Understanding Himalayan erosion using K/Ar thermochronological dating of silts & clays from the Bengal Fan

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Himalayan erosional processes have contributed to the global atmospheric CO_2 drawdown responsible for late Cenozoic global cooling through organic carbon burial and silicate weathering. Himalayan orogenesis has also led to more intense monsoon activity, which promotes erosion. To better evaluate the relationship between these factors, a more precise history of uplift, erosion, and weathering is needed. Past studies on deposits of material eroded from the Himalayas have used thermochronology of detrital minerals to infer past erosion rates, and chemical indexes to infer the balance of chemical vs. physical weathering and the intensity of monsoon rainfall. Here we produced K-Ar thermochronological dating and major element analysis (for a chemical index of alteration, CIA) on 14 samples from marine sediments (<63 μm grain size fraction) from the Bengal Fan, with depositional ages back to 21 Ma, with the aim to provide more data on Himalayan erosion and weathering history over this time. The high Himalayas have young (<20 Ma) thermochronological ages, but our K-Ar ages range from 80 to 230 Ma. This is probably because there is an admixture of thermochronologically older material from the Indian Shield (>500 Ma) in our samples. The balance of sediment coming from the two sources (Himalayas and Indian foreland) is not straightforward to interpret, but this changing provenance may reflect varying intensities of monsoon rainfall over the two areas and the rate of Himalayan uplift and erosion. The CIA generally co-varies with K-Ar age in our samples, and there is a possible trend from younger to older K-Ar ages in the sediments deposited from 21 to 8 Ma. Using K-Ar in tandem with major element analysis allows us to examine the role of chemical weathering in the proposed hypothesis. However, further work needs to be done to process all samples and measure the thermochronological age of individual grains to help differentiate provenances of our samples.