



Regional Climate Model (RCM) performance for European catchments and future changes in drought

S. Blenkinsop, H.J. Fowler

Water Resource Systems Research Laboratory, School of Civil Engineering and Geosciences, University of Newcastle, Newcastle upon Tyne, NE1 7RU, UK. (s.blenkinsop@ncl.ac.uk / Fax: +44 (0)191 222 6669 / Phone +44 (0)191 222 7933)

AquaTerra is an integrated project of the 6th EU RTD Framework Programme that aims to provide the scientific basis for an improved river basin management through a better understanding of the river-sediment-soil-groundwater system by integrating both natural and socio-economic aspects at different temporal and spatial scales. A crucial component of this will be the assessment of climate change predicted by climate models and the downscaling of regional climate model output for use in hydrologic models. It is intended that probabilistic climate change scenarios should be developed for European catchments by using a range of regional climate models (RCMs) which are to be weighted according to model performance. The criteria on which this is based will vary depending upon the relative importance of different aspects of the climate on the hydrology of a given catchment, for example, mean statistics, inter-annual variability or daily extremes. The use of a range of several climate models for the creation of scenarios should give a better estimate of model performance and associated uncertainty.

As a first step, the control climate (1961-1990) has been assessed for 7 catchments using integrations from 6 RCMs driven by 4 different general circulation models (GCMs) made available by the PRUDENCE project. Spatial variations in model performance across Europe are assessed and the annual cycle of mean monthly temperature and precipitation is examined along with the variability of monthly means through comparison with a gridded monthly observation series (CRU TS 2.0).

The occurrence of extreme events, such as droughts, is a crucial component of future climate that must be reproduced for climate change impact studies and which will have

significant implications for the management of water resources. Two drought severity measures, previously applied to the UK using only the HadRM3 climate model, are used to evaluate the 6 RCM simulations of the control climate against the observed series. These measures are constructed from monthly precipitation anomalies from the baseline climate and reflect both surface-water and groundwater drought. Furthermore, an examination is made of changes in drought occurrence and severity across Europe, including the AquaTerra study catchments, using the A2 scenario for each of the RCMs for the period 2070 to 2100.