Geophysical Research Abstracts
Vol. 12, EGU2010-7001, 2010
EGU General Assembly 2010

Formalized landscape models for surveying and modelling tasks

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We present a formalization of main geomorphic landscape models, mainly the concept of slopes, to clarify the needs and potentials of surveying technologies and modelling approaches. Using the Unified Modelling Language (UML) it is implemented as a exchangeable Geography Markup Language (GML3) -based application schema and therefore supports shared measurement campaigns.
Today, knowledge in Geomorphology is given synoptically in textbooks in a more or less lyrical way. This knowledge is hard to implement for the use of modelling algorithms or data storage and sharing questions. On the other hand physical based numerical modelling and high resolution surveying technologies enable us to investigate case scenarios within small scales. Bringing together such approaches and organizing our data in an appropriate way will need the formalization of the concepts and knowledge that is archived in the science of geomorphology. The main problem of comparing research results in geomorphology but is that the objects under investigation are composed of 3-dimensional geometries that change in time due to processes of material fluxes, e. g. soil erosion or mass movements. They have internal properties, e. g. soil texture or bulk density, that determine the effectiveness of these processes but are under change as well.
The presented application schema is available on the Internet and therefore a first step to enable researchers to share information using an OGC's Web feature service. In this vein comparing modelling results of landscape evolution with results of other scientist's observations is possible. Compared to prevalent data concepts the model presented makes it possible to store information about landforms, their geometry and the characteristics in more detail. It allows to represent the 3D-geometry, the set of material properties and the genesis of a landform by associating processes to a geoobject. Thus, time slices of a geomorphic system can be represented as well as scenarios of landscape modelling. Commercial GI-software is not adapted to the needs of the science of geomorphology. Therefore the development of an application model i. e. a formal description of semantics is imperative to partake in technologies like Web Feature Services supporting interoperable data transfer.