Geophysical Research Abstracts
Vol. 16, EGU2014-16819, 2014
EGU General Assembly 2014

Using multiscale behavior of hydrological systems for improving process understanding

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Landscape properties and climatic inputs are strongly heterogeneous in space and time resulting in hydrological processes that show multi scale or even fractal properties and behavior (Rodriguez-Iturbe and Rinaldo, 2000). Considerable effort is invested in finding the most appropriate approaches to represent hydrological processes across different scales and to produce reliable hydrological predictions.

Hydrological predictions have been mainly improved in the recent decades by increasing the complexity of hydrological models, e.g. by including different type of hydrological processes and landscape compartments and by considering feedbacks between different compartments. Nevertheless, because of information constraints that e.g. result in high parameter uncertainties, complex hydrological models also show limitations to provide reliable hydrological predictions. In other words, hydrological model predictions are and probably also will stay uncertain.

Spatially distributed hydrological models produce big amount of data depending on driving data, spatially distributed model parameters but also spatial and temporal model resolution. This talk will introduce multi scale investigation techniques to explore the probabilistic behavior of hydrological states and fluxes across different spatial and temporal scales. In particular, the question is addressed if catchments show self-averaging behavior.