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PARALLEL SESSION C : IMPACTS AND APPLICATIONS
C3: REGIONAL SCALE HYDROCLIMATE: FROM OBSERVATIONS TO MODELLING TO APPLICATIONS

Impact of climate change on streamflow across Victoria: making use of statistical downscaling

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Streamflows in key Victorian catchments a State of Australia located in the extra-tropical half of the continent, are projected into the future utilising a combination of a simple linear regression based a temporal range of rainfall and temperature driven by an ensemble of statistically downscaled CMIP5 global climate models (GCMs). Based on a previously developed streamflow regression, the application of this method to the downscaled GCMs required significant calibration of model rainfall and temperature output compared to that of gridded observations. The evaluation of model performances also highlight the fact that the statistical downscaling of the climate models removed the largest biases in reproducing the surface climate as the evaluation of downscaled climate models and direct outputs form the climate models does not yield similar results. Whilst changes in rainfall are relatively consistent across the state albeit with a topographic influence as expected from using downscaled information, changes in streamflow are much more sensitive, with each subregion responding to rainfall reductions in different ways. Results for Victoria as a whole indicate that by 2090, streamflow will be 20% to -40% less than the 1990 average. For the catchments close to the main orography, this is the equivalent to the streamflow conditions experienced during the Millennium drought, the worse historical protracted drought experienced in Victoria during 1997 to 2009. For catchments in the far west and east of the state, the model results indicate that the 2085 streamflow reductions will not be as severe as those in the Millennium drought. In this study, the effect of temperature on streamflow was analysed by using reconstructions with and without maximum temperature. On average, streamflow responses to temperature changes are very small, in line with the negligible effect that temperature had in the skill of the linear streamflow reconstruction. Results from this work indicate that whilst catchments across Victoria will respond differently to the effects of climate change, the majority are projected to see reductions of streamflow similar to those experienced during the Millennium drought by the end of the century, severely limiting Victoria's water capacity if it were to rely on rainfall alone. Alternative water sources, along with more efficient water management and use will be essential in the future if the state is to provide for increasing population demands.

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