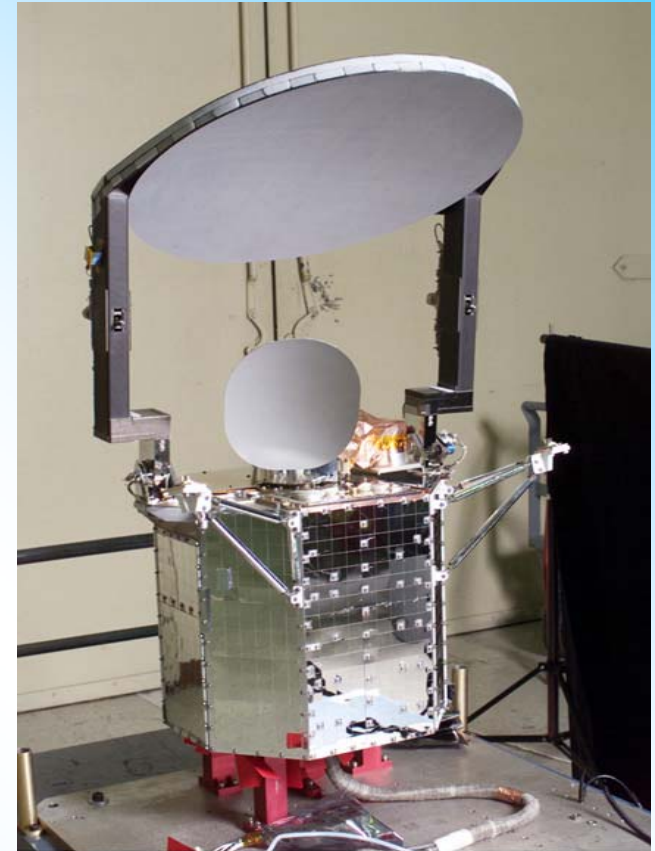




# SSMIS Cal/Val Calibration Anomaly Analysis



CN600-136-D

**Steve Swadley, Gene Poe and Al Uliana (NRL)  
Dave Kunkee (Aerospace)**

**SSMIS Cal/Val Team  
June 2005**



# SSMIS Cal/Val Calibration Anomaly Analysis



- **SSMIS Calibration Anomalies**
  - Warm Load Intrusions
  - Reflector Emissions due to Solar Heating
  - Lunar Intrusions into Cold Sky View
- **Detection and Mitigation Strategies**
  - Gain Filtering
  - Prediction of Orbital Locations
  - Bias Corrections
- **The Road Ahead**
  - Quality Flags versus Corrections Strategies
  - Radiance Assimilation Strategies
  - DMSP F-17 Terminator Orbit



# SSMIS Cal/Val Calibration Anomaly Analysis



- **Warm Load Anomalies**
  - Reflection Off of the Canister Top into Warm Load
  - Direct Illumination of the Warm Load Tines
- **Emission Due to Solar Heating of Reflector Surface**
  - Reflector Arm Temp vs. Modeled Antenna Temp
  - What is the Reflector Surface ?
    - SiOx Coated VDA
    - SiOx and Al VDA Mixture
    - Graphite Epoxy
- **Lunar Intrusions into Cold Sky View**
  - Cold Sky Calibration Anomaly Detection

**How Do We Unravel Their Cumulative Effect ?**



# SSMIS Cal/Val Calibration Anomaly Analysis



## Developed Detailed Analysis Tools

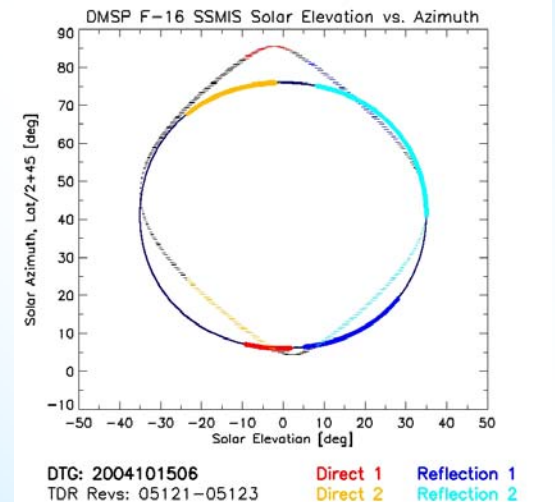
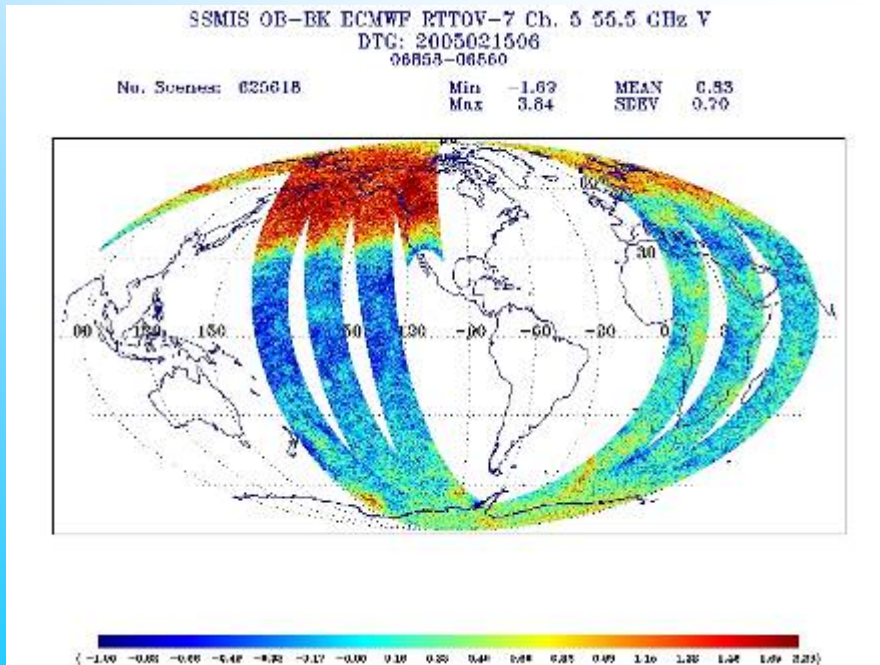
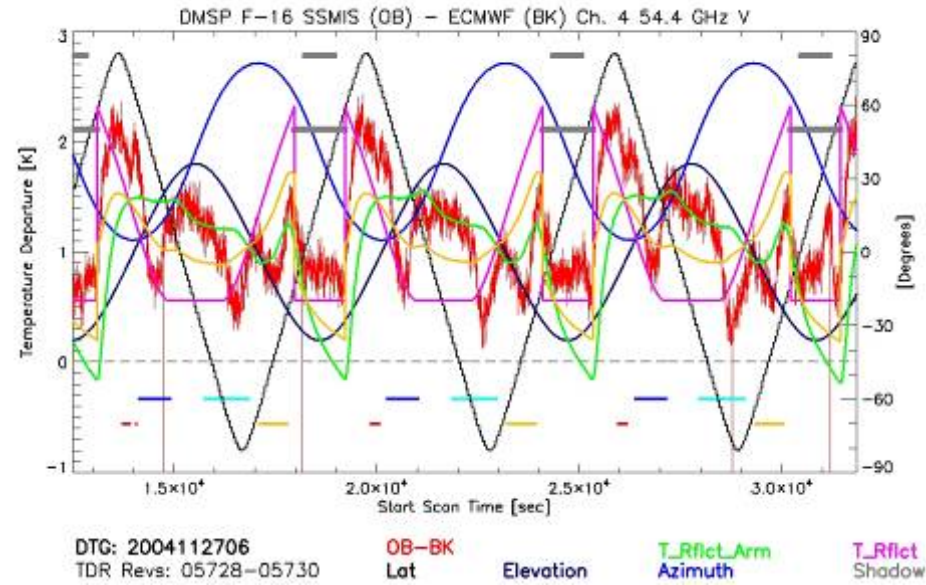
- OB-BK Geographic Coverage Plots
- Scan Averaged OB-BK Time Series
- Relative Gain  $G/G_{AVG}$  Time Series
  - $G = (C_w - C_c) / (T_w - T_c)$
- MUX Temperature Time Series
- LAS and 183 GHz Channel Frequency Dependence
- Solar Geometry Superimposed on each plot



# SSMIS Cal/Va Calibration Anomaly Analysis



ECMWF and SSMIS (OB-BK)  
Specialized data analysis and display tools allow visualization of multiple and diverse data sources to connect sensor related phenomena to characteristics and performance of retrievals and calibration



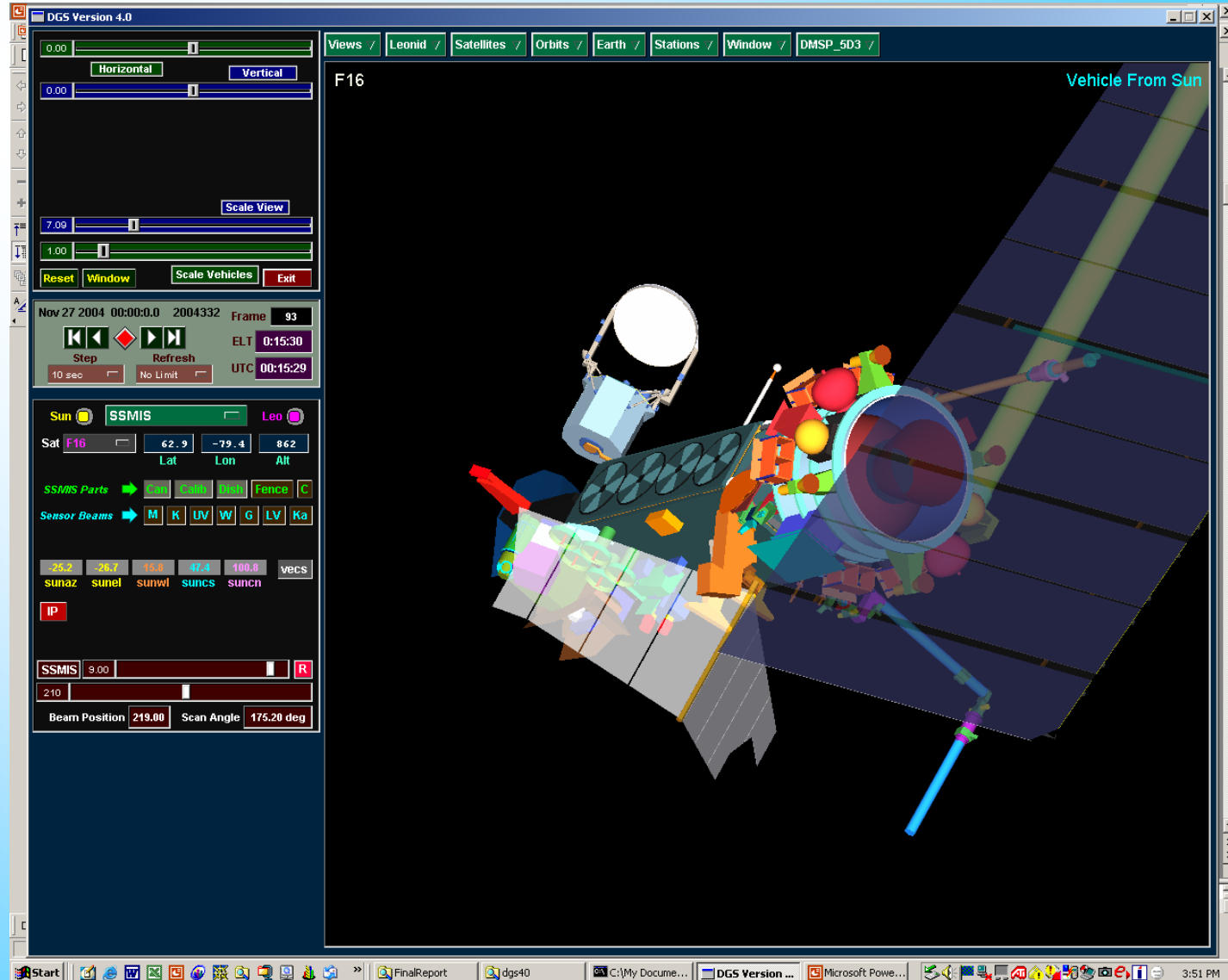


# SSMIS Cal/Val Calibration Anomaly Analysis



## DGS

Simulation tool:  
Recent software  
modifications added  
substantial capability  
to DGS.  
Allowed Cal/Val  
Team to analyze the  
SSMIS calibration  
anomalies and Field  
of View (FOV)  
intrusions





# SSMIS Cal/Val Calibration Anomaly Analysis



## Warm Load Anomaly Analysis

- **Caused by Short Term Heating of the Warm Load Tines**
- **Occurs at distinct combinations of Solar Elevation and Azimuth Angles and Interactions with Reflective SSMIS Canister Top**
- **Radiometer “Sees” Rapid Heating of Warm Load Tines before Warm Load Thermistors can Register Temperature Change**

## Gain Correction by Gain Gating and Filtering

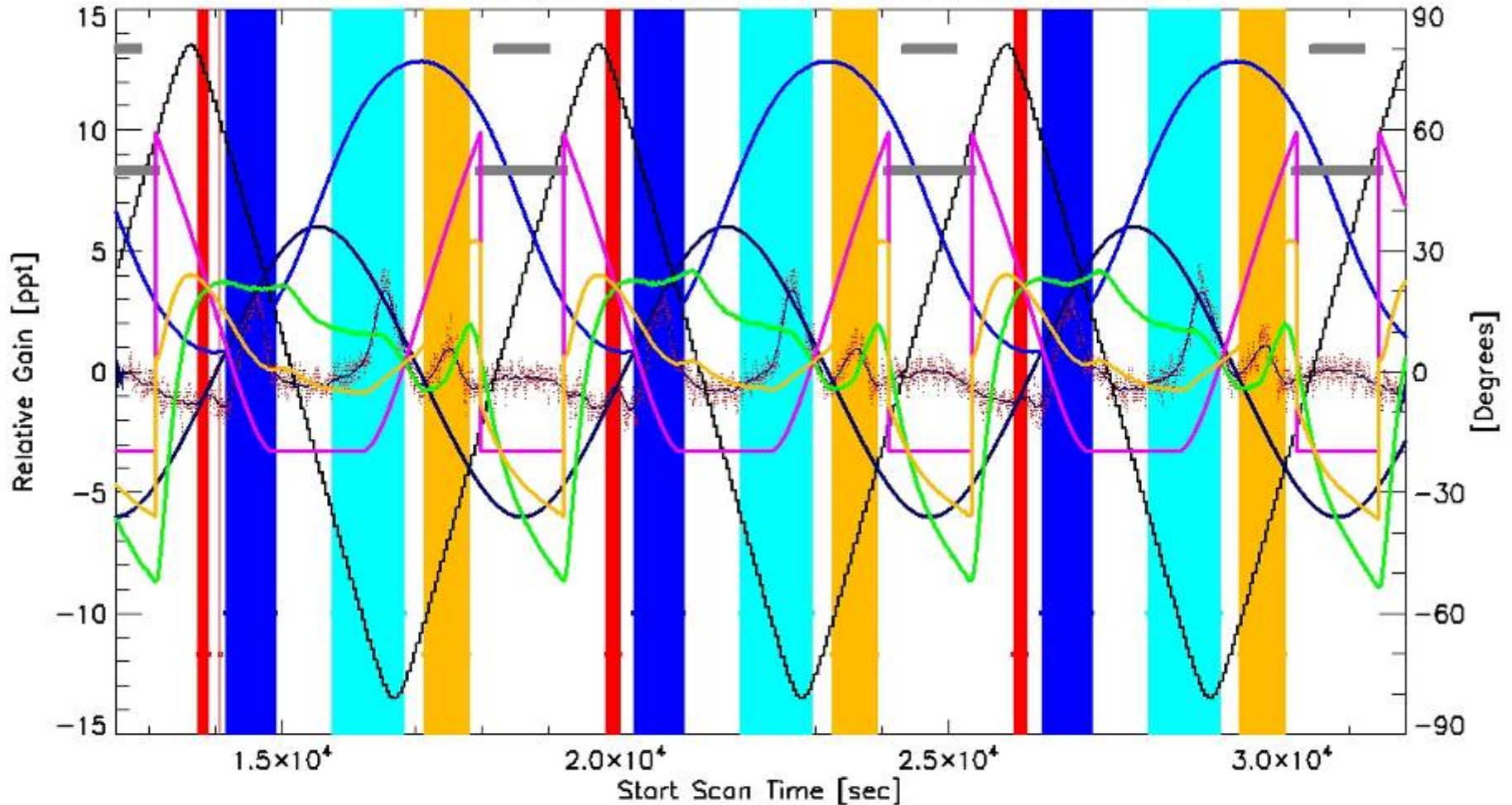
- **Use Algorithm based upon Solar elevation and azimuth angles to gate out anomalous warm load counts**
- **Fit a curve to remaining “good” gain data**
- **Are there enough “good” gain points to fit an accurate curve ?**



# SSMIS Cal/VaI Calibration Anomaly Analysis



DMSP F-16 SSMIS Relative Gain Ch. 17 91.655 GHz V



DTG: 2004112706  
TDR Revs: 05728-05730

Relative Gain  
Lat Elevation

$T_{Rflect\_Arm}$   
Azimuth

$T_{Rflect\_Shadow}$   
Shadow





# SSMIS Cal/Val Calibration Anomaly Analysis



Can We Remove the Anomalous Gain Structures ?

Use New Gain to Modify the Observed Temperature

Radiometer Gain,  $G$

$$G = (V_w - V_c) / (T_w - T_c)$$

So that the Original SSMIS Temperature,  $T_{\text{org}}$  is

$$T_{\text{org}} = T_c + (V_s - V_c) / G_{\text{org}}$$

And the New SSMIS Temperature,  $T_{\text{new}}$  is

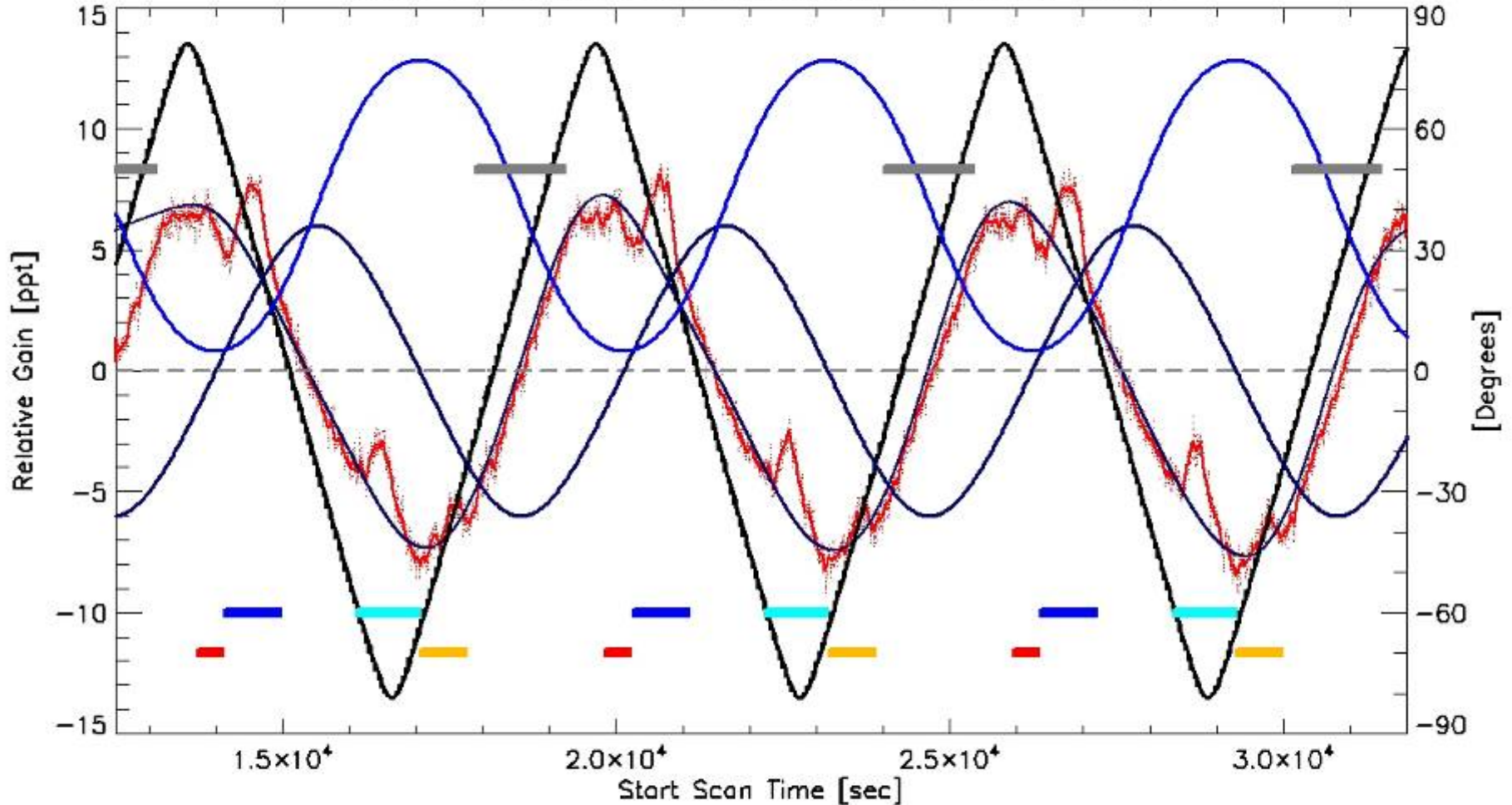
$$T_{\text{new}} = T_c + (V_s - V_c) / G_{\text{new}}$$



# SSMIS Cal/Val Calibration Anomaly Analysis



DMSF F-16 SSMIS Relative Gain Ch. 4 54.4 GHz V



DTG: 2004112706 TDR Revs: 05728-05730

ch\_4  
Elevation

Azimuth

Lat  
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis

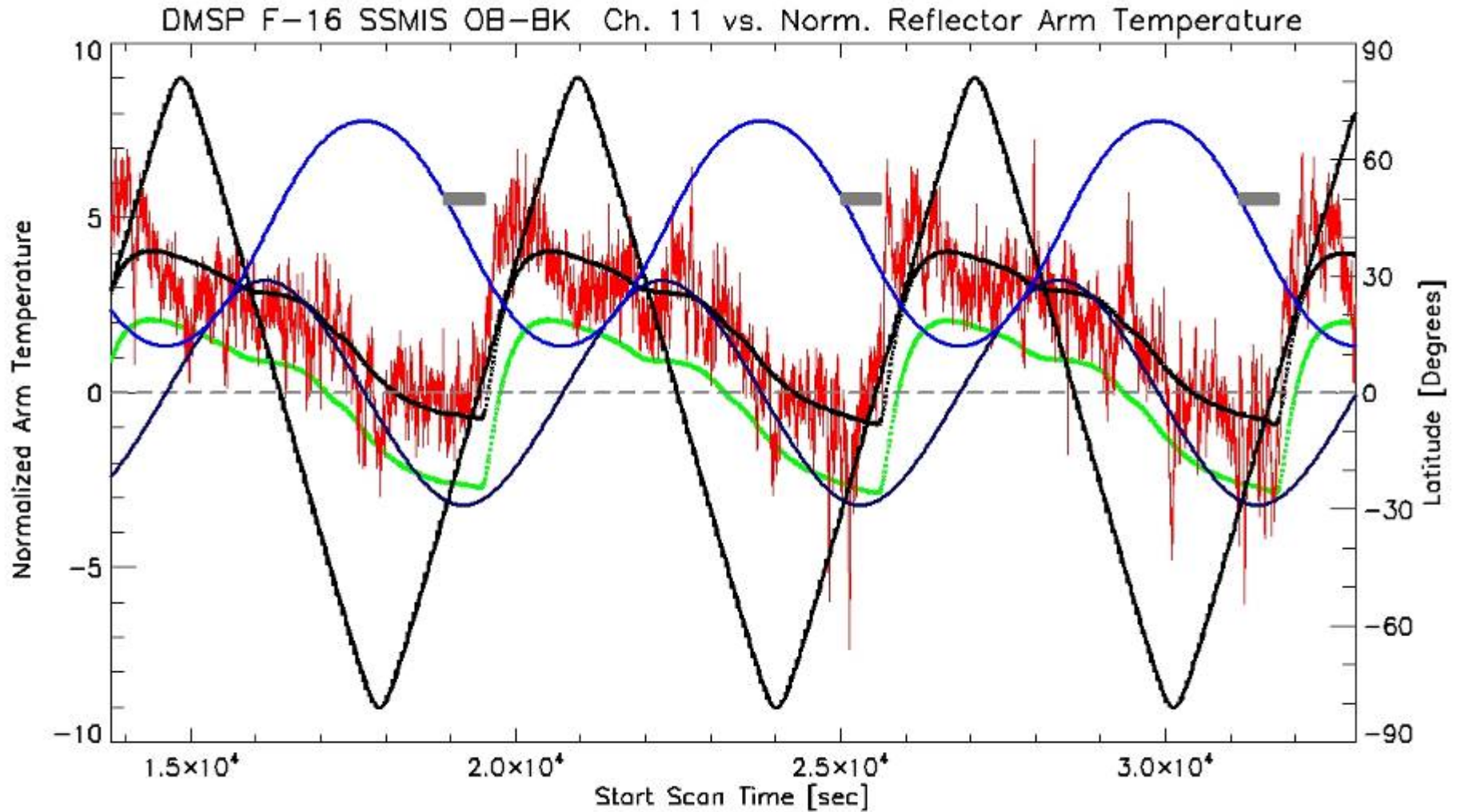


## Antenna Emissions and Reflector Temperature Model

- SSMIS Reflector “Looks” Directly into Sun Twice Each Orbit
  - Primary Effect as Spacecraft Emerges from Earth and/or Spacecraft Shadow
  - Secondary Effect as Spacecraft Enters the Earth and/or Spacecraft Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



