IASI Water Vapor Radiance Assimilation Experiments

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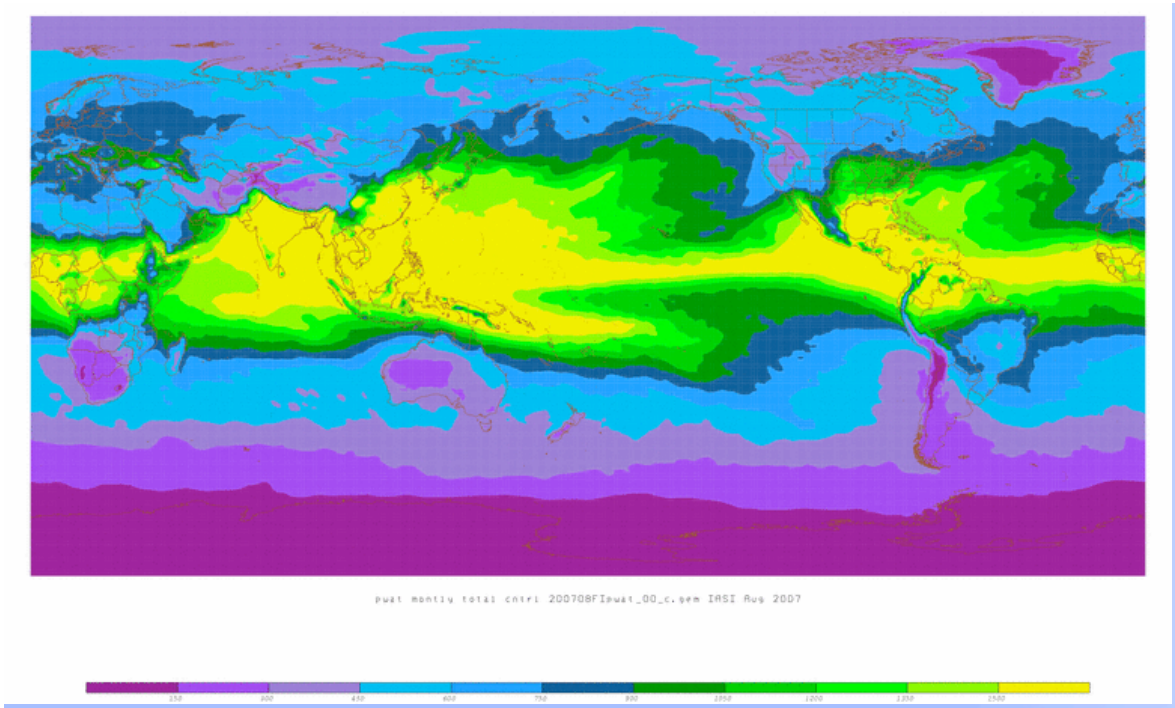
IASI Water Vapor Experiment

- December 2008 version of the GDAS/GFS at T382L64
- All operational data types planned to be used by operations
  - Including METOP's AMSUA, MHS, HIRS, and IASI longwave
- Two Seasons
  - 10 July – 31 August 2007
  - 1 Dec 2007 – 15 Jan 2008
- Last 30 days of each season are used
  - 00Z forecasts out to day 7

IASI Water Vapor Experiment

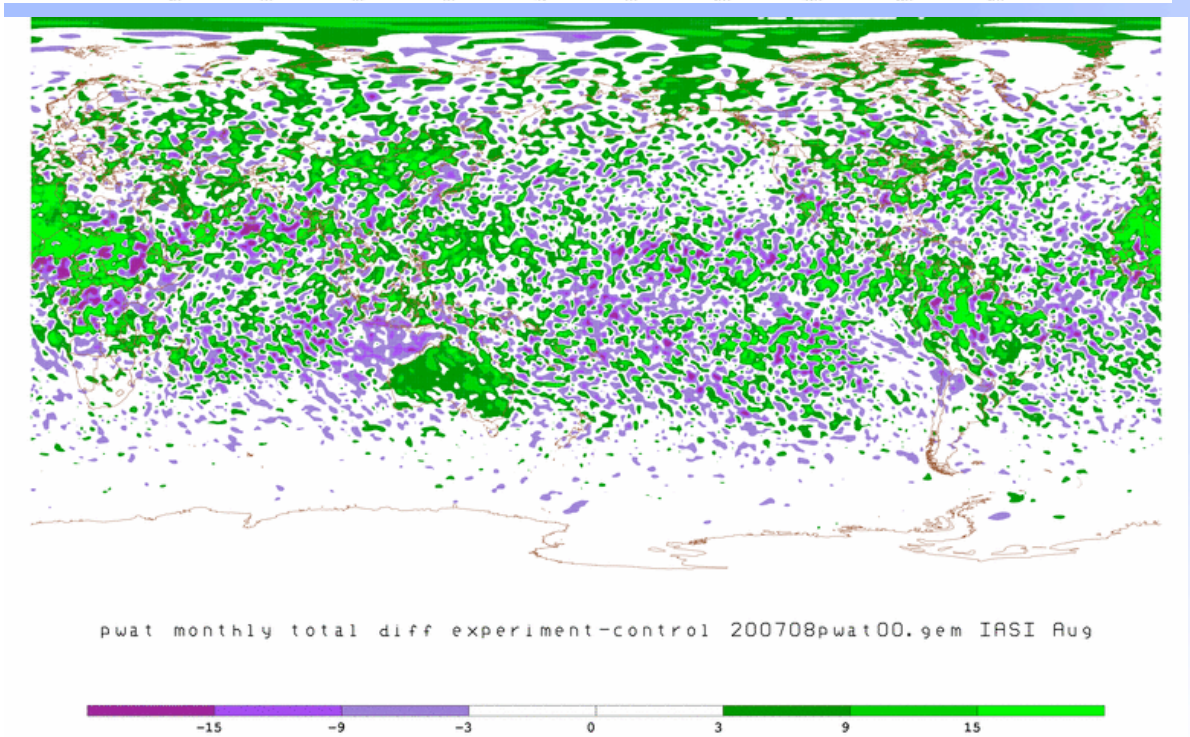
- IASI channel selection
  - 165 longwave channels
    - Also used in the control
  - 86 water vapor channels
    - Off-line water vapor channels only
- Thinned to 180 km
  - Clearest FOV based on AVHRR cloud fraction
- Radiance QC similar to AIRS
- One month used for bias correction spinup.

