Development of the GEOS-5 Atmospheric Assimilation System

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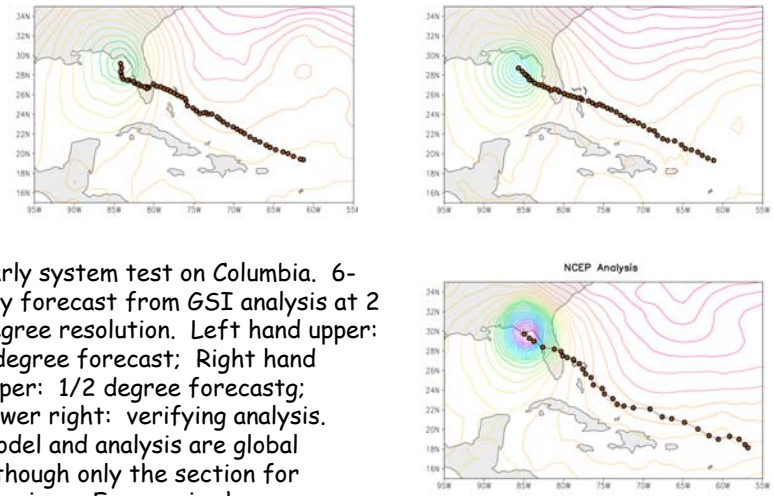
Objectives

Complete the development of the GEOS-5 atmospheric assimilation system comprised of the GEOS-5 AGCM and the Global Statistical Interpolation (GSI) analysis, the latter developed by NOAA.

Conduct simulations and forecasts to prepare a well-tuned state-of-the-art system running at high resolution resolution for the MERRA reanalysis—a major reprocessing of all atmospheric data during the satellite era -- and the MAP science goals.

Tune and evaluate the system in both climate and weather forecast modes.



Early system test on Columbia. 6-day forecast from GSI analysis at 2 degree resolution. Left hand upper: 1 degree forecast; Right hand upper: 1/2 degree forecastg; Lower right: verifying analysis. Model and analysis are global although only the section for Hurricane Frances is shown.

Technical Elements

To meet requirements for both climate and weather, runs are made at various resolutions, using different parameterizations, and doing parameter sweeps. Comprehensive diagnostics and a validation suite assembled for evaluation of our GEOS-4 system will be used to guide the parameter sweeps. Most of the parameter sweeps are conducted for only 500 days, sufficient to characterize the variability and the seasonal behavior. Fewer sweeps, with more judicious parameter choices are conducted for 20 years to characterize the climatology.

Significance

The GEOS-5 AGCM is the most comprehensive implementation of ESMF to date and will be used both in the GMAO coupled climate model and in data assimilation.

The GEOS-5 Data Assimilation System, which includes the GSI developed by NOAA, is the vehicle for transitioning our developments for new satellite data types to NOAA operations.

This well-tuned state-of-the-art system running at high resolution resolution will be used for the MERRA reanalysis—a major reprocessing of all atmospheric data during the satellite era -- and for the MAP science goals.