INTRODUCTION

Precipitation extremes are predominantly local and have major socio-economic impacts.

Coarse resolution datasets do not resolve most of the spatial - or even temporal- scale at which extremes occur. Regional Climate Models (RCMs) are in principle better suited to this purpose.

Increasingly high resolution RCMs are being used to understand climatic features such as extremes. Various questions arise from the potential use of high-resolution RCMs to study extreme events.

EXPERIMENTAL SETUP

• Weather Research and Forecasting (WRF) model.
• Domains: CORDEX Australasia (50km)
  NARClM SE Australia (10km)
• Three WRF configurations (table 1).
• 60 years (1950-2009).
• NNRP1 boundary conditions.
• Observations: AWAP gridded obs (5km).

Study of precipitation extreme indices from ETCCDI: AWAP, GHCNDEX, NNNP1 and three WRF configurations at 50km and 10km spatial resolution.

How do RCMs perform in terms of extremes indices?

How do RCMs reproduce probability distributions?

Are extremes better represented with higher resolution?

CONCLUSIONS

How do RCMs perform in terms of extremes indices?

Spatial distribution very well represented (corr> 0.8), although RCMs tend to overestimate extreme indices along the coast. R2 (BMJ cumulus) outperforms other RCMs.

Substantial improvement with respect to driving model (NNRP1) and GHCNDEX.

How do RCMs reproduce probability distributions?

For all regions, some members of the ensemble provide very accurate estimation of the observed precipitation distribution up to the 99th percentile.

R2 at 10km and R1 at 50km generally fit observations percentiles better. R3 overestimates high percentiles for all regions (except region 1) compared to AWAP.

NNRP1 overestimates low percentiles, and underestimates high percentiles for all regions (except region 1) compared to AWAP.

RCMs tend to produce more intense precipitation for all regions, some members of the ensemble provide very accurate estimation of the observed precipitation distribution up to the 99th percentile.

High resolution (10km) produces more intense precipitation, but increases overestimation from coarser resolutions.

RCMs substantially improve correlations from driving dataset (NNRP1) for both indices.

Both 10 and 50-km runs show similar correlations with AWAP, although slightly smaller for 10k - especially for Rx5day.

Related to performance of overestimation of very high percentiles (99th, see Fig. 5).

Are extremes better represented at higher resolution?

The use of RCMs definitely provides better representation of extremes compared to coarser datasets, suggesting interesting added value.

Enhancement due to increase of resolution in RCMs remains unclear, although some 50km runs leave little room for improvement.

Multi-step regionalization using precipitation and temperature seasonal PDFs. Principal component analysis, agglomerative clustering and non-hierarchical clustering.

RCMs remain unclear, although some 50km runs leave little room for improvement.