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1 A global evaluation of streamflow drought characteristics

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How drought is characterised usually depends on the region under study, the purpose of the study and the available data. As a result a large number of drought characteristics have been developed. Although it is generally not considered appropriate to define one unique measure of drought, some standardisation of methodology is preferable. This will enhance comparative studies and assist the interpretation of drought. In this study 16 daily streamflow series from a wide range of hydrological regimes have been selected to evaluate the applicability of several streamflow drought characteristics, including both low flow and deficit characteristics. The study has contributed to the ASTHyDA project, an accompanying measure project in the EC's 5^{th} Framework Programme (http://drought.uio.no). Evaluated low flow characteristics were percentiles from the flow duration curve (FDC) and the mean annual minimum of different durations (MAM(n-day)). The derivation of deficit characteristics, such as drought duration and deficit volume, requires for a daily time series that a pooling procedure is applied. Three different pooling procedures were evaluated, the moving average procedure (MA-method), an inter-event time criterion (IT-method) and the sequent peak algorithm (SPA). The MA-method proved to be a flexible approach for the global data, and its parameter, the averaging interval, can easily be optimized for each stream. For the IT-method it is more complicated and less obvious to find the optimal value for the required parameter (length of the excess period), in particular for flashy streams. The application of the SPA can only be recommended for the selection of annual max-

imum series of deficit characteristics and for very low threshold levels due to the high degree of pooling. A frequency analysis of deficit volume and duration was conducted by deriving the cumulative distribution function of the largest streamflow drought occurring in a given time interval from a partial duration series of drought events. From the theory of extreme value analysis the use of a Generalized Pareto model combined with a Poisson model is recommended, and it was found, that it indeed performed better or equally well than other distribution models. In general, this method can be used for streams of all regime types, as long as no multi-year droughts are present. However, for intermittent streams zero-flow periods have to be treated as censored data. For catchments with winter frost, summer and winter droughts have to be analysed separately.