Geophysical Research Abstracts
Vol. 17, EGU2015-8641, 2015
EGU General Assembly 2015

Streamwater δD and d-excess values in the Sutlej and Alaknanda valley, NW India

Iris van der Veen (1), Eric Deal (2), Dirk Sachse (1,3), Bodo Bookhagen (1), and Manfred Strecker (1)

(1) 1Universität Potsdam, Institut für Erd- und Umweltwissenschaften, Karl-Liebknecht-Str. 24-25, 14476 Potsdam-Golm, Germany (Veen@geo.uni-potsdam.de), (2) Institut des Sciences de la Terre, Université Grenoble-Alpes and CNRS, Grenoble, France, (3) GFZ German Research Centre for Geosciences, Section 5.1: Geomorphology, Organic Surface Geochemistry Lab, Potsdam, Germany

The Himalayan orogen constitutes the main water supply to the Indus and Ganges river systems in India. These rivers are heavily influenced by snow and glacial melt, and monsoonal rainfall. In addition, these rivers transfer large amounts of terrestrial carbon to the oceans. However, the extents to which different water sources and sources of organic material differ under changing climatic conditions are unclear.
Understanding these issues is of great importance in light of Global Change change, and how this can ultimately impact the behavior of glacial systems and surface processes in this highly populated area.
To determine moisture sources and flow paths, we use a combination of hydrogen- and oxygen-isotope analysis of surface waters from the Sutlej Valley (78°E) and the Alaknanda Valley (79°E). Moreover, a better understanding of spatial patterns of stable water isotopes of surface water would aid the use of leaf wax δD values from river transported and riverbank sediments to trace organic matter sources and transport in these fluvial catchments to help understand the transport of organic matter in the hydrological cycle.
Both the Indian Summer Monsoon (ISM), and the Northern Hemisphere Westerlies (NHW) influence precipitation in the Sutlej and Alaknanda valleys. The ISM picks up moisture in the Bay of Bengal transports it along the Southern Himalayan Front (SHF). The NHW transport moisture from the Mediterranean, Black and Caspian seas, and splits into two branches west of the Tibetan plateau.
The influence of these two systems change from west to east, where the Westerlies become particularly important west of 78°E (Bookhagen and Burbank, 2010).
Our preliminary results show that the δD values of the sampled surface waters (δDwater) become more depleted with increasing altitude, and have an isotopic lapse rate of 1.54 ‰ per 100 m elevation in the Sutlej area. The upstream Sutlej River was found to carry the most D-depleted signal, possibly indicative for precipitation originating at the higher elevations (i.e. Tibetan Plateau) and/or glacial meltwater.
In the northern tributaries of the Sutlej River, the d-excess is much higher compared to the d-excess in the southern tributaries, which could reflect the impact of the two different moisture sources in the area.