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Multiple climate indices of the Cenozoic sedimentary sequence in the western Tarim Basin, China

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The Tarim Basin is one of the largest closed basins in the word, and is a typical region that was affected directly by the retreat of the Tethyan Realm and the stepwise uplift of the Tibetan Plateau. In the western part, over 3000 m of Cenozoic sedimentary sequences, consisting of marine deposits in the lower, continental clay and fine sand in the middle, and molasse in the upper part, record the evolution of the eastern edge of the Tethyan Realm, the Asian aridification, and the deformation of the Pamir. In this work, we reported the high-resolution multi-proxy indices of the complete Cenozoic Ulukeqiati section from the westernmost of the Tarim Basin. Our results show: 1) variations in grain size, magnetic susceptibility and the ultrafine component, and magnetic susceptibility can be used as proxies for dynamics of transport medium, continental aridity, and temperature, respectively; 2) the long-term increase in mean size reflected an overall strengthen in potential energy to the transporting medium arised from tectonic activity and/or climate change, the long-term decrease in magnetic susceptibility and the ultrafine component proportion revealed an enhanced continental aridity, whilst, the long-term decrease in redness suggested a stepwise cooing process of the area during the Cenozoic; 3) comparison of the high resolution records with the geological events recorded in the same sedimentary sequence suggested that the retreat of the Tethyan Realm, the uplift of the Tibetan Plateau, and the Cenozoic global cooling played the leading roles in driving the Cenozoic Asian aridification.