

Generation of AIRS Radiance Dataset for Climate Studies

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NOAA/NESDIS

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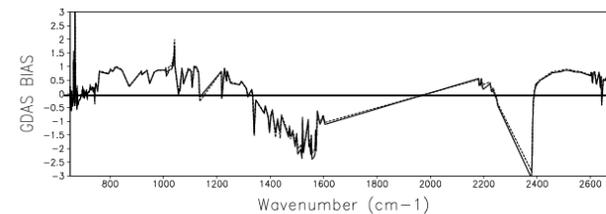
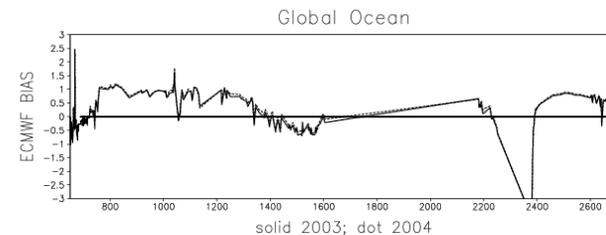
Background

- AIRS radiances are climate quality
- Key climate forcing, feedback and response variables are imbedded in AIRS
- Generate monthly maps of nadir angle adjusted AIRS radiances from our gridded datasets (single AIRS fov per $0.5 \text{ lon} \times 2.0 \text{ lat}$) for climate change detection and attribution and model validation



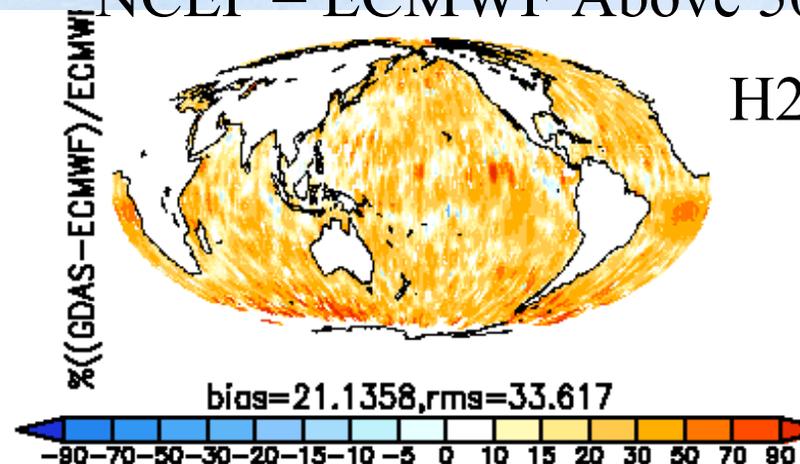
Applications of Mapped Spectrally Resolved Radiances

- Compare radiances with simulated radiances from model analyses
- Compare different years to see how the outgoing infrared radiances have changed.

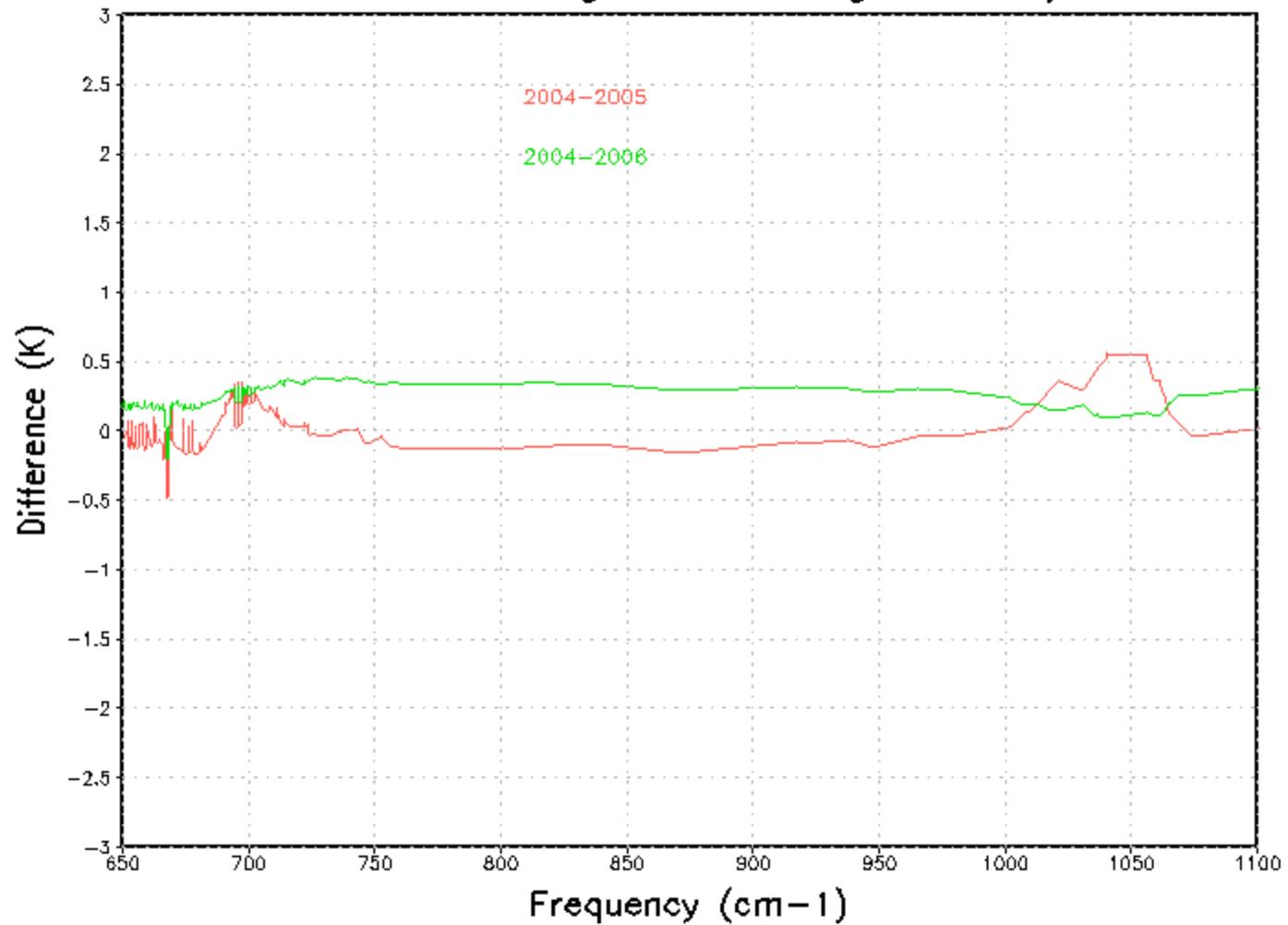


NCEP – ECMWF Above 500 mb

H2O



Global Average, Ascending, January

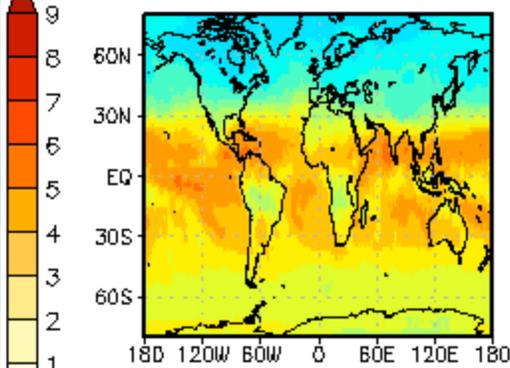




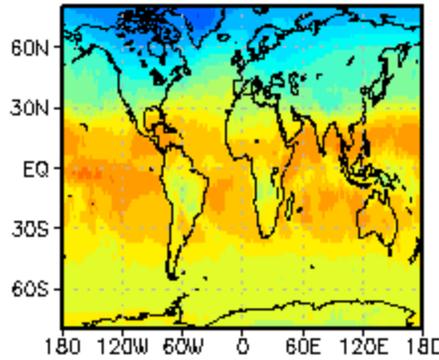
1040.03cm⁻¹

Descending

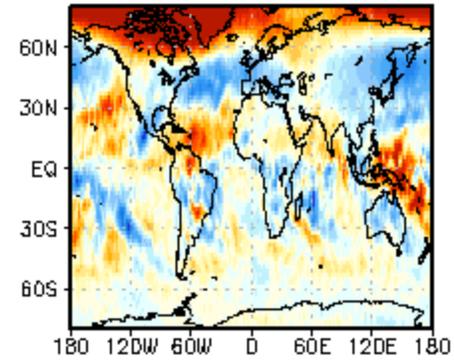
Jan 2004



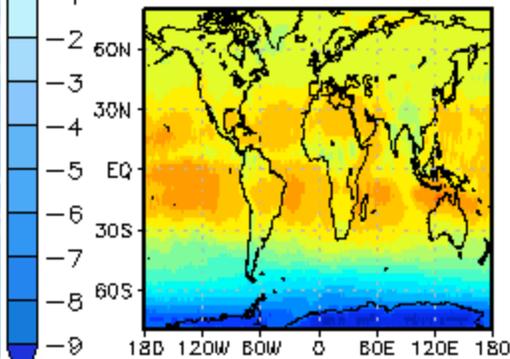
Jan 2005



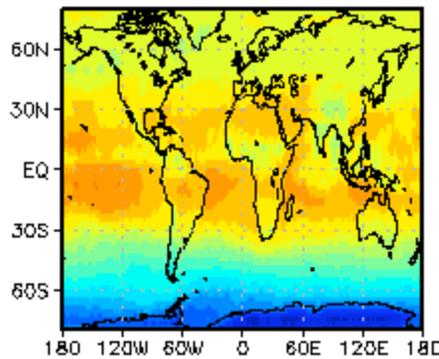
Jan 2004-2005



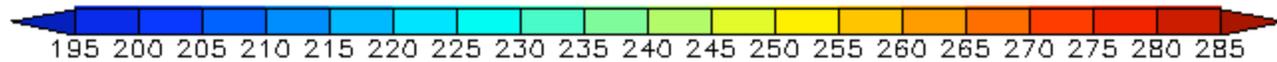
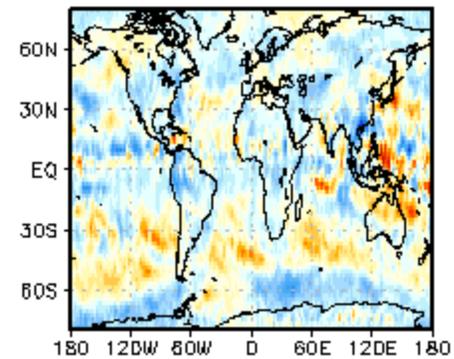
July 2004

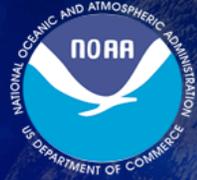


July 2005

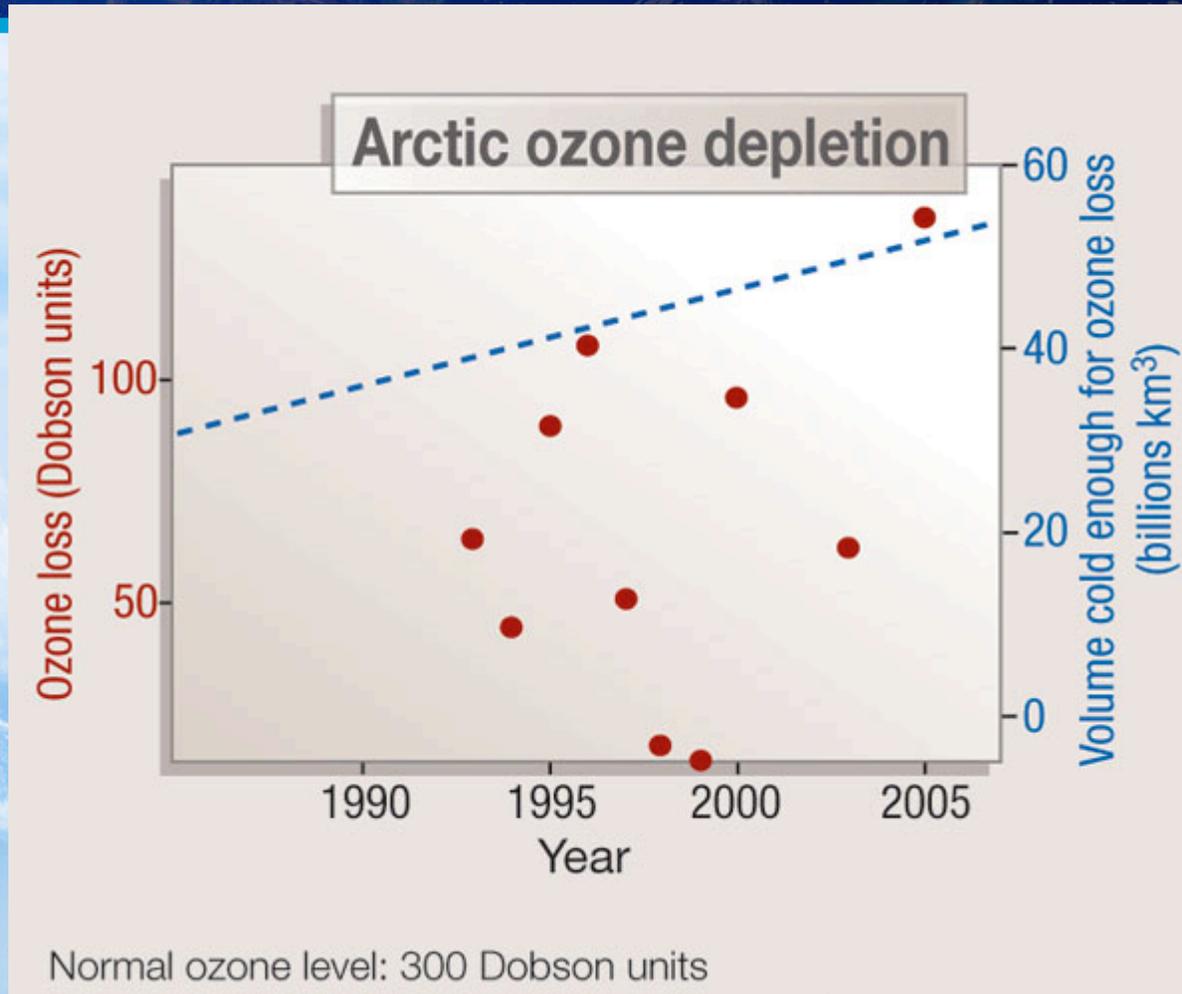


July 2004-2005





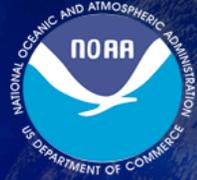
Ozone Loss



Arctic trends scrutinized as chilly winter destroys ozone

Is climate change to blame for looming northern hole?

Quirin Schiermeier, *Nature*, 5/5/05



Today's Topics

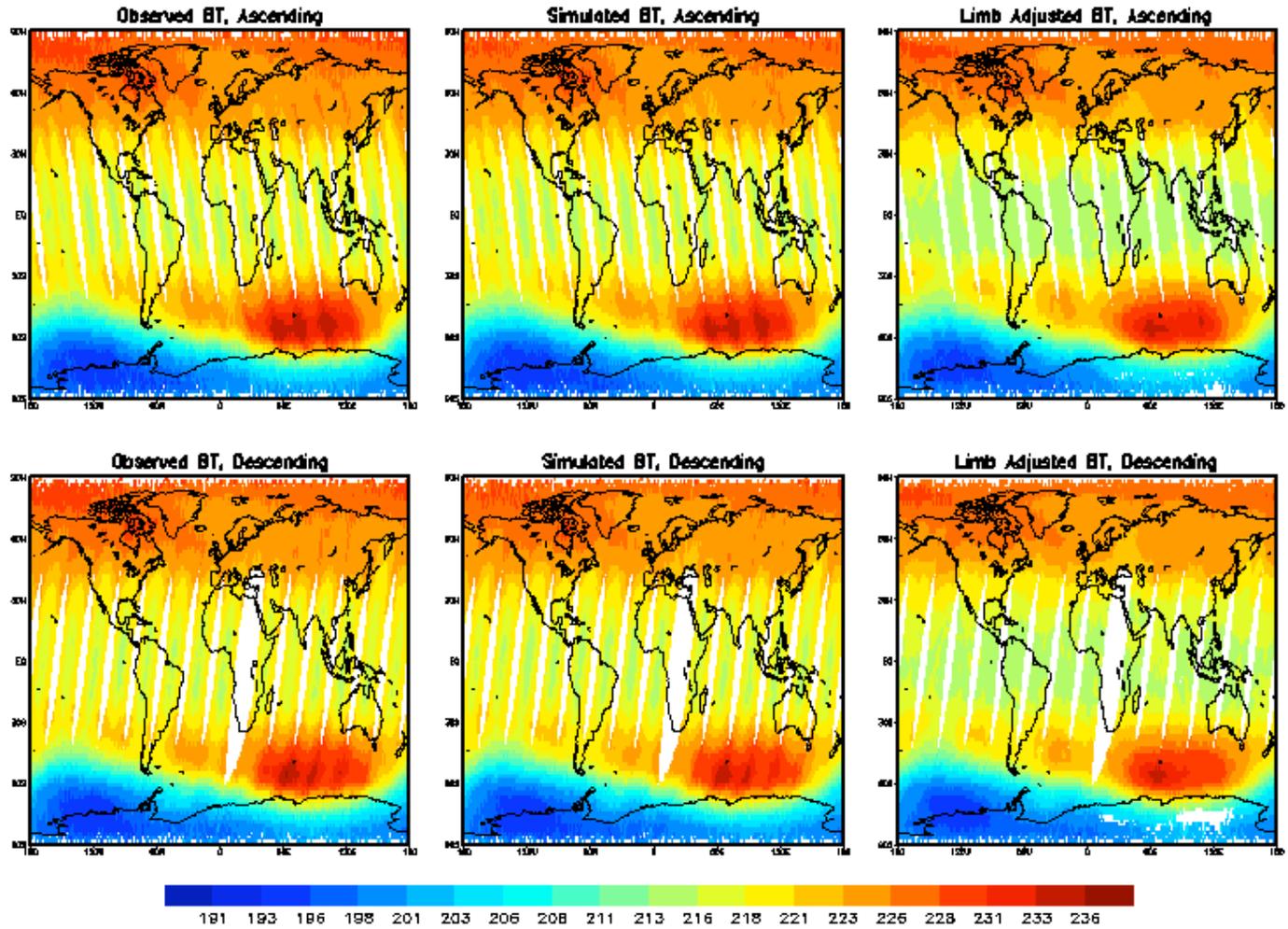
- Demonstrate the accuracy of the angle adjustment procedure and its importance
- Show comparisons with NCEP and ECMWF analyses
- Show some IASI PCA results and discuss importance of PCA for noise reduction



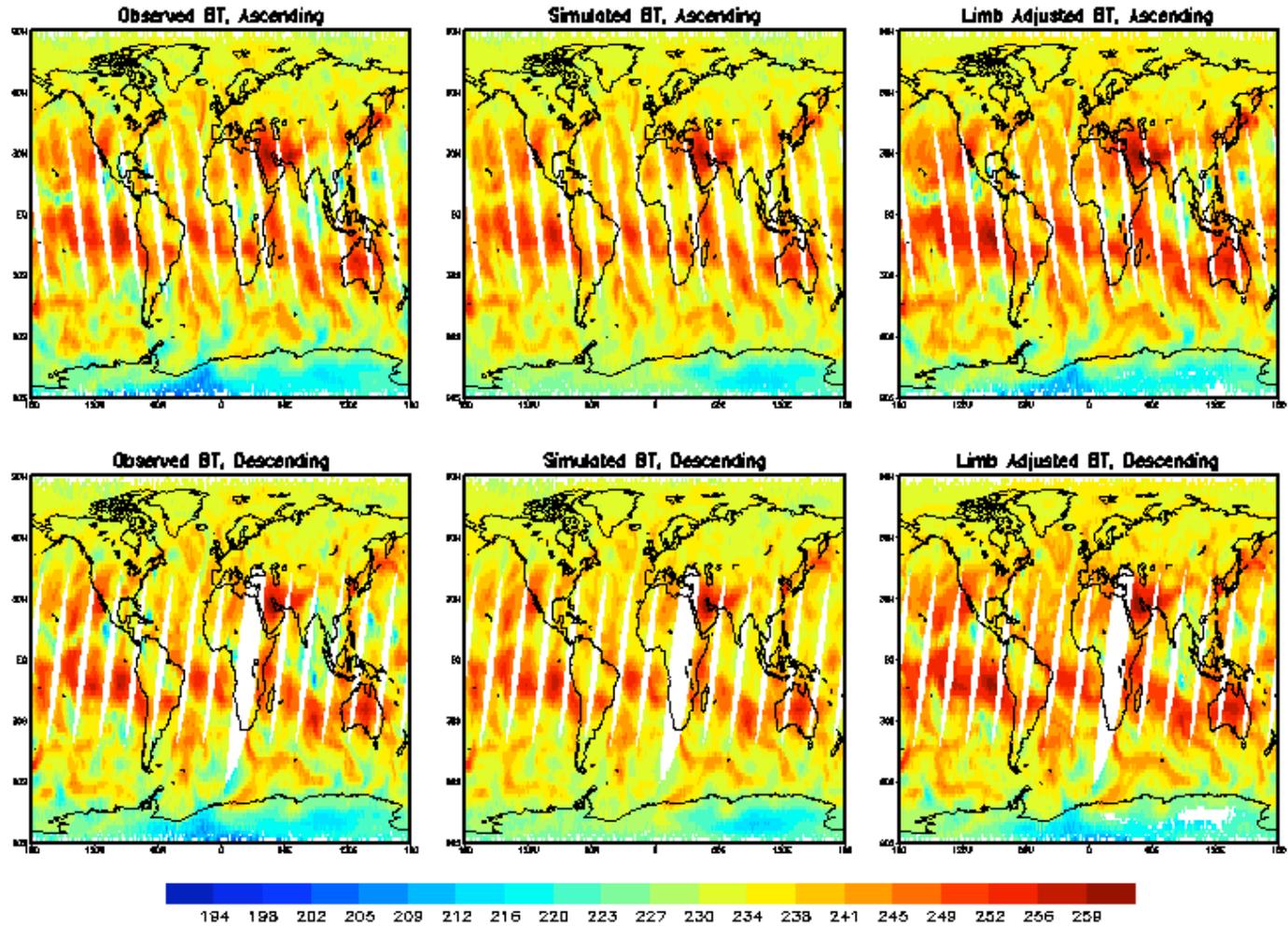
Accuracy



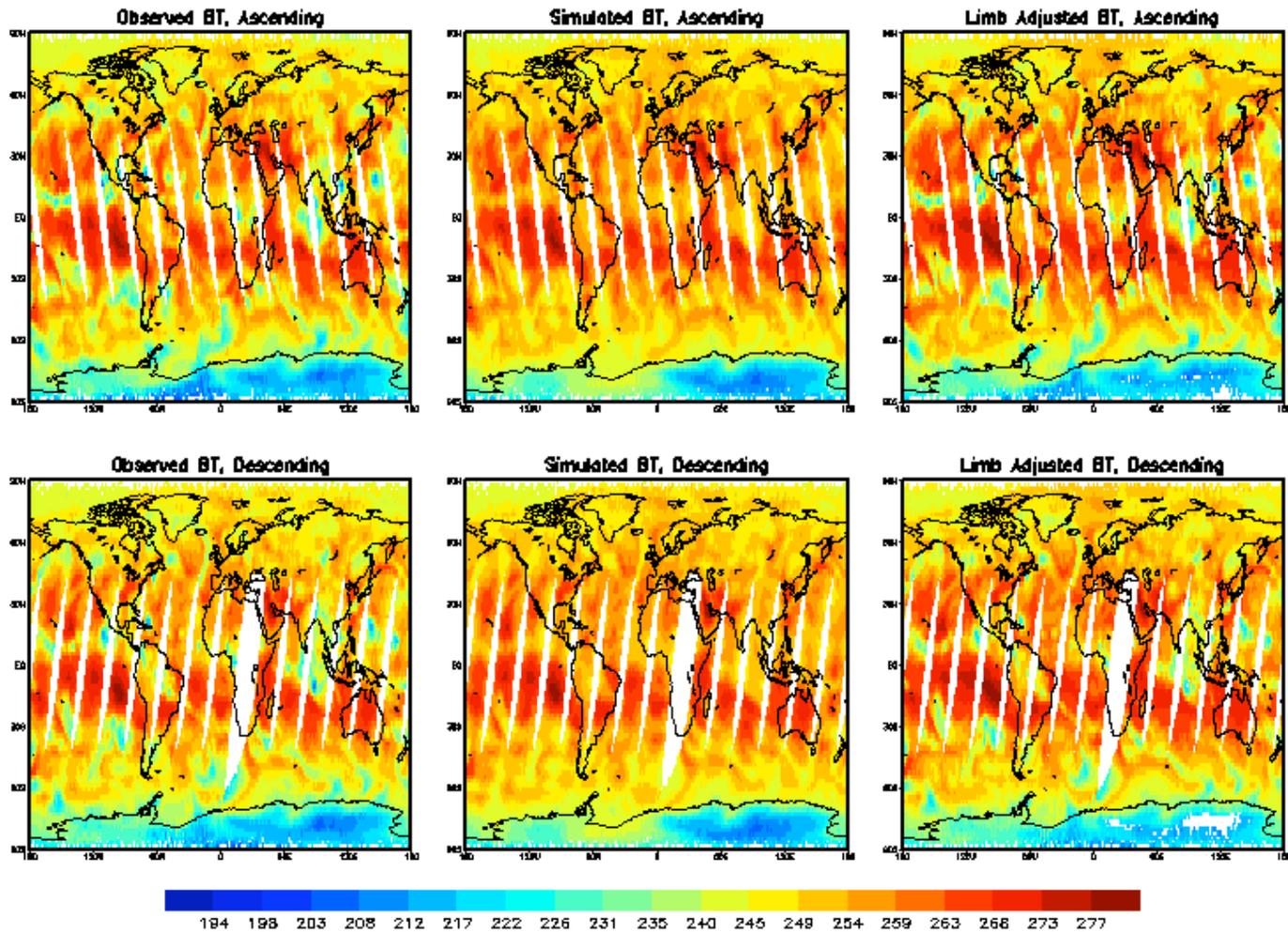
Observed, Simulated vs Limb Adjusted BT, 666.766cm^{-1} , 7 PCs, 2004/09/01



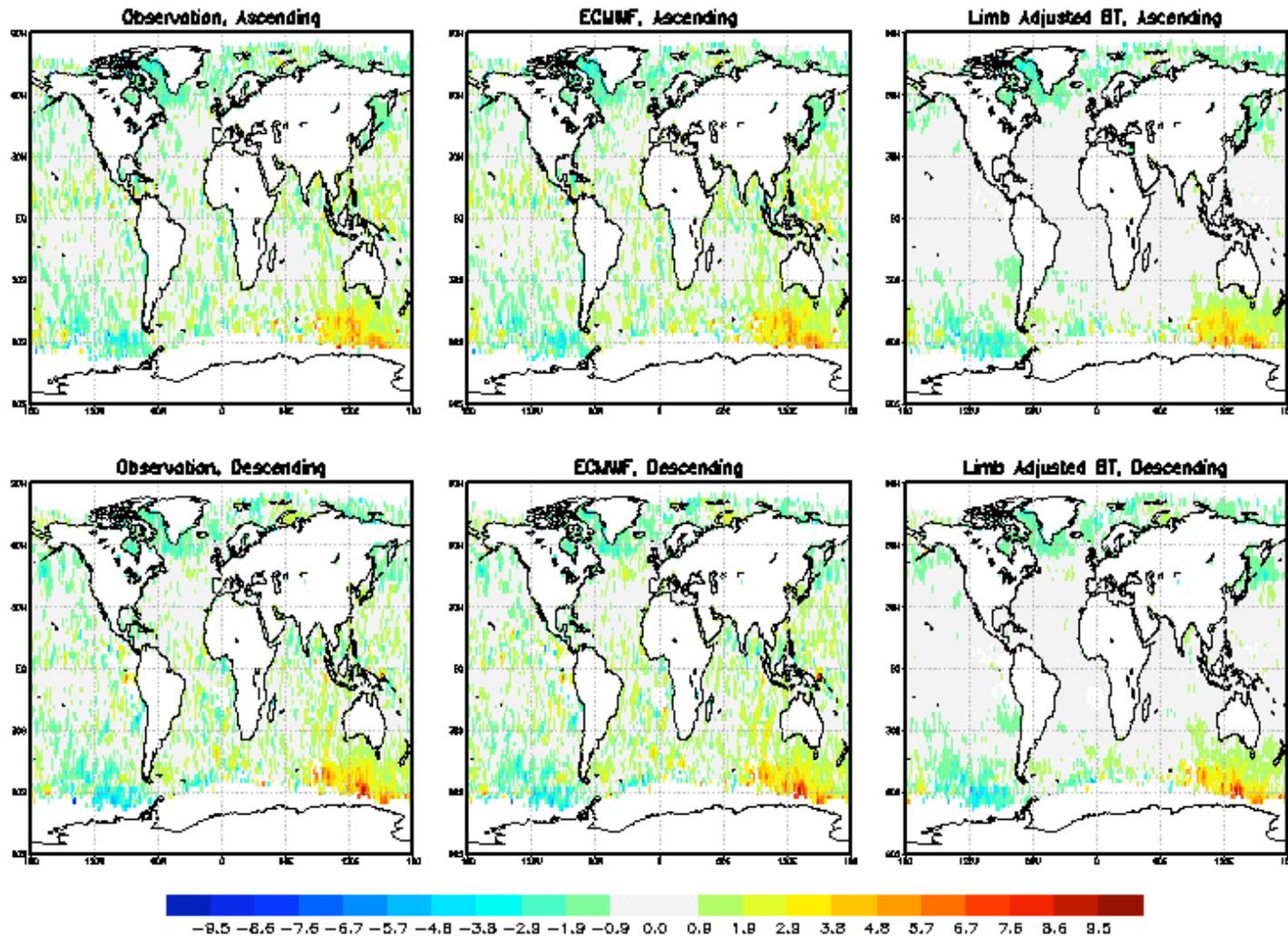
Observed, Simulated vs Limb Adjusted BT, 1519.07cm⁻¹, 7 PCs, 2004/09/01



