Geophysical Research Abstracts, Vol. 8, 05633, 2006
SRef-ID: 1607-7962/gra/EGU06-A-05633


# Forecasting: discrepancy between meteorological and hydrological droughts

Henny A.J. van Lanen

Hydrology and Quantitative Water Management Group, Wageningen University, the Netherlands (henny.vanlanen@wur.nl / Phone +31 317 482418)

Europe regularly suffers from extreme drought (e.g. 2003 and 2005) usually leading to larger damage than other climate-related hazards, for example, floods. There is general agreement that climate change will lead to a more variable climate that increases the frequency and severity of hydrological extremes. Drought forecasting is of key importance for the mitigation (pro-active measures, including increase of preparedness of society) of the potential impacts of drought. Drought is characterized by below average natural water availability, which is caused by a meteorological anomaly (meteorological drought; precipitation minus potential evapotranspiration). Typical drought characteristics are the duration and severity (e.g. deficit volume). Not all meteorological droughts lead to low groundwater levels, groundwater discharge and streamflow (hydrological drought), whereas a series of minor meteorological droughts might lead to a severe hydrological drought. An adequate forecasting of hydrological drought is based on the combination of meteorological forecasts, links to the climate system and a thorough understanding of drought governing processes and the propagation of droughts in the subsurface (catchment control).

This paper focuses on the importance of catchment control for hydrological drought forecasting, i.e. it explores the discrepancy between meteorological and hydrological droughts (drought propagation). In the first part of the paper examples of differences between meteorological and hydrological droughts are given for two contrasting climates. Results from the Pang (UK) and Noor (B/NL) catchments are used to illustrate propagation of drought in the subsurface of a temperate humid climate, and from the Upper-Guadiana catchment (ES) for a semi-arid climate. It will be shown that in both climatic regions the winter conditions are extremely important for the development of a hydrological drought, especially for catchments slowly responding to precipita-

tion (groundwater catchments). On the contrary, meteorological droughts are usually perceived as relevant only during the dry season (summer conditions).

In the second part of the paper the outcome from a rather simple hydrological model will be used to demonstrate the relationship between hydrological drought characteristics and different meteorological droughts (length, severity) for a series of catchment types varying from quickly to slowly responding to precipitation. Clearly the relationship between meteorological and hydrological droughts is strong for quickly responding catchments. Attempts to quantify the weaker relationship for slowly-responding catchments will be shown, including the effect of initial catchment storage. Eventually, the results of the studies on propagation of drought through the subsurface will be put in the context of drought forecasting.