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Hot-house climate during the Triassic/Jurassic transition: The evidence of climate change from the southern hemisphere (Salt Range, Pakistan)

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Abstract

The Triassic–Jurassic boundary interval was characterised by the change from warm, semiarid–arid to a hot and humid climate in the Tethyan domain linked to input of greenhouse gases from the Central Atlantic Magmatic Province (CAMP) activity and Pangaea breakup. This study provides the very first outcrop evidences of palaeoclimatic evolution during the Triassic–Jurassic boundary interval in the then southern hemisphere, along the eastern margin of Gondwana facing the western Tethys. In the Tethyan Salt Range of Pakistan a succession of Upper Triassic dolomites, green-black shales (Kingriali Formation) to overlying Lower Jurassic quartzose sandstones, shales, laterites and conglomerates (Datta Formation) represents the sedimentary archives of this critical time interval. Bulk and clay mineralogy of the Upper Triassic shales indicate the presence of mainly illite while kaolinite is a minor component. The kaolinite content, a reflection of the mature stage of chemical weathering and hence hot–humid conditions, increases up-section in the overlying shales and sandstone–shale succession. The following laterite–bauxite horizons lack illite and are entirely composed of kaolinite, boehmite and haematite. The bulk rock geochemistry of the succession confirms a similar trend. The Chemical Index of Alteration (CIA_{molar}) displays an