# Near-Realtime System for data debug and first light animations

Mitch Goldberg

NOAA/NESDIS

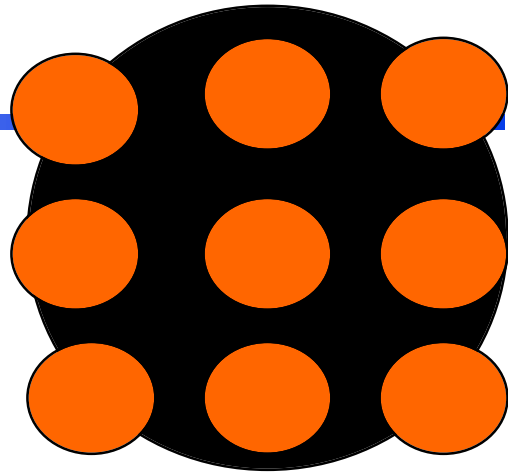
2/21/01

Walter Wolf (QSS), Lihang Zhou (QSS), and Yanni Qu (RDC)

# Background

- Science team via NESDIS will provide AIRS/AMSU-A/HSB observations and products in near-realtime to NWP centers.
- Simulating data in near-realtime since April 2000.
- Develop an excellent website for displaying products and for “data debug”

# NWP Product files



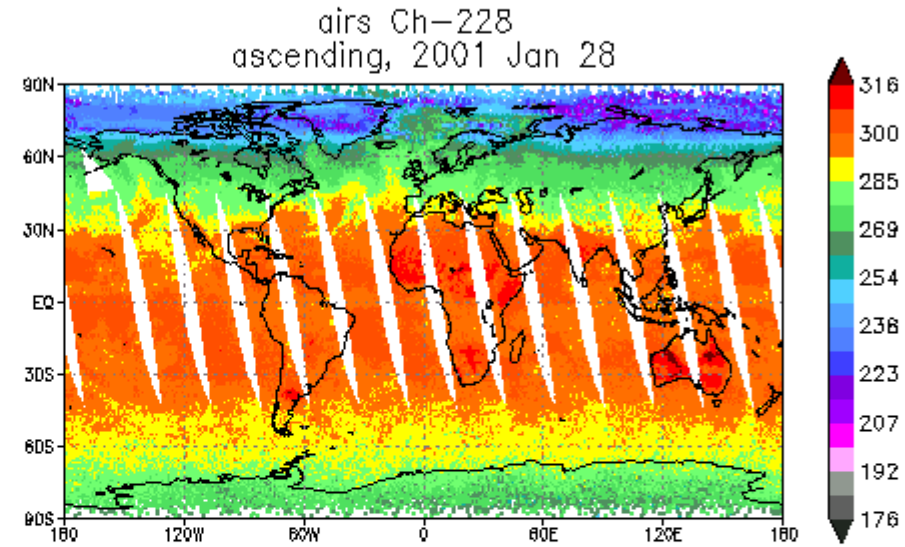
- Thinned Radiance files (HDF and BUFR):
- 4 types: (include clear indicators)
  - a) clearest of 3 x 3 from every golf ball, 281 channels. + AMSU and HSB ( 20 mbytes per orbit)
  - b) eigenvector scores (amplitudes) using same decimation as a)
  - c) Every 7th golfball with 281 channels plus all AMSU and HSB
  - d) Full resolution AMSU and HSB

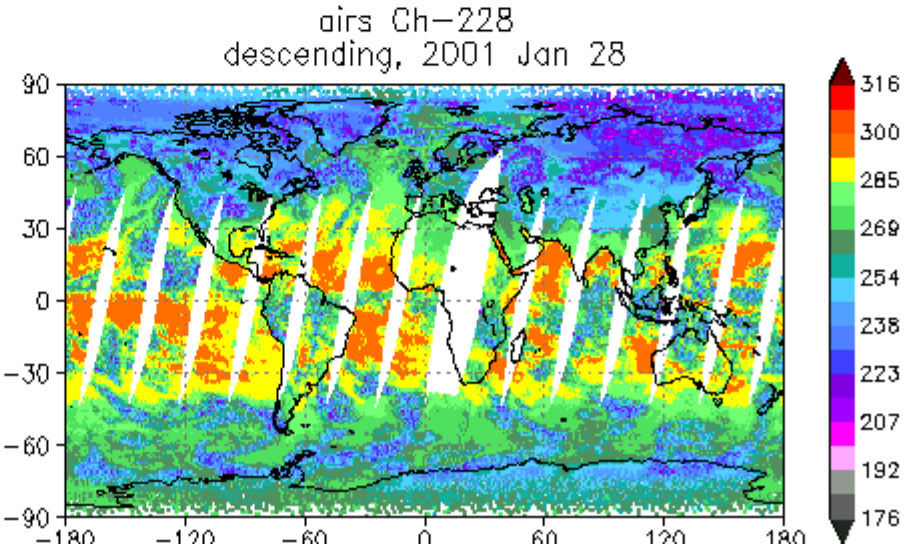
- Full resolution level 2 products – temperature, moisture and ozone.

# Welcome to AIRS Near-RealTime Simulations Website

For more information, please contact with: Mitch Goldberg


Thinned Radiance Data
EOF Scores
Radiance File
Rad. vs. Freq.
Level2 regression retrieval
At 100 Levels
At 25 Layers
Profiles
Error Estimate
At 100 Levels
At 25 Layers
Level2 Truth
At 100 Levels
At 25 Layers
Related Info.
"Cloud EOF"
AIRS at JPL
Other Links
Team Exercise
Stat for dec. 15
Stat for dec. 10
what are the cases:
Location, dec. 15
Location, dec. 10

Edit View Favorites Tools Help

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http://orbit-net.nesdis.noaa.gov/crad/st/airs_near_realtime/cldeof/index.html

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- Related Info.
- "Research Page"
- AIRS at JPL

# Radiance Data

**Today is: Febuary 20, 2001. Generally data 5 days prior to today are available for display.**

**Select Year:** 2000

**Select Month:** December

**Select Day:** 21

**Select Products:**

AIRS (1-228)

- AIRS (1-228)
- AMSU (1-15)
- HSB (1-5)
- Obs. Time
- Scan Angle
- Solar Zenith Angle
- Land Fraction
- Cloud Score (diff)
- Spatial Coherence

**Select Channel #:** 84

**Channel Information:**

AIRS
AMSU
HSB

ge:

**Select Min/Max Values:**

Min.:

Max.:

lonto: 180.0

latfrom: -90.0

latto: 90.0

**Select Contour On/Off:** OFF

Submit Reset

one

Internet

## airs : 2000 Dec 21 airs Ch-84

**Select to plot radiance vs. freq.**

lonfrom: 140.0

lonto: 180.0

latfrom: -5.0

latto: 5.0

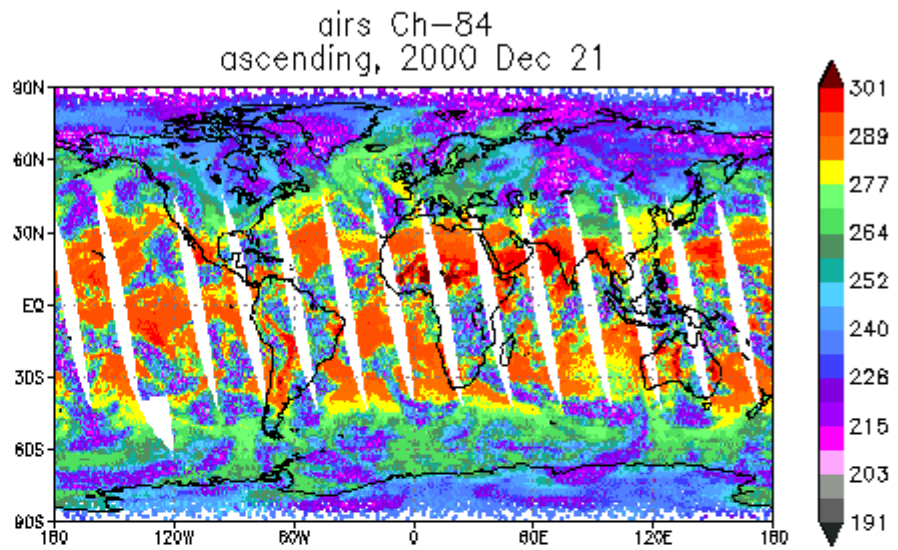
freqfrom: 651.26

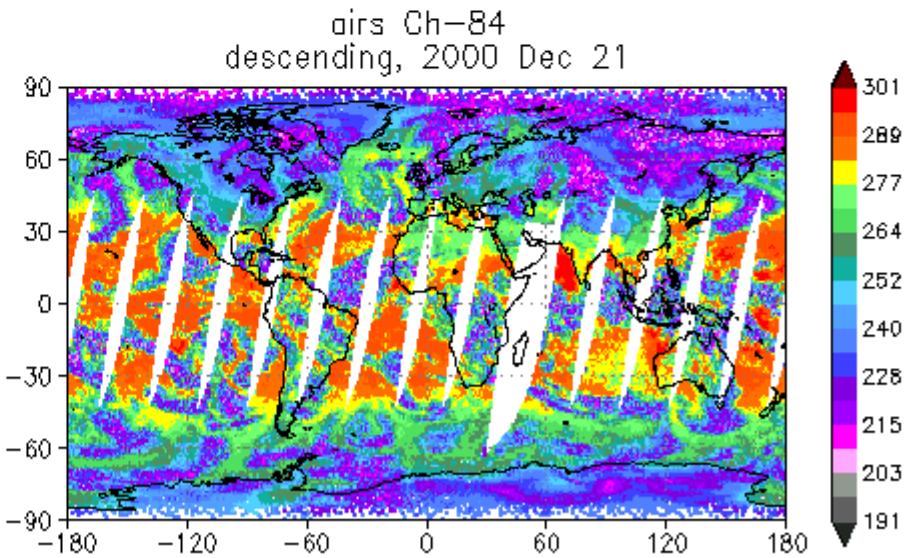
freqto: 2663.95

maxcscore: 500.

maxcoh: 5000.