Observed, Simulated vs Limb Adjusted BT, 1598.49cm⁻¹, 7 PCs, 2004/09/01

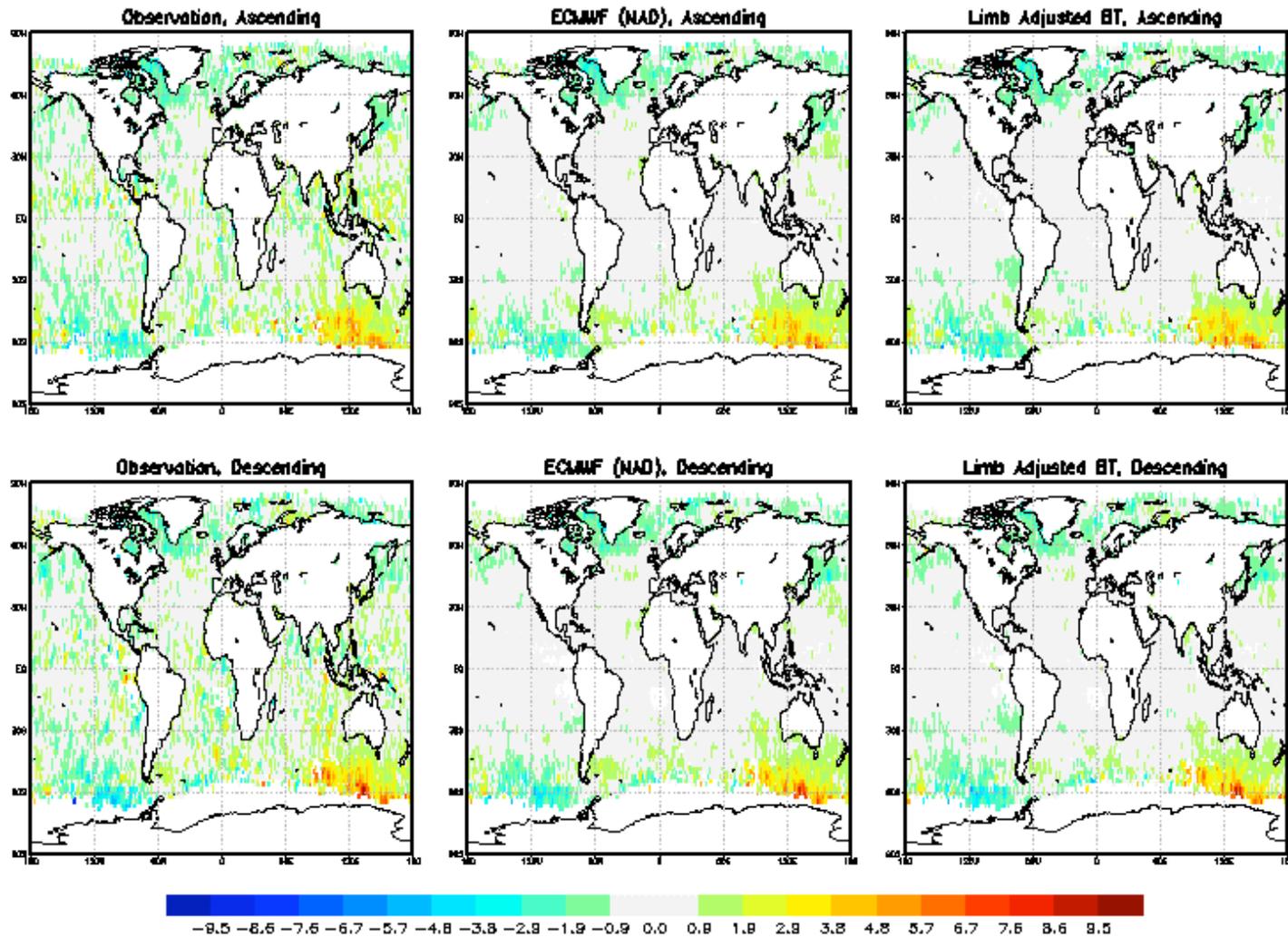


BT Monthly different, 703.87cm-1, Clear Sky, 7 PCs, Sep2005-Sep2004

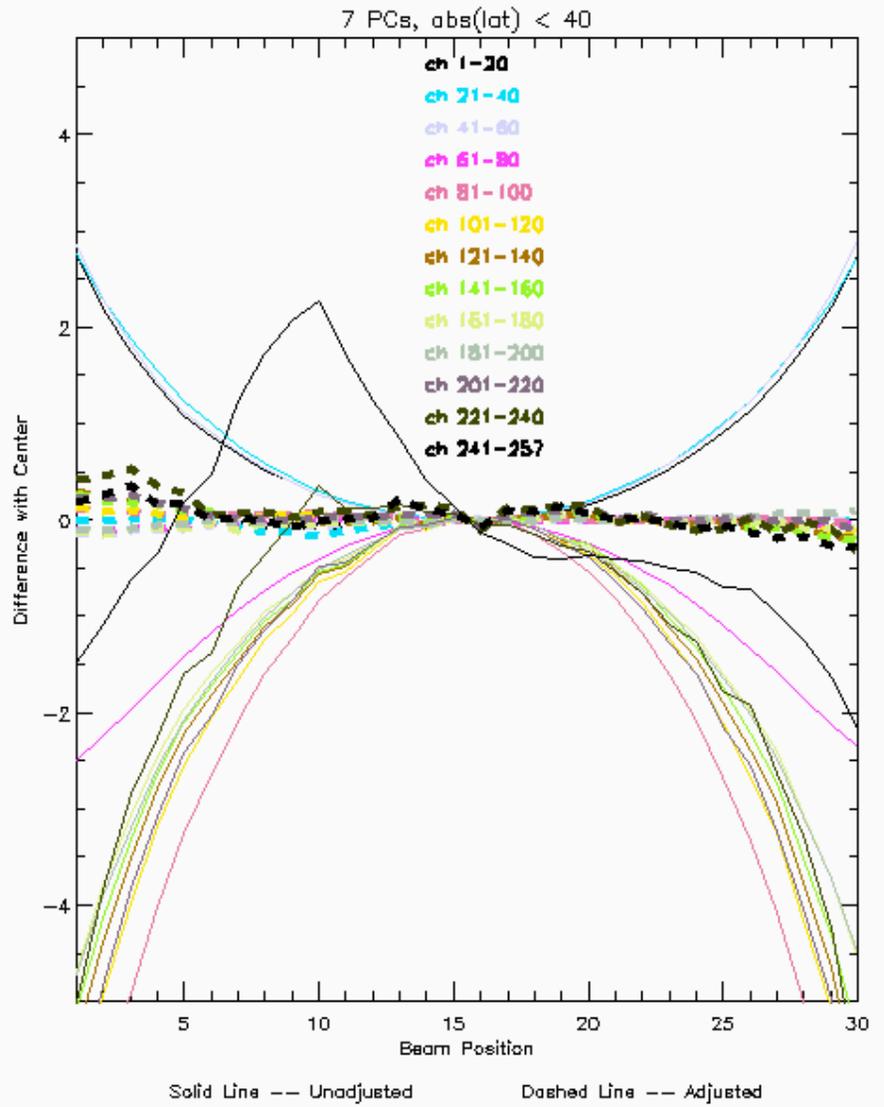
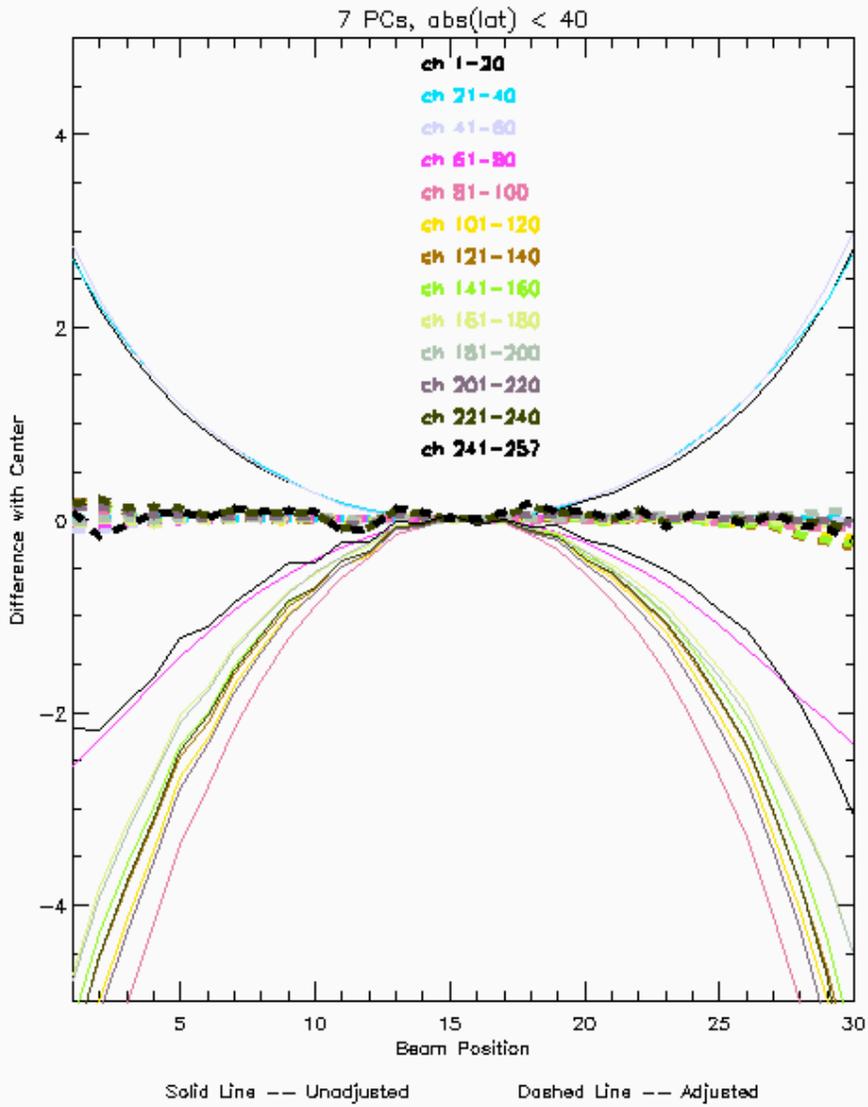


240 mb

BT Monthly different, 703.87cm⁻¹, Clear Sky, 7 PCs, Sep2005-Sep2004

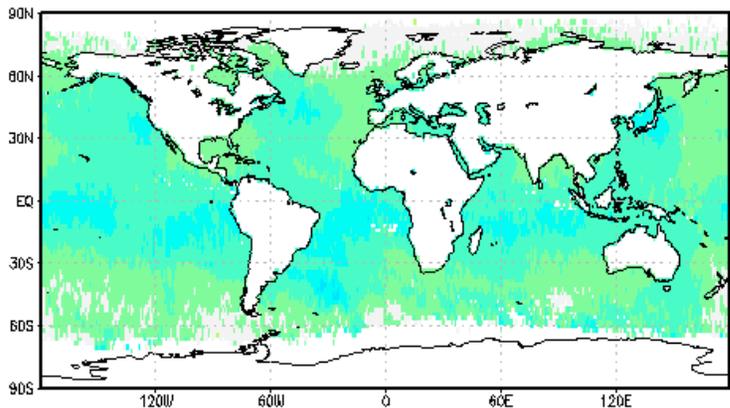


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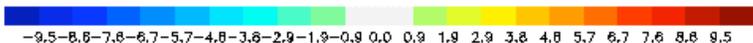
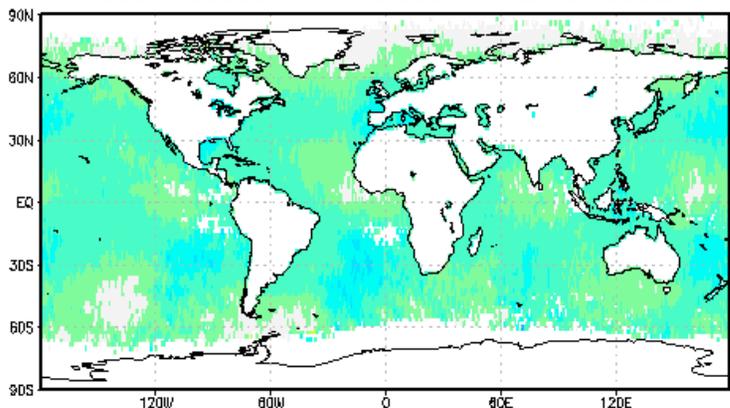


Observation - ECMWF, 667.522cm-1, Clear Sky, Sep, 2004

Ascending: bias=-1.95755 rms=2.1509
count=35252 min=-5.80202 max=3.31499

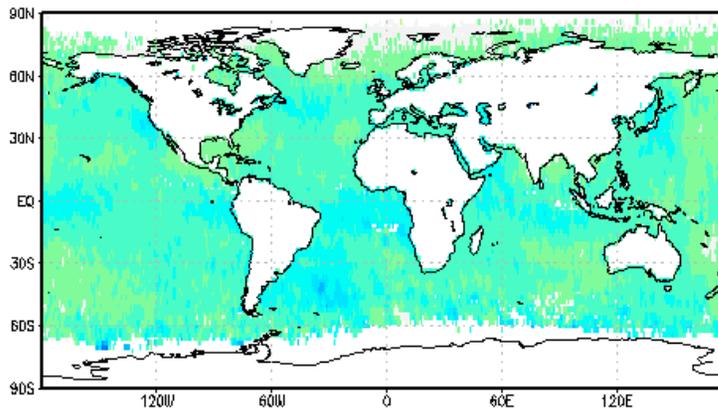


Descending: bias=-2.01537 rms=2.21272
count=33603 min=-6.09674 max=3.40532

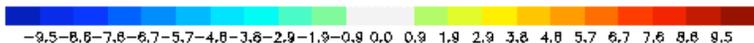
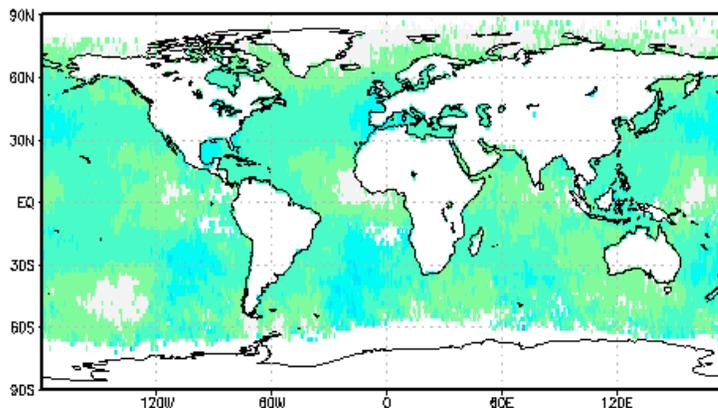


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 667.775cm-1, Clear Sky, Sep, 2004

Ascending: bias=-2.22905 rms=2.40858
count=35245 min=-9.1376 max=3.11456



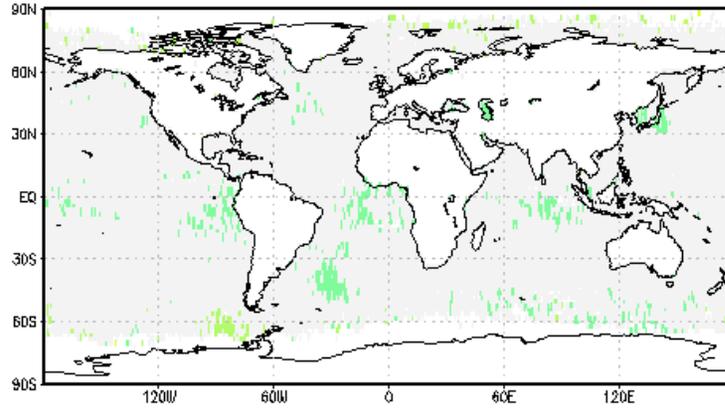
Descending: bias=-1.99881 rms=2.18779
count=33592 min=-7.06992 max=3.27574



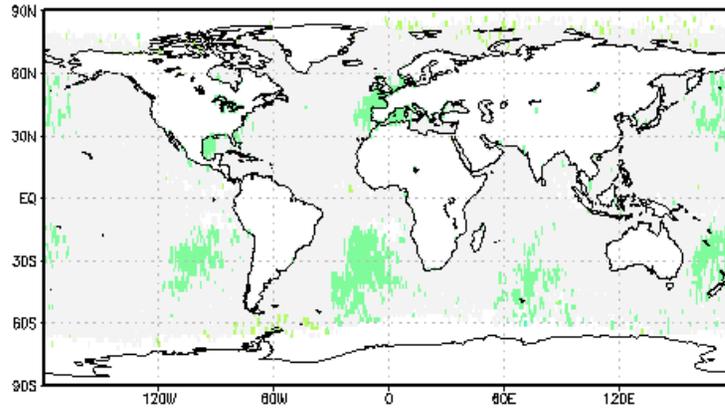
1.4 mb

Observation - ECMWF, 667.27cm-1, Clear Sky, Sep, 2004

Ascending: bias=-0.289516 rms=0.641068
count=35252 min=-2.94331 max=3.29433

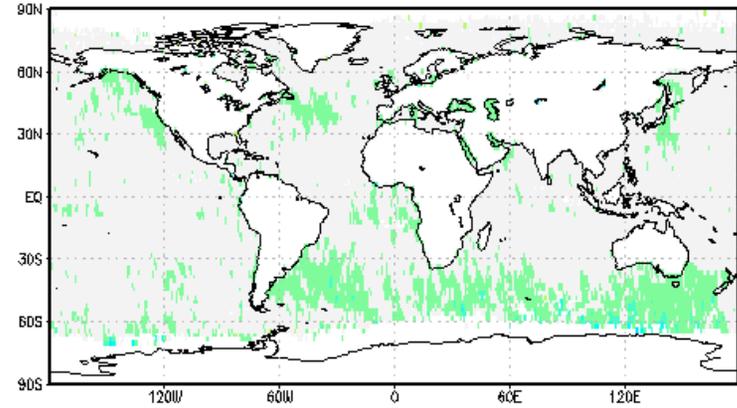


Descending: bias=-0.304972 rms=0.696023
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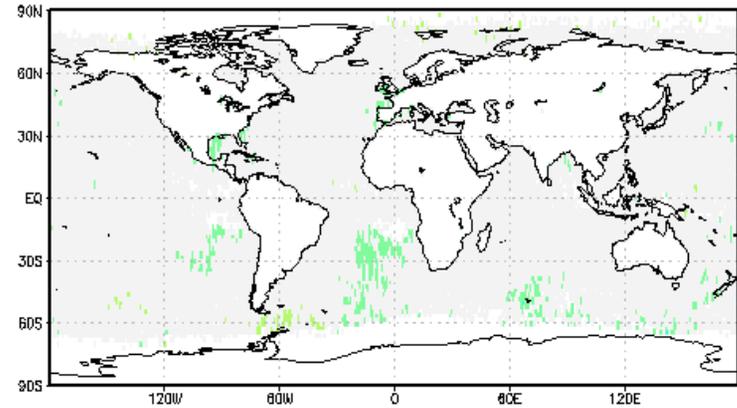


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 667.27cm-1, Clear Sky, Sep, 2004

Ascending: bias=-0.560958 rms=0.829966
count=35245 min=-5.53076 max=2.90421



Descending: bias=-0.16758 rms=0.551397
count=33592 min=-3.36766 max=2.57832



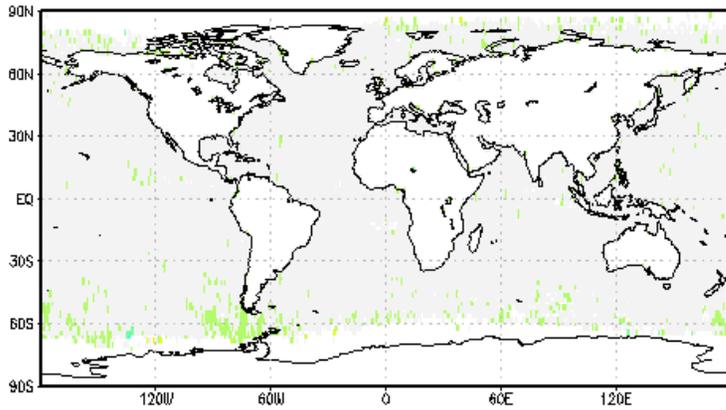
-9.5 -8.6 -7.6 -6.7 -5.7 -4.8 -3.8 -2.9 -1.9 -0.9 0.0 0.9 1.9 2.9 3.8 4.8 5.7 6.7 7.6 8.6 9.5

-9.5 -8.6 -7.6 -6.7 -5.7 -4.8 -3.8 -2.9 -1.9 -0.9 0.0 0.9 1.9 2.9 3.8 4.8 5.7 6.7 7.6 8.6 9.5

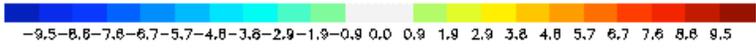
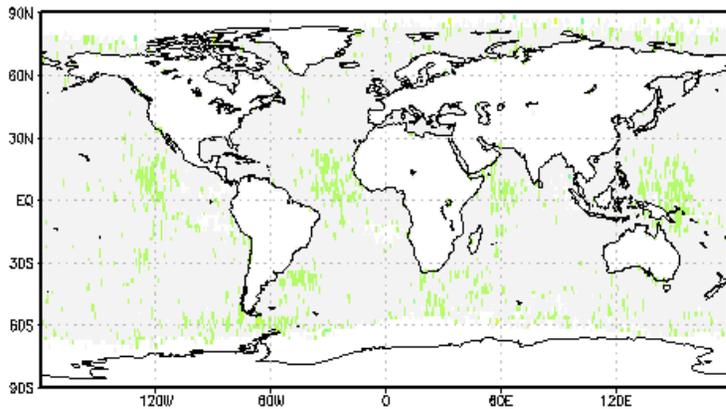
10 mb

Observation - ECMWF, 667.018cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.466221 rms=0.684292
count=35252 min=-5.08769 max=4.69765

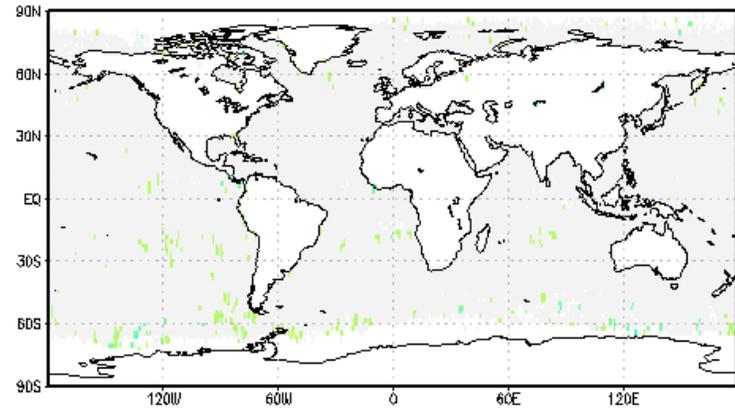


Descending: bias=0.503072 rms=0.744522
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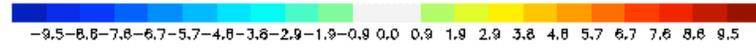
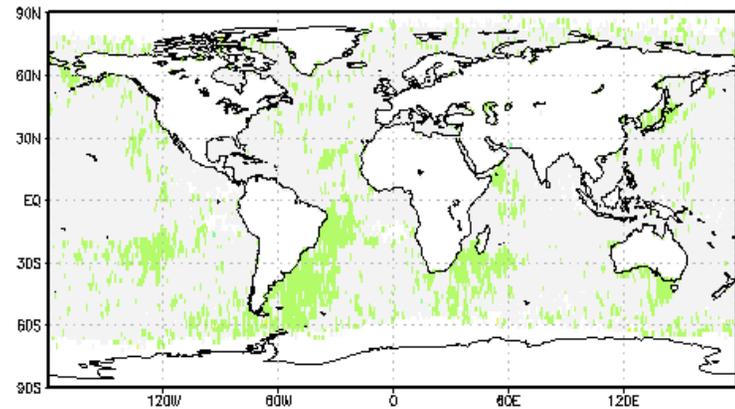


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 667.018cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.242473 rms=0.586699
count=35245 min=-4.61658 max=3.93762

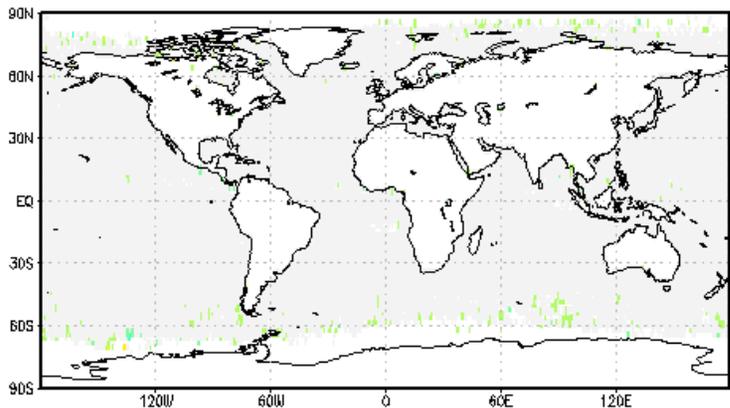


Descending: bias=0.600672 rms=0.795691
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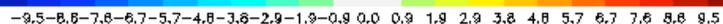
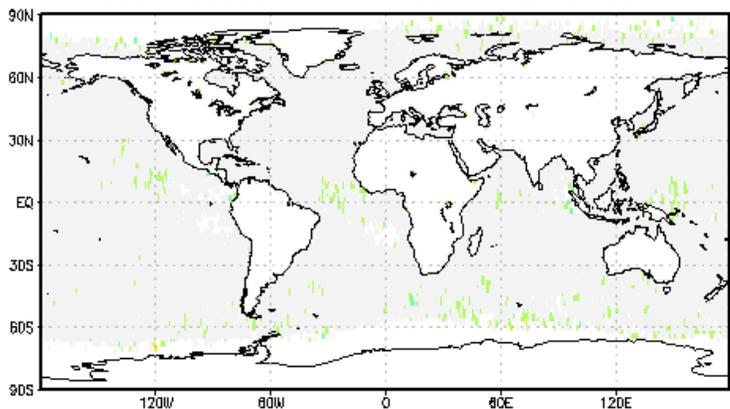


Observation - ECMWF, 666.766cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.267303 rms=0.576529
count=35252 min=-5.4464 max=4.047

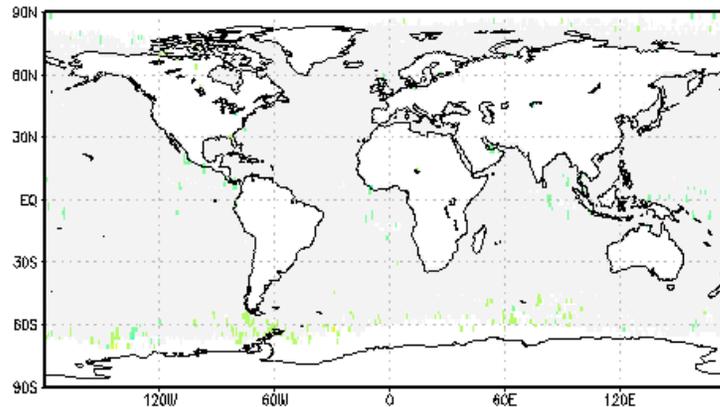


Descending: bias=0.303774 rms=0.635785
count=33603 min=-4.18047 max=3.79671

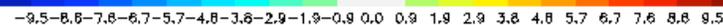
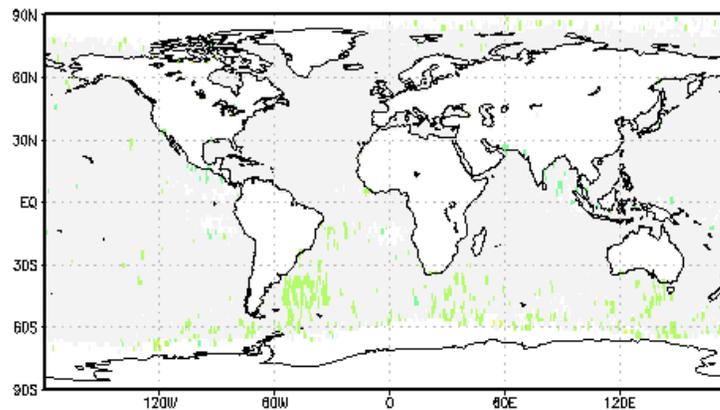


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 666.766cm-1, Clear Sky, Sep, 2004

