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Magnetic Polarity and Rock Magnetic studies across Marine to Continental Transition (Subathu-Dagshai sequence) in the Himalayan Foreland

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The Subathu-Dagshai Transition (SDT) in the Himalayan foreland provides an insight to study the marine-deltaic-continental transition and hence a major shift in the land-sea regional hydrogeomorphic setup. We attempt here to trace the changes in mineralogy and depositional fabrics using magnetic methods aided by magnetic polarity stratigraphy in a 270 m thick sedimentary succession exposed at Kaushalya river in Himachal Himalaya. An abrupt change in the magnetic mineralogy from ferrimagnetic to canted antiferromagnetic minerals is noted 30 m below the SDT 'Passage Bed' at ~ 40.75 Ma. Magnetic fabrics record tidal effect till ~41.25 Ma and the paleoflow became streamlined only after ~39.5 Ma in the Dagshai continental facies. Significantly higher flow regimes are noted at 39.8 Ma with paleoflow reversal and at 39.15 Ma without much change in paleoflow, possibly due to orogenic folding during the former and climatic and/or tectonic impulse during the latter.

The shallow marine anoxic conditions of the Subathu sea at ~41.5 Ma are observed which record the continental input at 40.75 Ma. This indicates that the continental setting was initiated at <40.750 Ma within the Subathu basin and suggests its time transgressive nature by at least 750 Ka. A changeover from the shallow marine anoxic depositional environment to marly-pedogenic estuarine continental conditions within a geological time span of 1.5 Ma appears to have played a key role in altering the atmospheric chemistry due to organic carbon exhumation immediately after the passage bed. This demands a closer look on the role of the Subathu-Zanskar sea as a carbon sink and the effect of exhumation of the organic matters on the contemporary regional climate change. Our study indicates that although the landform raised above the sea level by 40 Ma, the sedimentation continued in divergent manner with incision in some part and deposition in the other within the Subathu basin.