



ATMS Microwave Sounder Assimilation at FNMOC with NAVGEM/NAVDAS-AR

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NAVDAS-AR ATMS Assimilation

ATMS data acquired from AFWA
in HDF5 format

Gaussian averaging: ch03-22

$\sigma=36\text{km}$

full width at half maximum $\sim 85\text{km}$

Assimilate: ch04-15 and 18-22

Quality Control: surface sensitive
channels checks involve sea-ice,
cloud liquid and scattering; all
channels innovation against
 $3 * (\sigma_o^2 + \sigma_b^2)^{1/2}$

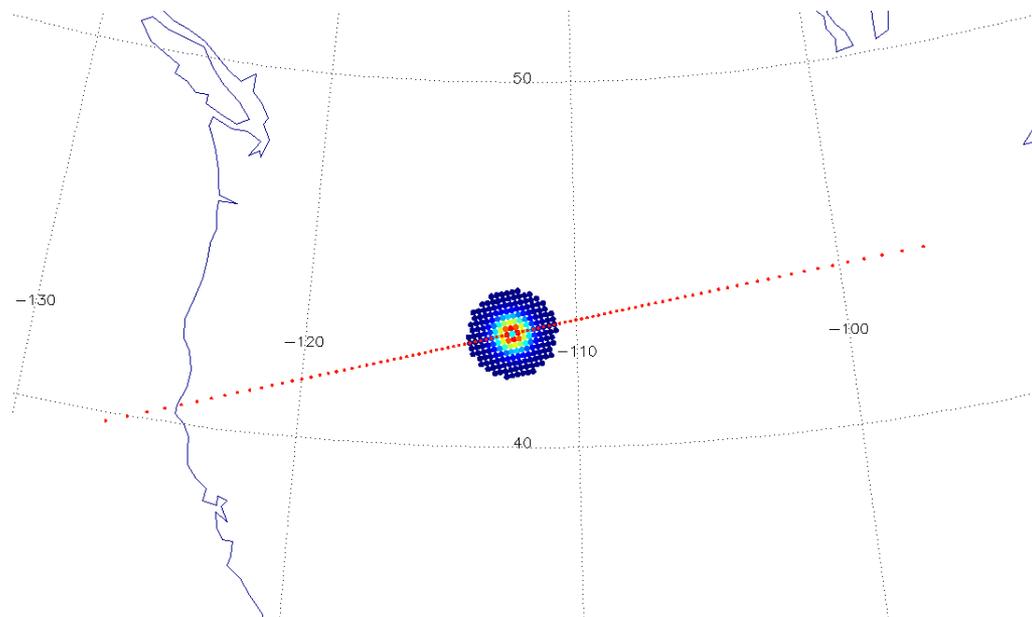
Thinning: 1.25° for global system

Gaussian Weighted Spatial Average

$$\hat{T}_B(s, b) = \sum_{i=1}^N w_i(p) T_B(\delta s_i, \delta b_i)$$

$$w_i(p) = \exp\left(\frac{-r_i^2}{2\sigma^2}\right)$$

$$r_i = \|(s, b), (s + \delta s_i, b + \delta b_i)\|$$

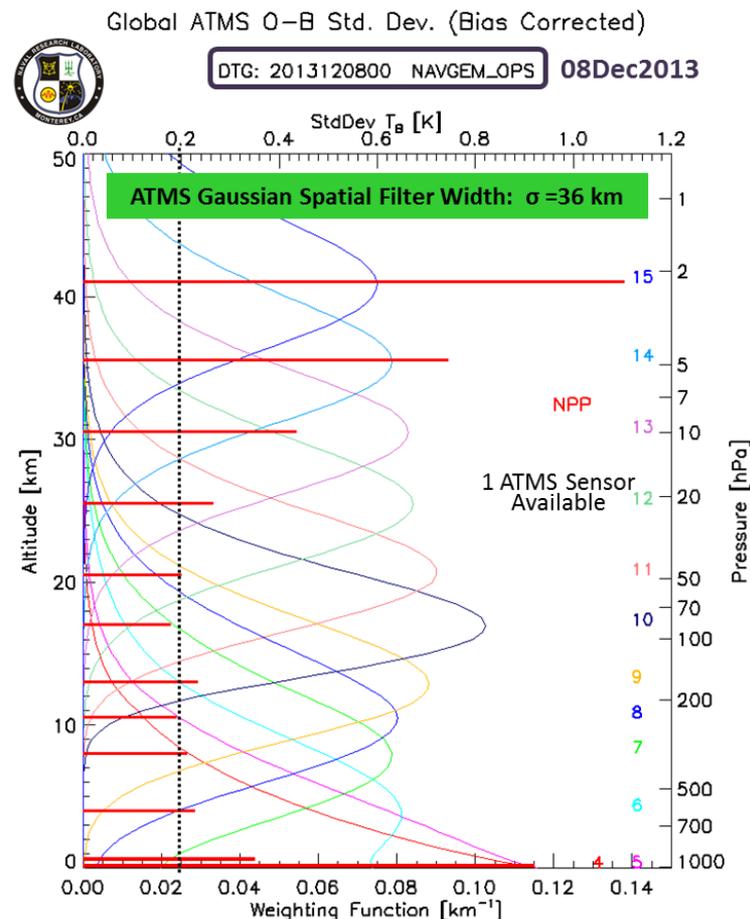
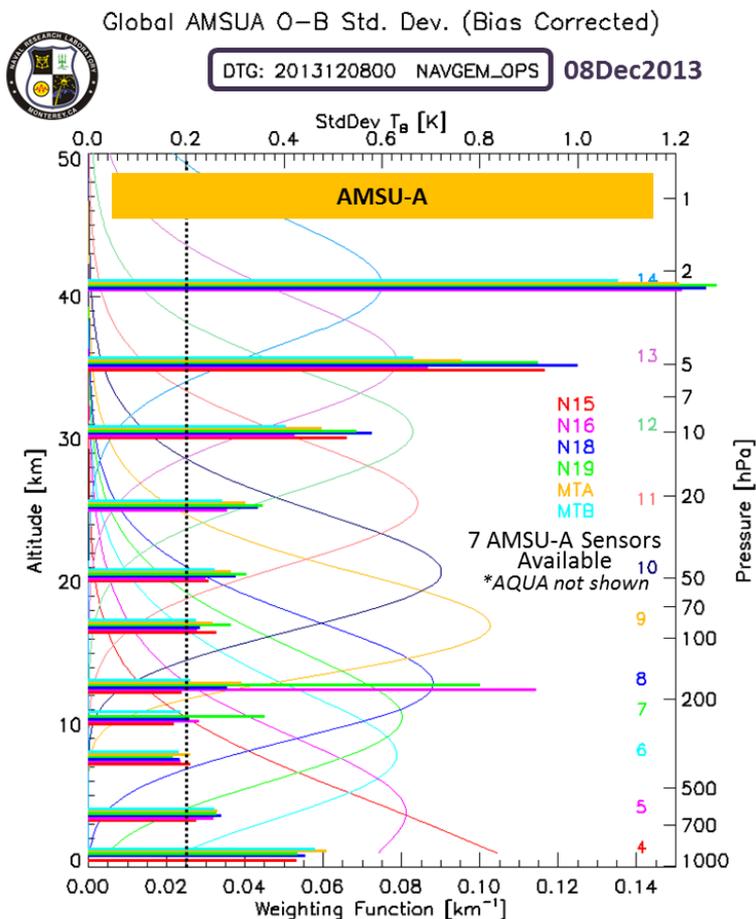


