First Results of the "SARECO" Cruise on the Rhone Fan : Further Evidences of Destabilization Processes

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Most fan constructions were set up as sequential units which reflect the cyclic variations in relative sea-level . The main depositional features can be related either to constructional processes (overbank deposits) or to destructive ones such as gravitational failures . High quality acoustical data are needed to recognize internal characteristics, patterns and unconformities and to identify the relationship between deposits in order to correlate high frequency sea-level changes with the resulting stratigraphic sequences.

The poster presented illustrates the main depositional features which are well developed at the top of the upper constructional series of the Rhone fan (northwestern Mediterranean Sea, France). It is the first contribution of a research programme which began in November 1989 (SARECO cruise) using a deep-towed sonar and 3.5 kHz profiler ("SAR", Système Acoustique Remorqué) .

The construction of the Rhone fan began at the end of the Messinian crisis which was followed by the flooding of the Mediterranean Basin during the Plio-Quaternary period . The fan was fed with terrigenous material discharged by the Rhone River and transported through the Petit Rhone Canyon . Its structure results from the stacking-up of sedimentary bodies superposed during four main successive phases ("basal", "lower", "upper" and "surficial" series (DROZ and BELLAICHE, 1985). The surficial series is well displayed only to the west. Therefore the "upper" one can be observed elsewhere . It shows at its top, on both sides of the fan, two large sedimentary bodies which contain chaotic or transparent seismic facies interpreted as debris-flow deposits. The eastward transparent unit has been mapped over 5100 km² . It reaches 160 m in thickness and represents about 170 km³ (BELLAICHE, COUTELLIER, DROZ et LE CANN, 1990). It originated from the remobilization of previously stratified deposits . The 3.5 kHz lines and sonograms have shown scarps with truncated strata at the location where the movement was initiated . Sliding of sediments deposited on both the continental slope and deep-sea channel levees are documented .

Geotechnical properties of sediments (water content, plasticity and cohesion) were determined at the eastern limit of the western transparent unit (BOUYE, 1983; MEAR, 1984). A poorly cohesive grey silty mud body (CU < 40-50) was found to lay unconformably on cohesive silty mud (CU ranging from 40 to 80) . It thickens away from the limit of the unit and is overlain with thin Holocene recent grey mud, separated by an oxidized layer dated of 11.000 yrs B.P.. These variations of the geotechnical properties of the grey silty mud can be assumed to illustrate the abnormal superposition of the destabilized unit over the levee overbank stratified autochtonous deposits .

The uppermost construction ot the deep-sea fan is due to a large extent to gravity induced mass transport which affected poorly compacted water-rich sediments on steep slopes and channel levees . These processes are assumed to have occurred mainly during the interglacial period and especially sea-level initial lowering (COLEMAN and ROBERTS, 1988) . Efficient new tools are still needed to study and correlate the major processes operative in deep-sea environments during the high frequency cycles of sea-level of the Quaternary . The SAR survey has provided such detailed information .

This programme will be developed and complemented by coring and in situ geotechnical measurements both in stratified and remobilized sedimentary units in the Rhone fan.

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C.I.E.S.M. Mediterranean Ocean Drilling Program Workshop

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So far, three scientific deep sea drilling cruises have been conducted in the Mediterranean : DSDP Leg 13 in 1970, DSDP Leg 42 in 1975, and more recently ODP Leg 107, in 1986.

DSDP Leg 13 was chiefly devoted to the first global exploration of the recent sedimentary cover of the domain. the results focused on one of the specific catastrophic event that occured in the Mediterranean : the Messinian dessication-salinity crisis. These results have allowed discussions and speculations on the significance, reasons and consequences of this paleo-environmental catastrophe, that occured some 5 MA ago.

DSDP Leg 42A, also facing the Messinian salinity model, allowed to illustrate the complex and puzzling evolution of the present Mediterranean, made of recent back-arc type basins developing in the middle of Mesozoïc oceans remnants as a consequence of the Africa-Europe convergence.

ODP Leg 107 recently focused on a transect study of the most recent the Mediterranean sub-basins : the Tyrrhenian Sea where opening processes also interact with the Messinian dessication event. Both the drilled sedimentary and basement sections have allowed to better understand and tentatively model rifting and magmatic processes that occur in response to a collision controlled opening and subduction.

Since 1986 and the COSOD II conference, many reports from various ODP structures have strongly recommended to look both towards global perspectives and new frontier experiments. After nearly twenty years of successful results in the Mediterranean, we believe that it is also time to propose drilling operations that should adress global prospects. In this challenge we believe that the Mediterranean Sea can play its part. As stressed during a previous Mediterranean ODP worshop held in Athens (1988), the Mediterranean represents the only area in the world where two large continents are progressively entering collision, therefore the Mediterranean is the only area where processes at colliding continental plate boundaries can really be studied.

In organizing this second workshop, we are concerned by a triple goals :

1.- to propose global scientific targets that can be addressed using new development in drilling technology (deep hole);
2.- to combine if possible deep drilling with *in situ* (logging) and possibly nearby geophysical experiments;
3.- to preserve further use of holes for future potential *in situ* experiments that may be organized using other platforms (drilling, submersible).

We believe that potential ODP programs for the Mediterranean sea will be successfull only if these goals are reached under internationaly managed team.