Ascending: bias=-0.000454846 rms=0.519252
count=35245 min=-5.00888 max=4.39697



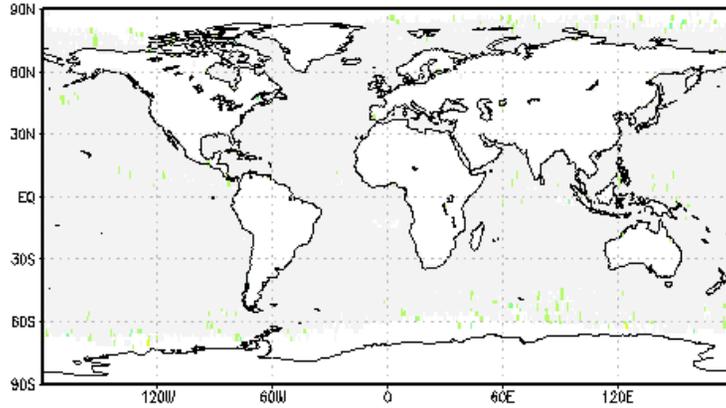
Descending: bias=0.204844 rms=0.59522
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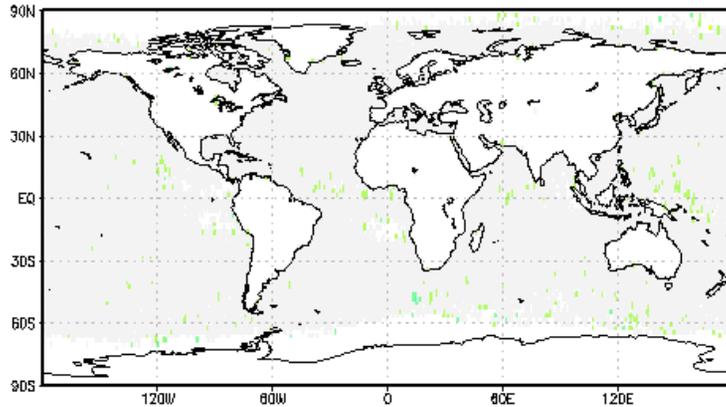
35 mb

Observation - ECMWF, 681.457cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.298858 rms=0.580099
count=35252 min=-4.21494 max=4.22475

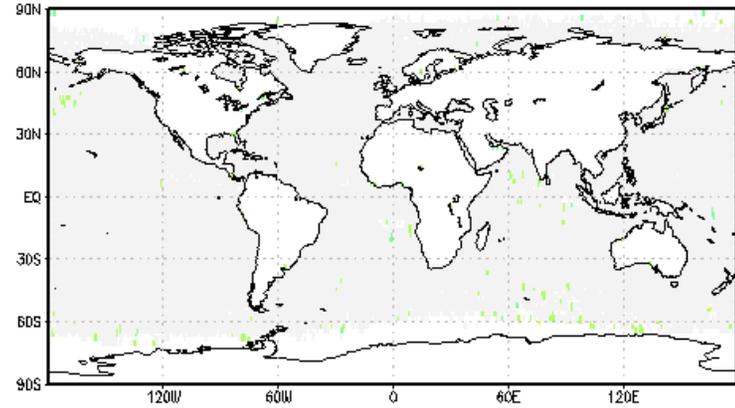


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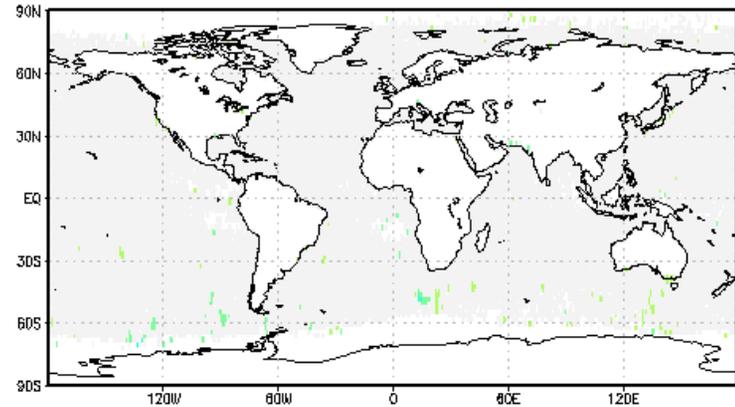


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 681.457cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.174639 rms=0.493837
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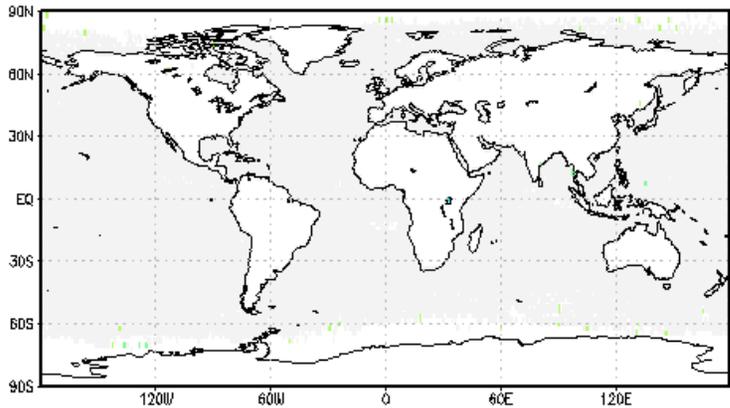
Descending: bias=0.141008 rms=0.51963
count=33592 min=-5.16002 max=3.56592



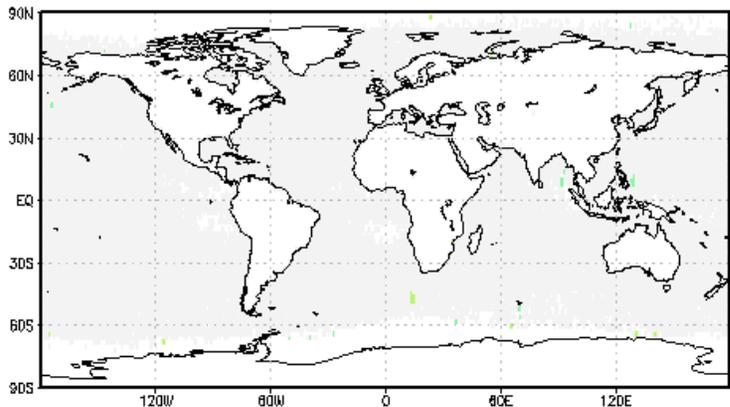
67 mb

Observation - ECMWF, 704.436cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.117787 rms=0.34425
count=35252 min=-3.25481 max=3.24326

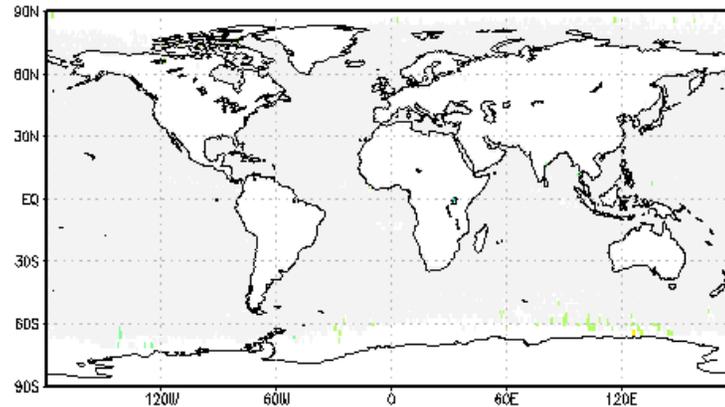


Descending: bias=0.102915 rms=0.377052
count=33603 min=-5.75525 max=3.17609

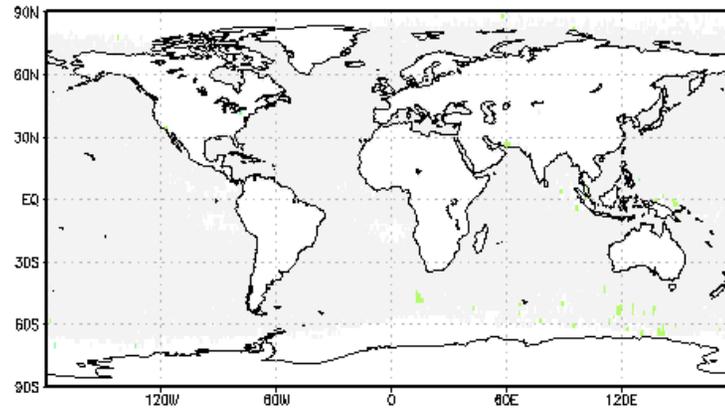


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 704.436cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.0839161 rms=0.328506
count=35245 min=-3.58487 max=3.7868



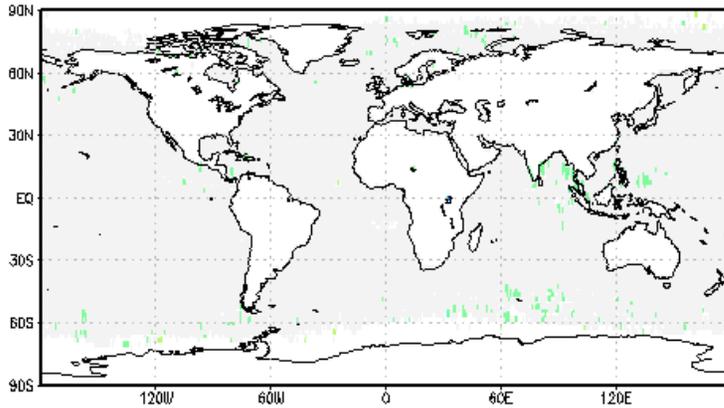
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count=33592 min=-5.16028 max=3.13062



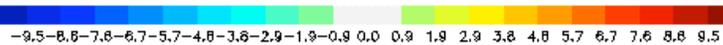
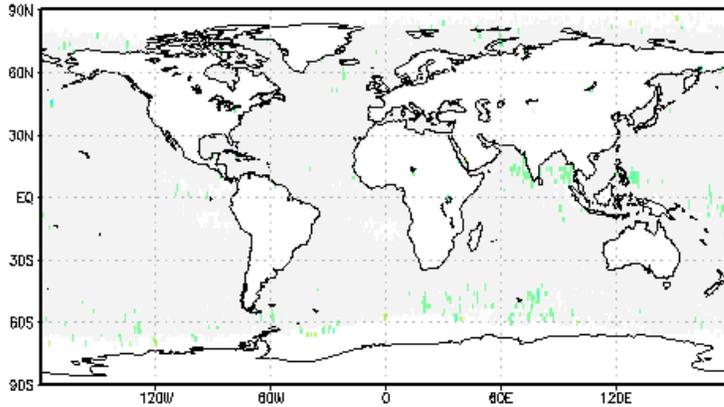
220 mb

Observation - ECMWF, 723.029cm-1, Clear Sky, Sep, 2004

Ascending: bias=-0.15108 rms=0.456039
count=35252 min=-8.52405 max=2.38672

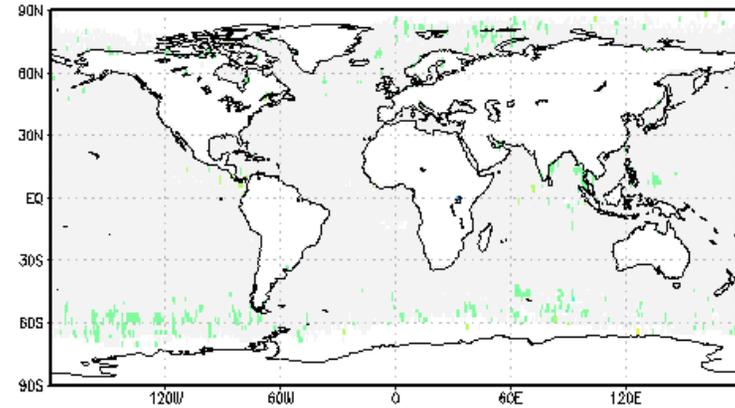


Descending: bias=-0.166967 rms=0.486816
count=33603 min=-10.3709 max=2.37924

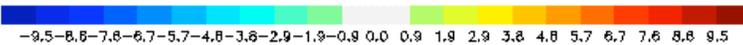
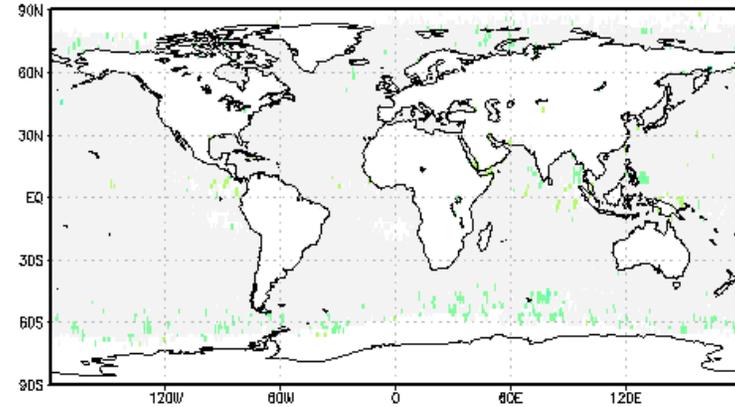


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 723.029cm-1, Clear Sky, Sep, 2004

Ascending: bias=-0.190429 rms=0.556302
count=35245 min=-8.60046 max=2.74487



Descending: bias=-0.0413993 rms=0.565617
count=33592 min=-10.9084 max=3.48587

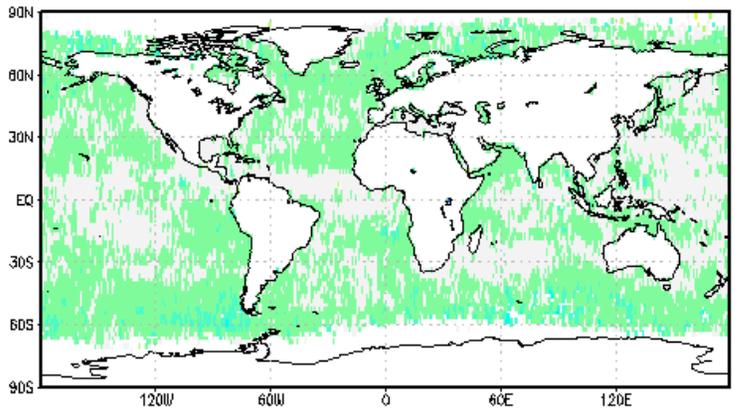


585 mb

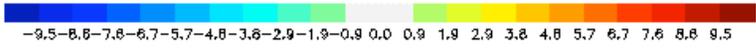
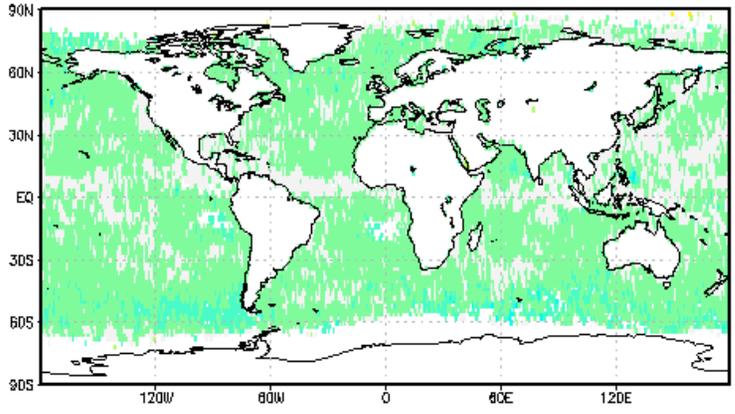


Observation - ECMWF, 801.099cm-1, Clear Sky, Sep, 2004

Ascending: bias=-1.01841 rms=1.2418
count=35252 min=-10.9417 max=3.34506

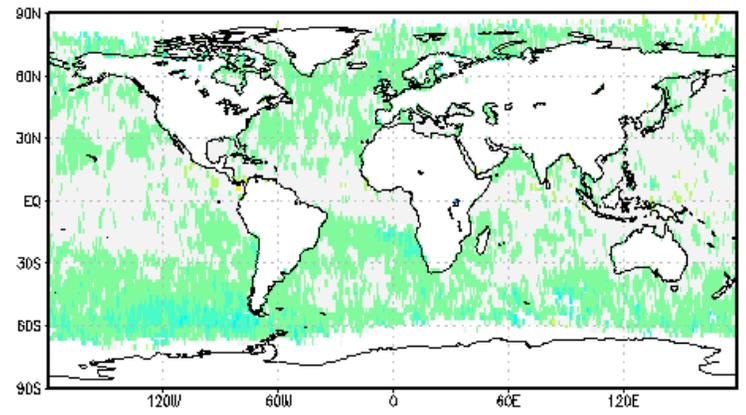


Descending: bias=-1.15762 rms=1.37307
count=33603 min=-11.0078 max=3.93463

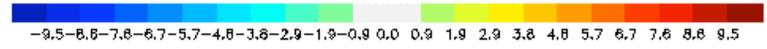
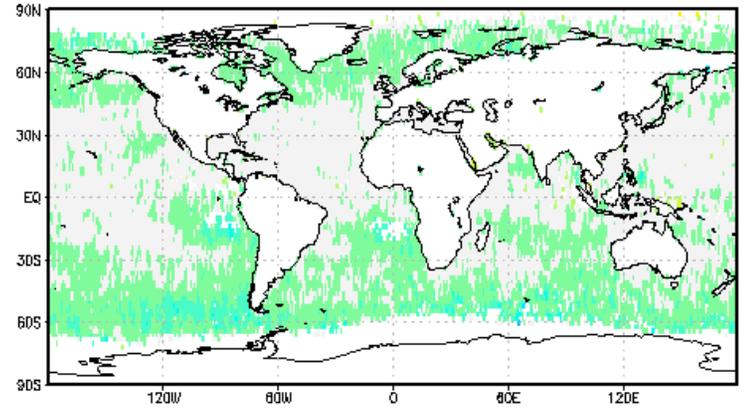


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 801.099cm-1, Clear Sky, Sep, 2004

Ascending: bias=-0.890376 rms=1.28113
count=35245 min=-10.2217 max=4.68164



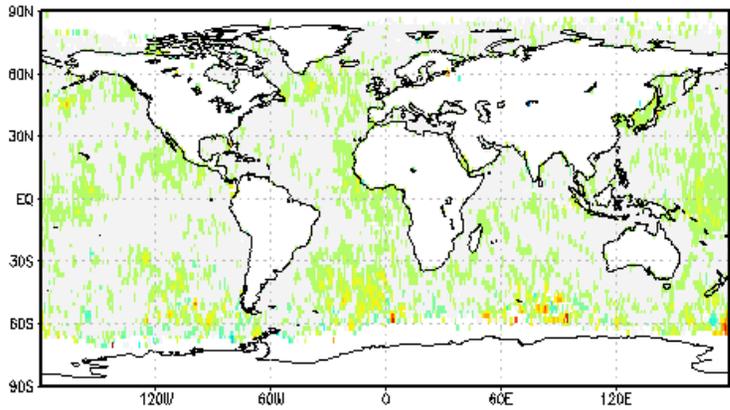
Descending: bias=-0.845101 rms=1.25534
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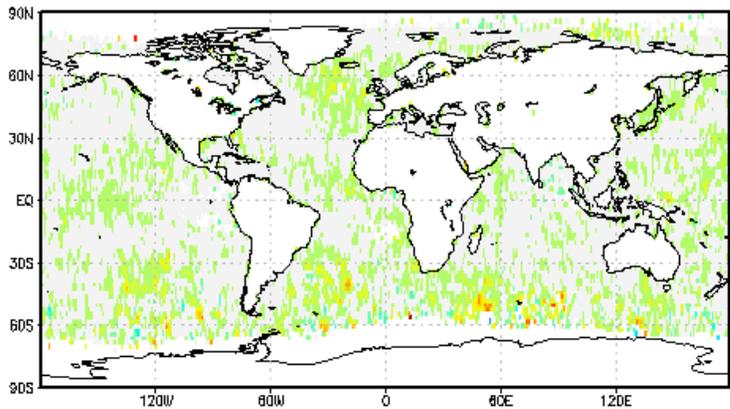
850 mb

Observation - ECMWF, 1519.07cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.62203 rms=1.39743
count=35252 min=-10.7392 max=17.5861

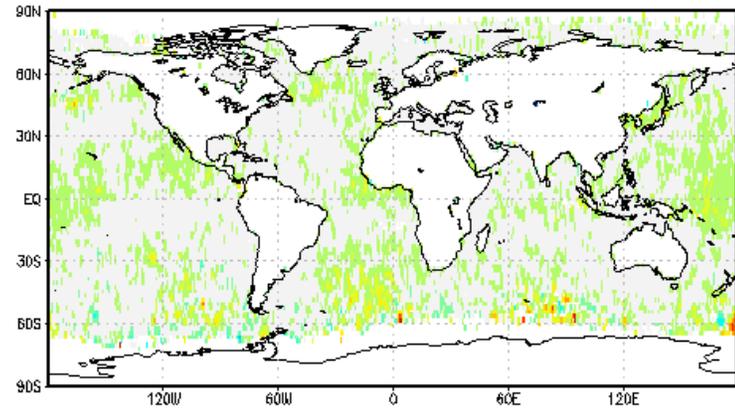


Descending: bias=0.647868 rms=1.48139
count=33603 min=-12.4124 max=16.5549

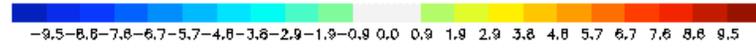
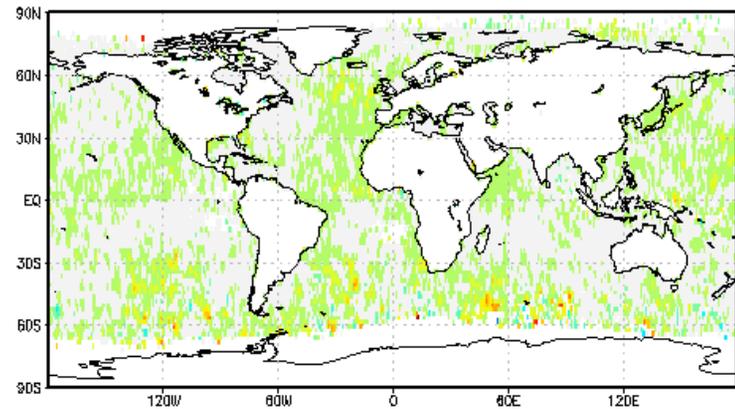


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 1519.07cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.611965 rms=1.39402
count=35245 min=-10.596 max=16.6671



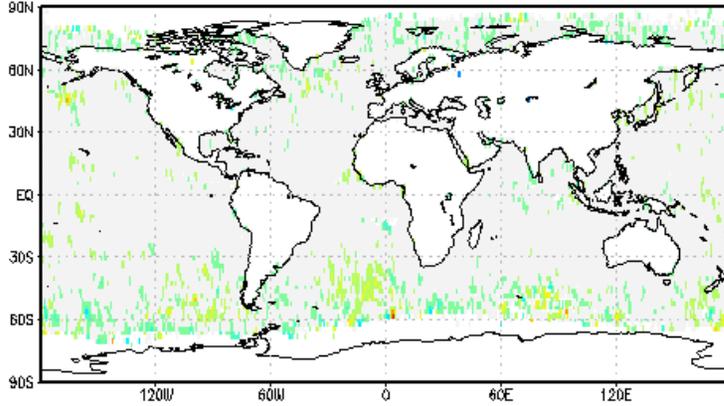
Descending: bias=0.737456 rms=1.52481
count=33592 min=-12.8482 max=16.5283



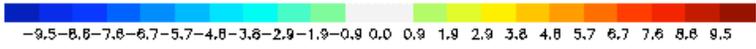
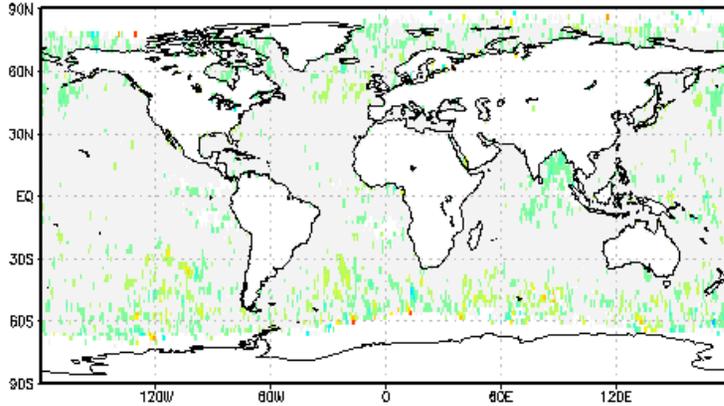
285 mb

Observation - ECMWF, 1598.49cm-1, Clear Sky, Sep, 2004

Ascending: bias=-0.0661891 rms=1.11611
count=35252 min=-9.79042 max=16.7093

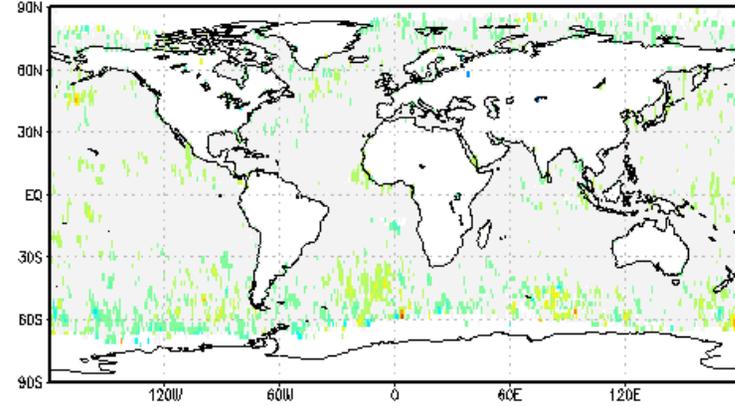


Descending: bias=-0.116707 rms=1.19503
count=33603 min=-11.6857 max=13.0458

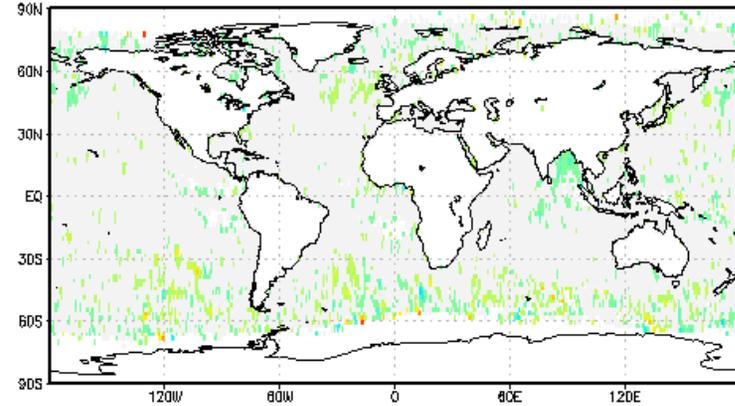


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 1598.49cm-1, Clear Sky, Sep, 2004

Ascending: bias=-0.00965988 rms=1.12849
count=35245 min=-10.0071 max=16.4171



Descending: bias=0.0265201 rms=1.18533
count=33592 min=-11.5689 max=13.0889



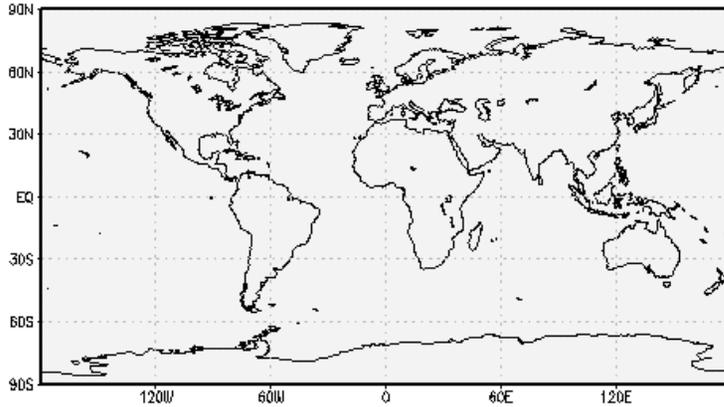
520 mb



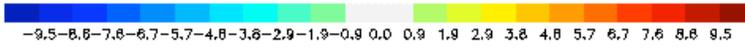
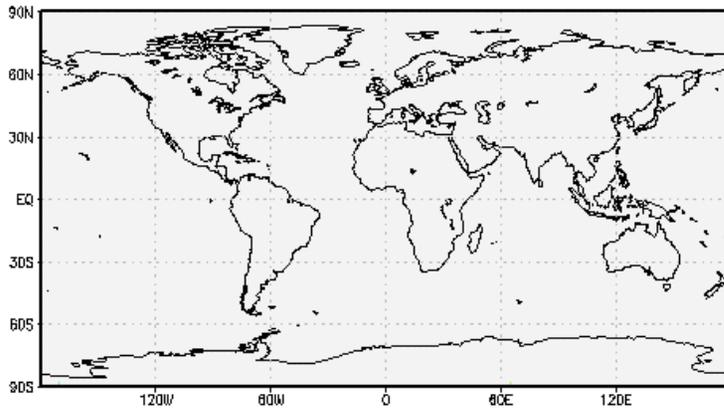
Intercomparison between NCEP and ECMWF analyses

