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The Early Aptian planktonic foraminiferal fauna: a taxonomic and quantitative study across the Selli Level (OAE1a)

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The mid-Cretaceous period was a critical time on a global scale characterized by an excess of atmospheric CO_2, a greenhouse climate and O_2 depletion in the ocean. As a consequence, there was a cyclic deposition and preservation of organic carbon-rich sediments (black shales), the so-called Oceanic Anoxic Events (OAEs). The Selli Level (Early Aptian) is a regional marker-bed identified in the Umbria-Marche area (central Italy) at the transition between the Maiolica and Marne a Fucoidi pelagic formations. It consists of laminated black shales rich in organic matter, alternated with radiolarian silts and with a poor carbonate content. The Selli Level is regarded as the sedimentary expression of the OAE1a (Oceanic Anoxic Event 1a) and is marked by a $\delta^{13}C$ anomaly, consisting of a pronounced negative shift followed by a long positive excursion.
A detailed and quantitative documentation in terms of species identification and distribution, variation of shell size, diversity and abundance of the planktonic foraminifera across the Selli Level equivalent is presented from the 24 m-thick stratigraphic section of the Cismon core (southern Alps, Italy).
In general, the planktonic foraminiferal assemblage throughout the stratigraphic interval is rather diverse and mainly composed by pseudo-planispiral taxa with elongate chambers and ampullae (gen. *Leupoldina*), planispiral taxa with globular and elongate chambers (gen. *Globigerinelloides s.l.*) and trochospiral taxa with globular (gen. *Hedbergella* and gen. *Gorbachikella*) and elongate chambers (gen. *Lilliputianella*).
Foraminiferal taxonomic, quantitative and morphometric analyses were conducted on washed residues and thin sections of about 250 rock samples spaced 5 - 20 cm apart. Species richness and shell size measurements on selected species were performed on washed residues, and absolute abundances were obtained from thin sections. Three intervals were identified (below, within and above the Selli Level) each of them characterized by minor to major changes in species richness, distribution and specimens abundance. Results reveal that planktonic foraminifera are common and diversified below the Selli Level being the assemblage composed by hedbergellids, few leupoldinids and globigerinelloidids. A similar composition in terms of species richness is recorded within the Selli Level, whereas abundance shows a marked decline, and planktonic foraminifera are absent in some intervals. The planktonic foraminiferal assemblage above the Selli is characterized by the occurrence of common hedbergellids, clavate hedbergellids, leupoldinids and both globular and elongate globigerinelloidids, and by a remarkable increase in species diversity and shell size of the planispiral taxa.
Finally, the results of the detailed taxonomic and quantitative analyses contribute to the understanding of the evolution of early Cretaceous planktonic foraminifera and are useful for improving the biostratigraphic correlations.