



Introducing a probabilistic Budyko framework

Peter Greve (1,2), Lukas Gudmundsson (1), Boris Orlowsky (1), and Sonia I. Seneviratne (1)

(1) ETH Zürich, Institute for Atmospheric and Climate Science, Zürich, Switzerland (peter.greve@env.ethz.ch), (2) Center for Climate Systems Modeling (C2SM), ETH Zürich, Zürich, Switzerland

Water availability is of importance for a wide range of ecological, climatological and socio-economic applications. Over land, the partitioning of precipitation into evapotranspiration and runoff essentially determines the availability of water. At mean annual catchment scales, the widely used Budyko framework provides a simple, deterministic, first order relationship to estimate this partitioning as a function of the prevailing climatic conditions. Here we extend the framework by introducing a method to specify probabilistic estimates of water availability that account for the nonlinearity of the underlying phase space. The new framework allows to evaluate the predictability of water availability that is related to varying catchment characteristics and conditional on the underlying climatic conditions. Corresponding results support the practical experience of low predictability of river runoff in transitional climates.