

Interactive comment on “Arctic-alpine blockfields in northern Sweden: Quaternary not Neogene” by B. W. Goodfellow et al.

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General comments:

The manuscript deals with the composition, origin and age of arctic-alpine blockfield surfaces in northern Sweden, and implications for evolution of the Scandinavian mountain landscape. The manuscript is well written, clear and concise, and has good tables and figures. A main strength of the manuscript is the number of samples analysed from pits dug along transects and on summits, making the evaluation of chemical weathering intensity robust. The clarification of issues related to gibbsite formation and climate is particularly important. The estimation of erosion rates and total surface histories inferred from in situ-produced cosmogenic ^{10}Be and ^{26}Al in summit quartz is based only on two samples, but the way the data is dealt with and discussed is very important and

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useful for future work. The findings and interpretations of the manuscript is very relevant for ongoing discussions in the scientific community on the origin (and implications for age) of blockfields in Scandinavia.

Specific comments:

p. 67, l. 8-9: rephrasing is suggested for this sentence: ‘Because nuclides have likely accumulated in surface regolith at a faster rate than provided for in our model and nuclide decay has likely been less...’ Rates for accumulation and decay cannot vary, but the duration of exposure and burial can?

p. 67, l. 26: consider rephrasing, 2x offers/offered.

p. 70: Clarification of what implications that can be inferred from the presence of gibbsite is important and welcomed.

p. 71-72, evidence against the glacial ‘buzz-saw’: Early glacial erosion of the uplands in Norway was suggested by Reusch in 1910 (Effects of glacial erosion in Norway, 11th international geology congress) as an explanation for the existence of flat upland surfaces. The modelling study of Pedersen & Egholm (2013, Nature 493, 206-210) also suggests that glacial erosion formed the flat upland surfaces in alpine settings prior to the mid-Pleistocene transition (950 ka). Except for the predicted (and logically explained) resistance to formation of blockfields on glacially-eroded surfaces, it seems that there is not necessarily any conflict between the results of Pedersen & Egholm (2013) and the modelled total surface histories (p. 67) ‘suggesting evidence that the late Quaternary has offered sufficient time for the present regolith mantles...to gain their respective ^{10}Be inventories’. I think it is important to clarify why the glacial/periglacial buzz-saw model is not compatible with the findings from northern Sweden, despite the apparent agreement in timing.

No technical corrections at this stage.