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Preliminary observations about the terrigenous Quaternary shelf-slope sequence in the Gulf of Lions based on the study of a long borehole (PRGL2, PRoMeSS 1)

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Global sea-level and climate changes are well recorded on deltaic margins where high sedimentation rates allow high resolution analysis of rapid changes. In June-July 2004, a drilling operation was funded by the EC in order to investigate the Adriatic and the Gulf of Lions deltaic margins (Promess 1, Berné et al., this conference). In the Gulf of Lions, great potentialities for resolving the chronology of sequences that have accumulated under the forcing of glacio-eustatic and climatic changes over several hundreds of thousands years exist, thanks to high sedimentation supply and rapid subsidence (Rabineau, 2001).

Two sites were drilled during the cruise:

- PRGL1 (300 m long), located at the interfluves of Bourcart and Herault canyons at water depth of 298 m. It is object of detailed multy-proxy analyses (micropaleontology, paleomagnetism, palynology, geochemistry), and will provide a continuous paleoclimatic record and chrono-stratigraphic framework (Flores et al., this conference);
- PRGL2 (100 m long), located at the seaward termination of the Last Glacial Maximum shoreline (103 water depth), it is characterized by occurrence of sedimentary discontinuities related to submarine and/or subaerial erosion, that can

be tied to correlative conformities. It is mainly studied for its seismic sedimentary facies, seismic features, physical and geotechnical properties.

We present initial interpretations of the prograding sediment wedges that were drilled during the cruise at site PRGL2.

The seismic facies at PRGL2 are characterized by prograding wedges, bounded by erosional discontinuities. From the bottom to the top, three major sequences can be identified:

- Steep (up to 7°) clinoforms pinching out seaward and forming a step of about 40 ms (twtt), consisting of very stiff sand;
- Wavy structures (the sediment waves of several authors) onlapping on the underlying deposits. They consist of clayey silt with sandy intervals;
- The uppermost sequence corresponds to another prograding prism, where clinoforms have a seaward dipping angle up 5° and mainly consist of silty sand.

Sedimentary characteristics of PRGL2 and the correlation with physical-geotechnical properties and geophysical data (based on sparker seismic profiles) show an outstanding correspondence. The interpretation of stratigraphic record in PRGL2 is providing a geologic framework of reference and it will permit:

1. to carry out reliable correlation with the continental slope sedimentary record (PRGL1, used as reference site because with no sedimentary discontinuities);
2. evaluate the impact of cyclical climatic variability and sea level change on nearshore sedimentary environments. Each sequence, up to 35 m thick, is interpreted as “forced regressive” body and represents the evidence of former shorefaces formed during sea-level falls (glacial periods), coeval to the thick sedimentary prism drilled along slope at PRGL1. The study of PRGL2 sedimentary succession is particularly important because it represents the first attempt to describe the internal structure and accumulation history of stacked clinoform bodies on the basis of deep boreholes, much more detailed than that carried out in the Gulf of Mexico (Winn et al., 1998);
3. build a link between the stratigraphic record and shelf-slope sedimentary dynamics.

Further investigation of utilizing seismic and dating methods will help to refine our understanding of the modes of shelf development during late Quaternary in the Gulf of Lions.

Winn, R.D, Roberts, H.H., Kohl, B., Fillo, R.H., Crux, J.A., Bouma, A.H., Spero, H.W., 1998. Upper Quaternary strata of the upper continental slope, northeast Gulf of Mexico: sequence stratigraphic model for a terrigenous shelf edge. Journal of Sedimentary Research 68(4), 579-595

Rabineau, M., 2001. Un modéle géométrique des sequences des dépôts quaternaires sur la marge du Gulf du Lion: enregistrement des cycles climatiques de 100.000 ans. PhD thesis, University of Rennes, pp. 394.