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Is these a link between eustatic variations, platform drowning, oceanic anoxic events, and ammonite faunal turnovers ? Case study of the Aptian sediments along the northern Tethyan margin

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The early Aptian witnessed an important episode of paleoenvironmental change, which has been linked to major marine volcanic activity related to the formation of the Ontong-Java large igneous province (e.g., Larson and Erba, 1999). This phase culminated in the formation of hemipelagic and pelagic organic-rich sediments, whereas profound changes are also observed in shallow-water settings, with the step-by-step disappearance of the northern Tethyan platform. Results show that the northern Tethyan platform has passed through three major crises in its evolution during the early Aptian. A first one started with an emersion phase, marked by a subaerial karstified discontinuity reported from the middle early Aptian (Deshayesites forbesi or early D. deshayesi zone). This is directly followed by the drowning of the Urgonian platform along the northern Tethyan margin, preceding the Selli Episode. The period following this drowning phase coincides with the negative and the following positive excursions in the δ^{13}C records and went along with the deposition of the so-called Lower Grünten Member, which is the result of heterozoan carbonate production and characterized by increased detrital input. Ammonite fauna witnessed an important diversification of hemipelagic forms, especially inside the heteromorph Ancyloceratacea. This radiation is probably linked to the expansion of hemipelagic facies, one of the main habitats of ammonites. A second phase, reported from the late early Aptian (late D. deshayesi zone), started with a small drowning event, marked by a firmground and by a phosphatic enrichment. This stratigraphical layer also corresponds to the establishment of the anoxic Apparein level. Above, the Upper Grünten Member continues with heterozoan carbonate production or with glauconitic condensed sediments. The corresponding δ^{13}C record is a the onset of a long-term decrease. The ammonite fauna is marked by a first turnover with the disappearance of Deshayesites, and the appearance of Dufrenoyia, Eotetragonites, Aconoceras, Colombiceras, and other genera (Daupin, 2002; Dutour, 2005). A third drowning phase, reported from the latest early Aptian (late D. furcata zone), occurred with the establishment of a second emersion phase, characterised by a significant karstified discontinuity. Just above, organic-rich sediments were deposited. This third phase is marked by the complete disappearance of platforms in favour of marl deposits, and coincides with the emergence of the anoxic “Niveau Noir level” which is considered as a document of an important phase of widespread dys- to anaerobic conditions within the Selli Episode (Föllmi, 2012). The ammonite fauna is marked by a second turnover with the replacement of Dufrenoyia, Cheloniceras, and Pseudohaploceras, by Epicheloniceras, Zucherella, Gabbioceras, and other genera (Daupin, 2002; Dutour, 2005). In conclusion, the combined effect of sea-level change and subsequent oceanic anoxia as the consequence of climatic change is a key element in the platform crises and associated important faunal turnover.

References

DAUPHIN L. (2002) Litho-, bio-, et chronostratigraphie comparées dans le bassin vocontien à l’Aptien. Phd Univ. des sciences et technologies – Lille I. DUTOUR, Y. (2005).- Biostratigraphie, évolution et renouvellements des ammonites de l’Aptien supérieur (Gargasien) du bassin vocontien (Sud-Est de la France).- Thèse Université Claude Bernard-Lyon 1, 302 p. (inedit) FÖLLMI, K.B. (2012).- Early Cretaceous life, climate and anoxia.- Cretaceous Research (2012), doi:10.1016/ j.cretres.2011.12.005 LARSON, R.L., ERBA, E., 1999. Onset of the mid-Cretaceous greenhouse in the BarremianeAptian: igneous events and the biological, sedimentary, and geochemical responses. Paleoceanography 14, 663-678.