

Community Global Observing System Simulation Experiments Package (CGOP)

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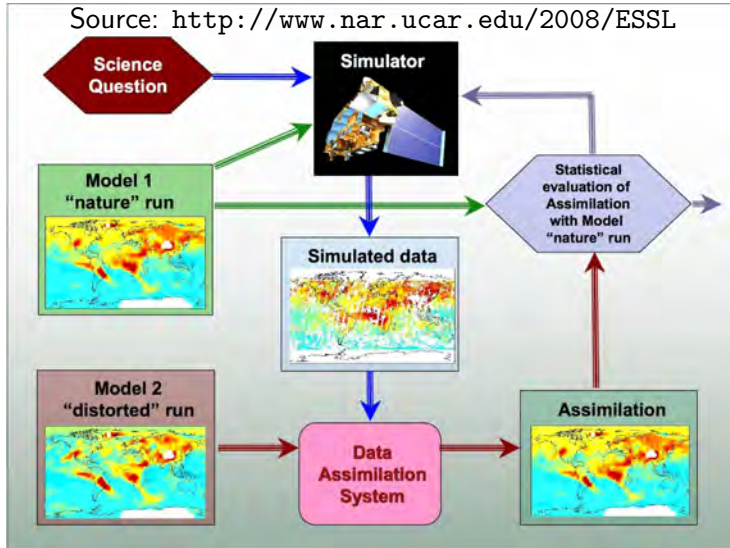
November 23, 2015



Introduction

Observing System Simulation Experiments (OSSEs)

Source: <http://www.nar.ucar.edu/2008/ESSL>



Schematic description of OSSEs

- **Data assimilation using real observations**

- True atmosphere is sampled by imperfect instruments
- DA system can only be validated using sparse data such as radiosonde and dropsondes
- Real observations are only available from current instruments

- **Data assimilation using OSSEs**

- Observations are simulated from a high-resolution NWP model known as "Nature run" using a forward model
- DA system can be easily validated since the true atmosphere (the "Nature run") is known
- Observations can be simulated for any future instruments as long as the forward model is available

Application of OSSEs

- investigate the impact of future instruments on the weather forecast and data assimilation
- evaluate different data assimilation techniques since the truth is well known
- examine the impact of any future gap in the weather satellites
- investigate the impact of new data types on weather forecast and data assimilation
- OSSEs can be used for many other applications such as product retrieval, satellite data bias correction, etc.

The Community Global OSSE Package

The Community Global OSSE Package - CGOP

Community Global Observing System Simulation Experiment Package

Forward Operators

GPS-RO
Bending Angle
and Refractivity
Simulator

Deriving
Conventional Data
from
Nature Run

Satellite Radiance
Simulator (CRTM)

Data Assimilation Components and Scripts

GFS
Model

GSI-Operational
Version

GSI-Research
Version (4D-Var)

DA Scripts
and Codes

Independent Assessment Tool (IAT) for post-processing

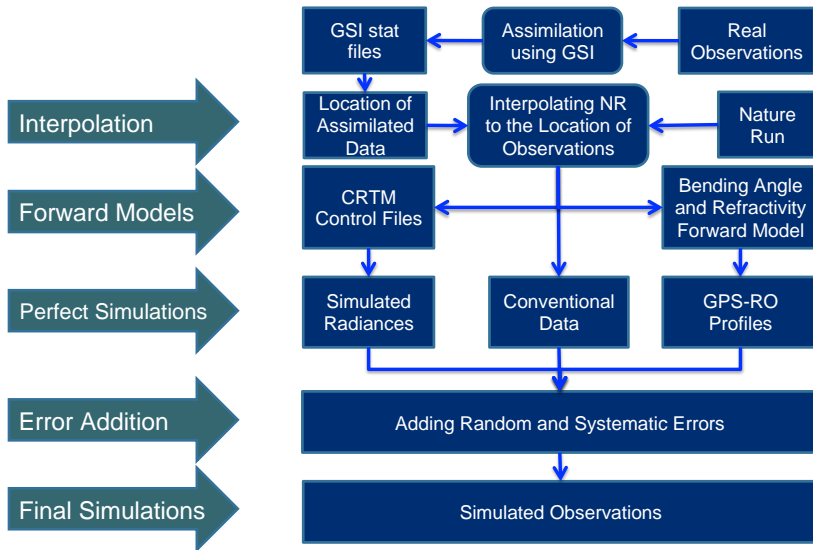
Radiance
Monitoring
(RadMon)

