The Permian-Triassic Boundary in the Middle East: A Review

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The Middle Permian – Early Triassic Khuff Formation occurs throughout the subsurface in the Middle East and is believed to contain the biggest gas reserves in the region. Along the epeiric Arabian platform shallow-water carbonates and evaporites prevail in the northern and central part and pass southward in argillaceous carbonates and siliciclastics. In eastern direction shallow-water carbonates pass in deep marine deposits of the Neo-Tethys. Outcrops in Saudi Arabia, Iran, UAE and Oman provide important analogue data for subsurface geologic models.

The Permian-Triassic Boundary (PTB) event, about 251 million years ago, was the time of the most severe mass extinction during the Phanerozoic that heavily affected marine and terrestrial ecosystems. Sedimentary rocks of the Khuff Formation and equivalent formations in the Middle East yield abrupt litho- and biofacies changes which are believed to be the result of events associated with Permian-Triassic Boundary (also called end-Permian mass extinction in the literature) and the Early Triassic recovery interval.

During the last decade numerous data of Permian/Triassic rocks in the Middle East have been published which make a compilation of the state-of-the-art knowledge of the PTB necessary. The following key observations have been made:

	Saudi Arabia outcrops	Subsurface Saudi, Qatar, UAE	N Oman subsurface	S Oman subsurface	Oman Mts Arab Pf	Oman Mts Tethys	Iran Zagros	Iran subsurface
Seafloor cement	not observed	not observed	not obs.	not obs.	obs.	obs.	not obs.	not obs.
Anoxic conditions	not observed	not observed	not obs.	not obs.	obs.	obs.	obs.	obs.
Microbialites	observed	not observed	not obs.	not obs.	obs.	obs.	obs.	obs.
Negative δ13C excurs.	not observed	not observed	not obs.	not obs.	obs.	obs.	obs.	obs.
Negative U excurs.	not observed	not observed	not obs.	not obs.	not obs	obs.	obs.	obs.
PTB clay & GR peak	not observed	not observed	observed	observed	not obs	obs.	not obs.	not obs.
PTB hardground	not observed	not observed	not obs.	not obs.	obs.	obs.	not obs.	not obs.

Generally, the PTB data collected by numerous researches in the Middle East are in good correspondence with observations from locations around the world yielding well investigated marine boundary sections. A more detailed comparison of Middle East data suggests that duration and severity changed across the Arabian platform. Depending on the depositional setting and ecosystem, recovery was either rapid or could encompass as much as the Lower and Middle Triassic. Possible scenarios explaining the differential response of carbonate-producing organisms to environmental changes will be discussed in more detail.

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