$N = 100$ pre-computed closest points



NAVDAS-AR Operational Radiance Assimilation Global Innovation STDV for DTG: 2013120800

Global innovation statistics from AMSU-A and ATMS for 08Dec2013 at 00UTC

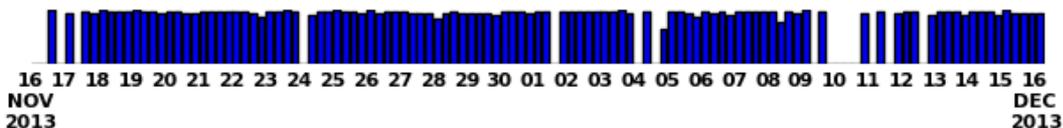
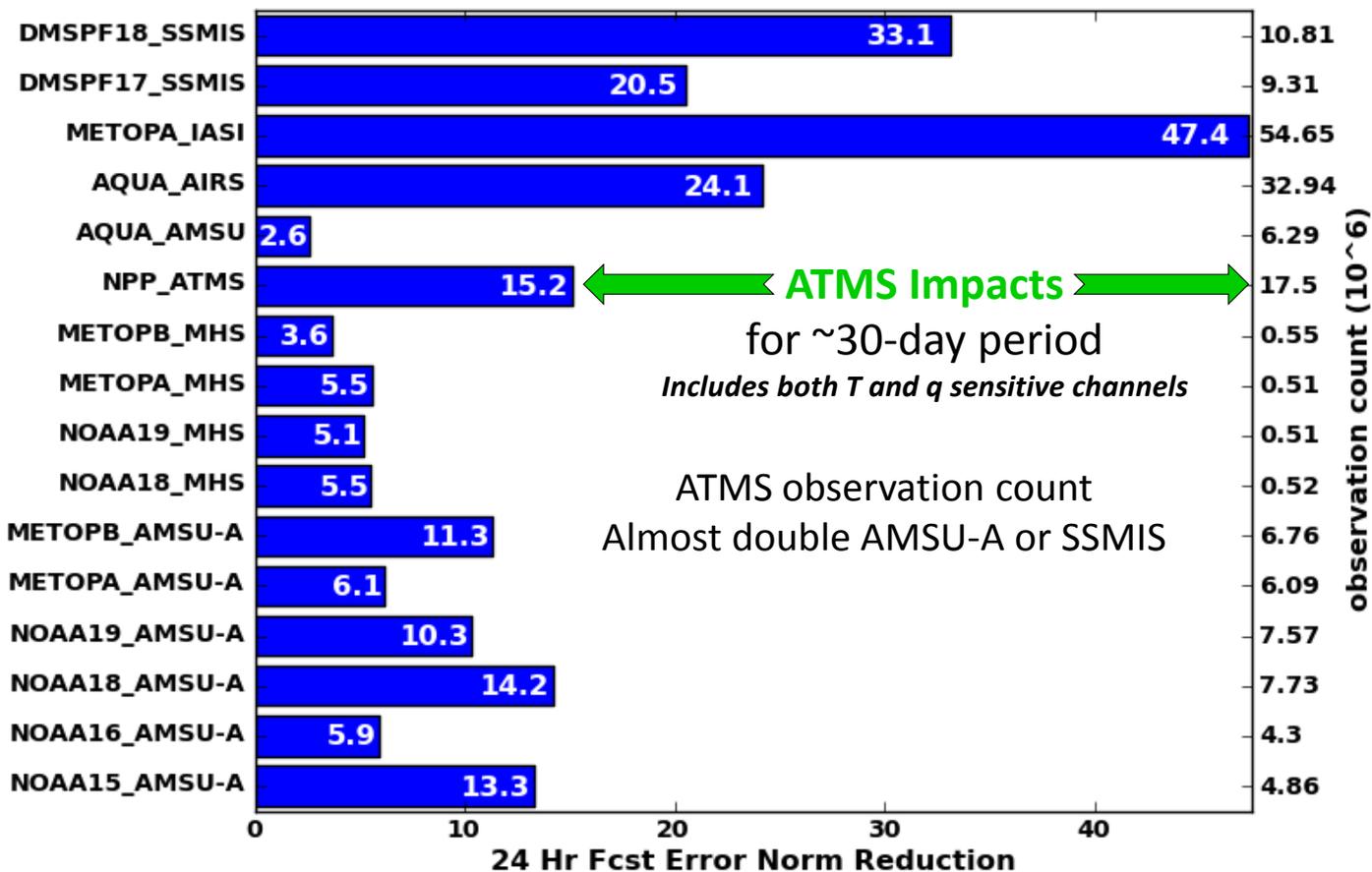


Each channel's standard deviation of the bias corrected innovation is shown as a horizontal bar aligned with the peak of the channel temperature weighting function.



