

Aridification of a Flat World: The Tectonic and Climate Evolution of Central Asia During the Jurassic.

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It is well established that the evolution of Central Asia has been largely driven by two main orogenic phases: the Late Paleozoic final amalgamation of the Central Asian Orogenic Belt (CAOB) that structured most of the regional lithosphere and the Cenozoic collision of India that generated the present-day topography. Also largely discussed are the climate changes associated to those orogenies, especially the aridification phase that accompanied the development of the Cenozoic orogen either linked to the topographic rise in the Tibet region or the retreat of the proto-Parathetys sea. In-between those two major geodynamic phases, the Mesozoic, and especially the Jurassic tectonic, topographic and climate setting has yet not been extensively explored. This peculiar period, characterized by an absence of block collision along the margins of Eurasia, was marked, from the Tian Shan region to the West, to Southern Siberia to the East, by low-amplitude transtensive and transpressive tectonic movements, largely localized along major, inherited strike-slip faults. The topography saw the final dismembering of the Late Paleozoic reliefs and the formation of a huge planation surface. The climate changed progressively from the humid Lower and early Middle Jurassic phase that produced most of the huge regional coal resources, to the semi-arid late Middle to Late Jurassic period with a climax in aridity reached at the Jurassic – Cretaceous transition.

Using sedimentology, geomorphology, structural geology, geochronology, isotope geochemistry and palynology we built a large-scale picture of the tectonic, topographic and climate evolution of Central Asia during the Jurassic. We propose that far-field effects of the subduction zones that surrounded most of the continent induced intra-plate deformation leading to extension and bloc-rotation. We suggest that the large-scale planation phase occurred prior to the aridification, implying that both events were probably uncorrelated. Finally, extending the climate investigation into the Cretaceous we show that the Middle Jurassic represented a major tipping point between the green world of Lower Jurassic and the since-then semi-arid climate setting of Central Asia.