Geophysical Research Abstracts
Vol. 20, EGU2018-1615, 2018
EGU General Assembly 2018

The principals of ocean temperature forecasting

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Numerical weather prediction (NWP) models predict future weather by approximating solutions to the (deterministic) partial differential equations that govern the dynamics in atmosphere and oceans. These models oftentimes exhibit systematical bias and miscalibration and therefore require statistical post-processing based on training data.

We consider NWP forecasts of sea surface temperature on the entire globe issued by the Norwegian Climate Prediction Model NorCPM. Challenges for statistical post-processing of sea surface temperature are, among others, strong seasonality effects, trends in the bias caused by warming of the oceans, and a nonstationary error covariance. We discuss alternatives for both bias correction and calibration and demonstrate that, despite the high dimensional nature of the problem and relatively few observations, principal component analysis can be used to approximate the error covariance matrix and to calibrate the forecast.