

Sedimentary characteristics on the Jurassic/Cretaceous boundary in the Junggar Basin, Central Asia: Tectonic and climate implications

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The Upper Jurassic–lower Cretaceous strata in the Junggar basin include the Qigu, Kalazha, and Qingshuihe formations in ascending order. By synthesizing outcrop and well data, we conducted a detailed sedimentologic and stratigraphic correlation analysis for the three formations. Our study shows that a sharp lithofacies change from intermittent braided-river red fine-grained sediments of the Qigu Formation to alluvial fan conglomerates of the Kalazha Formation, is widespread along the basin margins. From bottom to top, the Kalazha alluvial fan conglomerates can be divided into six sequences showing a progradation to retrogradation cycle, and they finally retrograde into the lake sediments of the lowermost Cretaceous Qingshuihe Formation. However, within the Junggar Basin, the Kalazha Formation is commonly considered to be absent and the Qingshuihe Formation possesses a basal fluvial coarse-grained sandstone bed (50–100 m), beneath which a widespread unconformity is observed. Stratigraphic correlation suggests that the alluvial fan conglomerates of the Kalazha Formation along the basin margins are equivalent to the basal sandstone bed of the Qingshuihe Formation within the basin. Finally, we conclude that progressive tectonic uplift and climate aridification occurred in the Junggar Basin during deposition of the Qigu Formation in the Late Jurassic, while the basin began to experience a relatively humid climate and underwent rapid subsidence during deposition of the Kalazha Formation in the latest Jurassic-earliest Cretaceous, probably driven by the far-field effects of the short-lived but significant Mongol-Okhotsk collisional orogeny.