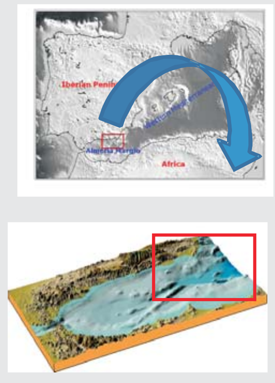
NEW INSIGHTS ON THE DISTAL ALMERIA FAN: LATE QUATERNARY ARCHITECTURE AND EVOLUTION (SW MEDITERRANEAN SEA)

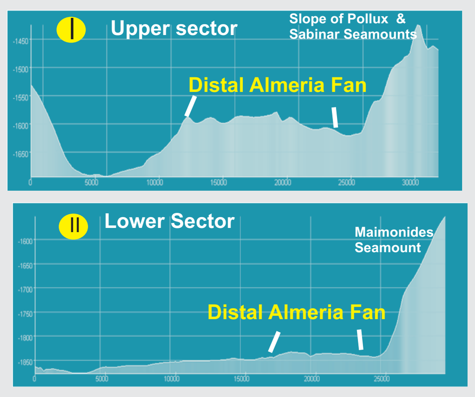
Alonso, B. (1), Ercilla, G. (1), Estrada, F. (1), Casas, D. (2), Garcia, M.(3), Vázquez, J.T. (4), Farran, M (1)
1- Instituto de Ciencias del Mar, CSIC, Barcelona (Spain), 2- Instituto Geológico y Minero de España, Madrid (Spain), 3- University of Cambrige, Cambrige (UK),
4- Instituto Español de Oceanografía, Málaga (Spain)

1. The study area

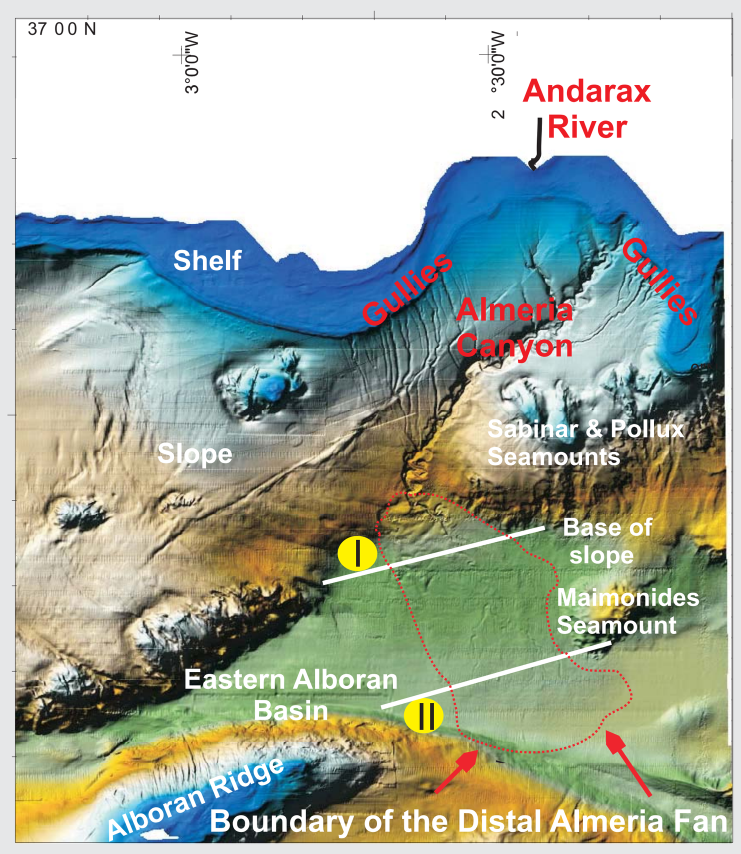


The present work is focused on the Distal Almeria Fan located on the Almeria margin and Eastern Alboran Basin. This fan is fed by the Andarax River, a relatively long submarine canyon (55 km) (Almeria Canyon) and several gullies that erode the slope deposits.