Submit Reset





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Other Links

# EOF Scores

Today is: Febuary 20, 2001. Generally data 5 days prior to today are available for display.

Select Year: 2000 Select Month: December Select Day: 21

Select Products: Recon. Score Select ch#: 1

PC (1-200)
Recon. Score
AMSU (1-15)
HSB (1-5)
Obs. Time
Solar Zenith Angle
Land Fraction
Cloud Score (diff)
Spatial Coherence

Select Spatial Ra ct Min/Max Values:

lonfrom: -180.0 0.91
lonto: 180.0 1.61
latfrom: -90.0
latto: 90.0

Select Contour On/Off: OFF

Submit Reset

*Any comments? please contact Lihang Zhou for additional information.*

# AIRS Near-Real-Time Simulations


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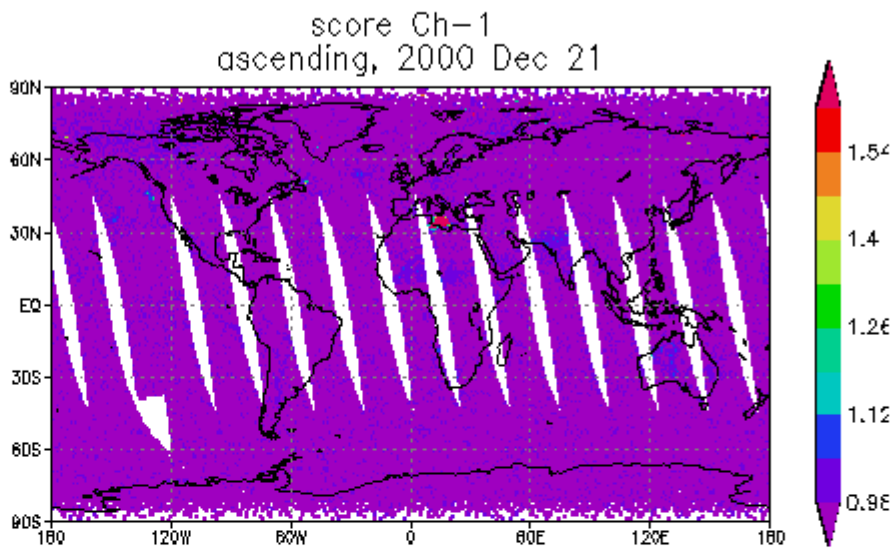
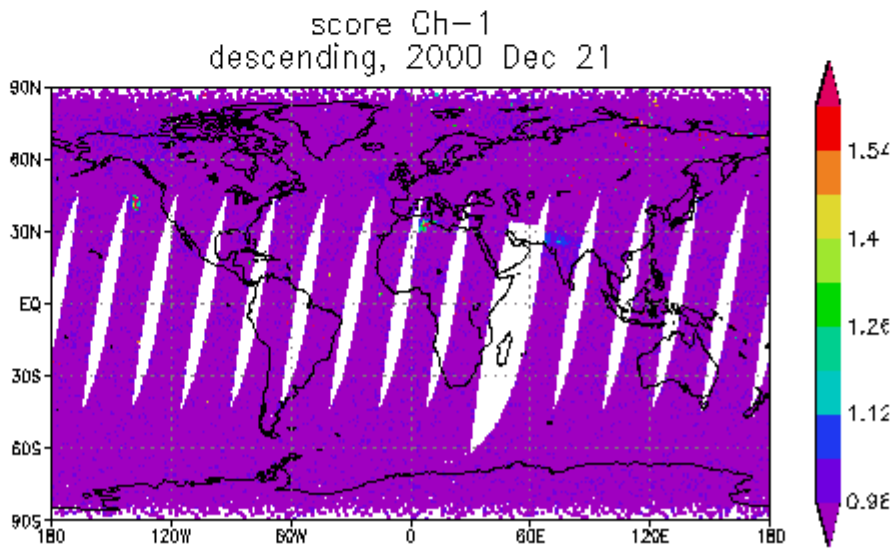
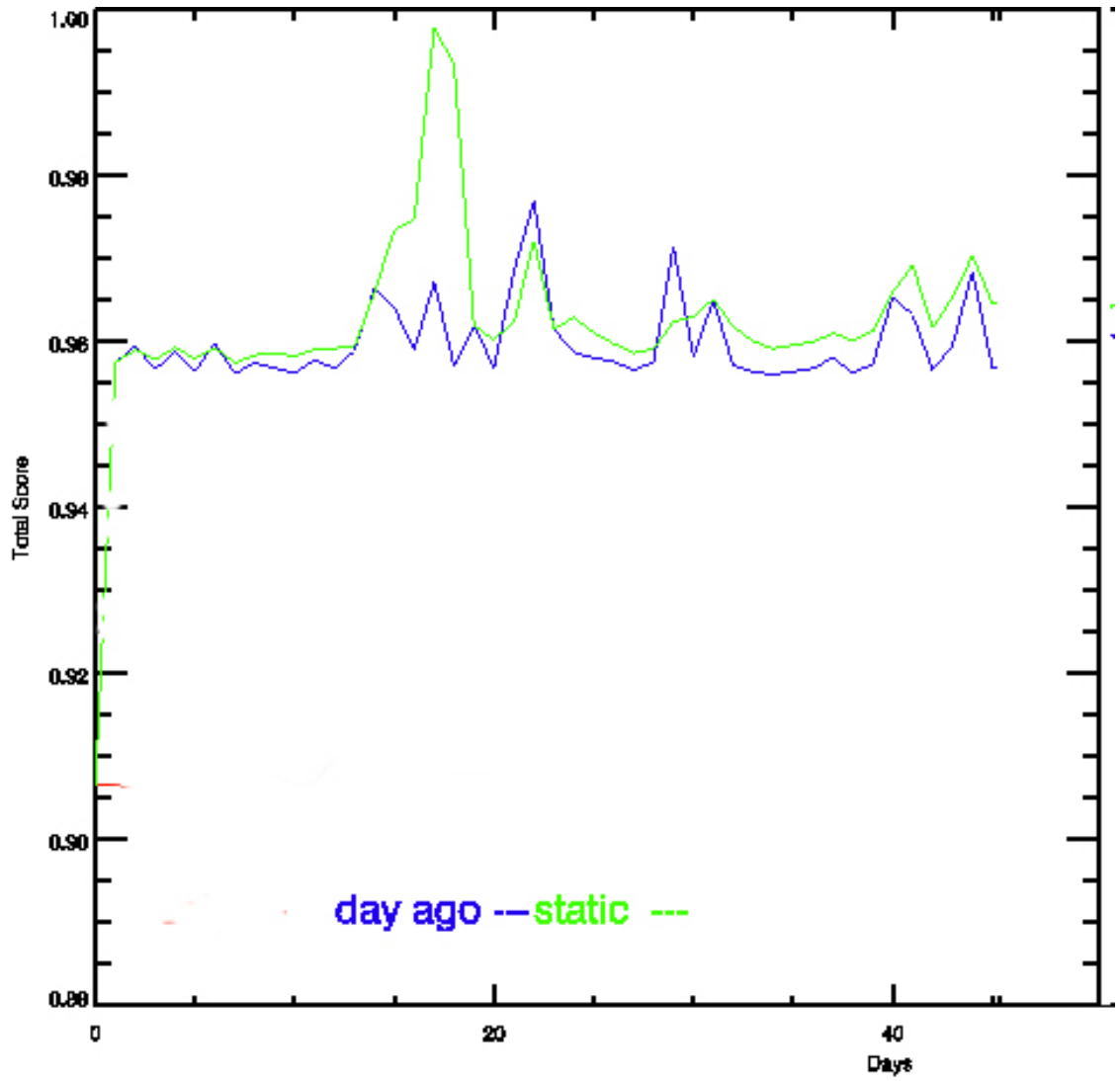
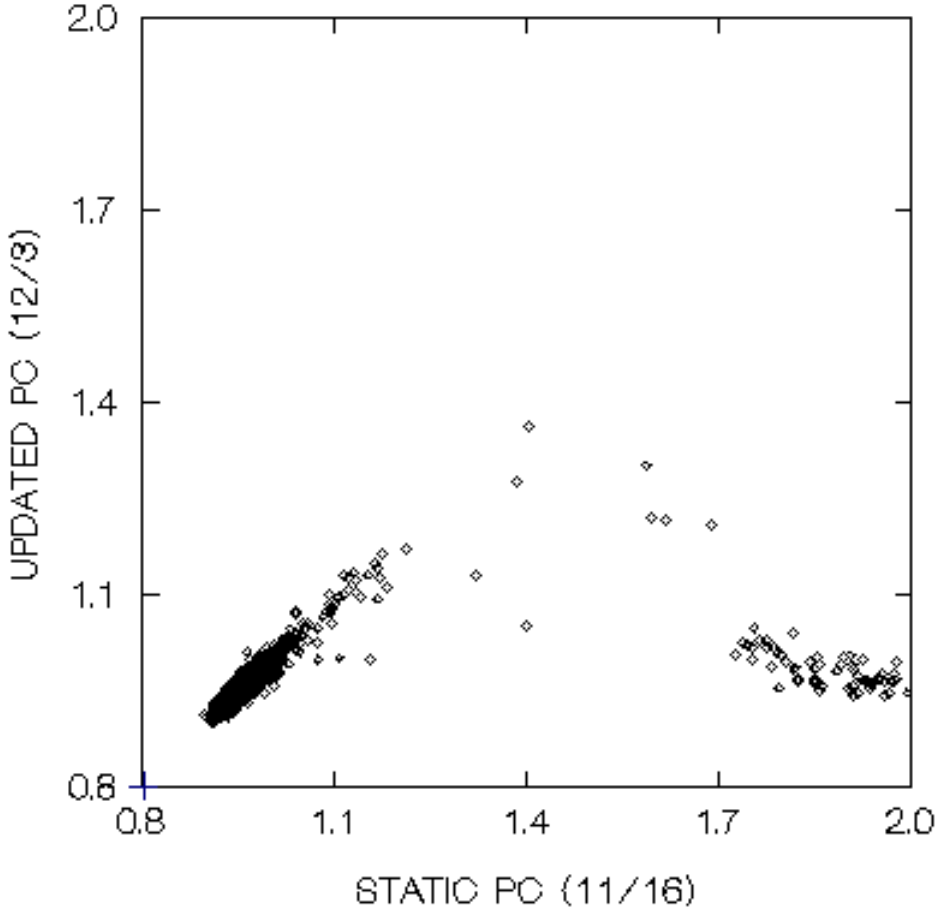


