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On the Meteorological Verification System used for Verification of United States Navy Numerical Weather Prediction Forecasts

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Introduction

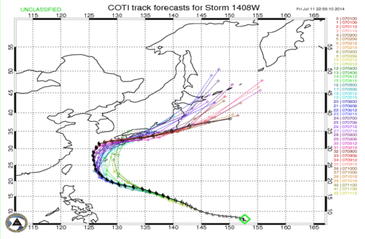
The verification software at the US Navy's Fleet Numerical Meteorology and Oceanography Center (FNMOC) has undergone significant improvements in the last few years. This poster introduces the improved Verification System. Standard atmospheric parameters, Precipitation, Model to Model Comparison, Model against Analysis, Point Location Verification, Wave Verification, Tropical Cyclone Verification, and Anomaly Correlations are all handled by the verification system and displayed in one web based application for Deterministic Model Verification. With the inclusion of the Ensemble Model Verification at FNMOC, all model verification information is now located in a single location making it possible to view the performance of the models run at FNMOC quickly and easily.

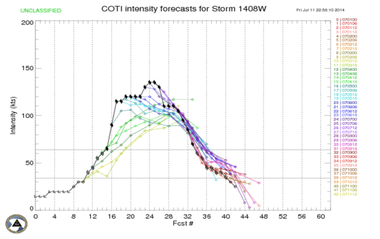
Publicly Available at: https://www.fnmoc.navy.mil/verify_cgi/

Tropical Verification

A Tropical Cyclone verification procedure was developed with the Joint Typhoon Warning Center (JTWC) to verify forecast aids for both a single tropical cyclone and over an entire basin for the Year-To-Date performance using operational best track as truth. Track and Intensity Error verification, Cross & Along Track Error, Latitude & Longitude Bias, and Intensity Bias verification results are produced.

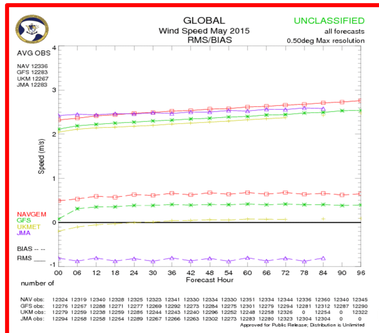
The images in the center of the poster are the 2014 Season homogeneous results for the Western Pacific Basin. Below is the performance of the Interpolated COAMPS-TC (COTI) for 2014-08W (Neoguri).