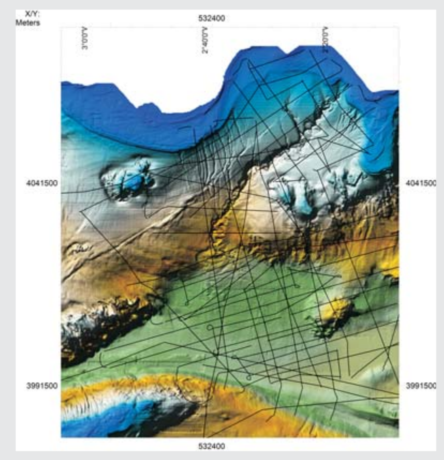
Cross-sections



The canyon mouth locates on the base of slope (1200 m) and the erosive/depositional area extends down 1900 m along the Eastern Alboran Basin. The formation and evolution of this fan ocurred from the Upper Pliocene to Quaternary time.



2. Dataset

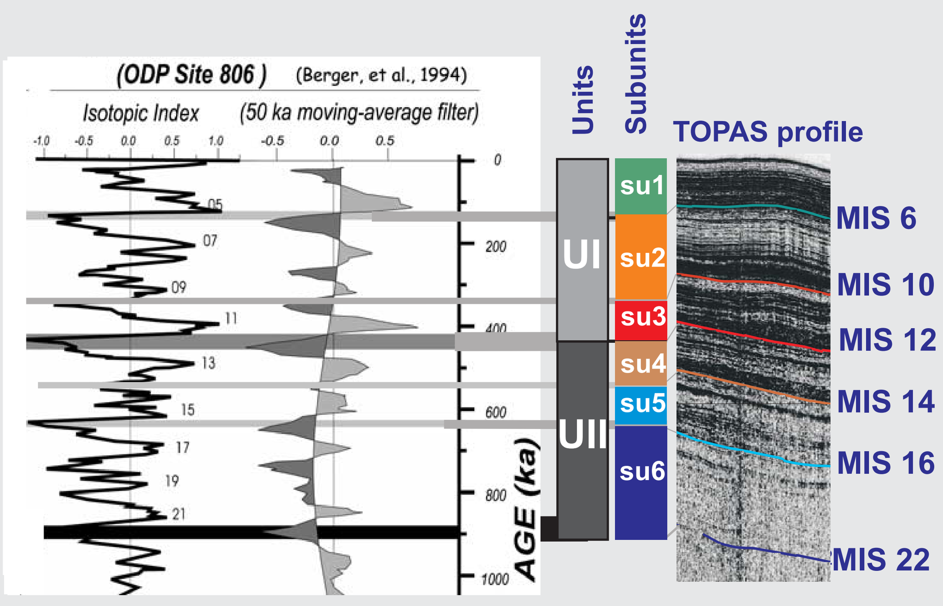


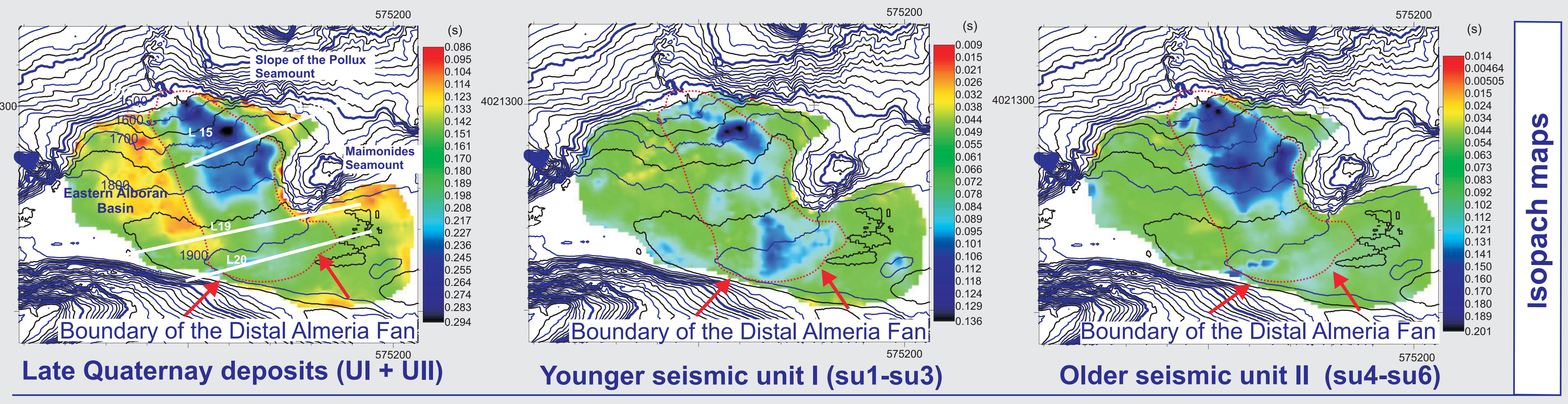
Multibeam bathymetry, very high-resolution seismic profiles (Topas and Parasound Systems) and high-resolution