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Rudist Carbonate Platforms: Outcrop Examples for Reservoir Characterization and Modeling

During the Cretaceous, the Pyrenean basin was characterized by a rift regime and evolved to a foreland, with sedimentation generating widespread carbonate platforms. Four different reefal outcrops of the south-central Pyrenees are described.

In the Segre valley, Aptian carbonate banks with clinof orm geometries, separated by flooding surfaces, were deposited on the margin of a rift basin. The banks consist of peloid-oolitic sands and protected inner-bank muddy deposits studded with rudists. The upper carbonate bank is a coral bioherm sealed by marls.

In the Isábena valley, Albian bioherms were deposited on the hanging wall of an extensional fault. The core of the bioherms is a framestone of domal corals, rudists and skeletal packstones with red algae and orbitolinas. The reef flanks consist of coral debris and red algae.

In the Flamisell valley, a Turonian-Coniacian coral-rudist buildup consists of a shallowing-up section formed by fine-grained skeletal limestones, lenses of coarse-grained skeletal calcarenites, massive coral limestones, and rudist beds. The reef complex, topped by a hardground, is overlain by deeper-water marly limestones.

In the Pallaresa valley, the Coniacian-Santonian rocks consist of a succession of prograding parasequences of cross-bedded calcarenites, that grade to limestones with more than 30 species of rudists, and coral-rich marls. The calcarenite shoals are compartmentalized by faults, pinch out onto marine shales, and are regionally sealed by shales.

The use of Cretaceous reefal outcrops in the Pyrenees may help in developing 3-D permeability models, and in understanding interwell- and reservoir-scale heterogeneities that affect fluid flow and processes of hydrocarbon recovery.