
170-4 - THE RESILIENCE OF A NORTHERN TETHYAN CARBONATE PLATFORM DURING THE OAE1A: GEOCHEMICAL INSIGHTS FROM THE CORBIÈRES REGION OF FRANCE



Tuesday, 11 October 2022



9:00 AM - 1:00 PM



Exhibit Hall F (Colorado Convention Center)

Booth No. 125

Abstract

Increased volcanism during the Cretaceous caused a rise in $p\text{CO}_2$ which led to higher global temperatures. Warmer temperatures led to slower ocean circulation and expansion of the oxygen minimum zone, leading to ocean anoxia known as Oceanic Anoxic Events (OAEs). OAEs consist of the development of low oxygen areas that are toxic for marine ecosystems. The OAE1a is dated to the Early Aptian, the Corbières region of Southern France was located on the north margin of the Tethys Ocean at that time. There, a shallow-marine carbonate-producing ecosystem was dominated by Urgonian limestone containing rudists, followed by marls containing orbitolinid, and topped by Urgonian limestones containing rudists and coral. Objectives for research include defining best practice for use of geochemical proxies in shallow-marine carbonate series that are prone to diagenesis and reconstructing Aptian paleoenvironmental conditions. This research informs on resilience of carbonate production during periods of super greenhouse conditions by linking enhanced nutrient and detrital supply to the demise of rudist-bearing facies and their replacement by a more adapted carbonate-producing ecosystem.

We use mineralogical and geochemical data along with petrographic analysis of samples from France assess impacts of detrital input, redox conditions, paleoproductivity and nutrient supply on efficiency of the carbonate factory of this platform in the Corbières. Geochemical data provide proxies for paleoproductivity (Si_{xs} , Sr/Al , P/Al , $\text{P}_2\text{O}_{5\text{xs}}$), detrital input (%terrigenous, Ti/Al , Zr/Al , $\text{Zr}/\text{Zr}_{\text{sh}}$), and redox conditions (Mn^* , Mn/Al , Mn_{xs}).

Results show $\text{P}_2\text{O}_{5\text{xs}}$ and %terrigenous curves vary with lithology through the section, and within the limestone sections both proxies vary little and remain low. But, in the marls both $\text{P}_2\text{O}_{5\text{xs}}$ and %terrigenous increase, specifically %terrigenous values range from 10 - 85%. Increased nutrient and terrigenous inputs were detrimental to rudist-dominated ecosystems that were replaced by biotic association with suspension feeders. Our results provide information about the resilience of the carbonate platforms to changes during the Early Aptian OAE1a and increase knowledge about how chemical elements act during diagenesis, thus enhancing our ability to identify the most reliable geochemical proxies.

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