NAVDAS-AR Operational Radiance Assimilation Observation Impacts DTG: 2013121600

NAVDAS-AR Observation Sensitivity

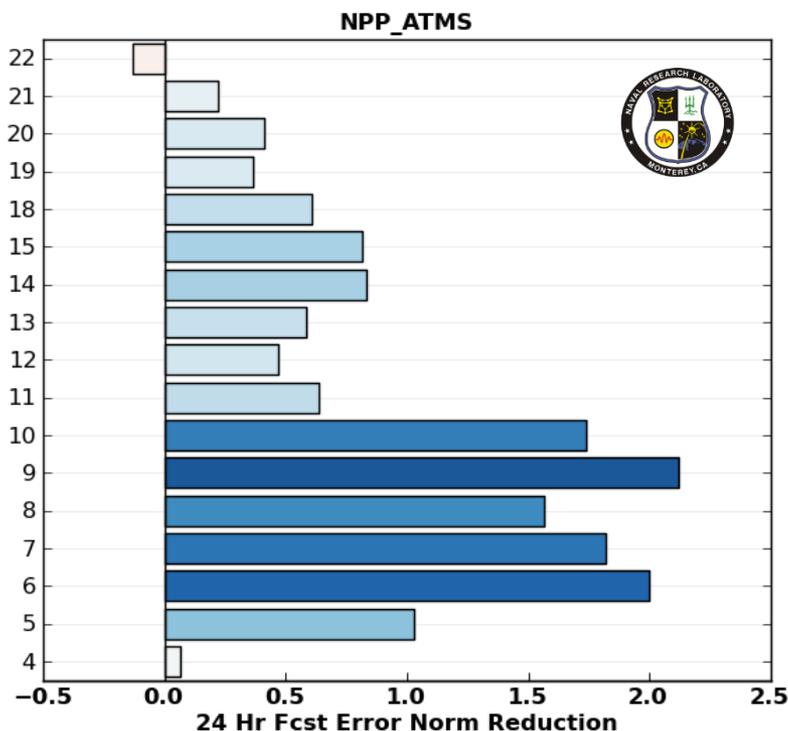




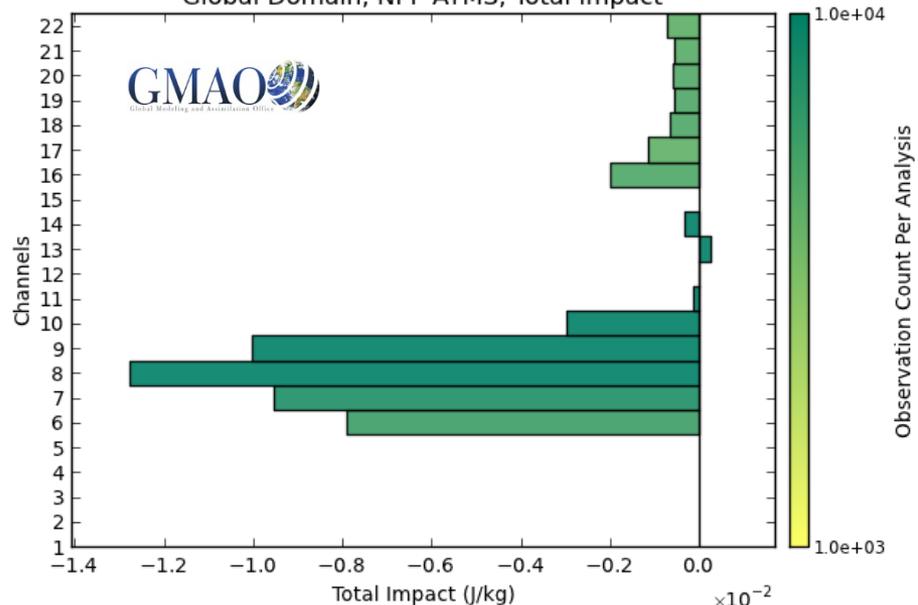
ATMS Observation Impacts by Channel NRL and GMAO Comparisons

ATMS observation sensitivity (FSO) from assimilation at FNMOC and GMAO

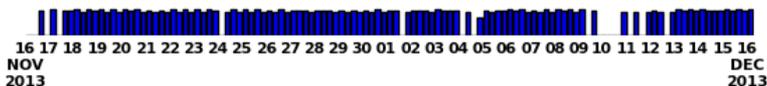
NAVDAS-AR Observation Sensitivity



GEOS-5 24h Observation Impact Per Channel
16 Nov 2013-16 Dec 2013 00z
Global Domain, NPP ATMS, Total Impact



http://gmao.gsfc.nasa.gov/forecasts/systems/fp/obs_impact/#



http://www.nrlmry.navy.mil/metoc/ar_monitor/

The following slides depict 30 day time series of O-B for ATMS

On 20 November, new SDR TBs were being produced using a new set of coefficients for beam efficiency and scan bias.

Previously these coefficients were set to (1,0) for each channel, so that the TDR T_B was equivalent to the SDR T_B .

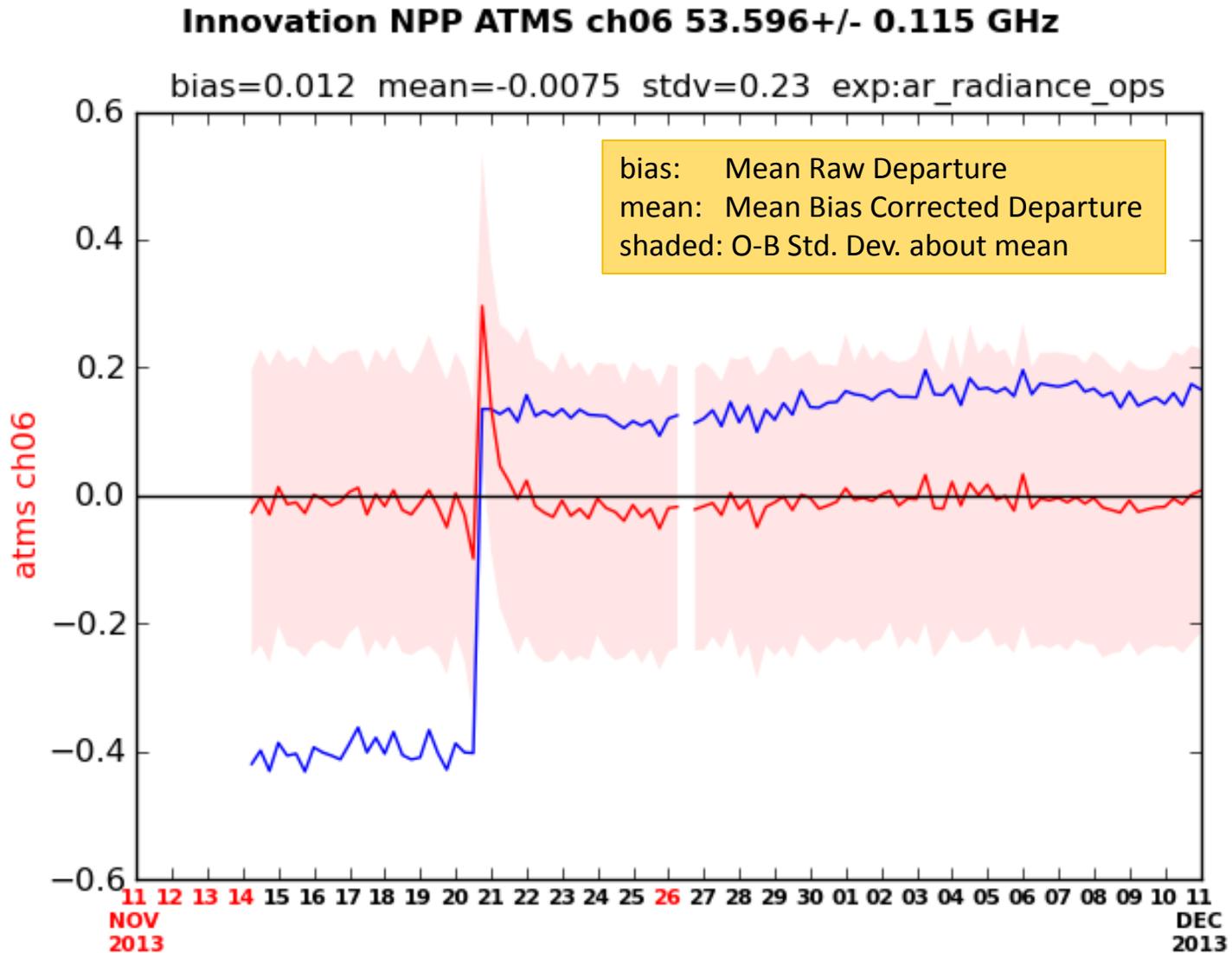
Each NWP center performs their own set of channel dependent bias corrections to bring the global O-B to a near zero values. Several predictors are employed in these variational bias corrections schemes, one or more of which involve the scan position bias.

