

The background of the slide is a photograph of a sunset or sunrise over the ocean. The sky is a deep blue, with a large, bright, orange and yellow cloud formation on the left side. The ocean is visible at the bottom of the frame.

Observation System Simulation Experiments (OSSE)

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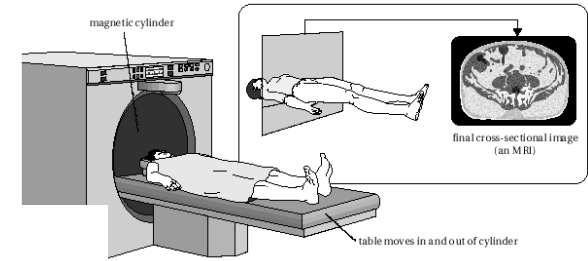
Design of an observation system

-- *Integration into existing systems*

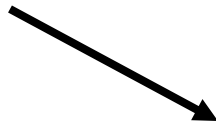
- Extremely expensive to build and maintain new observation systems;
- Unknown potential impact on weather and climate in addition to existing systems;
- Proper implementation and operation may maximize its impact.

OSSE

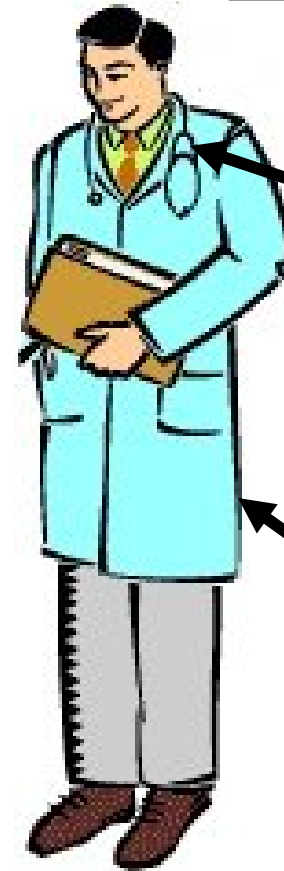
New instrument?



“True” Atmosphere



Nature Run



Old
Observation
instrument

Analysis and
Forecast
system

OSSE

Design, Simulation and Demonstration

- Benefit - Cost evaluation (*design and decision*);
- Operational experience (*simulation and learning*);
- Optimal design: where, when and what to observe for gaining best results (*design and demonstration*).

More importantly, OSSE can be done even before an observation network is physically built.

OSSE is a complex system

Analysis, forecast, and verification

- A nature run (a model forecast as “true atmosphere”) closely reflecting the reality;
- Construction of existing observation datasets and new observations from the nature run;
- Introduction of errors (obs, representative errors) representing those in reality;
- Calibration so that the existing obs impact in real and simulated atmospheres is similar based the forecast model and data assimilation technique.

ECMWF nature run

Low Resolution Nature Run

Spectral resolution : T511

Vertical levels: L91

3 hourly dump, **total 3.8 TB**

Initial conditions: 12Z May 1st, 2005

Ends at: 0Z Jun 1, 2006

Daily SST and ICE: provided by NCEP

Model: Version cy31r1

Completed in July 2006, rerun October 2006

ESRL copy saved at GSD mass storage

High Resolution Nature Run

for a selected period

Hurricane season is recommended

T799 resolution, 91 levels,

one hourly dump

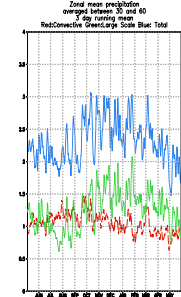
Get initial conditions from low resolution-NR

Initial Diagnostics of the Nature run

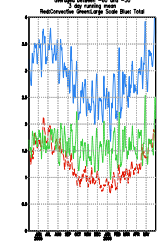
Study of drift in NR Michiko Masutani (NCEP)

Area averaged precipitation

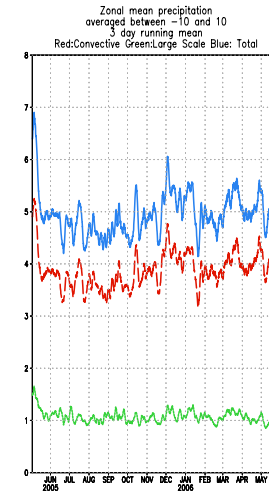
NH mid-latitudes



SH mid-latitudes



Tropics

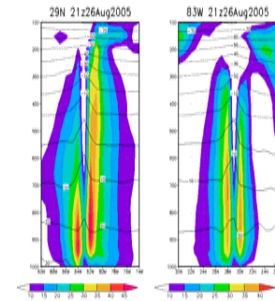


It takes about two to three weeks to settle tropical precipitation.
- Michiko Masutani (NCEP/EMC)