Verification
Database
(VSDB)

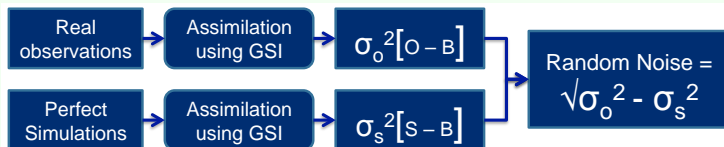
GSI Diag Files
Data Analysis

Hurricane Track/
Intensity

The OSSE Package

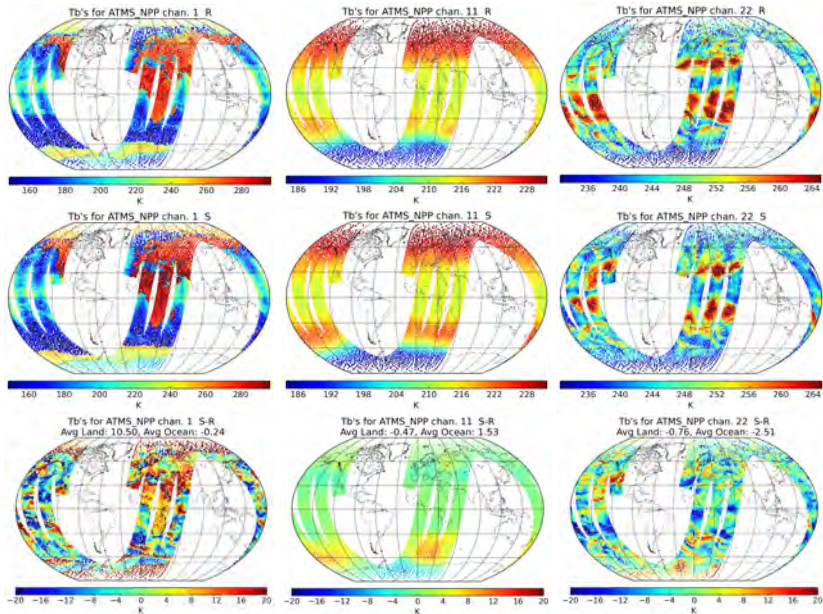


Random noise addition



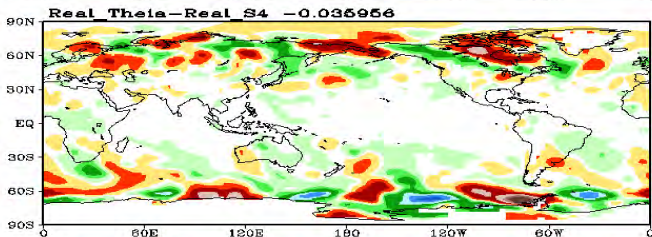
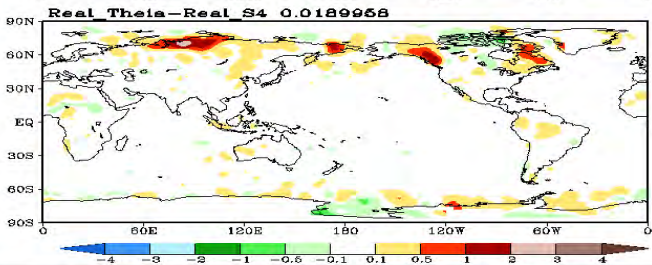
- For satellite radiances, the noise is added independently for each channel with no correlation
- For conventional data, the random error is added separately for p,t,q,v and stratified by layers
- The GPS-RO random error is added separately for bending angle and refractivity

Simulated versus actual observations for ATMS



Benchmarking of the different components of CGOP

Mean temperature difference for parallel runs on S4 and Theia starting from the same initial conditions



Thank you for
your attention!