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Model development based on a landscape oriented catchment unit concept

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This paper is a companion paper to our project proposal "Hydrologic model framework for river basins with a range of hydroclimatic and bioclimatic conditions" (HS4.1). It intends to present a few ideas of how to bridge available concepts of landscape classification (as an example the Holdridge Life Zones classification scheme will be used) and hydrological approaches related to the Dominant Process Concept. The focus is on the development of landscape related indices that consider water balance characteristics (e.g.: the relationship ET/P), seasonality measures, and/or runoff generation process signatures at the landscape scale.

Methods applied to consider runoff generation in hydrological modelling are commonly based on concepts such as the Hydrological Response Unit (HRU) concept (e.g. Flügel, 1995), the "hydrotop" concept (e.g. Reszler et al., 2006) and the Dominant Runoff Processes concept (DRP, e.g. Schmocker-Fackel and Scherrer, 2007). They are best suited to smaller scale catchment description. It is hypothesized here that additional/new concepts are necessary if the mechanismus that control runoff generation on a larger, i.e. regional scale should be captured.

Hydrological reasoning and first results from regional studies indicate that appropiately chosen "signatures" can be found to characterise differences in the control of the runoff processes in different catchments situations. Examples might be "indicators" which include the soil moisture state of a basin or the event runoff coefficient derived from hydrological model simulatons or from runoff observations, respectly (e.g. Samuel et al. 2008; Merz & Blöschl, 2009a).

The presentation will demostrate a few results from first studies on the above outlined concept. The study uses data from a set of Austrian catchments prepared for the studies reported in Merz & Blöschl (2009a).

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