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Scarce data in hydrology and hydrogeology: Estimation and modelling of groundwater recharge for a numerical groundwater flow model in a semi-arid to arid catchment

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Water resources are strongly limited in semi-arid to arid regions and groundwater constitutes often the only possibility for fresh water for the population and industry.
An understanding of the hydrological processes and the estimation of magnitude of water balance parameters also includes the knowledge of processes of groundwater recharge. For the sustainable management of water resources, it is essential to estimate the potential groundwater recharge under the given climatic conditions.
We would like to present the results of a hydrological model, which is based on the HRU- concept and intersected the parameters of climatic conditions, topography, geology, soil, vegetation and land use to calculate the groundwater recharge. This model was primarily developed for humid area applications and has now been adapted to the regional conditions in the semi-arid to arid region. It was quite a challenge to understand the hydrological processes in the semi-arid to arid study area and to implement those findings (e.g. routing [Schulz (in prep.)]) into the model structure.
Thus we compared the existing approaches for groundwater recharge estimations (chloride mass balance [Marei et. al 2000], empirical relations such as rainfall and base flow-relation [Goldschmidt 1960; Guttman 2000; Hughes 2008; Issar 1993; Lerner 1990; De Vries et. al 2002]) with the results of our numerical model.

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