

Microfacies Analyses and Carbon Isotope Studies on Lower Triassic Microbialites from Armenia

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After the end-Permian mass extinction the upper Paleozoic skeletal carbonate factory was abruptly replaced by a non-skeletal carbonate factory and Permian-Triassic boundary microbialites (PTBMs) were flourishing. These PTBMs were abundant in low-latitude shallow-marine carbonate shelves in central Tethyan continents and were present during at least four events in the Lower Triassic.

The investigated PTBMs from three different sites in southern Armenia were formed in a distal open marine setting on a pelagic carbonate ramp. They grew during two microbial growth phases in Griesbachian times, whereas the microbialites from the first microbial growth phase co-occur with calcium carbonate crystal fans (CCFs). The microbes formed predominantly thrombolites that vary in size between 5 cm to 1.5 m. The biggest thrombolite has a cone-shaped build-up geometry and an asymmetrical growth, which indicates the influence of a steady bottom current. It consists of numerous thrombolite domes with a top head diameter of up to 8 m width and a total height of up to 12 m. The microbialites are surrounded by a bioclastic wackestone that mainly contains ostracods, foraminifers, microgastropods, thin-shelled bivalves and sponges.

Carbon isotope studies were performed on both the microbialites and the surrounding sediment. A comparison between the $\delta^{13}\text{C}$ values of the microbialites and the surrounding sediment revealed that there is little difference ($<0.4\text{‰}$) between these values in the microbialites that formed during the second microbial growth phase. In contrast, the microbialites and CCFs from the first microbial growth phase show differences in the $\delta^{13}\text{C}$ values of up to 2.3‰ , which could be due to microbial activity.