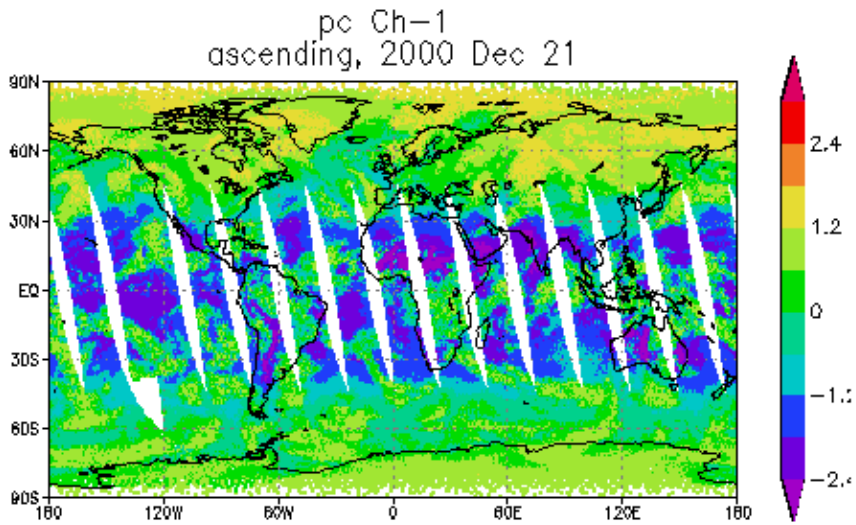



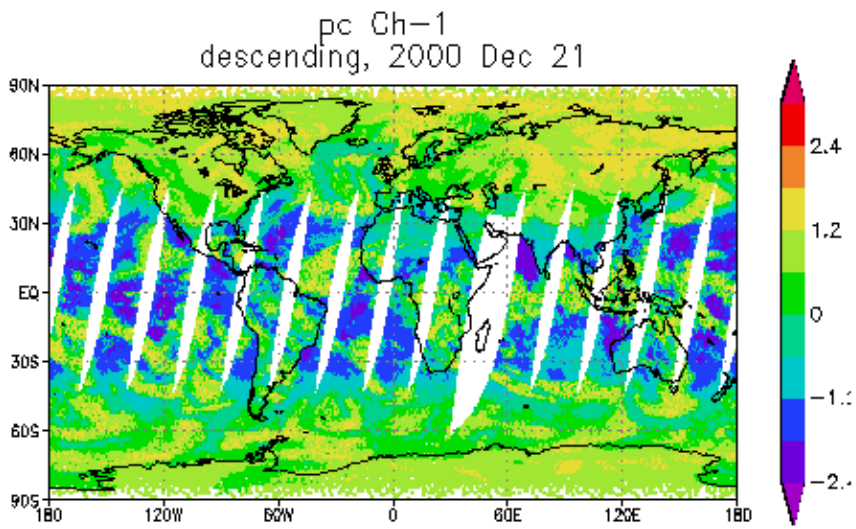
# Monitoring reconstruction score is important

