Geophysical Research Abstracts
Vol. 15, EGU2013-5289, 2013
EGU General Assembly 2013

Rudist bivalve shells as palaeoenvironmental archive: assessing ecological boundary conditions of Barremian subtropical carbonate platform ecosystems

Stefan Huck and Ulrich Heimhofer
Leibniz University Hannover, Institute for Geology, Hannover, Germany (huck@geowi.uni-hannover.de)

Mid-Cretaceous shoal-water ecosystems have been proven to show characteristic response modes (microencruster blooms, carbonate platform drowning) to major climatic and environmental changes that finally culminated in so-called oceanic anoxic events (OAEs). During most OAEs, the widespread burial of unusual amounts of organic matter in pelagic basins caused a strong carbon-cycle perturbation, expressed as prominent positive carbon-isotope excursion. Stratigraphically, the Aptian OAE1a is marked by a well-defined carbon-isotope pattern (negative spike and subsequent positive anomaly). Judging from high-resolution chemostratigraphic (C, Sr) studies, the observed neritic response modes are diachronous in nature and certain biotic changes (orbitolinid-rich sediments, *Lithocodium* blooms, carbonate platform drowning) clearly predate the deposition of OAE1a black-shales. The perturbations observed in the neritic realm underline the previously quoted progressive nature of Late Barremian-Early Aptian environmental change. Considering the observed time lag between the earliest biotic perturbations and widespread oceanic anoxia, a volcanic scenario related to the release of large volumes of CO_2 during the formation of the Ontong Java large igneous province seems at least likely.

The aim of the current project is to reconstruct the evolution of carbonate platform ecosystems in the northern subtropical realm during the early onset of enhanced (submarine) volcanic activity. A Late Barremian carbonate platform succession (Sausset-les-Pins section), deposited on a proximal part of the Provence platform (Marseille area, SE France), has been investigated applying high-resolution chemostratigraphy and detailed sedimentological analysis. The 60-m thick section is composed of peloidal to bioclastic packstones and grainstones rich in rudist bivalves (Urgonian limestones *sensu stricto*) and subordinate mudstones and wackestones.

In order to obtain information on the palaeoecological and palaeoenvironmental boundary conditions of this subtropical carbonate platform, we combine (i) an in-depth microfacies analysis based on 60 thin sections with (ii) a detailed geochemical analysis of rudist bivalve shells (*Toucasia*, *Monopleura* and *Requienia*). The outer (fibrous prismatic) low-Mg calcite shell layer of these rudists is relatively resistant against diagenetic alteration and therefore might serve both as chemostratigraphic (C + Sr) and palaeoenvironmental archive. Intra-shell (sclerochronological) variations in isotopic ($\delta^{18}O$, $\delta^{13}C$, clumped isotopes) and geochemical composition (Sr, Fe, Mn, Ba, Ca/Mg) will provide insights into seasonal (intra-annual) and long-term (Myr) palaeoclimatic and palaeoenvironmental changes. The outcome of this work will be of significance both for those studying the triggering factors of oceanic anoxic events and the palaeoecology of rudist bivalves.