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Uncertainty associated with choice of Global Circulation Model for water resource assessments

R. L. Wilby (1,2), R. J. Davis (3), **H. G. Orr**, (1,2) and G. Watts, (4)

(1) Climate Change Unit, Environment Agency of England and Wales (2) Geography Department, Lancaster University, UK (3) Hydrology and Hydrometry Policy, Environment Agency of England and Wales (4) Water Resources, Environment Agency of England and Wales

Climate change could have far reaching consequences for water resources, the physiochemistry and ecology of freshwater environments. To date, most climate impacts assessments have been undertaken on the back of single GCM outputs albeit at a number of time slices and for different emission scenarios. However, different Global Circulation Models (GCMs) vary in their treatment of key processes such as clouds and surface feedback mechanisms. There are also uncertainties in the representations of the climatology at regional scales, including differences between dynamical and statistical downscaling methods. Consequently, choice of GCM could have a significant impact on the timing and extent of adaptation responses.

This poster compares daily precipitation and potential evaporation series arising from three GCMs (HadCM3, CGCM2 and CSIRO) under two emission scenarios (SRES A2 and B2) downscaled using the Statistical DownScaling (SDSM) software. Uncertainties in future river flows are illustrated for the River Kennet in southern England using a catchment water balance model (CATCHMOD). Simulated daily discharges are then used to explore the impact of selecting different GCMs on deployable groundwater abstractions at a local pumping station.

The number of days with deployable abstractions varies between 83 to 96% (of maximum) depending on the choice of GCM for the control period 1961-1990. Scenarios downscaled from CGCM2 and CSIRO suggest slight increases in deployable abstraction pointing to a more favourable resource situation. In contrast, the HadCM3 B2 suggests no overall change in deployable yield and slightly fewer days with de-

ployable abstraction leading to a reduced yield from 86% potential in the 2020s to 75% in the 2080s under A2 scenario. Furthermore, HadCM3 suggests little change in the inter-annual variability of deployable yield whereas CGCM2 and CSIRO indicate greater stability in the future. The Environment Agency is working in partnership with other stakeholders to develop methodologies for incorporating such uncertainties within strategic water resource plans.