ECMWF (NAD) - GDAS (NAD), 2616.38cm-1, Sep, 2004

Ascending: bias=0.00868224 rms=0.0984311
count=64722 min=-4.74219 max=3.12189

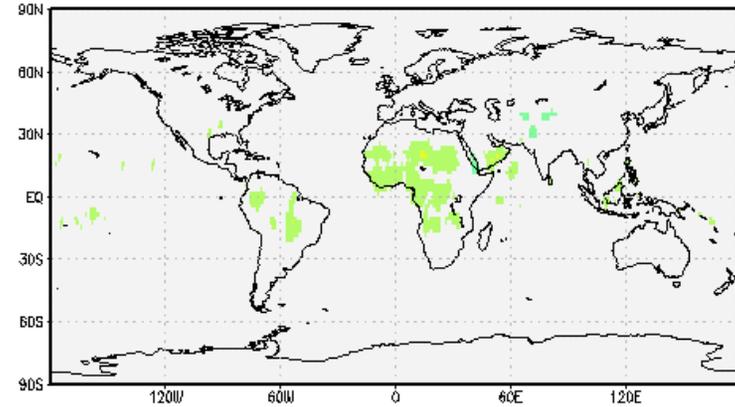


Descending: bias=0.00423709 rms=0.105894
count=64655 min=-4.52043 max=4.65947

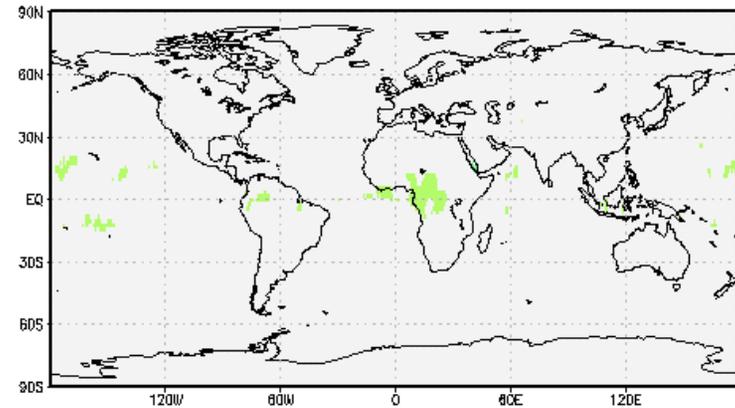


ECMWF (NAD) - GDAS (NAD), 801.099cm-1, Sep, 2004

Ascending: bias=0.152822 rms=0.345362
count=64722 min=-3.0799 max=2.88982



Descending: bias=0.149493 rms=0.300216
count=64655 min=-2.77622 max=2.00234

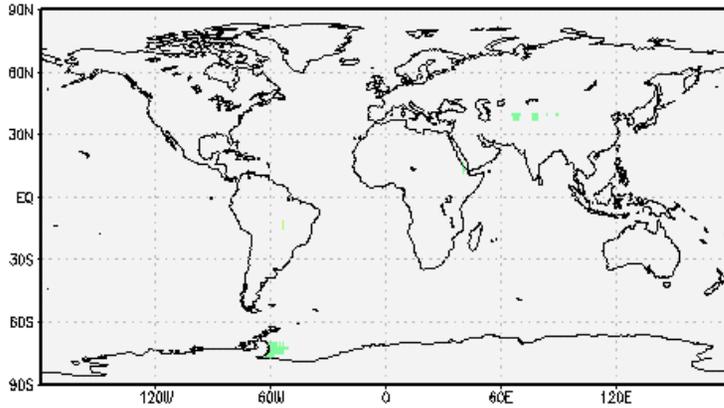


window

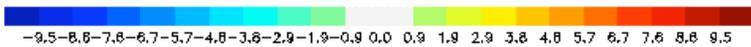
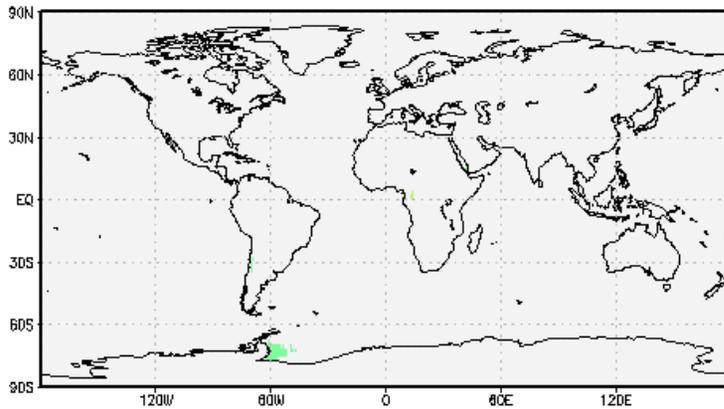
850 mb

ECMWF (NAD) - GDAS (NAD), 723.029cm-1, Sep, 2004

Ascending: bias=0.0034263 rms=0.22101
count=64722 min=-2.0102 max=1.36794

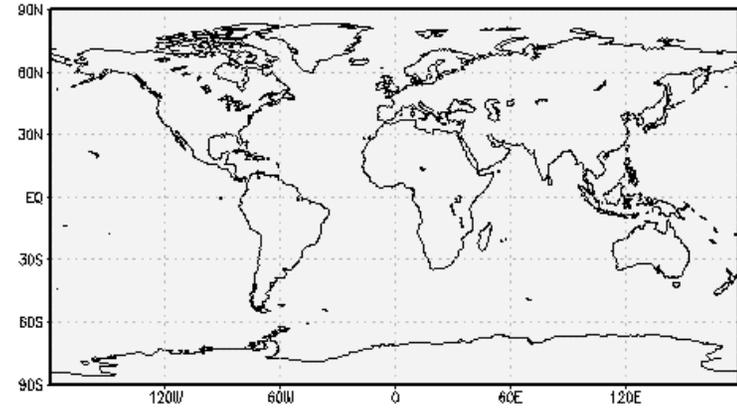


Descending: bias=-0.00183653 rms=0.218622
count=64655 min=-2.08679 max=1.38104

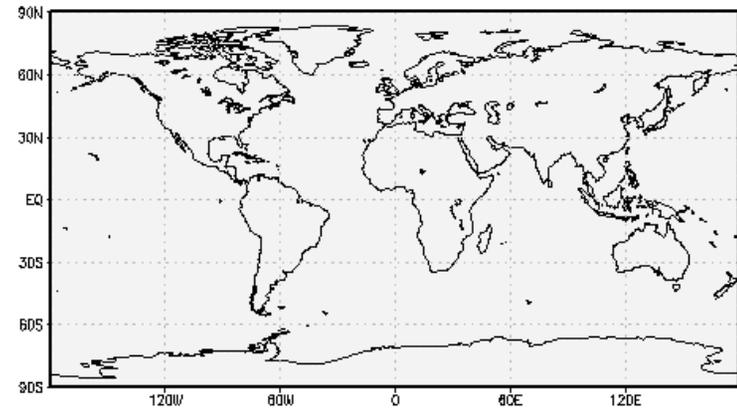


ECMWF (NAD) - GDAS (NAD), 704.436cm-1, Sep, 2004

Ascending: bias=-0.12814 rms=0.219024
count=64722 min=-1.16527 max=1.39995



Descending: bias=-0.136878 rms=0.224389
count=64655 min=-0.947857 max=1.26265

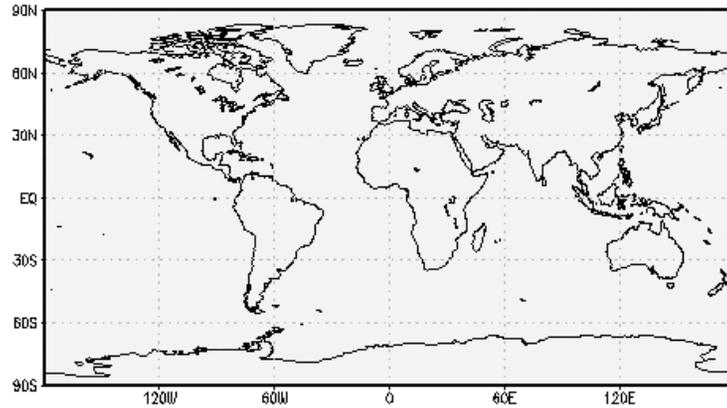


585 mb

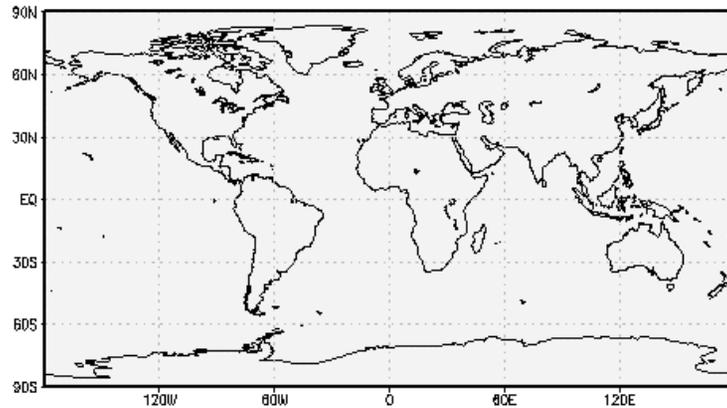
220 mb

ECMWF (NAD) - GDAS (NAD), 689.491cm-1, Sep, 2004

Ascending: bias=-0.109683 rms=0.190467
count=64722 min=-1.70311 max=2.06058



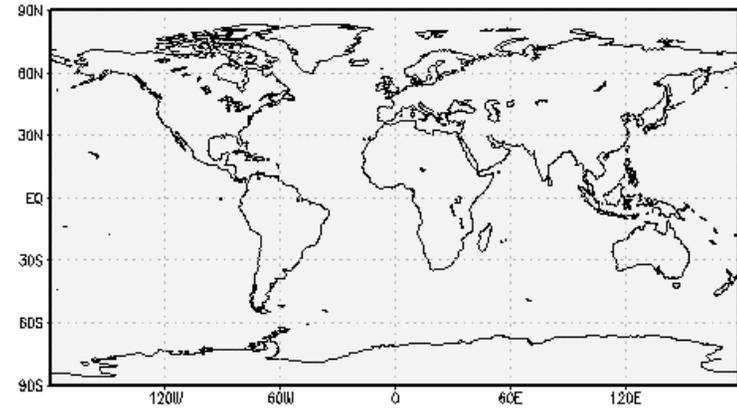
Descending: bias=-0.0916736 rms=0.172414
count=64655 min=-1.49423 max=2.11903



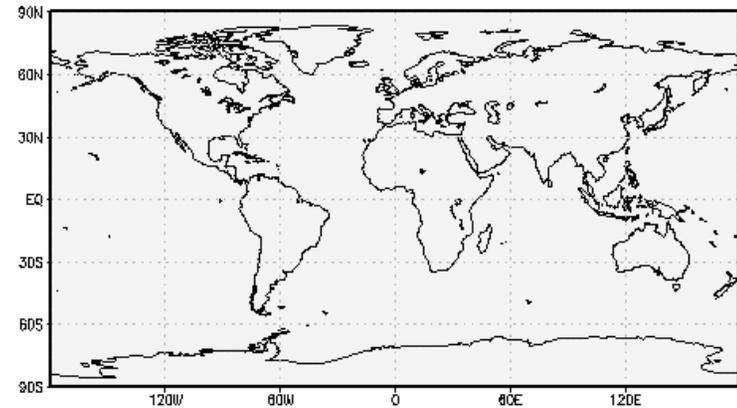
90 mb

ECMWF (NAD) - GDAS (NAD), 681.457cm-1, Sep, 2004

Ascending: bias=-0.0600827 rms=0.153005
count=64722 min=-1.44966 max=1.15315



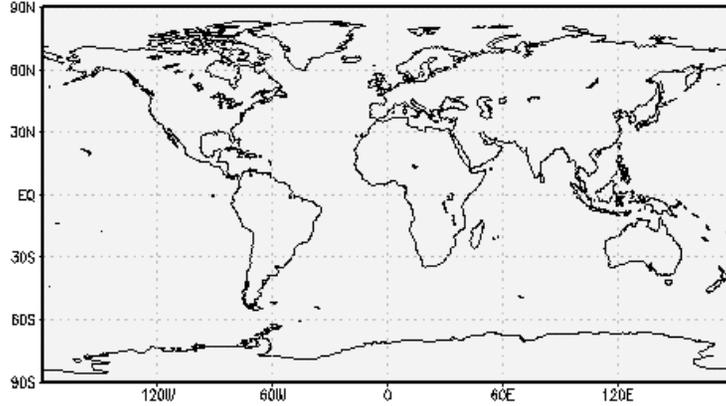
Descending: bias=-0.053804 rms=0.151765
count=64655 min=-0.867706 max=1.99684



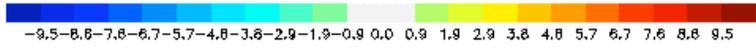
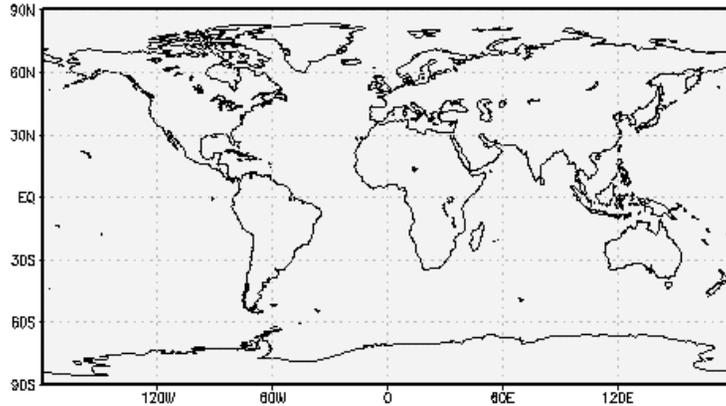
67 mb

ECMWF (NAD) - GDAS (NAD), 666.766cm-1, Sep, 2004

Ascending: bias=0.0177204 rms=0.117121
count=64722 min=-1.57379 max=2.52542



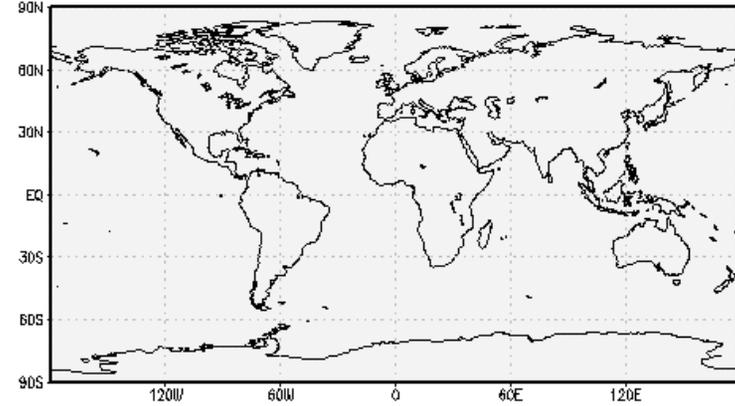
Descending: bias=0.0362061 rms=0.149237
count=64655 min=-1.44522 max=3.10333



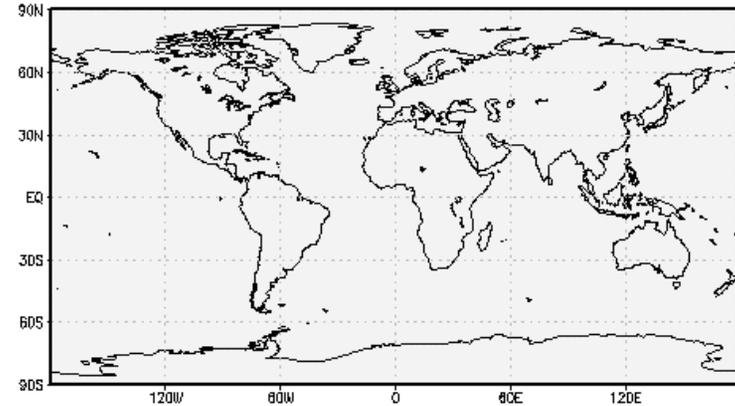
35 mb

ECMWF (NAD) - GDAS (NAD), 667.018cm-1, Sep, 2004

Ascending: bias=-0.22552 rms=0.26192
count=64722 min=-1.75775 max=2.05731



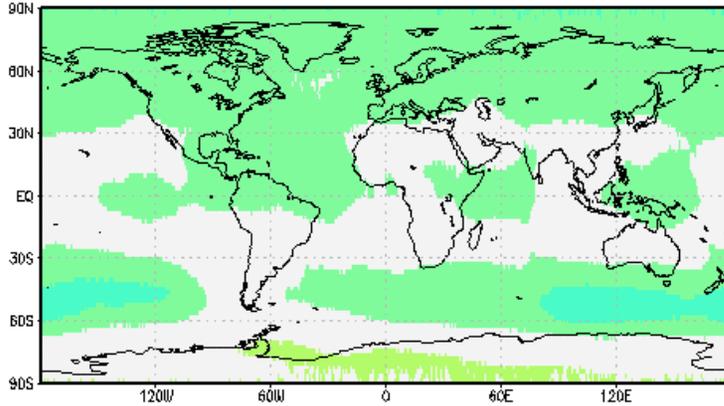
Descending: bias=-0.209098 rms=0.256626
count=64655 min=-1.99518 max=1.34569



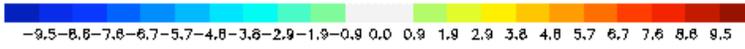
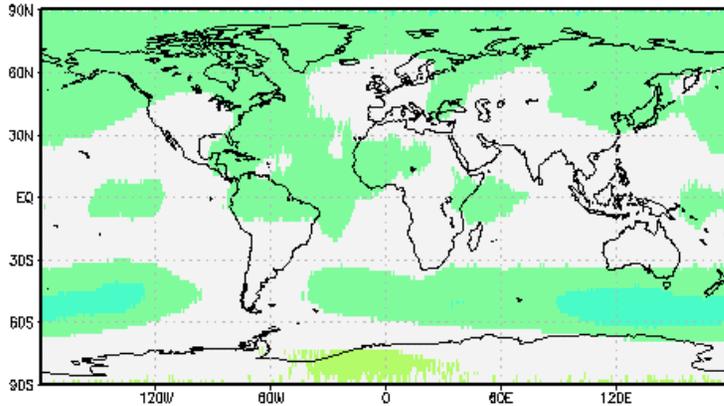
26 mb

ECMWF (NAD) - GDAS (NAD), 667.27cm⁻¹, Sep, 2004

Ascending: bias=-0.870112 rms=1.12672
count=64722 min=-3.02423 max=3.47758



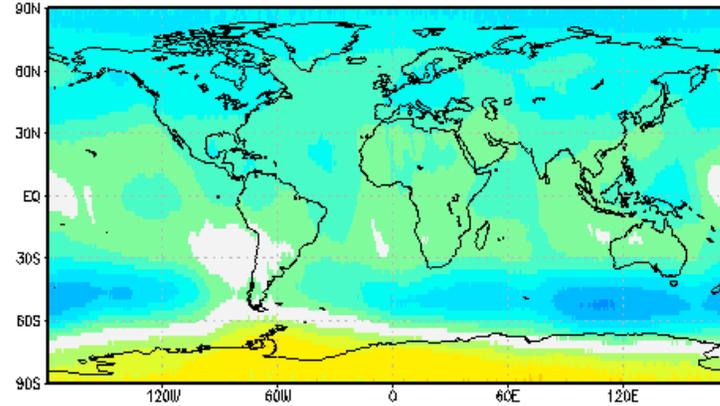
Descending: bias=-0.787291 rms=1.05586
count=64655 min=-2.92686 max=3.57628



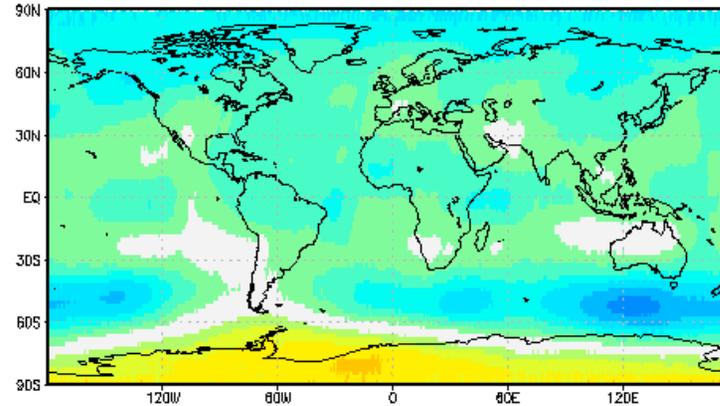
10 mb

ECMWF (NAD) - GDAS (NAD), 667.775cm⁻¹, Sep, 2004

Ascending: bias=-1.89734 rms=2.74684
count=64722 min=-6.04546 max=8.48418



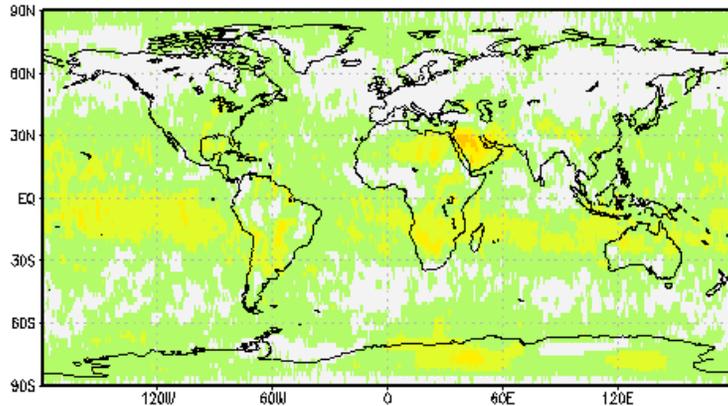
Descending: bias=-1.67336 rms=2.54601
count=64655 min=-6.30512 max=8.44688



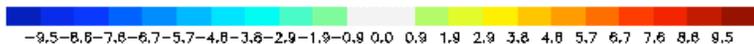
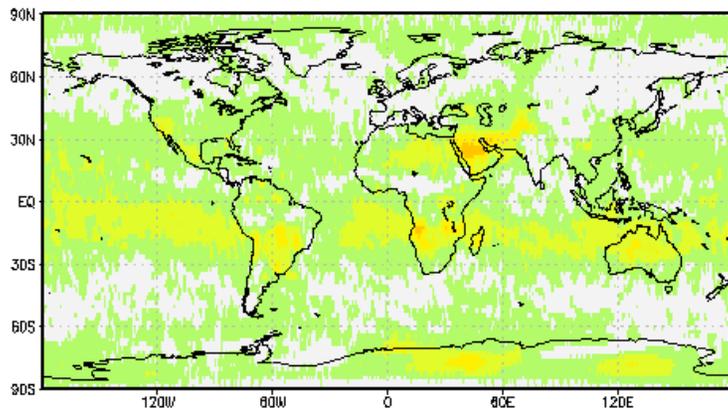
1.4 mb

ECMWF (NAD) - GDAS (NAD), 1519.07cm-1, Sep, 2004

Ascending: bias=1.2539 rms=1.43501
count=64722 min=-2.85356 max=5.502



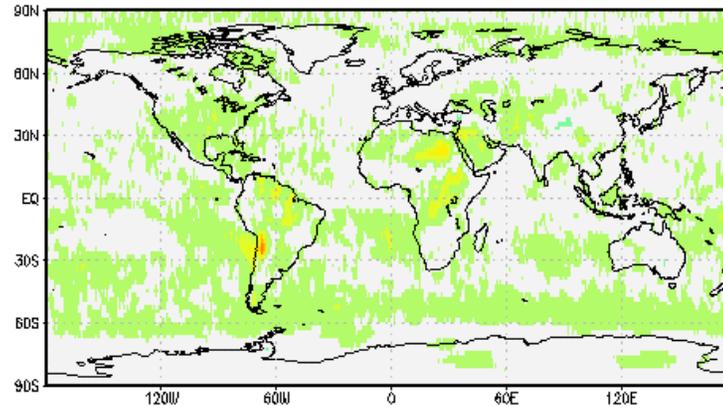
Descending: bias=1.20973 rms=1.39601
count=64655 min=-3.51067 max=5.75882



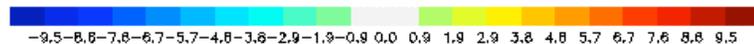
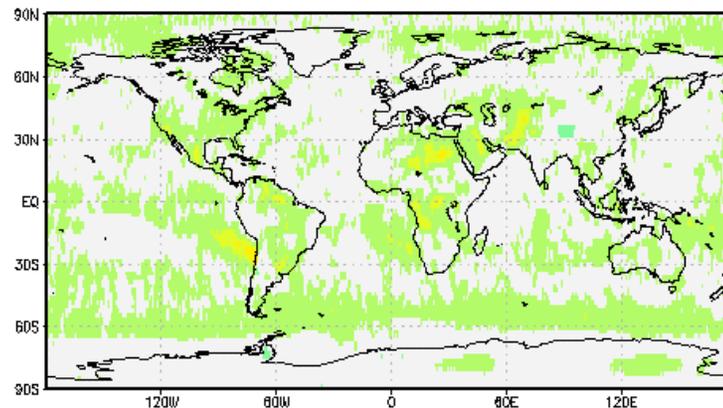
270 mb

ECMWF (NAD) - GDAS (NAD), 1598.49cm-1, Sep, 2004

Ascending: bias=0.76404 rms=0.968526
count=64722 min=-3.15038 max=8.00342



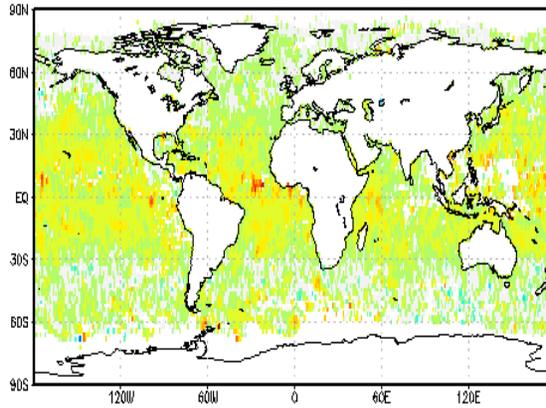
Descending: bias=0.743487 rms=0.949117
count=64655 min=-3.0182 max=4.69273



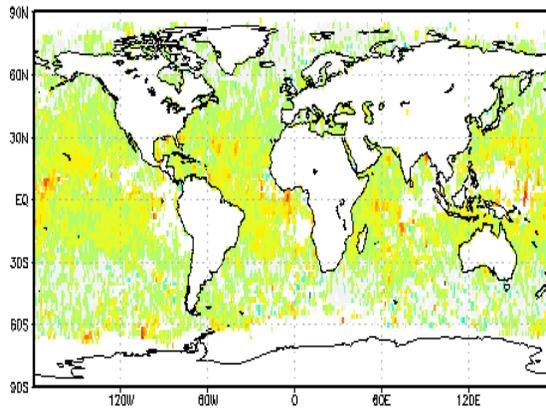
520 mb

ECMWF (NAD) - GDAS (NAD), 1519.07cm-1, Clear Sky, Sep, 2003

Ascending: bias=1.62176 rms=2.30708
count=28164 min=-12.8932 max=16.8255



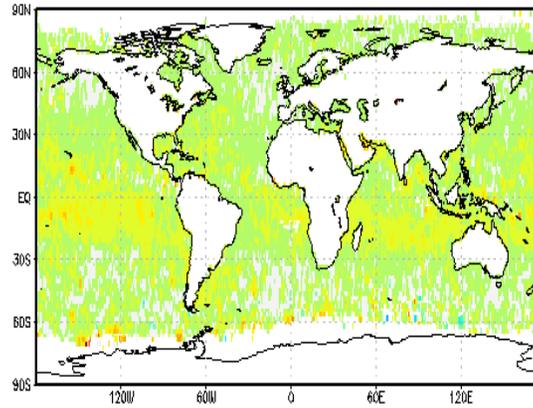
Descending: bias=1.60451 rms=2.32397
count=25254 min=-12.7366 max=15.0291



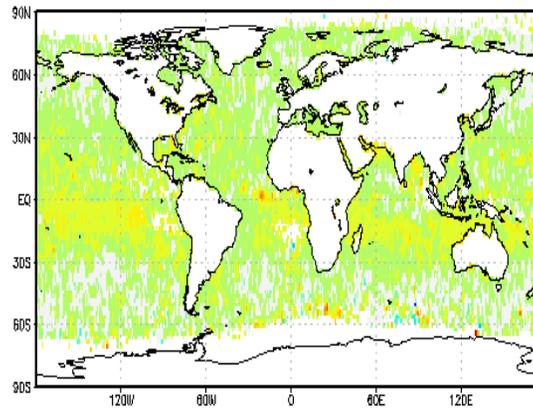
-9.5 -8.8 -7.8 -6.7 -5.7 -4.8 -3.8 -2.9 -1.9 -0.9 0.0 0.9 1.9 2.9 3.8 4.8 5.7 6.7 7.6 8.6 9.5

ECMWF (NAD) - GDAS (NAD), 1519.07cm-1, Clear Sky, Sep, 2004

Ascending: bias=1.55265 rms=1.99887
count=35180 min=-15.4154 max=16.7772



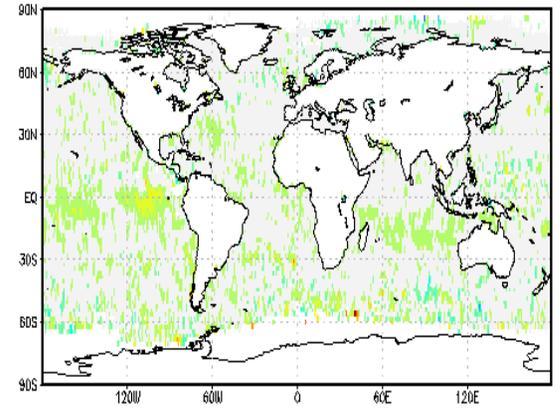
Descending: bias=1.41158 rms=1.95644
count=33506 min=-16.224 max=17.774



