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ABSTRACT BOOK

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Dancing towards the end – Ecological oscillations in coral reefs prior to the Messinian Salinity Crisis (Rosignano Limestone, Acquabona, Livorno, Tuscany)

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During the Oligocene and the earliest Miocene, the Mediterranean was a large seaway connecting the Atlantic and Indo-Pacific oceans, housing a wide variety of coral species and many reefs. By the end of the Miocene it had become a restricted basin and when, during the Pliocene, it once again connected to the Atlantic, the environment was no longer suitable for the development of large shallow-water coral reefs.

The reefs of the lower Messinian Rosignano Limestone (Tuscany) represent the latest and northernmost large structures of their kind. Having developed at the edge of the coral ecological niche, they can provide invaluable information. A detailed microfacies analysis of the largest of these structures, outcropping at Acquabona, is performed. Four facies are recognized: a coral boundstone, a coralline algal rudstone, a serpulid packstone to floatstone, and a stromatolitic packstone. The succession displays a progression towards more stressful environmental conditions, culminating in the stromatolitic packstone that testifies to the establishment of a microbial carbonate factory. Environmental conditions barely suitable for the development of coral reefs were already present at the beginning of the succession, as demonstrated by the composition of the boundstone. The overall skeletal assemblage displays higher amounts of heterotrophs in comparison to other Upper Miocene reefs developed south of Acquabona. Most of the observed coral colonies feature encrustations by coralline algae and encrusting foraminifera (mainly nubeculariids but also acervulinids). The frequency of these encrustations is distinctly larger in comparison to other Upper Miocene coral-reefs developed in more favorable conditions. The progressive environmental deterioration is paired with the reduction in the richness of the skeletal assemblage and the concomitant increase of groups of carbonate-producers better suited than corals to deal with stressful conditions.

When the Acquabona reef is compared with other Miocene coral reefs, it becomes evident what signs point towards the impending collapse of these bioconstructions.