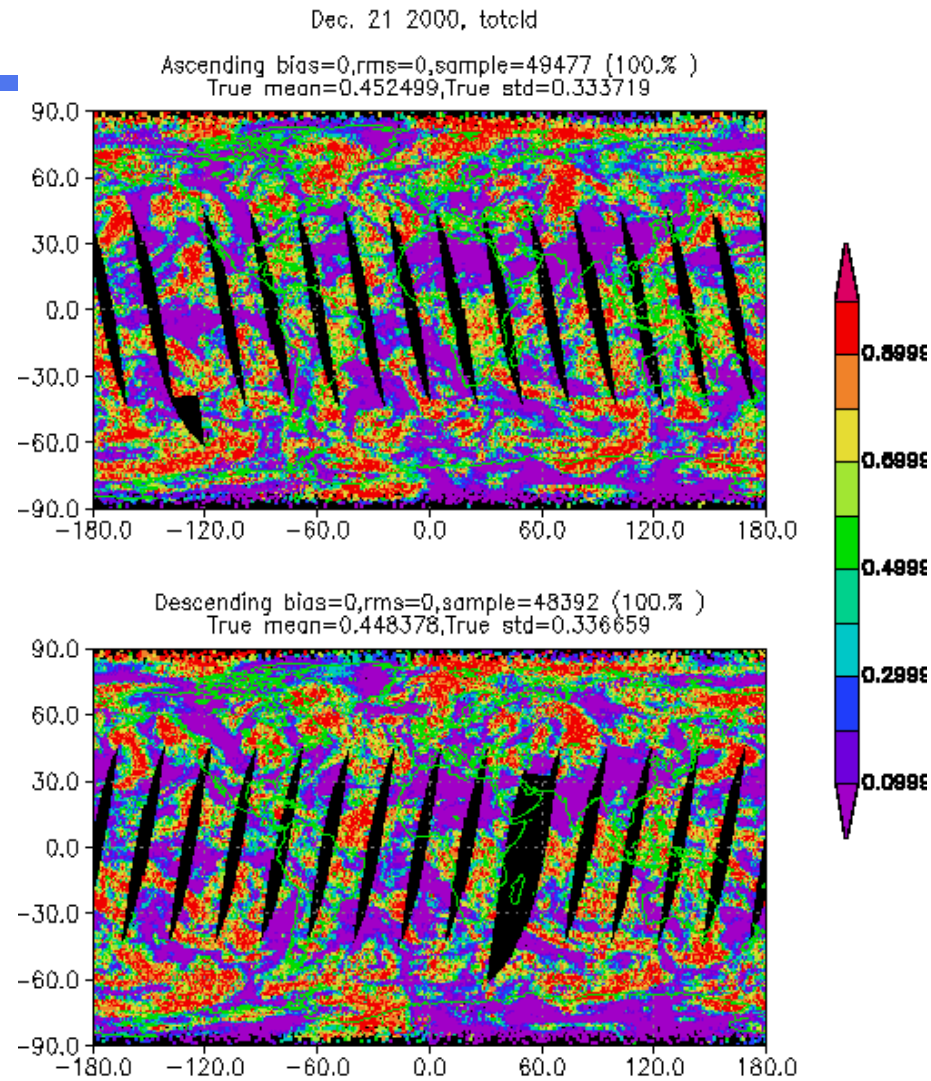


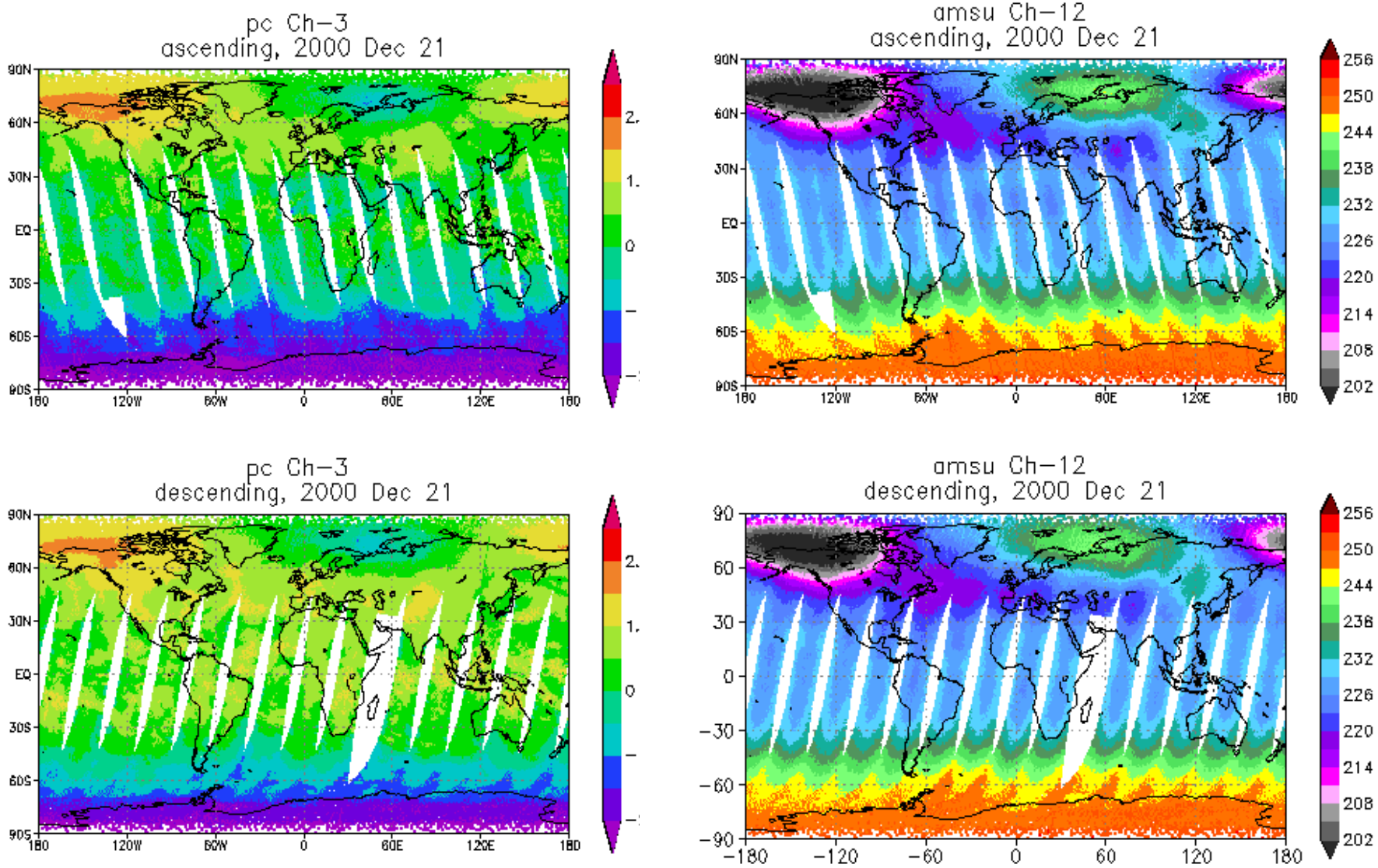
# 12/4/00 reconstruction scores

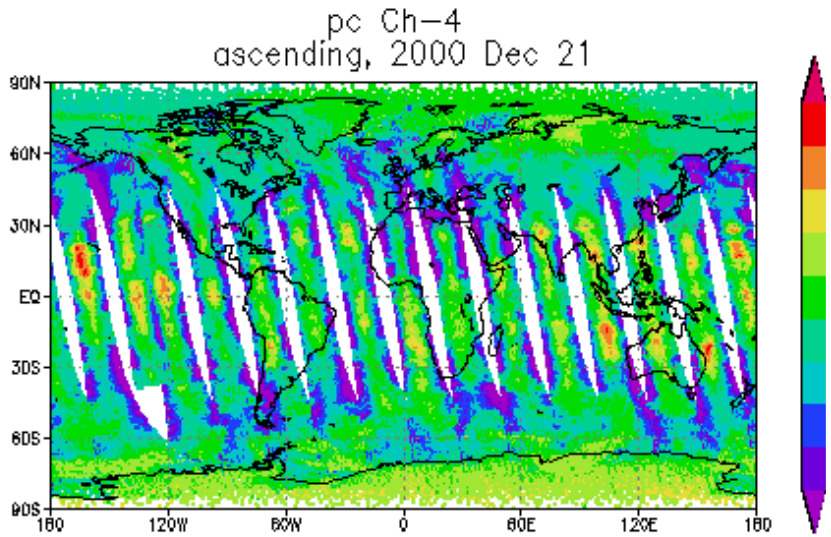


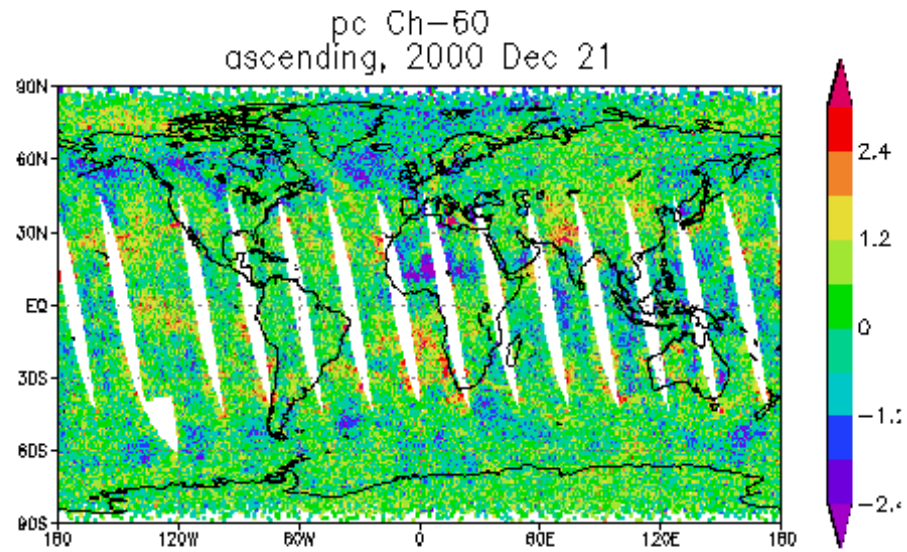

pc Ch-1
ascending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
-1.
-2.

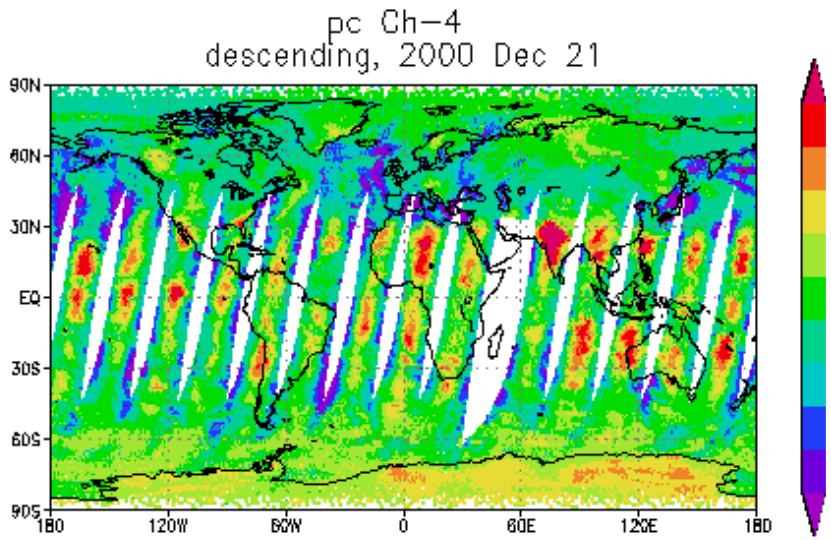

pc Ch-1
descending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
-1.
-2.

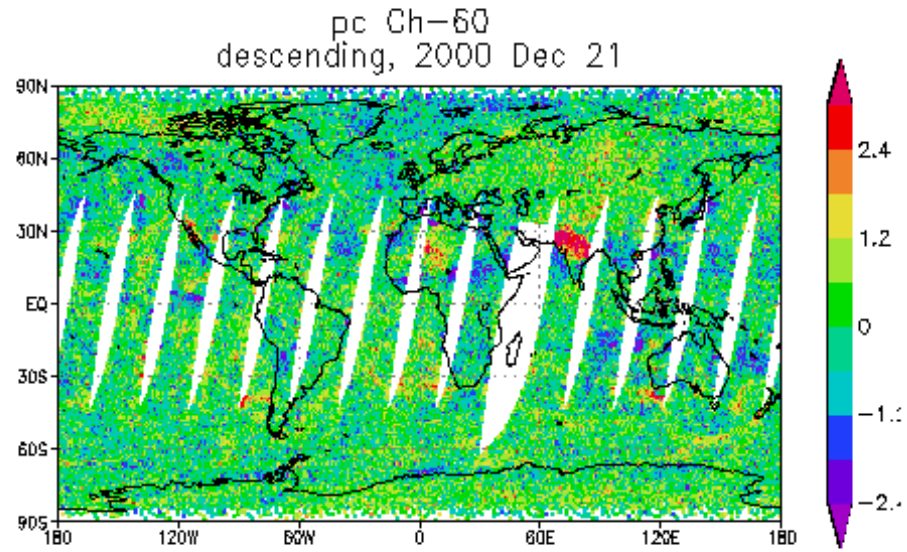

Dec. 21 2000, totcld
Ascending bias=0,rms=0,sample=49477 (100.% )
True mean=0.452499,True std=0.333719
Descending bias=0,rms=0,sample=48392 (100.% )
True mean=0.448378,True std=0.336659
90.0
60.0
30.0
0.0
-30.0
-60.0
-90.0
-180.0
-120.0
-60.0
0.0
60.0
120.0
180.0
0.8999
0.6999
0.4999
0.2999
0.0999

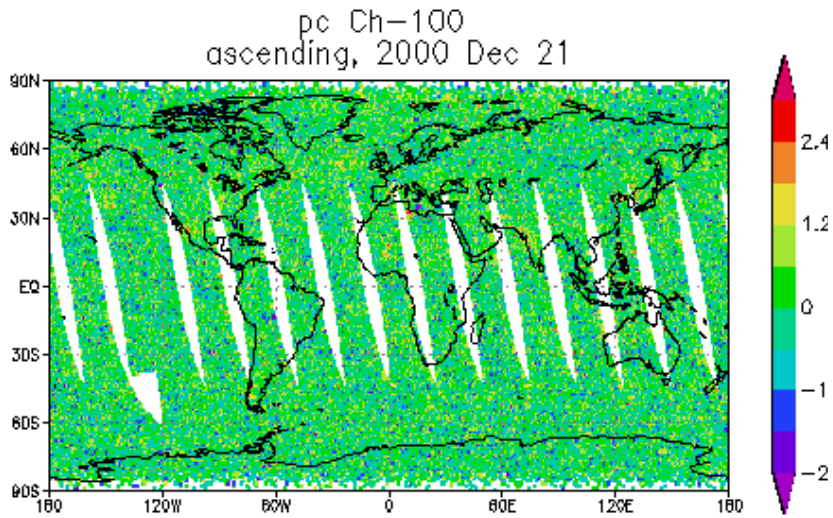

pc Ch−3
ascending, 2000 Dec 21
amsu Ch−12
ascending, 2000 Dec 21
pc Ch−3
descending, 2000 Dec 21
amsu Ch−12
descending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
90
60
30
0
−30
−60
−90
−180
−120
−60
0
60
120
180
256
250
244
238
232
226
220
214
208
202

