

Topographic and geologic control on soil function evaluation - a case study from South Tyrol

Fabian E. Gruber^{a,*}, Jasmin Baruck^a, Volkmar Mair^b, Clemens Geitner^a

^a*Institute of Geography, University of Innsbruck, Innrain 52f, 6020 Innsbruck, Austria*

^b*Amt für Geologie und Baustoffprüfung, Eggentaler Straße 48, 39053 Kardaun, Autonomous Province Bolzano – South Tyrol, Italy*

Abstract

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1. Introduction

Information on soil, a, at least from a human time perspective, non-renewable resource, is of increasing importance given erosion, soil degradation and soil sealing. It is necessary to know where and where not certain
5 practises are applicable and to adjust land-use planning appropriately. Accordingly, soil function evaluation is an invaluable tool for the future.

In this study, we present the soil evaluation tool *Soil Evaluation for Planning Procedures (SEPP)* and investigate topographic and parent material control of the different soil functions by applying a cross-validated
10 machine learning approach based on available soil pit information in the Oltradige/Überetsch region of the Autonomous Province Bolzano - South Tyrol.

(Haslmayr et al., 2016)

*Corresponding author

Email address: `Fabian.Gruber@uibk.ac.at` (Fabian E. Gruber)

2. Data and methods

15 2.1. Study area and soil data

2.2. SEPP - Soil Evaluation for Planning Procedures

The software SEPP currently computes a soil function evaluation based on soil pit descriptions. It requires that the pit descriptions are performed following the Austrian Soil classification (Nestroy et al., 2000, 2011) and related mapping manuals. The minimum soil profile site characteristics are local slope, Auflagemaechtigkeiten, Gruendigkeit, flurabstand, soil parent material, soil type, humus form, ecological hoechststufe, oekofoechte, land use ... For each horizon, the minimum characteristics necessary for computing the soil function are horizontbezeichnung, depth, ph value, carbonate class, texture, organic content class, Skelettanteil, dichte klasse, gefuege and gefuegeanteil. The soil functions for which 15 different potentials are computed are *habitat for living organisms* (specifically the potential as habitat for drought-tolerant species, moisture tolerant species, soil organisms and crops), *infiltration and drainage regulation* (minimum, average and heavy precipitation retention capacity as well as groundwater reformation rate), *natural soil fertility* as well as *filter and buffer for pollutants* (heavy metal, organic, acidifying and water-soluble). The result is the attribution of a grade between 1 and 5 for each soil function potential, with 1 signifying a high potential and 5 a low one.

35 3. Results

A first evaluation of the feature selection procedure shows that mostly 2 parameters are sufficient, that is that there is no increase in prediction accuracy by adding more predictors, and most of the time these a combination of a landform classification and a roughness or also local terrain parameter.

40 4. Conclusion

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