

# SEISMIC STRATIGRAPHY OF PLIO-PLEISTOCENE DEPOSITS ON THE SHELF EDGE SW OFF MALLORCA, SPAIN

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The seismic data, obtained on the southeastern shelf and shelf break of Mallorca, display a great variety of depositional features.

The seismic grid has been divided into two parts: one where a Miocene reef prevails and one where sediments of Plio-Pleistocene age are abundant. They are separated by a NE-SW-orientated fault, which has a maximum offset of 250 meters. The area north of the fault-line contains a thick package of sediments on top of the reef and shows a weak shelf break with mass transport deposits, while the area south of the line has shallow reef positions and is characterized by steep slopes and a sharp shelf break. This can be explained by the hard nature of the carbonate reef. The reef in the area belongs to the platform margin of the Miocene Lluçmajor reef deposits. Subaerial erosion after the Messinian Salinity Crisis created U- to V-shaped wedges in the reef.

The entire Plio-Pleistocene sequence has been divided into two sequences (1 and 2) and each sequence subdivided into two major units (A and B). Unit 1A drapes the reef, is heavily faulted and is of Lower Pliocene age. Unit 1B has a Lower- Pliocene to lower Upper-Pliocene age and has been correlated to transparent seismic facies observed all over the Mediterranean during this period (e.g. Hernández-Molina *et al.*, 2002). Its upper boundary is the Upper Pliocene Revolution (UPR, 2.4Ma). Sequence 2 consists of higher amplitude reflector deposits and displays mainly two different facies: cut-and-fill structures, which have a northwestern sediment infill and aggradational (sub) parallel continuous strata. Both unit 1B and sequence 2 are elongate mounded drift deposits. The observed cut-and-fill structures indicate towards a fluctuating strength of a current. This current may have originated from the permanent deviatoric current of the Balearic Current, running through the Mallorca Channel, or from the semi-permanent wind-driven storm currents inferred by Werner *et al.* (1993).

Sequence 2 displays divergent (unit 2A) to sigmoidal (unit 2B) sub-units in a canyon system along the fault. The current causing the elongate mounded drift deposits eroded sediment of units 1B and 2A. When currents slowed down, sediment was again deposited on steep slopes in the canyon, causing occasional failure and thus the sigmoidal deposits. The alternating sub-units of lower and higher amplitude reflectors of sequence 2 have been correlated to Marine Isotopic Stages. Unit 2A has been deposited from the UPR (2.4Ma) to Middle Pleistocene Revolution (MPR, 0.92Ma) and was subject to sea-level variations in the order of 50 meters. Unit 2B has been deposited from the MPR to present and was subject to sea-level variations in the order of 100 meters.

Sedimentation rates have been calculated based on the observed thicknesses and calculated ages. Rates before the UPR are in the order of 4.5cm/ka, but have to be interpreted with caution, as few data are obtained from this period. After the UPR, rates vary greatly, but tend to be higher on average. Especially after the MPR, when they reach 15cm/ka.

## References

- Hernández-Molina F.J., L. Somoza, J.T. Vazquez, F. Lobo, M.C. Fernández-Puga, E. Llave, and V. Díaz-del Río. 2002. Quaternary stratigraphic stacking patterns on the continental shelves of the southern Iberian Peninsula: their relationship with global climate and palaeoceanographic changes. *Quaternary International* 92(1):5-23.
- Werner F.E., A. Viúdez and J. Tintoré. 1993. An exploratory numerical study of the currents off the southern coast of Mallorca including the Cabrera Island complex. *Journal of Marine Systems* 4(1):45-66.