Evolution & Stability of Sediment Chemistry in Himalayan Rivers

G. E. HUGHES*[1], E.T.TIPPER[1], M.J. BICKLE[1], C.ANDERMAN[2]

[1] Dept. of Earth Sciences, University of Cambridge, Downing Street, Cambridge, CB2 3EQ, UK (*correspondence:gh436@cam.ac.uk)

[2] GeoForschungsZentrum, Telegrafenberg, Potsdam, 14473, Germany

The delivery of weatherable sediment to floodplains contributes to the regulation of CO_2 over geological times. Understanding the supply, provenance and subsequent evolution of the suspended sediments is therefore essential. The high erosion rates of large mountain belts, such as the Himalaya dominate global sediment budgets. Our research examines spatial and temporal changes in suspended sediment chemistry and supply between the Himalayan Range and Front of Kosi River Basin. The Kosi River is one of the five largest rivers draining the Himalayas.

We present chemical data on silicate residues obtained from sequential extraction, grainsize and mineral compositions and abundances. Building on work by [1&2] sediment chemistry will be explained in terms of mineralogical end members.

The controls on the chemistry of suspended sediment are source effects, sorting, quartz dilution and sediment storage within the river course. Downstream trends in Na/Al and K/Si appear stationary over successive monsoonal seasons (2015-2018) suggesting a geomorphological steady state.

By contrast, significant changes in Al/Si are seen within the monsoon season. Early monsoon sediments (May-July) sediments are characterised by low Al/Si ratios from fine grained minerals of mica and clays and late monsoon sediments (August-October) high Al/Si of more coarse grained sediments such as plagioclase and quartz. This suggests that the Kosi River is supply limited with a progressive loss of fine grained sediment during the monsoon season. The controls on this will be discussed.

[1] Lupker et al., (2012) Geochim. Cosmochim. Acta. 84, (410-432). [2] Bouchez et al., (2011) Geochemistry Geophyscis Geosystems, 12 (3).