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Interactive comment on "Thermal resistances in the Everest Area (Nepal Himalaya) derived from satellite imagery using a nonlinear energy balance model" *by* D. R. Rounce and D. C. McKinney

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Dr. Rounce,

I am interested in the implication of debris-cover on the effective surface temperature of the glacier ice beneath. I am wondering if you can speculate whether debris cover possibly biases/offsets the effective mean annual ice surface temperature by a non-trivial amount (i.e. > 1 C)? Or if it simply attenuates the annual temperature signal with depth, and thereby does not influence the underlying mean annual ice surface temperature?

As you may be aware, the thermal boundary condition prescribed at the surface of

a thermo-mechanical ice flow model is equal in importance to the prescribed surface mass balance forcing. In a recent collaboration (within your study region I believe), we found that a thermo-mechanical model of the partially debris-covered East Rongbuk Glacier was right on the "thermal knife-edge" between being cold and warm based (Zhang et al., 2013). The relatively low geothermal heat flux and deformational velocity made calculated basal ice temperature relatively sensitive to prescribed surface temperature. We just assumed mean annual ice surface temperature was equivalent to mean annual air temperature.

I realize this is a little beyond the scope of your paper, as your presented LT3 temperature data stops short of penetrating the debris layer, but I would appreciate any thoughts you might have.

Thanks, William Colgan

Zhang, T.; Xiao, C.; Colgan, W.; Qin, X.; Du, W.; Sun, W.; Liu, Y. & Ding, M. 2013. Observed and modelled ice temperature and velocity along the main flowline of East Rongbuk Glacier, Qomolangma (Mount Everest), Himalaya. Journal of Glaciology. 59: 438-448. doi:10.3189/2013JoG12J202

Interactive comment on The Cryosphere Discuss., 8, 887, 2014.