



Understanding the principle drivers of hydrological change in the 20th Century

Nicola Gedney and Graham Weedon

Met Office Hadley Centre, JCHMR, Maclean Building, Wallingford, OX10 8BB, U.K.

Significant changes in climate, and land and water use have all occurred during the 20th Century. These factors are likely to have influenced regional hydrology during this time period and to continue to do so throughout the 21st Century. In order to assess their future impacts we need to understand how these historical changes have modified the hydrological cycle.

Using the Met Office land surface model, the Joint UK Land Environment Simulator (JULES), we examine how historical land use changes such as the impact of deforestation and irrigation have affected the regional hydrological cycle. We investigate the influence of climate and atmospheric gas concentrations. For example, changes in atmospheric carbon dioxide and ozone may have affected hydrology through their direct effect on vegetation water use, growth and health.

We analyse how accurately the model reproduces observed variability and trends in evaporation and river flow over a number of spatial and temporal scales. Using spatial and temporal statistical analysis we attribute observed hydrological trends to the individual drivers.

The meteorological data used to drive the land surface model is generated from the Water and Global Change project (WATCH). This model forcing data is based on observed climate data combined with meteorological reanalysis data and a weather generator. The dataset covers the whole of the 20th Century at a 0.5 degree resolution globally. We look at uncertainty in aspects of this historical dataset and its implications on our estimates of the large-scale hydrological cycle.