

24-14 - THE IMPACT OF APTIAN SUPER GREENHOUSE CONDITIONS ON THE URGONIAN SUBTROPICAL CARBONATE PLATFORM



Sunday, October 10, 2021



9:00 AM - 1:00 PM



Exhibit Hall A (Oregon Convention Center)

Booth No. 35

Abstract

During the Early Cretaceous, enhanced greenhouse conditions favored the development of carbonate platforms in large epicontinental, intertropical seas. The Early Aptian Oceanic Anoxic Event (OAE) 1a relates to a major perturbation of the global carbon cycle triggered by submarine volcanism and impacted the development of marine ecosystems. The unfolding of the OAE1a favored the preservation of organic-rich shales in oceanic anoxic basins; in shallower settings, carbonate platforms either adapted to changing environmental conditions, or drowned. We hypothesize that carbonate-producing ecosystems located at higher latitude (30°N) first adapted then drowned. Located in south of France, the Vercors region includes a shallow marine carbonate succession that potentially includes a record of the OAE1a.

First, the petrographic analysis of thin sections from four sections informs on the dating and ecology of the platform: at the top of the upper Urgonian Formation characterized by a photozoan assemblage with rudist, corals and green algae, incised valleys represent a major drop in sea level before the upper Orbitolina Beds Formation, rich in crinoids, bryozoan and large benthic foraminifera (orbitolinids) reflects a switch toward a heterozoan assemblage. The series ends with the deposition of the crinoid- and quartz-rich Lumachelle Formation, without the return of a healthy carbonate ecosystem on the Urgonian platform.

Second, the carbon stable isotope and elemental compositions (x-ray fluorescence spectrometry) of rock samples inform on the presence of an OAE1a equivalent and on coeval paleoenvironmental conditions. A negative spike followed by a positive excursion in $\delta^{13}\text{C}$ values from the top of the upper Urgonian Formation upward confirms the presence of the OAE1a. A coeval increase in phosphorus and titanium contents that trace nutrient supply and continental detrital inputs, respectively, is associated with higher values of the chemical index of alteration; these trends accelerate into the Lumachelle Formation. This suggests that enhanced continental weathering augmented the detrital and nutrient supply in shallow seas that stimulated primary productivity and favored the switch to an ecosystem dominated by suspension feeders, before the platform drowned.

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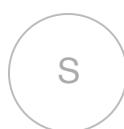
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