Convective precipitation
Large Scale precipitation
Total precipitation

The African Monsoon Region and the Tropical Atlantic

Oreste Reale NASA/GSFC



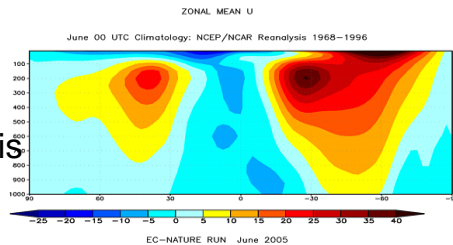
HL vortices: vertical structure

Vertical structure of a HL vortex shows, even at the degraded resolution of 1 deg, a distinct eye-like feature and a very prominent warm core.
-- Oreste Reale (NASA/GSFC/GLA)

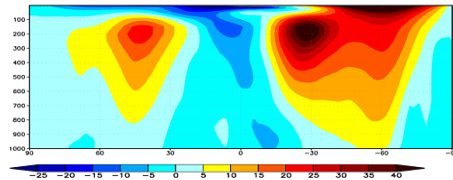
Zonal wind June 2006

By Juan Carlos Jusem (NASA/GSFC)

NCEP reanalysis

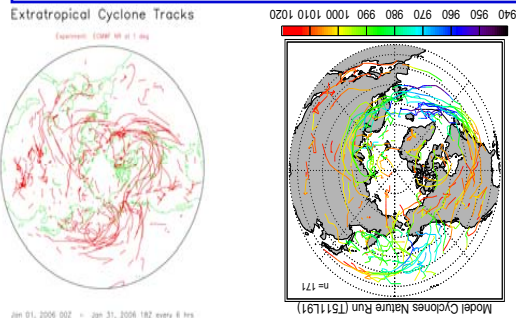


Nature Run



NH Cyclones Track

Joe Terry NASA/GSFC and Thomas Jung (ECMWF)



Jan 01, 2005 02:10:10

Model Cyclones Nature Run (T511L91)

A global OSSE test case

Model: Global Forecast System (GFS);

Analysis: Gridpoint Statistical Interpolation (GSI);

Nature Run: ECMWF forecast;

Platform: NCEP/IBM

Time period: May 1, to May 8, 2005;

Test dataset: 17,835 (spd); 64,458 (q); 48,104 (t)
477,874 (uv), 53,574 (ps)

Including:

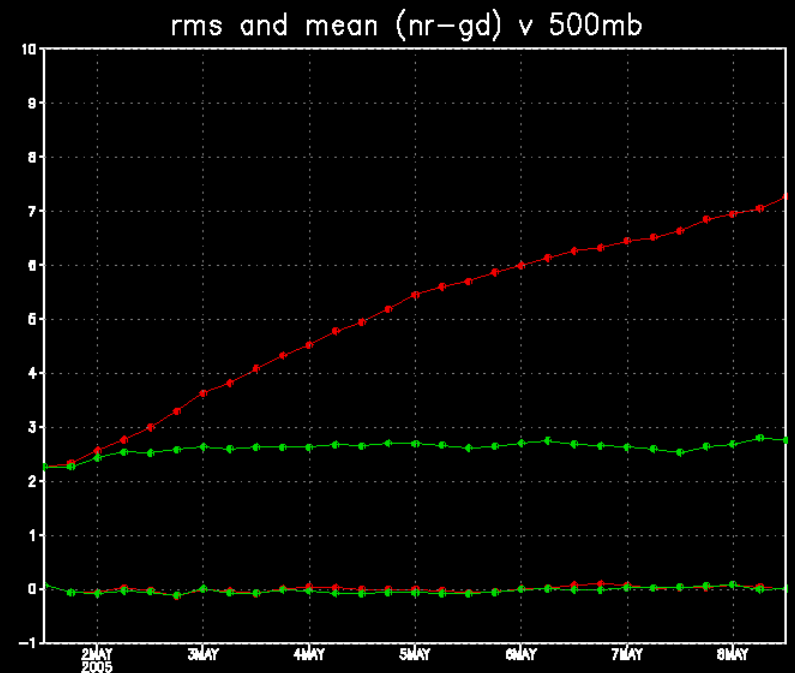
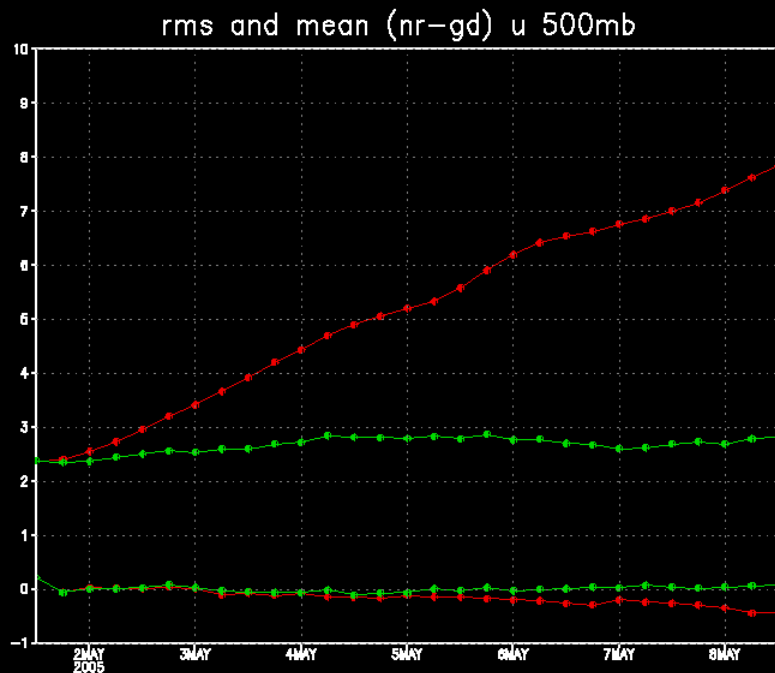
raob, pibal, acar, airep, pirep, cloud
tracked wind, profilers, metar, ship,
buoy, ssmi/wind, quikscat,

