EGU24-6452, updated on 13 Jul 2024
https://doi.org/10.5194/egusphere-egu24-6452
EGU General Assembly 2024

Local and remote sources of error inMJO forecasts in the Navy ESPC

Stephanie Rushley, Matthew Janiga, and Carolyn Reynolds
U.S. Naval Research Laboratory, Marine Meteorology Division, Monterey, CA, United States of America
(stephanie.rushley@gmail.com)

The Navy Earth System Prediction Capability (ESPC) is the Navy's coupled ocean-atmosphere-sea ice model. The current version of the Navy ESPC has 16 ensemble members and been operational since August 2020. The Navy ESPC has known biases in Madden-Julian Oscillation (MJO), which has a too strong amplitude and too fast propagation speed. During boreal winter, the MJO in the Navy ESPC is too strong due to biases in the vertical motion, which supports larger vertical moisture advection. The MJO is too strong in this season due to excessive evaporation in the western Pacific supporting moistening to the east of the MJO convective center. In this study, we examine the boreal winter MJO in the operational Navy ESPC ensemble. We use process oriented diagnostics to explore the local and remote sources of biases that drive good and poor MJO forecasts.

MJO forecasts are split into those that are well predicted and those that are poorly predicted. Individual MJO events are tracked following Chikira (2014), using Hovmöllers of MJO filtered OLR averaged between 10N and 10S. The MJO forecast performance is determined by comparing the forecasted MJO to the observed MJO based on the magnitude of the maximum amplitude of the MJO, the phase speed, duration of the event, and the location of the MJO convection. Using the moisture mode framework, we examine the maintenance and propagation of moisture anomalies to identify how the local and remote sources of error affect MJO skill. We use a moisture budget analysis to diagnose and understand the difference between the forecasts that performed well and those that performed poorly. Additionally, we examine the effects that these forecast errors in the MJO have on extratropical cyclones, surface winds, and clouds in the Navy ESPC and how biases in the extratropics affect the skill of MJO-teleconnections.