

Barremian-Aptian rudist shells record dramatic shallow-water sea-surface temperature changes in the Tethyan Ocean

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The dramatic and stepwise emplacement of large igneous provinces is generally accepted as primary driver of Cretaceous Oceanic Anoxic Events (OAEs). Although excess output of volcanically induced greenhouse gases should have promoted “super greenhouse phases”, several studies provide evidence for transient Cretaceous “cold snaps”, particularly during the Barremian-Aptian stage. To date, reconstructions of Cretaceous sea surface temperatures (SSTs) are predominantly based either on $\delta^{18}\text{O}$ analyses of pristine foraminiferal calcite or on crenarchaeotal membrane lipid distributions (TEX86) in pelagic deposits. Both types of proxies provide at best estimates of mean annual SSTs of open ocean settings.

In order to better understand the dynamics of Cretaceous global warmth and the impact of fluctuating SSTs on carbonate platform ecosystems, the current study aims at reconstructing the stratigraphic and spatial evolution of subtropical shallow-marine sea-surface temperatures. Well-preserved low-Mg calcite rudist shells hold a strong potential to act as archives for the reconstruction of Cretaceous palaeoclimatic and palaeoenvironmental conditions, as ontogenetic isotopic and trace element variability of these shells also resolve sub-annual (seasonal) temperature fluctuations (Steuber et al., 2005). In the context of the current study, high-resolution sclerochemistry ($\delta^{18}\text{O}$, Mg contents) has been performed on rudists derived from chemostratigraphically ($^{87}\text{Sr}/^{86}\text{Sr}$, $\delta^{13}\text{C}$) well-constrained Barremian-Aptian carbonate platform settings in the subtropical Tethyan realm (France, Croatia, Spain, Portugal). 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.

Steuber, T., Rauch, M., Masse, J.-P., Graaf, J., Malkoc, M. (2005) Low-latitude seasonality of Cretaceous temperatures in warm and cold episodes. *Nature* 437: 1341–1344.