Controls on Organic Matter Production and Accumulation During Oceanic Anoxic Event 2 In La Luna Formation, Northwestern South America

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ABSTRACT

The evolution of Earth's oceans during the Phanerozoic was punctuated by episodes of global ocean anoxia. The archetypical example of these events and focus of this study is known as the Cenomanian–Turonian oceanic anoxic event 2 (OAE2). During OAE2, black shales with high contents of total organic carbon were deposited in a wide range of marine environments causing a brief disruption of the global carbon cycle. Consistent with this disruption, is the global occurrence of a $\delta^{13}C$ positive isotopic anomaly in carbonate and organic substrates. Two contrasting hypotheses have been proposed to explain the initiation and expansion of ocean anoxia, protracted marine productivity, and organic matter production and accumulation during OAE2. On the one hand the oxygen minimum zone hypothesis states that enhanced organic matter production and accumulation resulted from strong upwelling of nutrients, high primary organic productivity, and intermittent benthic anoxic conditions. On the other hand the stagnant ocean hypothesis suggests that organic matter preservation and accumulation resulted from an increase in nutrient delivery and freshwater discharge to the basin causing salinity stratification and sustained anoxia of the bottom waters. The purpose of this project is to identify what of the aforementioned mechanisms controlled organic matter production and accumulation during OAE2 in the La Luna Formation using a combination of U-Mo concentrations as a proxy for benthic redox conditions, and marine palynology and palynofacies to identify periods of enhanced nutrient delivery and fresh water input. Results from this research will help to better understand the controls on organic matter production and preservation during periods of extended anoxia and formation of source rocks.

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