Geophysical Research Abstracts
Vol. 19, EGU2017-11097, 2017
EGU General Assembly 2017

Improved Subseasonal Prediction with Advanced Coupled Models including the 30km FIM-HYCOM Coupled Model

Stan Benjamin, Shan Sun, Georg Grell, Benjamin Green, Rainer Bleck, and Haiqin Li
NOAA Research, Earth System Research Laboratory, Boulder, CO, United States (stan.benjamin@noaa.gov)

Extreme events for subseasonal duration have been linked to multi-week processes related to onset, duration, and cessation of blocking events or, more generally, quasi-stationary waves. Results will be shown from different sets of 32-day prediction experiments (3200 runs each) over a 16-year period for earth system processes key for subseasonal prediction for different resolution, numerics, and physics using the FIM-HYCOM coupled model.
The coupled atmosphere (FIM) and ocean (HYCOM) modeling system is a relatively new coupled atmosphere-ocean model developed for subseasonal to seasonal prediction (Green et al. 2017 Mon.Wea.Rev. accepted, Bleck et al 2015 Mon. Wea. Rev.). Both component models operate on a common icosahedral horizontal grid and use an adaptive hybrid vertical coordinate (sigma-isentropic in FIM and sigma-isopycnic in HYCOM). FIM-HYCOM has been used to conduct 16 years of subseasonal retrospective forecasts following the NOAA Subseasonal (SubX) NMME protocol (32-day forward integrations), run with 4 ensemble members per week.
Results from this multi-year FIM-HYCOM hindcast include successful forecasts out to 14-20 days for stratospheric warming events (from archived 10 hPa fields), improved MJO predictability (Green et al. 2017) using the Grell-Freitas (2014, ACP) scale-aware cumulus scheme instead of the Simplified Arakawa-Schubert scheme, and little sensitivity to resolution for blocking frequency. Forecast skill of metrics from FIM-HYCOM including 500 hPa heights and MJO index is at least comparable to that of the operational Climate Forecast System (CFSv2) used by the National Centers for Environmental Prediction. Subseasonal skill is improved with a limited multi-model (FIM-HYCOM and CFSv2), consistent with previous seasonal multi-model ensemble results.
Ongoing work will also be reported on for adding inline aerosol/chemistry treatment to the coupled FIM-HYCOM model and for advanced approaches to subgrid-scale clouds to address regional biases important for seasonal and medium-range weather prediction scales.