Geophysical Research Abstracts
Vol. 14, EGU2012-9333, 2012
EGU General Assembly 2012

Linking soil forming processes, geomorphological dynamics and human activity to understand past and future patterns of landscape change

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The interactions between soil formation, slope processes, human activities and changing climate are important in shaping landscapes. However, these aspects of landscape development have not often been combined in integrated quantitative analysis. This means that we cannot yet make accurate assessments of the sustainability of our land-based activities under changing climate and management conditions. In particular, important questions about the effects of human activity on soil formation and of erosion on soil formation remain unanswered.
Models that can serve as a framework for the calculation of such interactions have recently become available, offering methods to rapidly and significantly increase our knowledge of the behaviour of the combined human-soil-landscape system under climatic influence. If quantitative data about interactions become available, these models can simulate landscape development and provide testable predictions.
Recent exploratory work in this direction is promising. With diminishing computational limitations and increasing attention for parsimony in model building, Landscape Evolutin Models (LEMs) now allow quantitative incorporation of soil formation processes (e.g. LAPSUS) and recent soil formation models allow calculation of the evolution of soil properties in ways that are suited for such incorporation (e.g. SoilGen2). A major step forward is possible whereby landscape evolution and soil formation will be integrated through quantitative modelling, with possibilities to include dynamic feedback mechanisms between soil and landscape. Such a model will allow us to study the coupled human-environmental system and is a significant contribution to landscape change management.
Our objective is to propose a model framework and platform for others to join or to be inspired. Altogether with the common goal to increase our understanding of the quantitative interaction between slope processes, soil formation and human activity through measurements and modelling.