Results



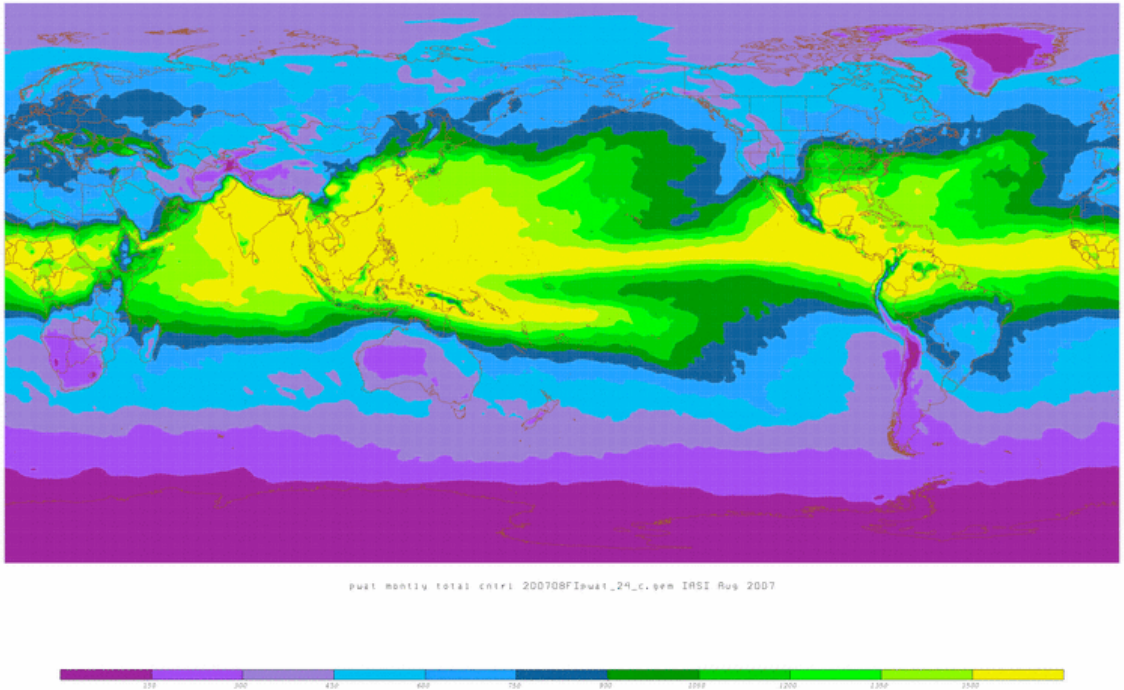
Analysis precipitable water

August 2007



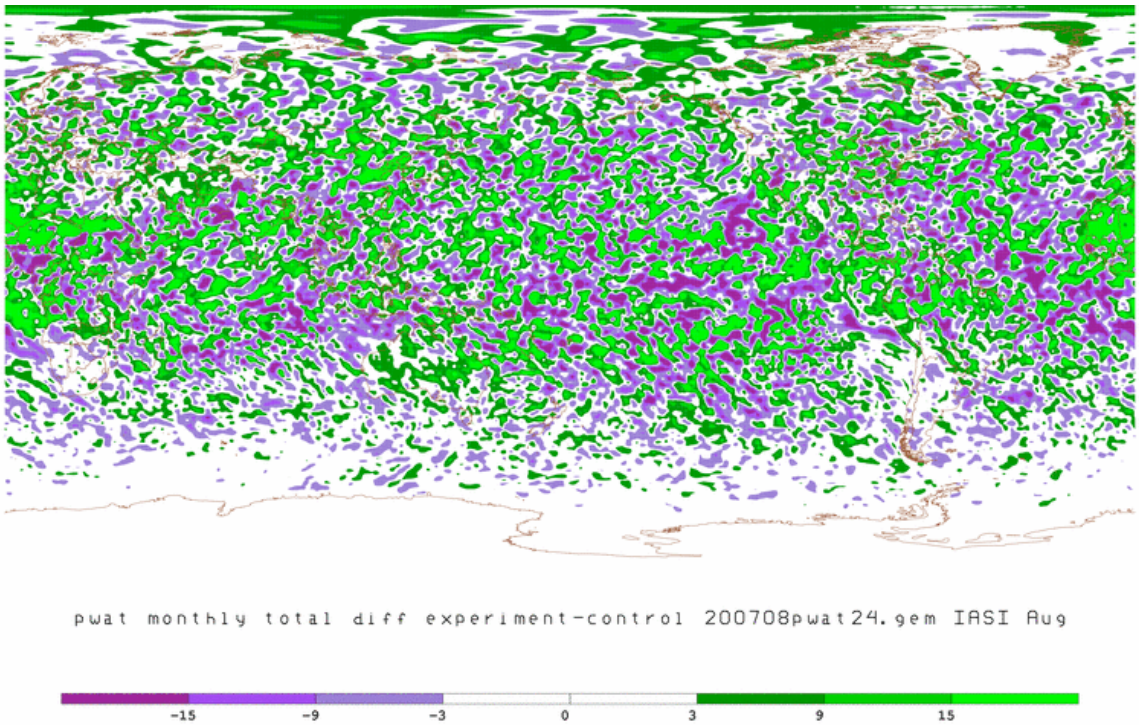
Analysis precipitable water difference (experiment – control).

August 2007



24 hour forecast precipitable water.

August 2007



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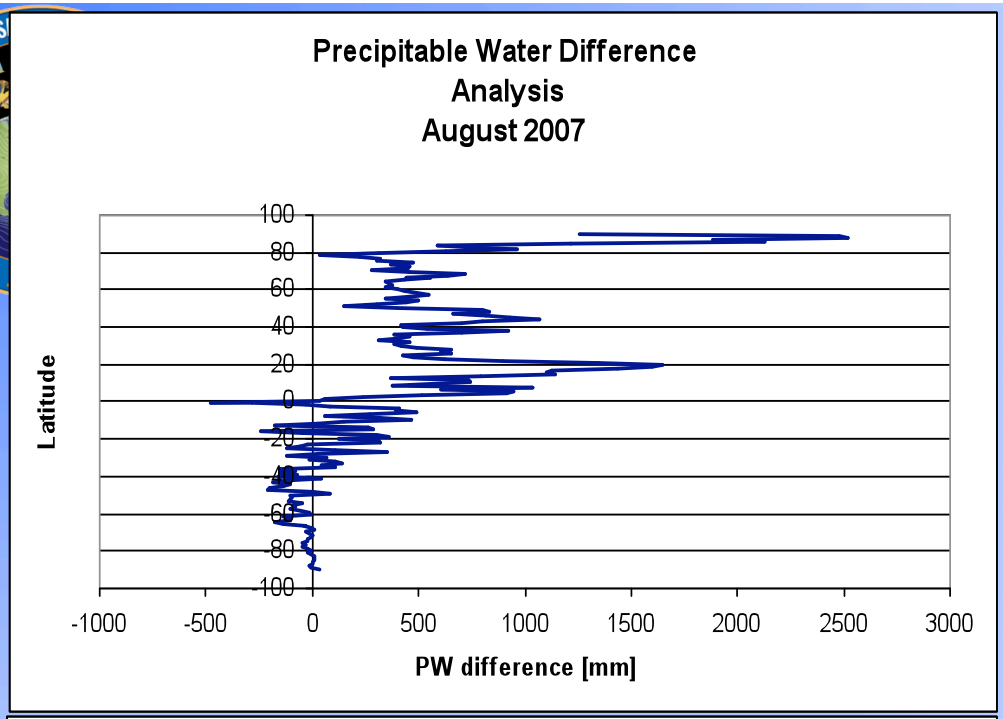
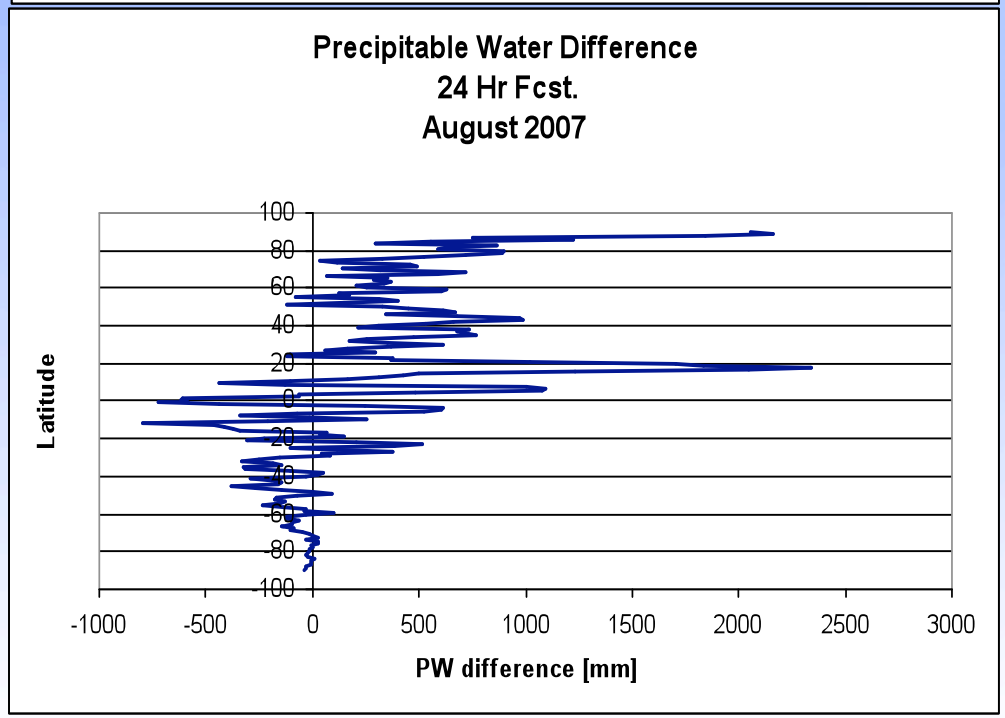
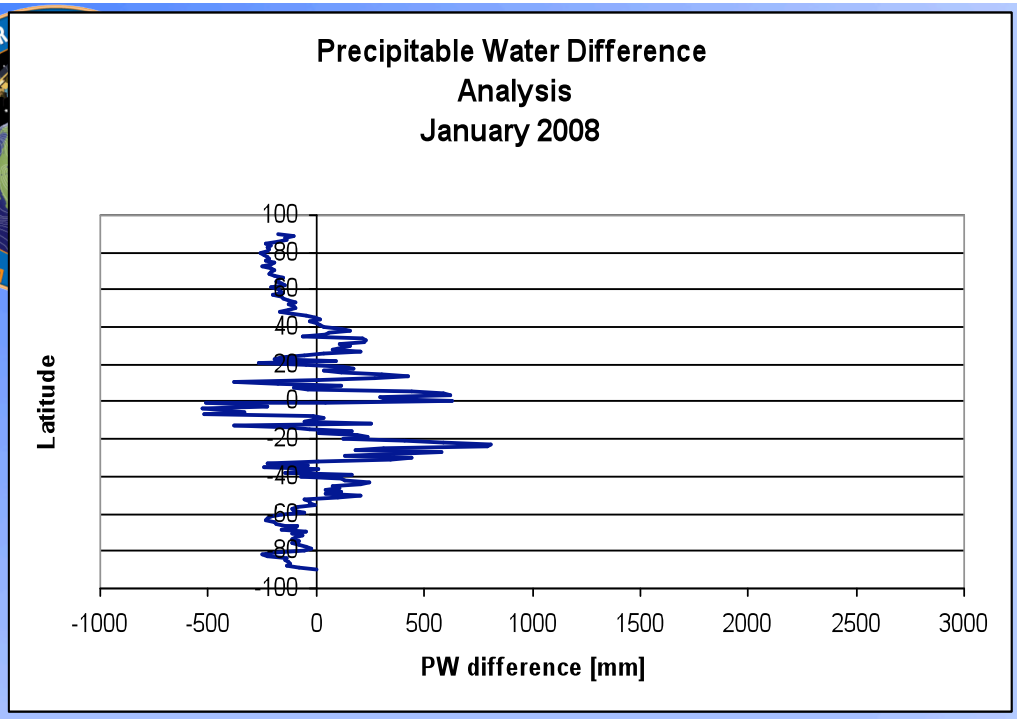