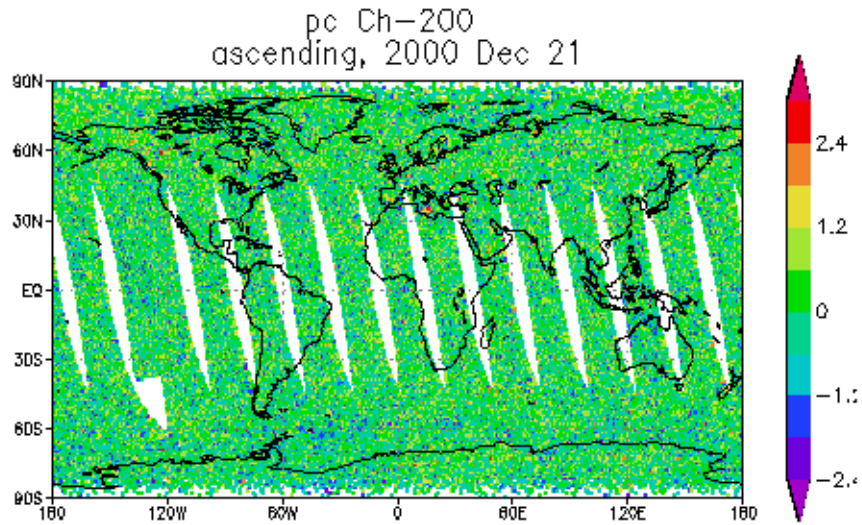

pc Ch−4
ascending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180

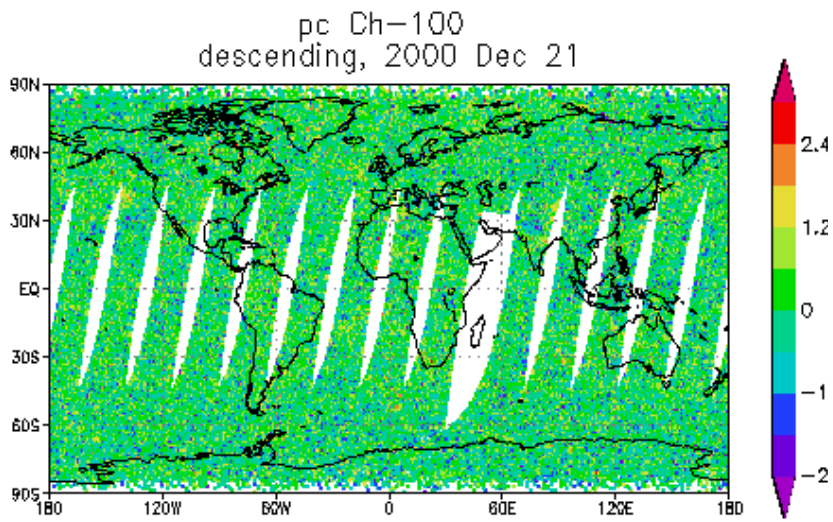

pc Ch−60
ascending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
−1.2
−2.4

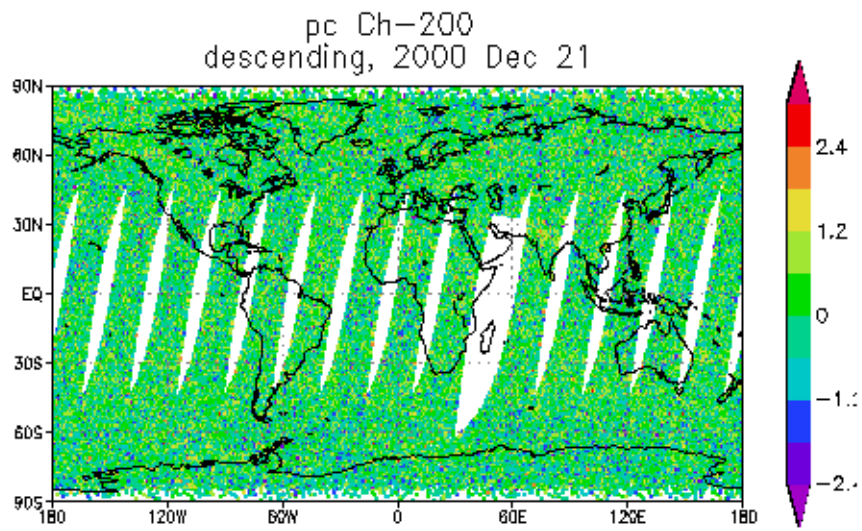

pc Ch−4
descending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180


pc Ch−60
descending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
−1.2
−2.4


pc Ch−100
ascending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
−1
−2


pc Ch−200
ascending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
−1.2
−2.4


pc Ch−100
descending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
−1
−2

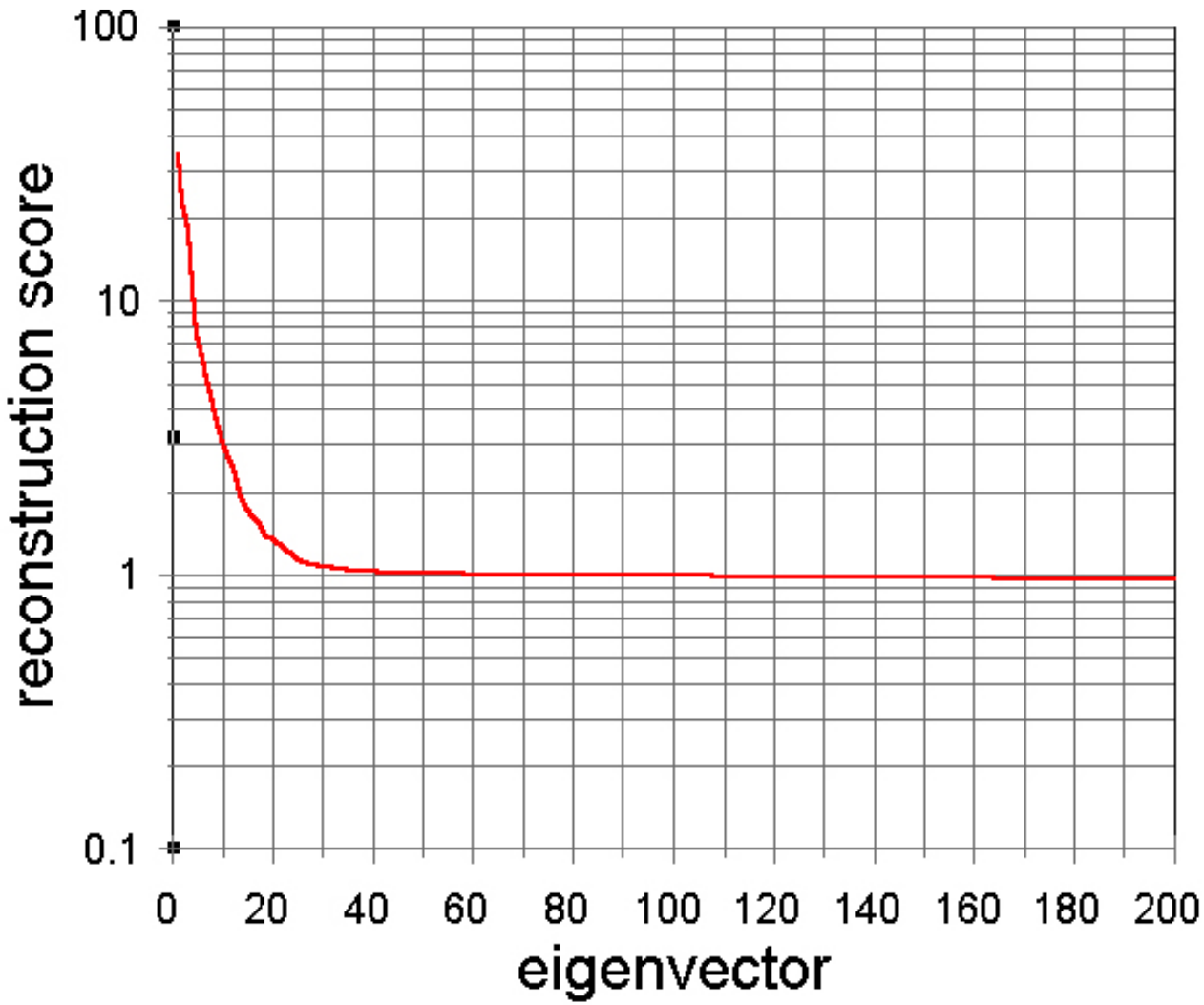

pc Ch−200
descending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
−1.2
−2.4

# Square root of the eigenvalues

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 7497.60 | 19 | 14.68 | 37 | 3.38 | 55 | 1.25 |
| 2 | 1670.40 | 20 | 13.49 | 38 | 3.11 | 56 | 1.19 |
| 3 | 945.52 | 21 | 12.28 | 39 | 2.82 | 57 | 1.16 |
| 4 | 496.01 | 22 | 11.32 | 40 | 2.53 | 58 | 1.15 |
| 5 | 284.01 | 23 | 10.70 | 41 | 2.41 | 59 | 1.09 |
| 6 | 266.30 | 24 | 9.08 | 42 | 2.39 | 60 | 1.05 |
| 7 | 156.95 | 25 | 8.24 | 43 | 2.34 | 61 | 1.02 |
| 8 | 139.67 | 26 | 7.85 | 44 | 2.24 | 62 | 0.98 |
| 9 | 88.27 | 27 | 6.77 | 45 | 2.03 | 63 | 0.90 |
| 10 | 72.83 | 28 | 5.98 | 46 | 1.86 | 64 | 0.86 |
| 11 | 60.03 | 29 | 5.83 | 47 | 1.78 | 65 | 0.81 |
| 12 | 53.42 | 30 | 5.39 | 48 | 1.71 | 66 | 0.80 |
| 13 | 45.01 | 31 | 5.34 | 49 | 1.65 | 67 | 0.78 |
| 14 | 39.72 | 32 | 4.98 | 50 | 1.61 | 68 | 0.77 |
| 15 | 34.54 | 33 | 4.34 | 51 | 1.54 | 69 | 0.73 |
| 16 | 26.57 | 34 | 4.09 | 52 | 1.52 | 70 | 0.72 |
| 17 | 22.62 | 35 | 3.62 | 53 | 1.35 | 71 | 0.70 |
| 18 | 17.60 | 36 | 3.48 | 54 | 1.34 | 72 | 0.66 |

