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Present is the Key to the Past: Soils to Paleosols and Their Implications for Landscape Stability (Tectonism) and Climate Change Based on Micromorphology and Clay Mineralogy

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Abstract: *The classic geological phrase "present is the key to the past" or the principle of "Uniformitarianism" can be utilized with caution to understand the evolution of the outermost thin layer of the Earth or Pedosphere. The modern soils of the Indo-Gangetic Plains (IGP) serve as the most important analogue to understand soils of the past "paleosols' and their evolution in response to climate changes and tectonics. On the basis of soils of the IGP, it is now well-established that soil-geomorphology, micromorphology, and clay mineralogy are potentially useful to understand the weathering and environmental processes that are crucial for the sustainability of the outermost surface of the Earth. The modern soils of the IGP helped to comprehend the degree of soil development or the extent of pedogenesis, soil-geomorphic surfaces, landscape stability, climate changes, and polygenesis in the older soils. The knowledge gained through soils of the IGP helped to comprehend the paleosols of the Himalayan Foreland of 31 Ma to 0.5 Ma despite many complexities. Clay mineralogy of the 56 Ma age sediments from western India provide important evidence of abrupt warming 3ºC to 5 ºC and ~25% increase in precipitation that accounted for enhanced chemical weathering and large-scale transformation of smectite to kaolin.*

Keywords**:** Soil-geomorphology, IGP soils, Paleosols, Climate change, Tectonics.