The Northern Hemisphere starts with more moisture …..

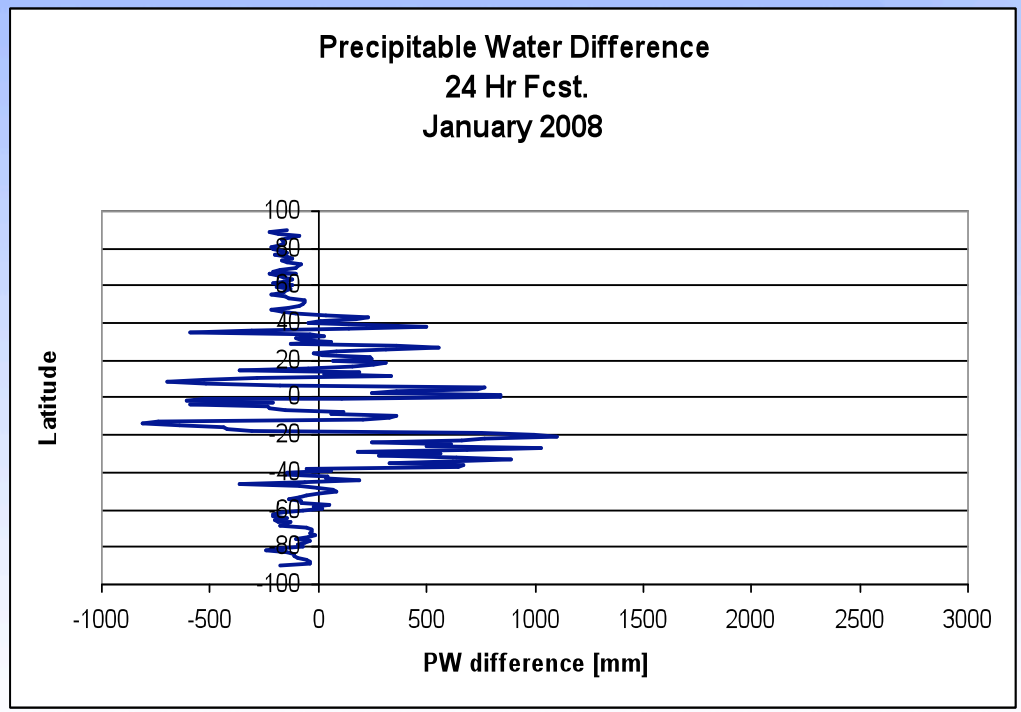
….. and keeps most of it through 24 hours.

Southern Hemisphere is dryer.



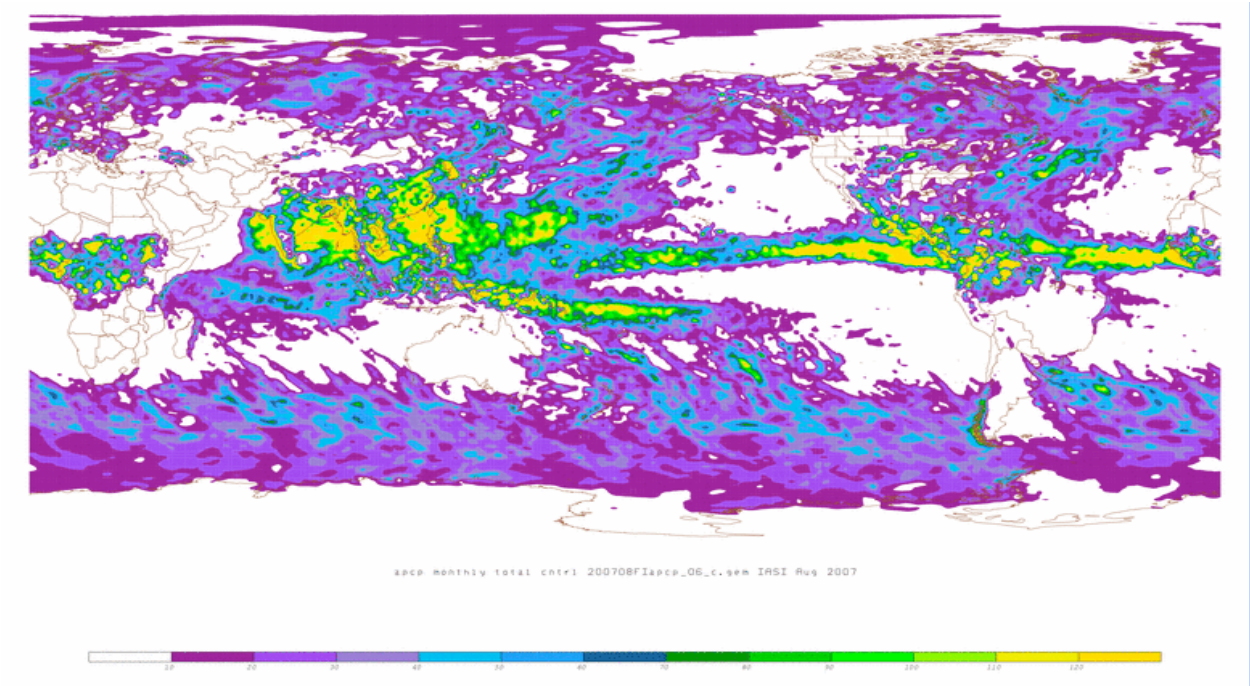
The Mid-Latitudes starts with less moisture …..

January 2008



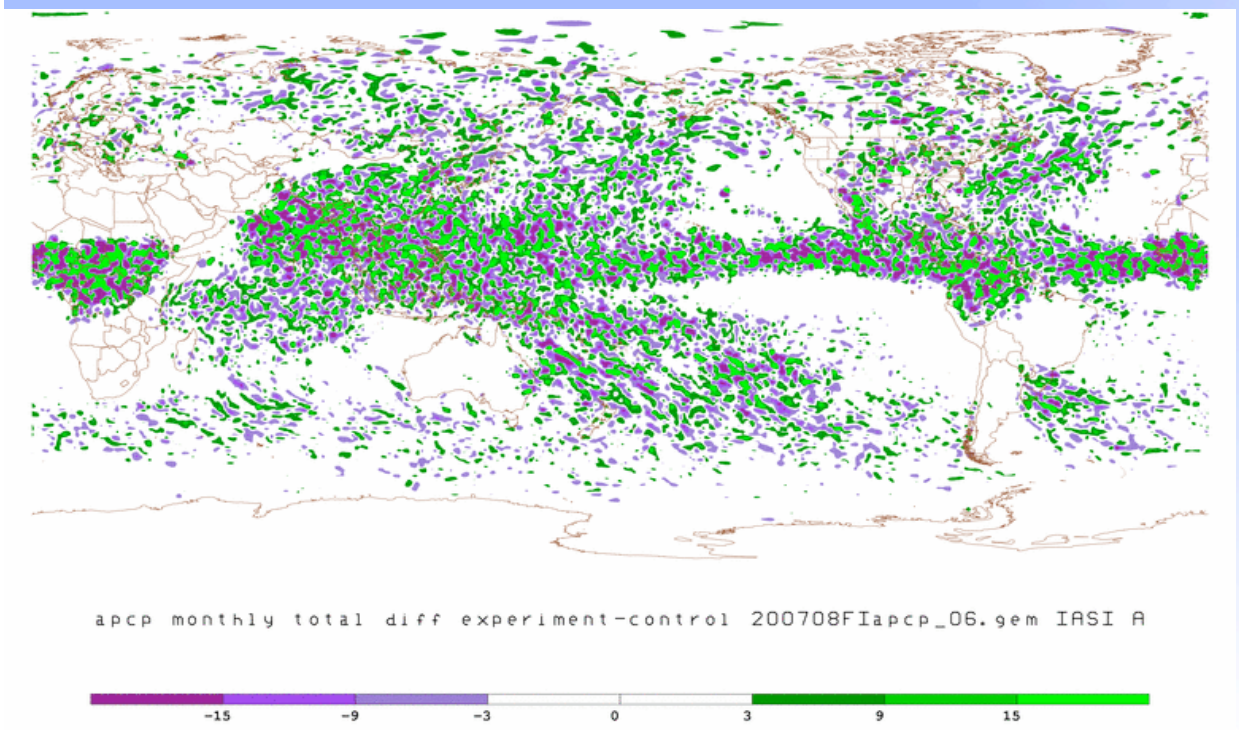
….. and remain dryer through 24 hours.