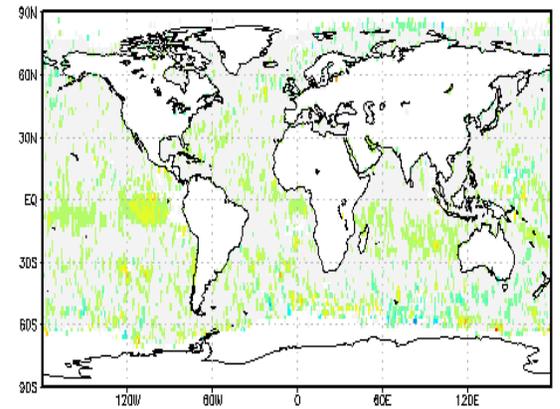
-9.5 -8.8 -7.8 -6.7 -5.7 -4.8 -3.8 -2.9 -1.9 -0.9 0.0 0.9 1.9 2.9 3.8 4.8 5.7 6.7 7.6 8.6 9.5

ECMWF (NAD) - GDAS (NAD), 1519.07cm-1, Clear Sky, Sep, 2005

Ascending: bias=0.351947 rms=1.35305
count=34157 min=-17.9442 max=16.6899



Descending: bias=0.315028 rms=1.41076
count=32235 min=-15.0059 max=15.8744

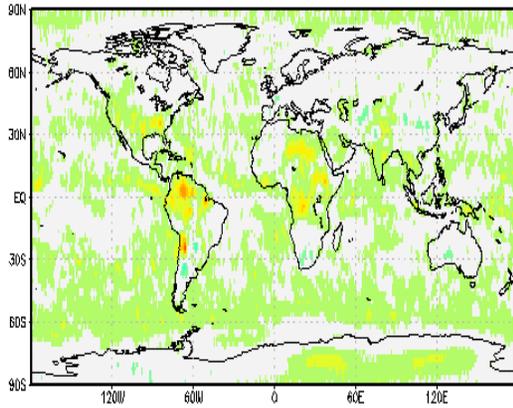


-9.5 -8.8 -7.8 -6.7 -5.7 -4.8 -3.8 -2.9 -1.9 -0.9 0.0 0.9 1.9 2.9 3.8 4.8 5.7 6.7 7.6 8.6 9.5

270 mb

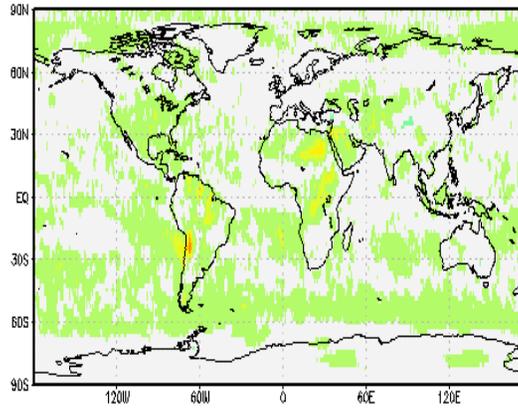
ECMWF (NAD) - GDAS (NAD), 1598.49cm-1, Sep, 2003

Ascending: bias=0.7874 rms=1.1327
count=64270 min=-3.88078 max=9.90822



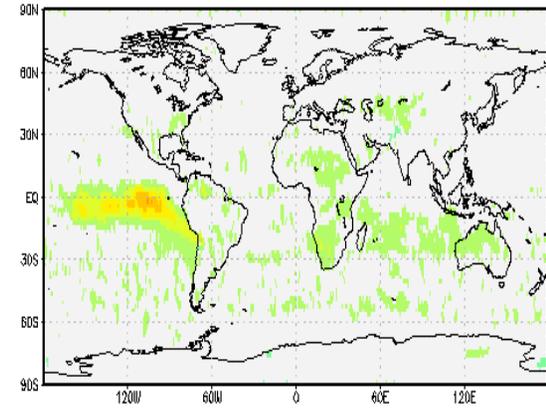
ECMWF (NAD) - GDAS (NAD), 1598.49cm-1, Sep, 2004

Ascending: bias=0.76404 rms=0.968526
count=64722 min=-3.15038 max=8.00342

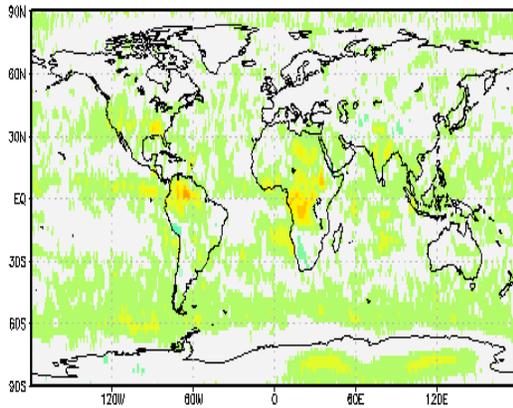


ECMWF (NAD) - GDAS (NAD), 1598.49cm-1, Sep, 2005

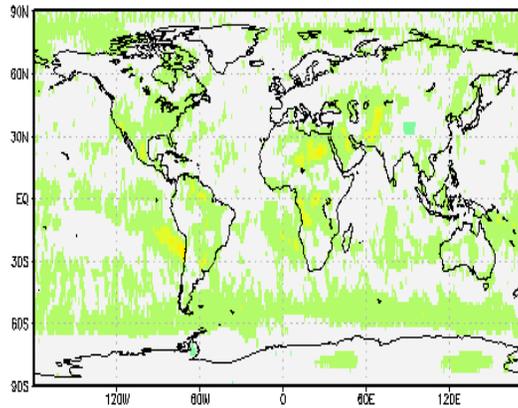
Ascending: bias=0.484669 rms=0.800822
count=64630 min=-6.30179 max=7.63952



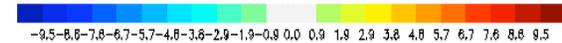
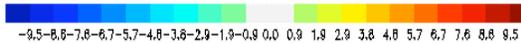
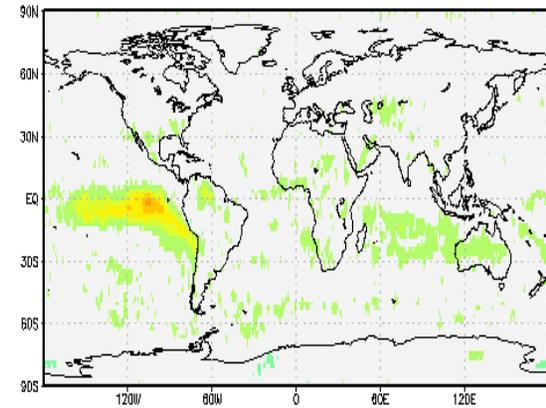
Descending: bias=0.830901 rms=1.1602
count=64211 min=-4.4673 max=6.57617



Descending: bias=0.743487 rms=0.949117
count=64655 min=-3.0182 max=4.69273

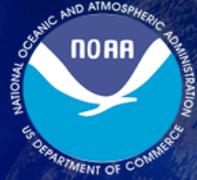


Descending: bias=0.449402 rms=0.767722
count=64578 min=-3.59575 max=7.14154



520 mb

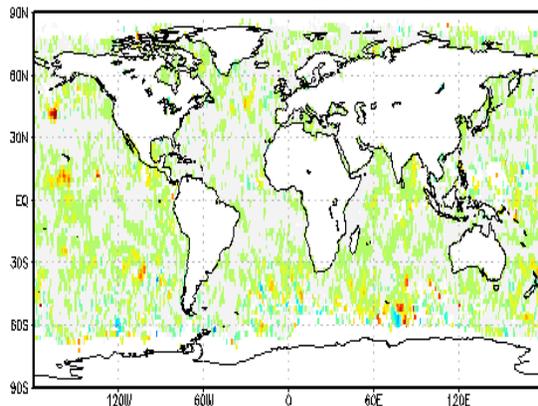




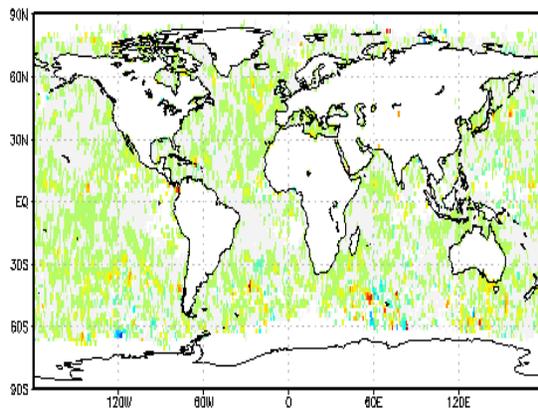
Which model is more accurate?

Limb Adjusted BT, 7 PCs - ECMWF (NAD), 1519.07cm-1, Clear Sky, Sep, 2003

Ascending: bias=0.730142 rms=1.77882
count=29753 min=-16.2292 max=21.0998

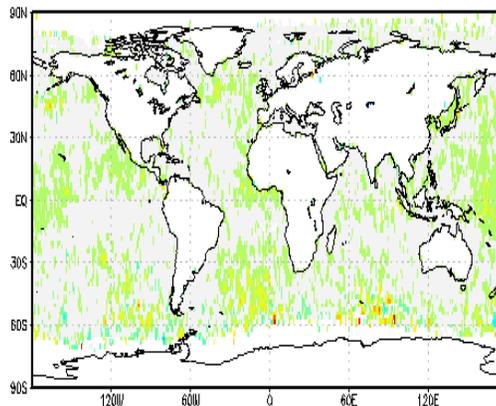


Descending: bias=0.801072 rms=1.75827
count=27014 min=-11.885 max=22.4717

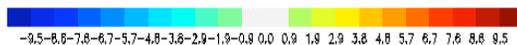
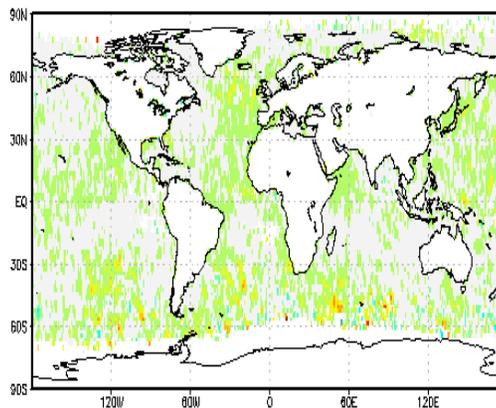


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 1519.07cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.611965 rms=1.39402
count=35245 min=-10.596 max=16.6671

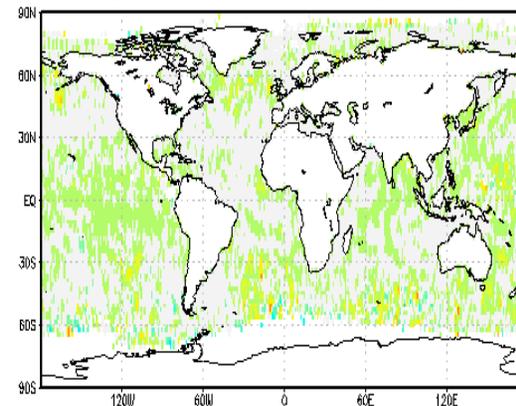


Descending: bias=0.737456 rms=1.52481
count=33592 min=-12.8482 max=16.5283

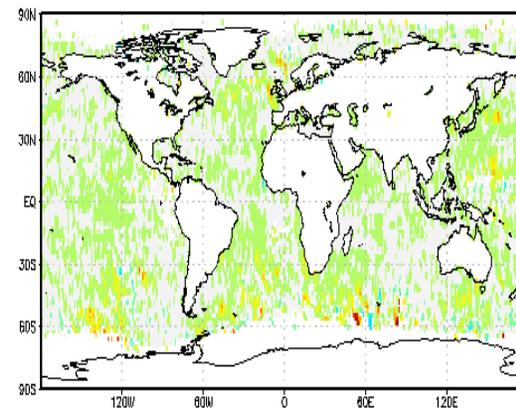


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 1519.07cm-1, Clear Sky, Sep, 2005

Ascending: bias=0.711376 rms=1.44785
count=34156 min=-14.687 max=15.7027



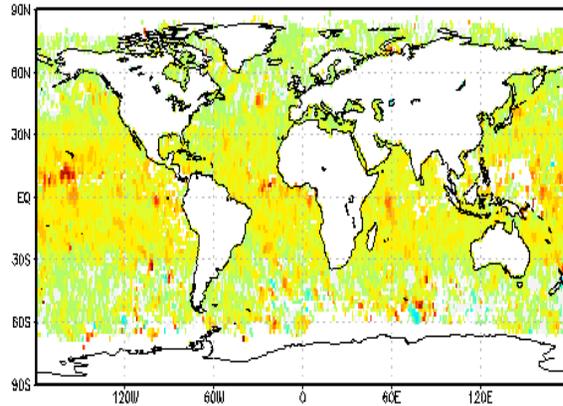
Descending: bias=0.812873 rms=1.56543
count=32235 min=-10.2056 max=19.5798



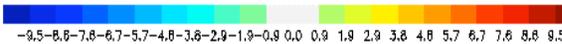
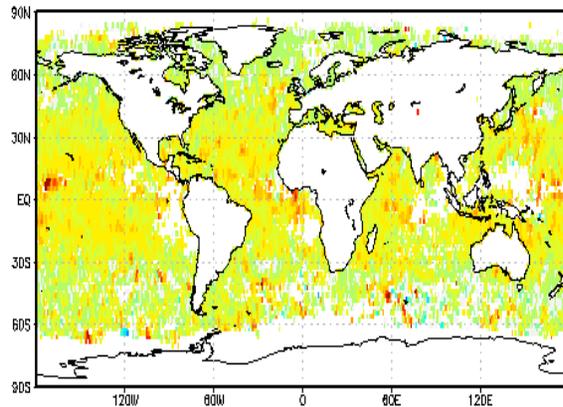
270 mb

Limb Adjusted BT, 7 PCs - GDAS (NAD), 1519.67cm-1, Clear Sky, Sep, 2

Ascending: bias=2.33514 rms=3.01443
count=28148 min=-14.3502 max=21.5598

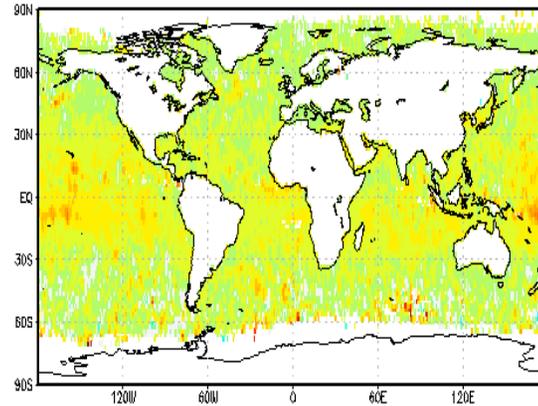


Descending: bias=2.41218 rms=3.05491
count=25254 min=-10.5441 max=23.7942

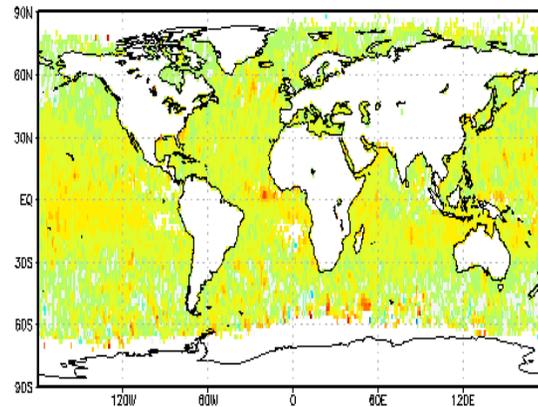


Limb Adjusted BT, 7 PCs - GDAS (NAD), 1519.67cm-1, Clear Sky, Sep, 20

Ascending: bias=2.16469 rms=2.65235
count=35173 min=-13.2313 max=19.9008

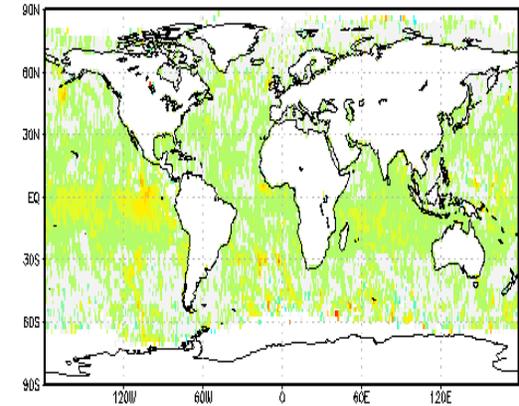


Descending: bias=2.14756 rms=2.69454
count=33494 min=-14.9042 max=16.2267

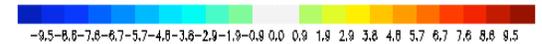
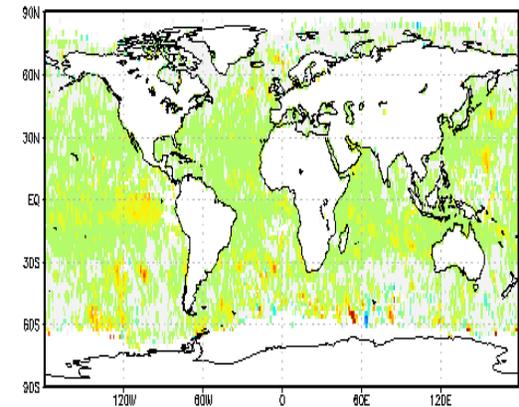


Limb Adjusted BT, 7 PCs - GDAS (NAD), 1519.67cm-1, Clear Sky, Sep, 2005

Ascending: bias=1.06333 rms=1.80113
count=34156 min=-10.62 max=18.7242



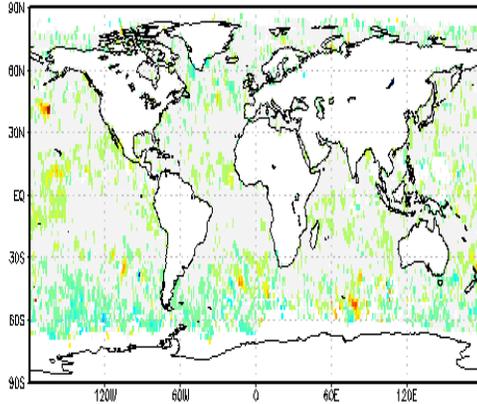
Descending: bias=1.12791 rms=1.91938
count=32235 min=-11.5761 max=18.3335



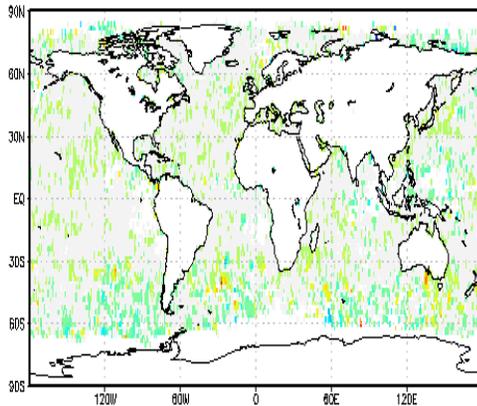
270 mb

Limb Adjusted BT, 7 PCs - ECMWF (NAD), 1598.49cm-1, Clear Sky, Sep, 2003

Ascending: bias=0.102696 rms=1.51404
count=29753 min=-12.781 max=18.1715

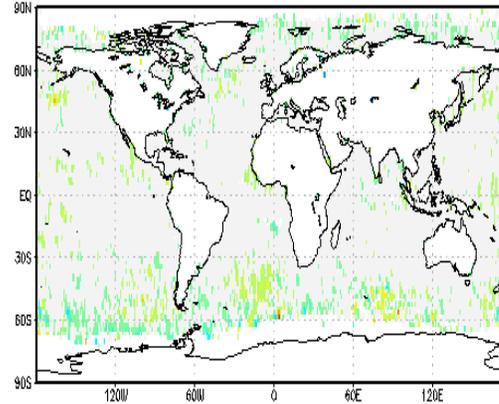


Descending: bias=0.162349 rms=1.4457
count=27014 min=-11.1455 max=17.0494

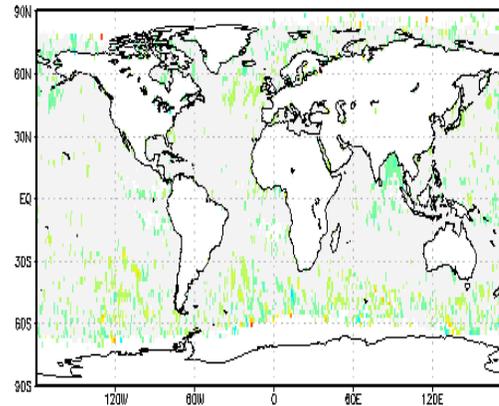


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 1598.49cm-1, Clear Sky, Sep, 2004

Ascending: bias=-0.00965988 rms=1.12849
count=35245 min=-10.0071 max=16.4171

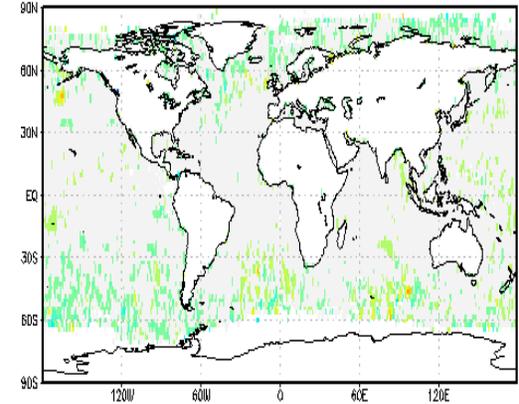


Descending: bias=0.0265201 rms=1.18533
count=33592 min=-11.5689 max=13.0889

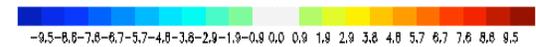
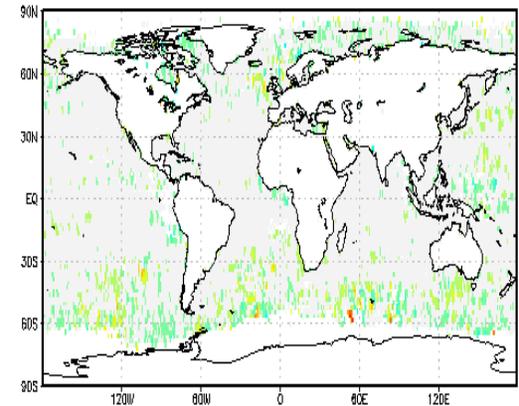


Limb Adjusted BT, 7 PCs - ECMWF (NAD), 1598.49cm-1, Clear Sky, Sep, 2005

Ascending: bias=-0.104855 rms=1.17339
count=34156 min=-12.2345 max=14.0103



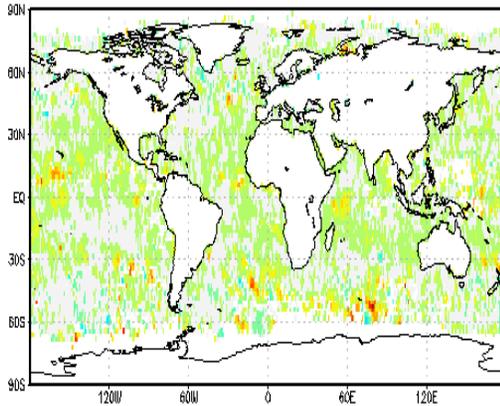
Descending: bias=-0.0162446 rms=1.22355
count=32235 min=-9.85136 max=12.5322



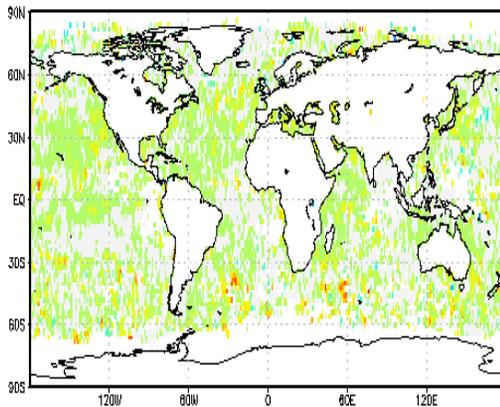
520 mb

Limb Adjusted BT, 7 PCs - GDAS (NAD), 1598.49cm-1, Clear Sky, Sep, 2003

Ascending: bias=0.864986 rms=1.86994
count=28148 min=-12.9485 max=18.2543

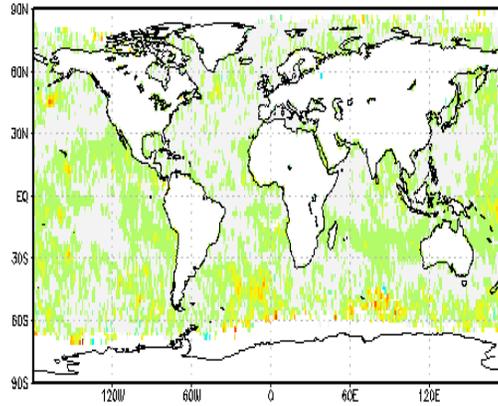


Descending: bias=0.954703 rms=1.87708
count=25254 min=-11.1691 max=16.7782

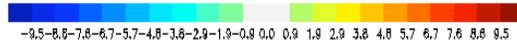
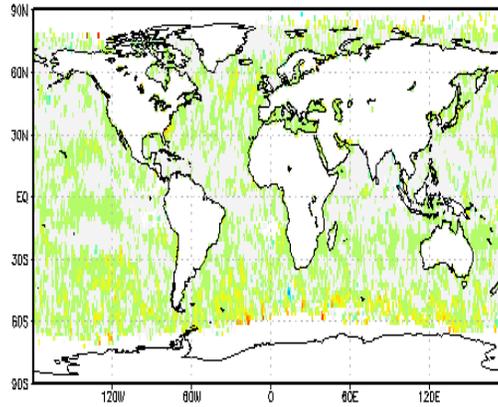


