

Late Cenozoic vanishing of the episodic lakes in central Asia

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The interplay between the climate and tectonics is a critical factor that determines the earth surface processes and landforms, however, it is still difficult to distinguish which provides the first driving force for the enhanced aridification and desertification in the Asian interior. As the largest terrestrial basin in the Tibetan plateau, Qaidam basin is filled with thick and continuous Cenozoic clastic sedimentary rocks, that preserves an exceptional record of the intraplate response to the India-Asia collision and post-collisional convergence and the climate variation. In this study, we established magnetic susceptibility, carbonate stable isotope record in the Late Miocene to Pliocene from lacustrine sediments in the Qaidam Basin, northern China, which appears to reveal the gradual vanishing and closure of the lake basin since ca. 5 Ma. This environmental shift coeval with the formation of the growth strata observed from both outcrops and seismic reflections from the western parts of the Qaidam basin. We therefore suggest that intensive tectonic deformation in the northern Tibetan plateau, rather than the climate change, was responsible for the growth of local topographic relief which subsequently isolated the drainage systems in the Qaidam basin. Together with evidence of tectonic-driven sedimentation variation at ca.10 Ma in the Qaidam basin and vanishing of episodic lakes in the Tarim basin since the late Miocene, we propose the tectonic-driven topographic uplift in the Tibetan plateau-Pamir and Tian Shan regions were primarily responsible for the Late Miocene to Pliocene vanishing of episodic lakes in central Asia.