Name: Matthew Newman
matt.newman@noaa.gov
CIRES/University of Colorado and NOAA/ESRL/PSD
325 Broadway
R/PSD1
Boulder CO 80305
Country: US
Title: Diagnosing subseasonal predictability of tropical anomalies
Additional authors:
Additional Affiliations:
Abstract:
An empirical modeling approach that can be used to make tropical forecasts and evaluate the processes contributing to and detracting from their predictability on subseasonal time scales is discussed. The model used, a Coupled Linear Inverse Model (CLIM) derived from observed simultaneous and time-lag correlation statistics of 5-day running mean anomalous SST, OLR, and 200 and 850 mb winds, has been run in near-realtime for the last few years, with forecasts available at http://www.cdc.noaa.gov/forecasts/clim/. Its forecasts have skill that is comparable to CFS2. Overall CLIM hindcast skill is actually higher on average than CFS2 hindcast skill for leads greater then about 10-15 days. However, for RMM1 and RMM2 hindcasts, CFS2 bivariate anomaly correlation skill (but not RMSE) is slightly higher for leads of up to 20 days. In general, geographical and temporal variations of forecast skill are quite similar between the LIM and CGCMs, making the much simpler CLIM a potentially useful forecast benchmark and also an attractive tool for assessing and diagnosing overall predictability the CFS2 and potentially other coupled GCMs. It is shown that certain initial conditions, derived from a singular vector analysis of the CLIM system propagator, result in both maximum anomaly amplification and greater realized forecast skill in both the CLIM and CFS2. Additionally, the eigenvectors of the system's dynamical evolution operator separate into two distinct, but nonorthogonal, subspaces: one governing the nearly uncoupled daily-to-subseasonal dynamics, and the other governing the strongly air-sea coupled longer-term dynamics. These subspaces arise naturally from the CLIM analysis; no bandpass frequency filtering is applied. A further analysis of which processes drive predictability on different time scales shows that maximum forecast skill occurs when initially destructive interference of anomalies from these two subspaces evolves to yield constructive interference.
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