Limb Adjusted BT, 7 PCs - GDAS (NAD), 1598.49cm-1, Clear Sky, Sep, 2004

Ascending: bias=0.89881 rms=1.57801
count=35173 min=-8.46484 max=16.6099

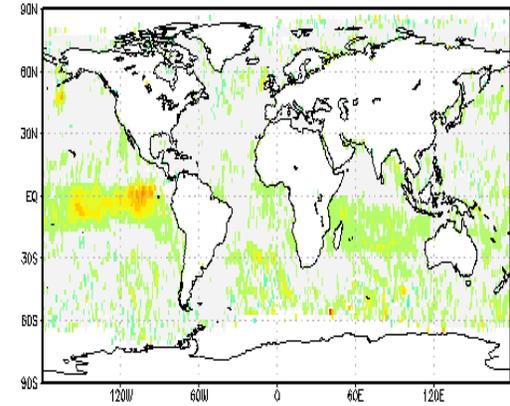


Descending: bias=0.871343 rms=1.60259
count=33494 min=-13.4903 max=15.8993

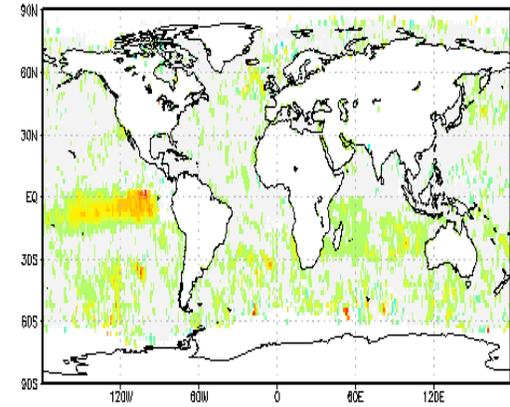


Limb Adjusted BT, 7 PCs - GDAS (NAD), 1598.49cm-1, Clear Sky, Sep, 2005

Ascending: bias=0.555719 rms=1.43056
count=34156 min=-9.91933 max=14.0816



Descending: bias=0.622048 rms=1.56381
count=32235 min=-8.68994 max=17.4972

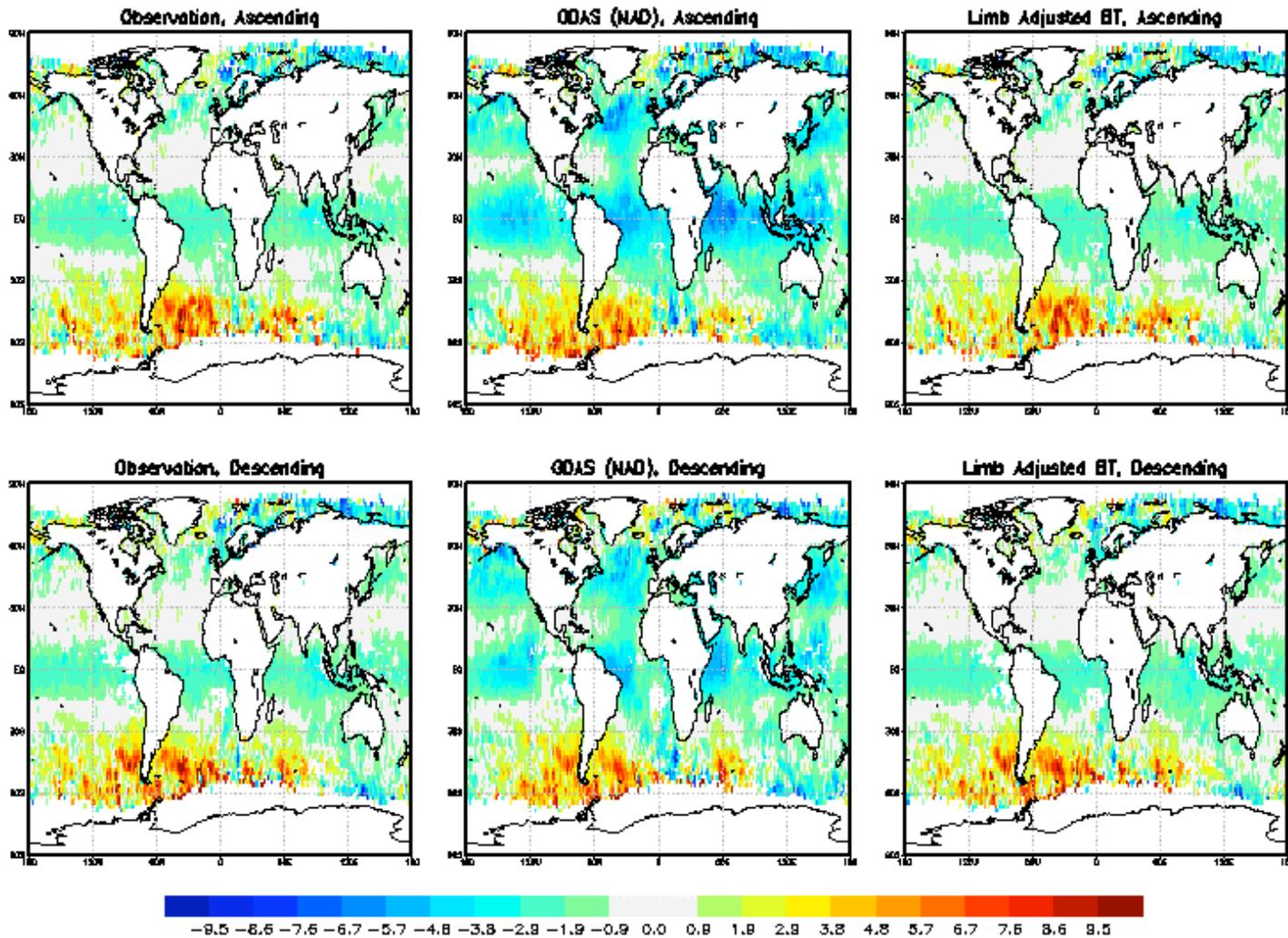


520 mb



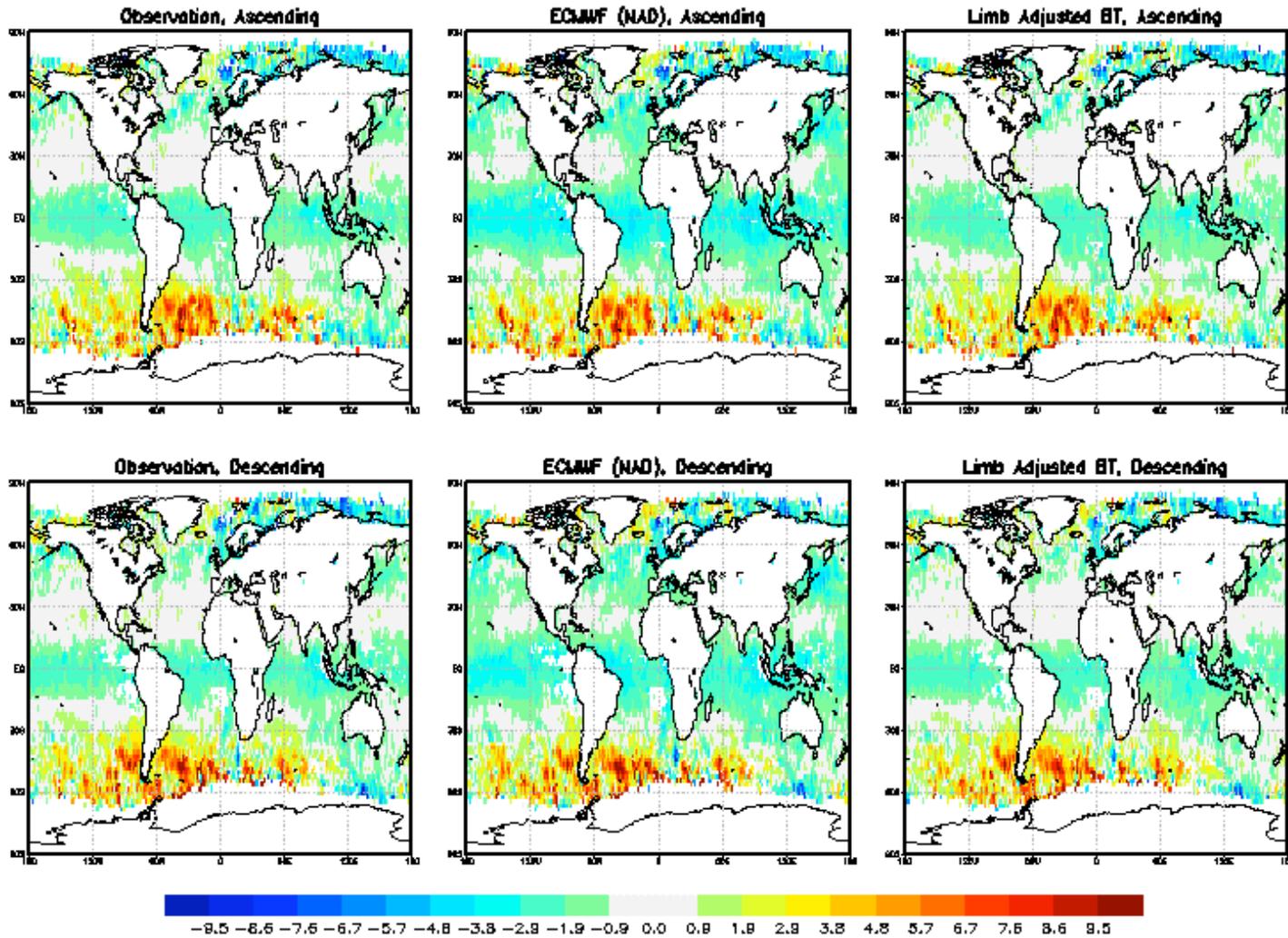
Inter-annual Difference

BT Monthly different, 667.775cm^{-1} , Clear Sky, 7 PCs, Sep2005-Sep2004



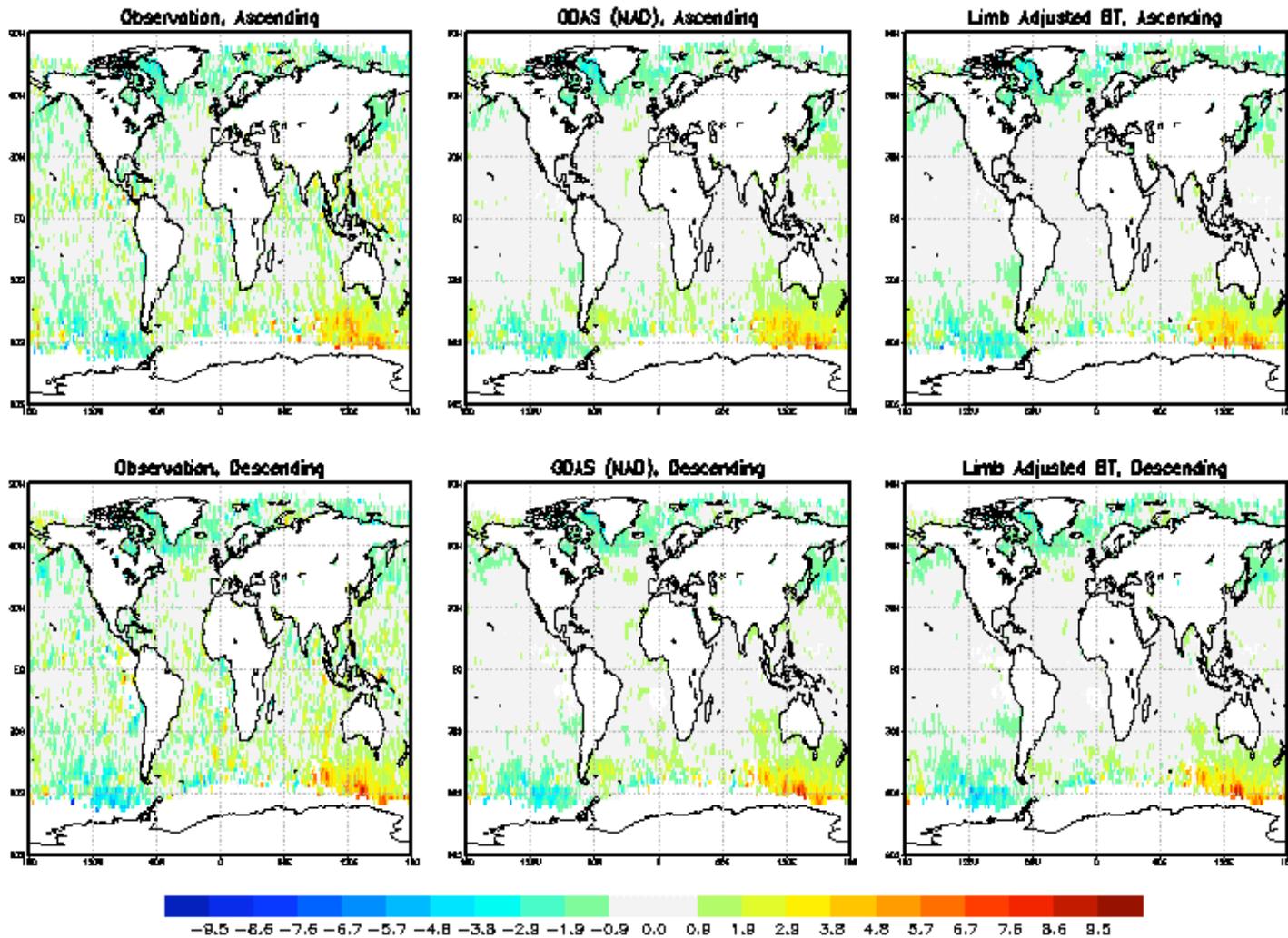
1.4 mb

BT Monthly different, 667.775cm^{-1} , Clear Sky, 7 PCs, Sep2005-Sep2004



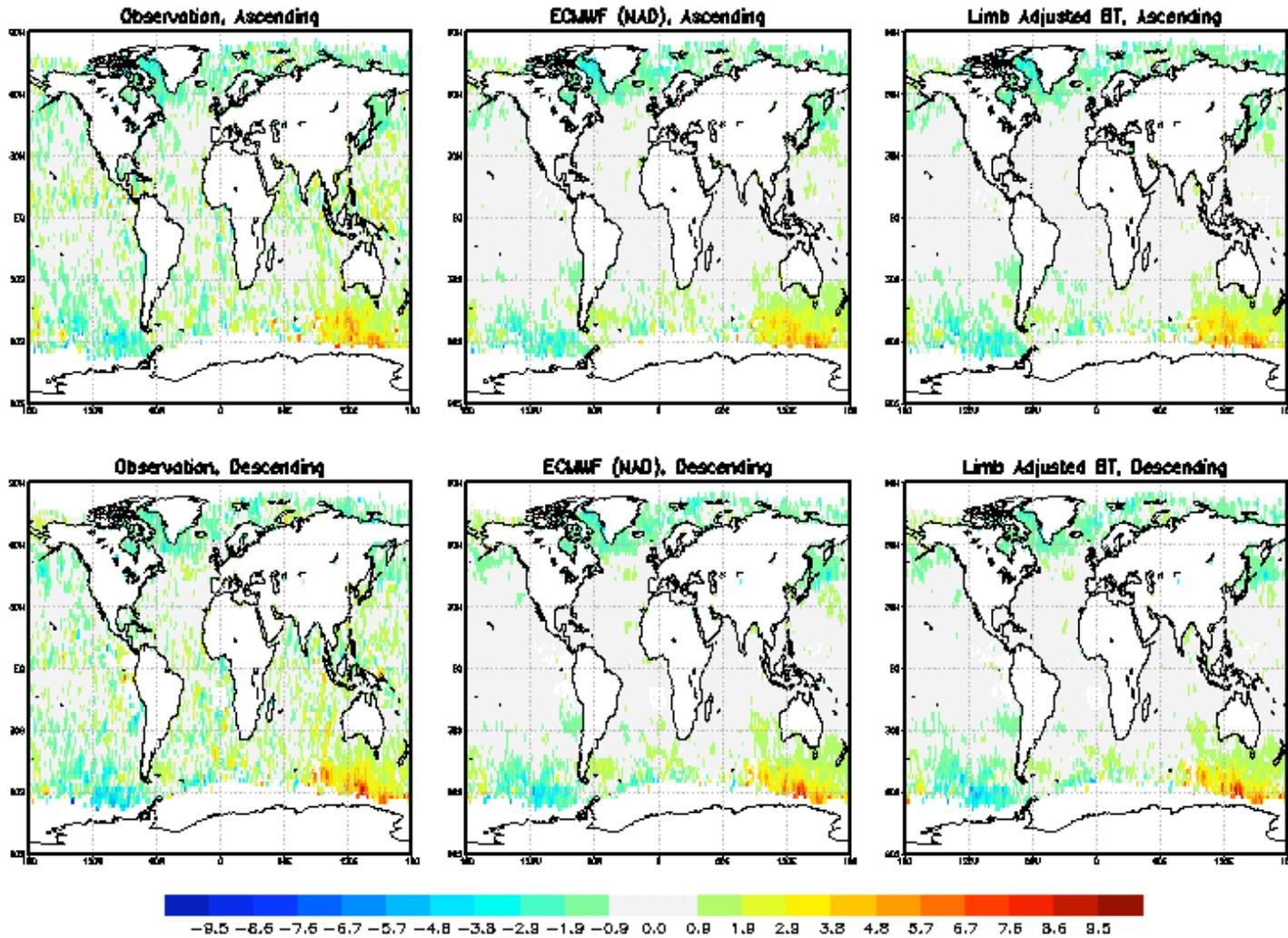
1.4 mb

BT Monthly different, 704.436cm^{-1} , Clear Sky, 7 PCs, Sep2005-Sep2004



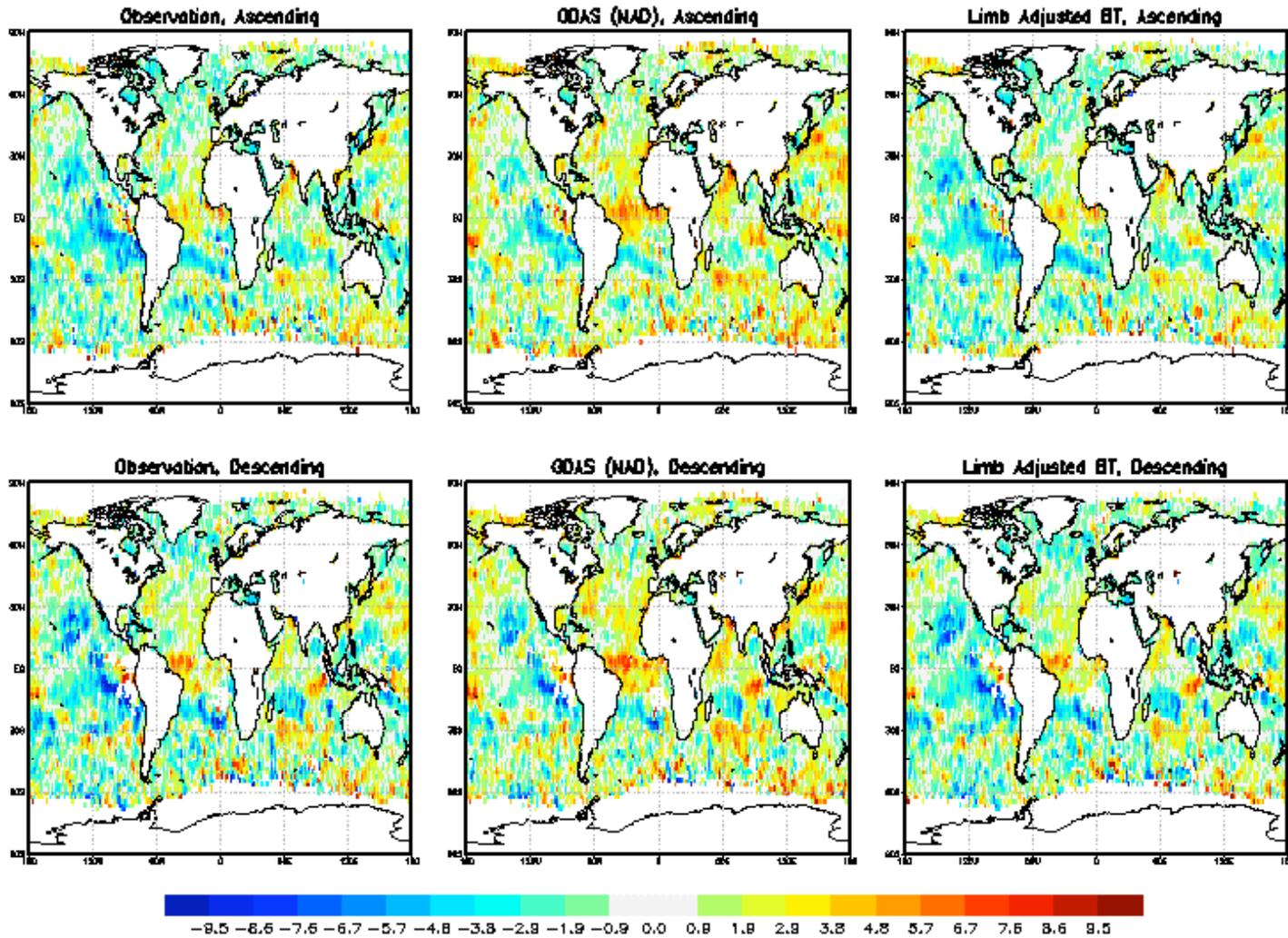
220 mb

BT Monthly different, 704.436cm^{-1} , Clear Sky, 7 PCs, Sep2005-Sep2004



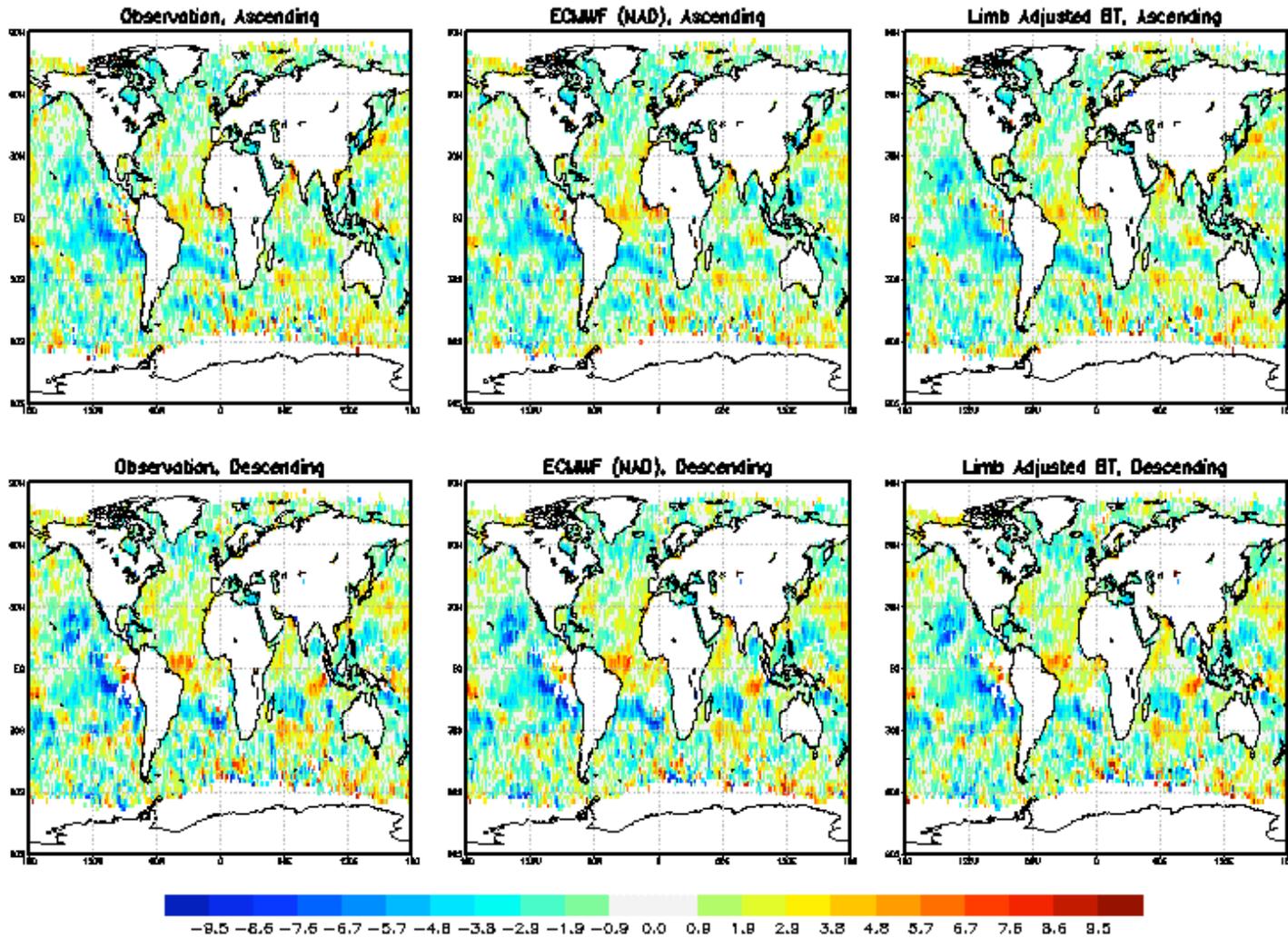
220 mb

BT Monthly different, 1519.07cm⁻¹, Clear Sky, 7 PCs, Sep2005-Sep2004



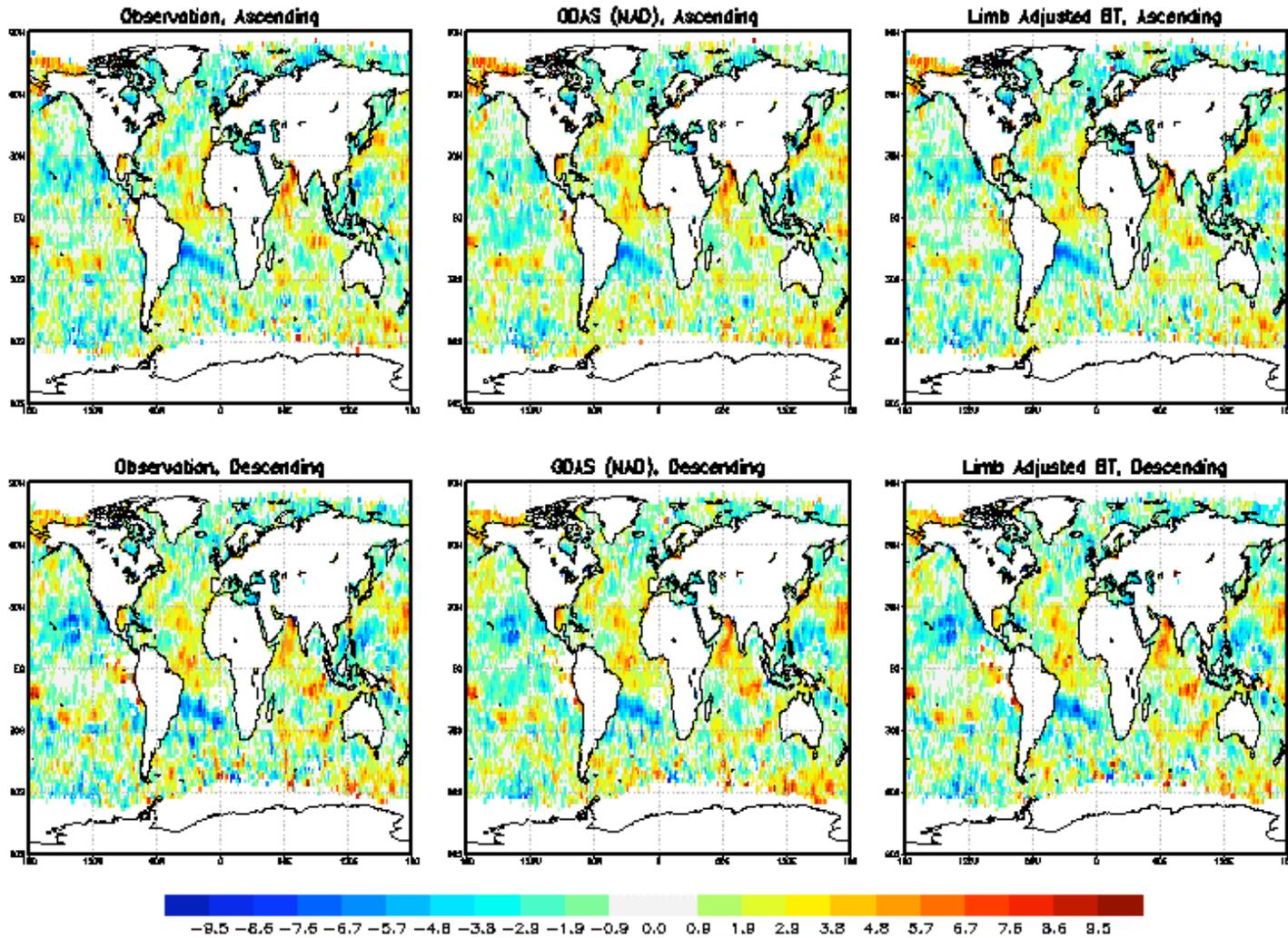
270 mb

BT Monthly different, 1519.07cm-1, Clear Sky, 7 PCs, Sep2005-Sep2004



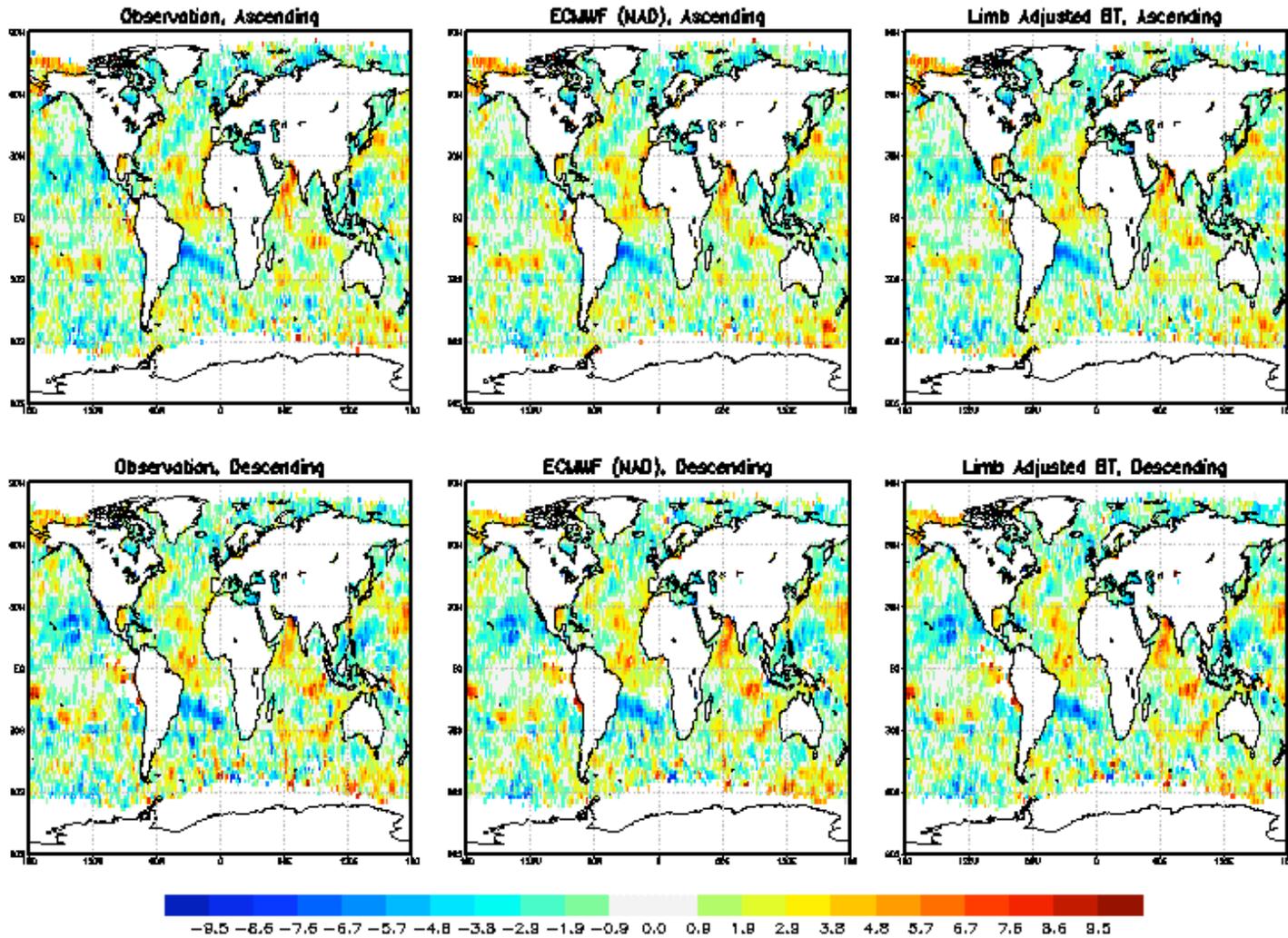
270 mb

BT Monthly different, 1598.49cm^{-1} , Clear Sky, 7 PCs, Sep2005-Sep2004



520 mb

BT Monthly different, 1598.49cm^{-1} , Clear Sky, 7 PCs, Sep2005-Sep2004

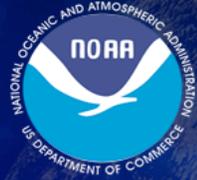


520 mb



Summary

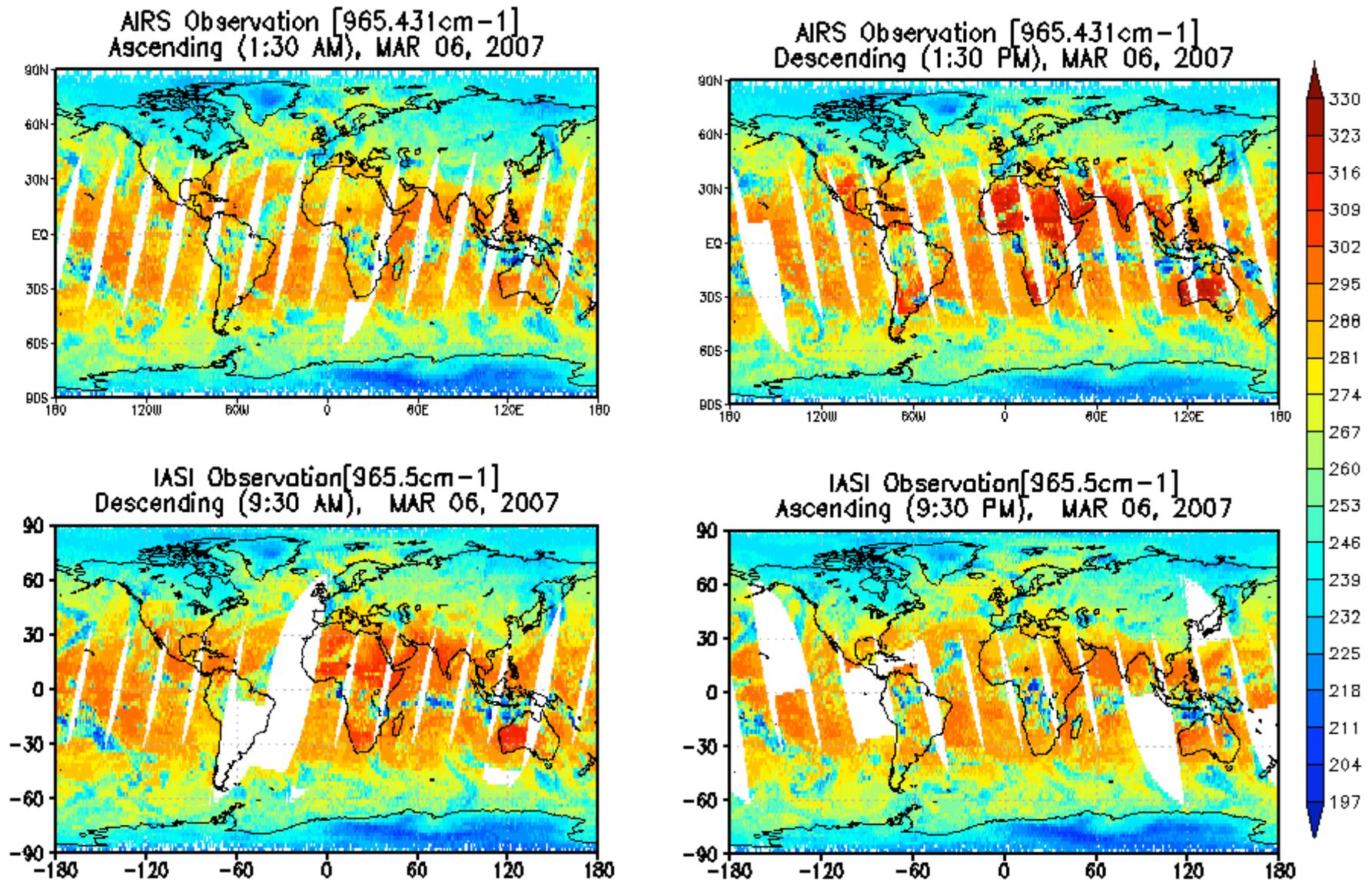
- Angle adjustment procedure is very accurate
- Need to angle adjust to provide robust global monthly maps without aliasing effects due to viewing geometry.
- Hence, a climate quality hyperspectral radiance (HR) dataset requires angle adjustment
- We will generate HR dataset from our daily gridded single fov datasets
- Once validated and published, we would like to provide code and coefficients for future full resolution reprocessing @GSFC.