DTG: 2004031706

TDR Revs: 02126-02128

Elevation

Azimuth

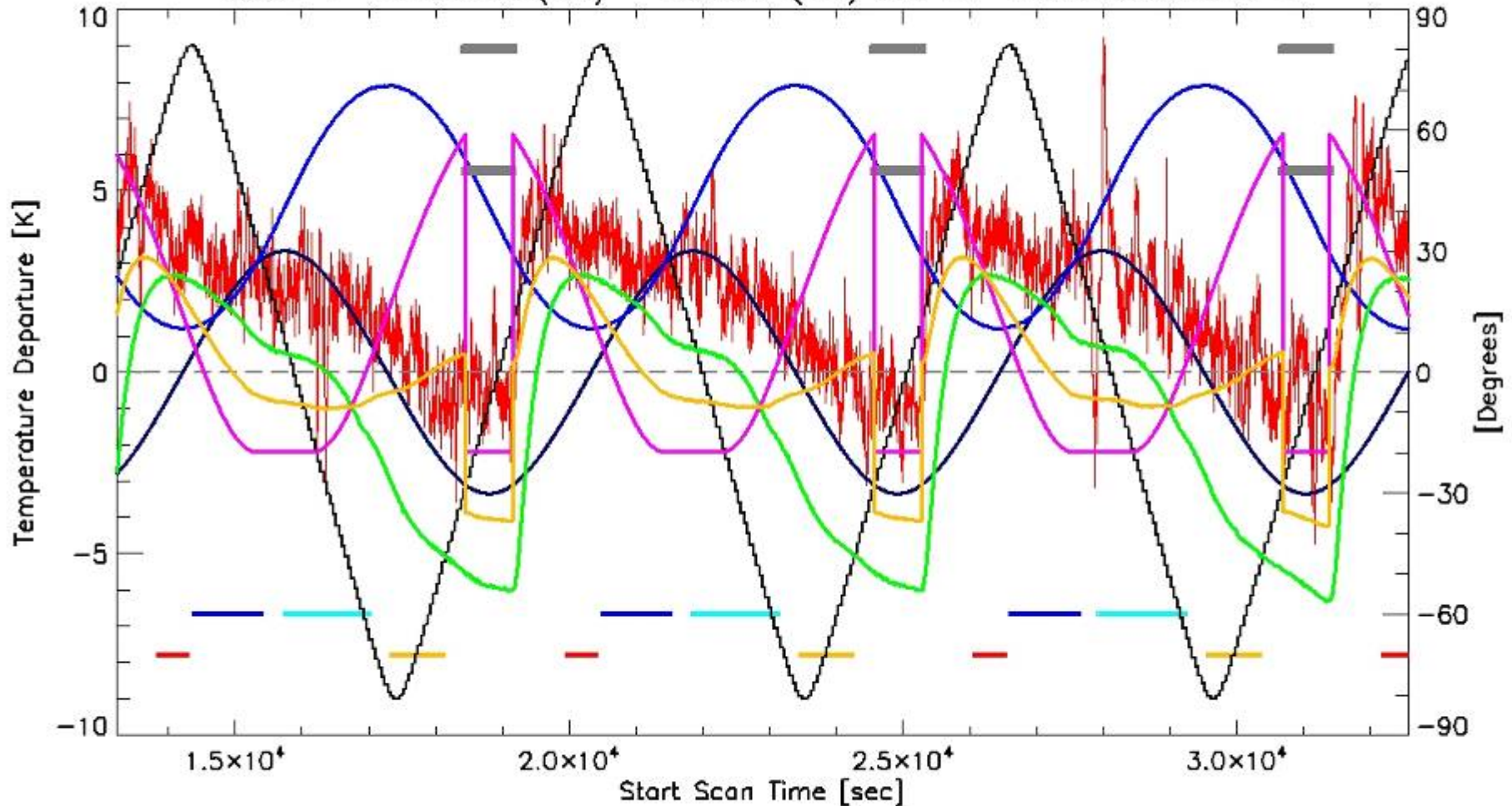
Lat  
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



DMSF F-16 SSMIS (OB) - ECMWF (BK) Ch. 11 183.31±1.0 GHz H



DTG: 2005030906

TDR Revs: 07169-07171

OB-BK

Lat

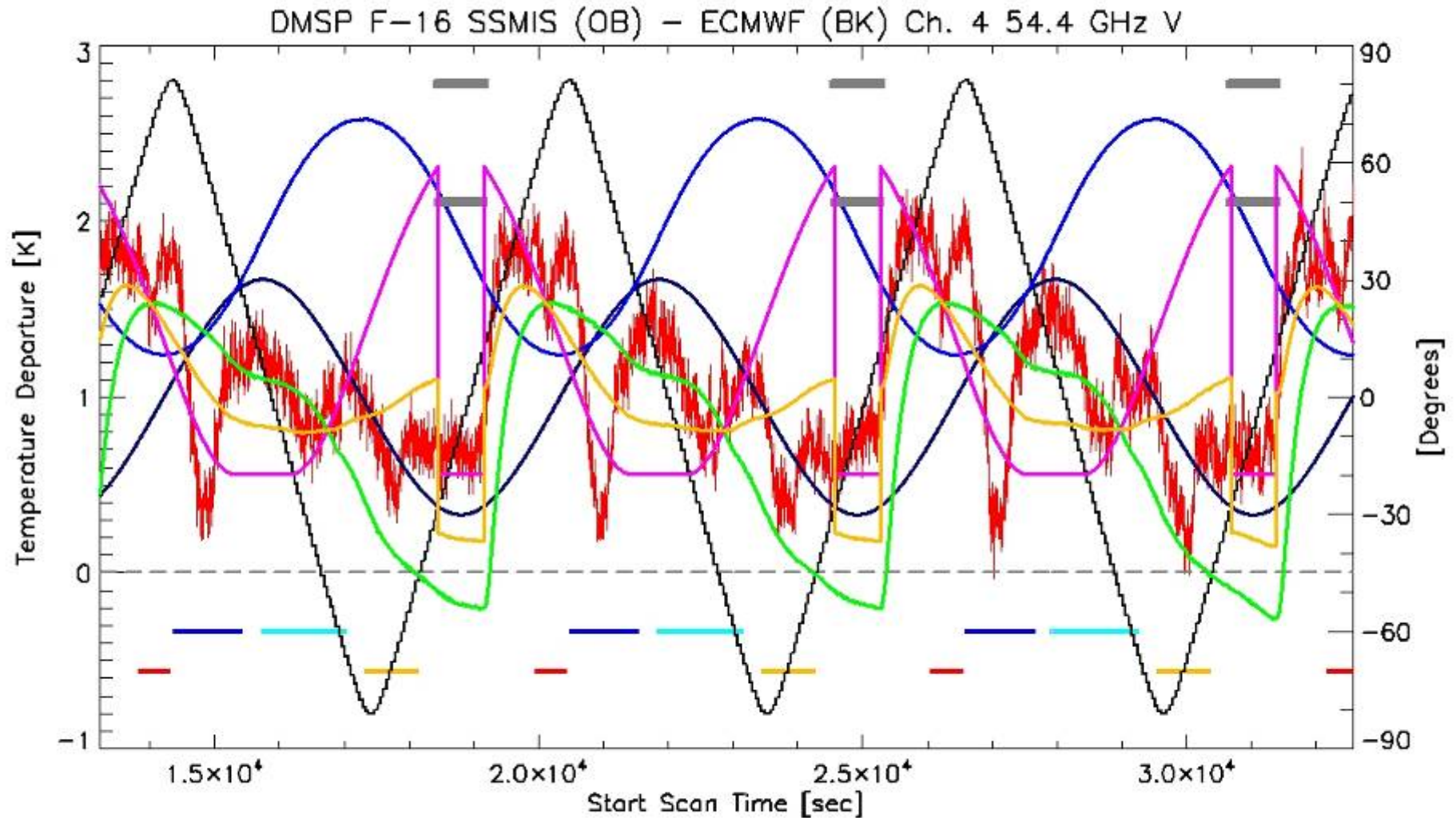
Elevation

T\_Rflect\_Arm  
Azimuth

T\_Rflect  
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



DTG: 2005030906

TDR Revs: 07169-07171

OB-BK

Lat

Elevation

T\_Rflect\_Arm

Azimuth

T\_Rflect

Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



$$\begin{aligned}T_{\text{Apparent}} &= (1 - \epsilon_R) T_{\text{Scene}} + \epsilon_R T_{\text{Reflector}} \\ &= T_{\text{Scene}} + \epsilon_R (T_{\text{Reflector}} - T_{\text{Scene}})\end{aligned}$$

I used  $T_{\text{Reflector Arm}}$  for the  $T_{\text{Reflector}}$

And looked at plots of

$\epsilon_R (T_{\text{Reflector}} - T_{\text{Scene}})$  vs. OB-BK

Where  $T_{\text{Scene}}$  can be TB from OB or BK

Use the  $\epsilon_R (T_{\text{Reflector}} - T_{\text{Scene}})$  Term as a correction to the SSMIS OB

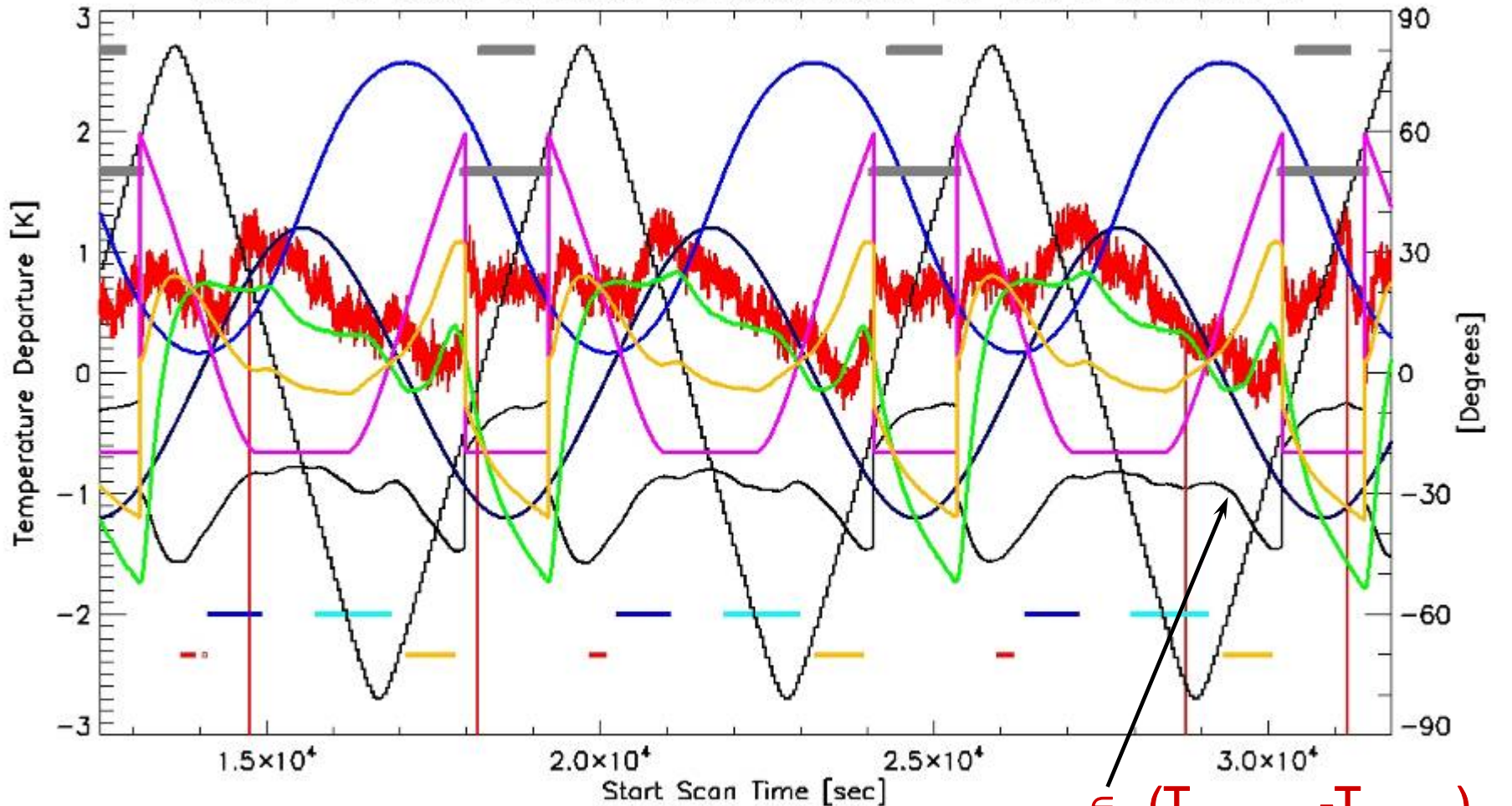


# SSMIS Cal/Va Calibration Anomaly Analysis



Using the Mean of the  $T_{\text{Reflector Arm}}$  and the  $T_{\text{Reflector Model}}$

DMSP F-16 SSMIS Emission Corrected GCOB-BK Ch. 4 54.4 GHz V



$$\epsilon_R (T_{\text{Reflector}} - T_{\text{Scene}})$$

DTG: 2004112706  
TDR Revs: 05728-05730

EC\_GCOB-BK  
Lat Elevation

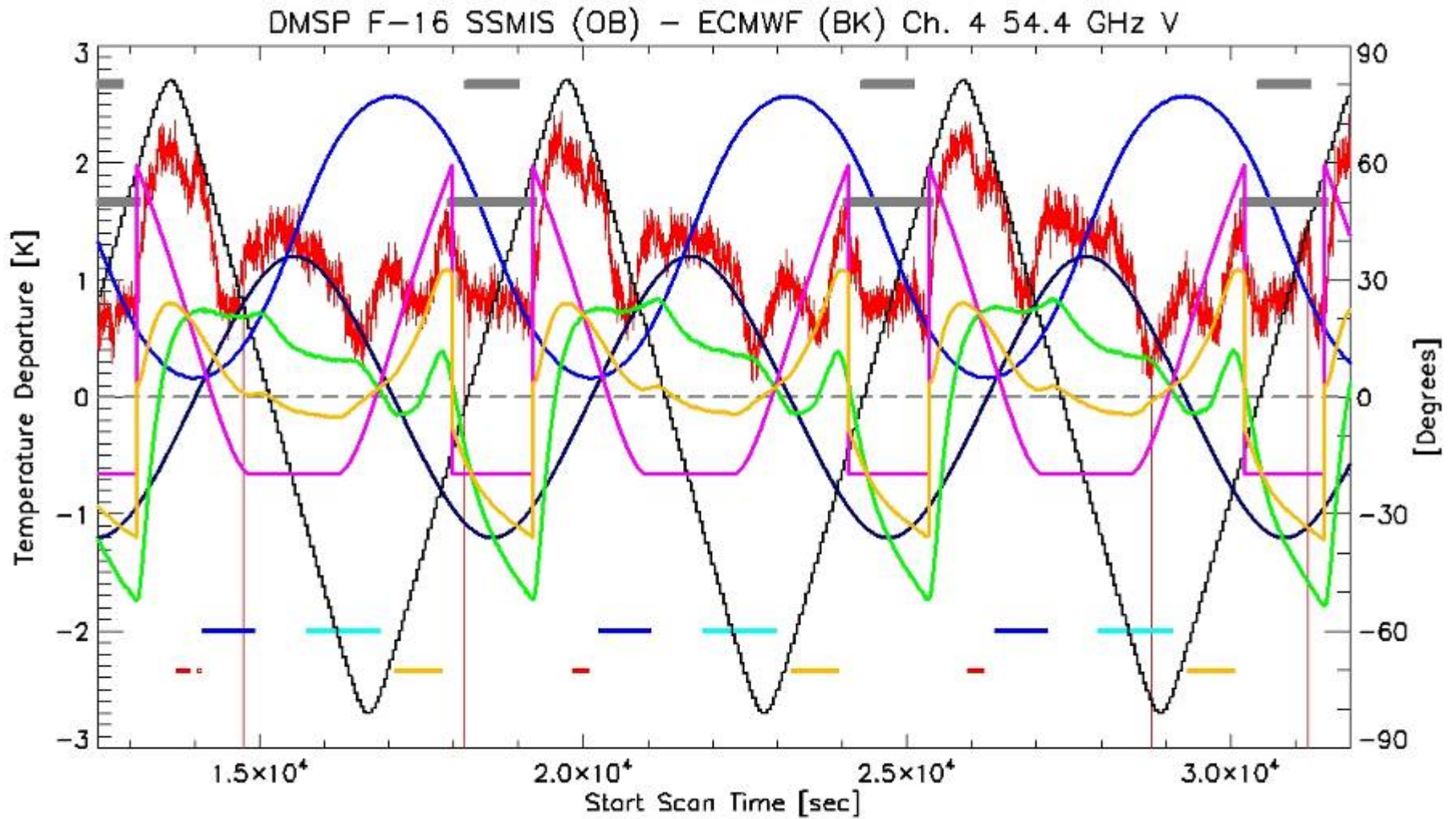
T\_Rflect\_Arm  
Azimuth

T\_Rflect\_Shadow





# SSMIS Cal/Val Calibration Anomaly Analysis



DTG: 2004112706  
TDR Revs: 05728-05730

OB-BK  
Lat Elevation

T\_Rflect\_Arm  
Azimuth

T\_Rflect  
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



## OB-BK In Radiance Space Depict Antenna Emissions

### Theoretical SSMIS Reflector Surface Parameters (NRL Multilayer Antenna Model)

Freq. (GHz)	Emissivity (V-pol/20deg) [ $\epsilon$ R ]			
	Al	GrEp	SiOx	SiOx/Al
19.35	0.00051	0.012	0.91	0.00051
37.0	0.00071	0.016	0.91	0.00071
60.0	0.00090	0.020	0.91	0.00090
91.65	0.00111	0.025	0.91	0.00111
183.0	0.00157	0.035	0.91	0.00157



# SSMIS Cal/Val Calibration Anomaly Analysis



**Do We See this Effect in the EDRs as Well ?**

**Recall the RTM shows the Vertically Integrated Effect of the BK Temperature and Moisture Profile**

**Sensor also Measures a Vertically Integrated Quantity through the Weighting Function**

**EDR Differences at a Specific Pressure Level DO NOT Reflect The Vertically Integrated Quantity**

**Which EDRs will Show Effect of Antenna Emission ?**



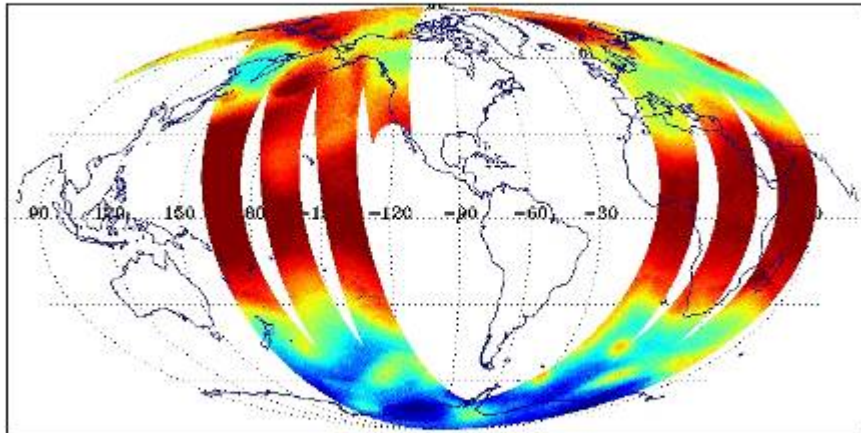
# SSMIS Cal/Val Calibration Anomaly Analysis



DMSP F-16 SSMIS 250 hPa Temperature  
DTG: 2005052606  
08271-08273

No. Scenes: 208199

Min	145.05	MEAN	225.89
Max	238.75	SDEV	6.44



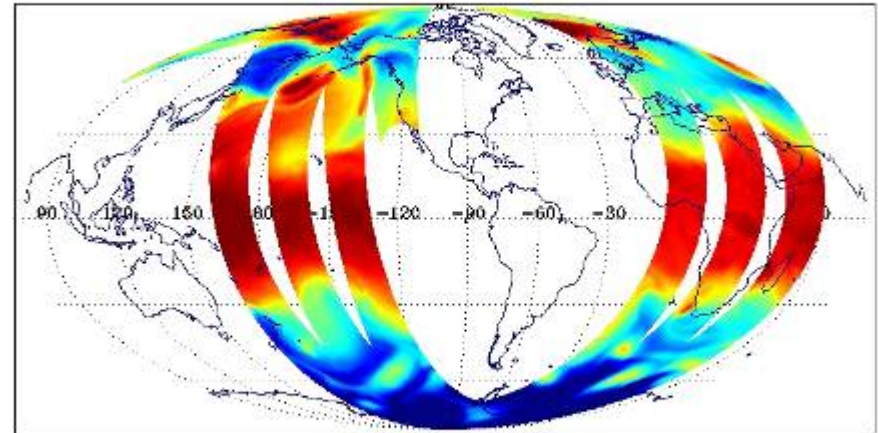
(21.0,26 211.81 212.76 214.19 215.44 216.77 218.11 219.16 220.78 222.12 223.46 224.89 226.13 227.47 228.81 230.14 231.48/13.12)

SSMIS 250 hPa T

ECMWF 250 hPa Temperature Analysis  
DTG: 2005052606  
08271-08273

No. Scenes: 208199

Min	203.20	MEAN	222.93
Max	236.01	SDEV	7.46



(21.0,26 211.81 212.76 214.19 215.44 216.77 218.11 219.16 220.78 222.12 223.46 224.89 226.13 227.47 228.81 230.14 231.48/13.12)

ECMWF 250 hPa T

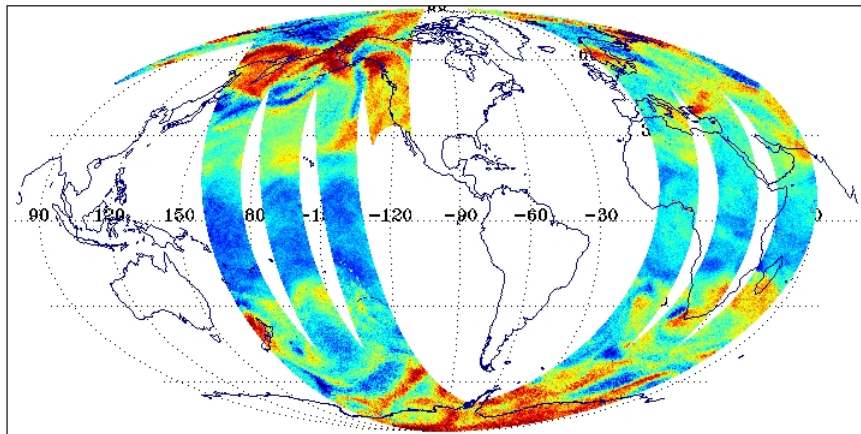


# SSMIS Cal/Val Calibration Anomaly Analysis



SSMIS OB-BK ECMWF 250 hPa Temperature Analysis  
DTG: 2005052606  
08271-08273

No. Scenes: 208199  
Min -81.82 MEAN 2.96  
Max 11.75 SDEV 2.45

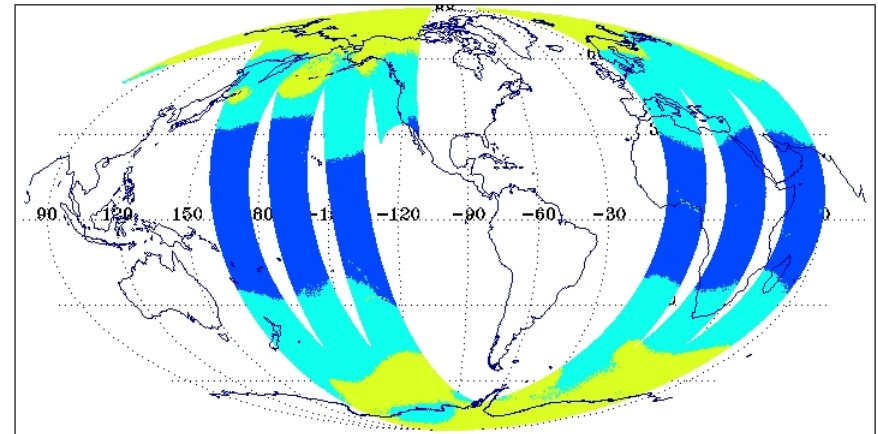


(-2.00 -1.38 -0.81 -0.25 0.34 0.92 1.50 2.07 2.66 3.22 3.80 4.38 4.95 5.53 6.11 6.68 7.26 7.84)

SSMIS – ECMWF 250 hPa  
Temperature Departure

SSMIS Temperature D-Matrix  
DTG: 2005052606  
08271-08273

No. Scenes: 208198  
Min 0.00 MEAN 0.00  
Max 0.00 SDEV 0.00



( 0.00 0.31 0.61 0.90 1.20 1.49 1.78 2.08 2.37 2.67 2.96 3.25 3.55 3.84 4.14 4.43 4.73 5.00)

