



Obliquely migrating pockmarks formed in response to 100 kyr and millennial-scale sea-level changes in the Gulf of Lions (Western Mediterranean)

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We describe here a particular type of pockmark whose functioning is based on changes of hydrostatic pressure driven by 100-kyr and millennial-scale sea-level changes. Around 400 small (diameter ranging from 15 to 130 m) and obliquely migrating pockmarks were analysed on the upper deltaic continental slope of the Gulf of Lions, off the southern coast of the France, on 3D high-resolution seismic data (Calimero survey in 2006). The seismic dataset is located on the upper slope at 300 m water depth in the Bourcart-Herault canyon interfluvium; it was acquired with a newly developed 3D seismic equipment (Thomas et al., 2004).

The precise chrono-stratigraphic framework provided by the PROMESS borehole PRGL-1 allows to constrain the different periods of activity of the upper-slope pockmarks (see for instance Bassetti et al., 2008). It shows that the pockmarks functioned episodically, during periods of sea-level falls, due to decreased hydrostatic pressure. The source of fluid would be contained in the underlying lowstand prodeltaic sediments. The chimneys of the pockmarks migrated obliquely at an angle comprised between 22° and 45°, in the direction of the local slope. The origin of this process is the increased sediment supply at the shelf edge during sea-level falls, together with downwelling and geostrophic currents along this margin. The angle of the chimneys is directly in relation with the sediment accumulation rate determined from the long (300 m) Promess 1 borehole situated in the study area (Sierro et al., 2009). Our results also show that the highest inclination angles of the chimneys correspond to the periods of highest sedimentation rates, at the end of glacial cycles, when sea-level was the lowest and the source of detrital sediment the closest.

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