ABSTRACT

Sequence stratigraphy and stable oxygen ($\delta^{18}O$) and carbon ($\delta^{13}C$) isotope studies have been carried out for the Palaeogene sediments from Subathu sub-basin of Himalayan foreland. The marine Subathu Formation rocks show large scale siliciclastic and calciturbidite deposition in the underfilled part in response to basin tectonics. Since fixing an age for the termination of marine beds, based on reworked fossils (e.g. *Assilina spira*) in calciturbidite units is not justifiable, the upper limit of Subathu Formation is considered to be significantly younger than ~ 44 Ma. Contrary to earlier inference the unconformity between the marine Subathu and overlying continental lower Dagshai Formations (~ 28 Ma) is placed at the top of the shoreface White Sandstone unit (~ 31 Ma), the last marine bed deposited in the foreland. Consequently the unconformity, marked by caliche development or erosion by Dagshai channel sand and interpreted as a Type 1 sequence boundary, signifies a hiatus of only ≤ 3 myr and not >10 myr as suggested earlier. The White Sandstone unit is interpreted as a Forced Regressive Wedge (FRW) formed during the marine to continental transition. Sandstones Petrography and their Sr and Nd isotopic compositions indicate a major provenance switch-over from dominant mafic/ultramafic to metamorphic source from the White Sandstone onwards. Using a simple isostatic model, a mechanism of accelerated surface uplift (at a rate of 0.1-0.15 mm/year) is suggested for both provenance change and forced regression. The overfilled continental sedimentation evolved in response to slow basinal subsidence producing continuous aggradational sequence. Stable isotope data show that in spite of burial diagenetic effect original climatic signals are still preserved in micro-domains of soil carbonates. Calculated meteoric water $\delta^{18}O$ value, based on isotope composition of pristine continental carbonates and fossil bioapatites, ranges from -7 to -12 ‰, very similar to modern monsoon precipitation and extends the antiquity of monsoon system back to the Oligocene time. The initiation/intensification of monsoon was coincident with a major change in fluvial architecture across the Dagshai-Kasauli transition within the continental sequence. The revised isotope based paleo-altitude estimation strongly supports the recent model of climate forcing on Himalayan tectonics.

Keywords: Himalaya, India, foreland, Palaeogene, sequence stratigraphy, stable isotope, monsoon.