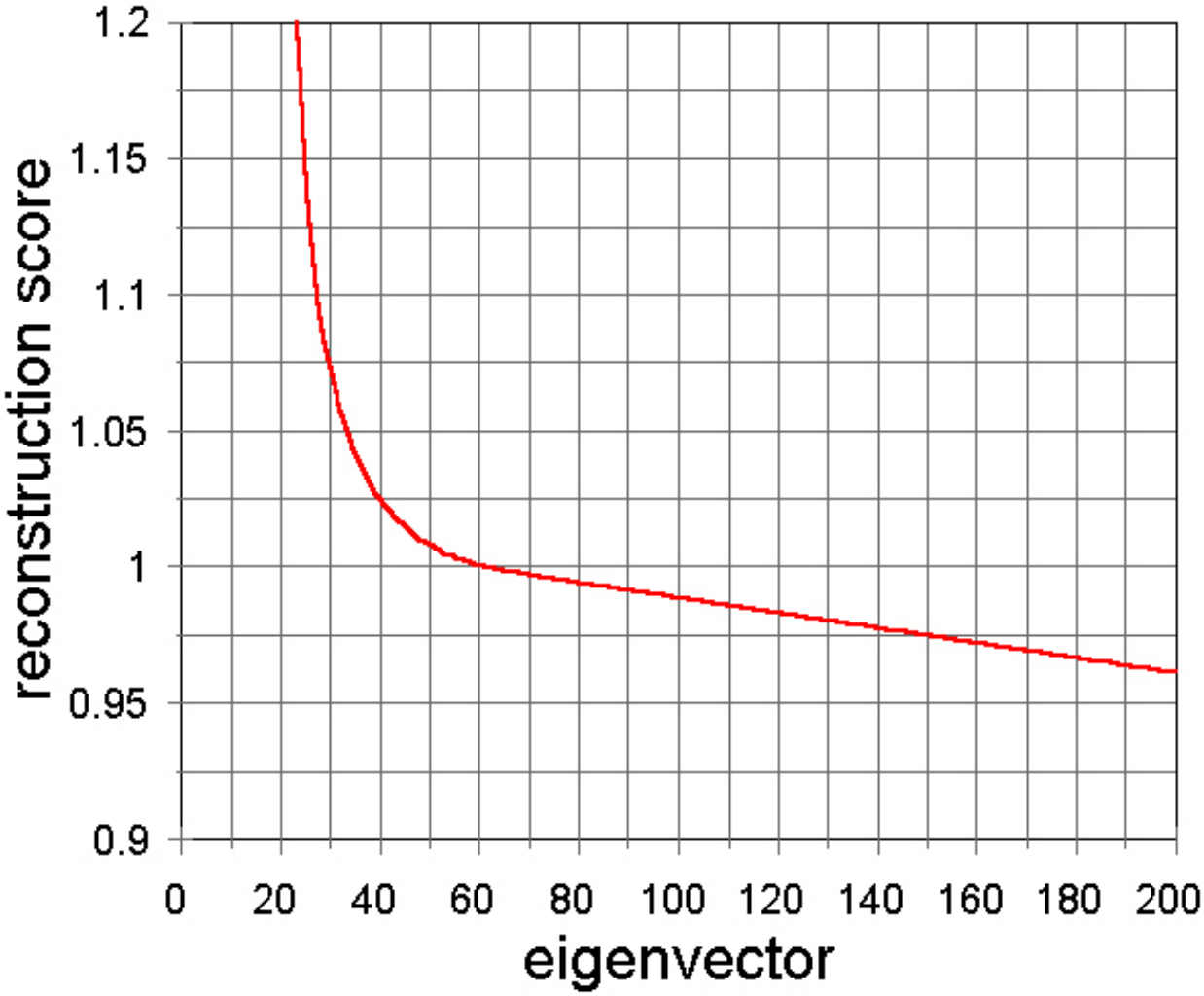
- Reconstruction score = $[\ 1/N\ \mathbf{3}(R^*_i - R_i)^2\ ]^{1/2}$

  i = 1 ….N channels



- Reconstruction score = $[\ 1/N\ \mathbf{3}(R^*_i - R_i)^2\ ]^{1/2}$

  i = 1 ….N channels



# Level 2 Error Estimate at Layers

Today is: Febuary 20, 2001. Generally data 5 days prior to today are available for display.

Select Year: 2000 Select Month: December Select Day: 21

Select Products: Temperature

Select Layer...

temp.->
617.511 -
706.565 -
802.371 -
904.866 -

- 142.3850
- 190.3200
- 259.9690
- 343.6180

ozone->
0.975 - 2.153
2.153 - 4.077
4.077 - 8.165
8.165 - 14.456

Temperature
Water Vapor
Ozone
Total Water
Total Ozone
Surface Air Temperature
Surface Skin Temperature
Cloud Top Pressure 1
Cloud Top Pressure 2
Cloud Fraction 1
Cloud Fraction 2

Select Spatial R

More...:

| | | | | | |
|---|---|---|---|---|---|
| lonfrom: | -180.0 | cloud score*: | 1.0 | Max. error: | 20.0 |
| lonto: | 180.0 | Upper cldfrc: | 1.0 | Recon. Score: | 0.98 |
| latfrom: | -90.0 | Lower cldfrc: | 1.0 | Coher: | 0.0018 |
| latto: | 90.0 | Upper pcld: | 1000.0 | Select Plot Type: | Map |
| | | Lower pcld: | 1000.0 | Contour On/Off: | OFF |

Select surface:
all land only ocean only

Submit Reset

* clear ~ < 2

*Any comments? please contact Lihang Zhou for additional information.*

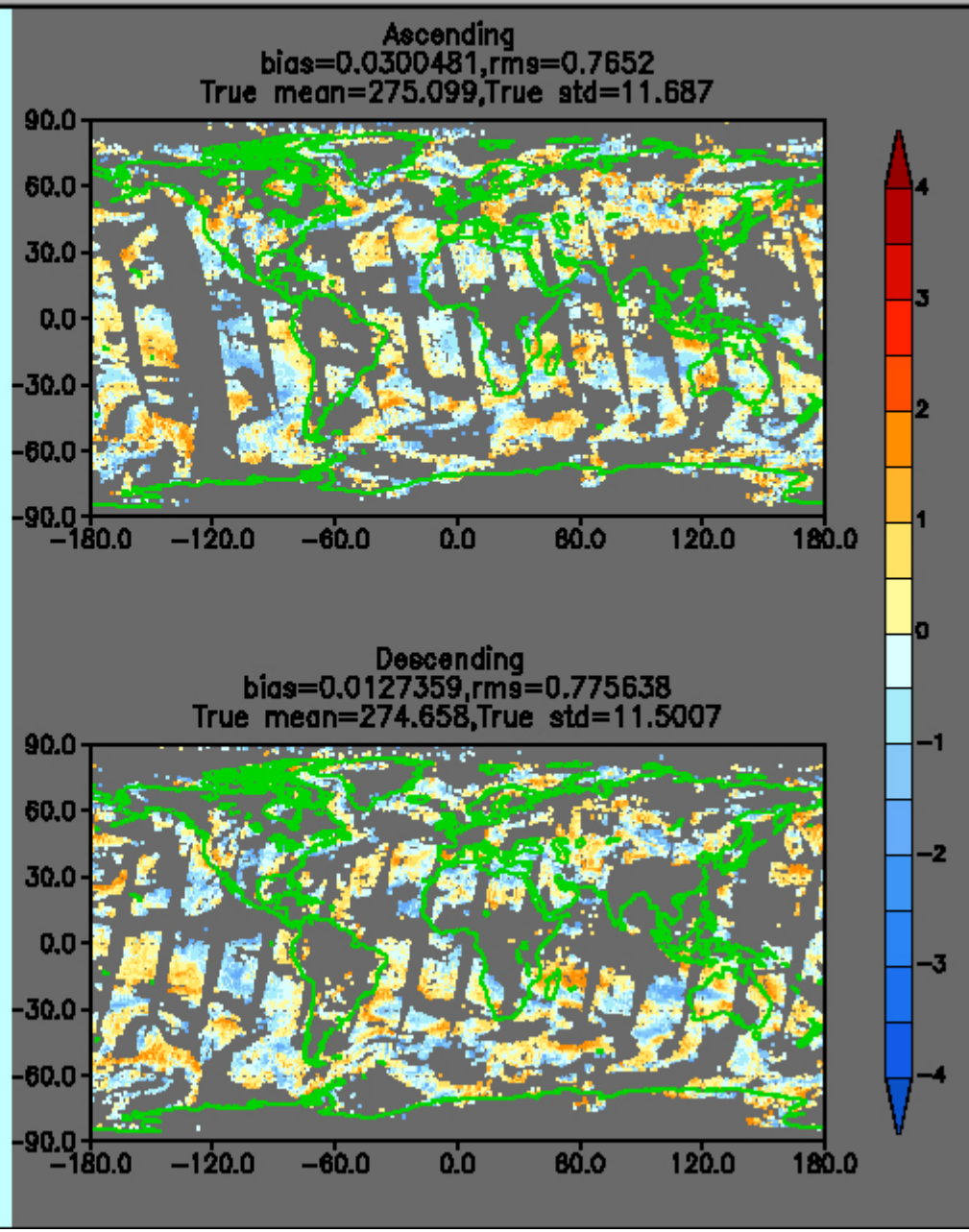
AIRS NEAR REAL TIME SIMULATIONS - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

# 700 – 800 mb layer

- Level 1B Data
  - AIRS
  - AMSU
  - HSB
- Level 2 retrieval
  - At Levels
  - At Layers
- Error Estimate
  - At Levels
  - At Layers
- Level 2 Truth
  - At Levels
  - At Layers
- Related Info.
  - Background
  - AIRS at JPL
  - Other Links



