

## **Stable isotopologues and hydrogeochemistry of high-altitude Western Himalayan water samples**

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The Himalayas (also known as the Third Pole) is the Earth's largest reservoir of snow and ice followed by the Arctic and Antarctic. Therefore, it is considered Asia's natural water tower that feeds its water and resources to one-fifth of the world's population. The unique location with lower latitude and high amount of heat exchange makes Himalayan frozen water sensitive to any changes in temperature and precipitation pattern and thus, changes in the source contribution to the Himalayan River system. To understand the source contribution, different end members contributing to Indus and Nubra river systems (western Himalaya) were collected. End members sample i.e., stream water, snow, precipitation, lake water, groundwater, and hot springs from the western Himalayan region (Leh and Ladakh) were analysed through the isotopic and chemical tracer technique. The results show that our measured stream water isotopologues are in good agreement with the modelled water isotopic ratios. Interestingly, hot spring water isotopic ratios ( $d^{17}\text{O}$ ,  $d^{18}\text{O}$ ) and secondary parameters (D-excess and  $^{17}\text{O}$ -excess) are significantly different compared to the stream water samples which is obvious due to the high-water pool temperature that leads to excessive evaporation and mixing. In this study, the hydrogeochemistry of different end members was also analysed and compared to the weathering phenomenon in the western Himalayan region.