High-resolution sequences in the Gulf of Lions: A quick review of new and not so new findings

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Résumé

The applicability of sequence stratigraphy concepts to the scales of so-called 4th- or 5th-order cycles (Milankovitch cycles) is often debated, since auto-genic processes such as shift of river deltas can complicate the sedimentary record. According to a quote attributed to Peter Vail, 'sedimentology is the random noise of stratigraphy'. This is largely true as far as the rock record is concerned. However, the analysis of Quaternary sequences on subsident margins, particularly in the Gulf of Lions (GoL), has been an important source of inspiration and validation in the development of certain concepts of sequence stratigraphy (forced regressions, healing phase, ...). One of the first calibrated verifications of the link between 100,000-year climate cycles and depositional sequences was the European Promess project in 2004, thanks to an age-model resolution of a few hundred or thousand years.
Today, new geophysical data acquired in the context of offshore wind farm projects (Lion et al., session 3.11) enable us to examine in even greater detail the influence of sea level and sediment flux on the architecture of Quaternary sequences. They also reveal the importance of hydrodynamic processes at these high resolutions, a hitherto underestimated controlling factor.
The signatures of 40 kyr cycles and subtle meltwater pulses can be depicted. At the margin scale, lateral variability in sequence preservation is observed, ranging from supply-dominated in the east to more amalgamated and strongly influenced by wind-driven circulation in the west. For example, the forced-regressed deposits linked to the sea-level fall between Marine Isotope Stage (MIS) 3 and MIS 2 form a sandy wedge up to 25 metres thick in the east part of the GoL. In contrast, only a thin veneer is preserved in the west, below the paleo-storm wave base. Thanks to the exceptional quality of the new data, we can reassess the sequence stratigraphic framework of several sedimentary bodies, such as shelf-edge deltas, dunes, sand ridges, shorefaces, and shoal retreat massifs. These findings could be applied to characterising water resources and shallow gas in the future.

Mots-Clés: High, resolution sequence stratigraphy, Gulf of Lions

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