January 2008



6 hour precipitation totals from the 0-6 hour forecast.

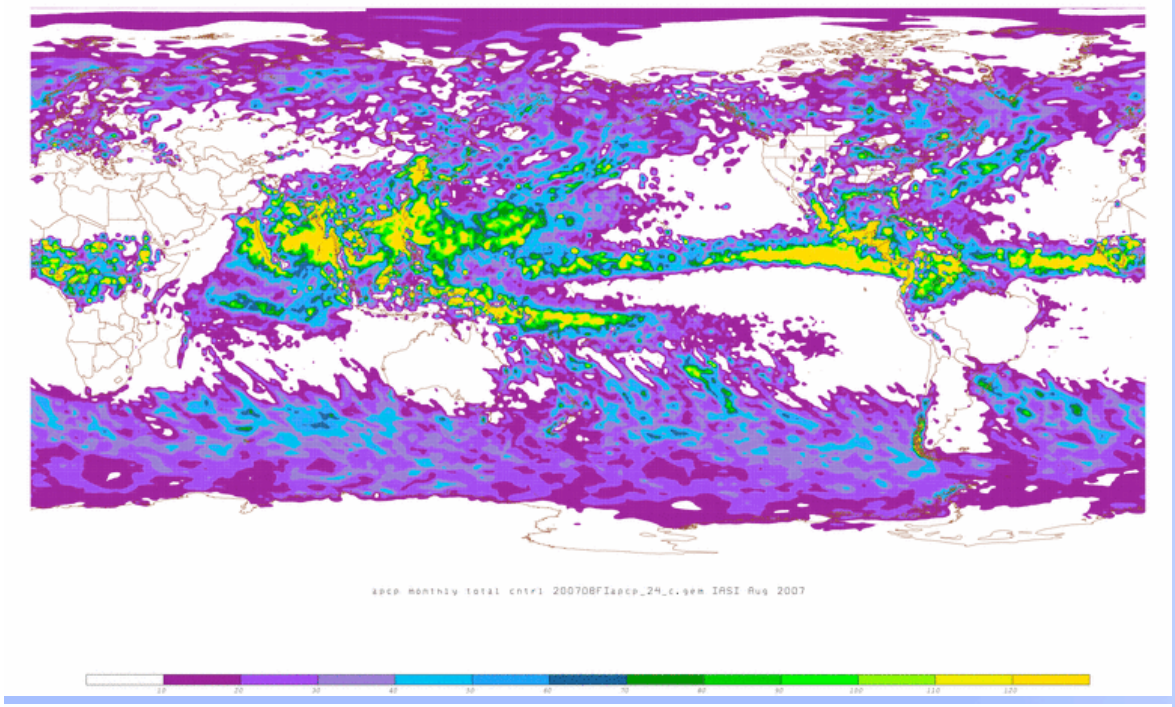
August 2007



Difference in 6 hour precipitation totals from the 0-6 hour forecast (experiment – control).

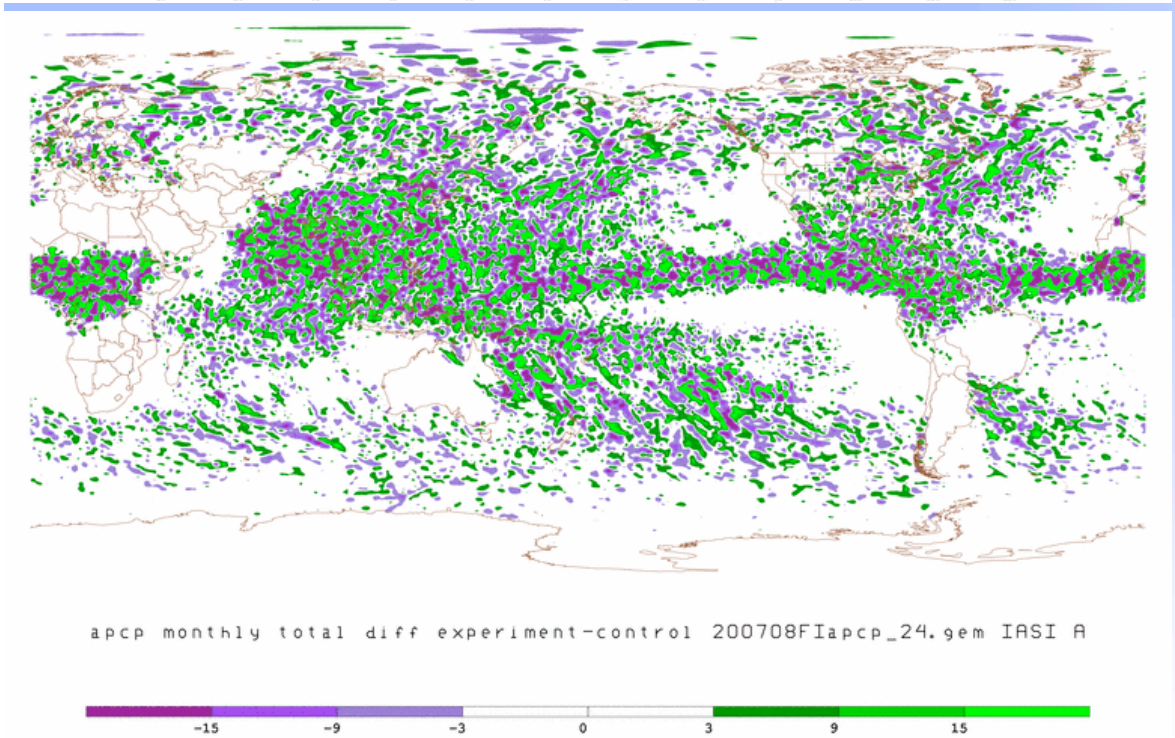
August 2007

CIMSS



6 hour precipitation totals from the 18-24 hour forecast.

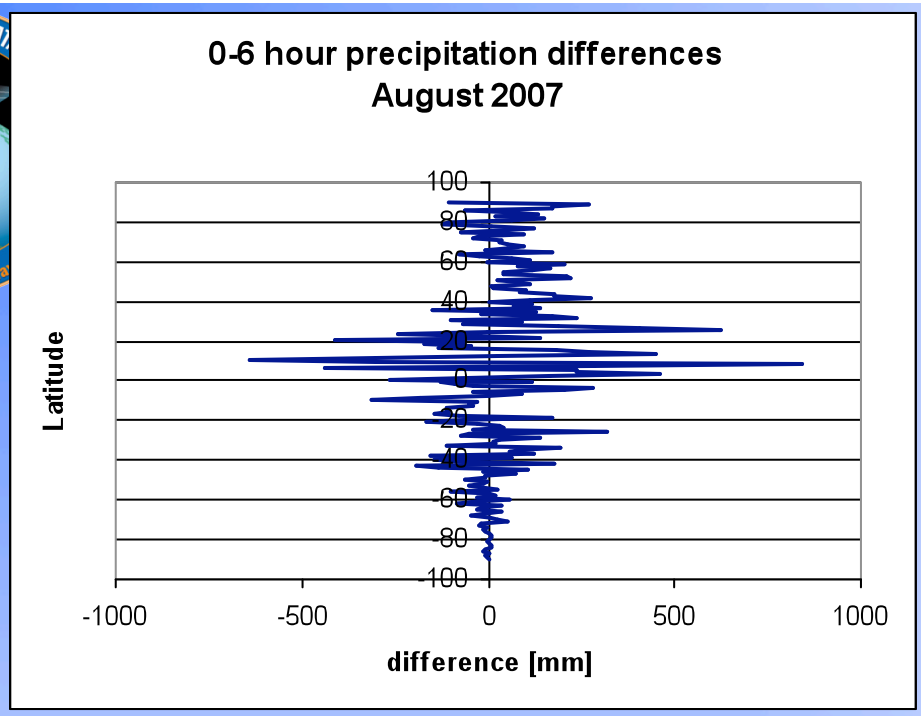
August 2007



Difference in 6 hour precipitation totals from the 18-24 hour forecast.

