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Unveiling the Development of Monsoon in Pakistan: A Concise Analysis

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The evolution of monsoon in South Asia is linked with closure of Tethyan gateways and uplift of the mighty Himalayas in the Paleocene. The topographic growth of Himalayas through Paleogene and Neogene induced the intensification of the South Asian monsoon which is driven by temperature differences between the continent and Indian Ocean. The greater precipitation accelerates the erosion of the mountain front which in turns controls the overall structure of the Himalaya ranges. During the Miocene, the zones of intensified summer monsoon caused rapid exhumation of the ranges and enhanced sedimentation across the continent forming greater Siwaliks in Pakistan and India. The tectonic uplift of the Attock–Cherat Ranges during the late Pliocene (2.8 Ma) restricted the flow of main Indus river and thus rare himalayan derived detritus are deposited during Quaternary which is evident from multiple geochemical proxies. Consequently, an intermontane basin (Peshawar Basin) was formed which constitute Pleistocene-Holocene siliciclasts preserving a significant record of paleoclimate and monsoonal fluctuation. The stratal package of Pleistocene-Holocene of Pakistan comprises floodplain muds which is overlain by lake rhythmites and loess deposits respectively. The multiple geochemical proxies show an overall cool-arid climate with pulsated monsoonal spills.