Geophysical Research Abstracts, Vol. 9, 03988, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-03988

Nannofossil evolution and fluxes as tracers of Cretaceous paleoCO2

E. Erba
Dept. of Earth Sciences, Univ. of Milan, Milan, Italy (elisabetta.erba@unimi.it)

Calcareous nannoplankton are among the most effective producers of calcite on Earth and, therefore, are intimately linked to the oceanic carbonate system and the global carbon cycle. The importance of nannofossils as rock-forming players dates back to the (Late) Jurassic and coccolith-nannolith micrites progressively reached maximum distribution and abundance in the Cretaceous.

Being characterized by (a) an extraordinary long, complete and detailed record, (b) great abundance and widespread distribution, and (c) sensitivity to short and long-term environmental changes, calcareous nannoplankton are best suited for paleobiological studies and modeling of biosphere-geosphere interactions. The evolution of Cretaceous calcareous nannoplankton is of particular interest being typified by a relatively long and complex history punctuated by accelerated radiation/extinction rates, turnovers, relatively long intervals of stability and major changes in abundance. Quantitative analyses of nannofossil assemblages have been performed on selected, well-dated sections in order to delineate the relationships between evolutionary processes and environmental pressure and/or interactions between organisms.

Times of enhanced/reduced nannoplankton calcification, diversification and production are correlatable with significant perturbations in the ocean-climate system at a global scale. However, some fundamental steps in nannoplankton evolution appear to commence under stable environmental conditions.

Abundance, diversity and fluxes of nannofossils during the Cretaceous were somehow affected by climate changes, sea-level fluctuations, sea-water composition, and oceanic fertilization, but most important was the amount of CO_2 in the ocean/atmosphere, presumably exerting a direct control on nannoplankton calcification. During the Cretaceous large variations in nannofossil fluxes seem correlatable with large magmatic events and supposed major increases in atmospheric CO_2. Hence, the nannofossil record is exploited to trace biocalcitization relative to fluctuating pCO_2 as well as evolving chemical and physical structure of the Cretaceous oceans.