Tropical climate Variability in CESM-DART

Jonathan Eliashiv (Scripps Institution of Oceanography, UCSD, San Diego)
Aneesh Subramanian (Physics Department, University of Oxford)
Alicia Karspeck (NCAR, Boulder)
Arthur Miller (cripps Institution of Oceanography, UCSD, San Diego)

This study assesses the representation of tropical convectively coupled waves and climate variability in DART/CESM compared to other global reanalyses. When compared against other reanalysis products, DART/CESM shows a more coherent presence of Kelvin waves and MJO events. An advantage of the DART/CESM analysis over most other reanalyses products is that it has a probabilistic representation of the forecast and analysis state. A key attribute of such a probabilistic assimilation system is that one can assess its reliability as compared to observations (ratio of forecast probabilities to observed frequencies of events). A closed-form reliability budget is used in this study to separate out the ensemble-mean departure from observations into model bias, ensemble variance and observation error, along with a residual term, which captures deficiencies in the reliability of the modeling system. Spatial structures of the reliability budget in the Tropics show a strong contribution of model bias corresponding to regions with deep convection. We further compute this reliability budget composited on different phases of the MJO event as well as Kelvin waves. The structural errors, model bias as well as their contribution to ensemble variance is further explored.