Impact of oceanic anoxic events on the Nd-Hf isotopic composition of detrital sediments

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Oceanic Anoxic Events (OAEs) correspond to periods of massive biological extinctions and are often associated with the deposition of organic-rich sediments known as black shales. The process triggering the event is not known but a significant increase of nutrients in the ocean is often suggested. While sudden increase of volcanic eruptions could be a source, enhanced weathering on continental platforms is also possible and no consensus has been reached yet. Finally, the impact of these major events on the nature and composition of detrital sediments is unclear.

This study presents Nd-Hf isotopic results of sediments deposited before, during and after the OAE2 (Cenomanian-Turonian, 93.5Ma) in two different Atlantic marine sections, one located at Taghazoute in Morocco and the other next to Cape Verde Island (DSDP Site 367). A clear change is seen in the neritic Morocco site and can be attributed to the major sea level rise occuring after the OAE2, an event that changed the nature of the eroded material. No similar effect is detected in the abyssal domain of Site 367 at the same time. Before and during the OAE2, no significant change in Nd and Hf isotopic compositions is detected in sediments deposited at both locations: at Site 367, ε_{Nd} and ε_{Hf} remain around –10.5 and -8 and in Taghazoute, they remain at -6.5 and -5 respectively. This demonstrates that large amounts of volcanic products did not affect the composition of the sedimentary pile. It also demonstrates that no obvious change in continental weathering occurred when approaching the OAE2 event. In contrast, the significant change of sea level associated to the event impacted the chemical composition of the sediments located close to the continent while the signal was blurred few hundred kilometers away in the deeper ocean.