Why was there no mass extinction during the Cenomanian-Turonian Oceanic Anoxic Event 2?

PAEZ-REYES M[1], OWENS J[2], CARVAJAL-ORTIZ H[3], GAONA-NARVAEZ T[4], LERMA I[1], BRANDON A[1], SAHOO S[5], COPELAND P[1]

[1] Dep. Earth & Atmos. Sci., Univ. Houston, Houston, TX
[2] Dep. Earth Ocean & Atmos Sci., U. Florida, Tallahasse, FL
[3] CoreLab-Advanced Technology Center , Houston, TX
[4] Dep. Earth & Envi., Florida International U., Miami, FL
[5] Equinor, Houston TX

Many significant ecological disruptions and attendant mass extinctions in Earth history have been associated with widespread anoxia. Recent geochemical data and modeling suggest an expansion of anoxia and euxinia (sulfidic water column) during the Cenomanian-Turonian Oceanic Anoxic Event 2 (OAE2, ~94 Ma). However, the rate of extiction of genera during this event has been estimated to ~8X less than at the end of the Permian, even though approximately the same area of seafloor was overlain by anoxic waters during both events. It has been suggested that under sustained euxinic conditions and high temperatures, extinction of marine organisms is more likely to happen. Mass balance modeling of U and Tl isotopes provide evidence for anoxic seafloor conditions ~15 times higher for OAE2 relative to the modern ocean. These two proxies highlight non-sulfidic anoxia and combining with additional proxies can help to delineating non-sulfidic anoxia and euxinia. Quantifying redox-sensitive trace-element (RSTE) concentrations in combination with geochemical modeling will quantify the various types of reducing seafloor area. Specifically, using Fe speciation to describe the local redox conditions enveloping the event which allows for interpretations of various elemental drawdown which is likely responding to the progressive global expansion of reducing to euxinic conditions. Sections of the La Luna Formation in Colombia deposited during OAE2 were compared to a database of RSTEs in other sections. Our results show that the RSTEs are enriched before and after OAE2 and are depleted during the event. This pattern is consistent with other sections around the world suggesting that a drawdown of the RSTE reservoir took place during OAE2 in response to widespread euxinia at the benthic boundary layer. The more-modest extinction rates during OAE2 may have been because the upper part of the water column was better oxygenated and that planktonic organisms could take advantage of this whereas benthic organisms in the Permian could not or due to low diversity prior to 94 Ma because of previous anoxic events.