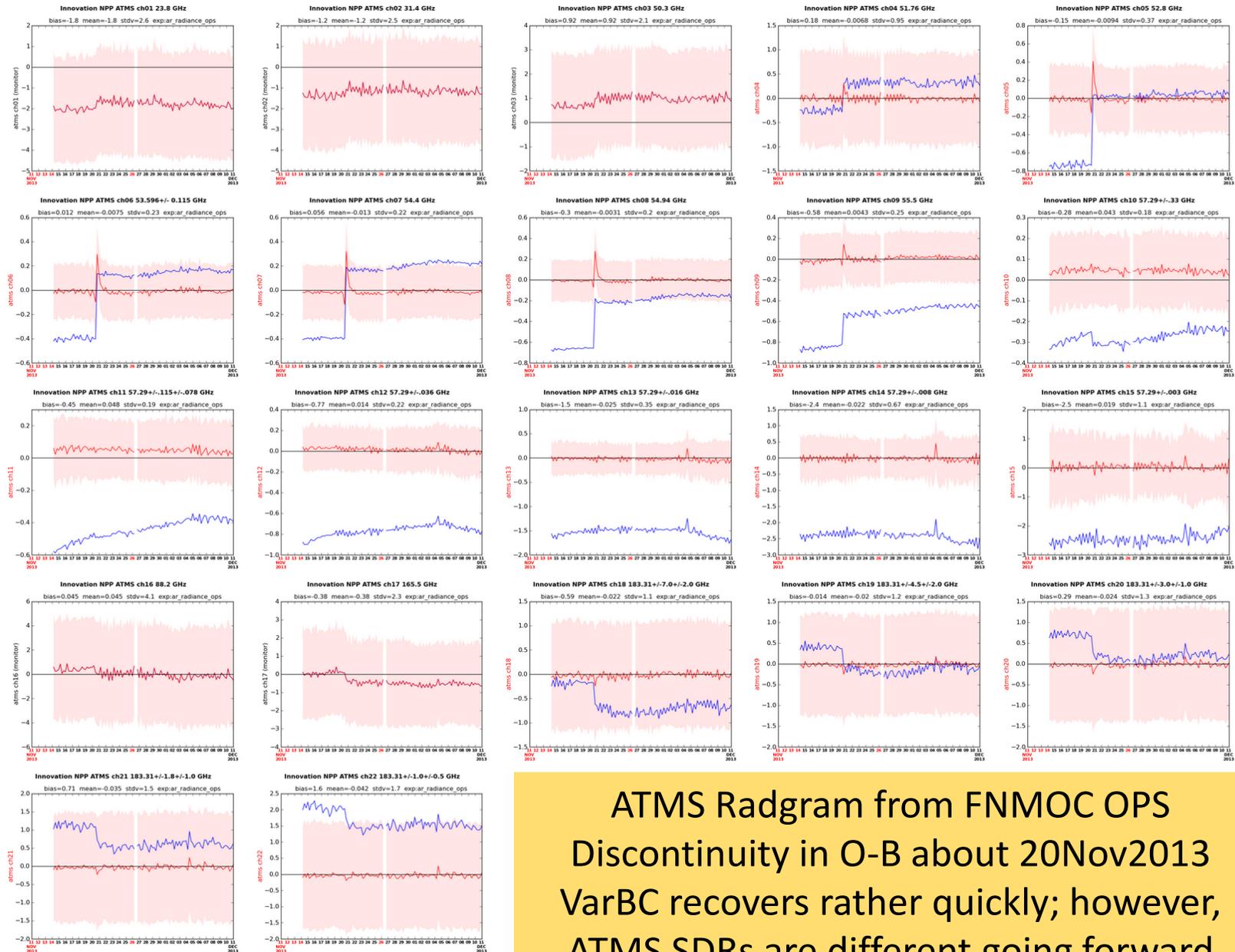
As you can see, from the following charts, all centers show a discontinuity in the O-B departures for the 20th of November, with the exception of the NCEP/EMC GFS model





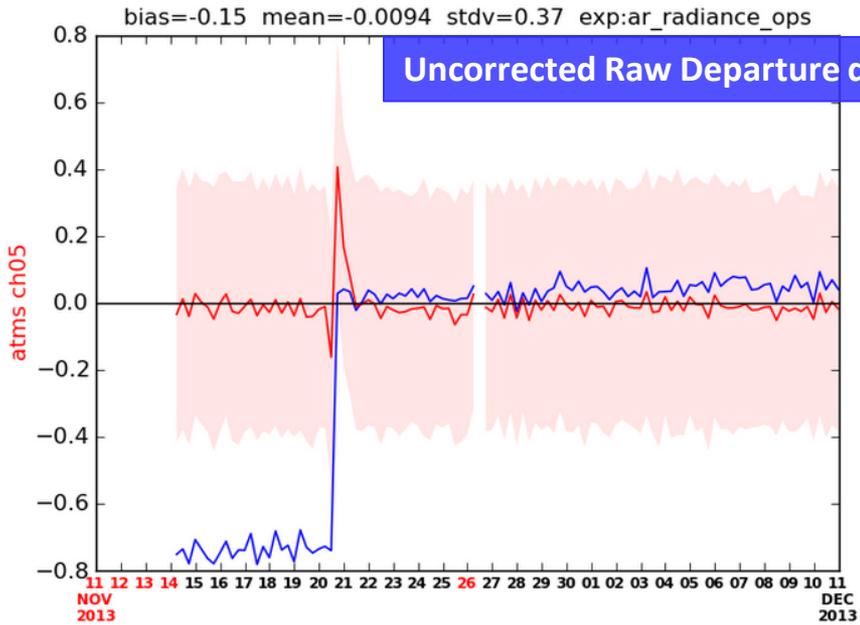
NAVGEM/NAVDAS-AR Operational ATMS Assimilation 30 Day Time Series of Global O-B Departures



