



## **Himalayan orogeny and palaeovegetational changes: a relook into the factors controlling global expansion of C4 grasslands.**

S. Singh (1), A. Awasthi (1), B. Parkash (1), and S. Kumar (2)

(1) Department of Earth Sciences, Indian Institute of Technology, Roorkee, India (geoseema05@yahoo.co.in), (2) National Institute of Hydrology, INDIA

The Himalayan orogeny constitutes a significant tectonic event in the Earth's Cenozoic history which encompasses a series of events resulting in long-term climatic cooling and drying. Establishing synchronicity of palaeoecological events through floral and faunal changes in proxy-records could help in documenting factors responsible for this change in global climate. Based on geological evidences, various workers in different parts of the world have established C4 grassland appearance during late Cenozoic, though the expansion is confined largely to Late Miocene. However, causes of this worldwide C4 grassland expansion have remained controversial since its discovery. Resolution of such controversies ultimately lies in undertaking more detailed local palaeo-vegetational studies of Cenozoic sediments and subsequent correlation at regional and global scale. The aim of the present work is to study the Himalayan Cenozoic sediments of India and the results are then compared with other similar studies done in different parts of the world. Carbon isotope analysis of soil carbonate, largely nodules, had been carried out from Samba-Mansar (S-M) section in the Jammu & Kashmir state of India which is placed laterally  $\sim 40$ - $50$ Km along strike from another comparable Jammu-Nandni (J-N) section. Analyses of a total of 141 samples in the Ramnagar sub-basin, spanning a period from  $\sim 12$ Ma to  $\sim 0.4$ Ma, have been coherent so as to have a better view of palaeovegetational change across the sub-basin, both at comparable temporal and spatial regional scale. Herein the isotopic results show the dominance of C3 vegetation pre-7Ma and C4 vegetation post-5Ma with first appearance of C4 plants at  $\sim 6.8$ Ma. Percentage abundance of C4 vegetation was less than 20% pre-7Ma but was increased to more than 40% post-5Ma reaching up to 100% in the youngest analyzed sediments. The results are in conformity with patterns of change in vegetation documented in other parts of the Himalayan belt. These indicate that though there is worldwide temporal variability in appearance of C4 plants but in the Himalayan Cenozoic sediments, C4 plants first appeared with their subsequent expansion during Late Miocene. It could be possible that at different places different factors or a combination of different factors played their roles which might be linked to each other directly or indirectly with major tectonic events of the Cenozoic Era. Further, such studies could greatly help in gleaning out possible causes responsible for the long term global climatic change over the past 40Ma.