



Recovery from mass extinction: Liassic carbonate buildups of the central High Atlas Rift Basin, Morocco

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Long-ranging effects of mass extinction are present in marine carbonate buildups of the Liassic carbonate depositional system of the central High Atlas rift basin (Morocco). The survival interval in the aftermath of the end-Triassic mass extinction lasted until the Early Sinemurian. Here, skeletal contribution is very minor and restricted to small foraminifera, ostracods, some molluscan shells, crinoidal ossicles and fragments of calcareous and porostromate algae. This survival interval is devoid of carbonate buildups although subtidal settings were locally persistent. A tectonic pulse at the Early to Late Sinemurian boundary interval resulted in an immigration of a marine fauna. However, until the latest Sinemurian (*macdonelli* Subzone of the *raricostatum* Zone) the marine deposits were dominated by filter-feeding benthic heterotrophs such as sponges, brachiopods, polychaetes, and crinoids. The recovery phase displays five types of carbonate buildups: oyster patch reefs with *Nanogyra* associated with a cryptic community of siliceous sponges, brachiopod biostromes, crinoid biostromes, sponge carbonate mounds, and siliceous sponge biostromes. During this stage, primary production within the enlarged basin must have been largely planktonic and there was a net-flux of organic matter to the seafloor (oxygen-minimum-zone). A regional radiation of organic-walled phytoplankton is inferred to explain the selective success of the filter-feeding community. Subsequent to tectonic reorganisation and a marine recirculation event (radiolarian facies, $\Delta \delta^{13}\text{C} \approx -1.1$, strongly negative Ce-anomaly) that occurred between the latest Sinemurian *macdonnelli* Subzone of the *raricostatum* Zone and the earliest Pliensbachian middle *jamesoni* Zone a highly productive,

shoal-rimmed carbonate platform developed. Pliensbachian carbonate buildups of the (sub-)climax phase are biostromes of crinoids, of large bivalves, and of oysters. Photosymbiotic sediment producers (mainly large bivalves) now state the success of specialists and environmental equilibrium conditions. In the latest Pliensbachian the climax stage was reached with the development of a coralgall reef-rimmed carbonate platform.