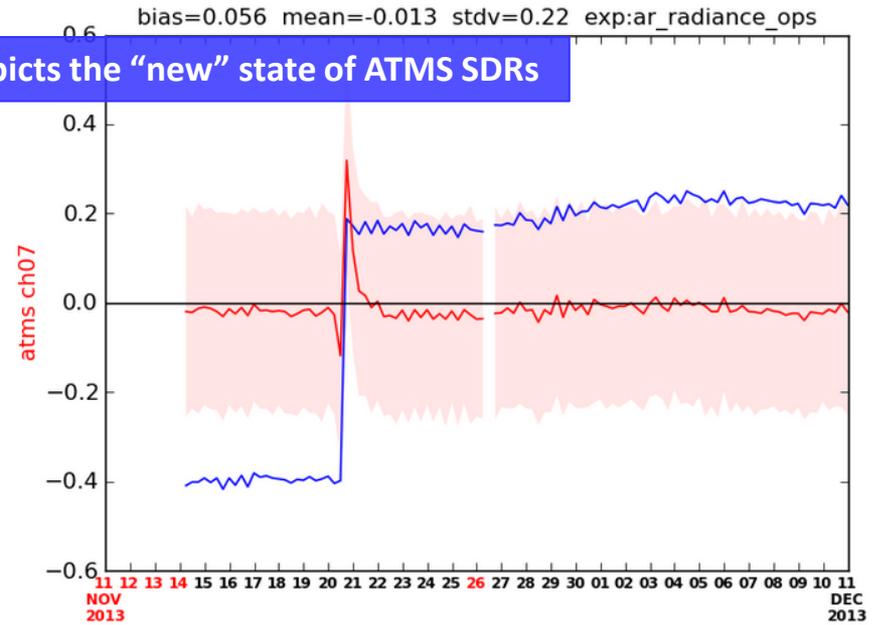


ATMS Radgram from FNMOC OPS
Discontinuity in O-B about 20Nov2013
VarBC recovers rather quickly; however,
ATMS SDRs are different going forward