SSMIS Temperature D-Matrix

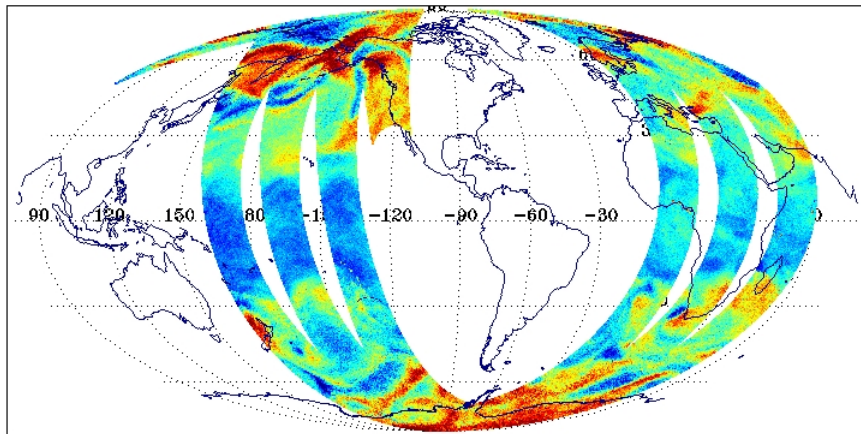


# SSMIS Cal/Val Calibration Anomaly Analysis



SSMIS OB-BK ECMWF 250 hPa Temperature Analysis  
DTG: 2005052606  
08271-08273

No. Scenes: 208199  
Min -81.82 MEAN 2.96  
Max 11.75 SDEV 2.45

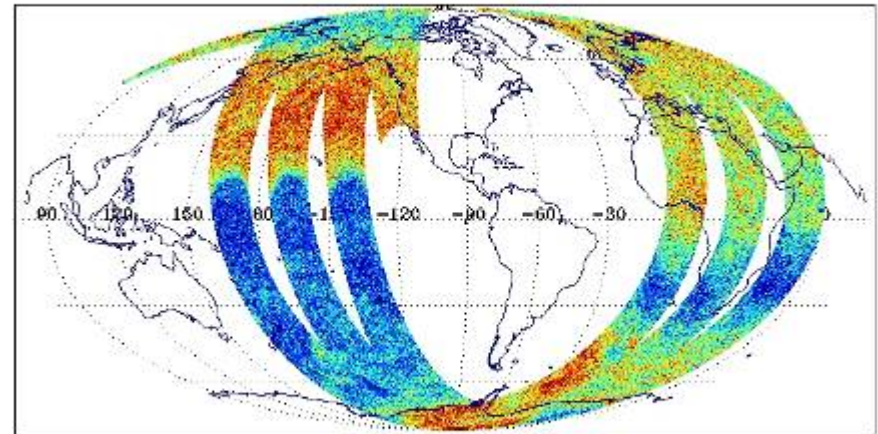


(-2.00 -1.39 -0.81 -0.25 0.34 0.92 1.50 2.07 2.66 3.22 3.80 4.38 4.95 5.53 6.11 6.69 7.26 7.86)

SSMIS – ECMWF 250 hPa  
Temperature Departure

SSMIS OB-BK ECMWF RTTOV-7 Ch. 4 54.4 GHz V  
DTG: 2005052606  
08271-08273

No. Scenes: 624598  
Min -9.30 MEAN 1.25  
Max 3.33 SDEV 0.52



(0.00 0.13 0.25 0.37 0.49 0.62 0.74 0.86 0.98 1.10 1.22 1.35 1.47 1.59 1.71 1.83 1.95 2.07)

SSMIS – ECMWF RTTOV-7  
Ch. 4 Departure



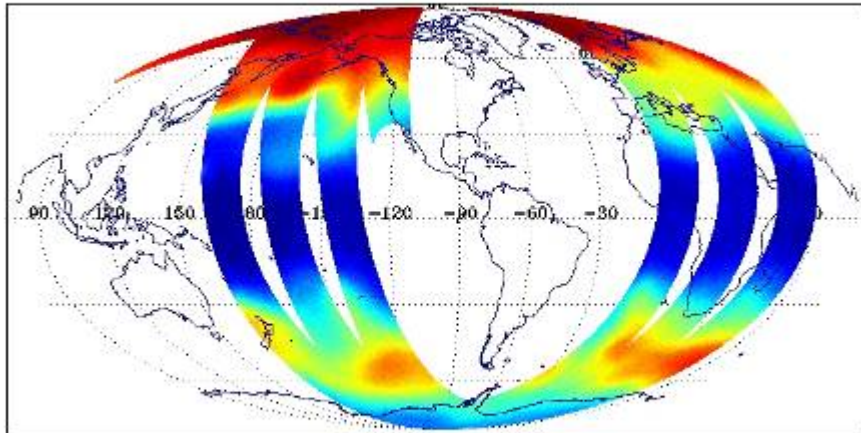
# SSMIS Cal/Val Calibration Anomaly Analysis



DMSP F-16 SSMIS 100 hPa Temperature  
DTG: 2005052606  
08271-08273

No. Scenes: 208199

Min	137.05	MEAN	207.52
Max	229.95	SDEV	11.84



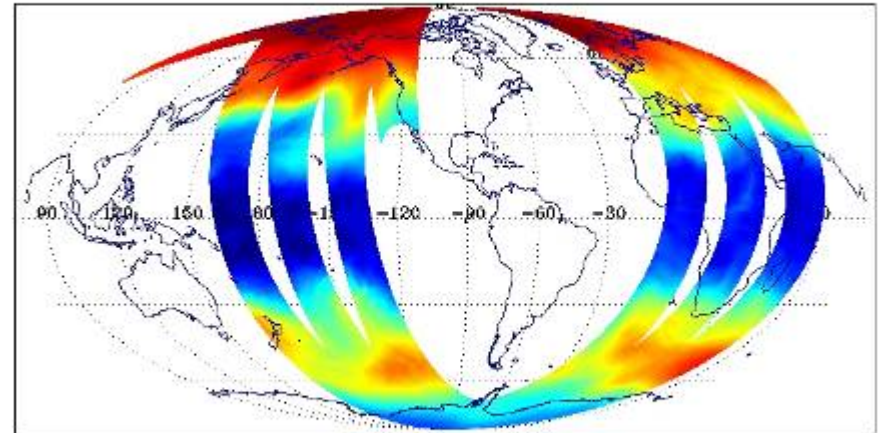
(189.26 181.25 193.83 195.87 198.11 200.35 202.59 204.53 207.07 208.31 211.05 213.00 216.24 218.28 220.52 222.76 225.00217.18)

SSMIS 100 hPa T

ECMWF 100 hPa Temperature Analysis  
DTG: 2005052606  
08271-08273

No. Scenes: 208199

Min	137.38	MEAN	208.61
Max	229.37	SDEV	11.40



(189.26 181.25 193.83 195.87 198.11 200.35 202.59 204.53 207.07 208.31 211.05 213.00 216.24 218.28 220.52 222.76 225.00217.18)

ECMWF 100 hPa T



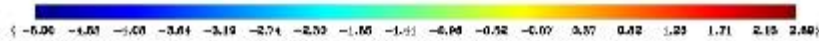
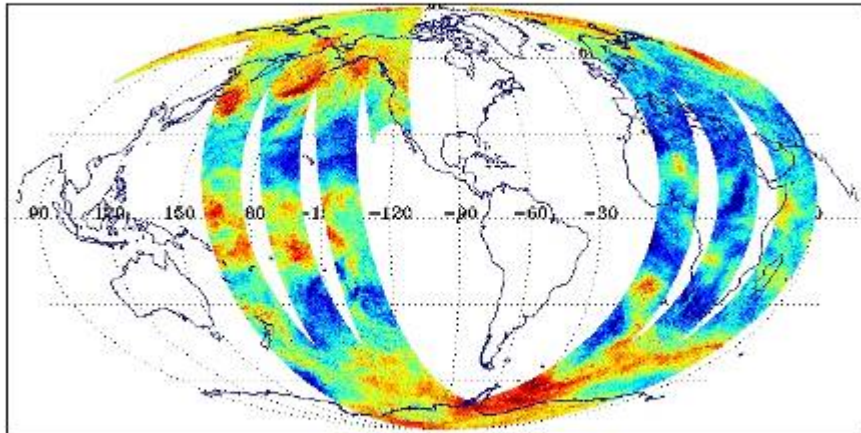
# SSMIS Cal/Val Calibration Anomaly Analysis



SSMIS OB-BK ECMWF 100 hPa Temperature Analysis  
DTG: 2005052606  
08271-08273

No. Scenes: 208199

Min -74.96 MEAN -1.09  
Max 3.87 SDEV 1.89

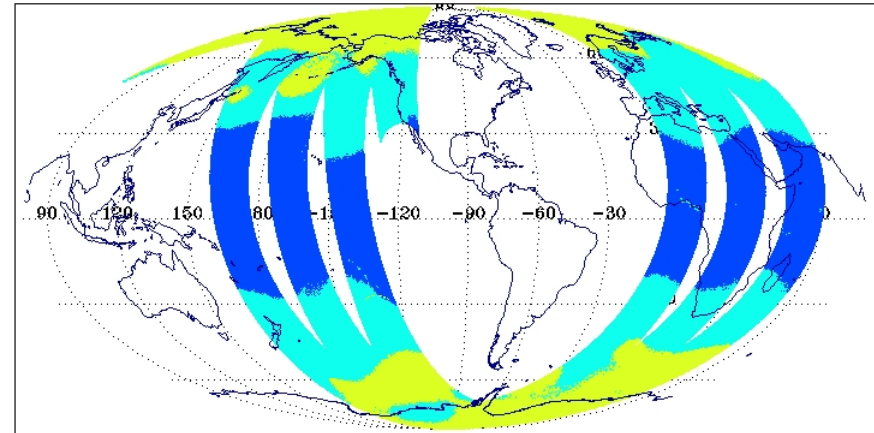


SSMIS – ECMWF 100 hPa  
Temperature Departure

SSMIS Temperature D-Matrix  
DTG: 2005052606  
08271-08273

No. Scenes: 208198

Min 0.00 MEAN 0.00  
Max 0.00 SDEV 0.00



SSMIS Temperature D-Matrix





# SSMIS Cal/Val Calibration Anomaly Analysis

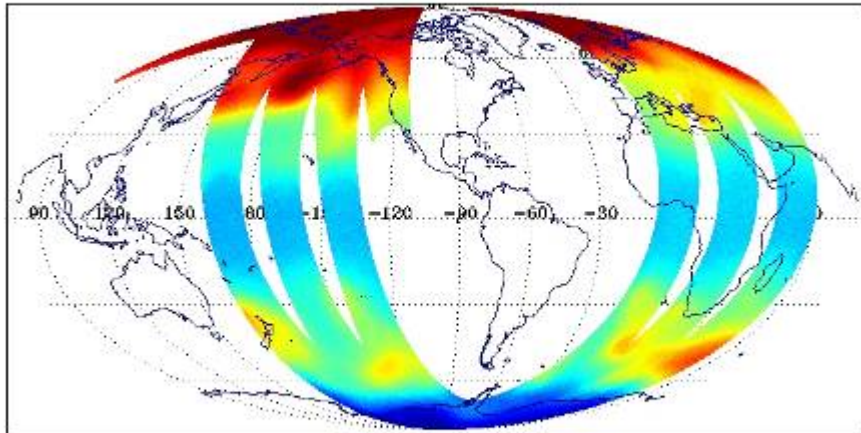


DMSP F-16 SSMIS Ch. 5 55.5 GHz V  
DTG: 2005052606  
08271-08273

No. Scenes: 624598

Min 2.92  
Max 332.18

MEAN 215.39  
SDEV 7.65



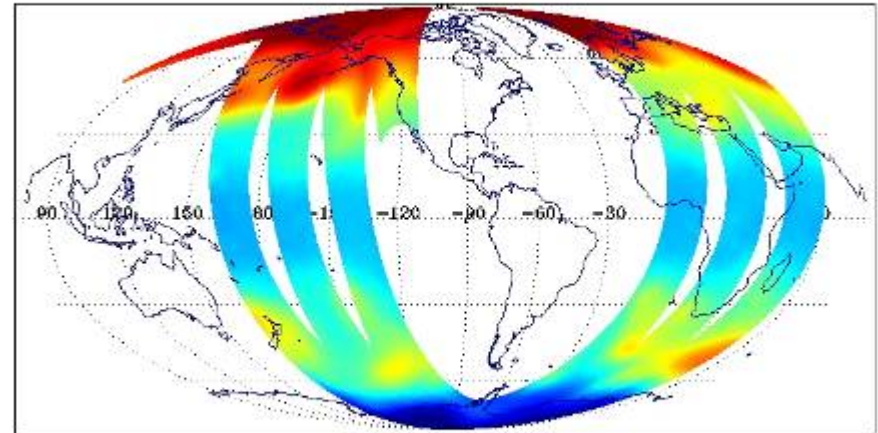
200.0 201.3 203.3 205.0 206.4 208.2 209.5 211.0 213.1 214.7 216.3 217.9 219.5 221.1 222.8 224.4 226.0 227.0

ECMWF RTTOV-7 SSMIS Ch. 5 55.5 GHz V  
DTG: 2005052606  
08271-08273

No. Scenes: 624598

Min 198.93  
Max 330.07

MEAN 214.53  
SDEV 7.14



200.0 201.3 203.3 205.0 206.4 208.2 209.5 211.0 213.1 214.7 216.3 217.9 219.5 221.1 222.8 224.4 226.0 227.0

SSMIS  
Ch. 5 Temperature

ECMWF RTTOV-7  
Ch. 5 Temperature



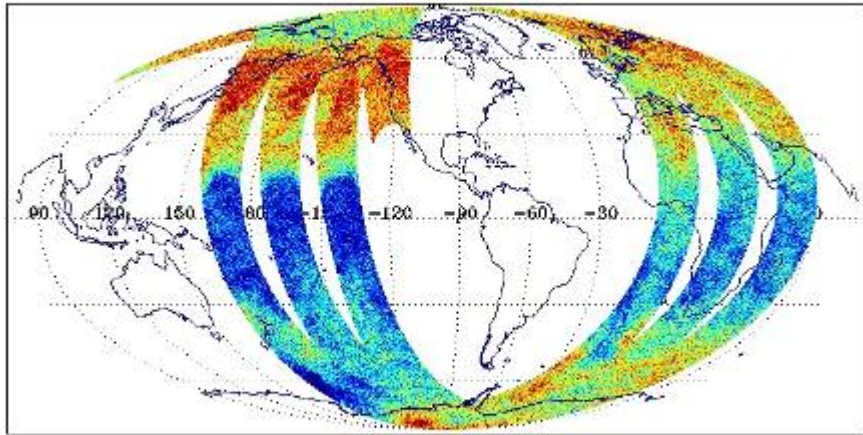
# SSMIS Cal/Val Calibration Anomaly Analysis



SSMIS OB-BK ECMWF RTTOV-7 Ch. 5 55.5 GHz V  
DTG: 2005052606  
08271-08273

No. Scenes: 624598

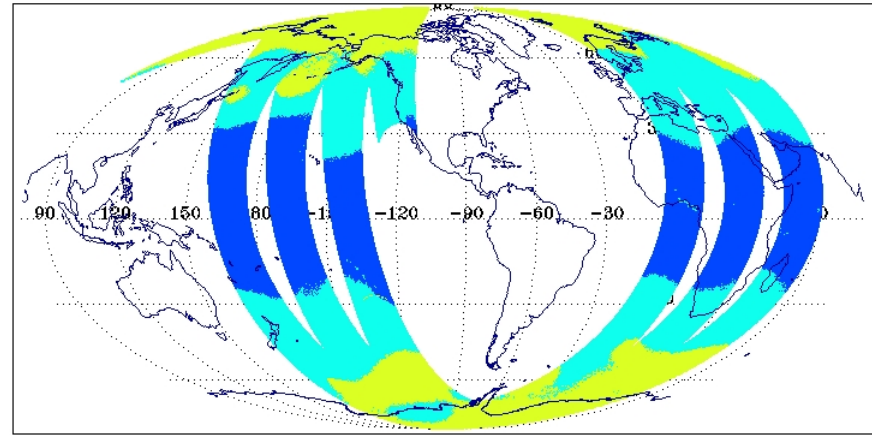
Min -1.84  
Max 3.52  
MEAN 0.88  
SDEV 0.62



SSMIS Temperature D-Matrix  
DTG: 2005052606  
08271-08273

No. Scenes: 208198

Min 0.00  
Max 0.00  
MEAN 0.00  
SDEV 0.00



SSMIS – ECMWF RTTOV-7  
Ch. 5 Departure

SSMIS Temperature D-Matrix



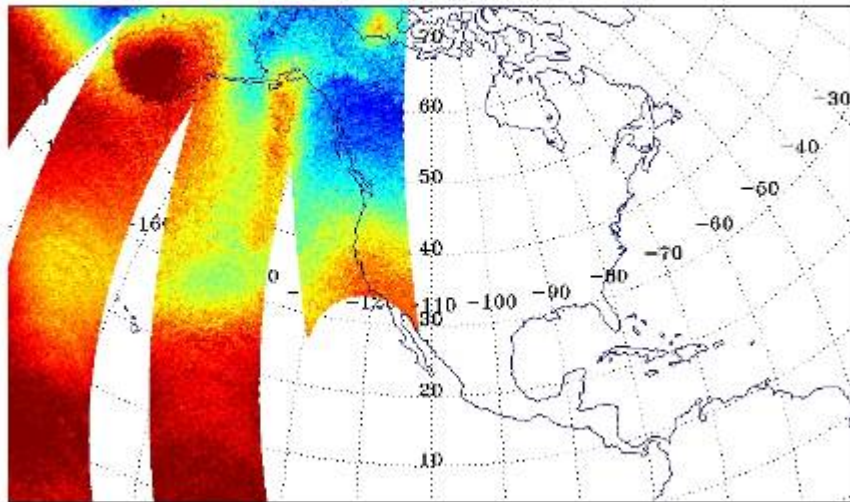
# SSMIS Cal/Val Calibration Anomaly Analysis



DMSP F-16 SSMIS 250 hPa Temperature  
DTG: 2005052606  
08271-08273

No. Scenes: 208199

Min	145.05	MEAN	225.89
Max	238.75	SDEV	6.44

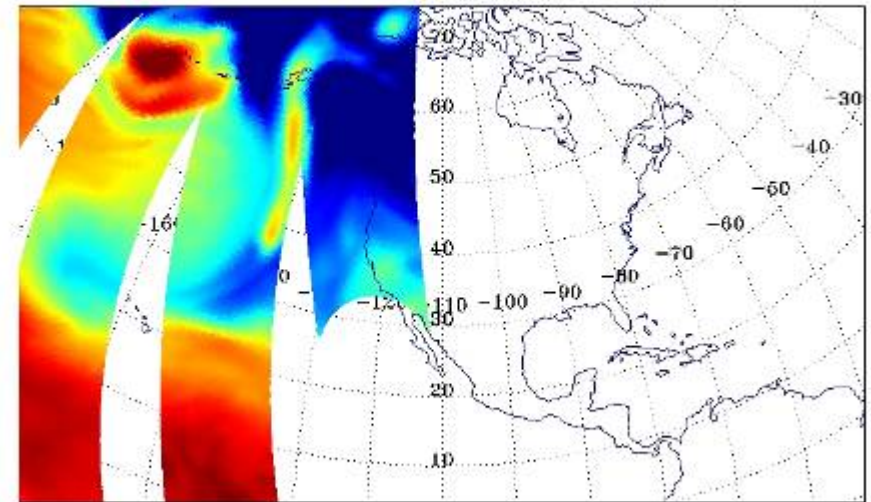


(220.06 220.54 221.02 221.50 221.98 222.46 222.94 223.42 223.90 224.38 224.86 225.34 225.82 226.30 226.78 227.26 227.74 228.22 228.70 229.18 229.66 230.14 230.62 231.10 231.58 232.06 232.54)

ECMWF 250 hPa Temperature Analysis  
DTG: 2005052606  
08271-08273

No. Scenes: 208199

Min	203.20	MEAN	222.93
Max	236.01	SDEV	7.46



(220.06 220.54 221.02 221.50 221.98 222.46 222.94 223.42 223.90 224.38 224.86 225.34 225.82 226.30 226.78 227.26 227.74 228.22 228.70 229.18 229.66 230.14 230.62 231.10 231.58 232.06 232.54)

SSMIS 250 hPa T

ECMWF 250 hPa T



# SSMIS Cal/Val Calibration Anomaly Analysis

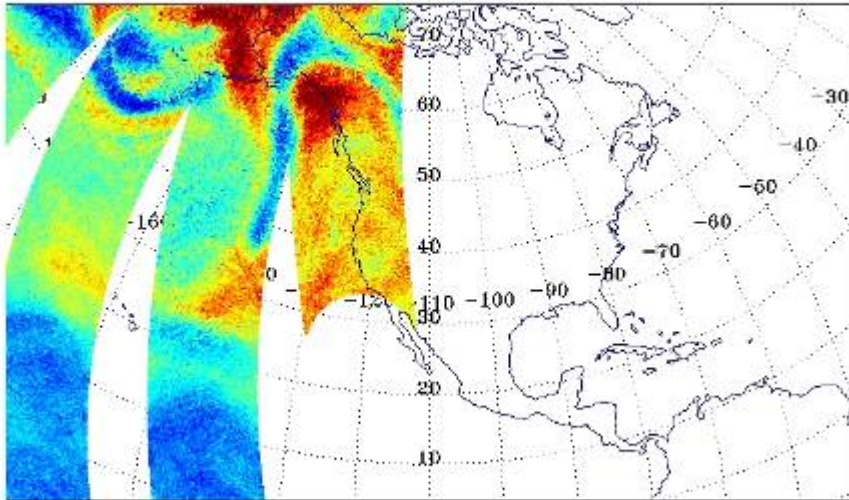


SSMIS OB-BK ECMWF 250 hPa Temperature Analysis

DTG: 2005052606  
08271-08273

No. Scenes: 208199

Min	-81.82	MEAN	2.96
Max	11.75	SDEV	2.45



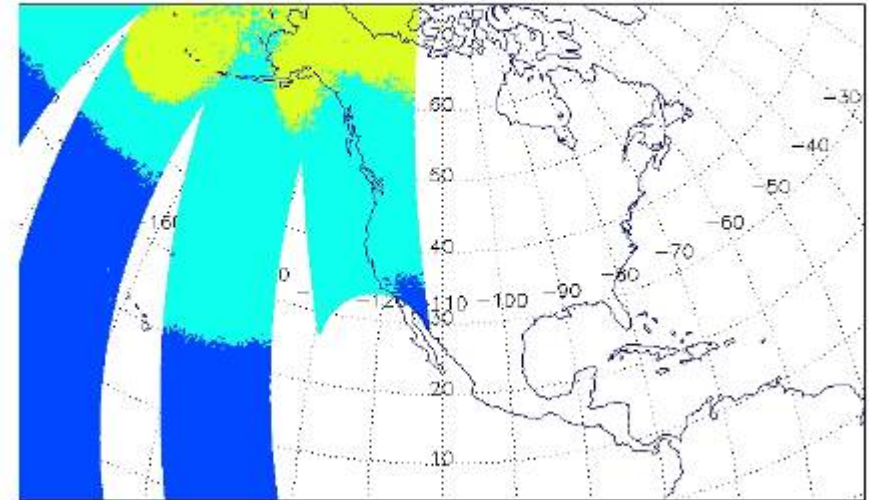
( -2.00 -1.75 -1.50 -1.25 -1.00 -0.75 -0.50 -0.25 0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75 4.00 4.25 4.50 4.75 5.00 5.25 5.50 5.75 6.00 6.25 6.50 6.75 7.00 7.25 7.50 7.75 8.00 )

SSMIS Temperature D-Matrix

DTG: 2005052606  
08271-08273

No. Scenes: 208198

Min	0.00	MEAN	0.00
Max	0.00	SDEV	0.00



( 0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75 4.00 4.25 4.50 4.75 5.00 5.25 5.50 5.75 6.00 )

SSMIS – ECMWF 250 hPa  
Temperature Departure

SSMIS Temperature D-Matrix



# SSMIS Cal/Val Calibration Anomaly Analysis



## SSMIS Cal/Val SSMIS LAS T and RH vs. ECMWF Analyses

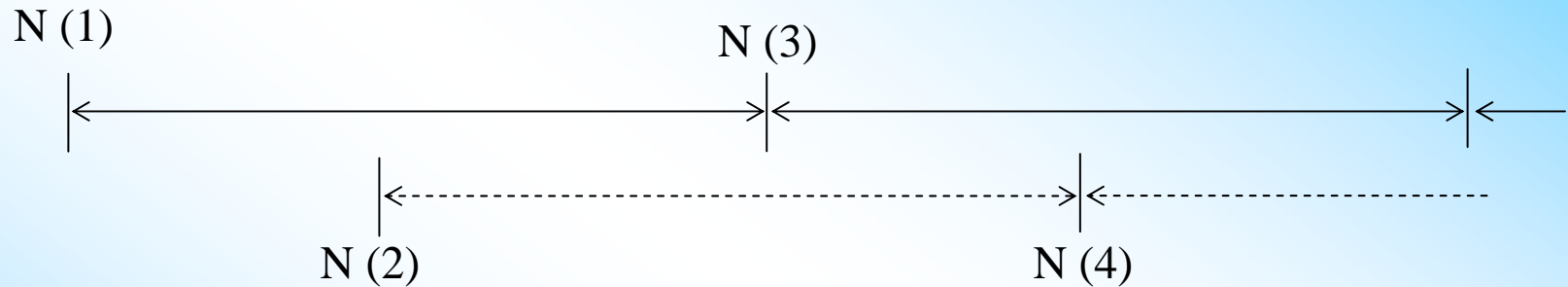
- **SSMIS Retrieval – ECMWF Analyses (OB-BK)**
- **Both Warm Load and Reflector Anomalies Effect Sounding EDRs**
- **However, the Calibration Anomalies are Not the Dominant Signature in the SSMIS Retrieval – ECMWF Patterns**
- **OB-BK Transition patterns Correlated with D-Matrix**
- **Temperature Retrieval OB-BK Transition Patterns Show Correlation with D-Matrix Transitions**



