



## **Anatomy of biocalcarenic units in the Plio-Pleistocene record of the Northern Apennines (Italy)**

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The Castell'Arquato Basin (CAB) in the foothills of the thrust-belt Northern Apennines is a foreland basin filled by Plio-Quaternary sediments and a reference area for Plio-Pleistocene biostratigraphy. The CAB exposes plurimetric biodetrital carbonate units at discrete temporal intervals. Such shell-rich units are at places lithified, turning into conspicuous biodetrital carbonate rocks (biocalcarenites) that display a cyclical stacking motif highlighted by the regular alternation with finer-grained marine deposits. The cyclical nature of thick biocalcarenites has been hypothesized to be orbitally-controlled by obliquity and/or precession cyclicity. Furthermore, biocalcarenite-mudstone couplets form distinct clusters governed by 100-400 ka eccentricity maxima starting from 3.1 Ma at the inception of the Northern Hemisphere glaciation. They correlate with sapropels cycles formed at times of maximum insolation (precession minima). The CAB calcarenites are poorly known with respect to their environmental genetic context what motivated a detailed paleoecological analysis to unravel at best their formative context. Five distinct biofacies arranged in stacking patterns are identified through two-way cluster analysis based on the macrofossil content. Our quantitative and qualitative results suggest that these polytaxic shell concentrations and their bracketing marine mudstones developed in middle shelf settings being sensitive to climatically-driven changes.