Geophysical Research Abstracts
Vol. 15, EGU2013-2399-1, 2013
EGU General Assembly 2013

Randomness of annual precipitation and climate model projections

Fubao Sun (1,2), Michael Roderick (1,2,3), Graham Farquhar (1,2)

(1) Research School of Biology, The Australian National University, Canberra, ACT, Australia (Fubao.Sun@anu.edu.au), (2) Australian Research Council Centre of Excellence for Climate System Science, Sydney, New South Wales, Australia., (3) Research School of Earth Sciences, The Australian National University, Canberra, ACT 0200, Australia.

Precipitation (P), the driver of the entire hydrologic cycle, is characterised by high year-to-year variability for a given region. Because of that, the trend in P generally depends on which period one chooses. Superimposed on that are different expectations about the future possible change of regional water availability. For example, in a recent case study over the Murray-Darling Basin (MDB) in Australia, we noted that the projections of ΔP (2070-2099 less 1970-1999) has a large range ($\sim \pm$150 mm a-1 century-1) for an ensemble of 39 IPCC AR4 climate model runs using the A1B emissions scenario. When averaged across the multi-run and multi-model ensemble, the projected change (4.9 and -8.1 mm a-1 century-1) is near zero, against a background climatological P of $\sim$500 mm a-1.

In this presentation, we describe a new approach to evaluating projections of ΔP in climate models. This approach is based on our recent finding that long-term annual P time series in both observations and each model run over the MDB were indistinguishable from that generated by a purely random process. By plotting Δ P versus the variance of the time series, we could identify models with projections for Δ P that were beyond the bounds expected from purely random variations. For the MDB, we anticipate that a purely random process could lead to differences of $\pm$ 57 mm a-1 (95% confidence) between successive 30-year periods. This is equivalent to $\pm$11% of the climatological P and translates into variations in runoff of around $\pm$29%.

This sets a baseline for gauging modelled and/or observed changes.