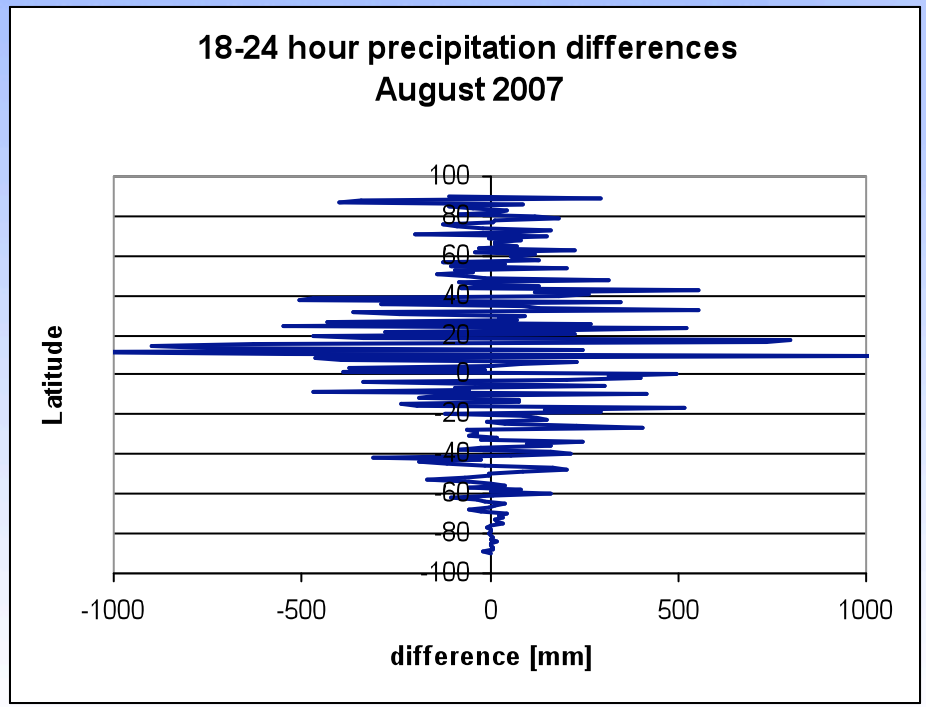
August 2007

CIMSS



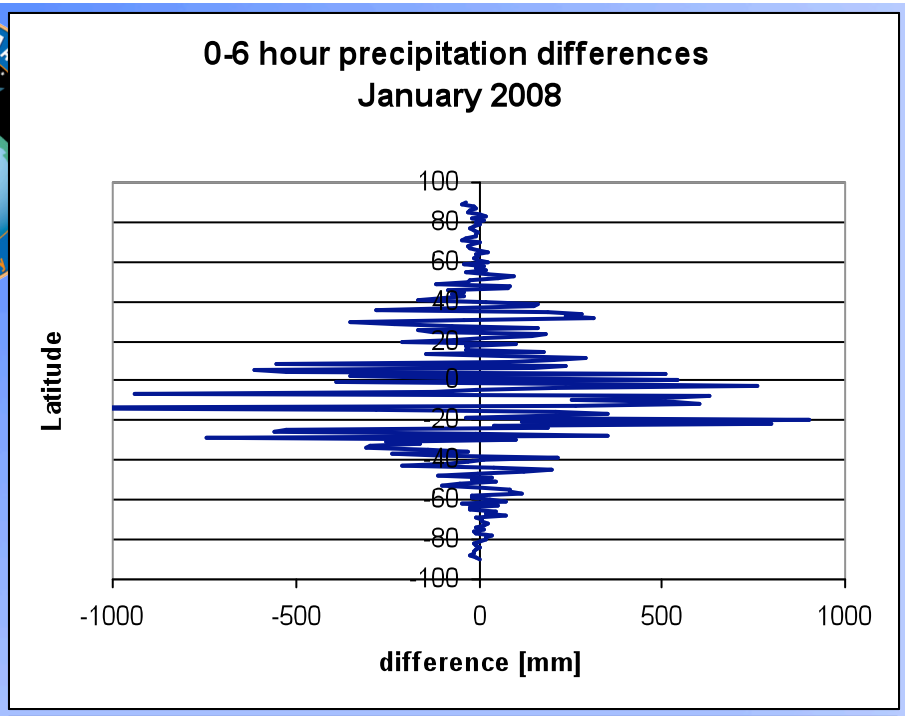
More rainfall in Northern Hemisphere after initialization.

August 2007



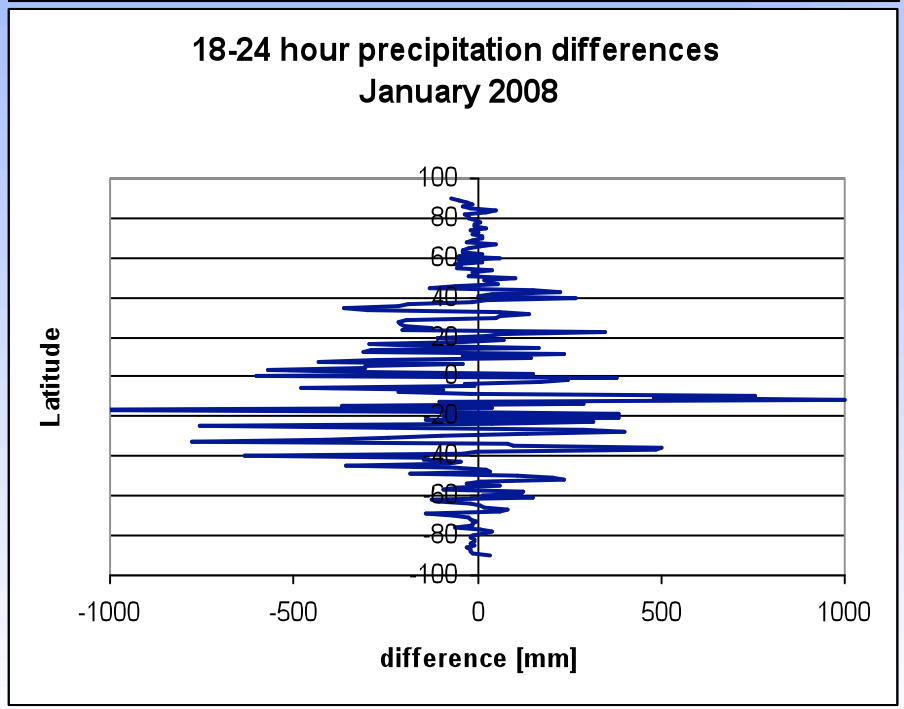
Less rainfall in Tropics at 24 hours.

