Geophysical Research Abstracts
Vol. 14, EGU2012-13756, 2012
EGU General Assembly 2012

Assessment of CMIP5 GCM daily predictor variables for statistical downscaling

F.S. Mpelasoka (1), S. Charles (2), F.H. Chiew (3), G. Fu (4), and S. Beecham (5)

(1) CSIRO, Land and Water, Canberra, Australia (freddie.mpelasoka@csiro.au, +61 2 62465800), (2) CSIRO, Land and Water, Perth, Australia (steve.charles@csiro.au), (3) CSIRO, Land and Water, Canberra, Australia (francis.chiew@csiro.au), (4) CSIRO, Land and Water, Perth, Australia (guobin.fu@csiro.au), (5) University of South Australia, Adelaide, Australia (simon.beecham@unisa.edu.au)

Assessment of CMIP5 GCM daily predictor variables for statistical downscaling

To support adaptation to climate change in the water resource sector in South Australia, downscaled climate projections are being constructed within the Goyder Institute for Water Research – a 5-year multi-million dollar collaborative research partnership between the Government of South Australia, CSIRO and the university sector. Statistical downscaling is a robust approach providing a link between observed (re-analysis) large-scale atmospheric variables (predictors) and local or regional surface climate variables such as daily station rainfall.

When applied to outputs of Global Climate Models (GCMs), the credibility of statistically downscaled future projections is dependent on the ability of GCMs to reproduce the re-analysis data statistics for the current climate. The main objective of this study is thus to assess daily predictor variables simulated by phase Five of Coupled Model Inter-comparison Project (CMIP5) GCMs, while acknowledging that an optimal measure of overall GCM performance does not exist and the usefulness of any assessment approach varies with the intended application.

Here we assess GCMs by comparing cumulative probability density functions of predictor variables against the re-analysis data using the Kolmogorov test metric. Historical daily data simulations from 12 GCMs (BCC-csm1, CanESM2, CSIRO-Mk3.6.0, GFDL-ESM2M, HadGEM2-ES, IPSL-CM5A-LR, IPSL-CM5A-MR, MIROC4h, MIROC-ESM-CHEM, MPI-ESM-LR, MRI-CGCM3, and NorESM1-M) for the period 1961-2005 are used. The variables assessed include specific/relative humidity, winds, geopotential heights at different atmospheric levels and sea-level pressure over the Australian region (7-45oS, 100-160oE). We present a summary of results for the South Australia region quantifying the ability of these GCMs in reproducing the mean state and the relative frequency of extremes for these predictors. The complexity and challenges in GCM selection emanating from the inconsistent performance of GCMs across predictor variables will also be discussed.

Keywords: Climate change; statistical downscaling; GCM performance; water resources; adaptation.