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Web-based Information System for Multi-Scale Physical State Variables

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Projects in geosciences and water related research and engineering are using mass of information originated from field measurements, numerical simulations and laboratory experiments on different time and space scale. The management and the useful utilization of information require suitable information systems for efficient interdisciplinary and distributed project collaboration. The conference contribution describes the concept, implementation and application of an innovative information system in an interdisciplinary research project to simulate the long-term deformation of large hillslopes. Models from hydrology, two-phase groundwater flow and soil mechanics will be linked and integrated towards one interdisciplinary, multi-scale simulation system. A wide range of field measurements (hydro-meteorological, hydro-geological, geotechnical and geophysical observations) on the case study Heumöser Hang/A and additional laboratory experiments are used for general understanding of the phenomena / natural systems as well as for parameter identification and verification. The different models, field and laboratory measurements deal with a huge amount of heterogeneous physical state variables on different scales in time and space. The integration of the different information sources and the collaboration between experts from different disciplines requires an innovative information system for multi-scale physical state variables in geosciences and water related projects. The information system to be presented applies a generalized tensor-based modeling approach for physical state variables to overcome the different space and time scales of the interdisciplinary ap-

proach. Physical state variables are described by sets of tensors, modeled by generalized classes and related meta data schemes. The meta data contain all relevant geosciences and water related engineering information such as physical entity type, coordinates, units, origin (e.g. instrument, measurement/experiment or simulation run) and relationship to other physical state variables. The tensor classes include besides physical state data all analysis/simulation functional relationships and semantics from the research/engineering point of view. Examples are methods for up- and downscaling on different approximation levels. The application of object-oriented principles allows the setting up of a powerful system-/discipline-independent tool set for component-oriented hydroinformatics system development. The concept integrates the traditional separated pre- and post-processing, data bases and simulation processors in a holistic and flexible hydroinformatics system in the geosciences environment. The application of Web-technology and document/information management enables a modern Web-based collaboration within projects. Details of the concept and application of the information system for multi-scale physical state variables within the interdisciplinary German research group “Grosshang” (Coupling of Flow and Deformation Process for Modeling the Movement of Natural Slopes, http://www.grosshang.de) will be presented on the conference.