Playing with different rules: nummulite banks in a greenhouse world

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The biosedimentary structures known as “nummulite banks” are still matter of debate about their autochthonous or allochthonous origin. Nevertheless, it is obvious that they are limited in time to the whole Eocene, being made up by the larger species of the genus *Nummulites*. This means they occurred during the last times of the Jurassic-Paleogene greenhouse interval, under chemical compositions of both the atmosphere and the oceanic waters fairly different from the modern ones.

To understand the nummulite banks we need first to define them according to the features we can observe both in the field and in laboratory on the collected samples. The definition must fit the original description by Arni (1965) and be as close as possible to the subsequent interpretations by following students. The definition here adopted consider as the main distinctive features the monospecificity and the relatively low A/B ratio.

The autochthonous view of the banks is here chosen as working hypothesis. However, the parallelism of the banks with modern coral reefs, first advocated in the original description by Arni, is considered not completely suitable to describe the bank paleoenvironment. Some recent data (Guido et al., 2010) suggest the presence of bacterial activity inducing a synsedimentary cementation of the nummulite tests, enhancing their mechanical resistance to the water energy. If confirmed, this lead to an unexpected similiarity with much older “mud mounds” rather than with modern coral reefs. It is still to be investigated the influence of water chemistry, especially the Mg/Ca ratio, and of atmospheric pCO_2 on the calcification rate of the larger species of *Nummulites*. In a general way, the calcitic tests of larger foraminifera were favoured by low Mg/Ca ratios whereas the aragonitic skeletons of scleractinians were not. The decline of larger foraminifera and the rise of modern coral reefs in carbonate settings seems to adapt very well to the temporal changes in the oceanic chemistry. The influence of the temperature changes in the same period could have been overestimated.

References:

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