Geophysical Research Abstracts
Vol. 17, EGU2015-14737, 2015
EGU General Assembly 2015

Projected changes in synoptic circulation states associated with extreme rainfall in South Africa

Chris Lennard
University of Cape Town, Climate Systems Analysis Group, South Africa (lennard@csag.uct.ac.za)

Projections of extreme rainfall are based on coarse resolution GCMs which may then be downscaled to finer spatial resolutions. Rainfall is a function of many atmospheric variables such as pressure, temperature, lapse rate, humidity, etc. and is has been proven difficult to capture by numerical models, extreme rainfall especially so.

Extreme rainfall in South Africa is associated with particular synoptic systems, e.g. cut off lows (COLs), tropical temperate troughs (TTTs) and cold fronts. Numerical models are able to simulate circulation states better than rainfall and extreme rainfall so we characterize circulation states to investigate projected changes in extreme rainfall.

Station data across South Africa are assessed for extreme rainfall associated with COLs and TTTs between 1980 and 2009 and the circulation states of these dates are extracted from the CFSR reanalysis. The synoptic data associated with COLs and TTTs are used to develop reference self organizing maps that characterize archetypal COL and TTT states and the frequency these states have been mapped to in the observed period.

CORDEX data from 5 regional models are then passed through the trained SOMS to (a) evaluate the ability of the models to simulate these two systems based on the CORDEX evaluation simulations and (b) projected changes in the frequency of occurrence of archetypal circulation states in two periods, 2040-2060 and 2080-2100.

This paper present the results from the analysis and concludes that synoptic circulation data is more reliable for assessing changes in extreme rainfall than the rainfall fields of the dynamical models.