Sedimentary processes in the Petit Rhone Canyon and the Rhone upper fan inferred from Sar profiles

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As part of the "Processus sédimentaires sur les pentes et Instabilités" research project of IFREMER, a geophysical survey using the SAR french side-scan sonar (Système Acoustique Remorqué), the multibeam echosounder EM-12 and a SIG 600 KJ sparker, was carried out in January 1992, in the Gulf of Lions (South of France)(Fig. A-B). The goals of the survey were to characterize, by their seismic and side scan sonar signatures, the instability processes of a young passive continental margin and to study their relation with the high frequency cycles of sea level changes. The studied area includes the shelf break, the slope and the upper domain of the Rhône deep sea fan.

The morphology and architecture of the Rhône deep sea fan has already been described from sea-beam and superficial seismic data by BELLAICHE *et all.*, (1983), DROZ (1983) and DROZ and BELLAICHE (1985). These authors differentiated the continental slope located between the shelf break (-180 m) and the isobath -1600 m and the upper fan located between 1350-1600 to 2000 m depth (Fig. C), with a main valley and associated sedimentary levees. On the slope, the Petit Rhône canyon is considered as the main vector for sedimentary supply towards the deep sea fan and then considered mainly as an erosional domain . The study of new SAR profiles across the Petit Rhône canyon, on the slope, and across the main valley of the upper fan shows that the sedimentary processes that occur in the area are not so simple.

The Petit Rhône canyon has a U section 3.5 km wide and 250 m deep on the upper slope (SR 50 profile, fig. D. 1), and becomes narrower and shallower downslope (see TR 24 profile, fig. D.2). A unit characterized by discontinuous high amplitude reflections overlains a basal unconformity. As displayed on the TR 24 profile this unit is thicker on each side of the Petit Rhône canyon.

These deposits demonstrate the existence of depositional processes in a domain previously considered as an erosional domain.

The TR 7 and TR 36 profiles (Figs. D.3, D.4), across the upper fan domain show the main valley with a flat bottom and an inner minor V valley shaped, few hundred metres wide and 70 m deep forming like terrace features. The main valley is infilled by the unit characterized by discontinuous high amplitude reflections (with interbeded transparent zones) which onlap the basal unconformity. On the TR 7 profile, this unit is confined in the main valley, whereas downwards (by exemple on the TR 36 profile) it also constitutes the eastern border of the main valley. Despite the absence of cores permetting us the datation of the upper unit and the basal unconformity, we suppose that the upper unit on the slope and the upper fan domain must be contemporaneous.

The formation of a basal unconformity in the canyon and the main valley might result from sea level fluctuations, whereas the presence of the upper unit on both sides of the Petit Rhône canyon and infilling of the main valley remains puzzling. In the main valley, it could be the result of (1) infilling of the main channel with slumps and channel facies as suggested by the presence of interbedded transparent facies followed latter by the incision of the minor valley, or (2) overflow deposition from the minor valley, as suggest by KTR7 and KTR8 cores obtained during the TRANSRHO survey which show a succession of fine turbidites which are interpreted as typical levee facies, or even a combination of these two mechanisms.

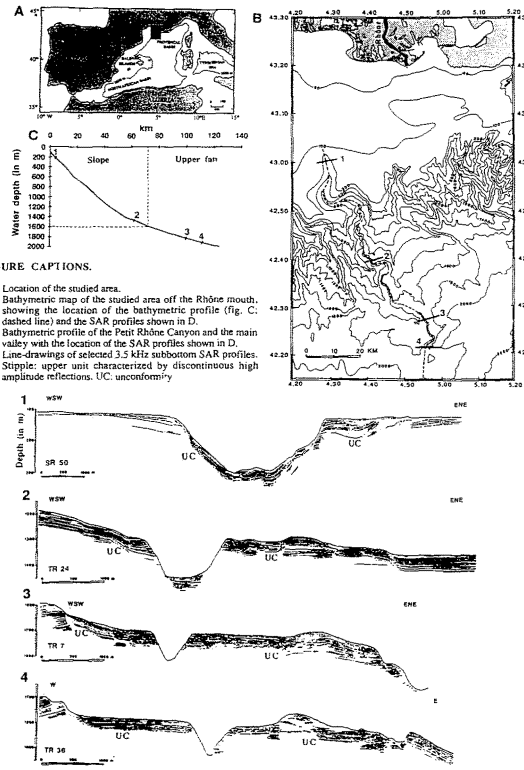

FIGURE CAPTIONS.

A - Location of the studied area.
B - Bathymetric map of the studied area off the Rhône mouth, showing the location of the bathymetric profile (fig. C: dashed line) and the SAR profiles shown in D.
C - Bathymetric profile of the Petit Rhône Canyon and the main valley with the location of the SAR profiles shown in D.
D - Line-drawings of selected 3.5 kHz subbottom SAR profiles. Stipple: upper unit characterized by discontinuous high amplitude reflections. UC: unconformity

REFERENCES

BELLAICHE, G., ORSOLINI P., PETIT-PERRIN B., BERTHON J.L., RAVENNE C., COUTELLIER V., DROZ, L., ALOISI J.C., GOT H., MEAR Y., MONACO A., AUZENDE J.M., BEUZART P. and MONTI S., 1983. - Morphologie au sea-beam de l'éventail sous-marin profond du Rhône (Rhône deep-sea fan) et de son canyon afférent. *C. R. Acad. Sci. Paris*, Vol. 296, pp. 579-583.

DROZ L., 1983. - L'éventail sous-marin profond du Rhône (Golfe du Lion) : grands traits morphologiques et structure semi-profonde. Thèse 3ème cycle, Paris VI, 195 pp.

DROZ L. and BELLAICHE G., 1985. - Rhône deep-sea fan : morphostructure and growth pattern. *Amer. Assoc. Petrol. Geol . Bull.*, Vol . 69 (I), pp. 460-479.