August 2007



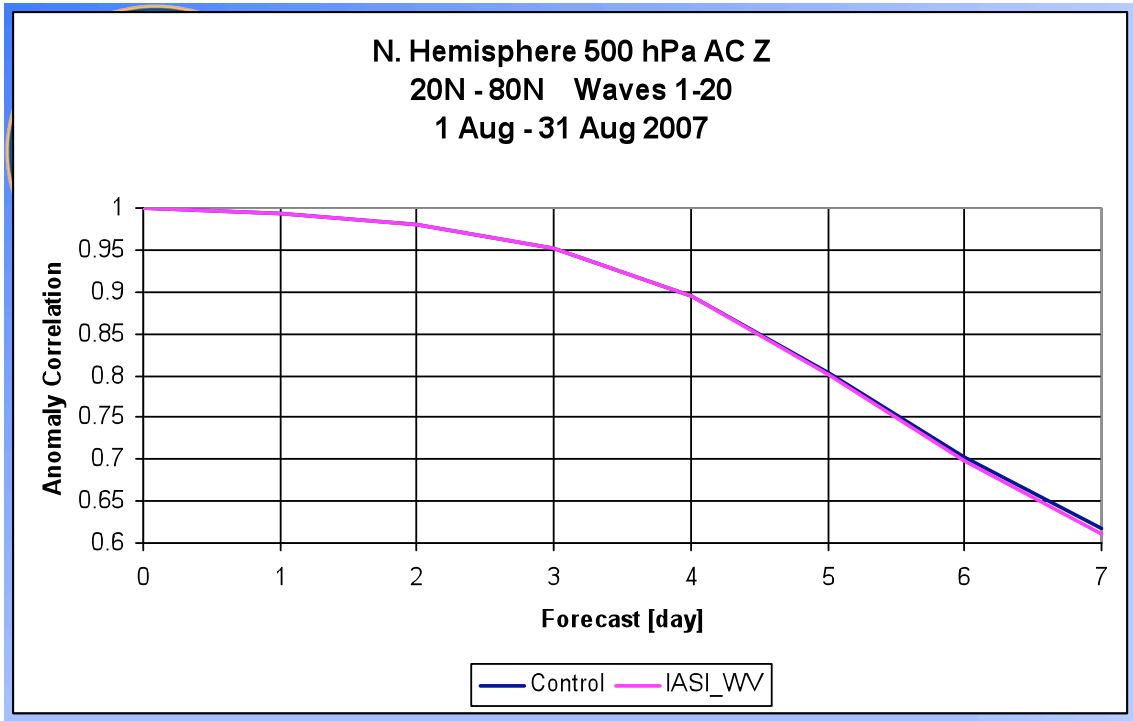
More variability by latitude than in August 2007.

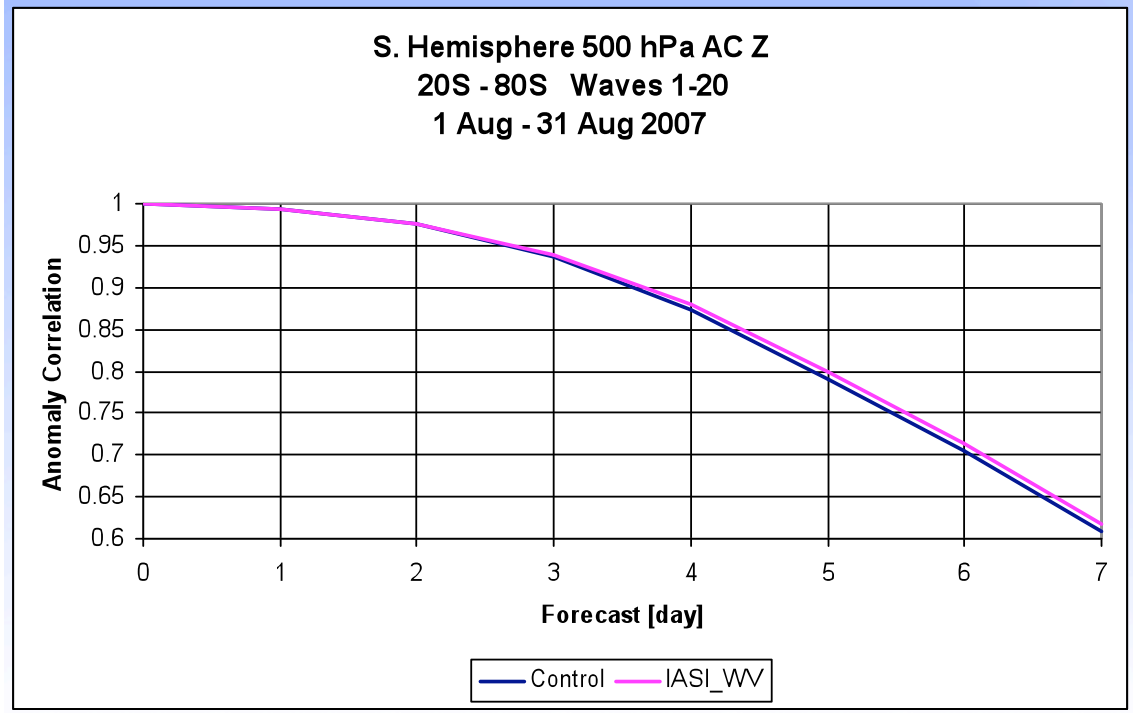
January 2008



No major trend with forecast time.

