Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.11903

Silicate weathering budget of Himalaya from IODP expedition 354 in the Bengal Fan.

ASWIN PRADEEP TACHAMBALATH[1], CHRISTIAN FRANCE-LANORD[2], ALBERT GALY[1], THOMAS RIGAUDIER[3] AND JULIEN CHARREAU[4]

[1]CRPG-CNRS-Université de Lorraine
[2]CRPG - CNRS - Université de Lorraine
[3]CRPG, CNRS-Lorraine Université
[4]CRPG, CNRS, Université de Lorraine

Presenting Author: pradeepaswin13@gmail.com

Weathering and erosion are key processes involved in the transfer and redistribution of materials on earth's surface, influencing climate and driving exogenic cycles of elements. In a kinetically limited weathering regime like Himalaya, both monsoon and erosion exert critical control on the weathering intensity, generating an intense erosional flux accompanied by enhanced organic carbon burial and silicate weathering. Today the Ganga-Brahmaputra River system transports about a billion tons of sediments towards the delta and Bengal shelf. Then, turbidite exported to the Bengal fan accumulate a long-term archive of the Himalayan erosion which preserve the signature of source rock characteristics and mineral sorting during transport.

Our study focuses on reconstituting a refined quantitative estimate of the Himalayan silicate weathering intensity using Neogene and Quaternary sediment record from IODP Expedition 354 at 8°N. Differences in chemical composition inherited from different crustal maturity of the Himalayan formations need careful assessment of sediment sources, done here using Nd isotopic composition, which are less effected by sorting and weathering, and demonstrate a strong control on provenance. Acid leaching of the sediments has been refined to retrieve silicate major and trace elements compositions of the sediments.

Source rock composition is constrained by comparison with modern river sediment and bed rocks. Bengal fan Data at 8°N show geochemical characteristic comparable to the modern pattern during Quaternary and Pliocene. Miocene record shows depletion of 0.2-0.4 mol/kg of Ca ($\delta Ca > 70\%$) and 0.1-0.3 mol/kg of Na that imply more intense plagioclase weathering, hence erosional conditions that favor silicate alteration, among those, higher temperature prevailing during Miocene. In parallel, we observe higher proportion of detrital carbonate during Miocene. This appears at odd with enhanced silicate weathering and may therefore reflect higher proportion of carbonates in the source rocks.