Weathering and soil formation on the slopes of volcano Cotacachi in northern Ecuador. (S05-zehetner103032-Oral)

Authors:

- F.Zehetner* - *Dept. of Crop and Soil Sciences, Univ. of Georgia*
- W.P.Miller - *Dept. of Crop and Soil Sciences, Univ. of Georgia*
- L.T.West - *Dept. of Crop and Soil Sciences, Univ. of Georgia*

Abstract:

Weathering and development of volcanic ash soils show similar patterns in different regions of the world; however, the specific environmental conditions at a given location result in a unique combination of factors and processes governing soil formation. This research was conducted to study pedogenesis on volcanic slopes in the inter-Andean valley of northern Ecuador. Twelve soil pedons representing different pedogenic environments were sampled at elevations between 2410 and 4050 m above sea level (asl). In pedons above 3200 m asl, allophane and aluminum-humus complexes dominate the colloidal fraction, the topsoils are high in organic matter, and the soils classify as Andisols with melanic epipedons. In pedons below 2700 m asl, halloysite is the predominant colloidal constituent, the topsoils contain < 1 % organic carbon, and the soils are Inceptisols and Entisols. The pedons at intermediate elevation mark a transition zone, in which allophane and halloysite coexist and the soils generally classify as Andisols with umbric epipedons. Virtually the same altitudinal weathering sequence was observed in the 3000-year old recent soils and in paleosols, which are considered to be older than 40 000 years. Thus, different time of pedogenesis has not caused marked differences in the composition of the colloidal fraction. Affecting leaching regime and organic matter decomposition, climate is considered the overriding factor responsible for the observed altitudinal differences in soil development.

Corresponding Author Information:

Franz Zehetner
Dept. of Crop and Soil Sciences, Univ. of Georgia
Miller Plant Sciences Building, Room 3111
Athens, GA 30602

phone: (706) 542-0916
fax: (706) 542-0914
e-mail: zefra@arches.uga.edu

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