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Sources and transformation of dissolved inorganic carbon in a Himalayan river system

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Inland waters play a vital role in the global carbon cycling. Mountainous rivers act as active pipelines for the transportation of sediments and elements from the mountains through the plains to be ultimately processed and buried along the coasts. During this transit, various *in situ* biogeochemical processes govern the alterations of the suspended and dissolved matter (and associated organic and inorganic components) and in the process exchange major GHGs (CH_4, CO_2 and N_2O) with the atmosphere. Due to changing climate and the associated shifts in the flow regime of the world rivers, it is essential to revisit the mechanisms by which carbon is being transported along the river continuum and further constrain the effects of regional climate and lithology on the rates of transport and processing. The rivers originating from the Tibetan plateau and the Himalayan region play a dominant role in continental weathering, and represent some of the highest rates among the large river systems across the globe.

In the present study, an attempt has been made to estimate the concentrations and fluxes of dissolved inorganic carbon (DIC) in the Jhelum River (a tributary of the Indus River) along with its major tributaries (Sindh, Liddar, Vishav, and Rambiara) situated in the Kashmir valley of the western Himalaya. The Jhelum River drains a distinct terrain of recent alluvium to a thick loess deposit, which is assumed to have a significant contribution to the inorganic carbon loading into the river. Furthermore, the flow velocity of the river and turbidity varies along its continuum resulting in a strong coupling of respiration and primary production. We used the miller-tans plots (a graphical mixing model) to identify the sources of inorganic carbon in different reaches along the continuum. Preliminary results from ~ 50 sites and three major seasons in the valley indicate DIC source with isotopically enriched signature ($d^{13}C_{DIC}$ ~ – 2.1 to –3.7 ‰) in the Sind and Lidder catchments whereas a depleted source in the mainstem of the river ($d^{13}C_{DIC}$ ~ –7.1 ‰).