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An analysis of seasonal forecasts from POAMA and SCOPIC in the Pacific region

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The Australian Bureau of Meteorology (BoM), as part of the Pacific Island Climate Prediction Project (PI-CPP), has developed seasonal forecasts for ten National Meteorological Services (NMS) in the Pacific region for nearly a decade, to improve seasonal forecast services to local communities and industry. As part of this project, a new statistical model called SCOPIC (Seasonal Climate Outlooks for Pacific Island Countries) was developed to provide partner countries with the ability to produce their own seasonal climate outlooks. In 2010, as part of the Pacific Adaptation Strategy and Assistance Programme (PASAP), the BoM developed a seasonal outlook portal for Pacific NMS as an alternative source of seasonal forecasts based on the Bureau's dynamical model POAMA (Predictive Ocean-Atmosphere Model for Australia). This dynamical model is a coupled ocean-atmosphere model, which has been developed by the Bureau for over ten years for forecasting research in Australia.

However, no formal assessment of the skill of the two forecast systems (POAMA and SCOPIC) has been carried out using a number of skill metrics for the Pacific region. Although the skill of POAMA in the Australian region is now well documented, the forecast skill is even higher in the Pacific region due to its proximity to the tropical ocean, where the El Niño-Southern Oscillation (ENSO) provides the main source of tropical climate variability and predictability on seasonal time scales. The statistical model (SCOPIC) uses discriminant analysis (multiple linear regression) and the relationships of sea surface temperatures (SST) or the Southern Oscillation Index (predictors) and monthly rainfall (predictands) to predict rainfall at various lead times. In contrast, POAMA uses the current state of the climate (initial ocean and atmospheric conditions) and model physics to predict forecasts of many climate variables at all locations across the globe and also at various lead times.

Here we demonstrate the skill of each system based on hindcast and real time skill using hit rate, ROC score, LEPS and other verification techniques to show the forecast skill of each system. As expected, both systems show good skill in El Niño and La Niña years and lower skill in neutral years, when regional teleconnections of tropical SST are lower. In some countries, SCOPIC has higher skill where local orography is important on rainfall i.e. Papua New Guinea and parts of Fiji. SCOPIC also has a longer period of observations at many stations that can be used to train the model, compared to the hindcast period used by POAMA. However, POAMA has good skill across most of the equatorial Pacific and parts of the southwest Pacific, especially in the austral summer, which is the wet season in the southwest Pacific. In the real time forecasts, POAMA has improved skill of 8–10% over SCOPIC using tercile forecasts based on scoring using consistent, near-consistent or inconsistent forecasts. This study highlights some aspects of higher and lower skill from both seasonal forecast systems and both can assist Pacific Island countries with seasonal forecasts and prepare them for climate change and extremes associated with the ENSO.