



Chemical and biological gradients along the soil chronosequence of the Damma Glacier Critical Zone observatory (Switzerland)

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Soils are the product of a complex suite of chemical, biological and physical processes. In spite of the importance of soils for society and for sustaining life on earth, our knowledge of soil formation rates and of the influence of biological activity on mineral weathering and geochemical cycles is still limited. In this contribution we provide a description of the Damma Glacier Critical Zone Observatory and present a first synthesis of our multidisciplinary studies of the 150-year soil chronosequence. The aim of our research was to improve our understanding of ecosystem development on a barren substrate, of the early evolution of soils and to evaluate the influence of biological activity on weathering rates. Soil pH, cation exchange capacity, biomass, microbial and fungal populations and soil organic matter show strong gradients related to soil age, in spite of the extreme heterogeneity of the ecosystem. The bulk mineralogy and inorganic geochemistry of the soils, in contrast, is very homogeneous and only in older soils (>100 yrs) incipient weathering is observed, mainly observed as a decreasing content in plagioclase and biotite by coincidental formation of secondary chlorites. Further, we document the rapid evolution of microbial- and plant-communities along the chronosequence. At the centennial time scales of the chronosequence no significant effect of biology on weathering or mineral alteration is observable.

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