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Prospects for Improving the Operational Seasonal Prediction of Tropical Cyclone Activity in the Southern Hemisphere

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ABSTRACT

Tropical cyclones (TCs) are the most destructive weather phenomena to impact on tropical regions, and reliable predicttion of TC seasonal activity is important for preparedness of coastal communities in the tropics. In investigating prospects for improving the skill of TC seasonal prediction in the South Indian and South Pacific Oceans, including the Australian Region, we used linear regression to model the relationship between the annual number of cyclones and three indices (SOI, NIÑO3.4 and 5VAR) describing the strength of the El Niño-Southern Oscillation (ENSO). The correlation between the number of Australian Region (90?E - 160?E) TCs and the indices was strong (3-month 5VAR ?0.65, NIÑO3.4 ?0.62 and SOI +0.64), and a cross-validation assessment demonstrated that the models which used July-August-September indices and the temporal trend as the predictors performed well. The predicted number of TCs in the Australian Region for 2010/2011 and 2011/2012 seasons was 14 (11 recorded) and 12, respectively. We also found that the correlation between the numbers of TCs in the western South Indian region (30?E to 90?E) and the eastern South Pacific region (east of 170?E) and the indices was weak, and it is therefore not sensible to build linear regression forecast models for these regions. We conclude that for the Australian Region, the new statistical model provides prospects for improvement in forecasting skill compared to the statistical model currently employed at the National Climate Centre, Australian Bureau of Meteorology. The next step towards improving the skill of TC seasonal prediction in the various regions of the Southern Hemisphere will be undertaken through analysis of outputs from the dynamical climate model POAMA (Predictive Ocean-Atmosphere Model for Australia).

KEYWORDS

Tropical Cyclones; Seasonal Prediction; Australian Region

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