Improved Diagnostics for NWP Verification in the Tropics

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The root-mean-square error (RMSE) is often used to verify forecasts. But its strong dependence on the observation variability makes it unsuitable for comparing model performance between regions where observation variability are much different, e.g. a cross vertical levels or between the mid-latitudes and the tropics. In this seminar, we shall introduce

- a normalized measure of random error, the "alpha index", based on the tensor variance of forecast - observation discrepancy.

- an "error ellipse" to represent the random error in vector wind, yielding two other diagnostics: eccentricity and orientation.

These diagnostics were applied to verify Naval Research Laboratory's limited - area model, Coupled Ocean/Atmospheric Mesoscale Prediction System (COAMPS), for the first time in Southeast Asia.

COAMPS forecasts were verified against radiosonde data from South China Sea Mo nsoon Experiment (SCSMEX), May - June 1998. The following results were obtain ed:

- The alpha indices show that (after bias correction) COAMPS performs best for wind, followed by temperature and then by dew point depression.

- The wind error ellipses revealed that the random error tended to align more with the background flow than with the model bias, possibly indicating a dynamical reason for its existence.

The seminar will present evidence that in this tropical region, 1day persistence forecasts are only outperformed by the model for wind. Moreover, the RMSE diagnostic sometimes yields misleading evaluations of the model's performance.

Reference: Koh, T. Y. and J. S. Ng (2009), "Improved Diagnostics for NWP Verification in the Tropics", J. Geophys. Res., 114, D12102, doi:10.1029/2008JD011 179.