Geophysical Research Abstracts
Vol. 16, EGU2014-5194, 2014
EGU General Assembly 2014

Soil mapping and classification in the Alps: Current state and future challenges

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Soil is an essential, non-renewable resource, which fundamentally needs sustainable management. Soils in mountain regions like the Alps have a diverse small-scale distribution and they are characterized by a slow soil development and multilayer profiles. This is mainly caused by high process dynamics and harsh climate conditions. Therefore, soils are particularly vulnerable and require a sustainable management approach. Furthermore, the global change, especially the climate and land use change, leads to new demands on the soil. Thus, high-resolution spatial informations on soil properties are required to protect this resource and to consider its properties in spatial planning and decision making.
In the Alpine region soil maps are mostly confined to small (mostly agriculture) areas. Especially, in higher altitudes of the Alps pedologic research and data collection are lacking. However, nowadays and in the future systematic soil mapping works are and will be no longer applied. Another methodical problem arises because each Alpine country has its own national soil mapping and classification system which are not adapted to Alpine areas. Therefore, appropriate methods of working practices for the Alpine region are mostly missing.
The central aim of the research project “ReBo - Terrain Classification based on airborne laser scanning data to support soil mapping in the Alps”, founded by the Autonomous Province of Bolzano - South Tyrol, is to develop and verify a concept, which allows the collection of soil data through an optimized interaction of soil mapping and geomorphometric analysis. The test sites are located in South Tyrol (Italy). The workflow shall minimise the required pedologic field work and shall provide a reliable strategy for transferring punctual soil informations into spatial soil maps. However, for a detailed analysis a systematic pedologic field work is still indispensable. As in the Alps reliable soil mapping and classification standards are lacking, following questions arise: What can we learn and adopt from existing mapping and classifications systems? Is there a basis for the development of international standards and future collaborations in the Alpine region?
Against this background we give an overview of the national classification systems in the Alpine region. Additionally, a data set of soil profiles from South Tyrol will be used to show the effects of different soil classifications with special reference to topography and parent material.