



Looking for added value in Australian downscaling for climate change studies

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Downscaling gives the prospect of added value in the regional pattern and temporal nature of rainfall change with a warmer climate. However, such value is not guaranteed and the use of downscaling can raise rather than diminish uncertainties. Validation of downscaling methods tends to focus on the ability to simulate current climate statistics, rather than the robustness of simulated future climate change. Here we compare the future climate change signal in average rainfall from various dynamical and statistical downscaling outputs used for all of Australia and in regional climate change studies over smaller domains. We show that downscaling can generate different regional patterns of projected change compared to the global climate models used as input, indicating the potential for added value in projections. These differences often make physical sense in regions of complex topography such as in southeast Australia, the eastern seaboard and Tasmania. However, results from different methods are not always consistent. In addition, downscaling can produce projected changes that are not clearly related to finer resolution and are difficult to interpret. In some cases, each downscaling method gives a different range of results and different messages about projected rainfall change for a region. This shows that downscaling has the potential to add value to projections, but also brings the potential for uncertain or contradictory messages. We conclude that each method has strengths and weaknesses, and these should be clearly communicated.