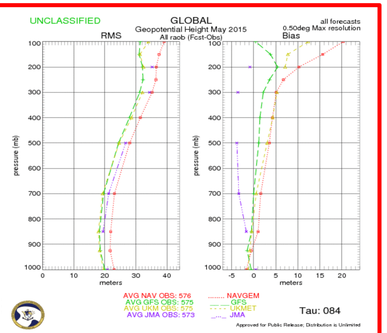


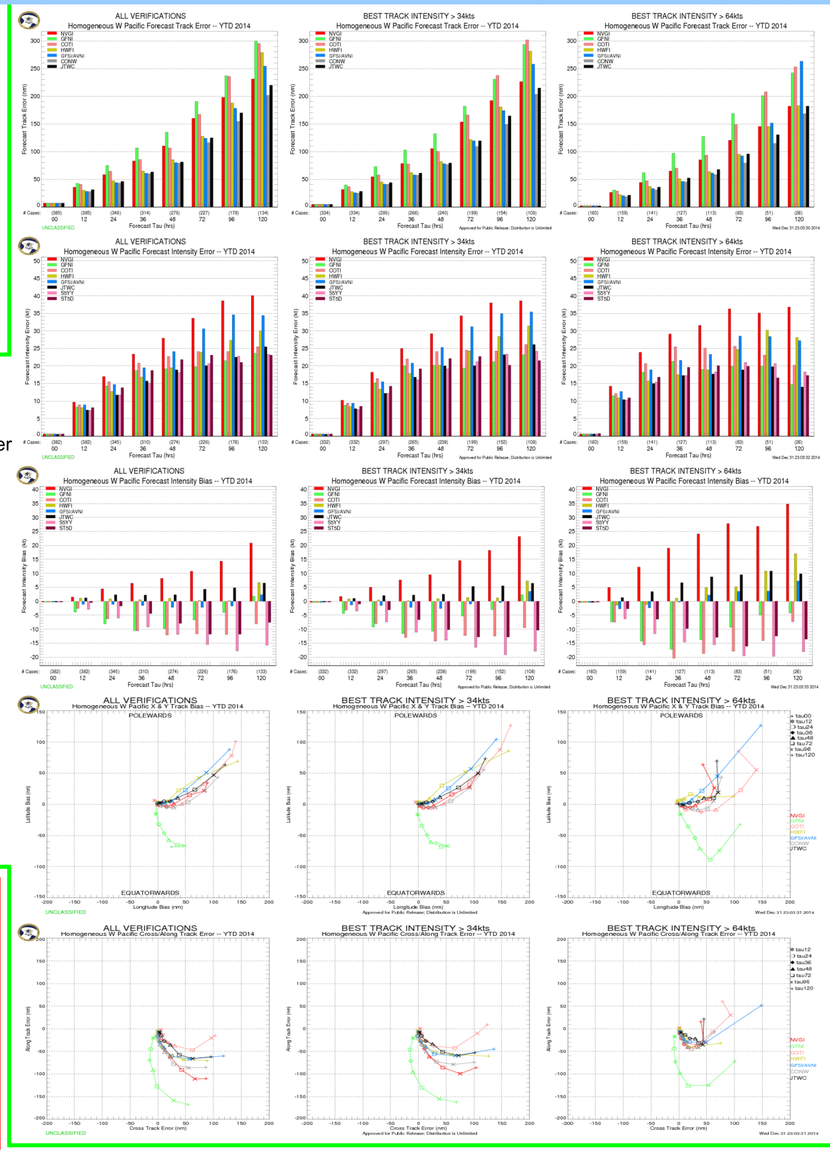


Standard Parameter Verification

Standard atmospheric parameters verified are air temperature & dewpoint (2m and upper level), Wind Speed & Direction (10m and upper level), MSLP, and Geopotential Height. The images above are global averages for May 2015 for 10m Wind Speed and Geopotential Height.

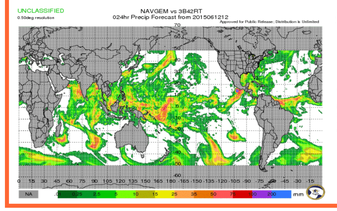


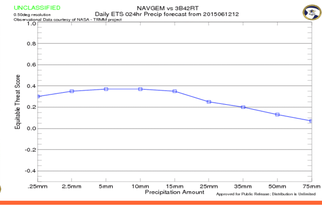


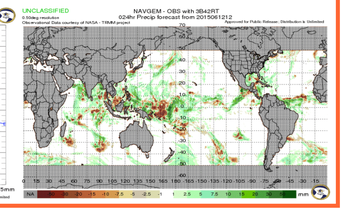


Precipitation

Verification using NASA TRMM-3B42RT (soon IMERG) as ground truth. ETS & Bias scores calculated daily at 9 threshold accumulations with areal coverage maps provided. Monthly verification scores can also be calculated. Daily scores for the 24hr NAVGEM forecast from the 12Z run on 12 May 2015 are shown.

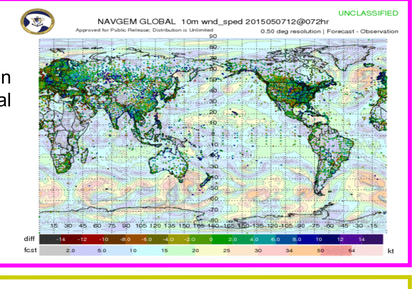


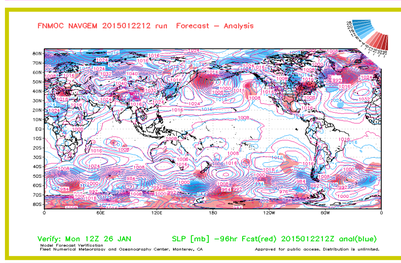




Point Location Verification

Verification of model at individual station with differences between Forecast and Observation plotted. Time-series charts of individual stations can also be created.



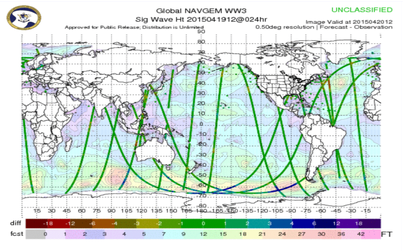


Model Against Analysis

Model comparisons to the Analysis to assist forecasters with determining regional discrepancies.

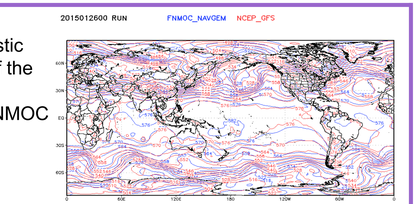
Wave Verification

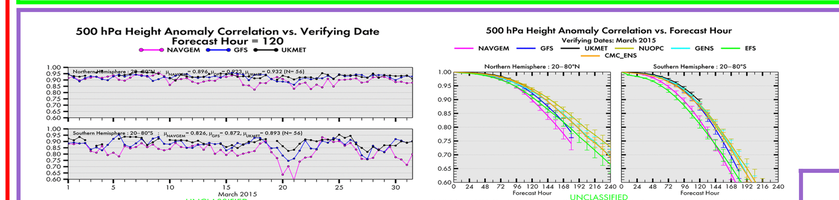
Significant Wave Height verification using altimetry and buoy data compared to the WW3 forecasts forced by FNMOC models.



Other Verification

- Direct comparisons between models to see where and how the models differ over the same forecast period. Allows the forecaster to see how the different deterministic models handle certain situations.
- Anomaly Correlations are performed for both Global Deterministic and Ensemble Models providing clues on overall performance of the global models.
- Ensemble Verification parameters are accessible also as all FNMOC model verification information is hosted in one location.
- Regional Ocean model forecast verification
- Total Cloud Cover forecast verification (Future)
- Open Ocean Wind verification by scatterometer (Future)
- Wave forecast against Analysis (Future)





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