January 2008



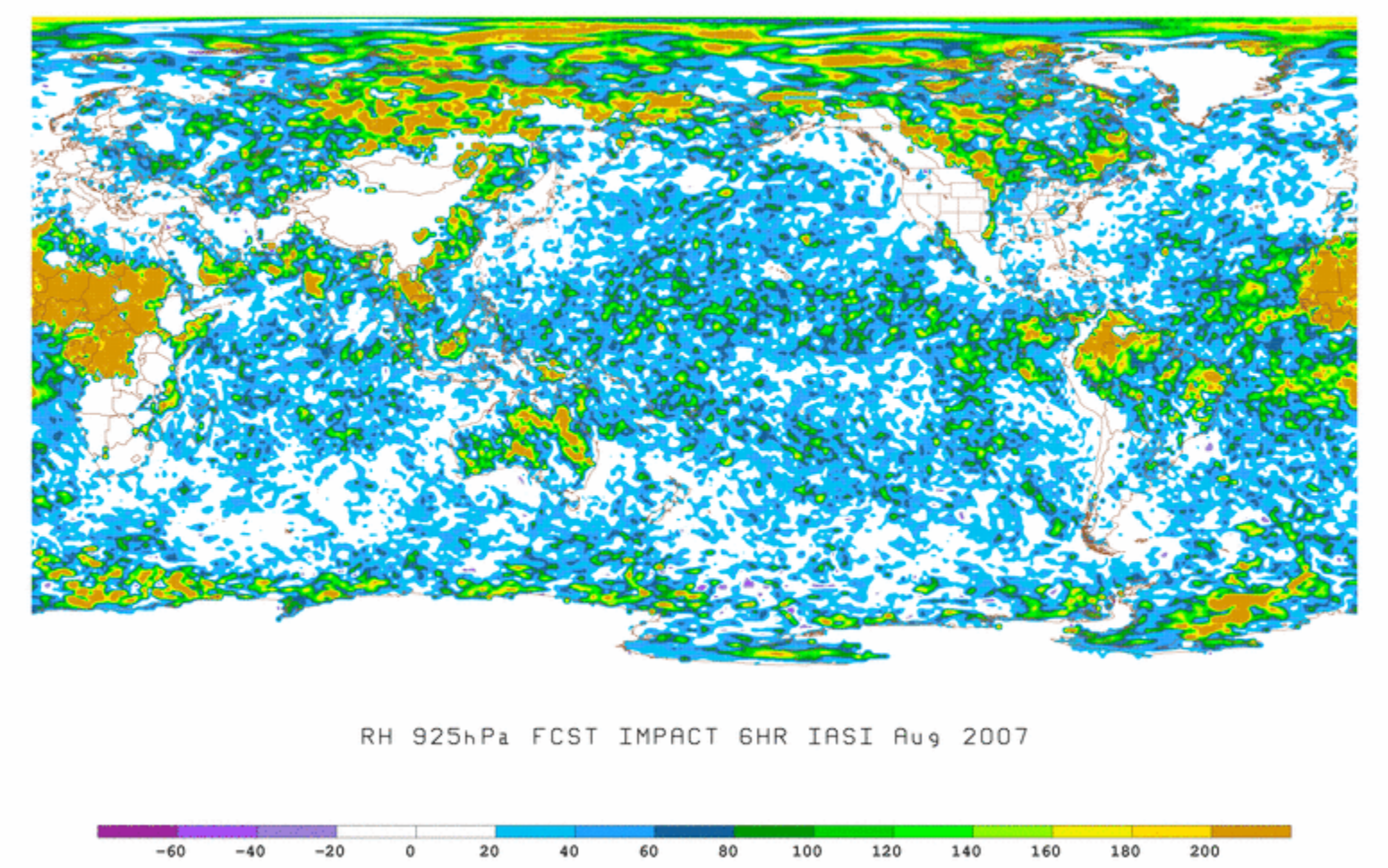


Anomaly correlations are mostly neutral

CIMSS

Forecast Impact of 925 hPa Relative Humidity

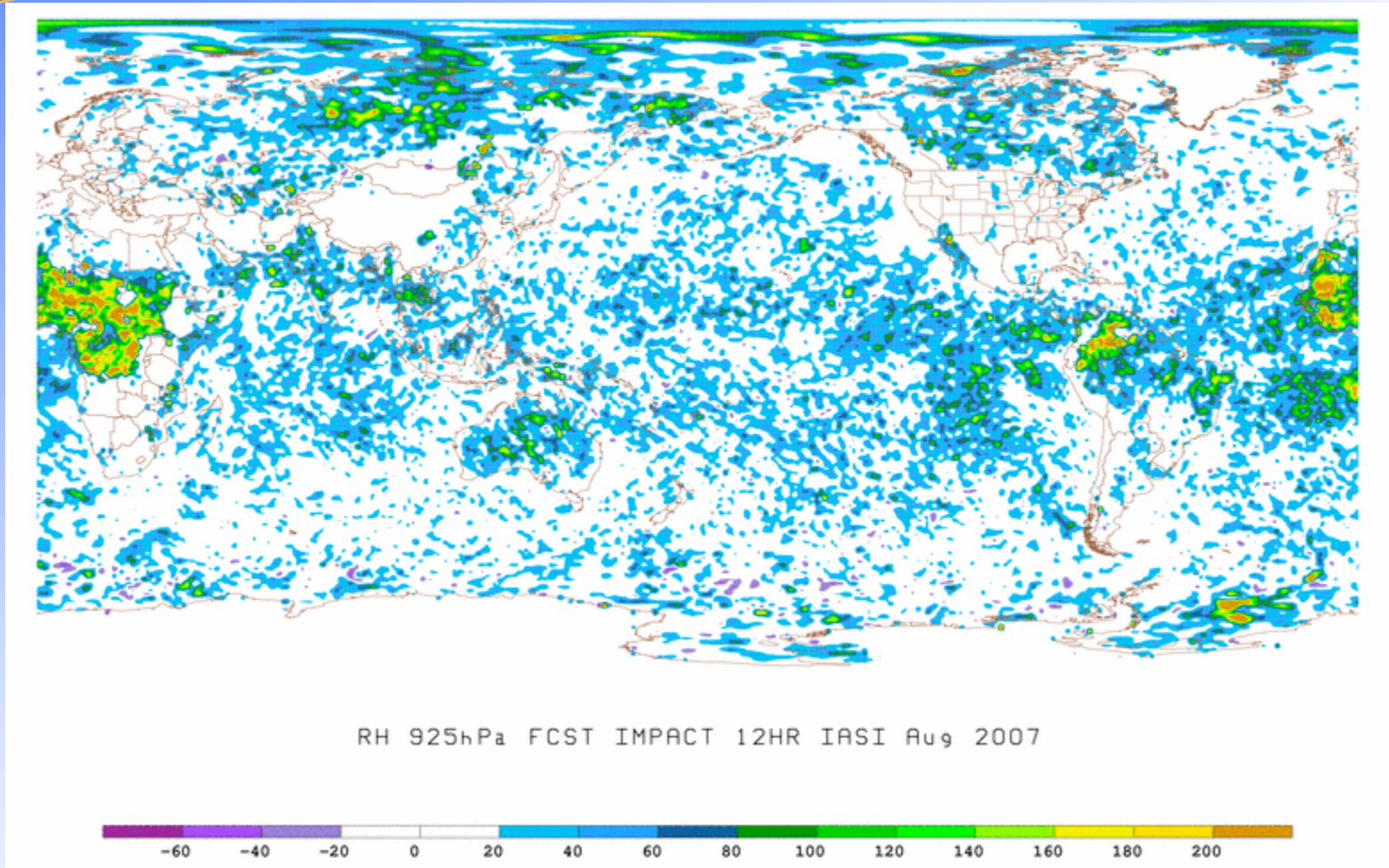
6 hour forecast



Values near zero or underground are white

Forecast Impact of 925 hPa Relative Humidity

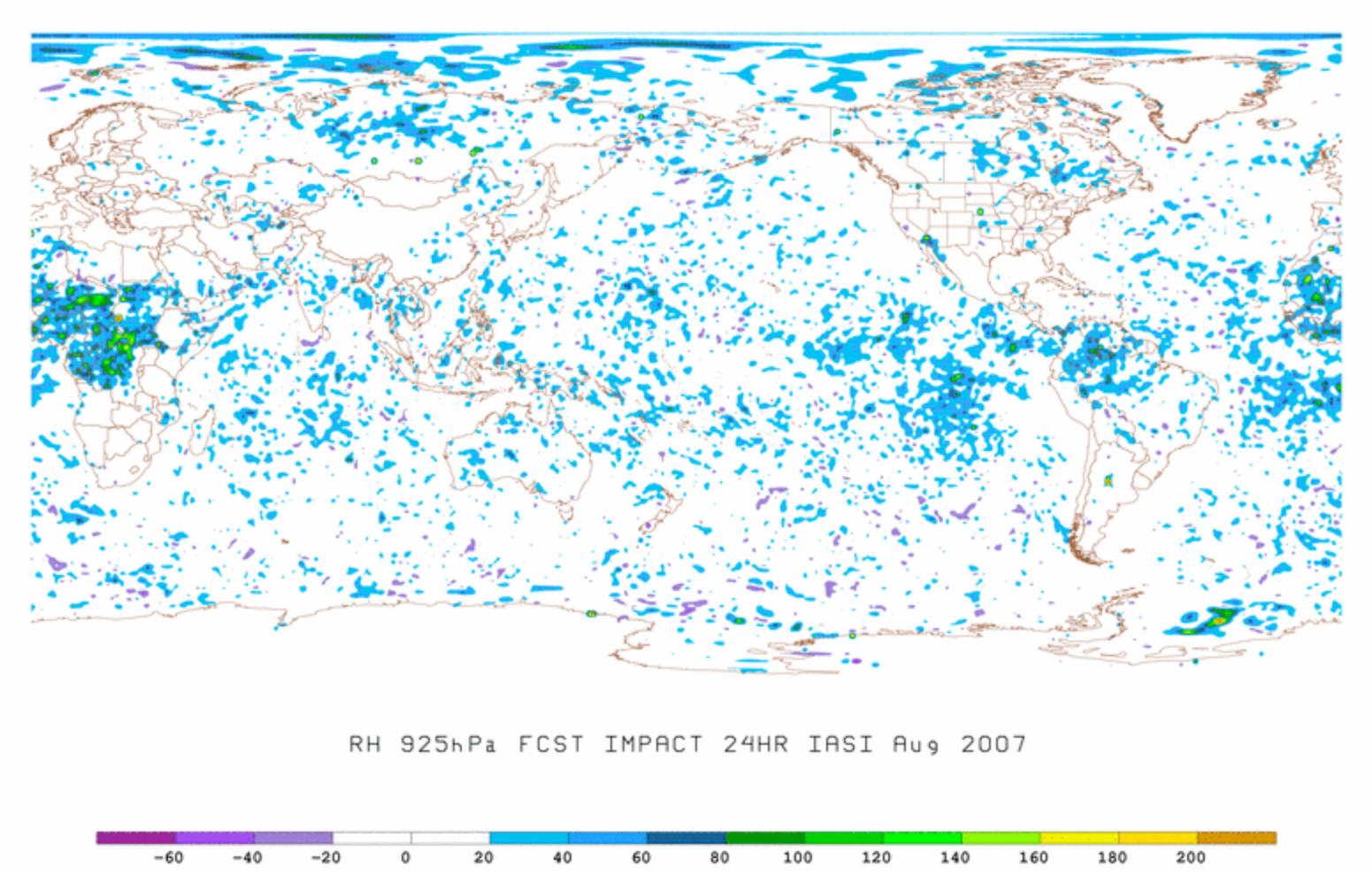
12 hour forecast



Values near zero or underground are white

Forecast Impact of 925 hPa Relative Humidity

24 hour forecast

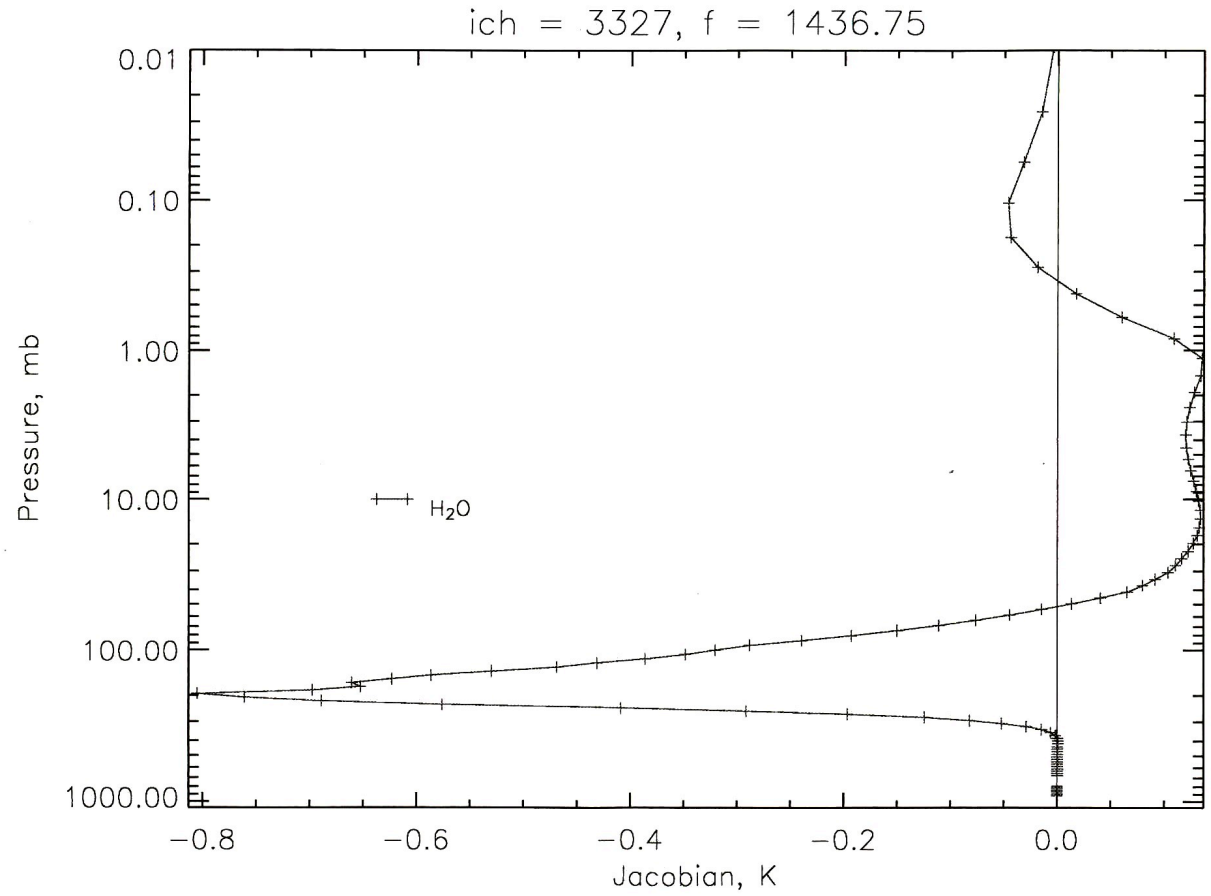


Values near zero or underground are white

Water Vapor Channel Issues to be resolved

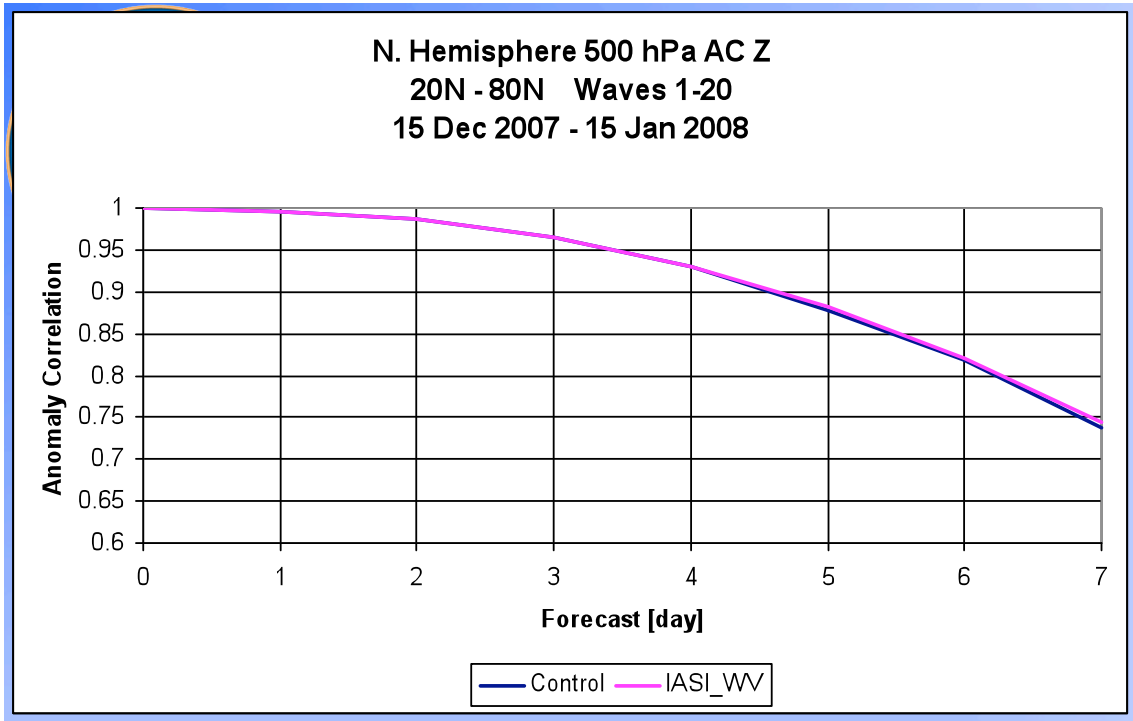
- Assimilation
  - Convergence
