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Pronounced carbonate deposition in the Early Triassic Induan stage: who were the carbonate producers?

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At the Late Permian Mass Extinction most marine carbonate producers were heavily affected/decimated or even terminated. After the event in several sections of deeper water environment a “boundary clay” was deposited and in the basal Griesbachian microbialites have been reported from many marine sections. Additionally, in shallow water sections oolites are present in the basal Griesbachian. The Dienerian in many Tethyan sections, though, is characterized by a huge increase in sedimentation rate due to deposition of limestone mud, often with only minor amounts of siliciclastic input. This contrasts the still missing “usual” (skeletal) carbonate producers that have not yet re-appeared after the extinction, and also in contrast to a constantly rising marine Sr-isotope curve. This pattern indicates short timed intense post-extinction acidification in deeper water areas causing a strong decrease of carbonate precipitation resulting in the sedimentation of the boundary clay. Post-extinction low sedimentation rate supported the extensive growth of microbialites, thrombolites and stromatolites on seafloors in the photic zone, resulting in the photosynthetic uptake of bicarbonate ions which induced carbonate biomineralisation within the microbial mats probably during still prevailing acidic ocean condition. In shallow water sections the formation/deposition of ooids (“Tesero Oolite”) occurred, due to non-acidic conditions and increasing water circulation. In the Dienerian the (photic zone) ocean pH again returned to non-acidic conditions due to probably mainly microbial activity, resulting in a thriving and carbonate precipitating planktic microbial community producing huge amounts of microcrystalline carbonate mud. As some sections already in the Griesbachian feature substantial accumulations of carbonate mud, there acidification might have lasted only for a shorter period. Burial of the mainly microbial biomass probably also resulted in the positive ¹³C isotope curve trend from the Griesbachian to the Dienerian-Smithian boundary, identifying the (marine) microbial community as THE biotic factor influencing/shaping the Early Triassic environment.

This is a contribution to IGCP572.