Upslope turbiditic sedimentation on the South-Eastern flank of the Mediterranean ridge

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Piston cores recovered on the outer deformation front of the Mediterranean Ridge (cruises BAN-82 and BAN-84 of R/V *Bannock*) on the Sirte and Herodotus abyssal plains allowed to study in detail turbiditic deposits of Pleistocene and Holocene age with composition clearly showing a provenance from the African continental shelf.

Turbidites were correlated up-slope in different cores and it was suggested that turbid flow coming from the African slope can climb the outer flank of the Mediterranean Ridge after crossing the Sirte and Herodotus abyssal plains during low sea level stands (CITA *et al.*, 1984a; RIMOLDI, 1989). If the turbidites had been deposited on a more or less flat abyssal plain and were later uplifted on the ridge by tectonic movements, unrealistic outward growth rates of 20-60 cm/year and uplift rates of 0.5-1.5 cm/year must be invoked. The grain size distribution and the composition of the Bronze Age Homogenite triggered by the caldera collapse of Santorini also indicated a similar depositional behaviour (CITA *et al.*, 1984b).

Sedimentologic and textural characteristic common to all these turbidites are:

1) Large thickness in the abyssal plains (over 9 m) and lateral continuity of several kilometers. For this reason these deposits can be classified as Mega-turbidites according to BOUMA (1987).

2) Thickness decreasing upslope on the southern flank of the Mediterranean Ridge.

3) Percentage of coarse fraction increasing upslope on the southern flank of the Mediterranean Ridge.

4) Composition of biogenic and terrigenous fraction indicating African shelf provenance.

Detailed grain size analyses performed on a transect of cores from the SE Mediterranean Ridge deformation front facing the Herodotus abyssal plain revealed two additional characteristics:

a) Two different turbidites, named A-turbidites and B-turbidites can be identified on the basis of colour, thickness, and composition. A-turbidites, only a few decimeters thick and often lacking the sand sized fraction, show a clay mineral composition identical to the present Nile derived sediments.

b) The grain size distribution within each B-turbiditic event, investigated through a Fritsch Analysette 20, shows alternation of maxima and minima of the coarsest fraction, with maxima decreasing steadily up-core (Figure 1).

From these observations, we conclude that individual mega-turbidites as they can be described from visual analysis of split cores, are actually composed of several units that can be identified with careful investigation of the grain size. The steady upward decrease of the maximum grain size of the different units suggests that they were produced by sedimentary events of progressively lower energy. Our speculation on the origin of such multiple events suggest that mega-events may occur with the quasi-contemporaneous triggering of several turbid flows in a wide source area. The distal zone of deposition are then reached by the different flows at different times, with highest energy flows first and lowest energy flows last. The upslope increase of the coarsest fraction in each turbiditic unit contrasts with the observation by MUCK and UNDERWOOD (1990) that diluted flows lose less energy than dense flows during an up-slope run because of their higher flow thickness. The genesis of a symmetric or back flow that brings the finest suspended fraction of the flow back to lowest elevations after the flow has reached the maximum elevation is suggested.

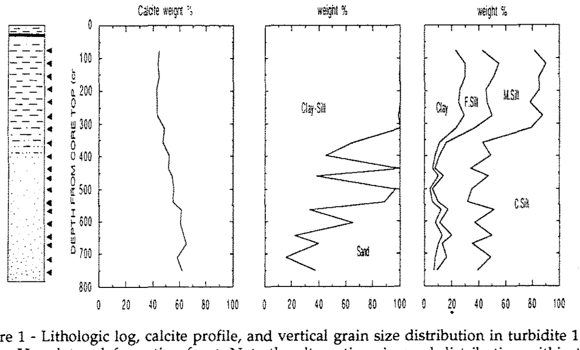

Figure 1 - Lithologic log, calcite profile, and vertical grain size distribution in turbidite 11B from the Herodotus deformation front. Note the alternations in sand distribution within the coarsest base of the turbidite that suggest a composite turbid flow.

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