# SSMIS Cal/Val Calibration Anomaly Analysis



## LUNAR ENCROACHMENT DETECTION SCHEME



$$\text{BASE} = \frac{\text{COLD CAL (1)} + \text{COLD CAL (3)}}{2}$$

### LUNAR ENCROACHMENT

$\text{COLD CAL} > \text{BASE} + \text{THRESHOLD}$

NUMBER TO EXCEED 8

NO EFFECT ON WARM CAL

ONLY TESTED CHANNEL 4 AND CHANNEL 17



# SSMIS Cal/Val Calibration Anomaly Analysis



Table showing Lunar  
Incursions into the SSMIS  
Cold Sky FOV SSMIS  
Launch to 10/2004

<u>Date</u>	<u>Seconds of Day</u>	<u>First Rev.</u>	<u>Last Rev.</u>
11/5/2003	31486	249	255
11/17/2003	49626	422	427
12/5/2003	14696	671	676
12/17/2003	8307	839	845
1/3/2004	78121	1091	1096
1/15/2004	53485	1256	1260
2/2/2004	42852	1509	1514
2/13/2004	61920	1667	1671
3/3/2004	87687	1926	1931
3/13/2004	57962	2076	2082
4/1/2004	58216	2345	2350
4/11/2004	60021	2486	2492
5/1/2004	53193	2767	2773
5/11/2004	12328	2902	2908
5/31/2004	48021	3190	3198
6/10/2004	7155	3325	3331
6/30/2004	18580	3610	3615
7/10/2004	20332	3751	3758
7/30/2004	38952	4022	4027
8/9/2004	9222	4173	4179
8/27/2004	47149	4433	4438
9/8/2004	60101	4591	4598
9/25/2004	55557	4844	4850

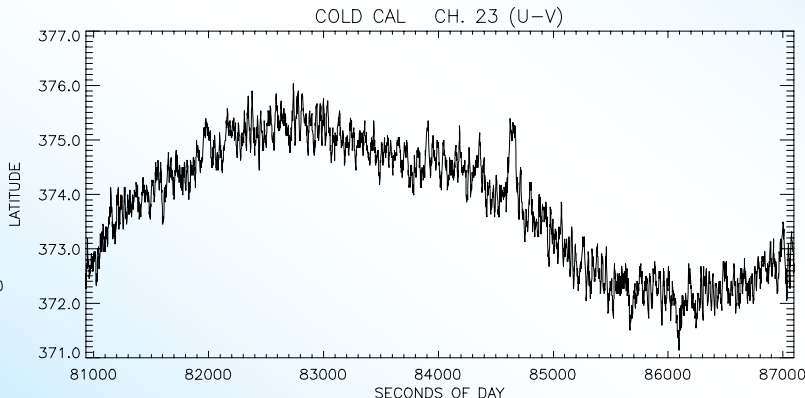
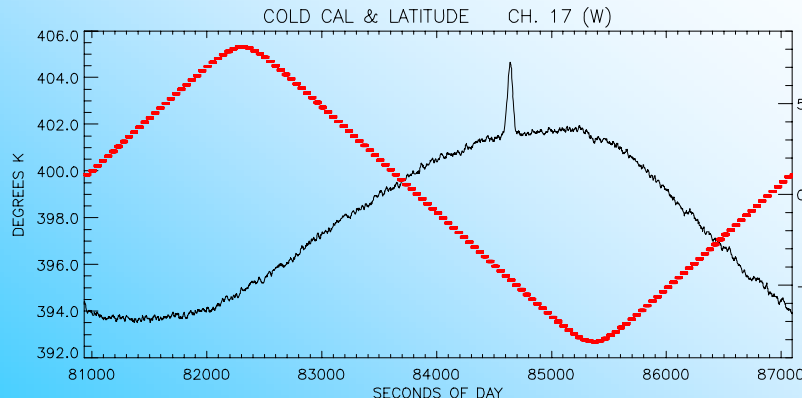
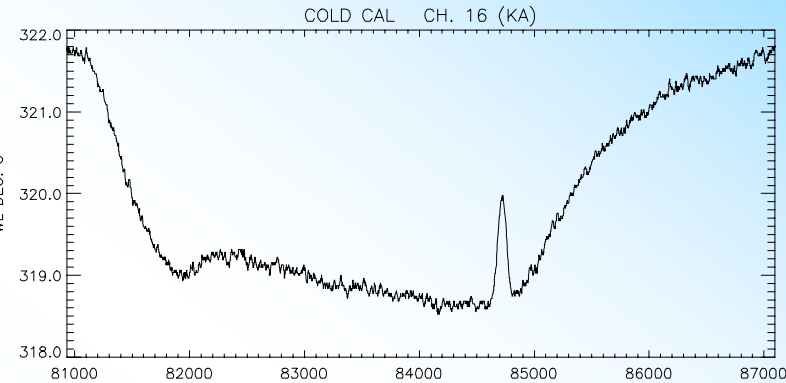
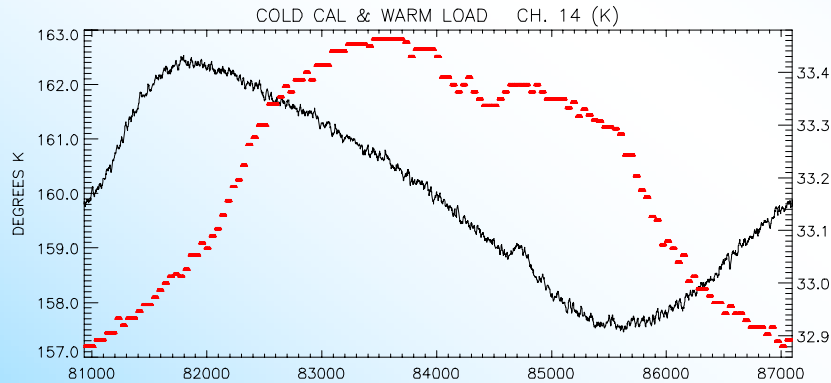
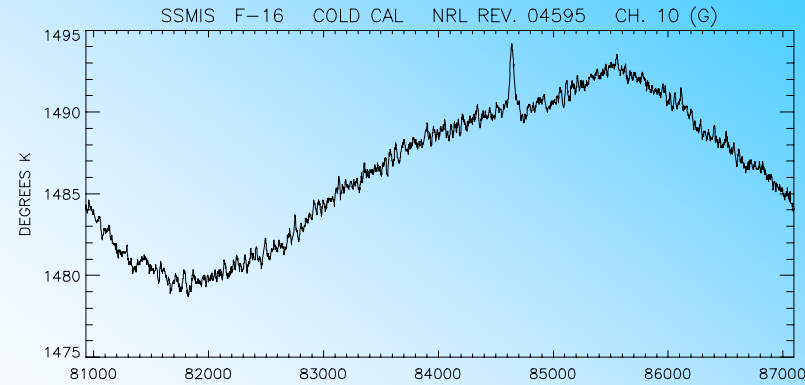
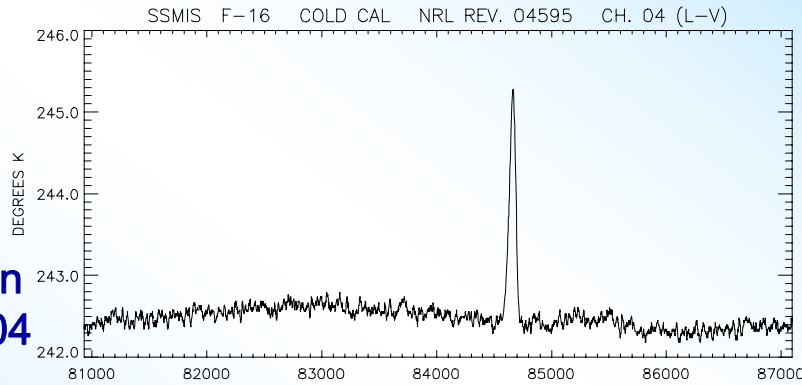


# SSMIS Cal/Val Calibration Anomaly Analysis



Example of  
Lunar incursion  
on Sept 8, 2004

Channels  
4, 10, 16, 17,  
and 23 shown



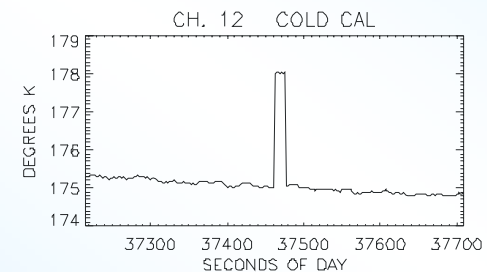
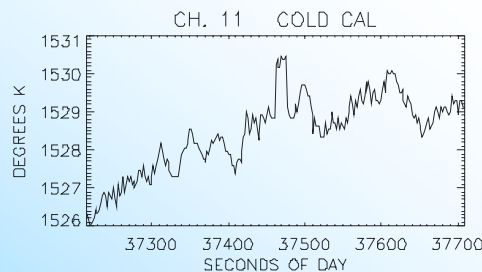
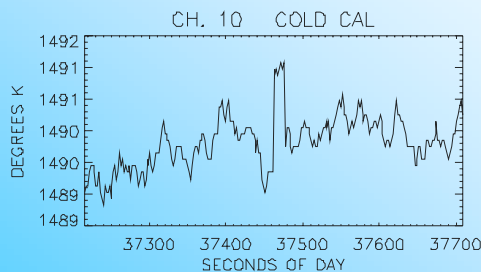
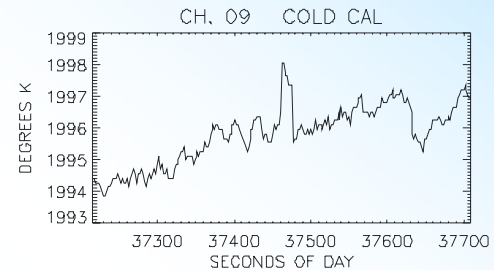
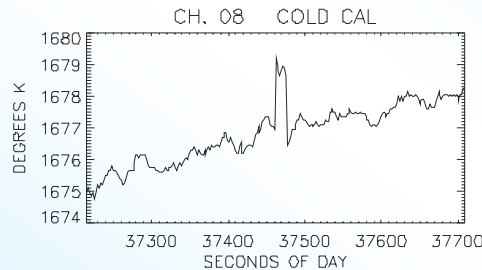
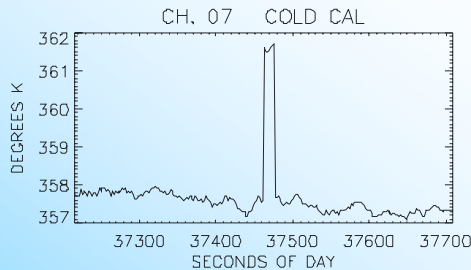
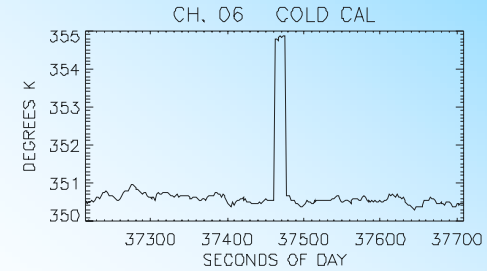
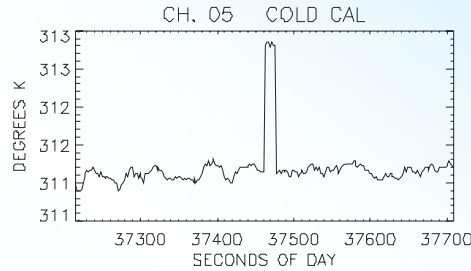
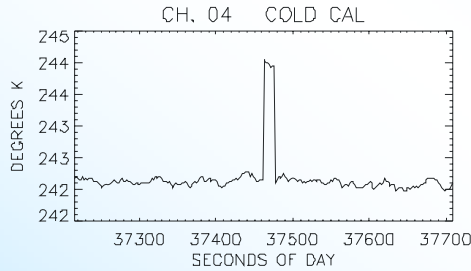
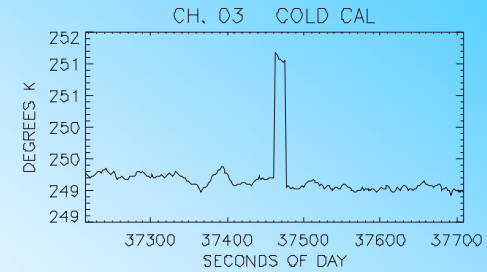
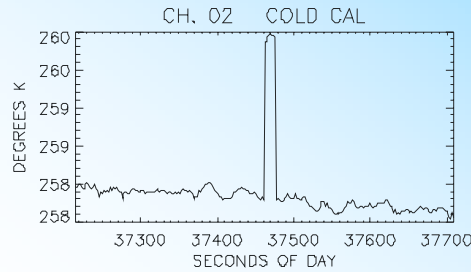
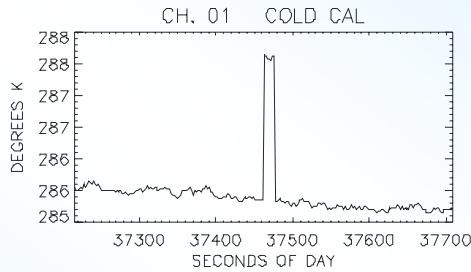




# SSMIS Cal/Val Calibration Anomaly Analysis



SSMIS F-16 REV. 04884



Example of calibration noise anomalies that are found to occur simultaneously in all channels

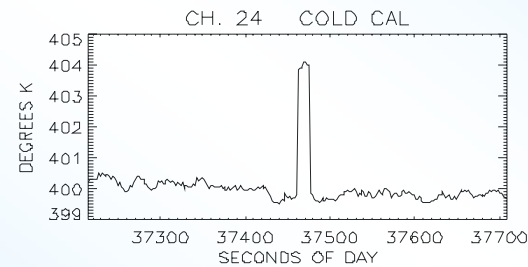
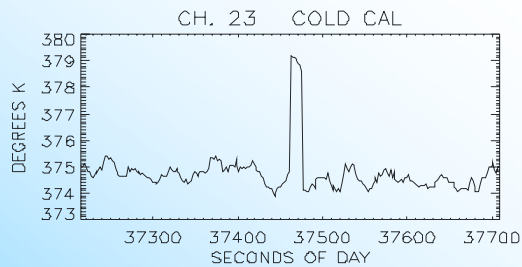
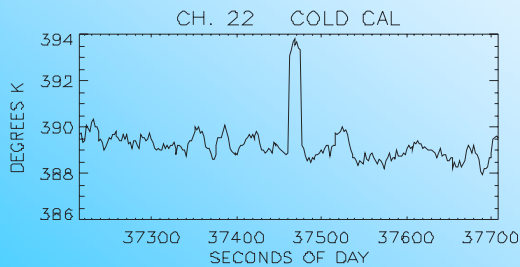
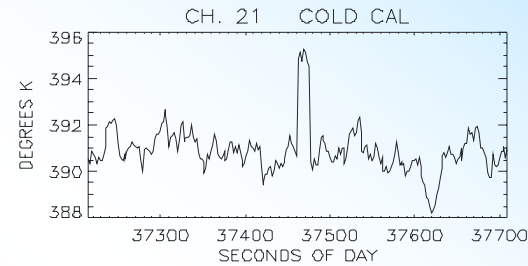
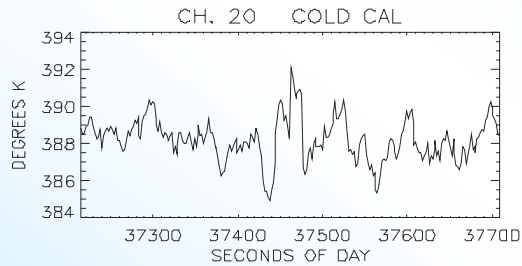
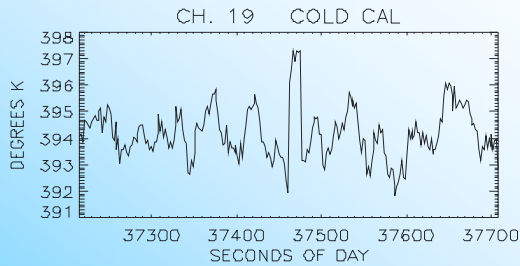
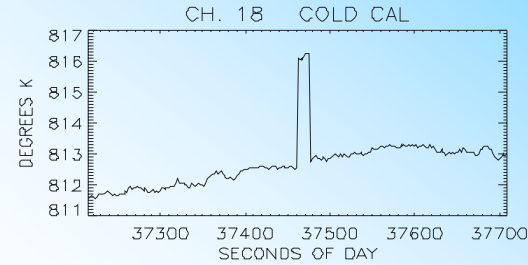
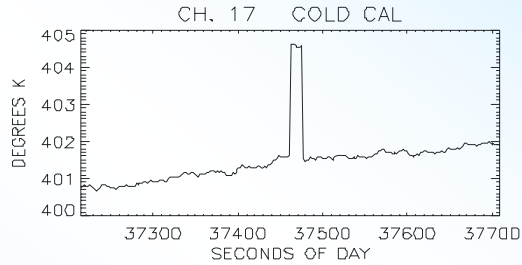
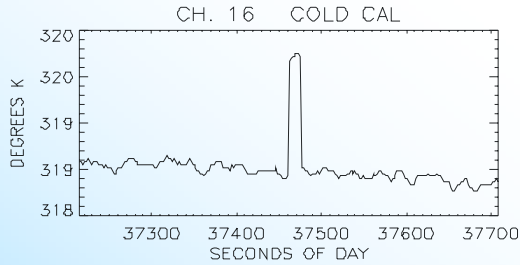
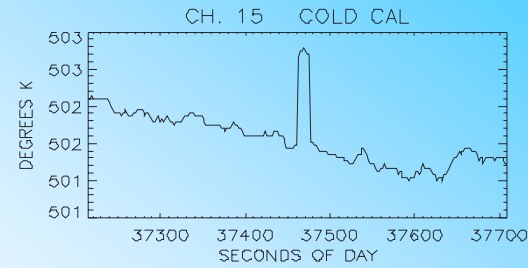
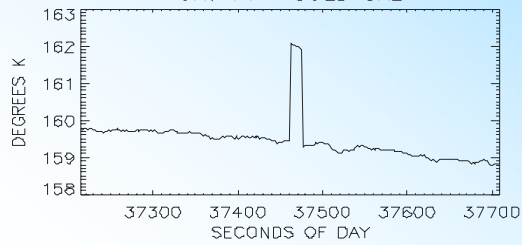
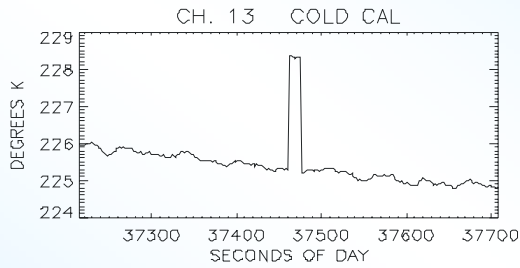
Currently this phenomenon has been detected X-times in SSMIS normal mode operation



# SSMIS Cal/Val Calibration Anomaly Analysis



SSMIS F-16 REV. 04884





# SSMIS Cal/Val Calibration Anomaly Analysis



## Sources of Bias in Scan Averaged OB-BK

- Bias in the NWP background fields
- Errors in Forward Model
  - Surface Emissivity Errors
  - Low Water Vapor Continuum Uncertainty
  - O<sub>2</sub> Absorption at Low Pressures and Temperatures
- Residual contamination of the observations from clouds or precipitation
- Within Scan Variations
- **SSMIS Calibration Anomalies**
- Inaccurate specification of SSMIS spectral response filters



# SSMIS Cal/Val Calibration Anomaly Analysis



## Regression Based Bias Corrections

Can the Scan Averaged OB-BK Bias be Modeled based upon Physical Mechanisms Identified as Sources of the OB-BK Anomalies ?

- Physically Mechanism Terms (Predictors) Include:
  - Reflector Arm Temperature
  - Time Derivative of the Reflector Arm Temperature
  - Direct Solar Intrusion Location Functions
  - Reflected Solar Intrusion Location Functions
  - Reflector Temperature Model Including Mean OLR Effects

So that,

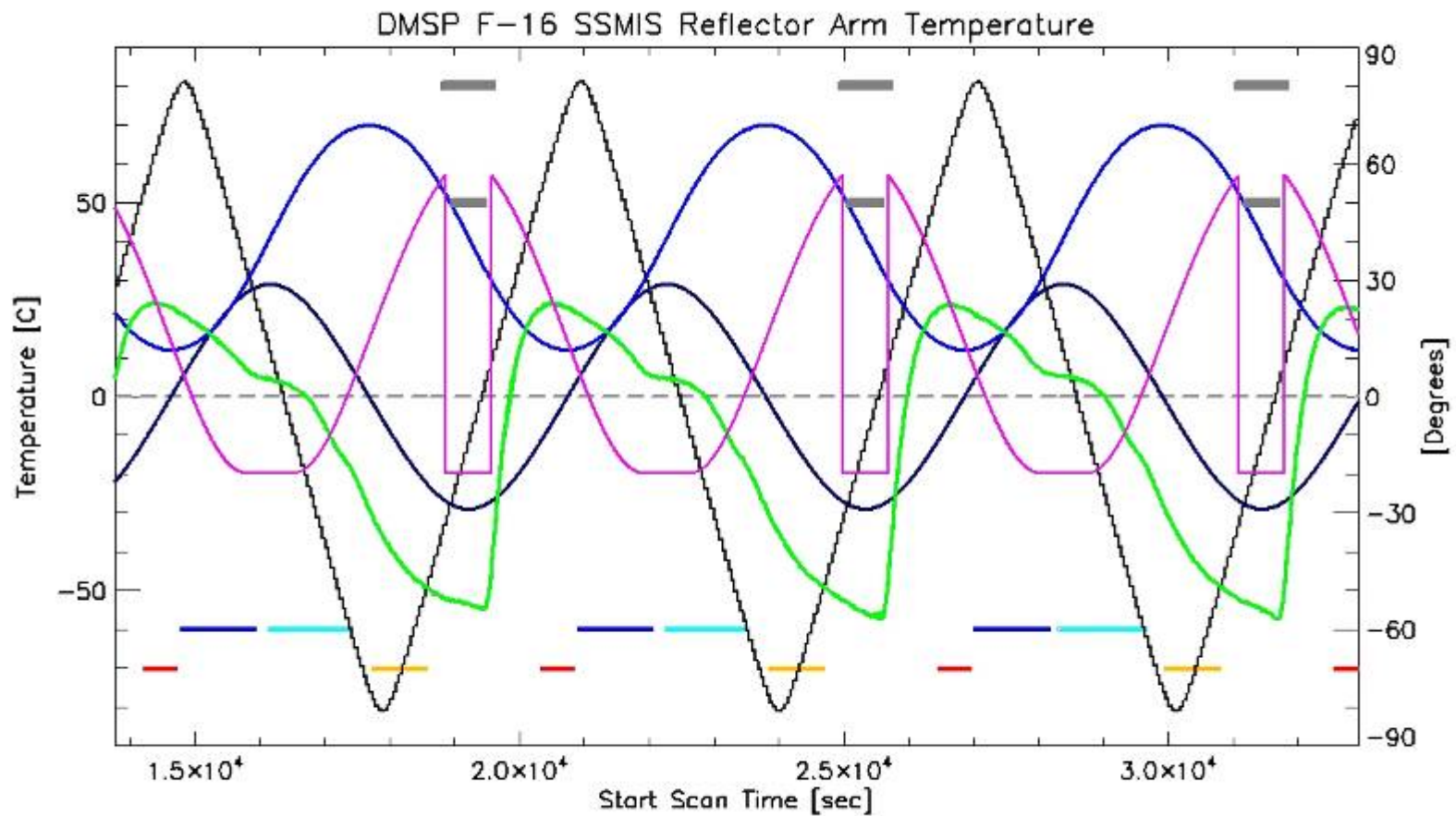
Predicted Bias =  $a_0 + a_i P_i$  ,where  $P_i$  are the Predictors