IASI Update

Mitch Goldberg, Chris Barnet, Zhaohui Cheng, Lihang Zhou, Walter Wolf, Tom King, Murty Divakarla, and many more....

NESDIS is now receiving IASI data in real time

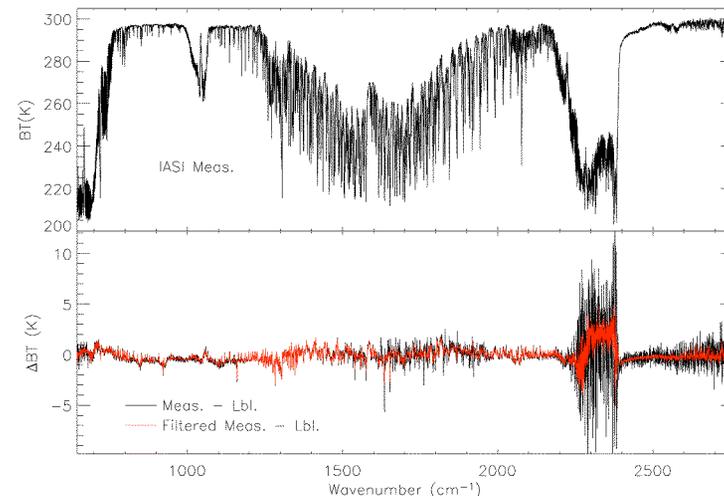
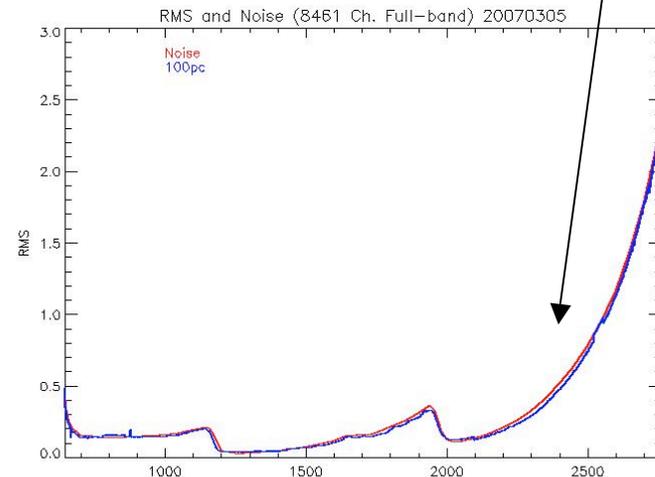


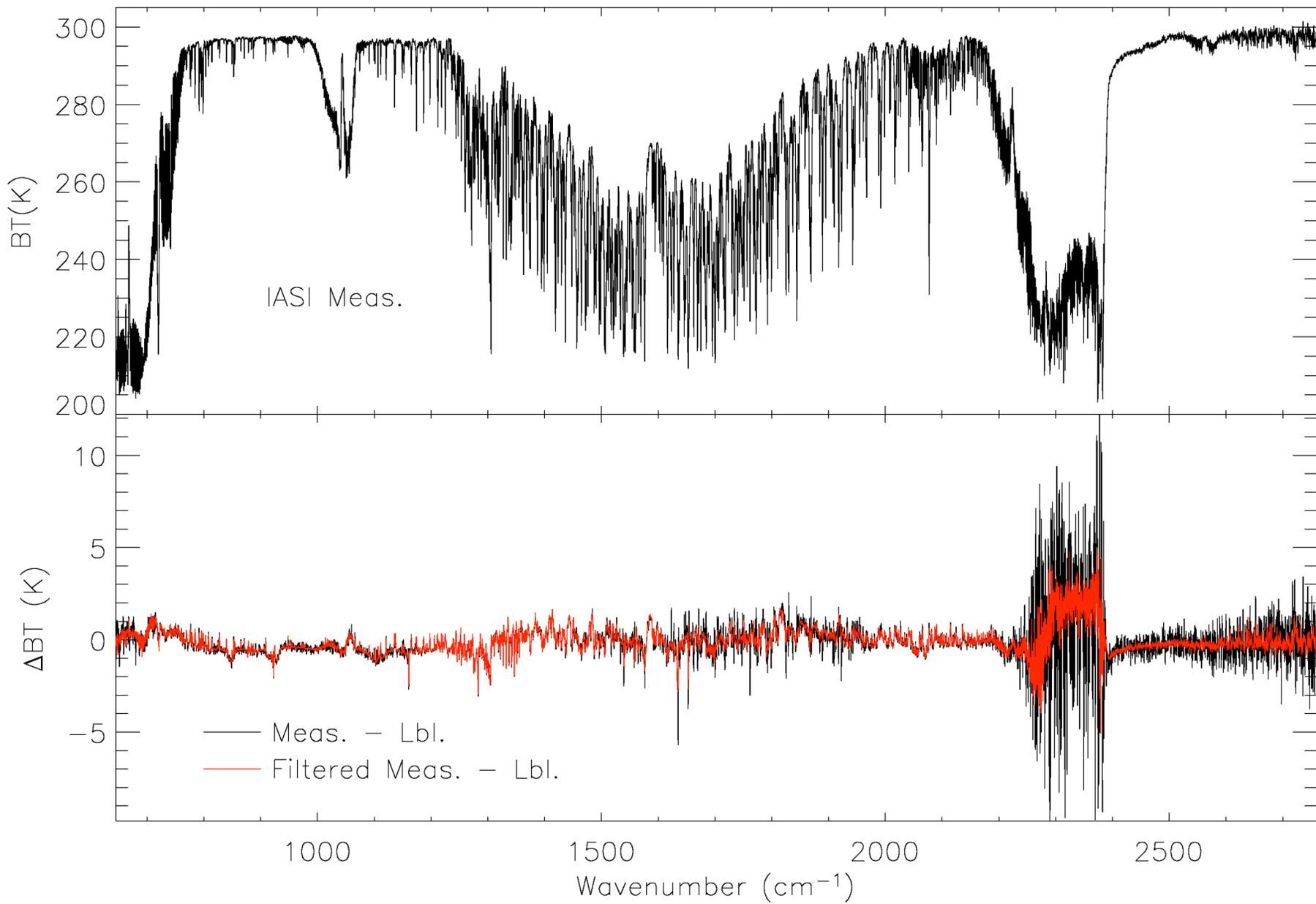
Comparison of AIRS and IASI (IASI instrument developed by CNES)

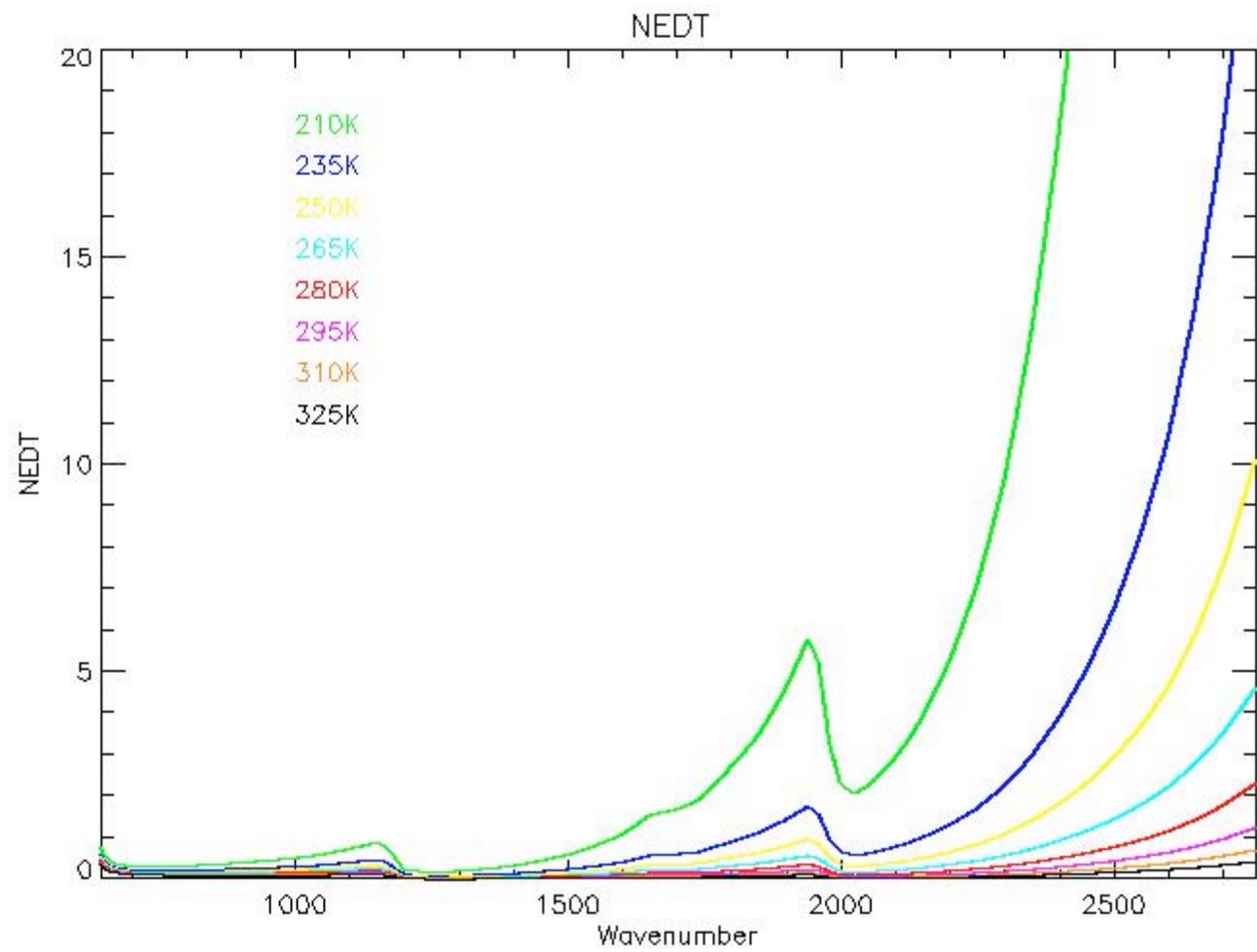
Eigenvector Analysis for Noise Reduction

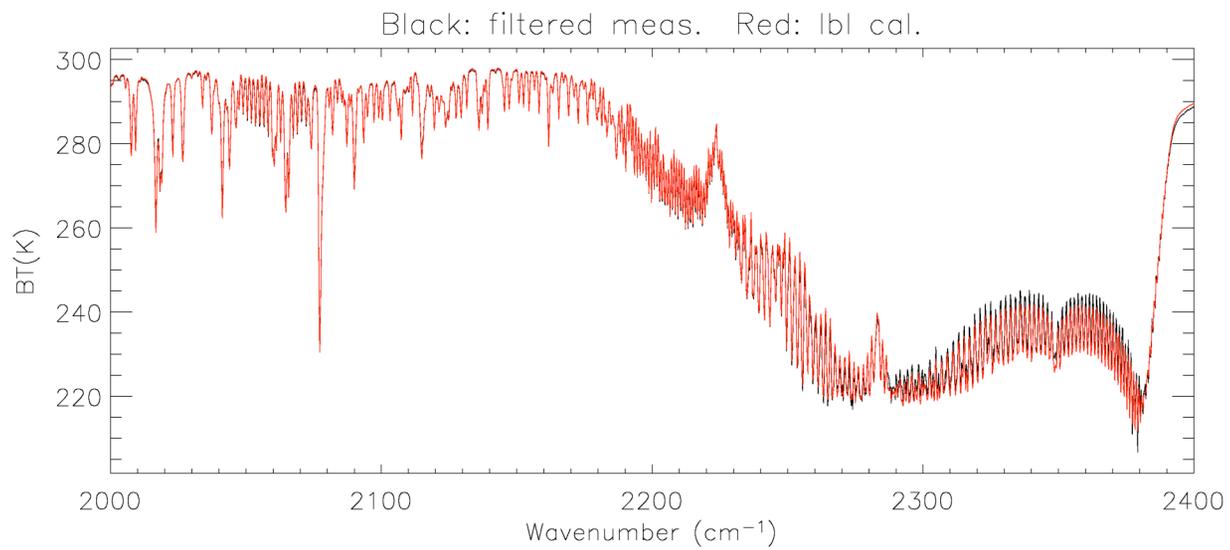
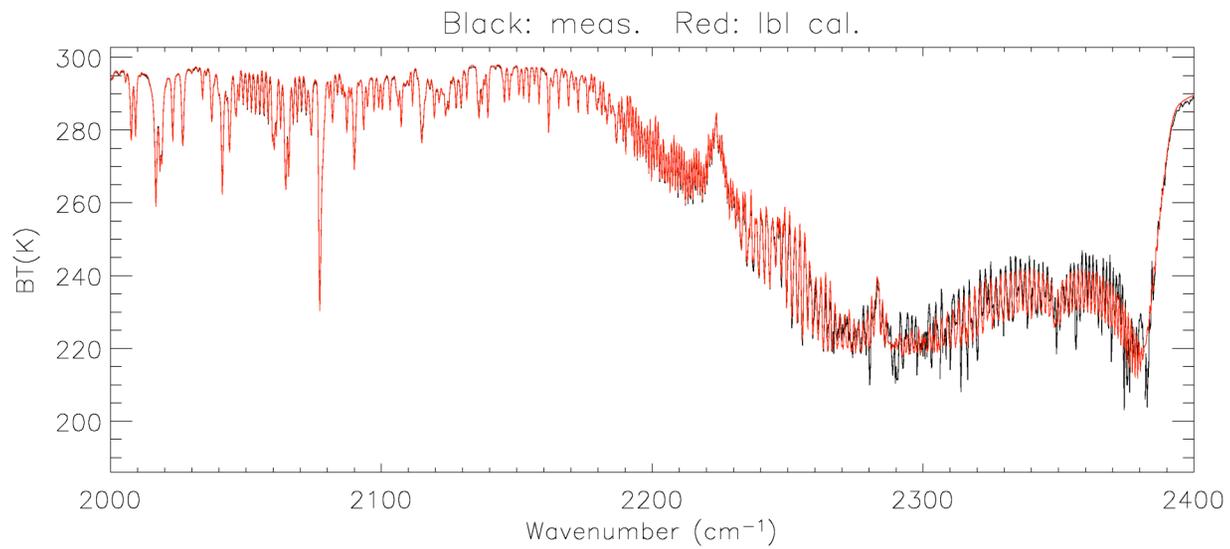
- Eigenvector analysis allows correlated data to be represented by a relatively small set of functions.
- 8461 channels can easily be represented by a 100 unique coefficients couples with 100 static structure functions (100 x 8461)
- Benefits: Noise filtering and data compression. Distribute and archive 100 coefficients instead of 8461 channels (lossy compression) We can now use shortwave IR window channels for applications (LW vs SW cloud tests)

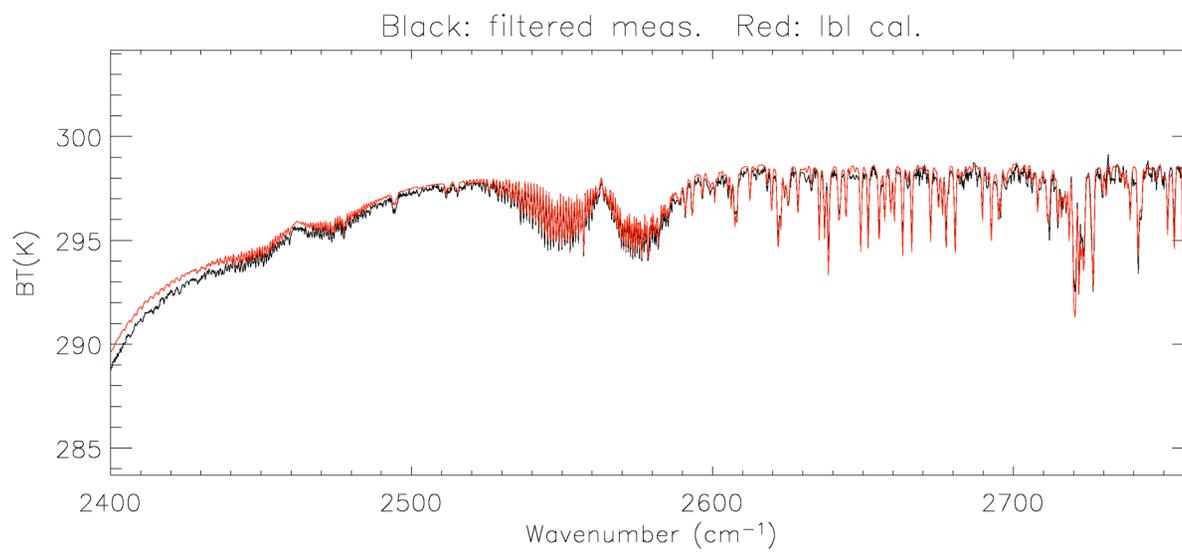
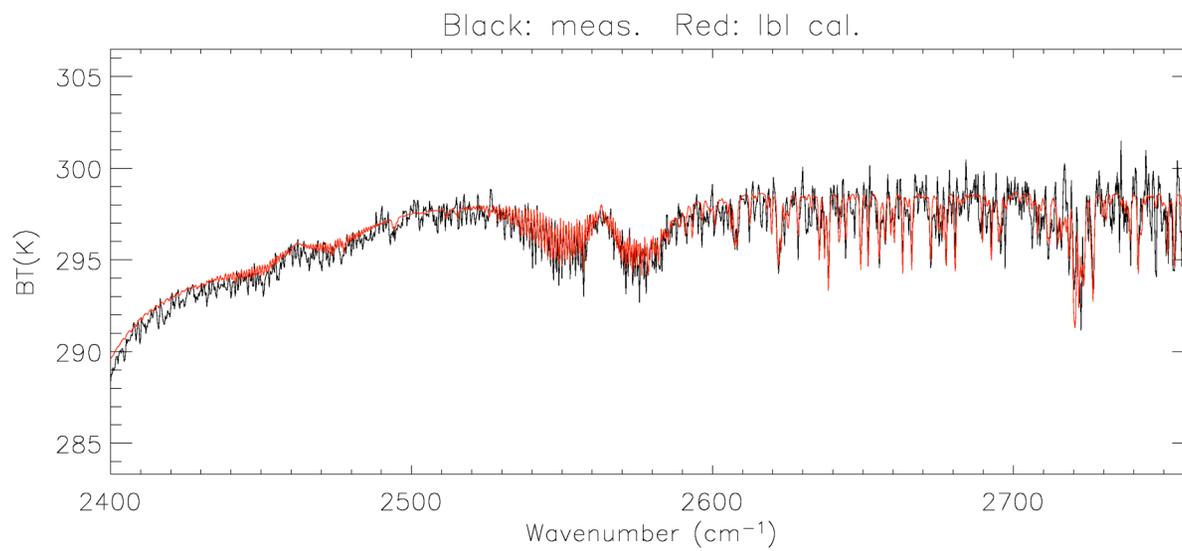
Independent assessment of noise from root mean Square difference between measured and reconstructed noise. The reconstructed radiances are noise filtered, therefore the rms matches the instrument noise