profiles have been analysed to study the late Quaternay architecture and evolution of the Distal Almeria Fan.

3. Architecture of the Distal Almeria Fan

Seismic analysis: seismic units and architectural elements

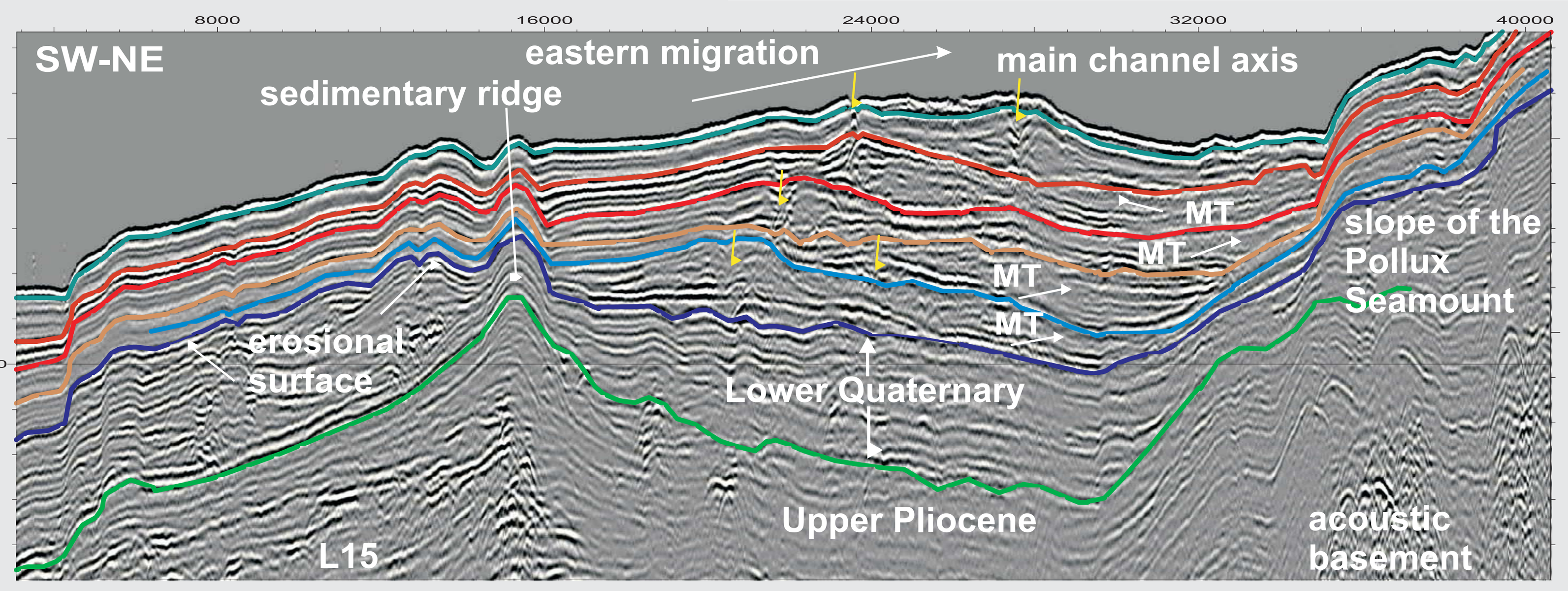
The high resolution seismic analysis allows us to identified two major units (I and II) and six subunits (U1 to U6 from younger to older) bounded by discontinuities related to the Quaternary isotopic stages (from MIS 6 to MIS 22).





