

The Sumeini Group in Oman: Northern Gondwana Slope development in a Permo-Triassic Environment

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The Oman Mountains expose the Middle Permian to Cretaceous Sumeini group belonging to the south margin of the Tethys. The Sumeini Group is a thick sequence (about 2500 m) of slope carbonate deposits and crops out near the border between Oman and the United Arab Emirates. It tectonically overlies autochthonous Eocene limestones and is overlain by sediments from the Hawasina nappes. This group is also described as para-autochthonous with a 5 to 30 km displacement in regards of the "autochthonous". The Sumeini Group includes 4 formations: Maqam Formation (Middle Permian to Lower Jurassic), Mayhah Formation (Middle and Upper Jurassic), Huwar Formation (Uppermost Jurassic to Cretaceous) and Qumayrah Formation (Upper Cretaceous). The Maqam Formation (about 1700 m thick) is further subdivided into 6 members, A, B, C, D, E and F. We focus in our study on the Permian to Lower Triassic part of the Maqam Formation (members A to D) with new results including paleontology, stratigraphy, sedimentology and geochemistry.

Member A is 80m to 250m thick and tectonically truncated at the base. It begins with shales and thin-bedded limestone or dolostones followed in its upper part by outer shelf fossiliferous limestones. New conodont dating give a Roadian to Wordian age for its base and Upper Capitanian age close to the Guadalupian-Lopingian boundary for its top. **The member B** consists of a 415 m thick sequence of thin-bedded to massive dolostone with numerous dolorudite intervals and in the lower part locally abundant breccia. This

member is uppermost Capitanian and Lopingian in age. The upper part consists of 50m of dm-sized bed of cherty dolostone and cherts rich in sponge spicules. It must be emphasized that a silica rich interval is widespread on NW Pangea margin but the biogenic silica factories collapsed near the end of the Permian Period throughout the world. The conodonts *C. cf. zhangii* near the top of unit B and the decrease in $\delta^{13}\text{C}$ carbon isotope values typical for the end-Permian extinction interval assure a late Changhsingian age.

The member C comprises a thin (25m) Griesbachian-Dienerian part and a thick (up to 900m) Smithian part. It starts with 3m of red shales and siltites, overlain by platy lime and then dolo- mudstone more or less marly comprising several slump levels. The first lime mudstone bed gave the conodont *H. parvus*, markers of the base of the Triassic. *H. postparvus* and *I. isarcica*, index of the second Griesbachian conodont zone follows. In sharp contrast to the well-bioturbated member B, the overlying basal meters of member C are well laminated with no evidence of bioturbation. This dramatic loss of the burrowing infauna indicates the appearance of oxygen-poor waters. This interval of the End-Permian extinction and base of the Triassic records a gradual decrease in $\delta^{13}\text{C}$ values marked by a sudden significant drop of ~6‰ at the extinction boundary. Contrary to most sections that show an onset of carbonate deposition right after the extinction event, this location shows a significant drop in total carbon content suggesting disruption of carbonate

sedimentation associated with the extinction event. The overlying thin Lower Smithian (7m) is characterized by vermicular limestones. The incredibly thick Middle and Upper Smithian sediments (up to 900m) consist essentially of platy limestones and calcarenites. Channelizing beds of intraformational calcirudite are also part of this succession. Carbonate sedimentation of the C member ended abruptly in the Early Spathian. The overlying **member D** is characterized by deposition of 10m brown shale with rare mm-thick sandstone and marls

beds, follow by a 75m thick sequence of green terrigenous siltstone. There are no age diagnostic fossils (Spathian-Anisian?).

This succession records the break-up and the early development of the Oman continental margin, subsidence and possible tectonic flexure or faulting during the Middle and Upper Permian. Almost no platform export during the Induan and the Spathian are observed but an incredible high sedimentation rate during the Middle to Upper Smithian is developed with submarine fan deposits.