

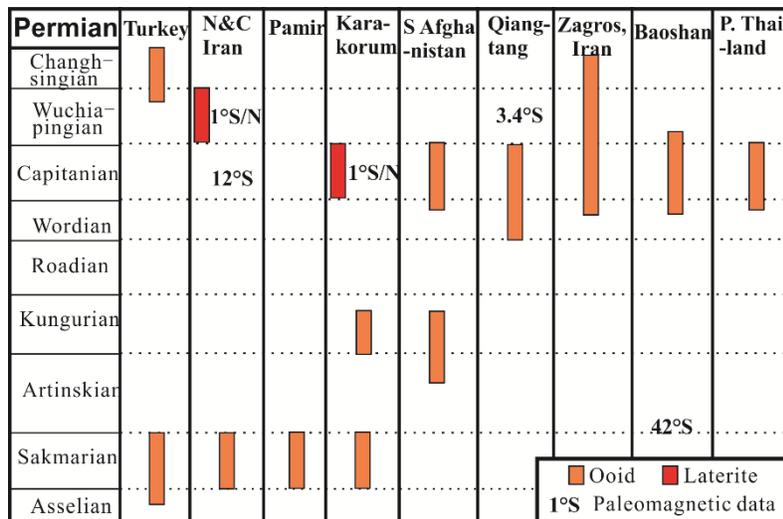
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Permian carbonate ooids from the Baoshan Block, China and other Cimmerian terranes with paleogeographic and paleoclimatic significance

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Carbonate ooids are environment-sensitive, hence valuable for reconstructing the paleogeography and paleoclimate of Cimmerian terranes, which are of high uncertainty in the context of Tethys evolution [1]. Permian carbonate ooids are confirmed to be extensive across the Baoshan Block in western Yunnan, China and comprise four major types: micritic ooid, compound ooid, leached ooid and half-moon ooid. They are assigned an age of Wordian-Capitanian (Middle Permian) on the basis of foraminiferal biostratigraphy. Further comparison with literature data reveals diachronous appearance of Permian ooids among Cimmerian terranes (Tab. 1). Ooids initially appeared in the Early Permian (mostly Sakmarian) in western Cimmerian region, whereas in the Middle Permian in the eastern region. Warm seawater with high salinity and carbonate saturation is a prerequisite to generate voluminous marine carbonate ooids [2-3]. These western Cimmerian terranes under consideration therefore were most likely already situated in warm-water tropical/subtropical region as early as Early Permian. In contrast, the delayed occurrence of ooids, subsequent to Early Permian glacio-marine diamictites, suggest that eastern Cimmerian terranes lagged behind the western ones concerning the degree of climatic amelioration. Through Middle to Late Permian, a coupling of humid tropical and arid subtropical climate zones has been suggested [4]. The equatorial humidity is also attested by laterites and coals developed near paleo-equator in certain Cimmerian terranes during Middle-Late Permian, e.g. Karakorum, N&C Iran and Qiangtang Block [5]. The Cimmerian terranes with Middle Permian ooids, including the



Baoshan Block, thus should be confined within arid subtropical region where evaporation could elevate seawater salinity and carbonate saturation. Such spatial and temporal heterogeneity in ooid distribution provides critical evidence, from the sedimentological perspective, to gauge the paleolatitudes of these Cimmerian terranes.

Table 1: Distribution of Permian carbonate ooids in Cimmerian terranes.

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