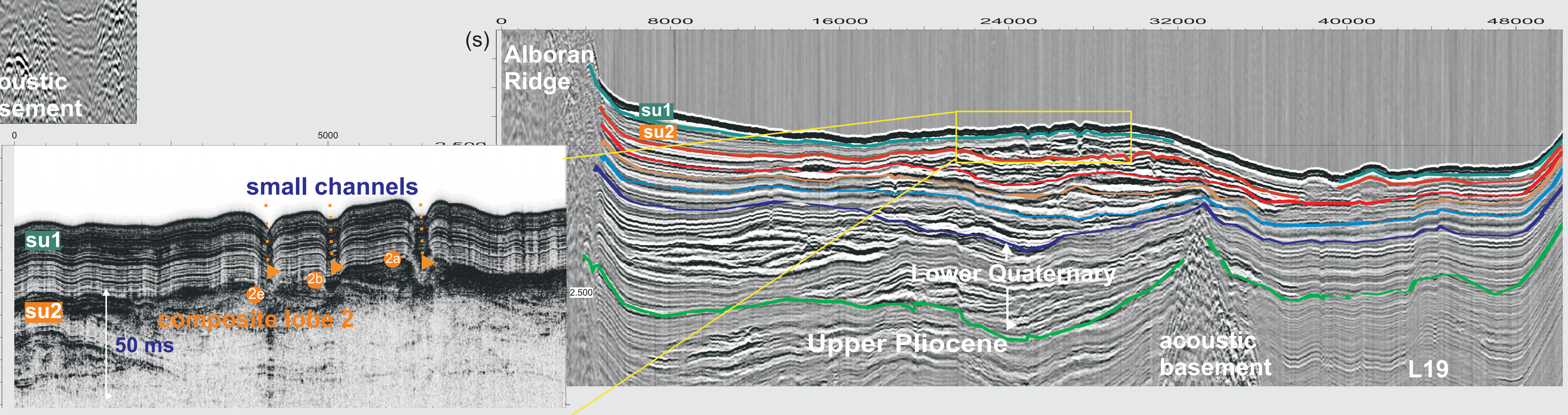
The thickness of the unit I reaches up to 0.136 s and its distribution displays two smaller depocentres: one at the base of slope and the other occurs at the basin. By contrast, the thickness of the older seismic unit II is higher (0.201s) and displays one important depocentre at the base of slope.

