# Sedimentology and biostratigraphy of the Pabdeh Formation, Paryab, Zagros Basin, SW-Iran, at the PETM interval: Implication for sea level fluctuations

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The Paleocene–Eocene geologic record suggest a complex interplay between rising temperatures, sea-level fluctuations, plankton taxa extinction and diversification, and changes in the trophic resource regime for the PETM (Paleoecene–Eocene Thermal Maximum) interval. To investigate changing conditions during the PETM interval in a deep-water marine paleoenvironment of the Zagros Basin (W-Iran), a total of 394 samples has been taken from the predominantly 171 m thick shaly lower part of the Pabdeh Formation in a section at the village of Paryab. The cyclic limestone-marl successions of the Paleocene–lower Eocene Pabdeh Formation were deposited in a deeper-water marine environment in the (closing) oceanic area of the Neo-Tethys, and consist of deep-water pelagic to hemipelagic shale, marl(stone) and limestone. This project aims to identify and evaluate facies changes in this offshore environment, in particular around the Paleocene/Eocene boundary and the PETM interval.

Biostratigraphic age determination is based on calcareous nannoplankton using smear slides and 100x oil immersion light microscope. Nannofossil biostratigraphy indicates standard zones NP6 to NP15 and CNP8 to CNE8, respectively, for the whole section of the Pabdeh Formation at Paryab. The PETM interval is indicated by several nannofossil taxa starting at 69.1 m*: Rhomboaster* spp. (mainly *Rhomboaster cuspis*), *Discoaster araneus*, and the disappearance of the *Fasciculithus richardii* group. At the same level carbon isotope values ($d^{13}C$) fall from 1.5 to -0.2 per mill depicting the begin of the distinct negative carbon isotope excursion (CIE) of the PETM interval. Higher up-section, *Sphenolithus moriformis* and *Discoaster diastypus* appear, and $d^{13}C$ values increase again. *Tribrachiatus contortus* and *Tribrachiatus orthostylus* have their first occurrence at 75.6 m, followed by *Rhomboaster bramletteii*, *Discoaster barbadiensis*, *Sphenolithus* cf. *radians,* and *Discoaster binodosus*.

Paleoecological analyses of the nannoplankton assemblages allow the identification of the PETM interval (global warming and increased ocean-water temperature). This short-term marine warming was followed by a long-term cooling after the early Eocene. Though thermal variation from warmer ocean waters during the PETM to the cooler ocean water temperatures afterwards is likely to have decreased the effects of Milankovitch cyclicity on the sedimentation pattern, however a significant facies change from shales to shale-limestone cycles can be identified in the section after the PETM interval.