Geophysical Research Abstracts, Vol. 9, 10321, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10321


# Proportional weighting of phreatic level measurements to increase model optimization efficiency.

# A search for rainfall intensity thresholds for preferential flow related groundwater recharge variability.

**F.A.N. Hogervorst**(1), G.H. de Rooij(1), M.F.P. Bierkens(2)

(1) Wageningen University, Subdept. Water Resources, Wageningen, The Netherlands, (2) University of Utrecht, Dept. of Physical Geography, Utrecht, The Netherlands, (Franck.Hogervorst@wur.nl)

Shallow groundwater systems in sandy soils sometimes show a pressure-response to high intensity rainfall before a homogeneous infiltration front could have reached the capillary fringe. About 10% of phreatic level series in the sandy regions of the Netherlands show failure of models to directly simulate these fast responses. High frequency field data is used in combination with 1D numerical unsaturated zone model SWAP and a time series model Menyanthes that applies a predefined form of the Impulse Response function (Pearson III distribution). As optimisation procedures apply Least Mean Square Error based on equality of all explaining data points these methods are naturally blind for processes that occur only at certain rainfall intensities, such as preferential flow. Even if high resolution rainfall data is available, equally weighted phreatic level data will obliterate rate-dependent processes as dynamic conditions are numerically underrepresented in Dutch conditions as rain falls only in 6% of the time. Although short time series are not considered unsuitable for parameter estimation, it allows one to focus on increasingly event-specific conditions for which the information content of the data may be higher, especially if different frequencies of rainfall are used. Also we applied a proportional weighting filter to focus on the data that contain the most information on unsaturated zone processes. The observed contrast between these two approaches, event-specific optimisation combined with proportional weight-

ing of target parameters, and standard optimisation of long time series is presented in a way that enables identification of unsaturated zone processes, measurement artefacts and spatial arrangement of local drainage characteristics.