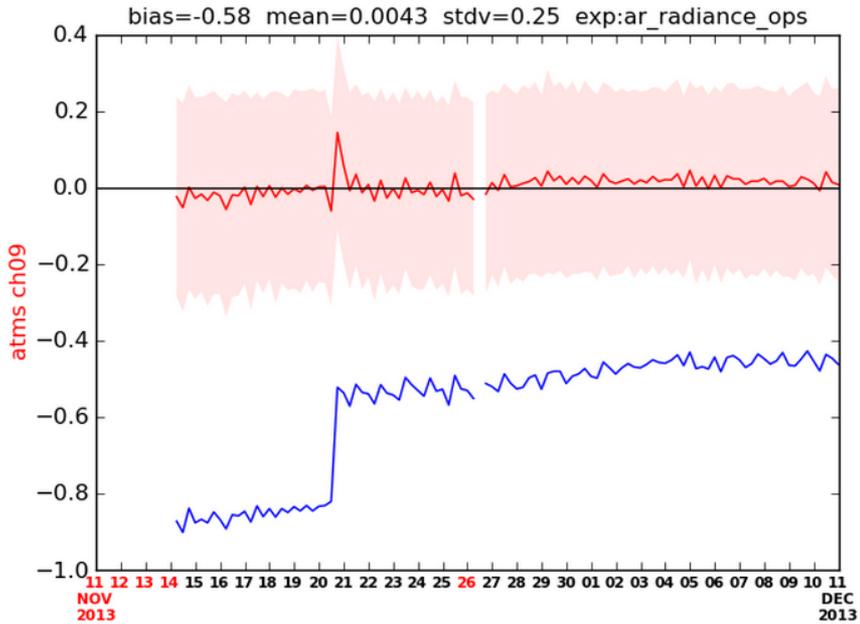
Innovation NPP ATMS ch05 52.8 GHz



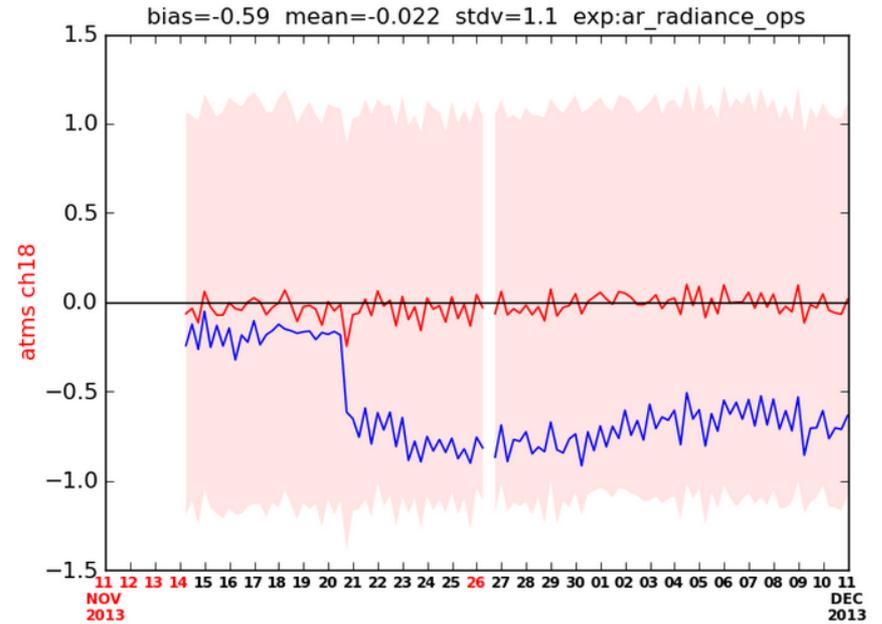
Innovation NPP ATMS ch07 54.4 GHz



Innovation NPP ATMS ch09 55.5 GHz



Innovation NPP ATMS ch18 183.31+/-7.0+/-2.0 GHz

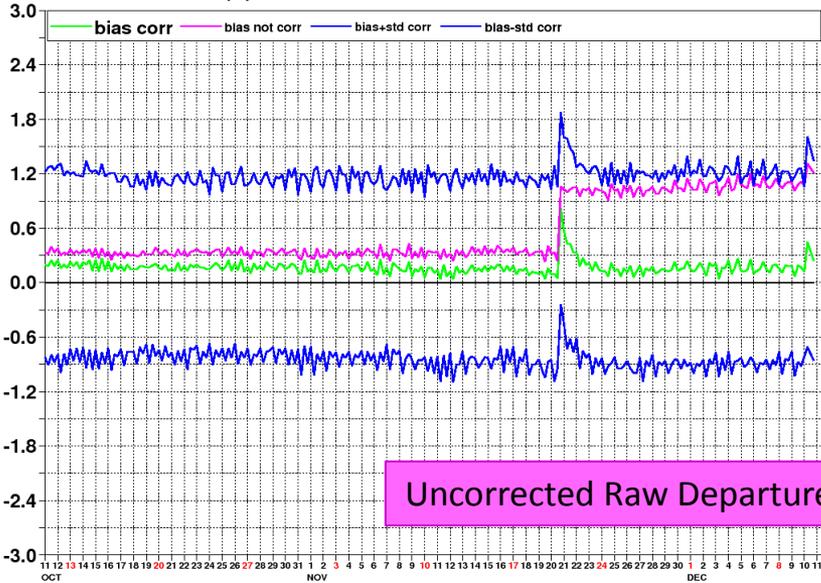




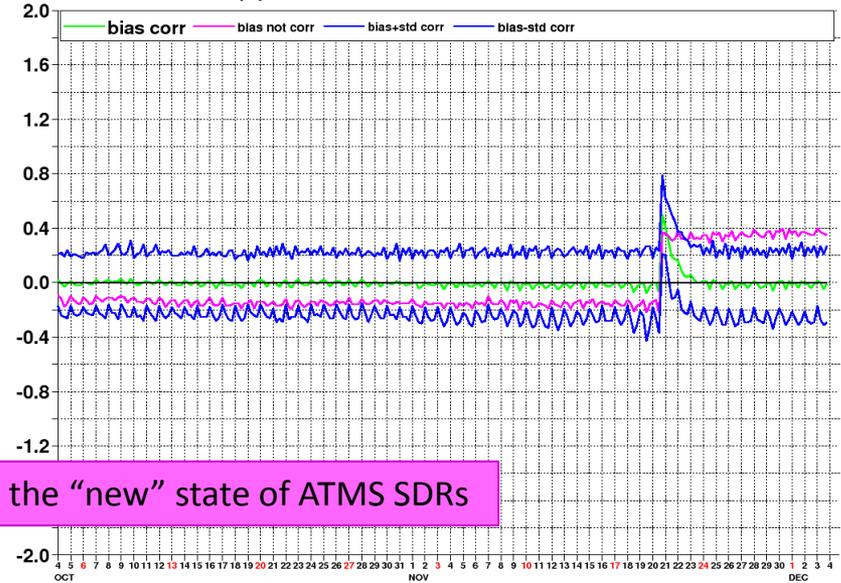
Météo France ATMS O-B 60 Day Time Series

MÉTÉO FRANCE

ATMS NPP - from 11-OCT-2013 to 11-DEC-2013
Tb (K) all classes channel 5 900 hPa

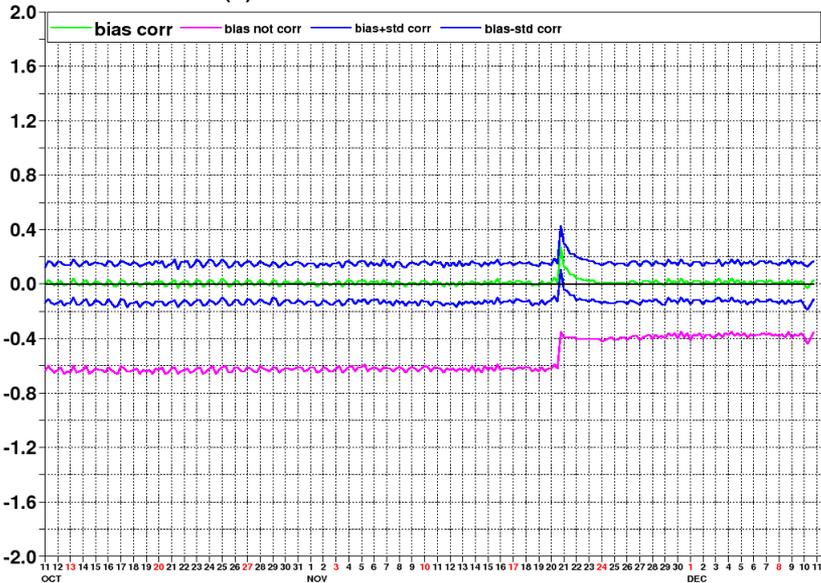


ATMS NPP - from 04-OCT-2013 to 04-DEC-2013
Tb (K) all classes channel 7 400 hPa

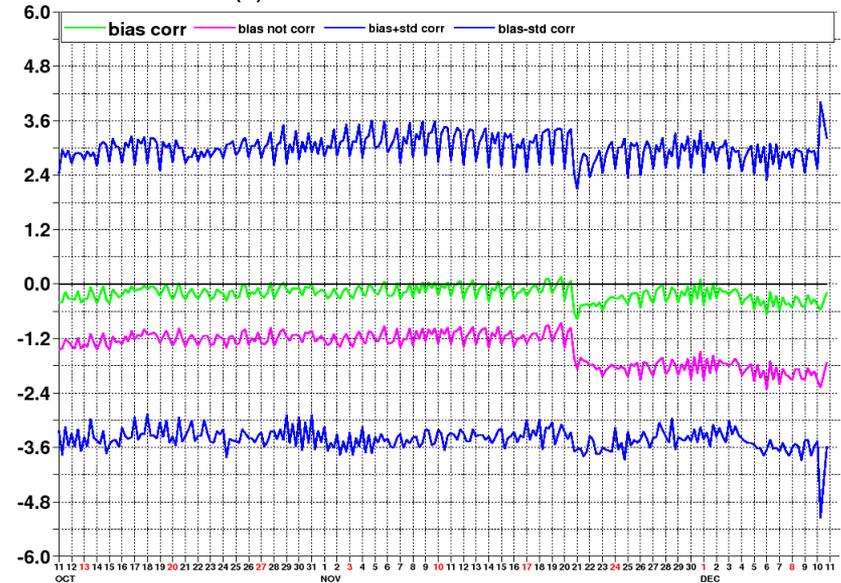


Uncorrected Raw Departure depicts the "new" state of ATMS SDRs

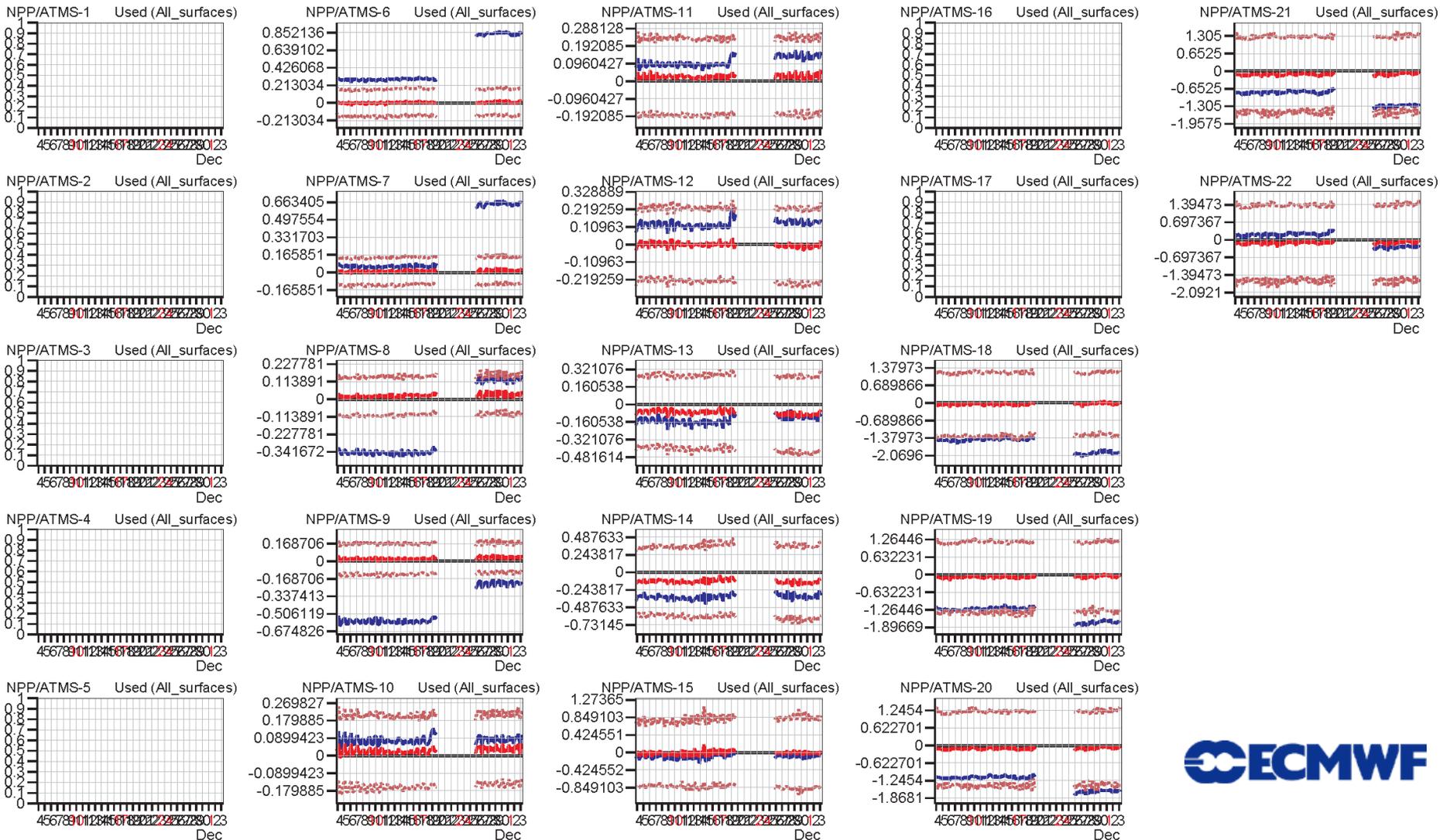
ATMS NPP - from 11-OCT-2013 to 11-DEC-2013
Tb (K) all classes channel 9 190 hPa



