Accounting for model error in atmospheric forecasts

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The presented work will illustrate the impact of analysis correction based additive inflation (ACAI) on atmospheric forecasts. ACAI uses analysis corrections from the NAVGEM data assimilation system as a representation of model error and is shown to simultaneously improve ensemble spread-skill, reduce model bias and improve the RMS error in the ensemble mean. Results are presented from a myriad of experiments exercising ACAI in stand-alone NAVGEM forecasts using two different ensemble systems; (1) the current operational EPS at FNMOC based on the ensemble transform method and (2) the Navy-ESPC EPS based on perturbed observations. The method of relaxation-to-prior-perturbations (RTPP) has also been implemented in the Navy-ESPC EPS and is shown to further improve the ensemble spread-skill relationship by allowing variance generated during the forecast to impact the initial-time ensemble variance in the subsequent cycle. Results from a simplified implementation of ACAI in the NAVGEM deterministic system will also be shown and indicate positive impact to model biases and RMSE.