  - Stratosphere moisture Jacobians
  - Constraining supersaturation
  - Constraining negative moisture
- Model moisture
  - Precipitable water/ relative humidity
  - Precipitation

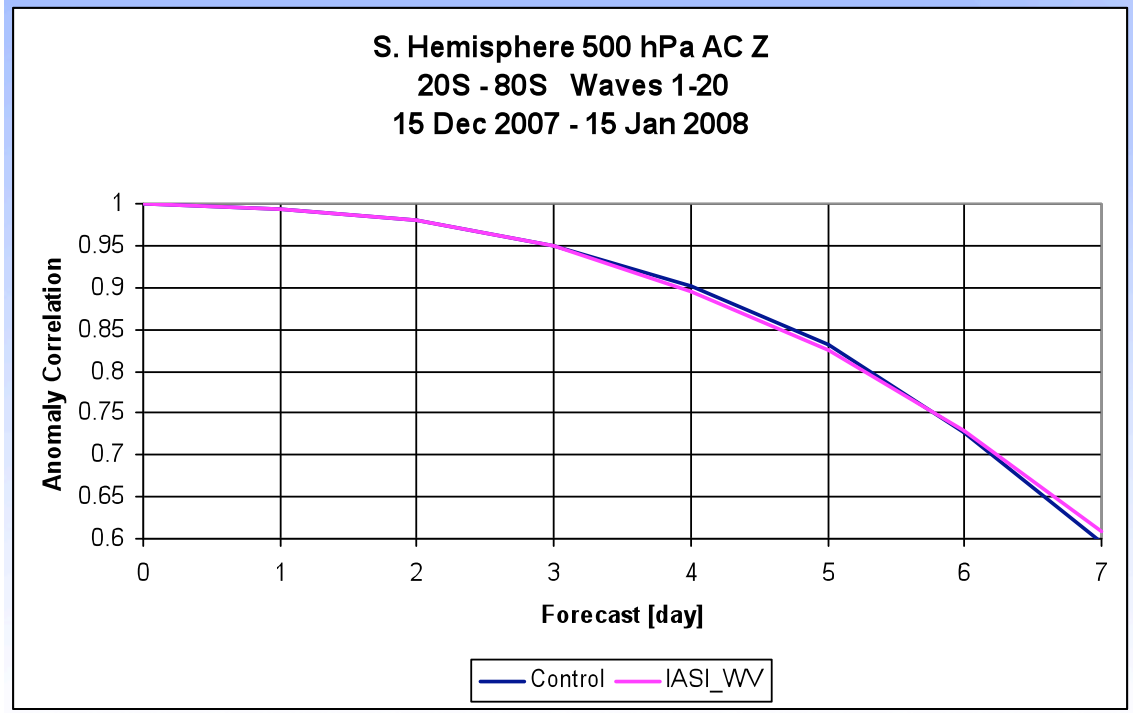
IASI Water Vapor Jacobian



From Chris Barnet

End


N. Hemisphere 500 hPa AC Z
20N - 80N Waves 1-20
15 Dec 2007 - 15 Jan 2008
Anomaly Correlation
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0
1
2
3
4
5
6
7
Forecast [day]
Control
IASI_WV


S. Hemisphere 500 hPa AC Z
20S - 80S Waves 1-20
15 Dec 2007 - 15 Jan 2008
Anomaly Correlation
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0
1
2
3
4
5
6
7
Forecast [day]
Control
IASI_WV

CIMSS