Leaf wax *n*-alkane stable isotope ratios determine sediment sources in the Arun River, eastern Nepal

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The central Himalaya in Nepal comprises one of the Earth's highest topographic relief. This mountainous barrier leads to an efficient blocking of moisture of the north- and northwestward propagating Indian monsoon system. South of the orographic barrier, mean annual rainfall ranges up to 5m/yr, while north of the barrier rainfall drops to < 0.5 m/yr. This steep climatic and topographic gradient results in strong hydrological and vegetation constrasts along major transhimalayan rivers, such as the Arun in eastern Nepal.

Associated to the hydrological gradient is a strong gradient in the isotopic composition of local stream water, allowing to trace water sources within the catchment. In this study we employ D/H ratios of 213 stream water samples and 23 river transported leaf wax *n*-alkanes samples, which are representatiative of plant material. We combine these with several river gauge station data and remotely sensed precipitation (TRMM), evaporation and temperature (both MODIS) data to decipher geographic sources of organic matter.

Our data indicate that a large proportion of the Arun's water drains from the Tibetan plateau and is derived from snow- and glacial meltwaters. Snowmelt is derived from precipitation during the winter westerlies. Leaf wax *n*-alkane D/H ratios from river sediments along the Arun river show substantial D-depletion, corresponding to waxes synthesized by plants in the higher-elevation Himalayas and/or the Tibetan Plateau north of the orographic barrier.

The dominance of Tibetan Plateau sourced leaf wax *n*-alkanes in river bank sediments in the downstream sections along the Arun suggests an unexpectedly high organic matter supply from the Tibetan Plateau in the eastern Nepalese Himalaya, in contrast to the Plateau's sparse vegetation cover.