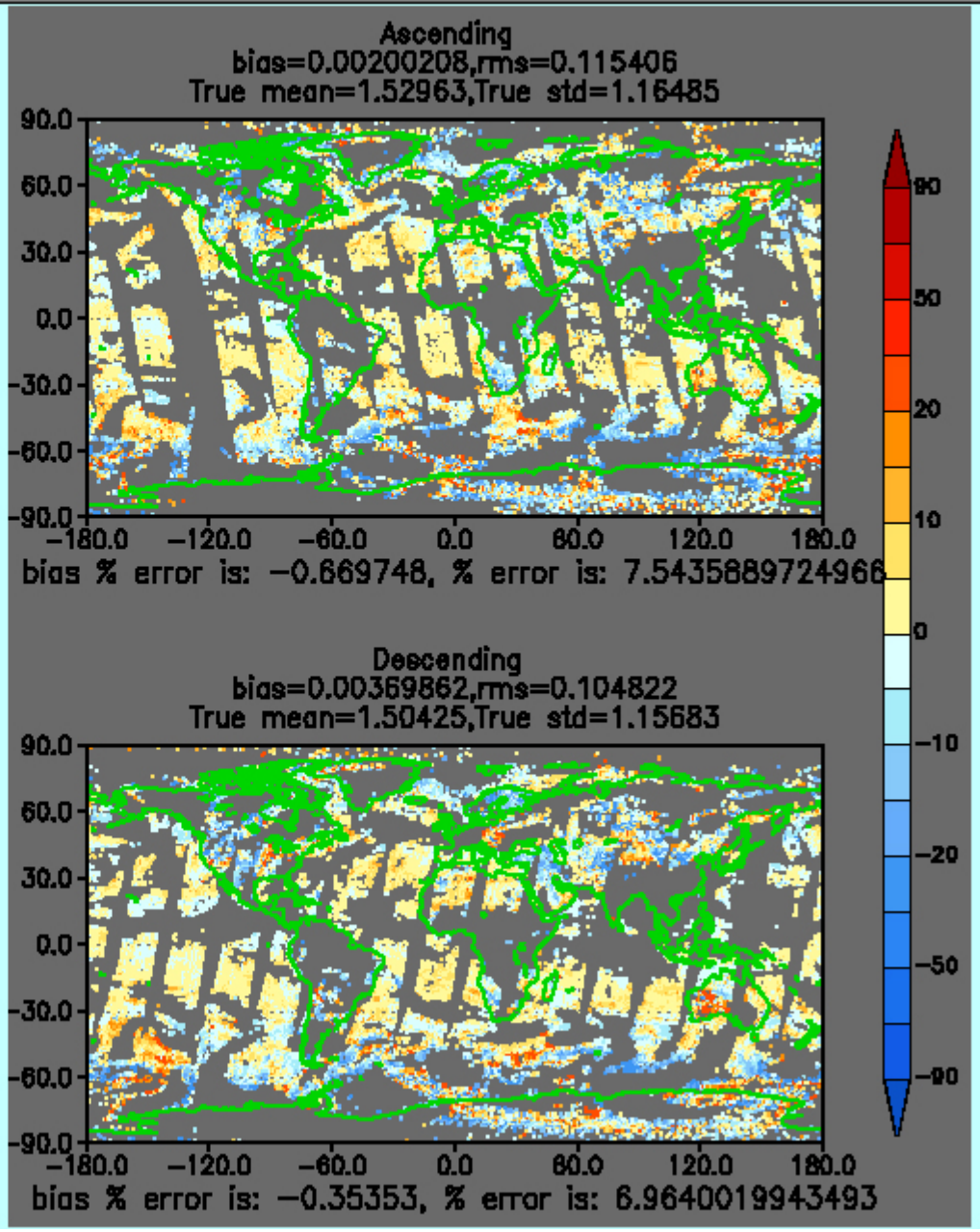
AIRS NEAR REAL TIME SIMULATIONS - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

# Total precip. water

- Level 1B Data
  - AIRS
  - AMSU
  - HSB
- Level 2 retrieval
  - At Levels
  - At Layers
- Error Estimate
  - At Levels
  - At Layers
- Level 2 Truth
  - At Levels
  - At Layers
- Related Info.
  - Background
  - AIRS at JPL
  - Other Links



# Regional display

900.62 cm-1 / 11.10 um

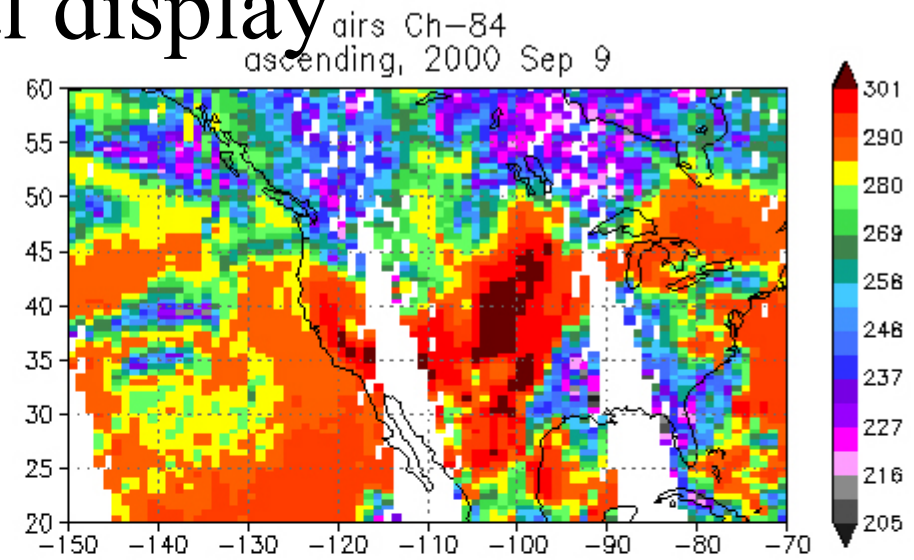
Level 1B Data
- AIRS
- AMSU
- HSB

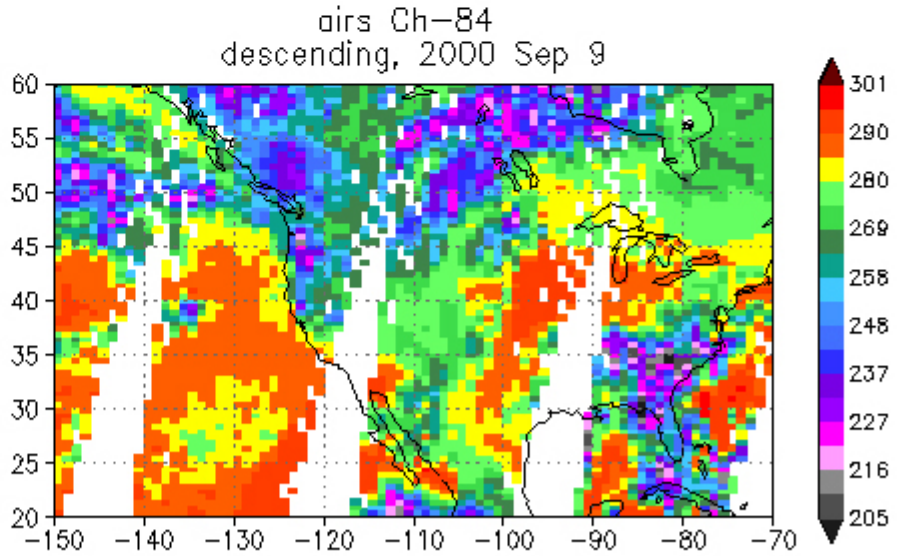
Level 2 retrieval
- At Levels
- At Layers

Error Estimate
- At Levels
- At Layers

Level 2 Truth
- At Levels
- At Layers

Related Info.
- Background
- AIRS at JPL
- Other Links




Back Forward Reload Home Search Netscape Print Security Shop Stop

Document: Done

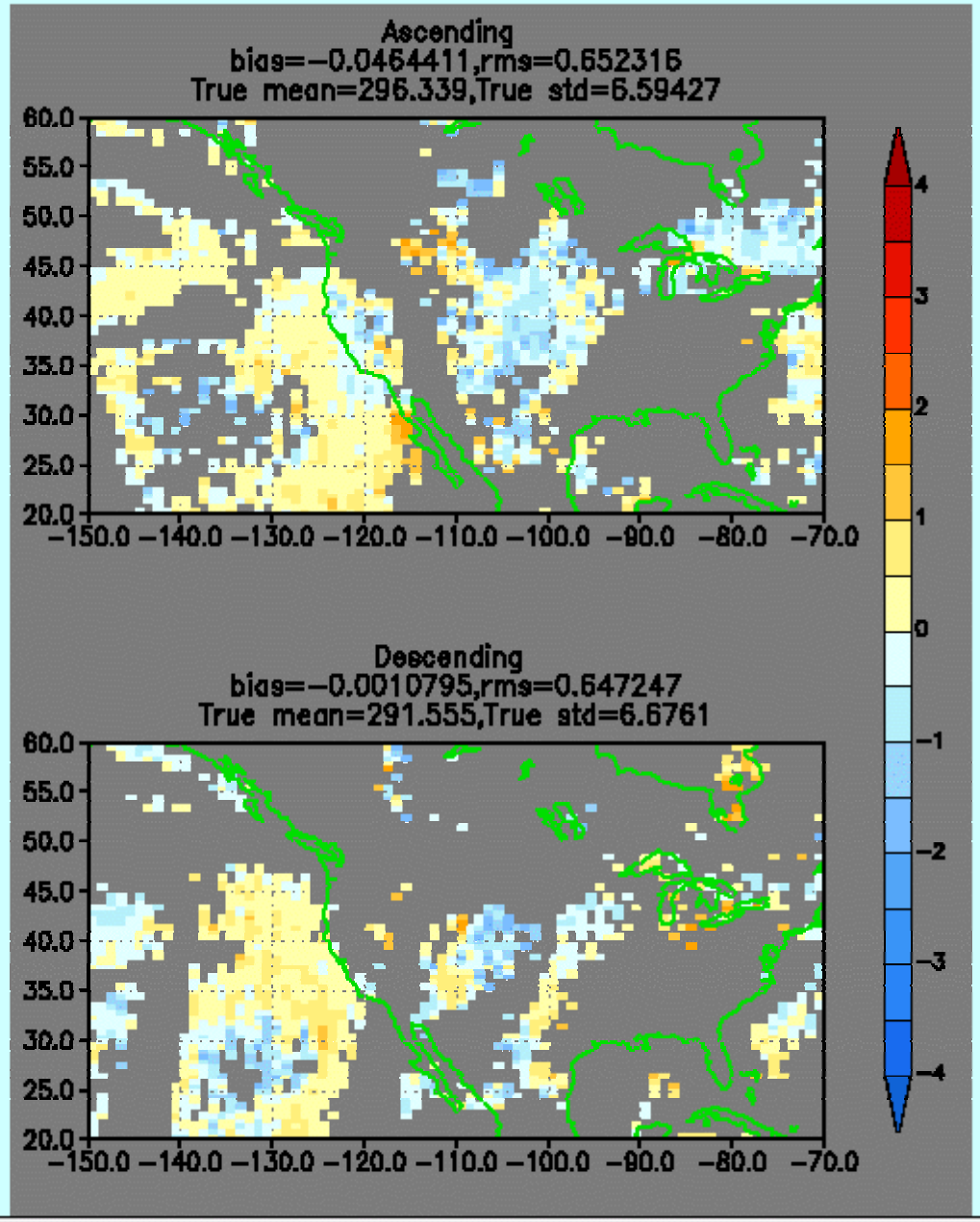
Start Sent ... Micro... two n... Adob... AIR...

