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Intra-annual water store and stable isotope dynamics for Himalayan basins of Nepal

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Isotope-based hydrograph separations are applied commonly to reveal the sources, mixing-ratios and timing of river flow and so evaluate runoff generation mechanisms. In this context, rivers draining the Himalayas have received limited attention despite their high sensitivity to climate change and their importance for regional and global water budgets and biogeochemical cycles. Seasonal variation in river water isotope compositions is not well documented for this high mountain region. Hence, this research aims to determine the nature and dynamics of water store contributions to river flow for Himalayan basins of Nepal over a hydrological year by undertaking a study of δ^{18}O and δD variation in river water and rainfall for two sub-basins of the Trishuli river with contrasting hydrology: (a) glacierized Langtang Khola and (b) rain-fed Phalankhu Khola. Weekly water samples were taken from April 2004-March 2005 at 4 river sites (in each sub-basin and above and below their confluences) and from two aggregate rainfall collectors. Sampling locations were paired with river and precipitation gauges. Isotopic data yield tight and internally consistent arrays that facilitate interpretation in relation to rainfall amount and isotopic composition, and river discharge data, and thus quantification of changing water store contributions (i.e. rainfall including summer monsoon, snow- and ice-melt, and groundwater), over the hydrological year, and between basins. This research provides a key baseline study during the current period of Himalayan glacier recession.