



Influence of soil and climate on root zone storage capacity

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The root zone water storage capacity (S_r) of a catchment is an important variable for the hydrological behaviour of a catchment; it strongly influences the storage, transpiration and runoff generation in an area. However, the root zone storage capacity is largely heterogeneous and not measurable. There are different theories about the variables affecting the root zone storage capacity; among the most debated are soil, vegetation and climate. The effect of vegetation and soil is often accounted for by detailed soil and land use maps. To investigate the effect of climate on the root zone storage capacity, an analogue can be made between the root zone storage capacity of a catchment and the human habit to design and construct reservoirs: both storage capacities help to overcome a dry period of a certain length. Humans often use the mass curve technique to determine the required storage needed to design the reservoir capacity. This mass curve technique can also be used to derive the root zone storage capacity created by vegetation in a certain ecosystem and climate (Gao et al., 2014). Only precipitation and discharge or evaporation data are required for this method. This study tests whether S_r values derived by both the mass curve technique and from soil maps are comparable for a range of catchments in New Zealand. Catchments are selected over a gradient of climates and land use. Special focus lies on how S_r values derived for a larger catchment are representative for smaller nested catchments. The spatial differences are examined between values derived from soil data and from climate and flow data.

Gao, H., Hrachowitz, M., Schymanski, S.J., Fenicia, F., Sriwongsitanon, N., Savenije, H.H.G, (2014): Climate controls how ecosystems size the root zone storage capacity at catchment scale. DOI: 10.1002/2014GL061668