



Climate extremes in the Pacific: improving seasonal prediction of tropical cyclones and extreme ocean temperatures to improve resilience

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Climate change and climate extremes have a major impact on Australia and Pacific Island countries. Of particular concern are tropical cyclones and extreme ocean temperatures, the first being the most destructive events for terrestrial systems, while the latter has the potential to devastate ocean ecosystems through coral bleaching. As a practical response to climate change, under the Pacific-Australia Climate Change Science and Adaptation Planning program (PACCSAP), we are developing enhanced web-based information tools for providing seasonal forecasts for climatic extremes in the Western Pacific.

Tropical cyclones are the most destructive weather systems that impact on coastal areas. Interannual variability in the intensity and distribution of tropical cyclones is large, and presently greater than any trends that are ascribable to climate change. In the warming environment, predicting tropical cyclone occurrence based on historical relationships, with predictors such as sea surface temperatures (SSTs) now frequently lying outside of the range of past variability meaning that it is not possible to find historical analogues for the seasonal conditions often faced by Pacific countries.

Elevated SSTs are the primary trigger for mass coral bleaching events, which can lead to widespread damage and mortality on reef systems. Degraded coral reefs present many problems, including long-term loss of tourism and potential loss or degradation of fisheries. The monitoring and prediction of thermal stress events enables the support of a range of adaptive and management activities that could improve reef resilience to extreme conditions.

Using the climate model POAMA (Predictive Ocean-Atmosphere Model for Australia), we aim to improve accuracy of seasonal forecasts of tropical cyclone activity and extreme SSTs for the regions of Western Pacific. Improved knowledge of extreme climatic events, with the assistance of tailored forecast tools, will help enhance the resilience and adaptive capacity of Australia and Pacific Island Countries under climate change.

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