# SSMIS Cal/Val Calibration Anomaly Analysis



## Reflector Temperature Model Using Constant Mean Global OLR



DTG: 2004031706

TDR Revs: 02126-02128

Lat

Elevation

T\_Rflect\_Arm  
Azimuth

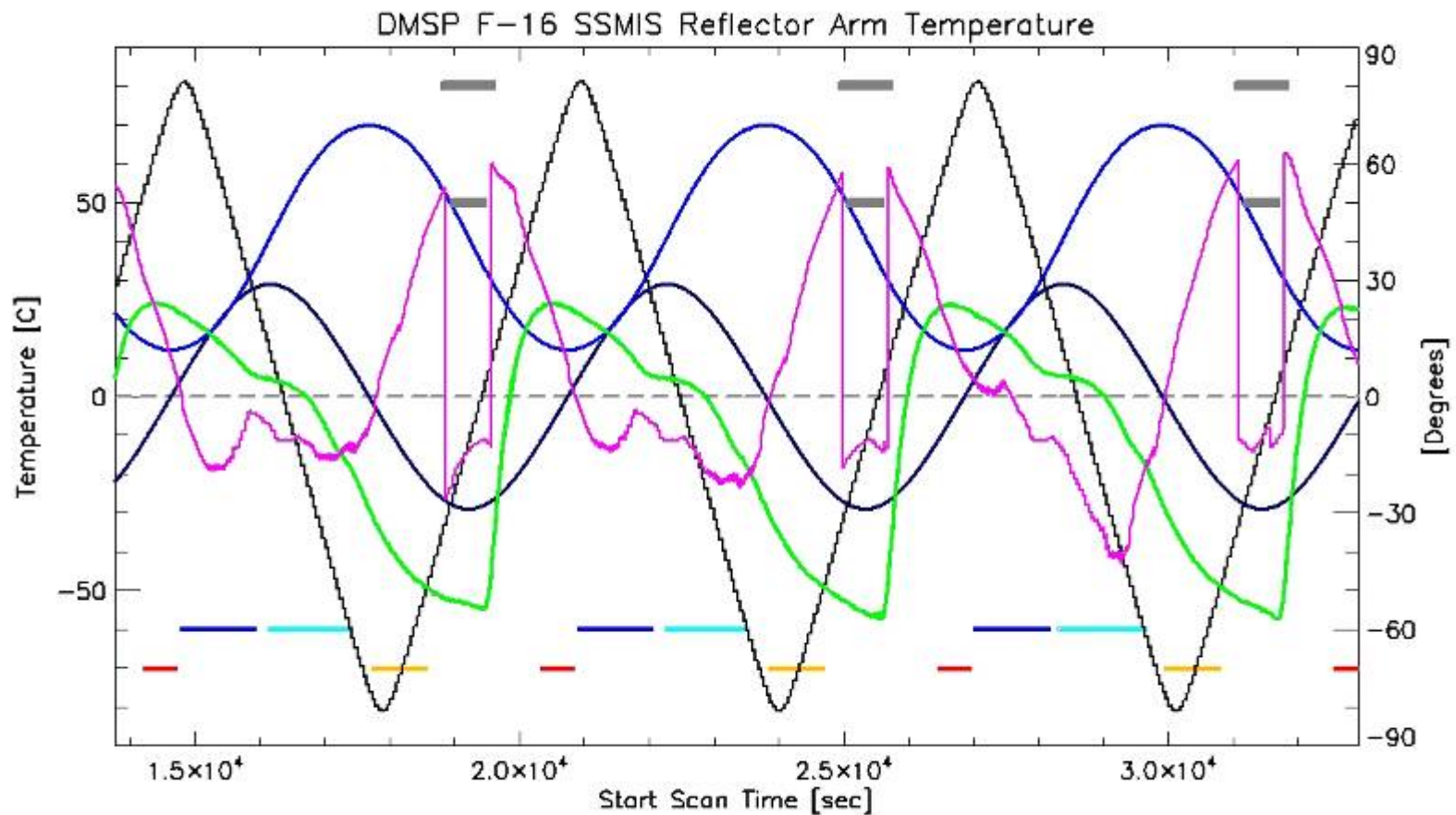
T\_Rflect  
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



## Reflector Temperature Model Using Monthly Mean OLR



DTG: 2004031706

TDR Revs: 02126-02128

Lat

Elevation

T\_Rflect\_Arm  
Azimuth

T\_Rflect  
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



## Regression Based Bias Correction Results

Reflection 1 Warm Load Intrusion Location:  $R_1$

Reflection 2 Warm Load Intrusion Location:  $R_2$

Direct Warm Load Intrusion Locations:  $D$

Observed Reflector Arm Temperature:  $T_{\text{Arm}}$

Modeled Reflector Temperature:  $T_{\text{Rflct}}$

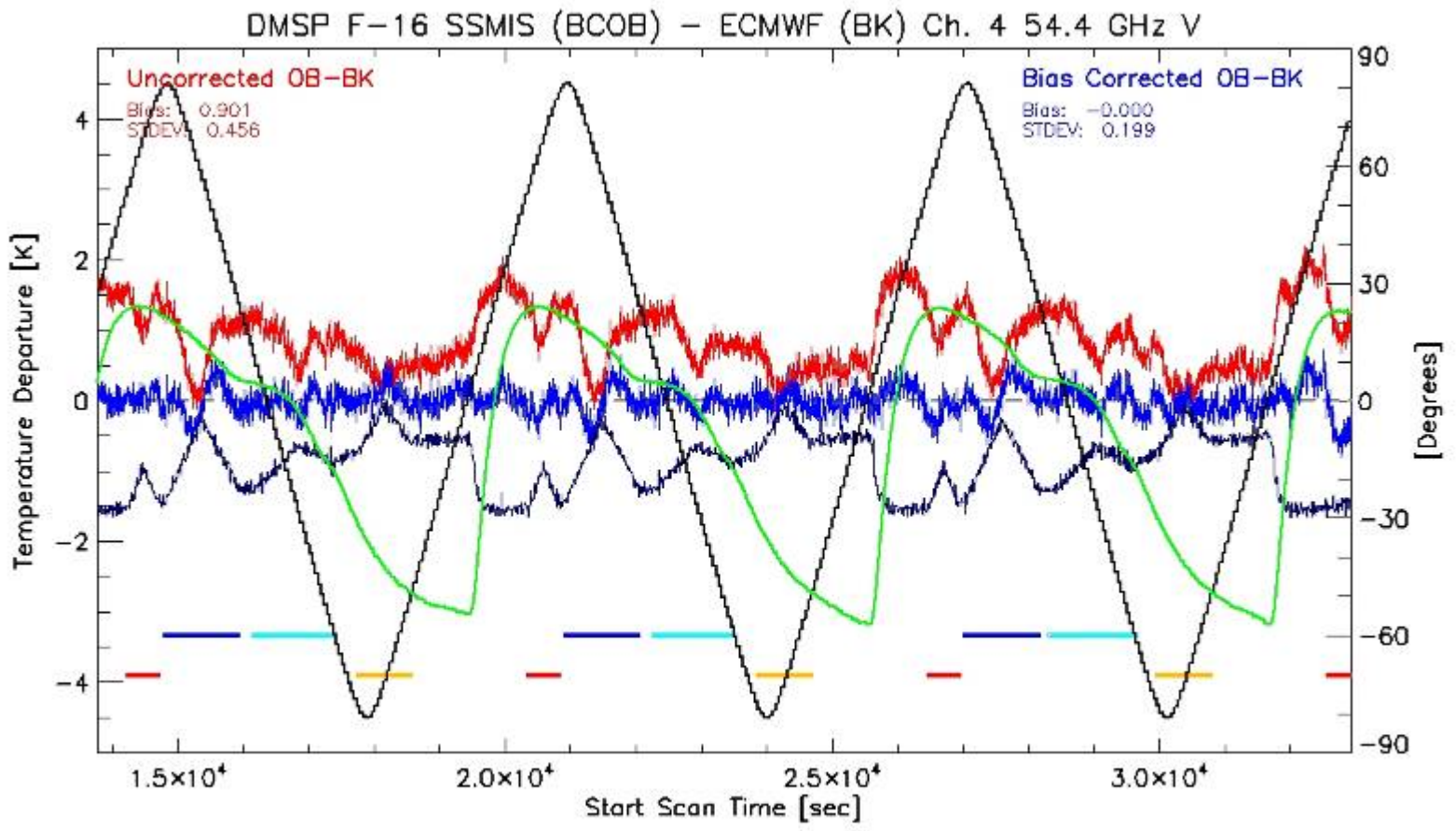
Time Derivative of Reflector Arm Temperature:  $\frac{dT_{\text{Arm}}}{dt}$



# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       



DTG: 2004031706

TDR Revs: 02126-02128

Lot

T\_Rfict\_Arm



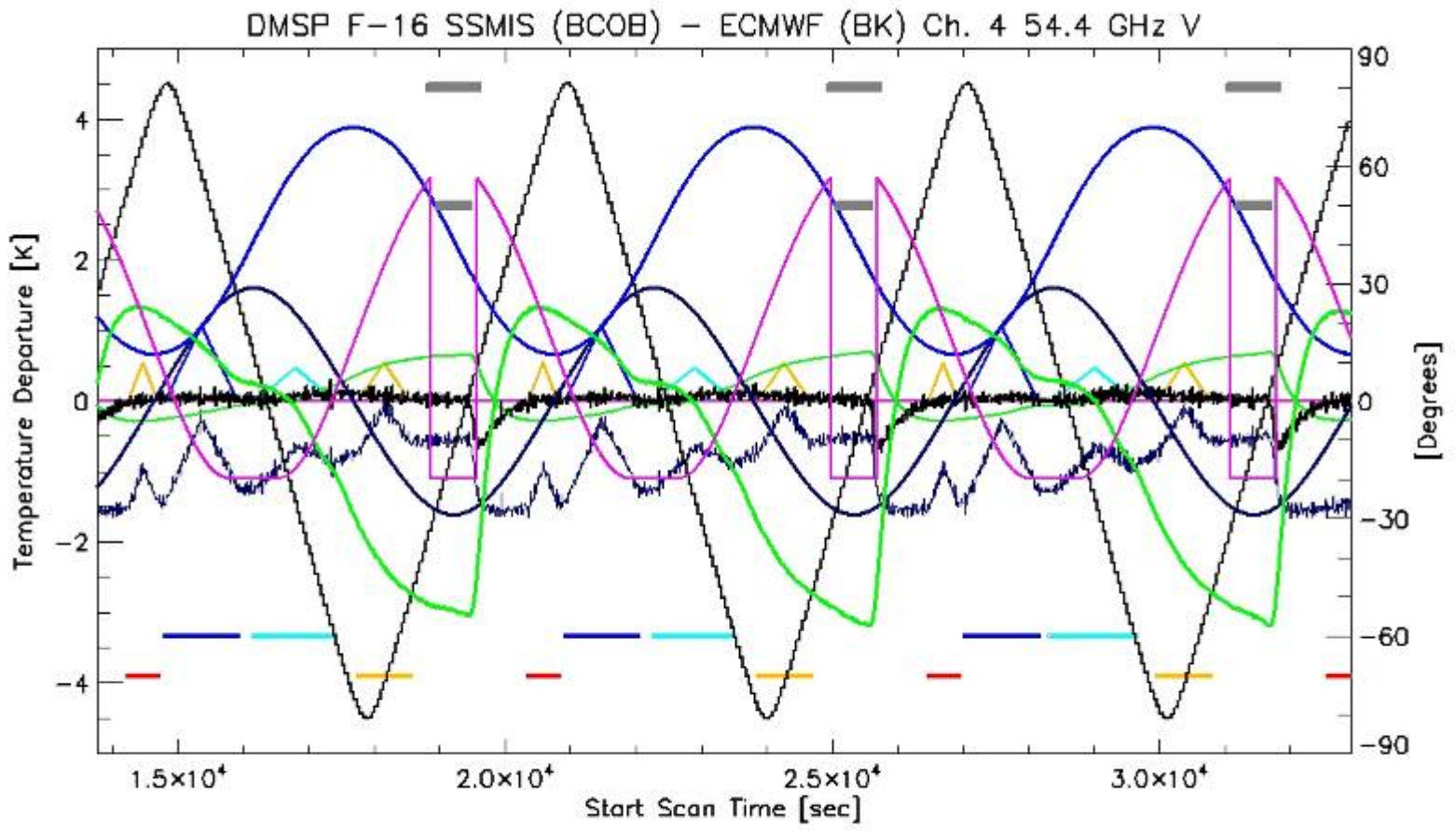


# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       

$R_1$   
 $R_2$   
 $D$   
 $T_{Arm}$   
 $T_{Rflct}$   
 $dT_{Arm}/dt$



DTG: 2004031706

TDR Revs: 02126-02128

Lat

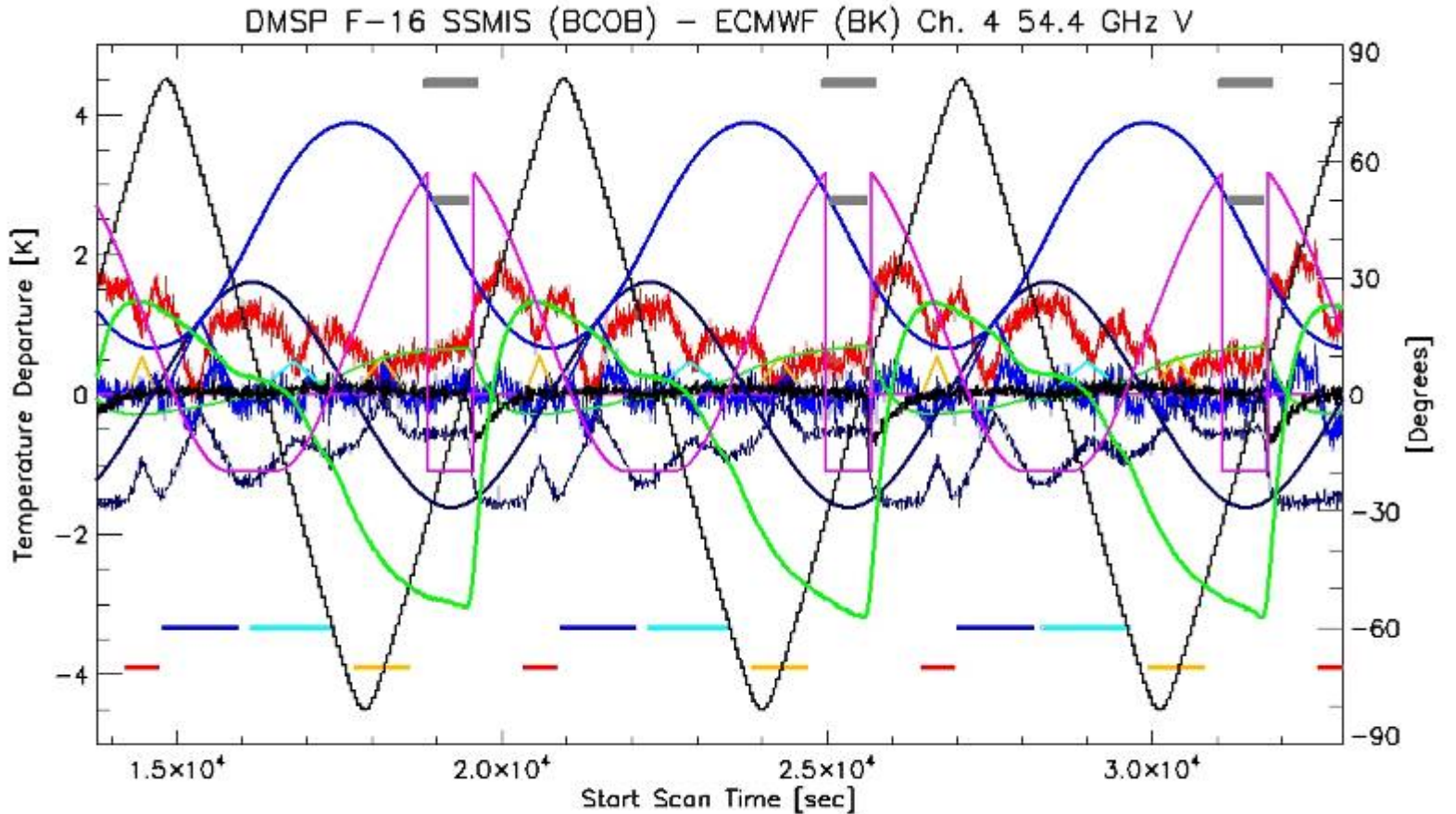
Elevation

$T_{Rflct\_Arm}$   
Azimuth

$T_{Rflct}$   
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



DTG: 2004031706

TDR Revs: 02126-02128

Lat

Elevation

T\_Rflect\_Arm  
Azimuth

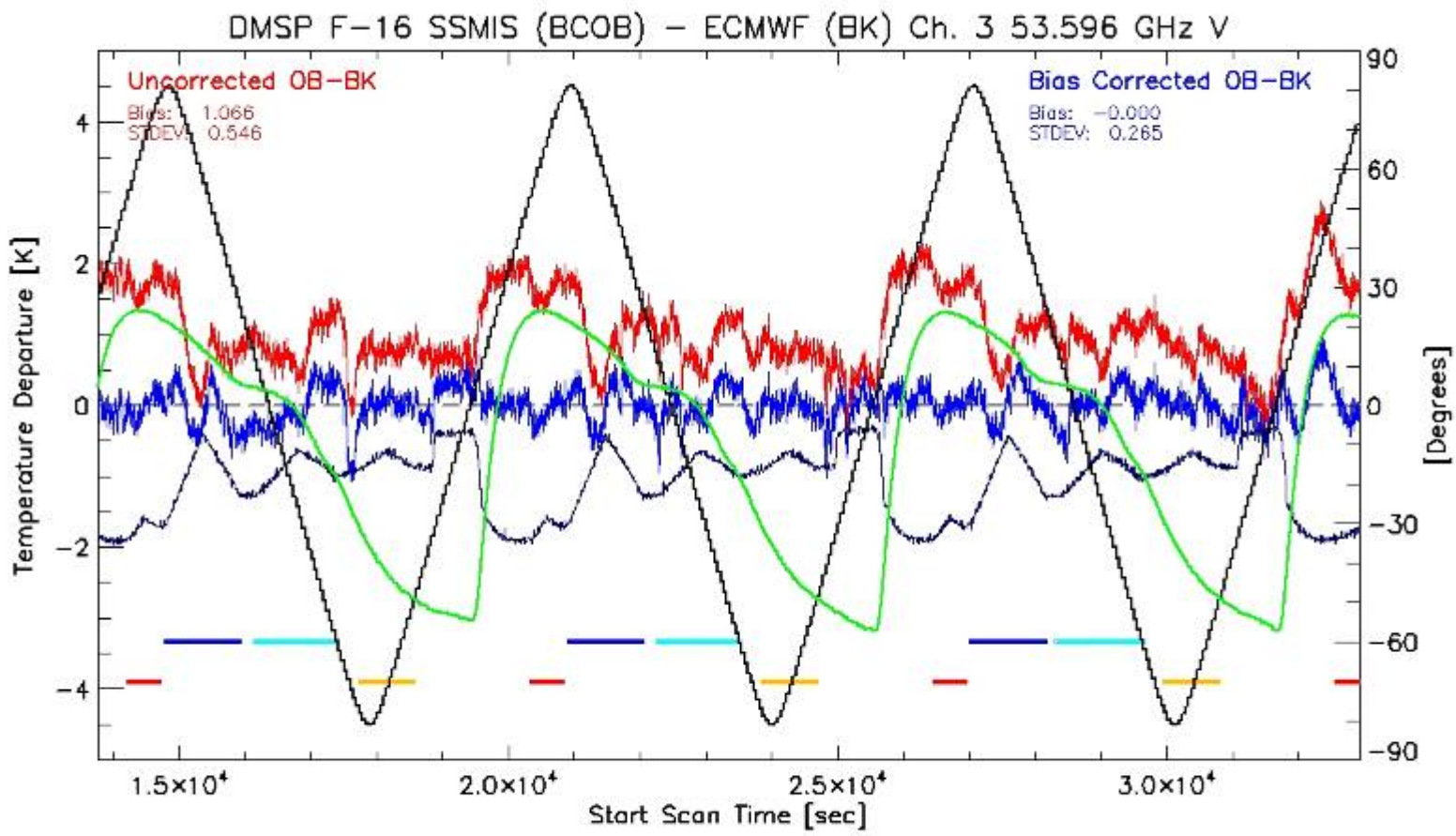
T\_Rflect  
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       



DTG: 2004031706

TDR Revs: 02126-02128

Lot

T\_Rfict\_Arm

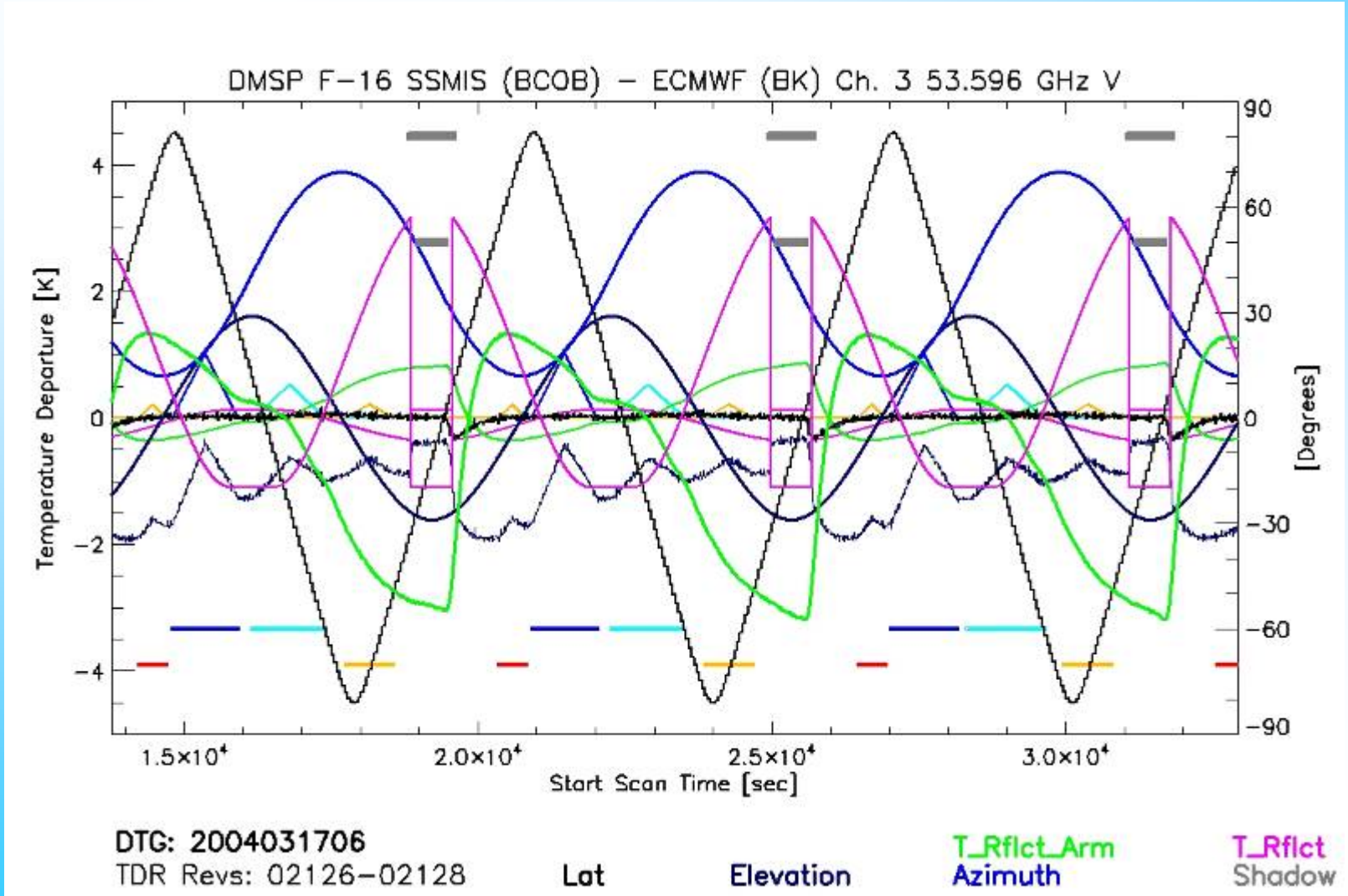


# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK \_\_\_\_\_ Bias Corrected OB-BK \_\_\_\_\_ Bias Correction \_\_\_\_\_

