Very low-temperature luminescence thermochronometry of feldspar applied to the Siwalik Hills

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Luminescence thermochronometry comprises a new, very low-temperature system, capable of constraining thermal histories between 30 and 100 °C over timescales of 10^{4-5} yrs [1]. It is based upon the established optically stimulated luminescence dating technique [2] and exploits the time and temperature dependent accumulation of trapped charge within feldspar minerals, in response to exposure to ionizing radiation within the natural environment. The relative ease of luminescence measurements allows sample specific kinetic values to be constrained over laboratory timescales, which can then be used to invert natural luminescence signals into cooling histories [3]. Here we outline the principles of luminescence thermochronometry and its recent application to 18 sandstone samples from the Siwalik Hills in Nepal and Bhutan. Using a multi signal approach, whereby four signals with different thermal stabilities are measured for each sample [3], cooling rates of ~100 °C/Myr over the last 0.2 Ma were calculated. These preliminary results suggest that estimated erosion rates over the foothills of the Himalaya are up to one order of magnitude higher than the longer-term erosion rates (1-3 mm/yr) documented in the high-range of the orogen.

[1] King, G.E. et al., 2016. *Chem. Geol.* 446, 3-17. [2] Huntley, D.J., et al., 1985. *Nature*, *313*(5998). [3] King, G.E., et al., 2016. *Quat. Geochron.* 33, 76-87.