Paper Number: 1690

Ecologic Restructuring After the Permo-Triassic Extinction: A geochemical and paleoecological case study of the Middle Triassic of low-latitude eastern Panthalassa

Fraiser, M., Marenco, P., Crispell, E., Johnson, C., Marenco, K.

UWM-Geosciences Milwaukee Wisconsin, USA

Bryn Mawr College Geology Bryn Mawr PA, USA

Globally, the biotic recovery from the end Permian mass extinction is hypothesized to have been well underway by the Middle Triassic. However, the Middle Triassic of the western United States does not exhibit this recovery equally in all facies. Strata exposed in the western USA suggest that shallow marine environments were well-oxygenated during most of the Early Triassic, possibly allowing for more rapid ecosystem recovery in proximal environments. In contrast, global geochemical proxies and sedimentary evidence from distal localities suggest that the deep ocean remained anoxic for the entirety of the Early Triassic and possibly into the Middle Triassic.

In order to better understand the environmental conditions that may have differently affected recovery in different facies, we performed carbon isotopic chemostratigraphy of the Anisian Prida Formation at Fossil Hill and the Favret Formation at Favret Canyon in northwestern Nevada. In addition, we collected trace and major elemental data via ICP-MS in order to assess the diagenetic history of the samples. As a whole, the samples collected from Favret Canyon exhibit lower Mn/Sr values than those from Fossil Hill. Samples from Fossil Hill exhibit high Mg/Ca values suggesting extensive dolomitization at that locality. Carbonate associated sulfate (CAS) abundance data were low overall, but averaged an order of magnitude lower in the distal versus proximal localities. Total sulfur (TS) abundances were uniformly low in all environments. Low [CAS] is consistent with a prolonged period of deep ocean anoxia, and the low TS abundances could have resulted from low availability of sulfate in the basin even with seawater anoxia. Initial paleoecological observations from the same environmental transect also suggest a dichotomous response between the proximal and distal sections. Dark mudstone and siltstone deposited at the basin margin contain very low amounts of bioturbation and dense accumulations of benthic, low-oxygen-adapted invertebrates. Packstone and wackestone from shallower-water environments contain higher diversity faunas containing corals, crinoids, gastropods and bivalves suggestive of biotic recovery.

Our findings hint that late Early Triassic to Middle Triassic faunas in nearshore versus deeper environments differed significantly. These initial results suggest that the relationship between localized and global redox changes and biotic recovery is more complex and nuanced than previously appreciated.