



Ecological and environmental changes in Cretaceous carbonate platforms near OAEs related to probable acidification of the ocean: examples from the OAE1a and OAE2 events

Annie Arnaud-Vanneau (1), Lucie Bonvallet (1,2), and Thierry Adatte (2)

(1) Association Dolomieu, Geology, Grenoble, France (annie.arnaud@orange.fr), (2) University of Lausanne, Lausanne, 1015, Switzerland

Major environmental crises deeply affected the carbonate platforms during the Cretaceous, leading to their drowning and a general renewal of ecosystems, amongst, including that of carbonate organisms. These changes will heavily modify the nature of sediment deposits.

These events are often accompanied initially by 1) a drop in sea level and a transgression and are linked with 2) high volcanic activity, 3) increased runoff,

4) erosion and 5) nutrients leading to 6) climatic changes and 7) increased anoxic conditions and finally 8) a general drowning of carbonate platform and 9) flora and fauna changes.

The crises show the same environmental three steps evolution: (1) the disappearance of some bivalves such as some rudists characterized by a mixed aragonite-calcite shell (Skelton and Gilli, 2012) and some dasycladales, (2) the installation of an ecosystem dominated by echinoderms with crinoids and bryozoans characterized calcite and low Mg-calcite walls and (3) the disappearance of aragonite and high Mg calcite producing coral skeleton and some benthic foraminifera.

To sum up, these crises led to a change from primarily photozoan to predominantly heterozoan carbonate production mode mirroring a change from oligotrophic to mesotrophic conditions. The first mode corresponds to carbonate tropical platform dominated by corals and rudists, while the second is supplying marls and limestones dominated by crinoids and bryozoans.

The global sea level fall observed before the OA1 and OA2 will reduce the space available for the biota, which will be therefore more sensitive to trophic changes. But nutrient input cannot explain the complete demise of the platform; a drop in pH linked to CO₂ increase linked to temperature change is required too.