$R_1$   
 $R_2$   
 $D$   
 $T_{Arm}$   
 $T_{Rfct}$   
 $dT_{Arm}/dt$

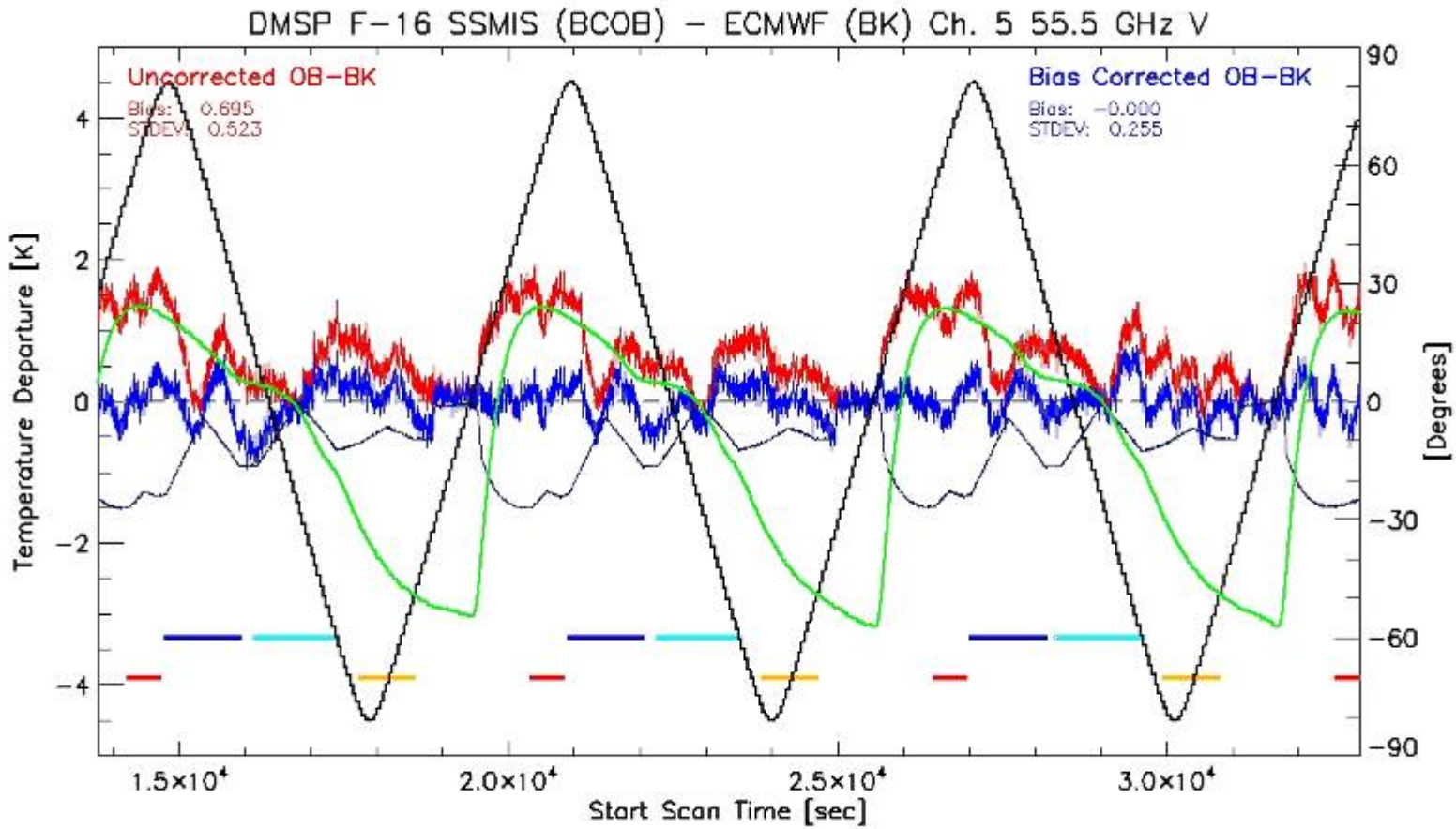




# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       



DTG: 2004031706

TDR Revs: 02126-02128

Lot

T\_Rflect\_Arm

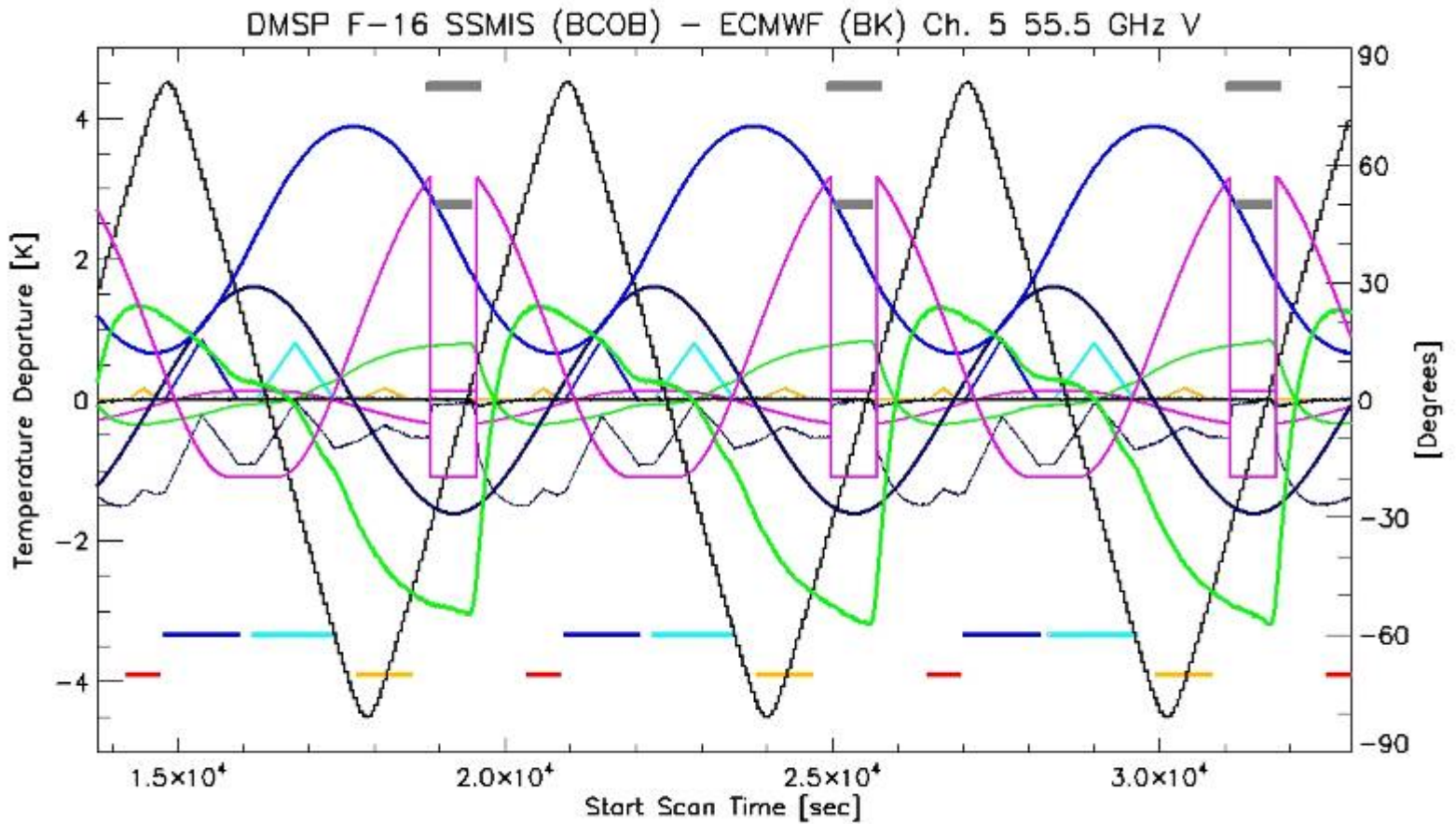


# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       

$R_1$   
 $R_2$   
 $D$   
 $T_{Arm}$   
 $T_{Rfct}$   
 $dT_{Arm}/dt$



DTG: 2004031706

TDR Revs: 02126-02128

Lat

Elevation

$T_{Rfct\_Arm}$   
Azimuth

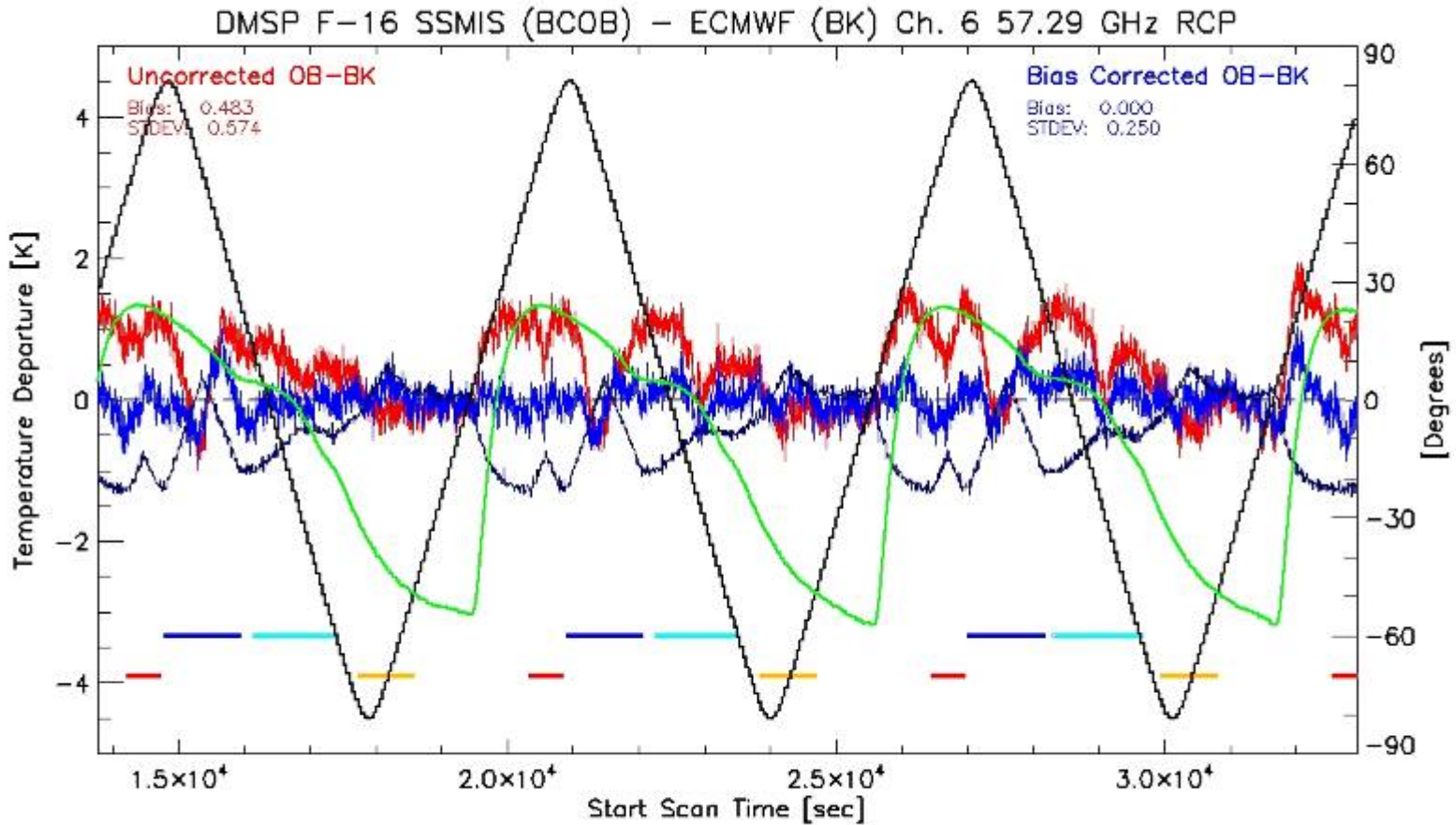
$T_{Rfct}$   
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       



DTG: 2004031706

TDR Revs: 02126-02128

Lat

T\_Rflect\_Arm

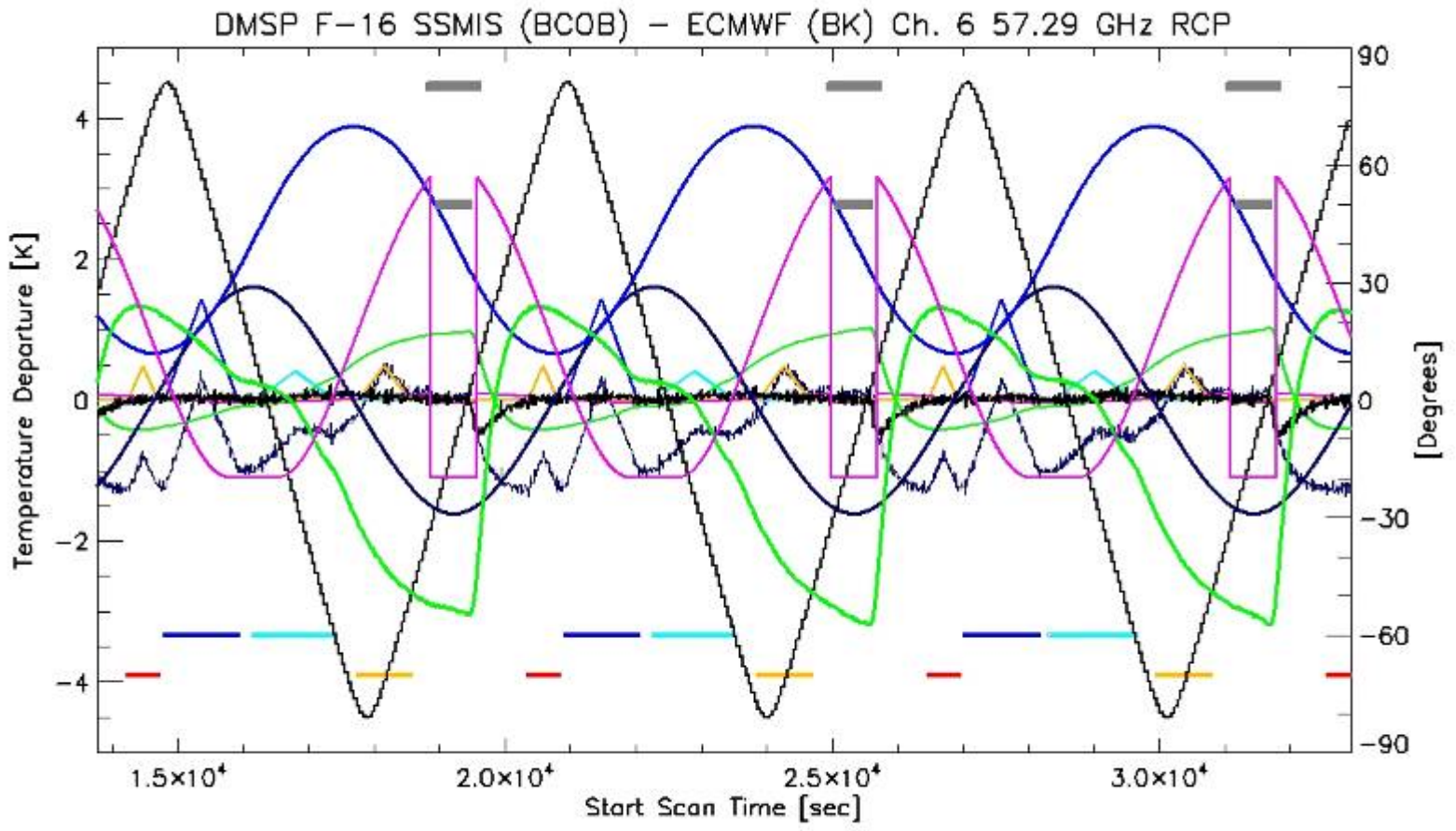


# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK \_\_\_\_\_ Bias Corrected OB-BK \_\_\_\_\_ Bias Correction \_\_\_\_\_

$R_1$   
 $R_2$   
 $D$   
 $T_{Arm}$   
 $T_{Rflct}$   
 $dT_{Arm}/dt$



DTG: 2004031706  
 TDR Revs: 02126-02128  
 Lat Elevation  $T_{Rflct\_Arm}$  Azimuth  $T_{Rflct}$  Shadow

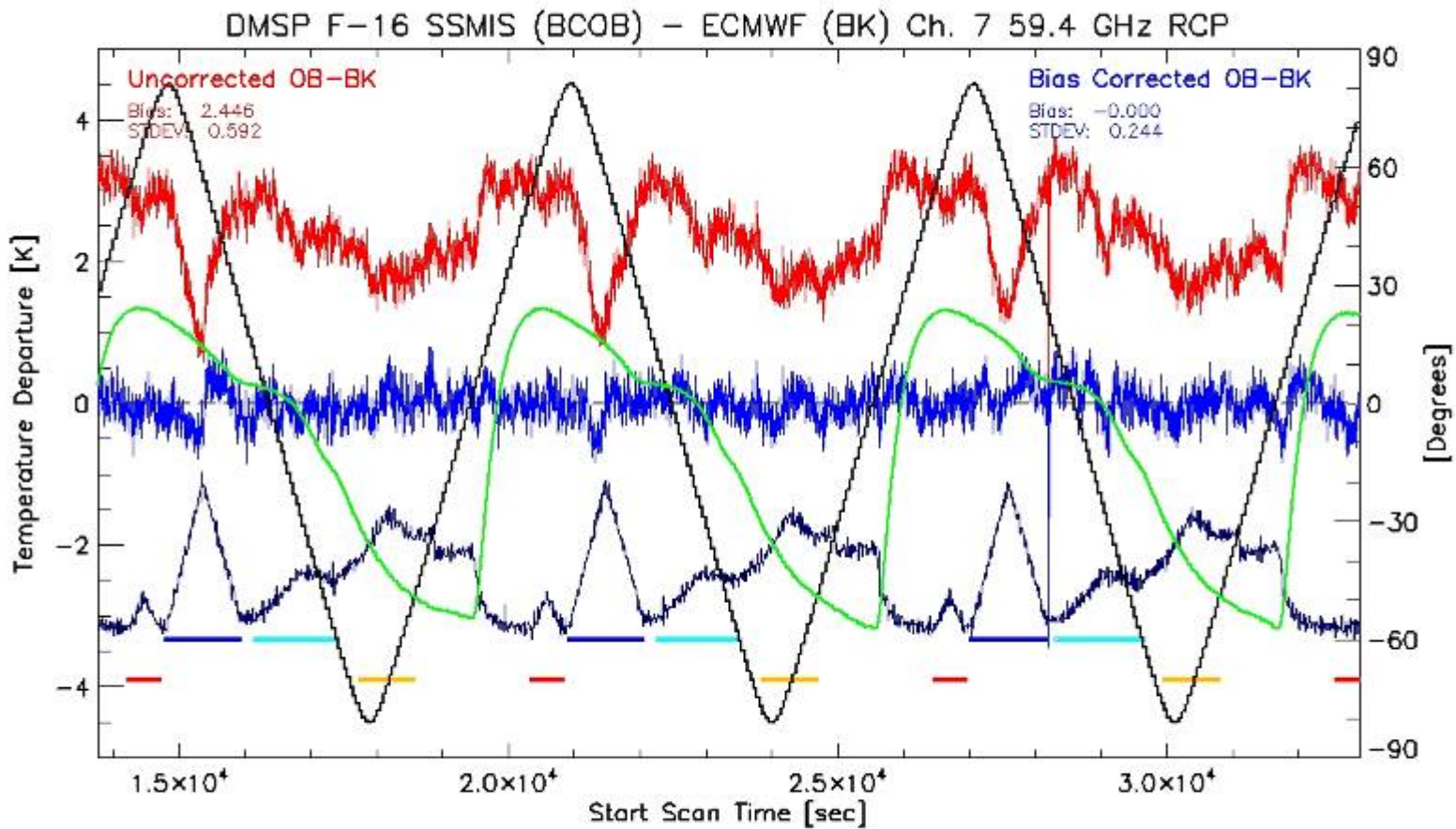




# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK \_\_\_\_\_ Bias Corrected OB-BK \_\_\_\_\_ Bias Correction \_\_\_\_\_



DTG: 2004031706  
TDR Revs: 02126-02128

Lat

T\_Rfict\_Arm

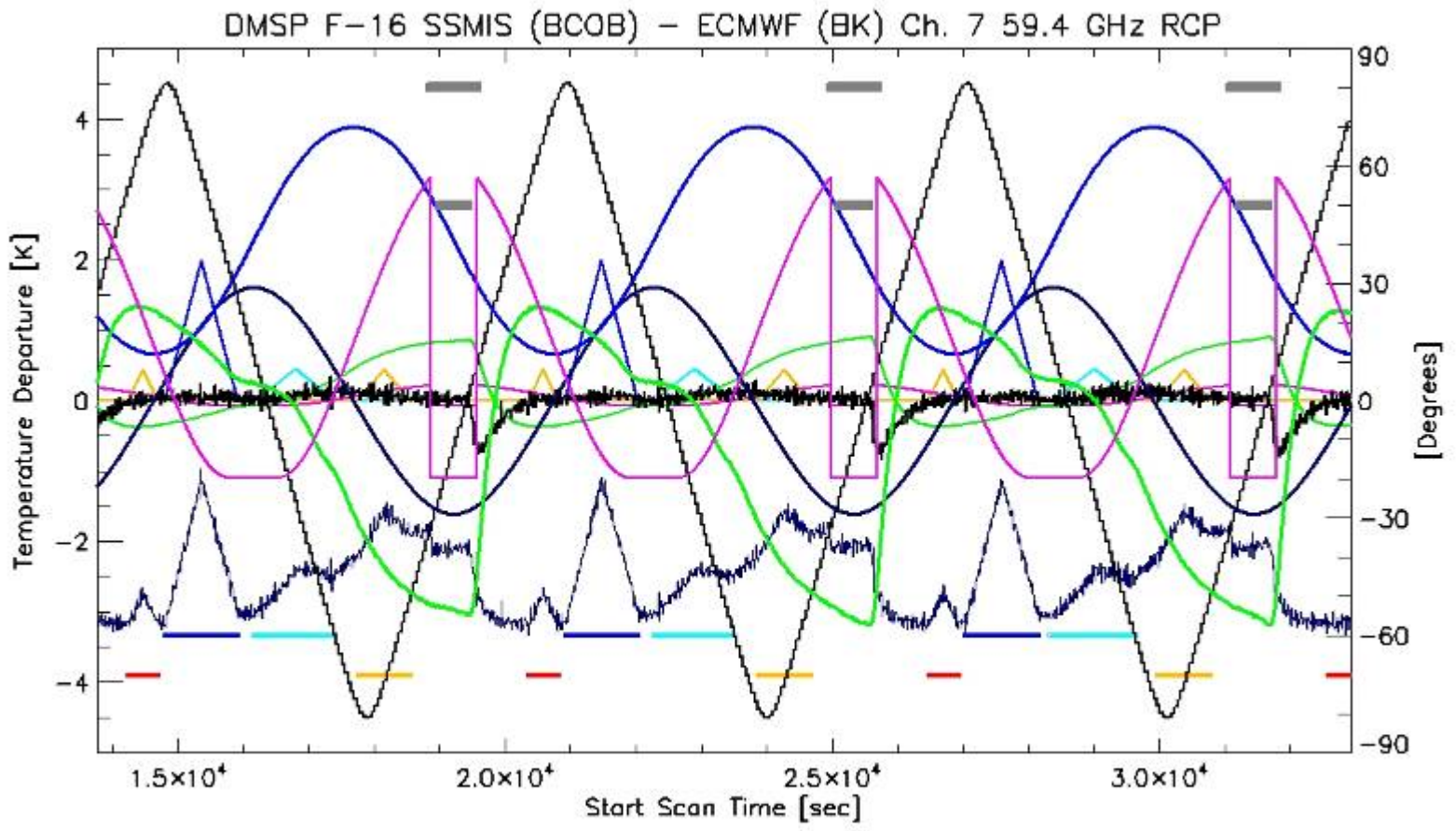


# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       

$R_1$   
 $R_2$   
 $D$   
 $T_{Arm}$   
 $T_{Rflct}$   
 $dT_{Arm}/dt$



DTG: 2004031706

TDR Revs: 02126-02128

Lat

Elevation

$T_{Rflct\_Arm}$   
Azimuth

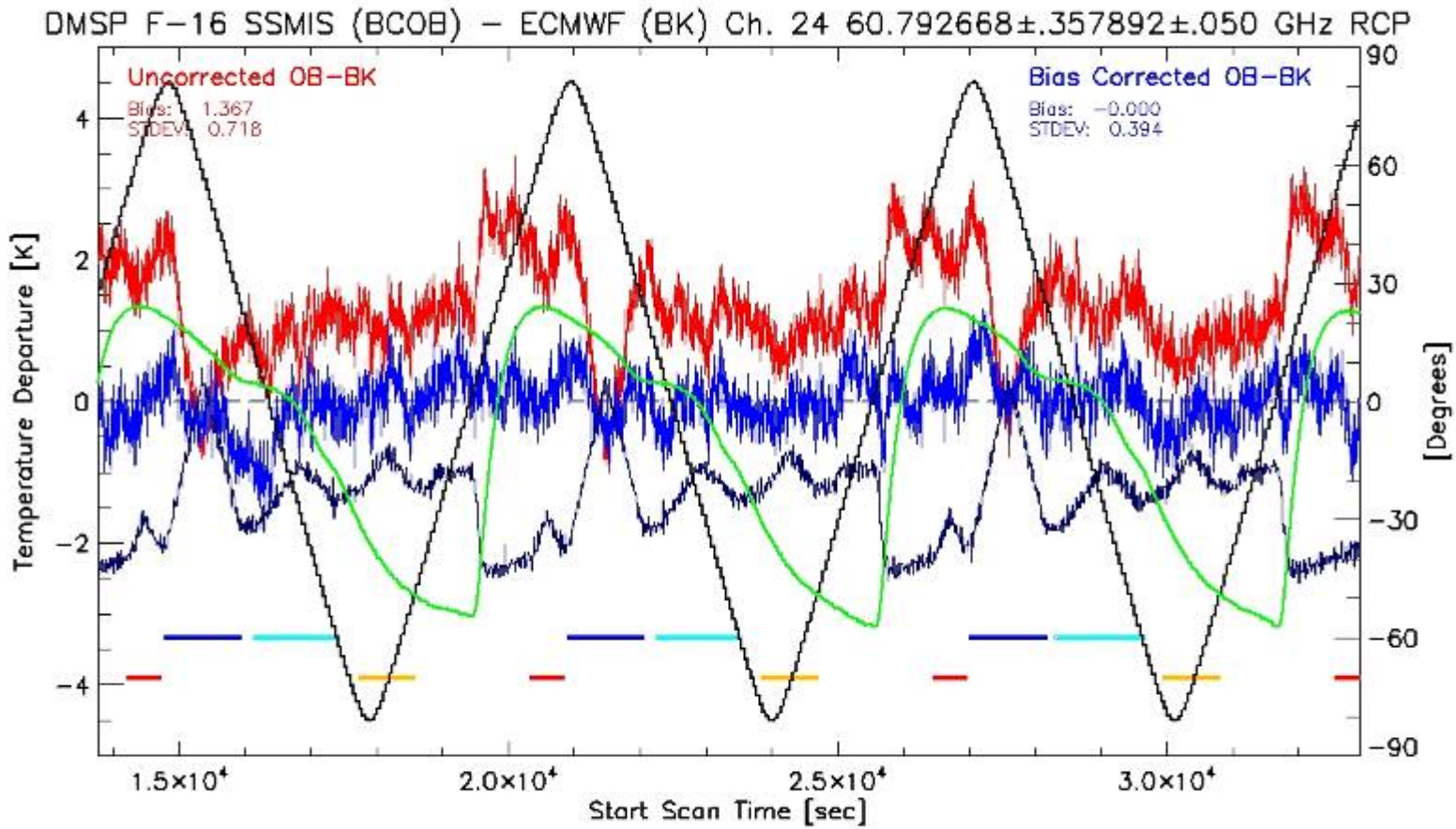
$T_{Rflct}$   
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       



