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# Drilling below the salt in the Western Mediterranean Sea : the GOLD-1 (Gulf of Lion Drilling) Project.

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In recent years the Gulf of Lion within the Occidental Mediterranean Sea has become a unique natural laboratory for the study both the evolution and interaction of deep processes (geodynamics, tectonics, subsidence, isostasy) and surficial processes (river behavior, sedimentary fluxes, sea-level changes, climatic impacts). Here, representing a large group of international researchers, we present the main objectives for a deep drilling project at the foot of the continental slope (2400 m water depth) in the Gulf of Lion. This position is the only place in the Gulf of Lion where the sedimentary column is expected to be complete without major erosional hiatuses or time gaps. It is located sufficiently far from the shelf and slope to not have been affected by the extraordinarly erosional event of the Messinian, and at the same time be free from salt-related faulting and diapirism. At this position we have recorded nearly a complete high-resolution history of the last 23 through 30 Ma of Mediterranean history in some 7.7 km of sedimentary archive. From the petroleum exploration perspective the deepest part of the margin reamain underexplored since all existing wells were drilled on the shelf and slope GLP1 & 2 being the deepest one. New interpretations in the region (especially concerning the Messinian event) have considerably changed earlier views of potential hydrocarbon reservoirs.

New results expected from deep drilling are numerous:

1) For the substratum: the upper continental crust thins to less than 5 km, and changes laterally to a relatively thin crust with high velocities whose precise nature is still undetermined (Gailler et al., 2009). The aim of the drilling is to reach this crucial information which is essential for the understanding of the evolution of the sedimentary basin (Aslanian et al., 2009).

2) The drilling will allow the dating and characterization of the impact of the initiation and changes in glacioeustatic cyclicity in alpine glaciers and ultimately on sedimentation in the deep basin. For the Miocene and older sediments the drilling, will yield information about the nature, paleoenvironments and age of deposits enabling an astronomically-tuned Neogene time scale to be refined for the period of Aquitanian through Langhian interval.

3) The Messinian extreme event represents a unique sedimentological, hydrological, oceanographic, biological and probably climatological crisis in Earth history. It is a unique case to study the impact of sea-level drop (more than 1000 m, one order of magnitude greater than Late Quaternary glaciations) on sedimentary river behavior, deltaic and evaporitic deposition and ensuing biotic crisis. Deep drilling with the R/V Chikyu is the only way to go through the complete series of evaporites in the Provence Basin, sample the initiation and evolution of the crises, the first deposits related to the lowering of sea-level on the one hand and to the salinity crisis on the other.

4) Finally, this drilling will represent the first opportunity to study the composition and functioning (metabolic processes and products, regulation of populations, etc.) of the microbial communities (bacteria, Archaea, viruses, fungi and protists) from the deep biosphere of the Mediterranean Sea.

An additional and linked MSP GOLD-2 project has the objectives of recovering a unique global Pliocene records preserved on the shelf (Rabineau et al., this congress, session CL 1.6)

We invite all interested scientists to join us in planning and promoting this drilling project. We are proposing an IODP Magellan workshop in Banyuls in October 2010 to bring together all interested scientists and stake-holders around these proposals and other drilling projects in the Mediterranean Sea (e.g. ICDP). Please contat us at the earliest opportunity.