Geophysical Research Abstracts, Vol. 8, 10670, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10670

A linear transfer function model to predict groundwater recharge in the valley of the Drâa (South-Morocco)

Q. Goor , E. Persoons , M. Vanclooster

Department of Environmental Sciences and Land Use Planning, Université catholique de Louvain, Belgium

An accurate prediction of groundwater recharge is needed to design sustainable water management strategies. The use of physical based flow models in groundwater management, however, is often jeopardized by data and parameter availability. Hence, as an alternative to Richards equation based flow models, effective and parsimonious data based modeling approaches are needed.

In this study, we test the applicability of a linear transfer function model (TFM) to predict the groundwater recharge from the Drâa wadi in Southern Morocco. Water within the Drâa wadi is artificially released from the Mansour Eddahbi dam in Ouarzazate to support hydroelectricity production and irrigation within the Drâa valley. Infiltration in the wadi during the artificial release, recharges the groundwater bodies within the valley. The tested TFM, uses water release from the dam within the wadi and net precipitation as model input. The TFM parameters are physically interpreted in terms of effective flow properties.

The TFM is tested to estimate groundwater below the first oasis (Mezguita) of the valley. The water release from the dam entering the oasis is estimated from wadi discharge measurements, while rainfall is estimated using a tele-monitored rainfall gauge. Groundwater level data are collected close to the wadi, using automated piezometers. Model parameters are inferred from inverting the TFM by means of a local optimisation algorithm, using wadi discharge, rainfall and groundwater data collected for the period august 1997-august 1999. The model is next used to predict recharge and groundwater level data for the period september 1999 - september 2001. Results show that the TFM parameters can be estimated from available data, that the effective

recharge parameter estimation problem is well posed, and that the physical interpretation of the effective parameter values is consistent.

Results show also that the prediction performance for the period 1999-2001 is influenced by increased pumping in the groundwater by local farmers. This pumping is not directly monitored and not considered within the present version of the TFM.