

Conclusions and future plans:

In this study, a statistical model was developed to downscale large scale predictors. Such a technique complements dynamical approaches for climate change studies performed with CAOGCM and allows finer time and spatial resolutions for impact studies.

- a SM, based on the recognition of analogues, was developed for two agricultural areas of Australia: the Murray-Darling Basin and the South West corner of the continent.
- The SM was found to be more skillful than persistence in all cases apart for winter (JJA) in the MDB. In the MDB, results are contrasted between the southern part where analogues are successful and the Northern Tropical part where skill is low.
- Extreme events such as anomalous spells were found to be well captured by the SM. The quality of the spell reproduction is dependent on the skill achieved.
- Those results were confirmed when GCM outputs were used as predictors. The ability to reproduce a particular PDF is maintained with no particular bias on the mean. Furthermore the spells are similarly captured.

In the future, further work is needed to improve the SM and compare this approach with other downscaling methods:

- Using 40 years, of re-analyses available from NCEP or ECMWF would give access to more predictors and would train the model on a dataset with different properties from that used for validation. This is a key validation prior to downscaling of climate changes.
- Some intercomparisons are planned in collaboration with other groups interested by downscaling over Australia, and using a non-homogeneous hidden Markov Model. Comparison with PDF obtained from a dynamical downscaling model such as a nested regional climate model is also planned.
- The SM is to be applied to transient scenarios proposed by coupled models. A particular emphasis will be put on applying analogues to several coupled models in order to investigate if statistical downscaling reduces the scatter observed between climate change scenarios at regional scale.
- Impact studies are to be conducted in collaboration with other groups, in particular for areas which have shown high skill, such as the lower part of the Murray-Darling Basin.