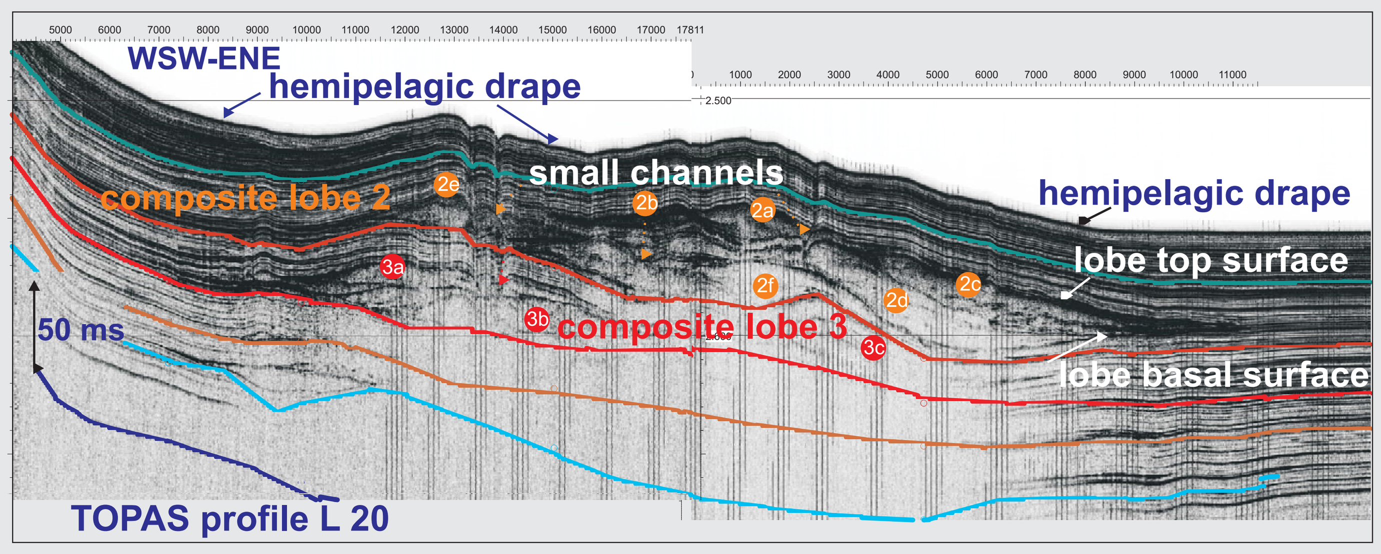
Channel-fill and levee deposits



The stratigraphic architecture is defined by vertical stacking and lateral migration of the channel- fill and overbank deposits at the base of slope (1200-1700m) and the lobe deposits from the base of slope to the basin. Mass-movement deposits (MT) interfinger with turbidite deposits at the eastern side of the channel.

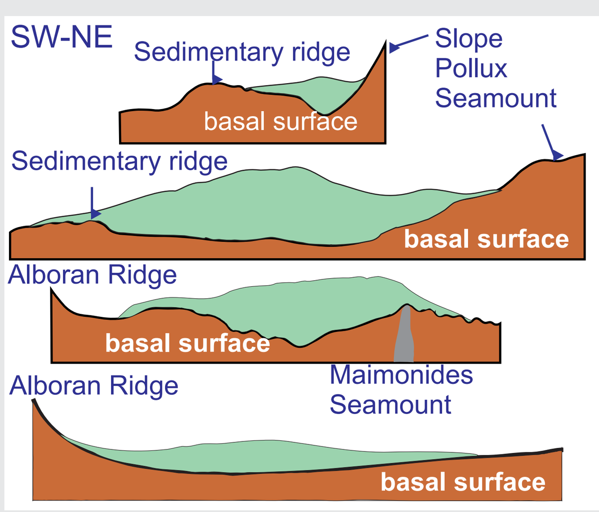
Lobe and distributary channels deposits





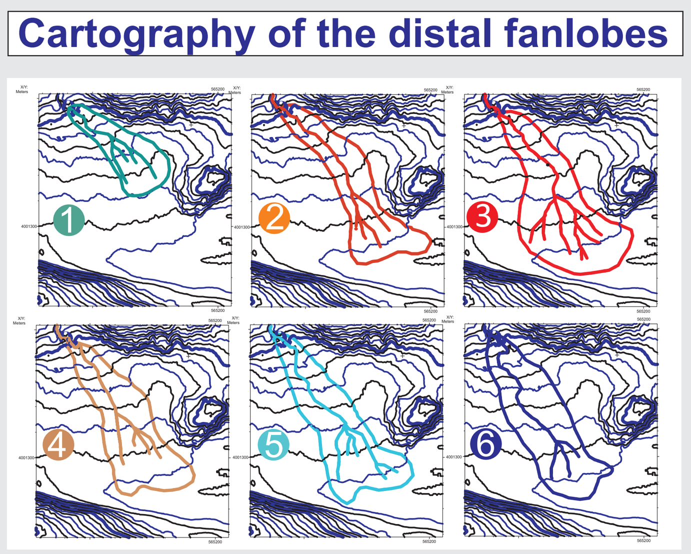
Lobe deposits are single or composited (from two to six minor-order lobes). They are fed by a diverging network of small distributary channels (a few meters deep) and they disappear towards the most distal area (unchannelized sector).

