Signatures of Late Eocene Arid Climate in the Himalayan Foreland Basin Sequences, India

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Early Eocene is considered as the warmest period among the Cenozoic Era and the late Eocene, with the occurrence of the arid climate indicators, marks the beginning of the cool period [1-3]. These global events mark their presence in the Himalayan foreland basin sequences too. Early Eocene sequences of the Himalayan foreland basin show extensive occurrence of carbonate rocks. These carbonates, containing pelloids and larger foraminifera, probably deposited in coastal environments of the tropics and suggest that the deep marine sedimentation did not occur in the Himalayan foreland basin. The elevated levels of the atmospheric CO_2 between 50-40 Ma was responsible for the release of substantial amount of bicarbonate from the weathering of silicate and carbonate rocks and eventual transformation of bicarbonate into carbonate in the depositional basin. Pedogenic calcretes and gypsum are considered as indicators of arid climate [4-5]. In the late Eocene (after *ca.* 40 Ma), the reduced levels of the atmospheric CO_2 (~500 ppm V) and added sediment supply from the hinterland was responsible for the closing down of the carbonate factory here. Multiple calcrete horizons occur in the detrital sequences of the western Himalayan foreland basin and this implies that the basin depocenter was in the subtropical climatic belt (30-35ºN latitudes) during this time interval. They (calcretes) show profile development and they possess alpha as well as beta fabric. The presence of beta fabric such as alveolar septal fabric, rhizolith, pellet and *Microcodium* suggest that the calcrete profiles developed by the pedogenic processes. This is also supported by the presence of large negative carbon (-8.5 to -11.2‰) and oxygen isotope values (-8.5 to -13.0‰), respectively. The development of calcretes around this time in the Himalayan foreland basin sequences may be linked with the arid climate coupled with global cooling, which was also responsible for the nucleation of the Antarctic ice-sheet in the southern oceans.

References

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