



The OSSE Framework at the NASA Global Modeling and Assimilation Office (GMAO)

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GMAO
Global Modeling & Assimilation Office

Summary

The Global Modeling and Assimilation Office (GMAO) has been developing an Observing System Simulation Experiment (OSSE) framework. The OSSE system is currently based on the Nature Run (NR) developed by GMAO called G5NR. The G5NR is currently being tested for use in the GMAO OSSE framework. Synthetic observations have been generated based on the G5NR fields, including conventional observations, GPS, and satellite radiances. These synthetic observations are ingested using the Grid-point Statistical Interpolation data assimilation system, with forecasts performed by the GEOS-5 model at 55 km/72L.

OSSE Experiments

Some recent improvements to the GMAO OSSE framework include the easier user control of options via resource files, removal of some bugs, optional output of additional diagnostics, and simplification of scripts. The new codes avoid rereading of the G5NR data sets when generating synthetic observations and use ESMF Shared Memory to accommodate large datasets. The selection of observation error correlation functions has also been generalized.

GMAO OSSE Components

The GEOS-5 Nature Run (G5NR) A 2-year global, non-hydrostatic mesoscale simulation with a 7 km horizontal resolution.

A Package to Simulate Observations

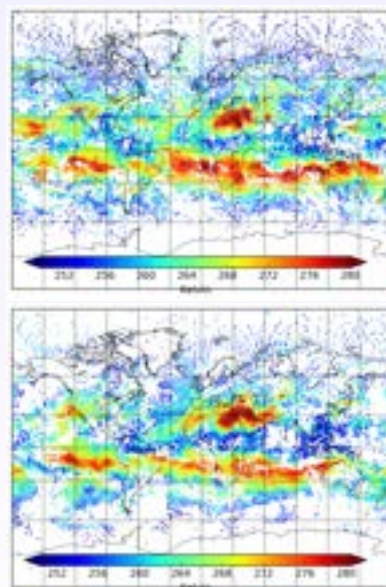
G5NR is interpolated to the location of real observations then satellite radiances and GPS bending angles are simulated

Error Addition/Tuning Realistic errors are added to the synthetic observations based on O - F differences

GEOS-5/GSI DA System Currently GSI as data assimilation system and GEOS-5 as the NWP model

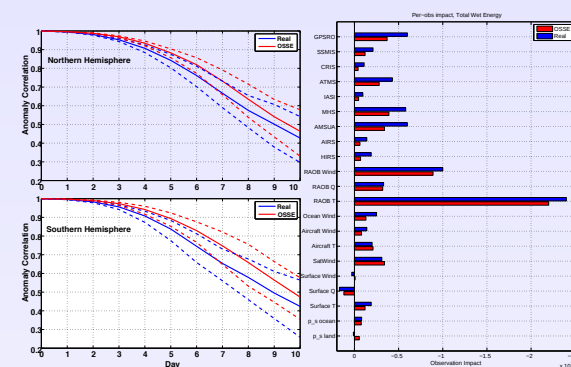
CRTM Coefficient Training New capability to be able to simulate satellite radiances for future instruments

Generation of Real-ish Obs Hyperspectral obs are used to generate semi-real IR obs for proposed instruments

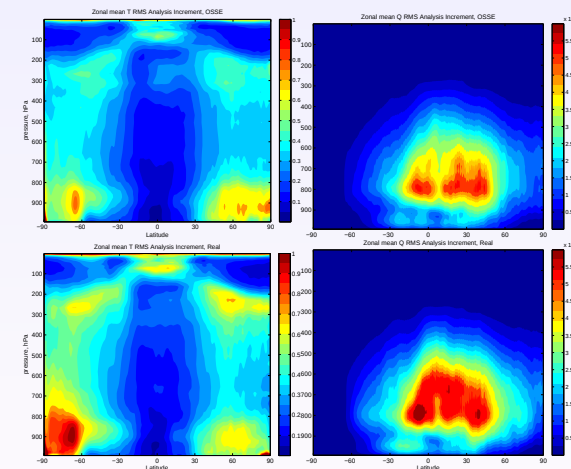


Real (top) versus simulated (bottom) observations for an infrared instrument.

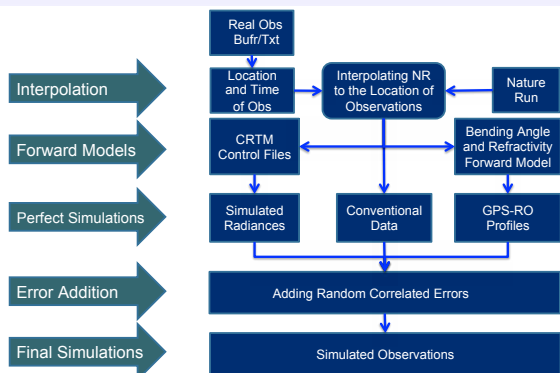
Evaluation of the OSSE System



Anomaly correlation (left) and observation impact per obs (right) for both OSSE and Real systems.



Observation increments (analysis minus background) for temperature (left) and specific humidity (right) for the OSSE (top) and real (bottom) observations.



Schematic Description of Simulating Synthetic Observations by the GMAO OSSE Package.

! The GMAO OSSE framework is an ongoing project and updated results are presented regularly at different meetings.

This work was supported by the NASA Global Modeling and Assimilation Office (GMAO). Computing resources are made available by the NASA NCCS. For more information visit the GMAO website: <https://gmao.gsfc.nasa.gov/>

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