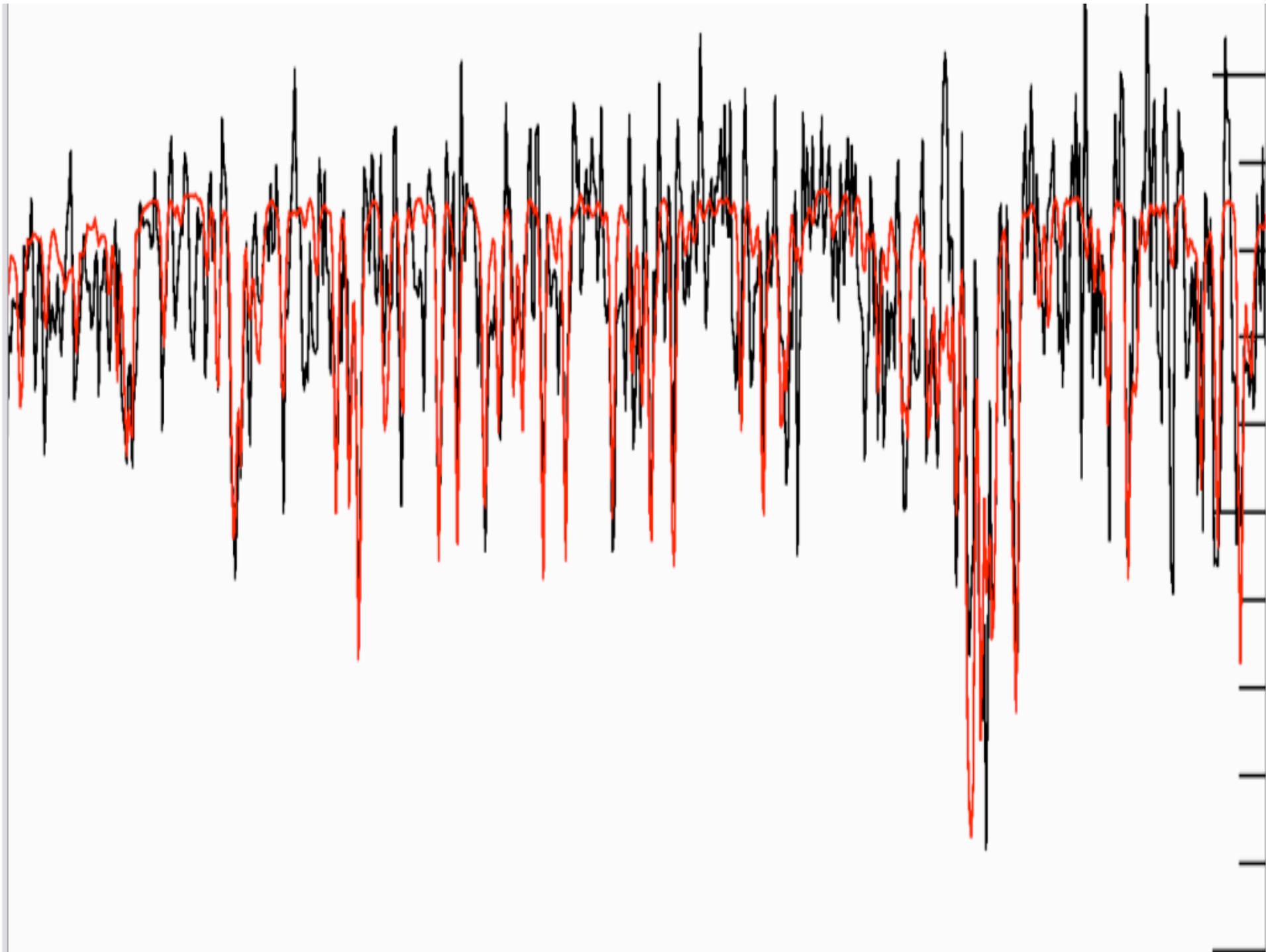


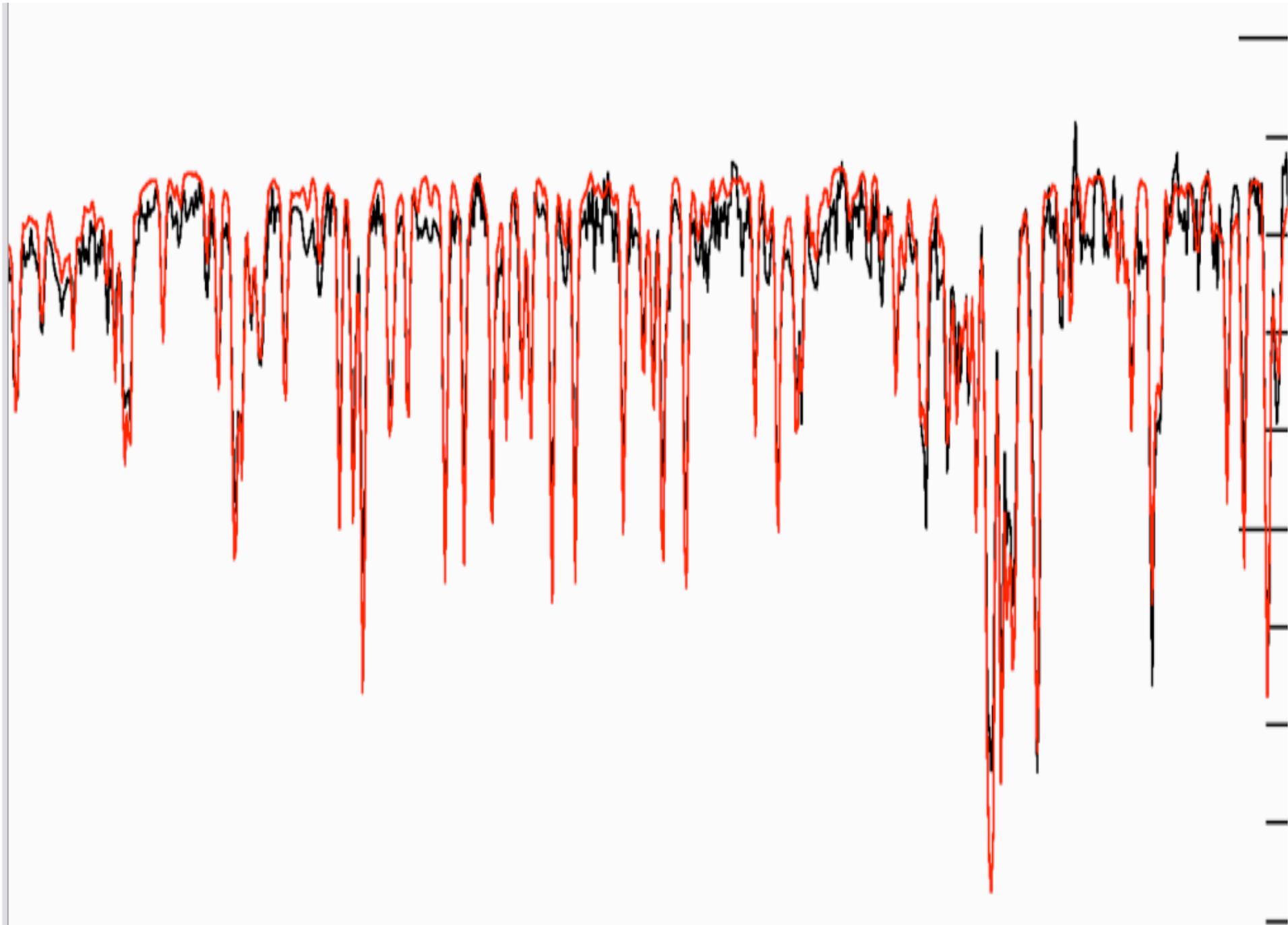




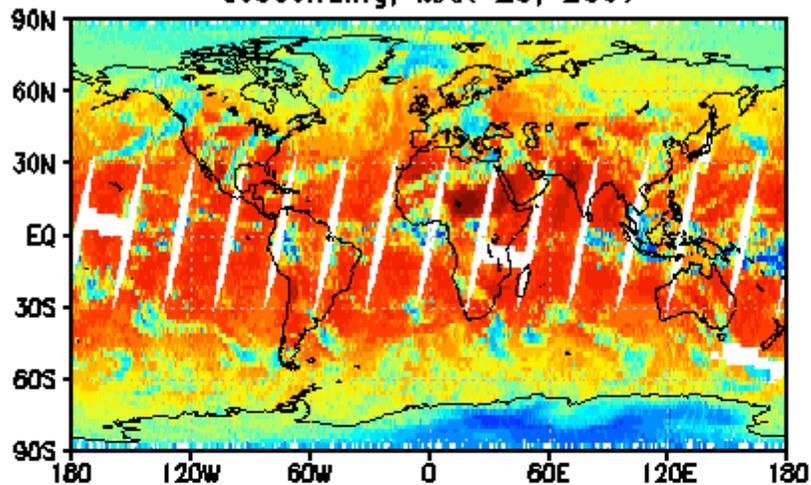




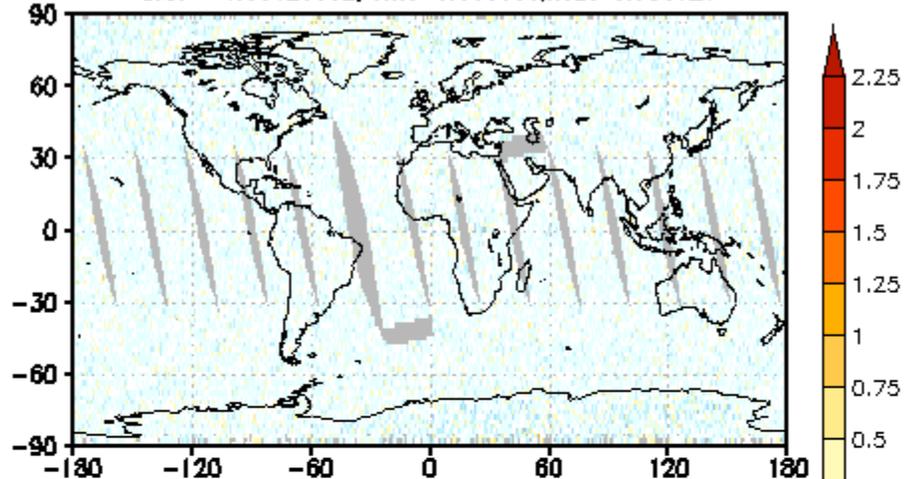




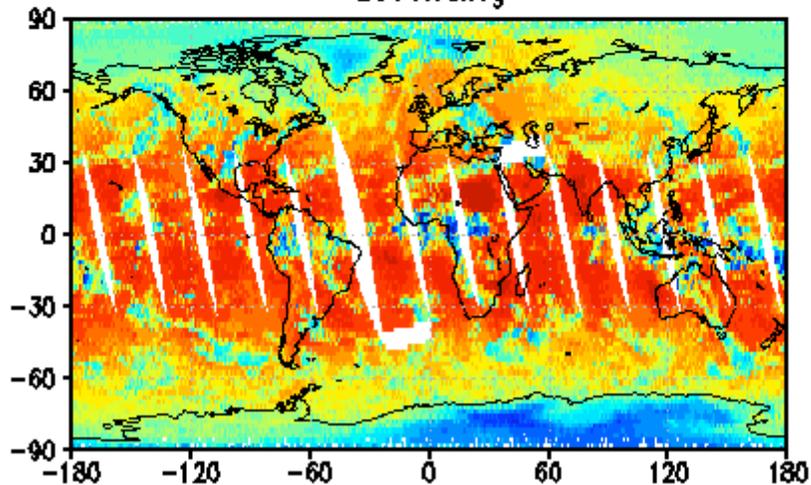
IASI Observation [755.25cm⁻¹]
descending, MAR 23, 2007



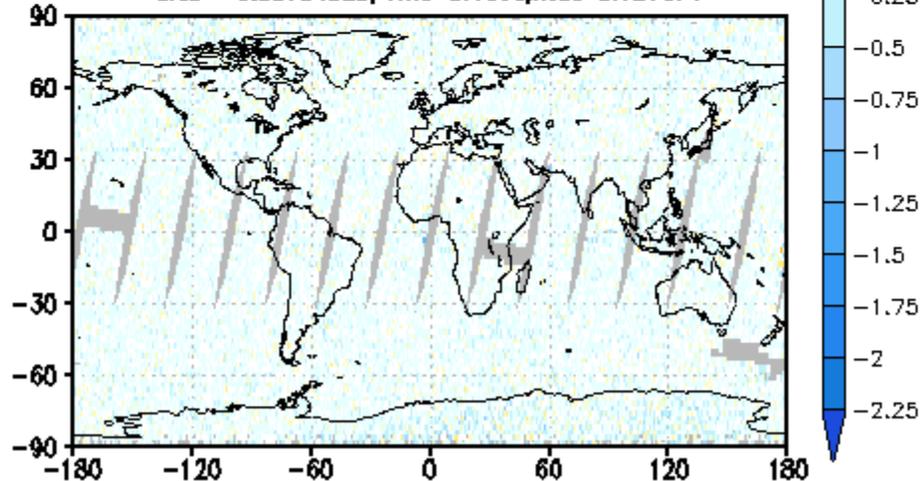
00Z23MAR2007, Obs-Rec(3pc) 755.25cm⁻¹
Ascending, sample=54129, std=0.160018
bias=-0.00621152, rms=0.160138, nedt=0.183929



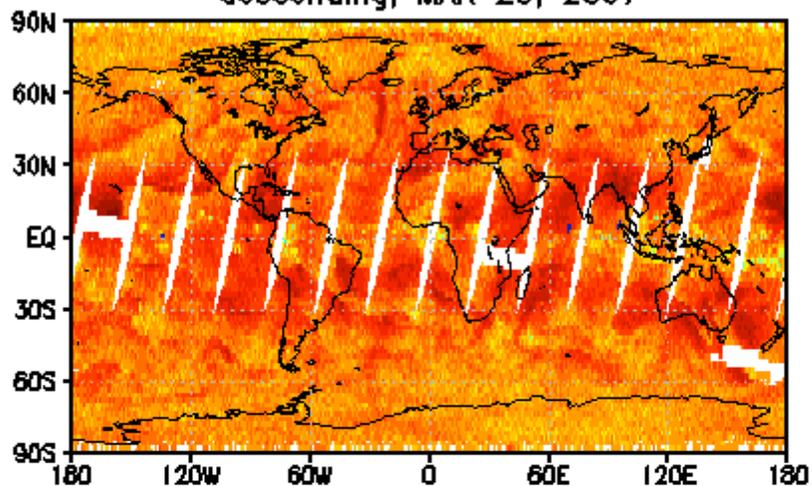
ascending



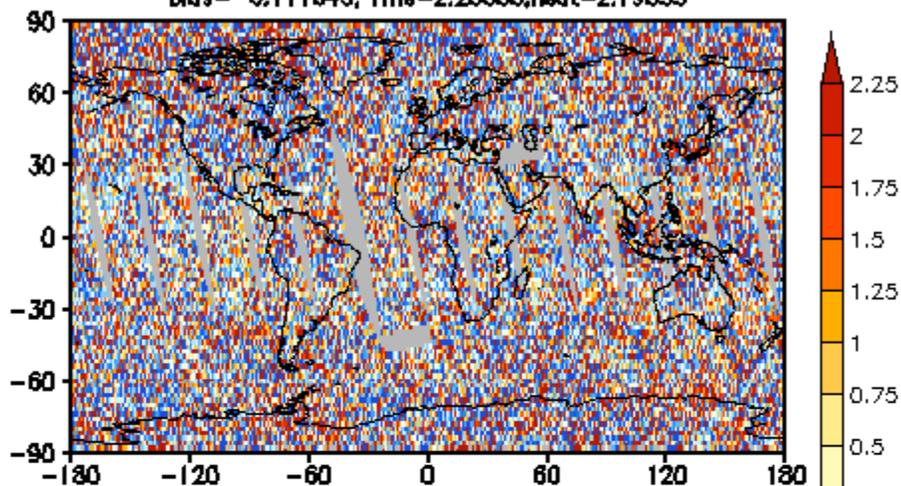
Descending, sample=54288, std=0.159302
bias=-0.00794925, rms=0.1595, nedt=0.181871



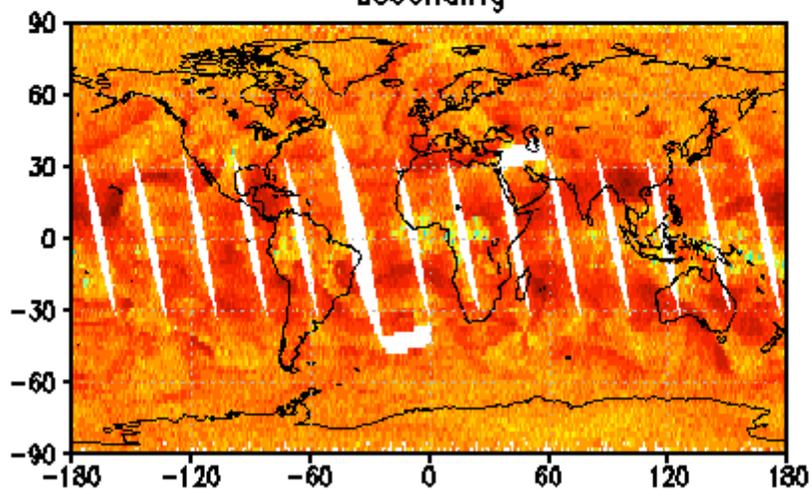
IASI Observation [1942.5cm^{-1}]
descending, MAR 23, 2007



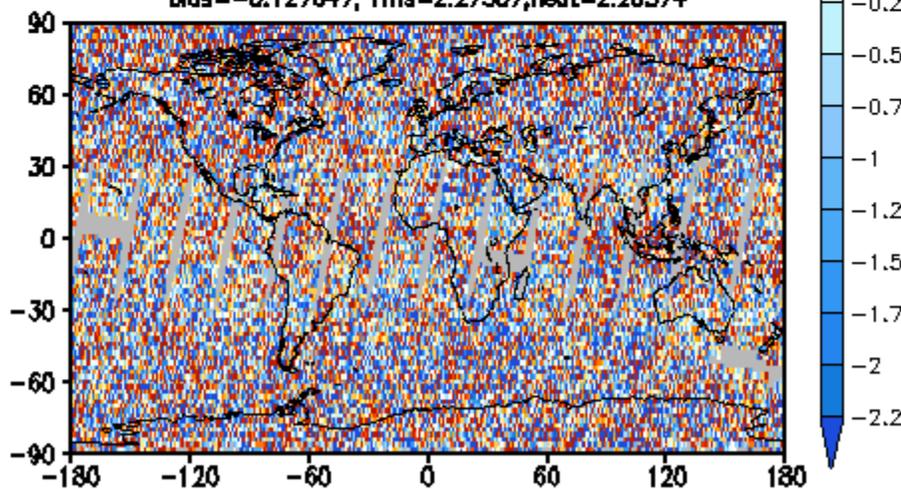
00Z23MAR2007, Obs-Rec(3pc) 1942.5cm^{-1}
Ascending, sample=54044, std=2.28415
bias=-0.111643, rms=2.28888, nedt=2.19833



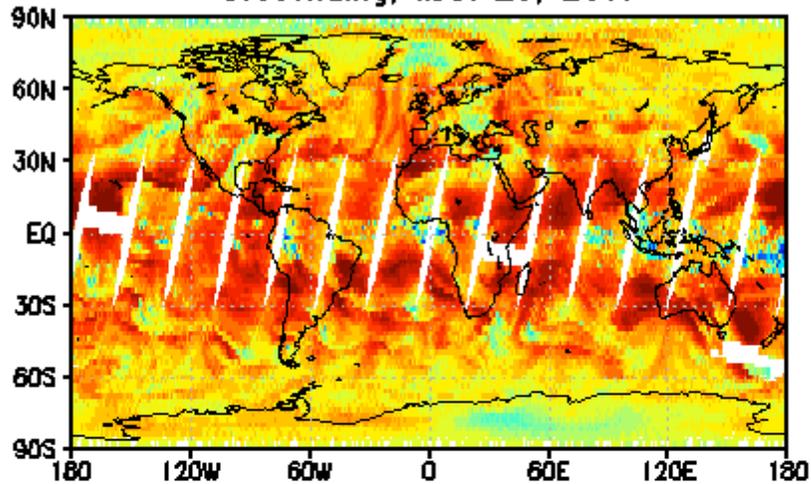
ascending



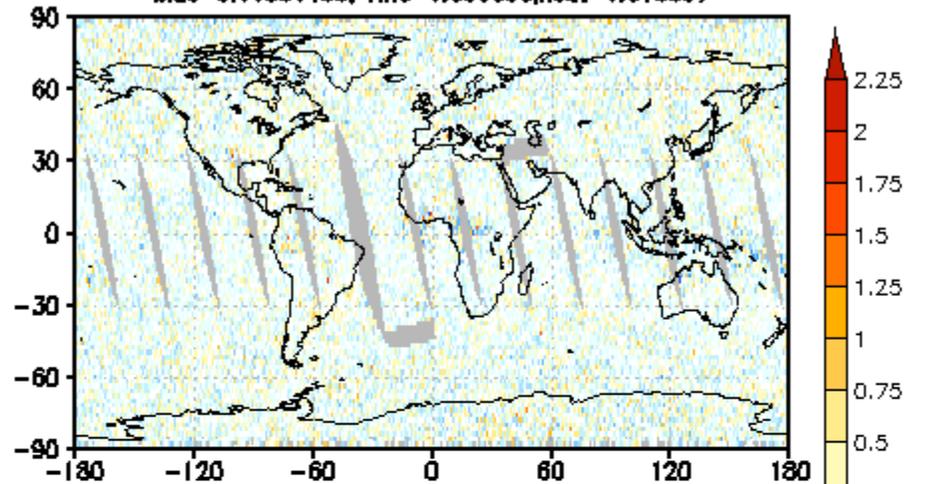
Descending, sample=54232, std=2.26949
bias=-0.127647, rms=2.27307, nedt=2.20374



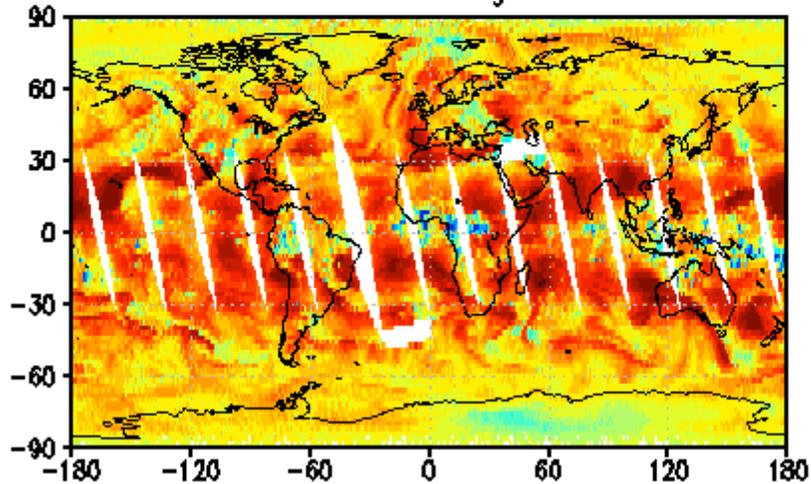
IASI Observation [1567cm^{-1}]
descending, MAR 23, 2007



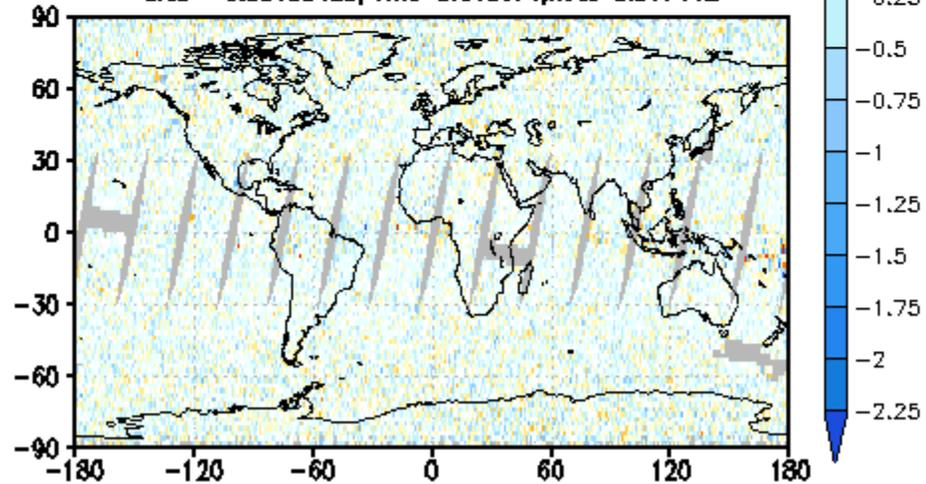
00223MAR2007, Obe-Rec(3pc) 1567cm-1
Ascending, sample=54044, std=0.309287
bias=0.00360466, rms=0.309306, nedt=0.316607



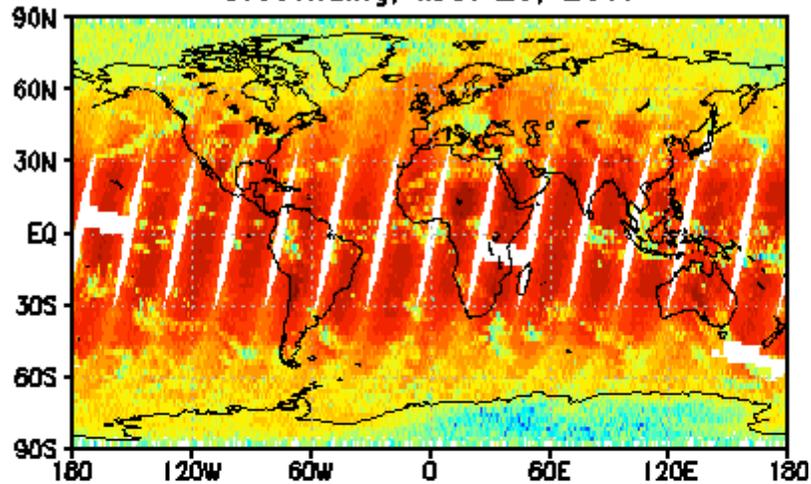
ascending



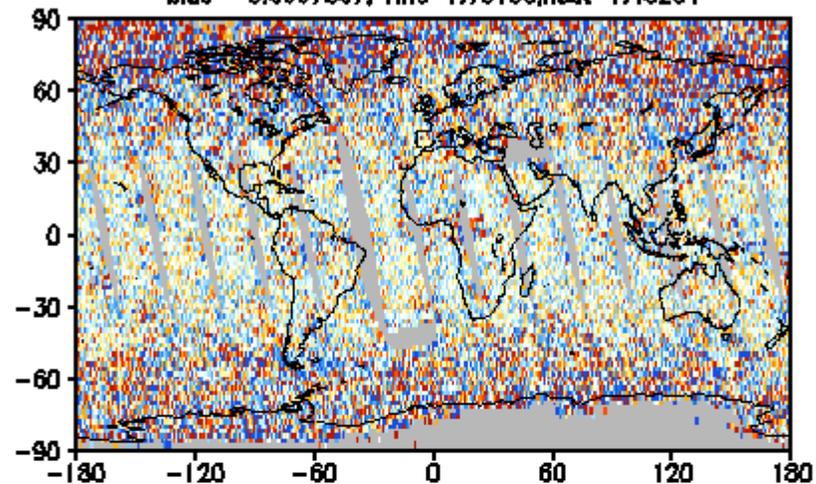
Descending, sample=54233, std=0.310985
bias=-0.00190429, rms=0.310971, nedt=0.317112



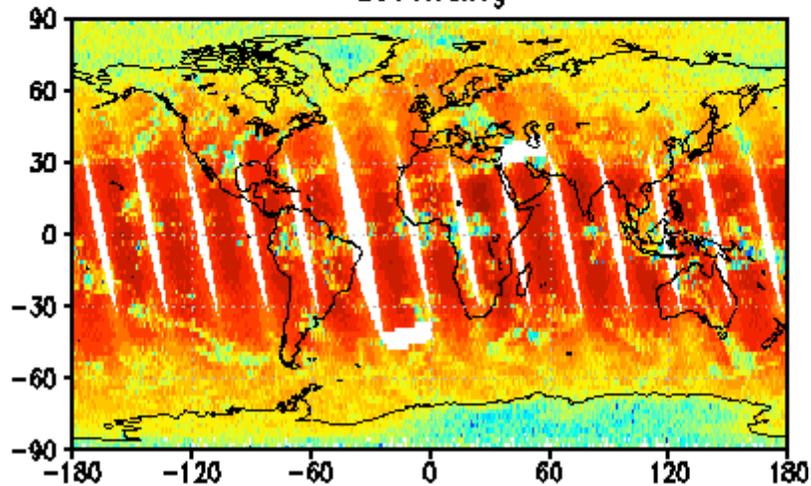
IASI Observation [2390.25cm⁻¹]
descending, MAR 23, 2007



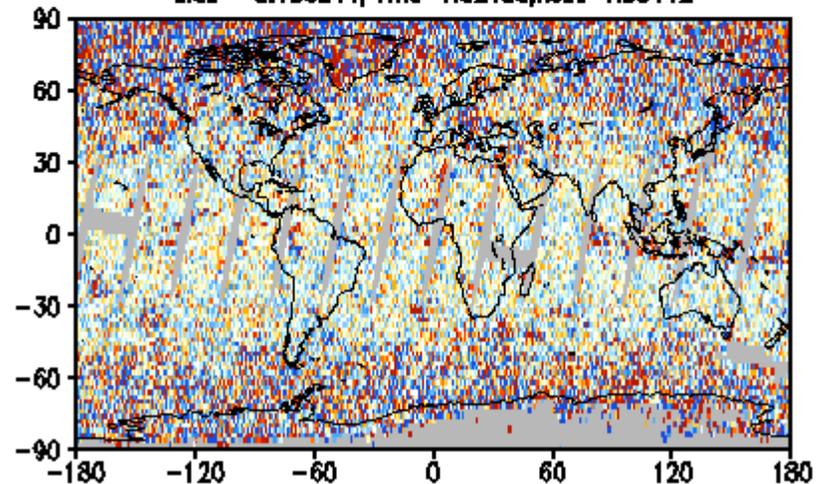
00223MAR2007, Obs-Rec(3pc) 2390.25cm⁻¹
Ascending, sample=47175, std=1.6981
bias=-0.0997307, rms=1.70103, nedt=1.48254



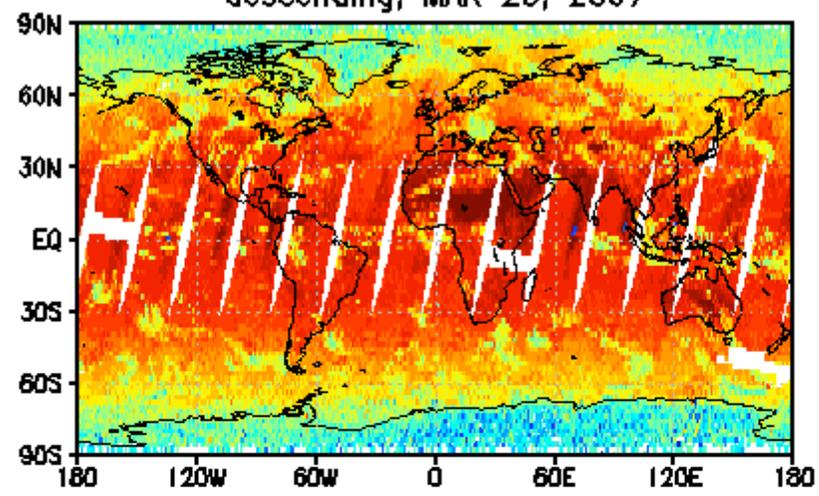
ascending



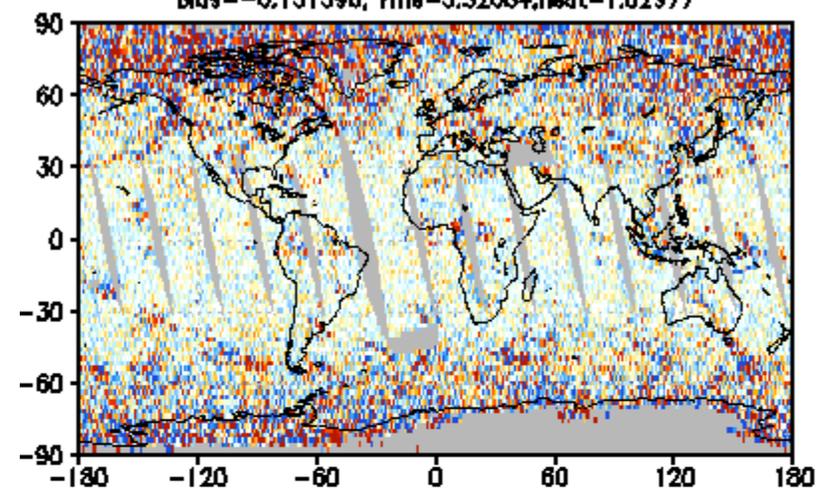
Descending, sample=50421, std=1.81795
bias=-0.106244, rms=1.82105, nedt=1.50412



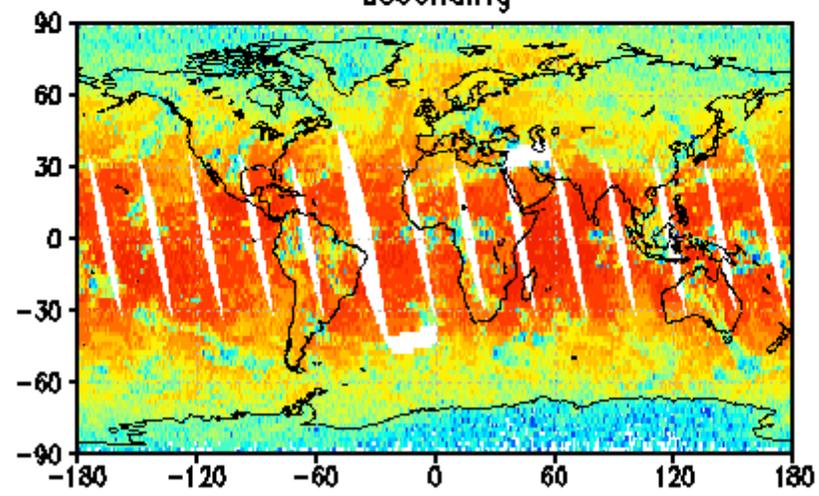
IASI Observation [2616.75cm⁻¹]
descending, MAR 23, 2007



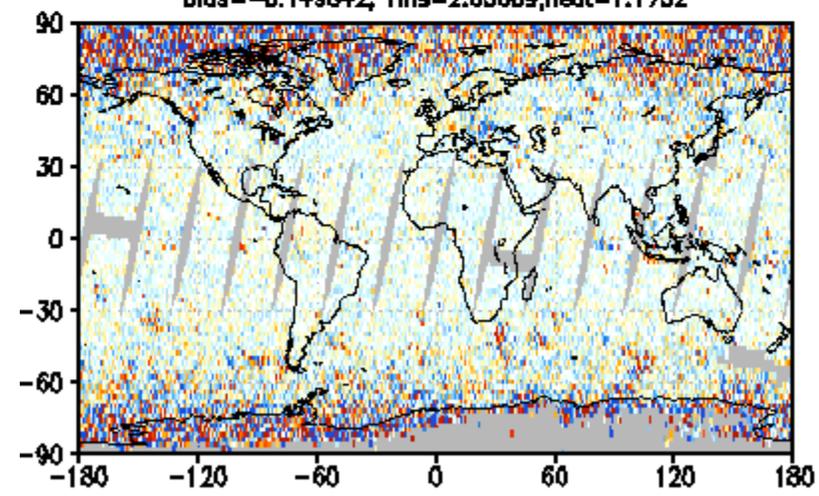
00223MAR2007, Obs-Rec(3pc) 2616.75cm⁻¹
Ascending, sample=47109, std=3.31824
bias=-0.131396, rms=3.32084, nedt=1.82977



ascending



Descending, sample=50381, std=2.63183
bias=-0.149842, rms=2.63609, nedt=1.1752



Summary

- Must use PCA to filter high noise IASI data.
- Reconstructed – original radiance will provide a very accurate single fov noise estimate.