ATMS NPP - from 11-OCT-2013 to 11-DEC-2013
Tb (K) all classes channel 18 700 hPa



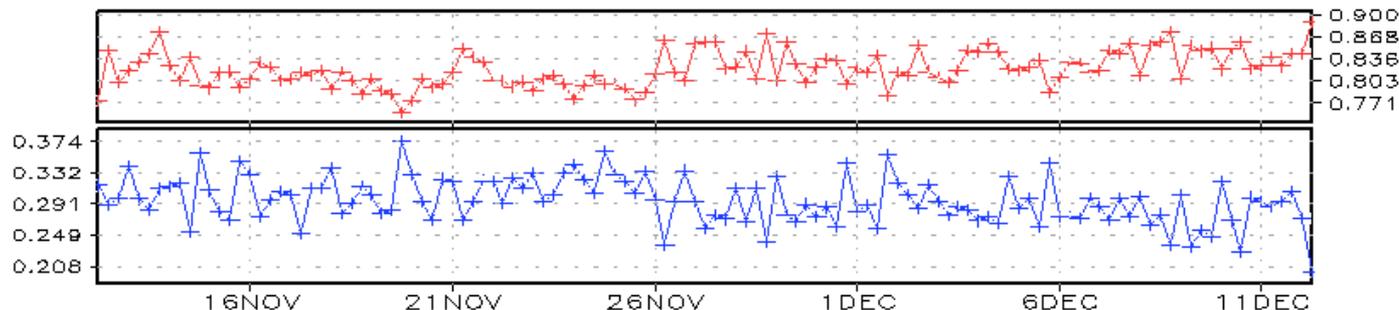
Statistics for RADIANCES from NPP/ATMS
 Area: lon_w= 0.0, lon_e= 360.0, lat_n= -90.0, lat_s= 90.0
 Operational Suite (0001) [Time step = 6 hours]
 Departures: blue = uncorrected, red = bias corrected +/- SD (dots)



platform: atms_npp
region : global (180W-180E, 90S-90N)
variable: ges_(w/o bias cor) - obs (K)
valid : 06Z12NOV2013 to 06Z12DEC2013

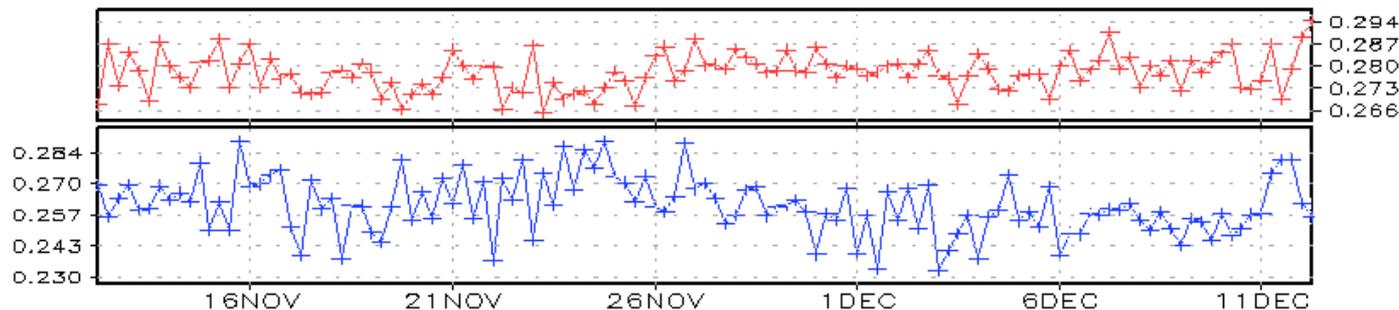
channel 5
 χ 0.1707
f 52.80 GHz
 λ 5677.89 μm

avg: 0.295
sdv: 0.821



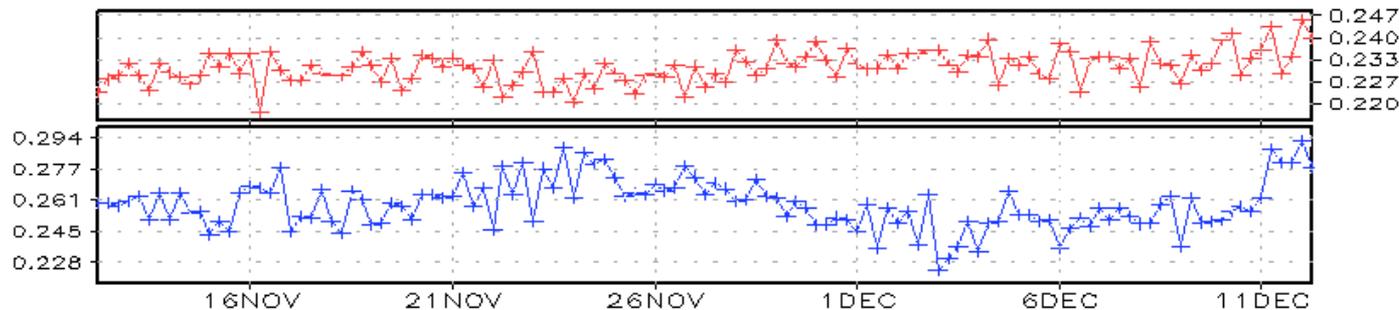
channel 6
 χ 0.1015
f 53.60 GHz
 λ 5593.56 μm

