**Bias-correction of tropical cyclone structure in ECMWF Ensemble Prediction System for NW Australia**

**Saima Aijaz1, Zhendong Huang2, Harvey Ye1, and Jeff Kepert1**

*1Bureau of Meteorology, Melbourne*

*2The University of Melbourne, Melbourne*

*Saima.Aijaz@bom.gov.au*

This paper describes the application of statistical techniques for the purpose of correcting systematic biases in global ensemble tropical cyclone (TC) predictions. The study aims to improve model predictions for tropical cyclone events provided by Numerical Weather Prediction models. The region of focus is the Northwest Shelf of Western Australia, which is a highly active region for tropical cyclone genesis in the Australian region. The region is characterised by a large number of oil and gas assets that are particularly vulnerable to the effects of TCs. Better TC genesis forecasts will improve the ability of the oil and gas industry to plan for cyclones that are in the process of forming.

We have developed methods to correct the biases in the European Centre for Medium-Range Weather Forecast Ensemble Prediction System (ECMWF EPS) that mainly arise due to its relatively coarse resolution. We employ three different statistical techniques for bias correction: 1) Simple Linear Regression; 2) Multivariate Regression; 3) Principal Component Analysis (PCA). We use the Australian best track data for verification. A comparison of root-mean-square-errors (RMSE) resulting from the three methods shows that the PCA generally performs better than the simple and multivariate regression models.

The IKE was found to be a valuable predictor in all three models. We found that the EPS Rmax was not well-correlated with the best-track Rmax. The relatively poor performance of Rmax was expected, as most models have little ability to predict it and very high resolution is needed to avoid systematic biases. After bias-correction, we verify the predicted parameters using the spread-skill relationships and rank histograms. We then replace the model surface fields with a bias-corrected vortex using a modified Rankin vortex. These adjusted wind fields provide better-calibrated wind exceedance probability guidance than the raw model output, and are used to force a wave model and generate better-calibrated wave probabilities.