Geophysical Research Abstracts
Vol. 14, EGU2012-14335, 2012
EGU General Assembly 2012

Determining soil formation rates in limestone terrain using elemental fingerprinting

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A large body of research has focused on determining and modelling soil erosion rates for a wide range of environmental conditions and ecosystems around the world. In contrast, relatively little is known about soil formation rates. Knowledge of the latter, however, is critical for determining the seriousness of soil erosion for a given environment. In this exploratory study, in situ subsurface formation of weathering residue from Jurassic limestone was determined along a Catena in the temperate climate of the Schwaebische Alb, southern Germany.

The limestone surface has been covered by a clay- and flint-rich sediment (Feuersteinlehm) since the Tertiary, allowing in situ accumulation of weathering residue between the limestone surface and the Tertiary sediment. The limestone residue was therefore able to accumulate protected from surface erosion since the Tertiary and to develop into a Terra fusca-type material. Terra fusca and Feuersteinlehm are both clay-rich, but geochemical elemental fingerprinting allowed distinguishing of both materials. Although some uncertainties exist, the thickness of this sub-surface weathering residue provides some insight into the weathering rate of limestone and the potential de novo formation of Terra fusca since the Tertiary. This presentation will explore these issues in the context of the dominant regional climate of this region.