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Estimating bioerosion rate on fossil corals: a quantitative approach from Oligocene reefs (NW Italy)

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Bioerosion of coral reefs, especially when related to the activity of macroborers, is considered to be one of the major processes influencing framework development in present-day reefs. Macroboring communities affecting both living and dead corals are widely distributed also in the fossil record and their role is supposed to be analogously important in determining flourishing vs demise of coral bioconstructions. Nevertheless, many aspects concerning environmental factors controlling the incidence of bioerosion, shifting in composition of macroboring communities and estimation of bioerosion rate in different contexts are still poorly documented and understood.
This study presents an attempt to quantify bioerosion rate on reef limestones characteristic of some Oligocene outcrops of the Tertiary Piedmont Basin (NW Italy) and deposited under terrigenous sedimentation within prodelta and delta fan systems. Branching coral rubble-dominated facies have been recognized as prevailing in this context. Depositional patterns, textures, and the generally low incidence of taphonomic features, such as fragmentation and abrasion, suggest relatively quiet waters where coral remains were deposited almost in situ. Thus taphonomic signatures occurring on corals can be reliably used to reconstruct environmental parameters affecting these particular branching coral assemblages during their life and to compare them with those typical of classical clear-water reefs.
Bioerosion is sparsely distributed within coral facies and consists of a limited suite of traces, mostly referred to clionid sponges and polychaete and sipunculid worms. The incidence of boring bivalves seems to be generally lower. Together with semi-quantitative analysis of bioerosion rate along vertical logs and horizontal levels, two quantitative methods have been assessed and compared. These consist in the elaboration of high resolution scanned thin sections through software for image analysis (Photoshop CS3) and point counting (J-Microvision). The first method provide the exact value of the bored area within single coral clasts and then the percentage relative to bioerosion rate; whereas the percentage obtained through point counting is a statistical estimation of bored vs. non-bored areas.
Preliminary results are presented and discussed, in order to underline the differences between the two methods and to find out which can be the most confident. Possible misinterpretations connected to the application of both methods will be highlighted as well. Quantification of bioerosion rate in fossil corals allows the comparison of values from different depositional settings and ages and thus is expected to become an additional tool for paleoenvironmental reconstructions.