avg: 0.260
sdv: 0.277



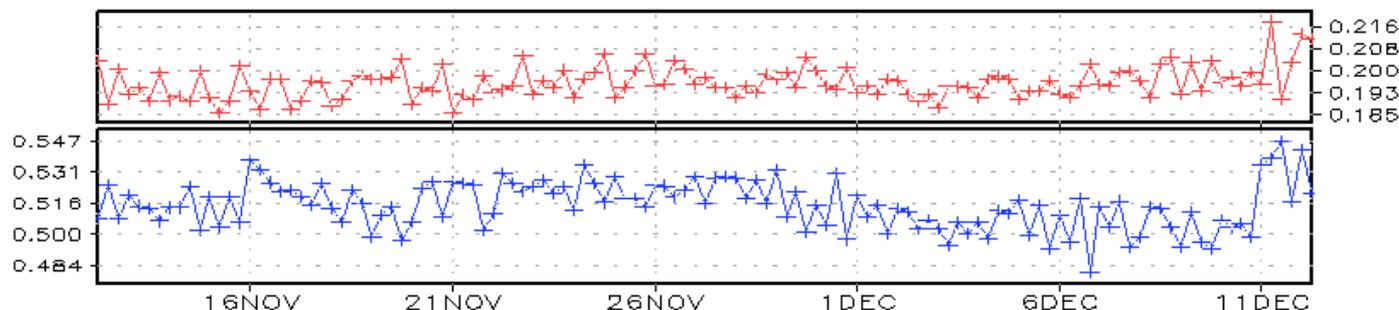
channel 7
 χ 0.0585
f 54.40 GHz
 λ 5510.89 μm

avg: 0.258
sdv: 0.230



channel 8
 χ 0.0598
f 54.94 GHz
 λ 5456.72 μm

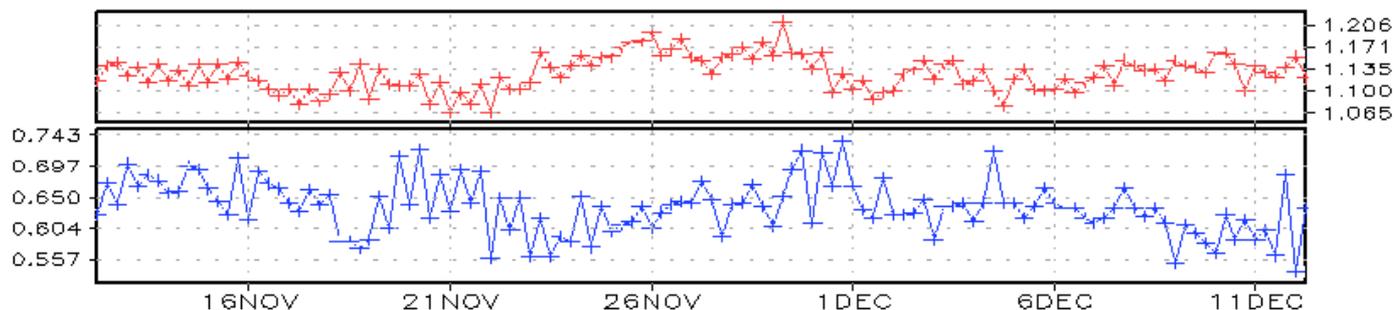
avg: 0.514
sdv: 0.196



platform: atms_npp
region : global (180W-180E, 90S-90N)
variable: ges_(w/o bias cor) - obs (K)
valid : 06Z12NOV2013 to 06Z12DEC2013

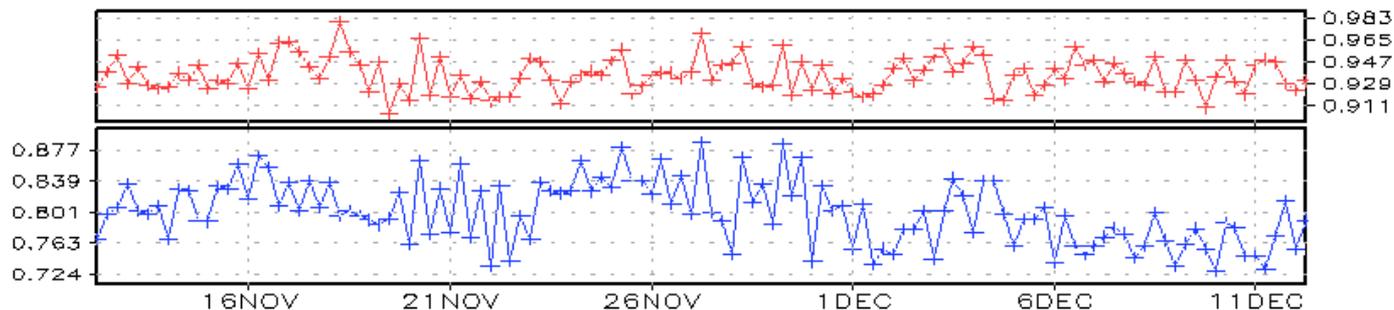
channel 17
x 0.3353
f 185.50 GHz
λ 1611.43 μm

avg: 0.635
sdv: 1.128



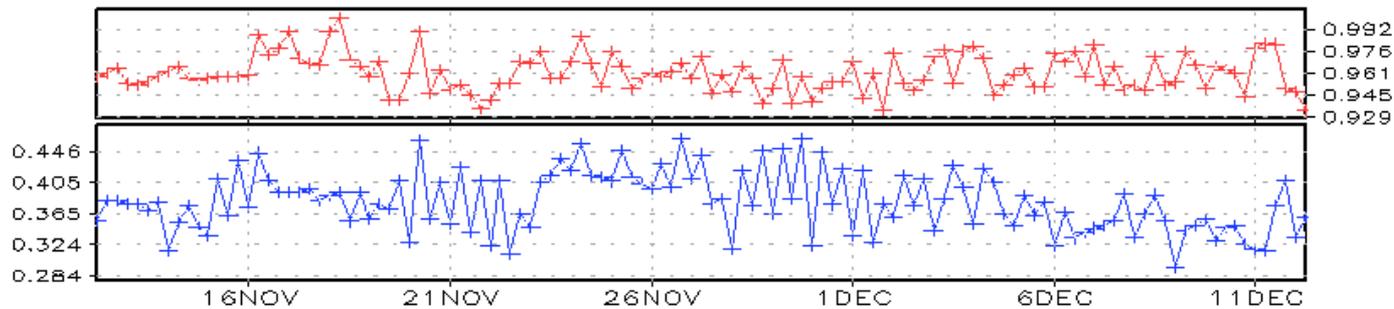
channel 18
x 0.3229
f 183.31 GHz
λ 1635.44 μm

avg: 0.800
sdv: 0.936



channel 19
x 0.3492
f 183.31 GHz
λ 1635.44 μm

avg: 0.380
sdv: 0.960



channel 20
x 0.3809
f 183.31 GHz
λ 1635.44 μm

avg: 0.192
sdv: 0.988