DTG: 2004031706

TDR Revs: 02126-02128

Lat

T\_Rfict\_Arm

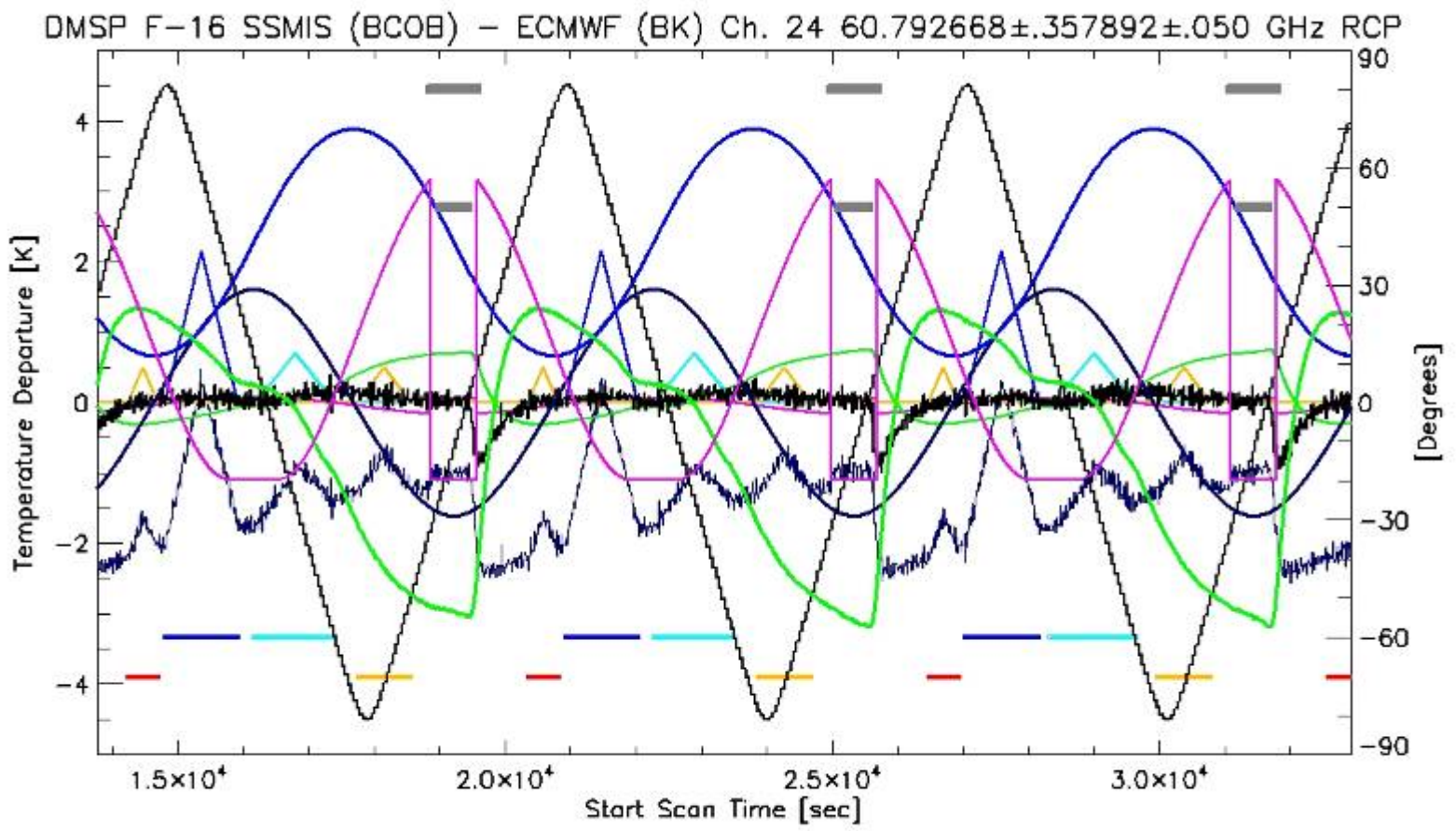


# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       

$R_1$   
 $R_2$   
 $D$   
 $T_{Arm}$   
 $T_{Rfct}$   
 $dT_{Arm}/dt$



DTG: 2004031706

TDR Revs: 02126-02128

Lat

Elevation

$T_{Rfct\_Arm}$   
Azimuth

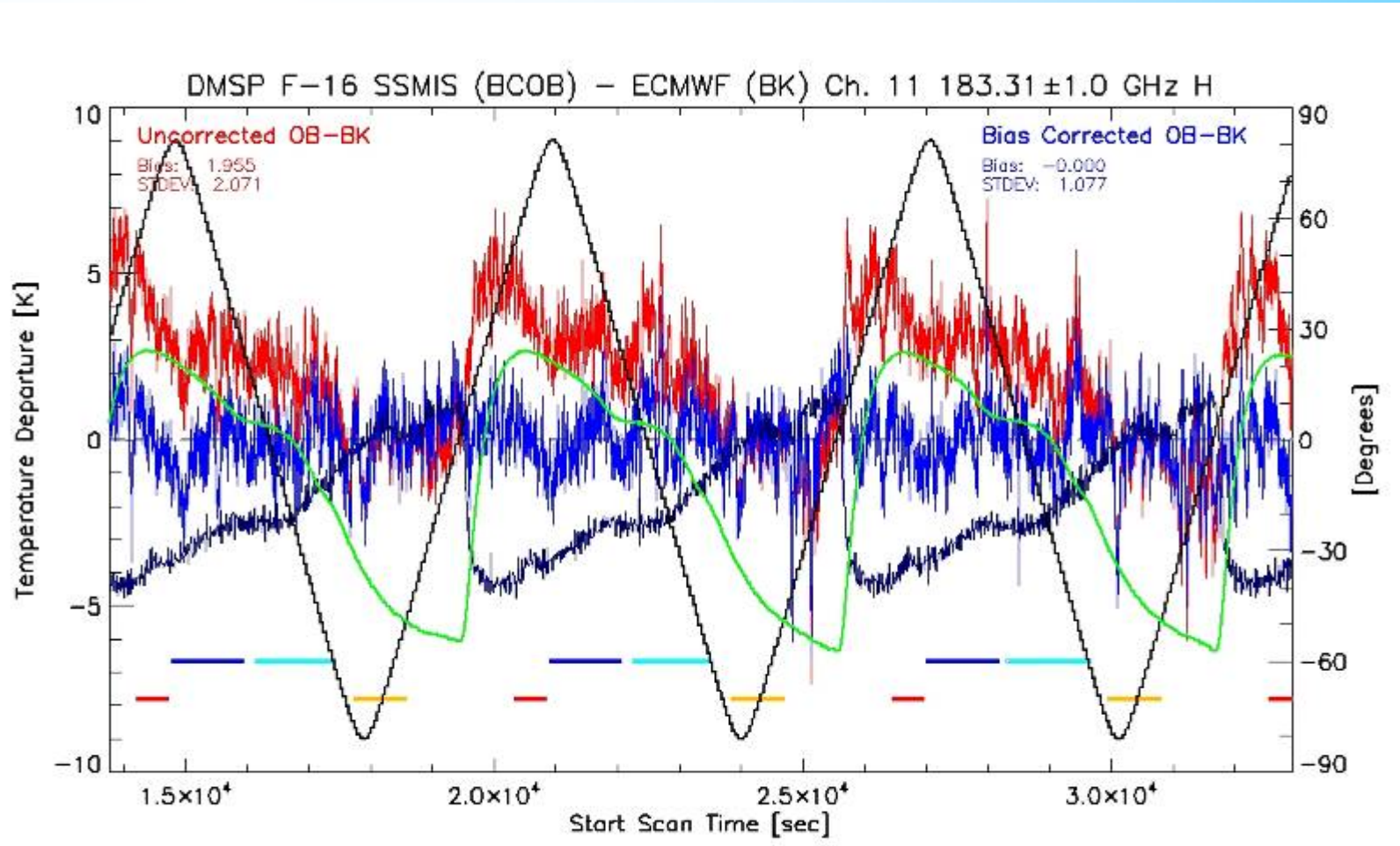
$T_{Rfct}$   
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       



DTG: 2004031706  
TDR Revs: 02126-02128

Lot

T\_Rflect\_Arm

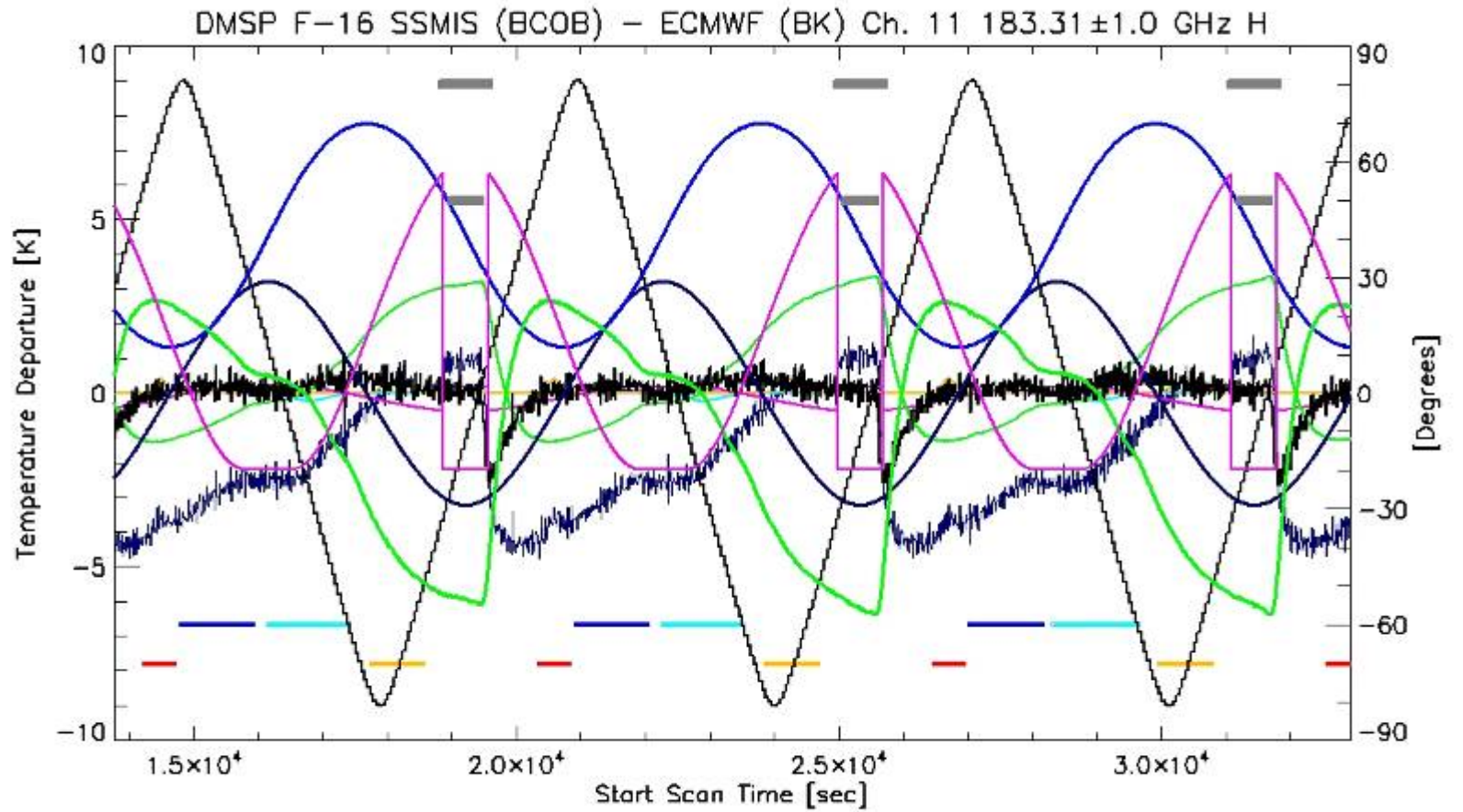


# SSMIS Cal/Val Calibration Anomaly Analysis



Uncorrected OB-BK        Bias Corrected OB-BK        Bias Correction       

$R_1$   
 $R_2$   
 $D$   
 $T_{Arm}$   
 $T_{Rfct}$   
 $dT_{Arm}/dt$



DTG: 2004031706

TDR Revs: 02126-02128

Lat

Elevation

$T_{Rfct\_Arm}$   
Azimuth

$T_{Rfct}$   
Shadow



# SSMIS Cal/Val Calibration Anomaly Analysis



## Scan Averaged Regression Based Bias Corrections

- Apply Scan Averaged Bias Corrections to each Scan of the TDR Data
- Before and After Geographic Patterns
- OB-BK versus BCOB-BK Histograms

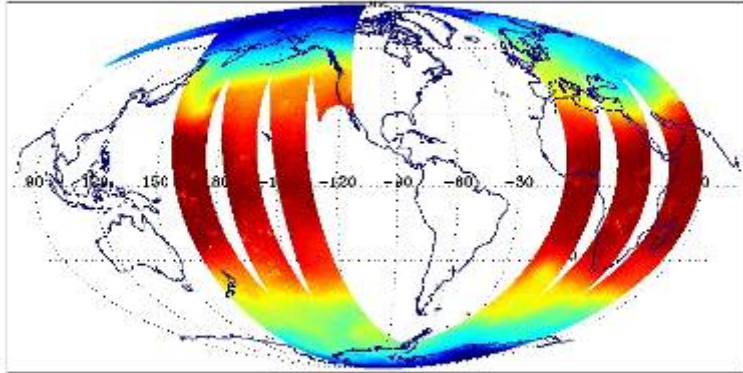


# SSMIS Cal/Val Calibration Anomaly Analysis



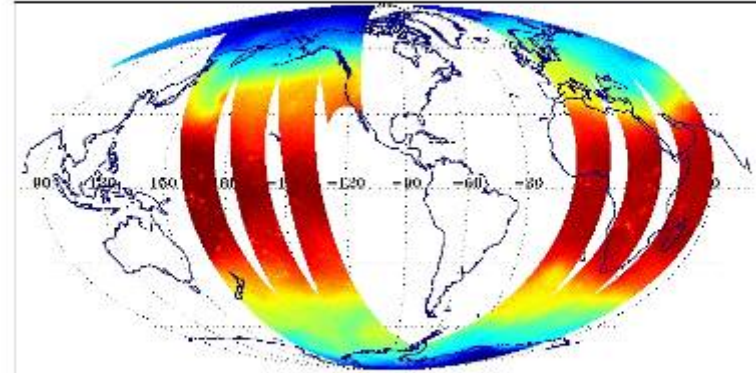
DMSP F 16 SSMIS Ch. 3 53.596 GHz H  
DTG: 2004031708  
02128-02128

No. Scenes: 620633      Min 221.74      MEAN 241.16  
Max 252.40      SDEV 7.11



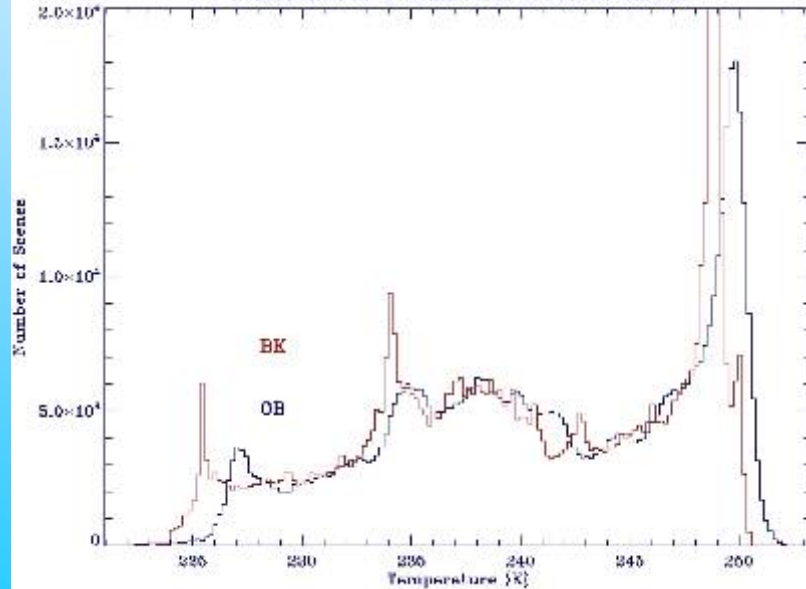
Bias Corrected DMSP F 16 SSMIS Ch. 3 53.596 GHz V  
DTG: 2004031708  
02128-02128

No. Scenes: 605699      Min 220.77      MEAN 239.84  
Max 251.59      SDEV 7.27



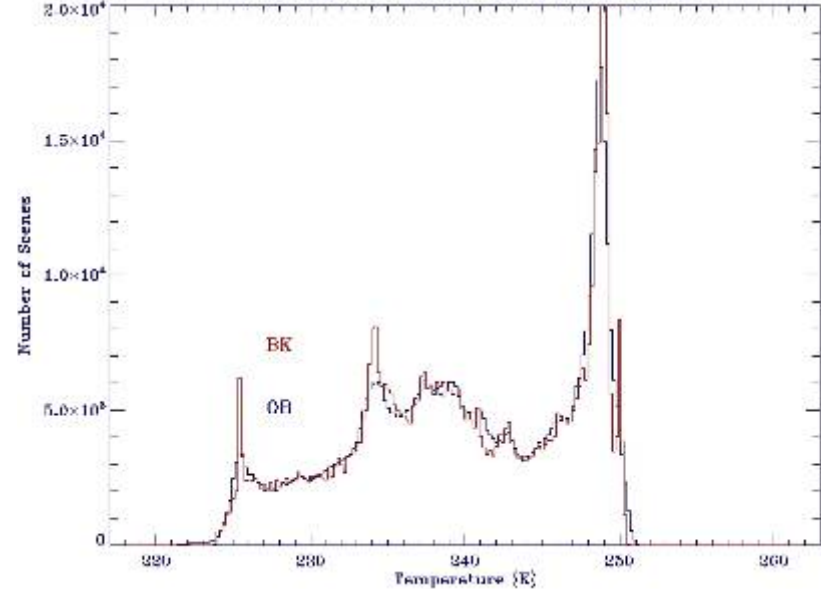
Color scale for H-polarization: 225.0 227.5 230.0 232.5 235.0 237.5 240.0 242.5 245.0 247.5 250.0

ECMWF RTTOV-7 SSMIS Ch. 3 53.598 GHz H



Color scale for V-polarization: 225.0 227.5 230.0 232.5 235.0 237.5 240.0 242.5 245.0 247.5 250.0

ECMWF RTTOV-7 SSMIS Ch. 3 53.598 GHz V





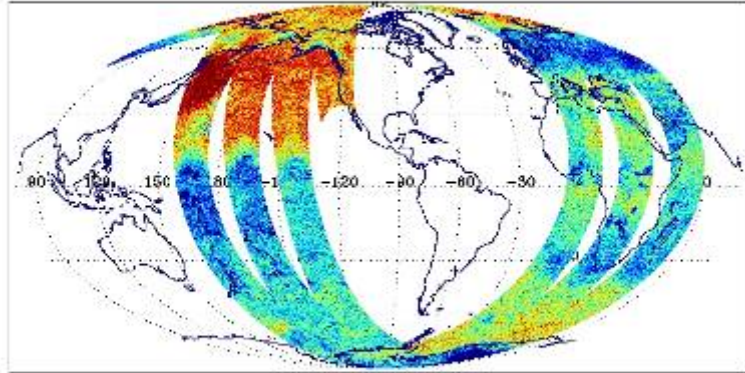


# SSMIS Cal/Val Calibration Anomaly Analysis



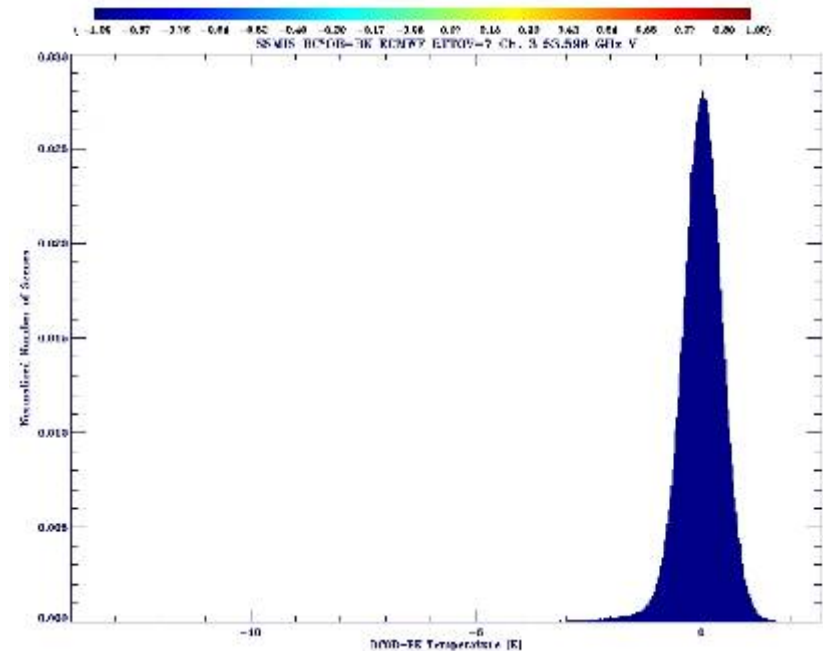
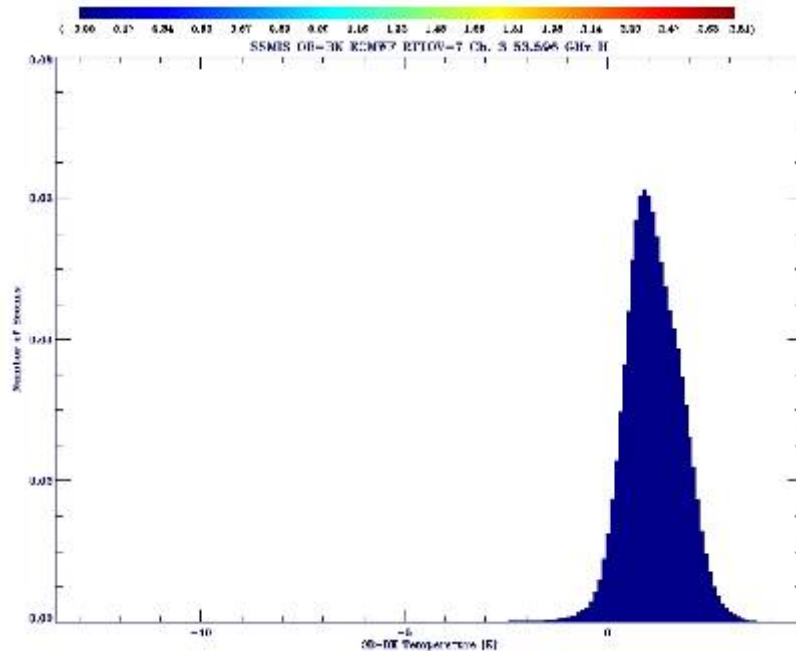
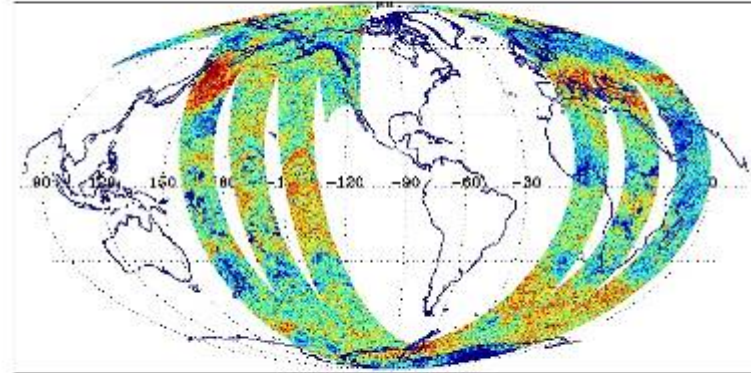
SSMIS OB BK ECMWF RTTOV 7 Ch. 3 53.596 GHz H  
DTG: 2004031706  
02126-02128

No. Scenes: 620039      Min -13.14      MEAN 1.12  
Max 4.29      SDEV 0.70



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 3 53.596 GHz V  
DTG: 2004031706  
02126-02128

