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Impact of Soil Data Parameterization on Recharge for Climate Change Studies

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Recharge is a major factor in water budget analysis and therefore in the evaluation of available water resources under changing climate. Recharge estimation depends strongly on the soil type. This study utilizes a soil data which is provided by Agriculture and Agri-Food Canada, here after referred to as government data. Aim is to evaluate the reliability of the soil data for climate change modelling using HYDRUS-1D and a statistical downscaling model (SDSM), and to demonstrate the significance of our previously developed recharge estimation method (Assefa and Woodbury 2013) for climate change studies. While the future climate time series is constructed by using predictor variables derived from the HadCM3 A2 experiment, the required soil hydraulic parameters are estimated from single/dual porosity soil hydraulic models and parameter estimation technique based on transient soil moisture data. The latter are recorded using a state-of- the art sensors equipped in a HOBO^{TM} weather station, which is installed at our experimental site in the valley bottom of the Deep Creek watershed in North Okanagan, British Columbia, Canada.

The reliability of the government soil data for climate change modelling is assessed by simulating soil moisture and groundwater recharge. The results suggest promising performance of the soil data for vadose zone hydrologic modelling, with correlation coefficient and RMSE estimated at 0.84 and 0.036 cm^3cm^{-3}, respectively. The modelling results show that the government soil data can be taken as a reliable resource for vadose zone hydrologic modelling in a changing climate.

Assefa KA, Woodbury AD (2013) Transient, spatially varied groundwater recharge modeling. Water Resources Research 49 (8):4593-4606. doi:10.1002/wrcr.20332