Geophysical Research Abstracts
Vol. 12, EGU2010-5099, 2010
EGU General Assembly 2010

Major paleoceanographic changes recorded in Upper Albian-Lower Cenomanian sediments in the Western Tethys and in the North Atlantic: possible response to intense tectonic activity

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During the mid-Cretaceous intense and widespread volcanism induced a high atmospheric CO2 concentration and, consequently, a very strong greenhouse effect (Bice & Norris, 2002). Opening and closing of oceanic gateways had an impact on paleoceanography (Poulsen et al, 1998; Poulsen et al, 2001). Global temperature and sea level reached the highest levels in the last 120 million years. (e.g. Pucéat et al, 2003; Hay, 2008).
In this study we test if tectonically driven changes in oceanic circulation had an impact on Tethyan oceanography as predicted by models (Poulsen et al, 1998; Poulsen et al., 2001). We trace sedimentological changes during the Albian-Cenomanian across the Western Tethys and into the North Atlantic, integrating litho-, bio-, and isotope stratigraphy to obtain a robust correlation between studied sections, from pelagic to coastal settings.
Albian sediments display very different facies from one site to the other. Pelagic marls with several black shales alternated to green, white, or red beds (Marne a Fucoidi/Scaglia Variegata Formation) are observed in the southern Tethys. Silty/sandy nodular limestone and marly limestones, with hiatuses and condensed intervals, (Garschella Formation) were deposited along the northern Tethyan shelf. Black shales and bioturbated marls are present in cycles, with several hiatuses, in the North Atlantic.
These heterogeneous sediments became gradually replaced by more homogeneous and carbonate-rich facies between the Late Albian and the Early Cenomanian. These new facies consist of white, sometimes reddish, micritic limestones, rich in planktonic foraminifera. This sedimentation pattern is dominant in Upper Cretaceous successions, both in deep basins and on shelves.
This change in sedimentation happened gradually in an East-West extending trend. It is first observed in the southern Tethys, then along the northern Tethys, and finally in the North Atlantic.
We interpret the described change in sedimentation as due to a gradual turn of the oceanic circulation happening on the million of year time frame, which is probably related to one or more of the opening and closing of oceanic gateways during the mid-Cretaceous.

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