# Skin temp. error

Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

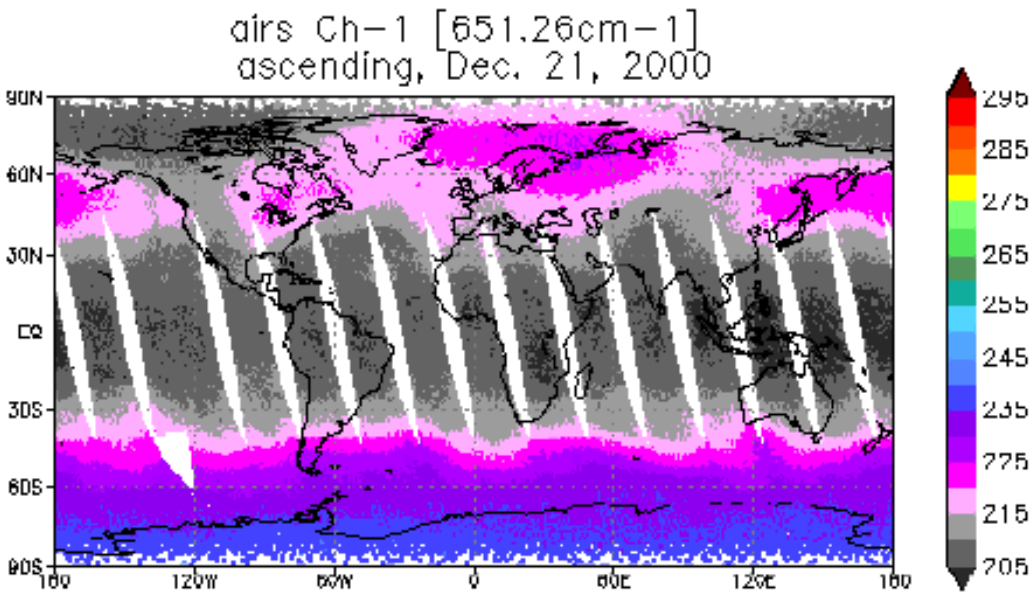
- Level 1B Data
  - AIRS
  - AMSU
  - HSB
- Level 2 retrieval
  - At Levels
  - At Layers
- Error Estimate
  - At Levels
  - At Layers
- Level 2 Truth
  - At Levels
  - At Layers
- Related Info.
  - Background
  - AIRS at JPL
  - Other Links

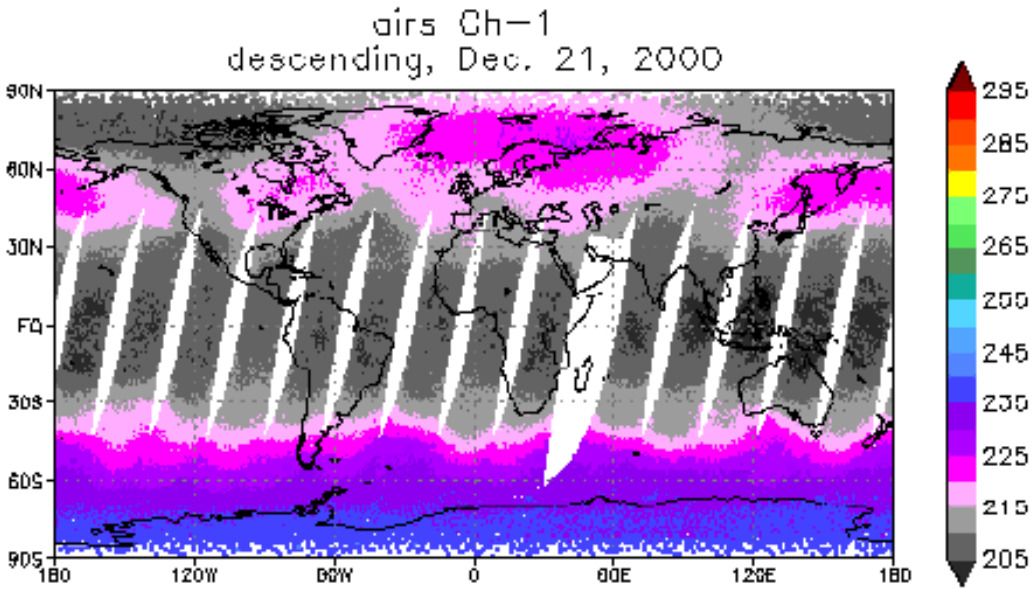


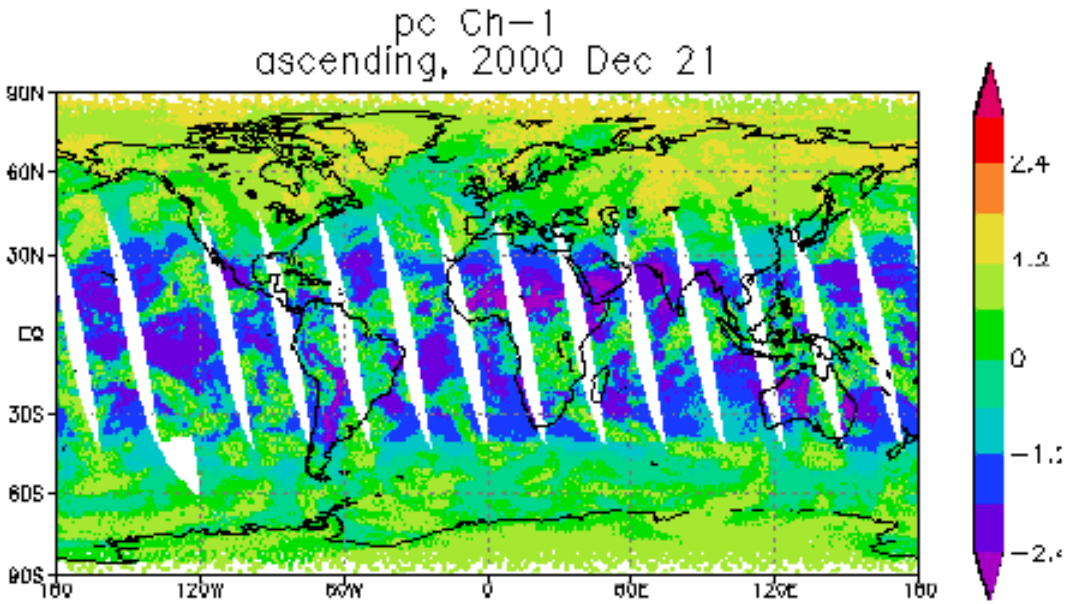

Document: Done

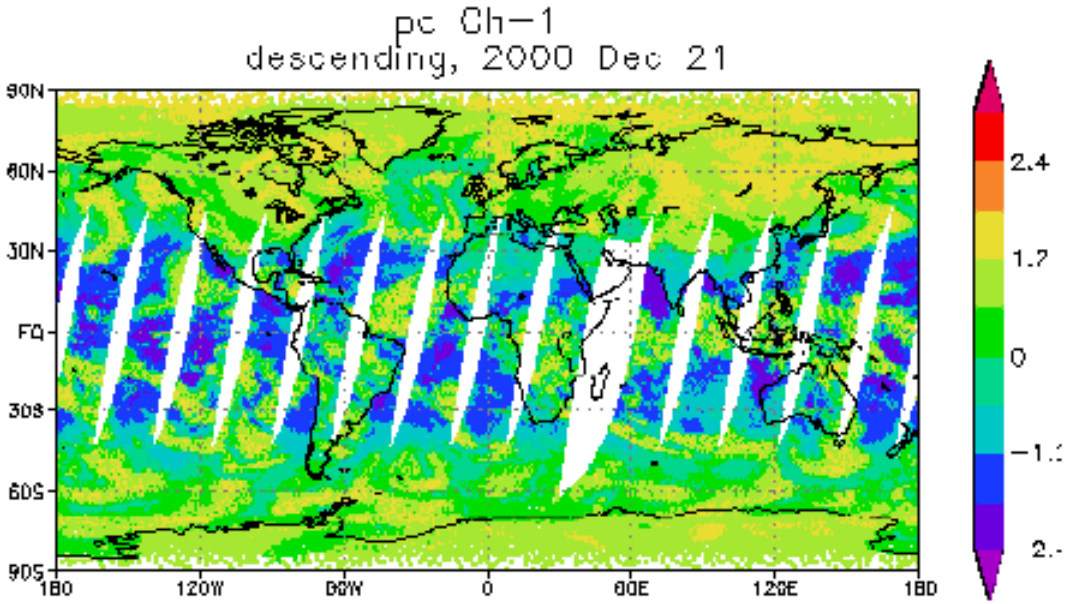
# Animation

- Hundreds of pictures can be generated
- Plan to use animation for quick-look evaluation of the data.
- Run cron jobs that will produce movie files from individual image files.


airs Ch-1 [651.26cm-1]
ascending, Dec. 21, 2000
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
295
285
275
265
255
245
235
225
215
205


airs Ch-1
descending, Dec. 21, 2000
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
295
285
275
265
255
245
235
225
215
205


pc Ch−1
ascending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
−1.2
−2.4


pc Ch−1
descending, 2000 Dec 21
90N
60N
30N
EQ
30S
60S
90S
180
120W
60W
0
60E
120E
180
2.4
1.2
0
−1.2
−2.4

# First light – show& tell

- Generate AIRS eofs and determine # of independent pieces of information for each grid box.
- Convolve AIRS to HIRS and determine # of independent pieces of information
- Plot ratio of AIRS/HIRS information content.
- Call it – Increase in atmospheric information
- AIRS increases information content by 500%!!

# Summary

- We have an excellent web site for monitoring
- Add animation
- Always compare retrieval products with forecasts (or analyses).
- Always compare computed radiances (from forecast or analyses) with observed.
- Plan to expand website to include all products.