CGD SEMINAR

DATE: Tuesday, 13 November 2018

TIME: 11 a.m.

LOCATION: NCAR, 1850 Table Mesa Drive
Mesa Lab, Main Seminar Room

TITLE: Cross-spectral analysis of the SST/10-m wind speed coupling resolved by satellite products and climate model simulations

SPEAKER: Lucas Laurindo, University of Miami

ABSTRACT:

Although the occurrence of positive correlations between SST and near-surface wind speed (*w*) over oceanic mesoscale ranges is well-known, the intrinsic spatial and temporal scales over which this air-sea coupling regime takes place are not well established. The contribution of the near-ubiquitous mesoscale ocean eddies in driving the observed coupling characteristics, relative to that of larger-scale ocean phenomena such as extratropical SST fronts and Rossby waves, also remains unclear. This work addresses these gaps using cross-spectral statistics calculated between SST and *w* from satellite products, and from two CCSM4 simulations based on identical atmospheric components but with contrasting horizontal ocean resolutions of 0.1°, capable of resolving mesoscale eddies (HR), and of 1°, whose eddy effects are parameterized (LR).

Satellite-based estimates reveal that the transition from negative SST/*w* correlations at large-scales to positive at oceanic mesoscales occur at wavelengths coinciding with the atmospheric first baroclinic Rossby radius of deformation; and that the dispersion of positively-correlated signals resemble tropical instability waves near the equator, and Rossby waves in the extratropics. Transfer functions are used to estimate the SST-driven *w* response in physical space (w_c), a signal that explains 5–40% of the mesoscale *w* variance in the equatorial cold tongues, and 2–15% at extratropical SST fronts. The signature of ocean eddies is clearly visible in w_c, accounting for 20–60% of its variability in eddy-rich regions. In the considered model simulations, the lack of resolved eddies in LR leads to a significantly underestimated mesoscale *w* variance relative to HR. Conversely, the w_c variability in HR can exceed the satellite estimates by a factor of two at extratropical SST fronts while underestimating it by a factor of almost six near the equator, reflecting shortcomings of the CCSM to be addressed in its future developments.

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The National Center for Atmospheric Research is sponsored by the National Science Foundation. Any opinions, findings and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the National Science Foundation