

New evidence on chemical weathering and associated carbon-dioxide consumption in tropical river basins during Anthropocene

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Climate change extent over the Earth's surface has been unpredictable due to the large uncertainty of associated parameter control during the Anthropocene. This study aims to better understand the major controlling factor of long-term global climate from fluvial processes. This is achieved by estimating the rates of chemical weathering (CWR) and associated carbon-dioxide consumption (CCR) in monsoon dominated tropical river basins of the Western Ghats and glacial fed river basins of the Himalayas, India. Samples of river water were collected on monthly basis for the analysis of major ion chemistry in the Swarna river basin, South India and Yamuna river basin, North India. In addition, selected river water samples were subjected to analysis of stable isotopic composition of carbon. Physico-chemical parameters were measured onsite for pH, electrical conductivity and dissolved oxygen in river water. Water samples of Swarna river were slightly acidic to near neutral while the Yamuna river water samples were alkaline in nature. In this study, a new correction factor for anthropogenic impact on river water has been proposed for the forward model of CWR estimation. The resultant new estimates of silicate weathering rate (SWR) and CCR reflected the difference of about 5% and 13% respectively in the small humid tropical river basin (Swarna basin) compared to the general forward model estimates. This difference in SWR and CCR estimates were much higher in other river basins of relatively less wet climate regions of India. With increased anthropogenic impact on river basins during recent decades, there is certainly significant effect on long term climate modelling from global silicate weathering. Thus, the study suggests careful assessment of magnitude of silicate weathering and associated carbon-dioxide withdrawal in tropical river basins during the Anthropocene.