generated

from the nature run.

Time sequence of RMS and mean at 500mb (wind)

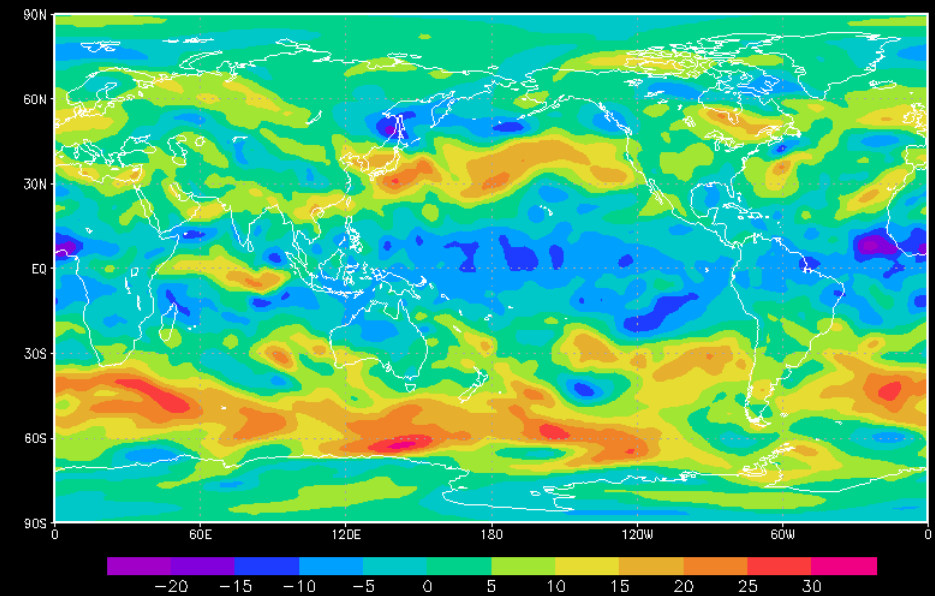
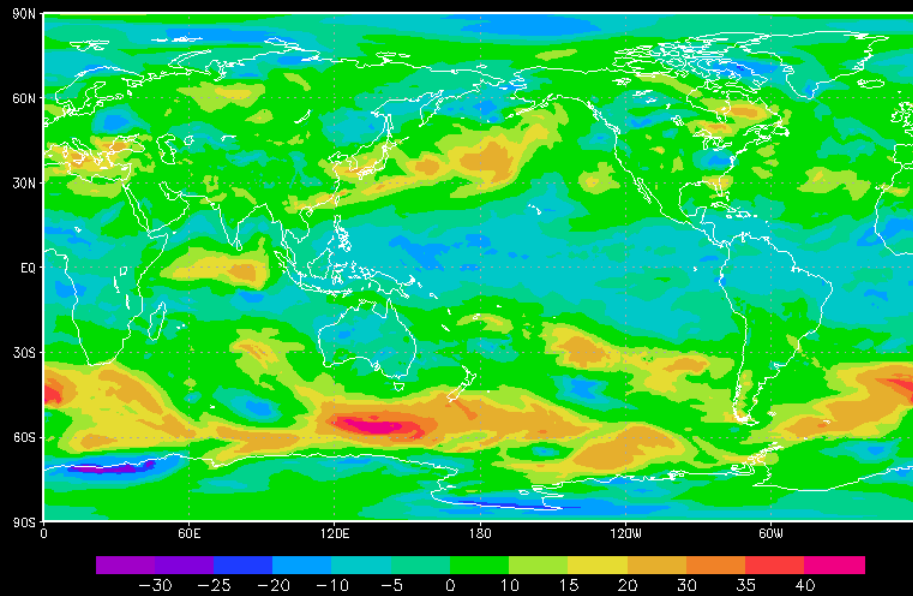
red: NR-NO; green: NR-CO



