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Late Cretaceous heterozoan carbonates: palaeoenvironmental setting, relationships with rudist carbonates (Provence, South-East France).

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During Late Cretaceous (Coniacian-Early Santonian) times, heterozoan-rich bioclastic carbonates prevailed in the Provence Platform area. They substituted rudist-rich carbonates, which flourished during the Late Turonian in the same area. In this presentation, we will show a detailed sedimentological study of these heterozoan-rich carbonates, which are present in the Méjean syncline, west of Marseille. At this locality, the thickness of the bioclastic series exceeds 500m. The heterozoan carbonates consist of packstones and grainstones, organized in meter-thick, cross-bedded sedimentary strata. Microfacies analysis has shown that bryozoans, red algae and echinoderms are the main skeletal constituents mixed with reworked fragments of rudists and benthic foraminifera. Detritic elements are mainly represented by quartz and glauconite grains. In the study area, the heterozoan carbonates were subdued to a complex diagenetic evolution. Iron precipitation occurred in environments with high carbonate productivity and a high hydrodynamic level. Early-marine cements developed mainly in the upper portions of shallowing-upward parasequences during intervals with decreasing sedimentation rates. Late burial cements occurred sequentially as syntaxial rim cements, dentate calcite crystals and blocky calcite. During the mesogenetic burial history, microstylolitisation developed in the packstones. Deposition of the heterozoan carbonates started during the transgressive Coniacian cycle, following a relative sea-level fall in the Late Turonian. Bioclastic sedimentation rates during the Coniacian vary between 74 and 88 m/Myr, a value similar to that recorded on Holocene shelves of Australian and New Zealand. Coniacian-Santonian heterozoan carbonates had a widespread palaeogeographic distribution in south-east France and Sardinia. The availability of hard substrates due to a high hydrodynamic level during the Coniacian transgression was a major cause for the development of the heterozoan association as a whole. Likewise, iron-rich terrigenous supply and upwelling patterns probably enhanced the nutrient level on the shelf and in turn favoured the development of suspension-feeders and mesotrophic organisms. Open-marine, relatively deep cool-water conditions were responsible for the deposition of the heterozoan association *versus* the photozoan rudist association during the Coniacian. This latter association progressively recovered and thrived when shallow marine warm-water conditions re-established during the Santonian. Comparisons are made with modern analogue environments in which heterozoan dominated cool-water carbonate sedimentation occur.