Chemical weathering pathways in the central Himalaya – new constraints from DI14C and δ34S

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Chemical weathering at Earth's surface releases soluble elements from rocks to streams and the oceans, interacting with the global carbon cycle along multiple pathways. The carbon budget of continental erosion is strongly dependent on the nature and relative importance of these pathways [1]. Weathering of silicate minerals with carbonic acid represents a long-term net sink of atmospheric CO₂. However, chemical weathering by other acids, such as pyrite oxidation-derived sulfuric acid, represents a net CO₂ source to the atmosphere [2]. Constraining the net balance of acids and lithology involved in weathering reactions is therefore paramount to budget the impact of chemical weathering on the carbon cycle. In this contribution, we present preliminary radiocarbon data measured on dissolved inorganic carbon (DI14C) from stream and spring waters in the central Himalaya of Nepal. DI14C is a promising tracer of the different chemical weathering reaction pathways [3], and DI14C values in the central Himalaya span across the natural spectrum. To constrain sulfate sources, measurements of δ34S on dissolved sulfate complement this dataset [4], which also shows considerable variability ranging between -15 to +18 ‰. Inverting the dissolved ion composition and their isotopic constraints provide constraints on the proportions of carbonic and sulfuric acid weathering of silicates and carbonates. These results will then be compared with catchment lithological, geomorphological and climatic parameters.