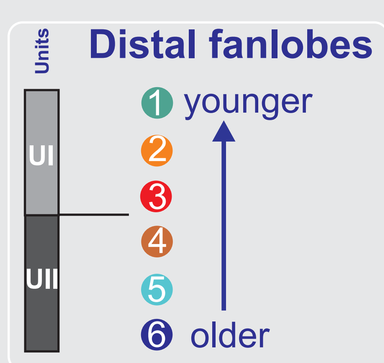
Morphologic and geometric parameters



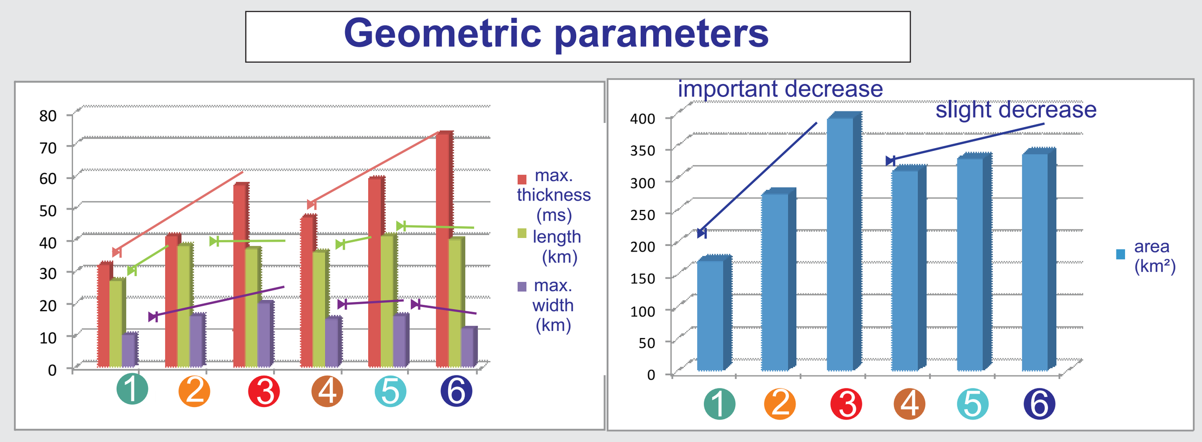
The paleotopography of the late Quaternary fan deposits reveals an irregular basal concave-up surface. It displays a confined setting: the eastern side is bounded by seamounts while the western side by a sedimentary ridge.

