Mineralogical and geochemical patterns in soils on tills in California's Lake Tahoe Basin.

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Studies of weathering rates and processes in sub-alpine environments are relatively rare, especially where deposit ages are well constrained. We studied 18 granitic-till-derived soils and 21 rocks in Tioga-age (~ 19ka) and Tahoe-age (~118ka)[1] moraine crest deposits in the Lake Tahoe Basin. Mineralogical and elemental analyses included quantitative XRD[2], DSC/TG, total elements by ICP-OES, and mineral selective dissolution[3]. Chemistry and morphology of silica-cemented subsoil layers (duripans) were investigated by electron microprobe analysis and exploratory *in situ* U/Th. We also measured the chemistry of ex-situ pore waters and estimated mineral equilibrium using various approaches [4, 5]. Tahoe-age soils have lost up to 16% plagioclase, 9% biotite, and 2% amphiboles as compared to proxy initial till composition. As a result, soils have accumulated amorphous silica and gibbsite, but to a greater extent and depth in the Tahoe-age soils. U and Th are associated with the amorphous silica and gibbsite, in concentrations that may allow *in situ* dating. Our results show that mineral weathering has produced amorphous silica and gibbsite in a cold, subalpine environment, and that these products accumulate in older soils. These weathering products are more typically associated with stronger weathering on much older landscapes in warmer climates. Results also provide a basis for estimation of mineral alteration rates in these sub-alpine deposits.

[1] D. H. Rood, D. W. Burbank and R. C. Finkel, *Quaternary Science Reviews*, 2011, **30**, 646-661 [2] D. D. Eberl, 2009 [3] NRCS, 2004 [4] D. L. Parkhurst and C. A. J. Appelo, 1999 [5] J. P.Gustafsson, 3.1 edn. 2014