Wind (U) comparison (700mb) at 12Z May 8, 2005

ECWMMF nature run

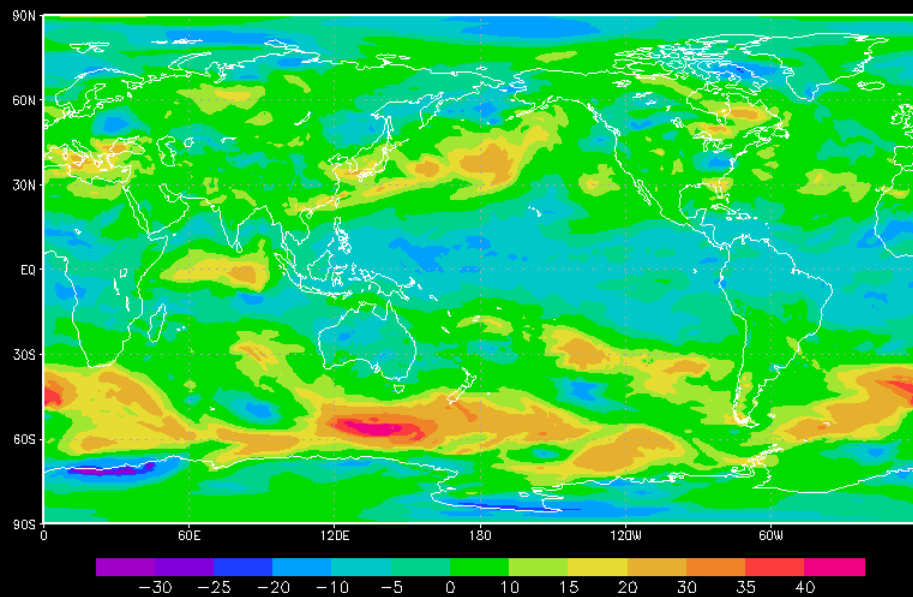
OSSE without obs



Wind (U) comparison (700mb) at 12Z May 8, 2005

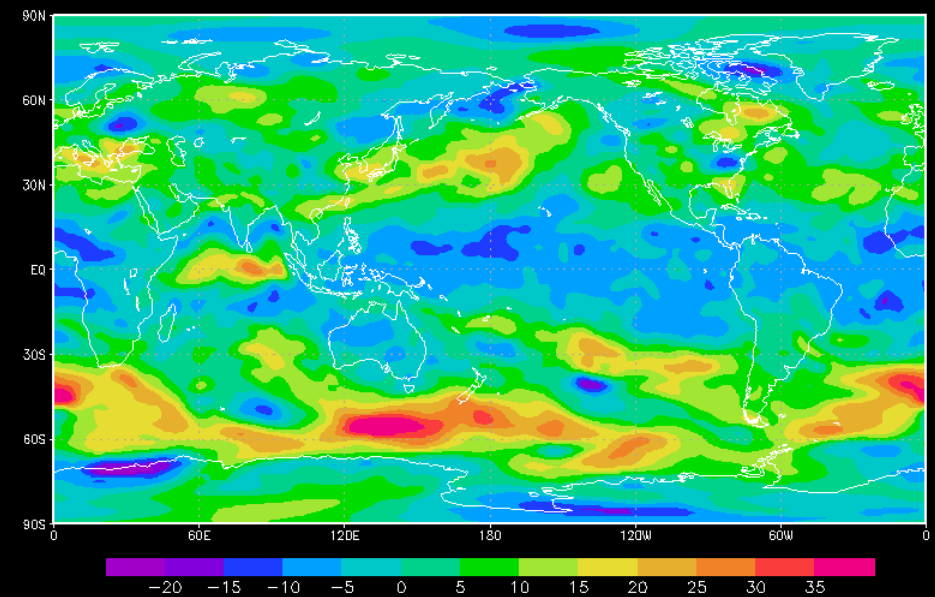
ECWMMF nature run

OSSE with “convention” obs



GRADS: COLA/IGES

2007-05-22-13:31



2007-05-22-13:23

ESRL OSSE

Goal: support future observation systems

- Joint effort with several institutes, NCEP, JCSDA, NASA, ECWMF, SWA;
- Usage of ECMWF one year forecast as nature, GFS as forecast model, GSI as data assimilation technique;
- Potential applications to UAS and HMT.

Summary

An OSSE is a useful tool for evaluating a new observation system before it is built or deployed.

Question?

More interesting presentations on UAS and HMT...