



The role of anthropogenic forcing in extreme rainfall during early March 2014 in Christchurch, New Zealand

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Torrential rainfall over a 48-hour period on the 4th and 5th of March 2014 saw Christchurch, New Zealand, endure widespread severe flooding. Resulting damages are estimated to have cost NZD \$22.5 million in insurance claims relating to more than 100 homes that were inundated with water. Low pressure to the northeast of the city in combination with a moisture-laden air mass fuelled the extreme rainfall as a conveyor belt of moist air was driven onshore by strong south-easterly flows. Christchurch Gardens received 246% of normal March rainfall within a period of 24 hours - the largest one-day March rainfall since records began in 1873. This study investigates whether, and to what degree, there was an anthropogenic influence on March rainfall in Christchurch such as observed in 2014. Results from very large ensembles of 'weather@home' regional model simulations show evidence of increased March maximum one-day rainfall for Christchurch in the anthropogenic world, a result which is found to be robust across different spatial averaging areas. The most extreme rainfall events appear to be typified by synoptic conditions much like those observed in early March 2014, with strong onshore winds and a deep low centred in close proximity (within ~ 400 km). This provides further evidence of the ability of the 'weather@home' model to reproduce synoptic features of extreme rainfall events in New Zealand.