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Ecosystem engineers and biogeomorphology of the Mediterranean algal reef Coralligenous

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Coralligenous (C) is a type of Open Frame Reef, characterized by a variable association of calcareous red algae and macroinvertebrates. It is distributed across the Mediterranean shelf below the deepest seagrass meadows and down to the mesophotic zone, with different facies. The Italian project FISR "CRESCIBLUREEF" provided an extraordinary opportunity to explore the development of the Mediterranean C, from inception to present-day morphology and distribution off the SE coasts of Sicily. The spatial extension of C hybrid banks and discrete reliefs over the studied Sicilian shelf controls the hydrodynamics at the seafloor, the habitat biodiversity, and the related carbonate production at the shelf scale. The analyzed C samples, collected at about 36 m depth, had a columnar shape, were Holocene in age, and their development significantly modified the seafloor geomorphology. Our observations confirmed that most of the framework was built by calcareous red algae with an important contribution by bryozoans, with serpulids, molluscs, and rare corals as accompanying components of the sessile macroscopic fauna.

The framework was highly porous, with a primary porosity derived from the growth, shape and structure of the skeletal components of both builders and dwellers, and an important secondary porosity derived from bioerosion and other early taphonomic processes involving both skeletonised and soft-bodied organisms, like sponges. During the entire process of framework growth and development, sponges played an important role as mineralization mediators of the autochthonous micrite fraction, which contributes significantly to the framework consolidation. Detrital micrite, rich in fine skeletal remains, is trapped in the primary and secondary cavities and represents an archive for the study of the organisms which are not directly involved in the framework building.