

Proposal for deep drillings in the Mediterranean Sea (Rhône Deep-Sea Fan and Var Ridge)

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The general aim of this drilling project is devoted to deep turbiditic sedimentation related to external forcing mechanisms such as sea-level changes, tectonics and climate.

We shall present here, among the main objectives of this project, those that concern the improvement of sequence stratigraphy model [1, 2] in deep-water settings; many of which are not universally recognized and usually are poorly documented.

The Rhône Fan in the Gulf of Lions [3] and the Var Fan on the Ligurian Margin [4]⁽²⁾, two of the main turbiditic systems of the northern Mediterranean margin, offer a unique opportunity to precise the relative influences of sea-level changes and regional tectonics on basinal sedimentation. These fans have in common several characteristics: their construction follows the same main eustatic event (Messinian salinity crisis), they were fed by common terrigenous sources (the Alps) and they are both of Plio-Quaternary age. The main differences between them concern the nature of sedimentary input (probably much coarser in the Var system than in the Rhône Fan), and the physiographic and local tectonic conditions prevailing during their constructions. These differences resulted in contrasting modes of fan growth:

- The **Rhône Fan** can be considered as "typical" and relatively simple example of a turbiditic system. During its history, the prevailing physiographic characteristics of the Gulf of Lions margin were not different from those of today, and were very close to the general sequential model (broad shelf, well expressed shelf-break). Moreover, subsidence of the margin is known to have been relatively low and constant since earliest Pliocene, varying from about 26 m/100,000 years on the outer shelf to about 33 m/100,000 years in the basin [5].

These analogies in the background conditions (physiography, subsidence) of the Gulf of Lions and of the sequential model, together with the relative simplicity of the sedimentary evolution of the Rhône Fan, make the Gulf of Lions and Rhône Fan good potential areas to test the general concepts of the sequential model of margin construction.

However, the sedimentary evolution of this fan shows some specificities that are not predictable by the model. Our observations indicate in particular (a) the existence of significant turbiditic sedimentation during relative rises of sea-level and sea-level highstands (e.g.: deposition of the sandy "neofan" during the Holocene highstand [6], and probable active channelized basin sedimentation during the lower Pliocene sea-level rise [3]), and (b) mass-movement processes at the end of lowstand channel/levee deposition, that is to say during the subsequent rises of sea-level [3].

It appears thus that the determination of the exact timing of deposition of this types of sediments is essential and will be considered as another objective for the proposed drilling.

- In contrast, the **Var System** must be regarded as a "atypical" turbiditic system. The main interest of this system lies in the specific physiographic conditions and the local tectonic activity that resulted in the overgrowth of a single levee (the "Var Ridge" southern levee). These conditions were, among others: absence of a shelf, which prevented accumulation during highstands, continuity between the Var River and the Var Canyon leading to the permanent feeding of the basin by the fluvial input, tectonic control of feeding axes leading to the stability of depocenters.

These specificities design the Var system as a good target for improving the general model.

Comparison between drilling results in the Rhône Fan, where sealevel changes are likely to be the main controlling factor of sedimentation, and in the Var System, where local tectonics played a greater role, is expected to highhigh significant information on the relative influence of these two factors.

⁽¹⁾Other institutions are likely to participate in the further elaboration of this proposal, still in preparation; it will be presented in the framework of an open discussion during which other objectives should be defined.

⁽²⁾The results concerning a comparative study of architecture and growth-pattern of both the Rhône Fan and Var Ridge will be presented during the section on "Deep sea depositional systems".

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