Cartography of the distal fanlobes





Geometric parameters

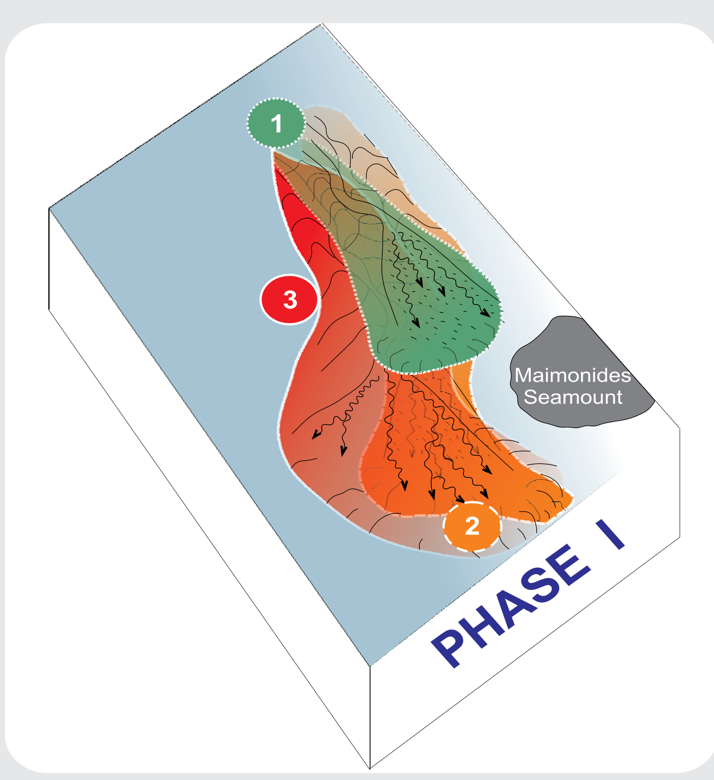


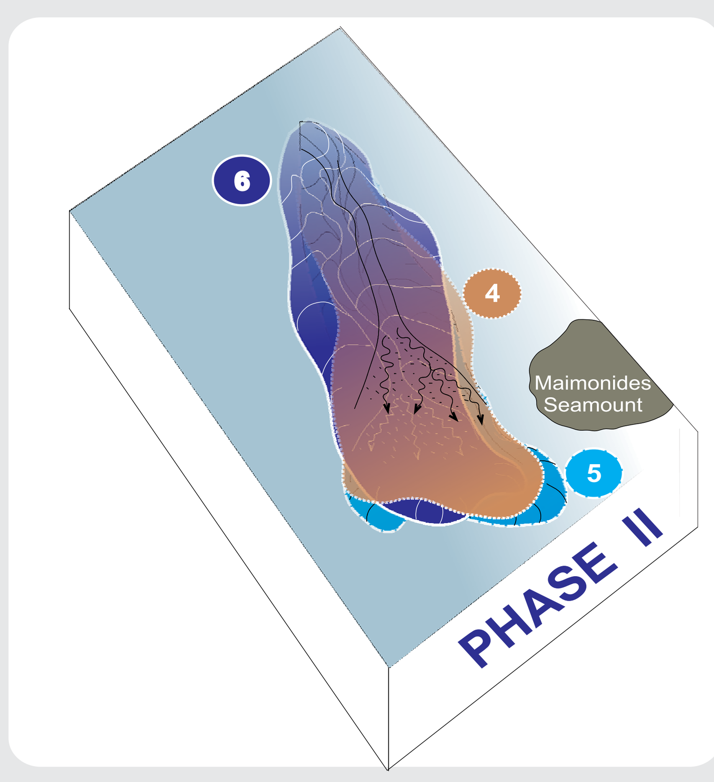
Morphologic and geometric parameters (thickness, length,width and area) of the distal fanlobes.

4. Evolution and Controlling Factors

Taking into account the morphology, dimensions and stratigraphy, the growth of the Almeria Distal Fan could be explained by two evolutive phases (I and II).

The formation and evolution of the fan is controlled mainly by sea level cycles of 3[rd]-order, changes of the sediment supply volume, sediment type, avulsions, and previous paleotopography.





Comparison

PHASE I — Distal fanlobes 1,2 3 (440 ky-present)

- shallowest formation of distributary channels
- important decrease of the fan area
- fan migration from west to east
- morphological changes: lobulate to elongate shape
- decrease of turbidite sediment accumulation
- paleosurface has a slight concave shape
- retrograding pattern

PHASE II — Distal fanlobes 4, 5,6 (900 ky-440 ky)

- slight decrease of the fan area
- vertical stacked with a slight migration
- similar morphological shape: elongate shape
- increase of turbidite sediment accumulation
- paleosurface is very irregular with a concave shape
- agrading pattern

Contribution to MONTERA, CONTOURIBER, and SAGASbis Projects financed by the Spanish MICINN