Estimation and comparison of glacial melt in the central and western Himalaya using two and three component isotope mixing model

It is not always easy to identify the different components that constitute river discharge. In the present study, hydrograph separation was carried out using two-component and three component isotope mixing models. Electrical conductivity of river water provides an instant, on-site approximation of the relative contribution of different components of drainage water. Two domains were studied. The first study site represents the upper Ganga river basin, central Himalaya while the second site lies in the Chandra sub-basin in the Lahaul-Spiti district of Himachal Pradesh in western Himalaya. These two Himalayan regions differ in climate and topography. The results of the hydrograph separation suggest that the surface runoff (snowmelt and rainfall) is the major contributor to the total river flow in both the domains. Also, there is a significant temporal and spatial variability in the δ18O and electrical conductivity in the end member components. River water isotopic composition becomes depleted post-monsoon and electrical conductivity remains low in the post-monsoon season. Due to mixing rainfall modifies the actual isotopic signature of glacial ice. Careful selection of end members provide glacial melt (<10% at Rishikesh) that are consistent with the expected thinning rates of Himalaya. Result show higher glacial melt fraction in the western Himalaya.