Soil production and chemical weathering rates along a vegetation gradient in the East River Watershed, Colorado

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Project Abstract: Globally, mountain watersheds are hotspots for chemical weathering, but our process-level understanding regarding the mechanisms and drivers of chemical weathering in steep, high elevation landscapes is incomplete. To quantify the influence of vegetation on soil chemical weathering rates, soil samples were collected across a vegetation gradient on Mount Gothic, an igneous quartz monzonite intrusion in the East River watershed, near Crested Butte, Colorado. Three sampling sites are above tree line, at elevations >3700 m, whereas three additional sampling sites are at elevations <3400 m, where there is spruce forest vegetation. Bedrock samples were collected from outcrops adjacent to each of the soil pits to characterize the geochemistry of un-weathered parent material. The samples are currently undergoing analyses at the University of Massachusetts Cosmogenic Nuclide and XRF Laboratories. Though quartz-poor, the samples have yielded sufficient material for measurement of *in situ*-produced ^{10}Be, a cosmogenic nuclide that is used to assess rates of surface processes averaged over geomorphic timescales. The ^{10}Be concentrations will be used to quantify the total denudation rate, or the rate of mass loss due to the combined influences of physical erosion and chemical weathering (mineral dissolution). By measuring the enrichment of Zr, a chemically immobile element, and applying geochemical mass balance, the fraction of total denudation caused by chemical weathering will be quantified. The results will be used to determine rates of physical erosion and chemical weathering that will be used to assess the influence of vegetation on chemical weathering rates. Additional samples are to be collected at sites that span similar biotic and climatic gradients, but that have different underlying geology, which will further permit assessment of the factors that most strongly influence soil chemical weathering in the East River watershed.