Highlights from Niznik et al. (Submitted)

Prior studies, e.g., Widlansky et al. (2011) and Matthews (2012), have emphasized the role of transient synoptic systems in governing the structure and variability of the South Pacific Convergence Zone (SPCZ), but the fidelity of these interactions as simulated by models included in Phase 5 of the Coupled Model Intercomparison Project (CMIP5, Taylor et al. 2012) has not yet been evaluated. Niznik et al. (submitted) show a wide range of synoptic precipitation variability as diagnosed through metrics including standard deviation (shown below), histograms, and spectral analysis:

![Figure 5](image)

**Figure 5.** Climatological DJF synoptic (14-day high-pass filtered) precipitation standard deviations (shading, mm day-1) over the Pacific for the (a) TRMM observational data set, (b) CFSR reanalysis, (c) CMIP5 coupled model ensemble mean, (d)-(o) individual CMIP5 coupled model means. The thick black line in all panels is the TRMM 4 mm day-1 contour, for reference.

Additionally, the storm graveyard, a region of mean negative zonal stretching deformation in the upper troposphere previously determined to play a key role in SPCZ-storm interactions, is generally weaker and has a distinct longitudinal spread among models (see figure below). Despite a range of simulated precipitation variability and storm graveyard locations in these models, the basic mechanism of tropical-extratropical interaction appears to be generally well simulated. Because the modeled subtropical SPCZ manifests the observed climatological “tilt” associated with accurate SPCZ-storm interaction, we suggest that the zonal bias of the SPCZ evident in CMIP5 models is largely related to simulation errors in the Tropics.
Figure 9. Coupled model negative ZSD at 250 hPa (blue shading) as compared to CFSR negative ZSD (black contours) at the same level in the storm graveyard region, as well as the coupled MEM. The location of the CFSR (black dot) and individual model or MEM (purple dot) ZSD minimum are shown for reference. The relative strength of the minimum value of ZSD in each model compared to CFSR is shown in parentheses after each model name.

References


