent deposition of sandy beds during the last glacial termination and the Holocene in the deep basin of the Gulf of Lions, Western Mediterranean

B. Dennielou (1), L. Jallet (2) and S. Berne (1)
(1) IFREMER, PlouzanÈ, France, (2) University of Perpignan, France

Though the deposition of sand in the deeps of oceanic basins via gravity processes is commonly reported, it is, geographically, mostly restricted to confined environments such as deep-sea fan channels and associated terminal depositional areas and, temporally, mostly restricted to periods of time when rivers are connected to outer shelf canyon heads, i-e dominantly during sea level low stands.

Several sediment cores sampled sandy beds, interbedded with last glacial termination and Holocene hemipalagic deposits in the deep basin (2000-2500 m) of the Gulf of Lions at the foot of the canyon drainage network, in the vicinity of the Rhone deep-sea fan, These beds have been deposited during and after the last sea level rise, after turbiditic spillover deposits stopped in the distal part of the last turbiditic channel of the Rhone deep-sea fan (Bonnel et al. 2005). This contrasts with the classical concept of the eustatic control of submarine fan development (Shanmugam et al. 1985) and the present flooding of the shelf that should prevent the transfer of coarse sediment into the deep basin.

The sand layers are dominantly composed of homogeneous or fining upward well-sorted heterogeneous quartz (rounded to sharp and transparent to stained) with scarce shell debris and shallow water foraminifera. Their thickness varies from few millimetres to few centimetres. They commonly have an erosional base and a bioturbated top. Some layers can be tracked from a core to another and show a very variable thickness. These characteristics suggest that they correspond to the deposits from unconfined grain flows with a strong erosional power.

The heavy mineral composition shows a dominantly Rhodanian source with a variable contribution from pyreneo-langudocian sources for most of the layers and suggest a transit of the sands via the SËte canyon network. Few layers show a contribution from Pyrenean sources and suggest a transit via La Fonera canyon.

The age of these sand layers estimated from radiocarbon dating from the hemipelagic sediment above or below range from 15.1 ky BP to 1.67 ky BP.

The source of these sands is believed to be relict shoreface sands that accumulated at the shelf break during the last glacial maximum (∼20 ky BP) when the sea level was about 120 meter lower than presently (Berne et al. 2001) and that presently undergo reworking and transport during periods of high-energy (Bassetti et al., submitted).

The trigger for these sand movements may be related to instabilities where the canyon heads cut into the shoreface sands and/or to dense water cascading events (Durrieu de Madron et al. 2005) transporting shoreface sands into the canyon for temporary storage and occasional flushing (Gaudin et al., submitted). Further radiocarbon dating in progress will better constrain the time span of the layers and the possible climatic control on the trigger.

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