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Shallow carbonate production following the Cretaceous-Paleogene crisis: architecture and composition of an upper Danian (Paleocene) reef rimmed shelf from the western Pyrenean basin, North Spain

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Descriptions of whole Paleocene carbonate platform systems are still rare and attempts to evaluate carbonate production and the structure of shallow water carbonate factories early after the Cretaceous-Paleogene boundary is usually constrained by the availability of large outcrops, well-preserved fossils and/or good biostratigraphic resolution. In this contribution we document the facies architecture of a shallow carbonate platform that was developed during the late Danian (early Paleocene) along the south and western Pyrenean basin, in north Spain. This platform was 40-50 km wide in dip section and is represented by a 100-170 m thick almost pure carbonate succession made up of deposits representative of a wide range of environments, including tidal flats, lagoons, reefs and different types of bioclastic accumulations. The most distinct feature of the upper Danian platform was the presence along its margin of a thick prograding reef complex mainly built by phaceloid and massive scleractinian corals and different groups of calcareous algae. Of significant evolutionary significance for this time are the moderate diversity of the coral assemblages, the abundance of solenoporaceans

and dasycladaleans and the relative scarcity of red corallines, which mainly occur restricted to the lower reef front and fore-reef facies belts. The zone behind the coralgal rimmed margin was occupied by a 20-30 km wide lagoon, mainly defined by the deposition of fine-grained limestones rich in miliolids and small dasycladaleans and, less frequently, by m-thick bioclastic and oolite sand bodies. Lagoonal deposits are well stratified and occur arranged into shoaling upward cycles, usually culminating in restricted facies but showing few evidence of subaerial exposure. The most landward zone of the upper Danian platform was occupied by an extensive tidal flat mostly characterized by the cyclic accumulation of fine-grained dolomites, laminated mudstones and shales and crusts of evaporite minerals. As a whole the upper Danian platform from the Pyrenean basin represent a rimmed shelf developed under warm semi-arid conditions by the interaction of two main subtidal carbonate factories. One was represented by the coralgal associations thriving along the platform margin; the other was defined by low-diversity but prolific communities of porcellaneous foraminifers and green algae occupying the broad lagoons and the back zone of the coralgal platform rim.