

**Ecological impact of the OAE1a (Early Aptian) on Urgonian ecosystems from
Vercors, southern France**

Alexis Godet^{1*}, Jacob Byerly^{1,2}, Matthew Bourdon^{1,3}, Marina Suarez⁴, Annie Arnaud-Vanneau⁵, and Thierry Adatte⁶

¹Department of Earth and Planetary Sciences, The University of Texas at San Antonio, San Antonio, Texas, USA; ²EOG Resources, Corpus Christi, Texas, USA; ³Baker Hughes, Sugarland, Texas, USA; ⁴The University of Kansas, Lawrence, Kansas, USA; ⁵Association Dolomieu, Grenoble, France; ⁶Institute of Earth Sciences, University of Lausanne, UNIL-Mouline, Géopolis building, 1015 Lausanne, Switzerland

*corresponding author: alexis.godet@utsa.edu

Climate and environmental instability during the Early Aptian culminate with the unfolding of the Oceanic Anoxic Event (OAE) 1a, which consists of the deposition of black shales in deep marine settings and a typical negative spike in $\delta^{13}\text{C}$ values followed by a positive excursion. In the Vercors, southern France, the Urgonian platform developed coeval to the OAE1a, but the impact of this paleoenvironmental crisis on the ecology of benthic ecosystem is yet to be quantified.

First, field and petrographic data allow to identify sequence boundaries and maximum flooding surfaces; these are biostratigraphically dated and correlated within the study area. Second, a composite $\delta^{13}\text{C}$ curve permits to identify the C3 to C7 isotope segments from the literature, thus pinpointing the onset of the OAE1a above the Urgonian Limestone, in the Upper Orbitolina Beds. Third, thin section point counting data permit to quantify the proportion of allochems, thus illuminating the ecology of ecosystems. Principal component analysis helps

define three ecological tiers: diversified, photozoan associations with rudists, green algae, and benthic foraminifera dominate ecosystems prior to the OAE1a and up to the C7 segment, while a less diversified heterozoan association with bryozoan and crinoid developed in the aftermaths of the OAE1a. Fourth, elemental geochemical data identify an increased nutrient and detrital input (C7 segment) as the major triggering mechanisms for ecological adjustments and changes in the biodiversity of ecosystems. Our research indicate that these changes are initiated in the aftermaths of the OAE1a but culminate after it.

Word count: 244.