Geophysical Research Abstracts
Vol. 13, EGU2011-6088, 2011
EGU General Assembly 2011


# Orbital control on carbon cycle and oceanography in the mid-Cretaceous greenhouse time

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We established a new high-resolution carbonate carbon isotope record of the Albian interval of the Marne a Fucoidi Formation (Central Apennines, Italy), which were deposited on the southern margin of the western Tethys Ocean. This isotopes record is one of the most detailed and continuous available for the Albian stage and shows a prominent 400kyr cyclicity, which can be linked to Milankovitch's long eccentricity.
The mid-Cretaceous, and especially the Albian, ocean-climate system is known to be highly sensitive to orbital variations. Milankovitch's orbital cycles are expressed both in the lithology and in other proxies in several sedimentary archives (e.g. Dean et al, 1977; Herbert & Fischer, 1986; Grippo et al, 2004; Prokoph & Thurow, 2001; Kössler et al, 2001). However, they mainly reflect precession and short eccentricity, which seem to be more important on the local/regional scale, but too rapid for being clearly recorded in the global oceanic carbon reservoir. In pelagic sediments carbonate carbon isotope data are a useful proxy for detecting paleoceanographic signals at global scale, our results suggest that orbital changes had an impact on the global oceanic carbon reservoir at timescales of 400kyr under the mid-Cretaceous greenhouse conditions.
Long eccentricity cycles have been observed in carbon isotope records of the Cenozoic and the Quaternary (e.g. Pälike et al, 2006; Wang et al, 2010) and can be compared with our new results of the mid-Cretaceous. This comparison allows us to test the response of the carbon cycle to orbital forcing under very different climatic conditions, from the mid-Cretaceous greenhouse to the Quaternary icehouse.

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