



The Cretaceous – Paleogene paleogeography of Central Asia recorded in depositional environments of the Proto-Paratethys Sea in the Tarim Basin (Western China)

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The Proto-Paratethys, a shallow epicontinental sea, extended from Cretaceous to Paleogene times across Eurasia from the Mediterranean Tethys to the Tarim Basin in western China. Transgressive and regressive episodes of the Proto-Paratethys Sea have been previously recognized but their timing, extent and depositional environments remain poorly constrained especially for the Cretaceous and early Paleogene. This hampers understanding of their driving mechanisms (geodynamic and/or eustatic) and paleoclimatic consequences on regional aridification and monsoons.

As part of the ERC “MAGIC” project, we report an integrated sedimentologic and stratigraphic analysis of the Proto-Paratethys from its initial Cretaceous onset to the final Paleogene retreat from multiple investigated sections in the western border of Tarim Basin. Facies associations include field observations and microfacies analyses from carbonate samples. New bio- and magneto-stratigraphic results from key intervals are also provided to testify the previously constructed regional stratigraphic framework.

The previously controversial number of marine incursions in the Tarim Basin is resolved to 6 (3 Cretaceous and 3 Paleogene) also recognized in the neighboring Tajik and Turan Basins to the west and the present-day Alai Valley. The eastward extent of these marine incursions varied through time with a maximum extent during late Paleocene - early Eocene. The first marine incursion is a Cenomanian transgression recorded in the marls and calcareous mudstones of the Kukebai Formation. The next two are Coniacian and Campanian transgressions recognized in the carbonate units of the Yigeziya Formation. The first Paleogene incursion is characterized by thick evaporites of the Paleocene Aertashi Formation overlain by the marine shales of the Lower Qimugen Formation. The latter represents the maximum extent and the deepest environments of the Proto-Paratethys. The marine Kalatar limestones and silty shales of the Wulagen Formation are associated with the penultimate transgression whereas the silty shales of the Bashibulake Formation were laid down during the last smaller marine incursion.

Generally, transgressive intervals are composed of restricted marine bay environments, shoal & oyster-rich bioherms giving rise to upper offshore to shoreface transition silty shales. The regressive intervals are composed of intertidal flats, supratidal sabkhas and salinas, fluvial, playa and lake environments of alluvial plain. The temporal and spatial extent of the transgressive and regressive intervals enable to discriminate the major drivers of marine fluctuations with their potential consequences on Asian aridification and monsoons.