

High Resolution Coupled Climate Simulations

Michele Rienecker and Max Suarez
Global Modeling and Assimilation Office, NASA/GSFC

Objectives

Improve coupled climate model simulations of seasonal-to-interannual variability

Address two of the important problems of any prediction problem: coupled climate model biases, and identification of the inherent predictability in the coupled climate system.

Evaluate the role of model resolution in reducing biases in the eastern Equatorial Pacific: a warm SST bias, a distortion of the South Equatorial Current, and deficient representation of the stratiform cloud deck.

Technical Elements

The GMAO coupled model system using ESMF and updated component models: GEOS-5 AGCM, the Catchment LSM and the Poseidon V5 OGCM

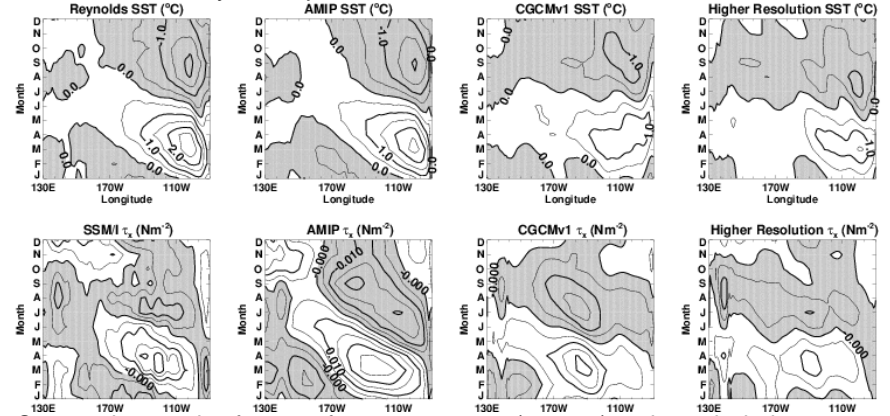
Resolution:

AGCM: 1/2 degree

OGCM: 1/6 degree

Simulation: 1 x 40-year simulation

Seasonal cycle: Equatorial Pacific SST and zonal wind stress



Seasonal anomaly of sea surface temperature (top row) and zonal wind stress (bottom row). Far left: Observations, center left: results from an atmosphere-land run with prescribed SSTs, center right: model results from lower resolution experiment, far right: model results for higher resolution experiment.

Significance

This integration will provide a first indication of the resolution requirement for coupled models. It is expected that the improved simulation will provide a 'nature run' useful for synthetic observations which may be used in observing system design and prediction experiments. Such experiments will contribute to defining the underlying predictability limits of El Niño and other short-term climate signals. This will also be the first coupled simulation of long duration using ESMF coupled component models.