No. Scenes: 620039      Min -13.50      MEAN 0.00  
Max 2.25      SDEV 0.49



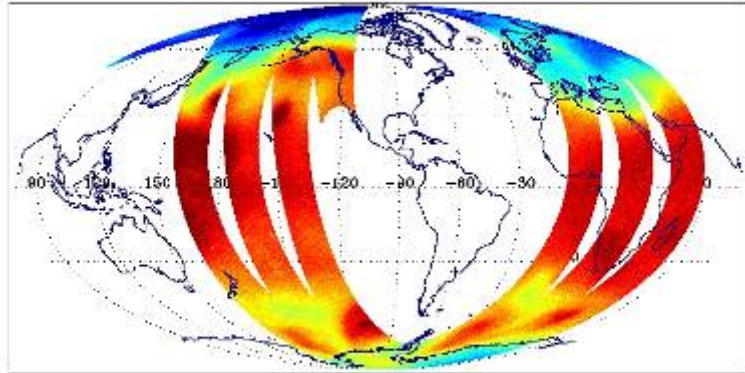


# SSMIS Cal/Val Calibration Anomaly Analysis



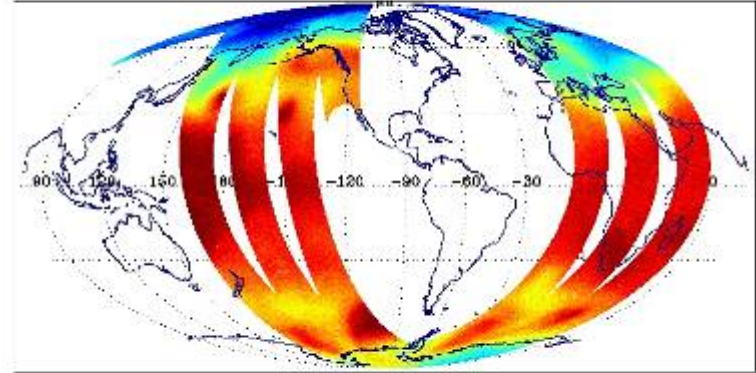
DMSP F 16 SSMIS Ch. 4 54.4 GHz H  
DTG: 2004031708  
02128-02128

No. Scenes: 608633      Min: 216.49      MEAN: 220.23  
Max: 234.08      SDEV: 3.11



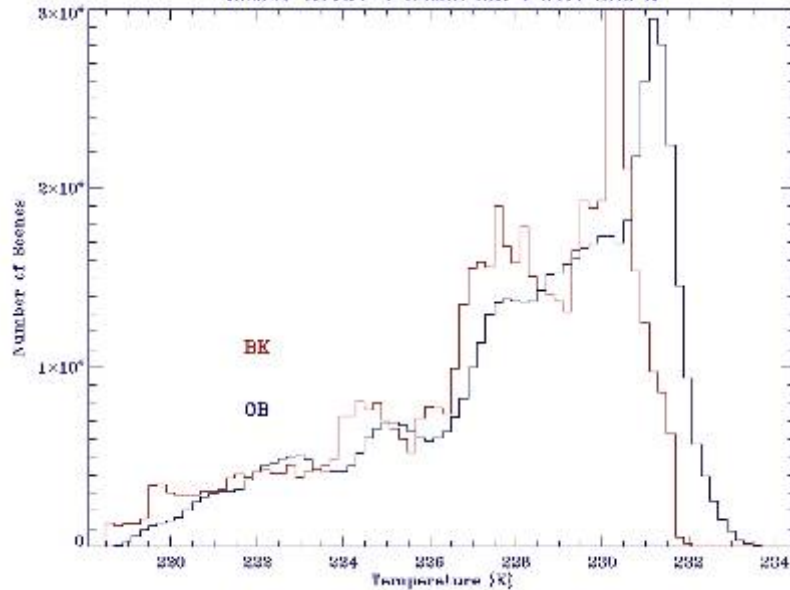
Bias Corrected DMSP F 16 SSMIS Ch. 4 54.4 GHz V  
DTG: 2004031708  
02128-02128

No. Scenes: 605689      Min: 216.97      MEAN: 227.26  
Max: 232.86      SDEV: 3.18



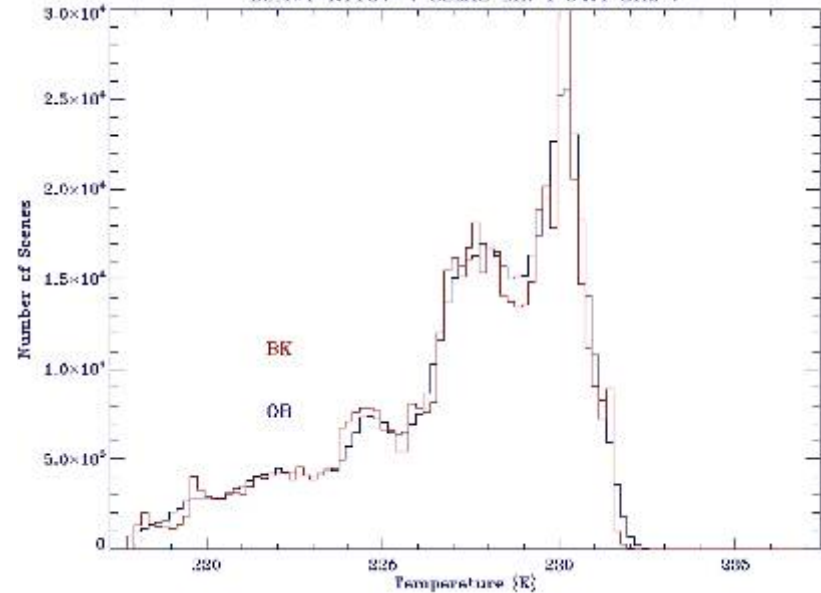
212.0 212.5 213.0 213.5 214.0 214.5 215.0 215.5 216.0 216.5 217.0 217.5 218.0 218.5 219.0 219.5 220.0 220.5 221.0 221.5 222.0 222.5 223.0 223.5 224.0

ECMWF RTTOV-7 SSMIS Ch. 4 54.4 GHz H



212.0 212.5 213.0 213.5 214.0 214.5 215.0 215.5 216.0 216.5 217.0 217.5 218.0 218.5 219.0 219.5 220.0 220.5 221.0 221.5 222.0 222.5 223.0 223.5 224.0

ECMWF RTTOV-7 SSMIS Ch. 4 54.4 GHz V



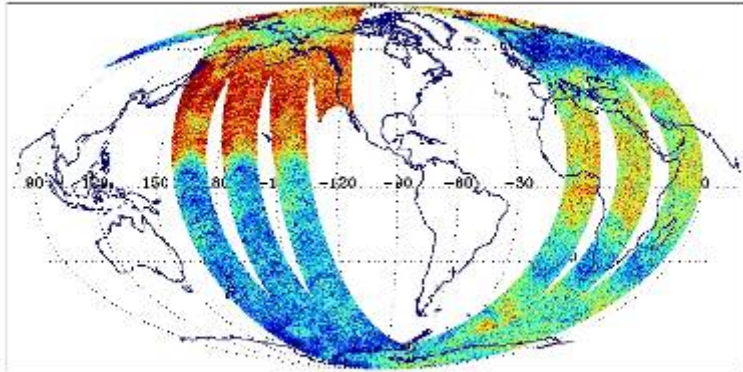


# SSMIS Cal/Val Calibration Anomaly Analysis



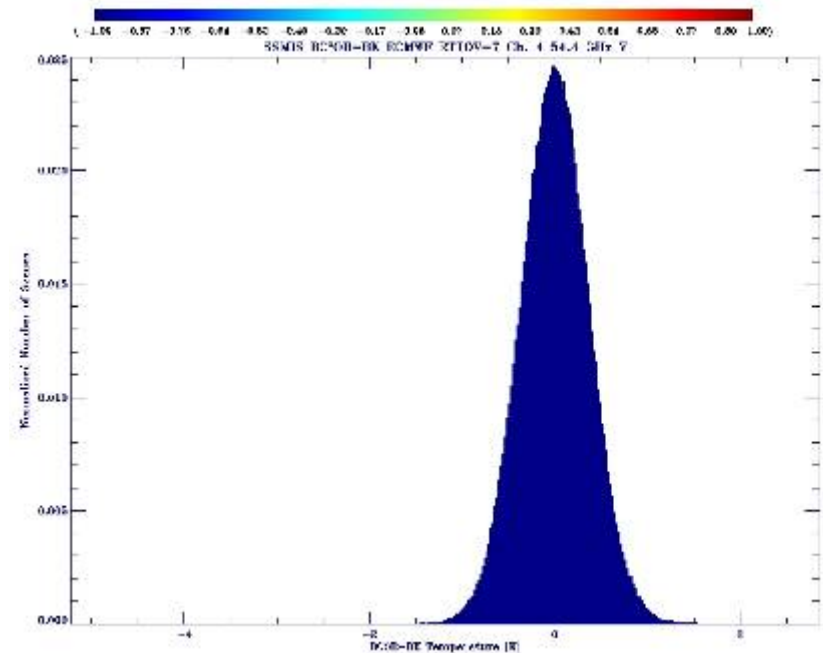
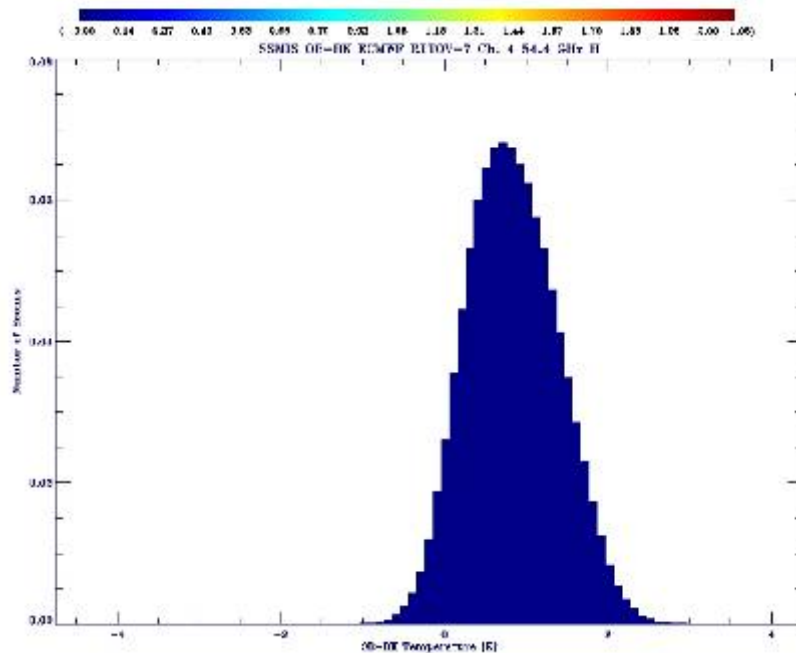
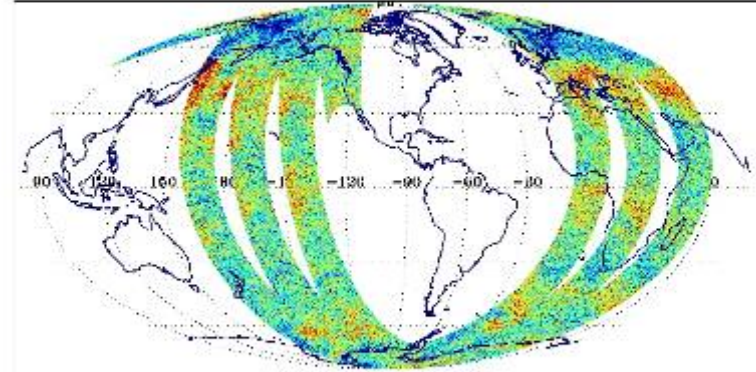
SSMIS OB BK ECMWF RTTOV 7 Ch. 4 54.4 GHz H  
DTG: 2004031708  
02128-02128

No. Scenes: 620039  
Min -4.54    MEAN 0.84  
Max 4.08    SDEV 0.55



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 4 54.4 GHz V  
DTG: 2004031708  
02128-02128

No. Scenes: 620039  
Min -5.03    MEAN -0.00  
Max 2.66    SDEV 0.37



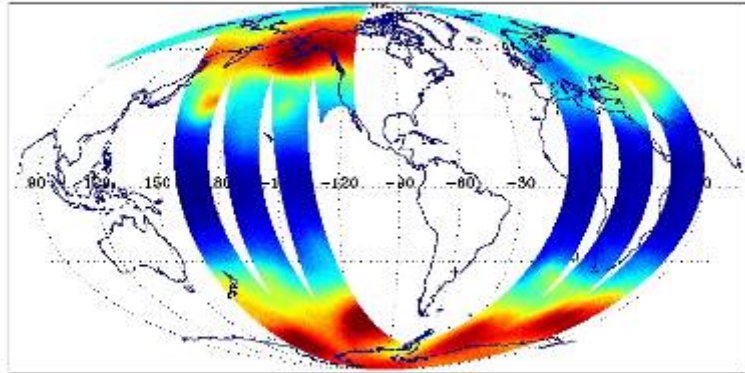


# SSMIS Cal/Val Calibration Anomaly Analysis



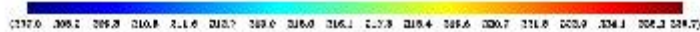
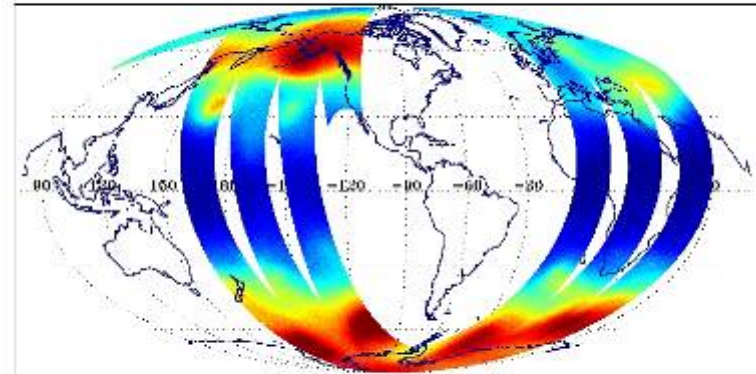
DMSP F 16 SSMIS Ch. 5 55.5 GHz H  
DTG: 2004031708  
02128-02128

No. Scenes: 620933      Min 205.33      MEAN 216.15  
Max 226.77      SDEV 5.79

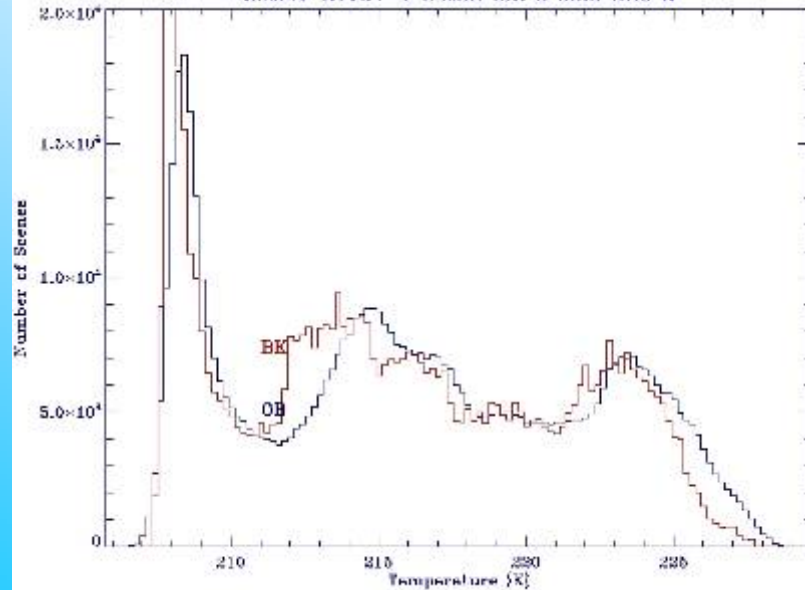


Bias Corrected DMSP F 16 SSMIS Ch. 5 55.5 GHz Y  
DTG: 2004031708  
02128-02128

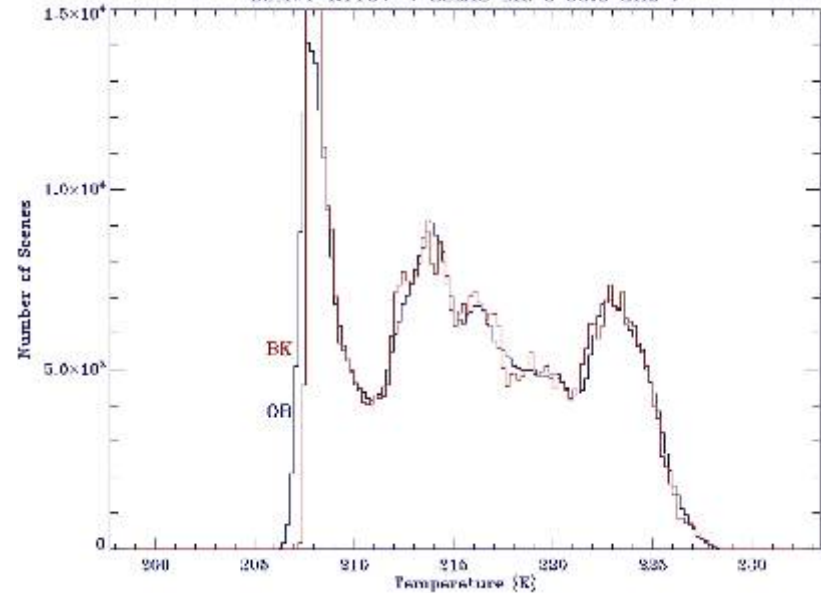
No. Scenes: 605699      Min 205.10      MEAN 215.57  
Max 226.55      SDEV 5.88



ECMWF RTTOV-7 SSMIS Ch. 5 55.5 GHz H



ECMWF RTTOV-7 SSMIS Ch. 6 55.5 GHz V



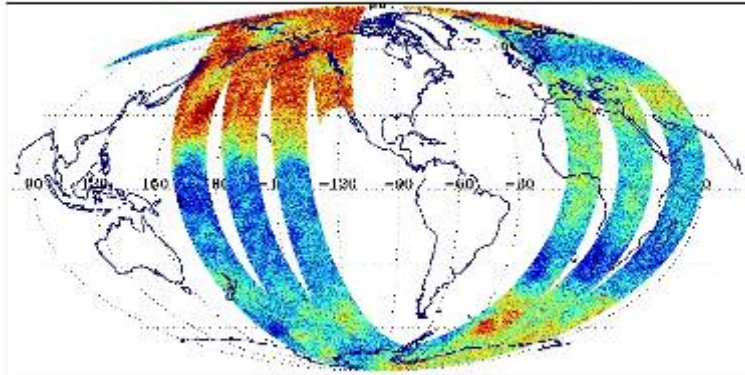


# SSMIS Cal/Val Calibration Anomaly Analysis



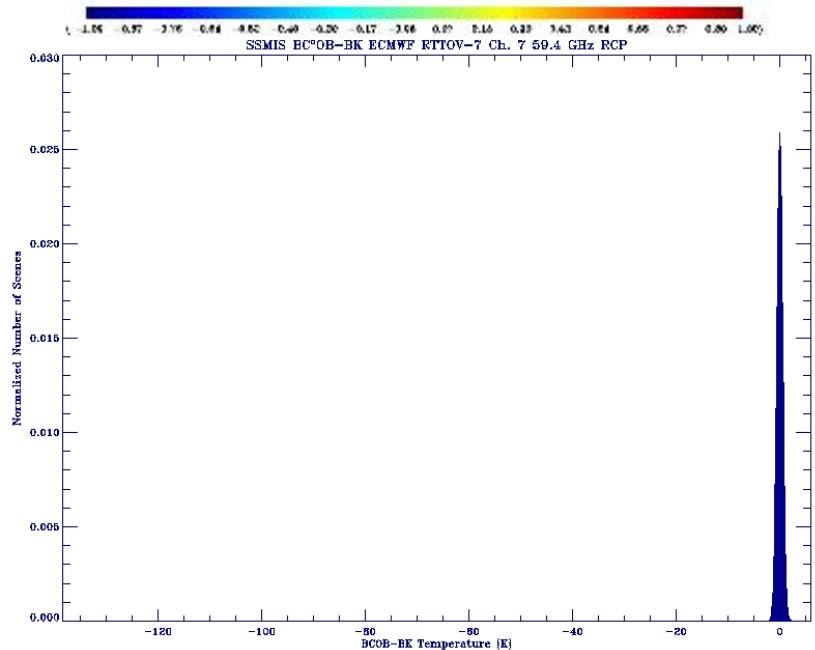
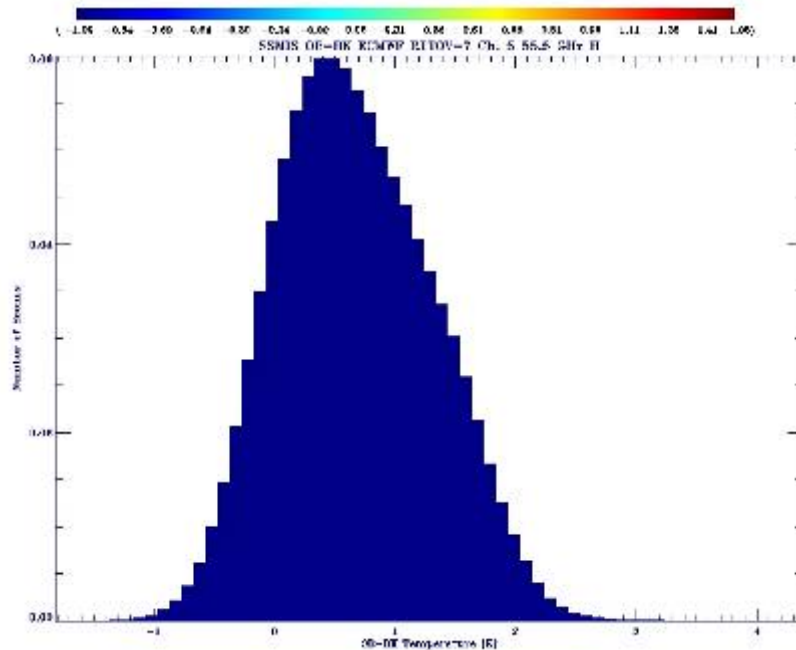
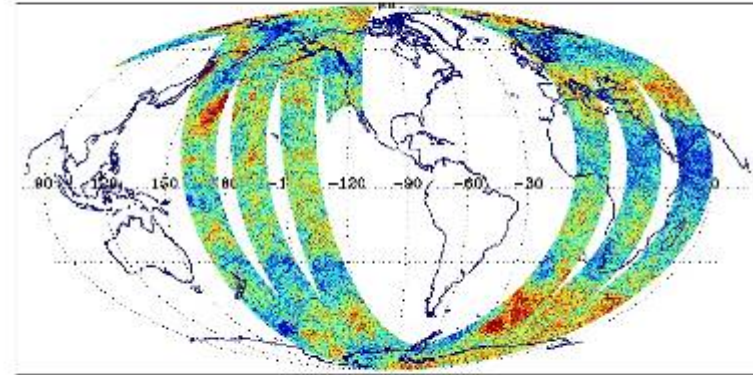
SSMIS OB BK ECMWF RTTOV 7 Ch. 5 55.5 GHz H  
DTG: 2004031706  
02126-02129

No. Scans: 620038      Min -1.67      MEAN 0.67  
Max 4.18      SDEV 0.64



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 5 55.5 GHz V  
DTG: 2004031706  
02126-02129

No. Scans: 620039      Min -2.07      MEAN -0.00  
Max 2.70      SDEV 0.43



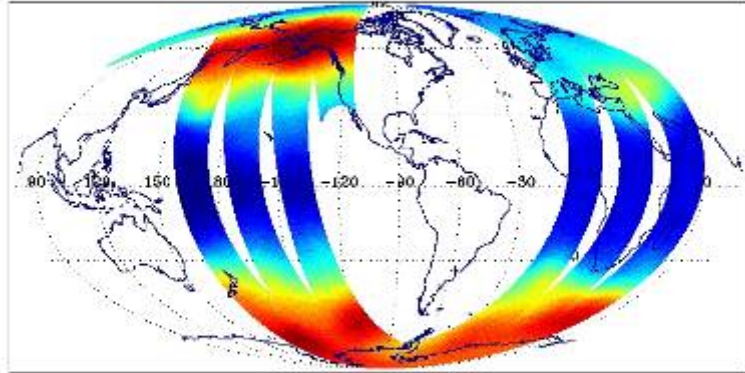


# SSMIS Cal/Val Calibration Anomaly Analysis



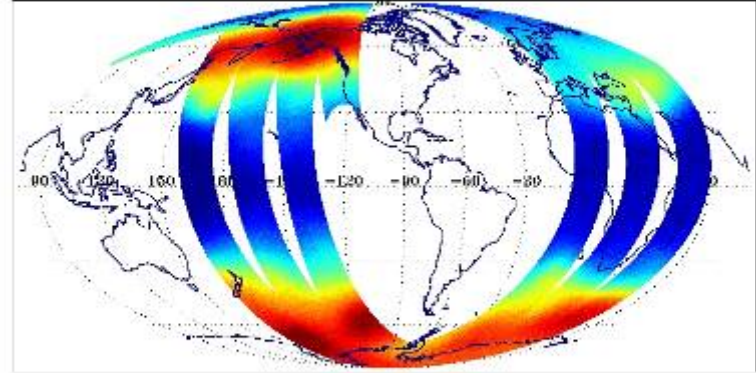
DMSP F 16 SSMIS Ch. 6 57.29 GHz RCP  
DTG: 2004031708  
02128-02128

No. Scenes: 620633      Min: 201.74      MEAN: 214.04  
Max: 226.85      SDEV: 6.91

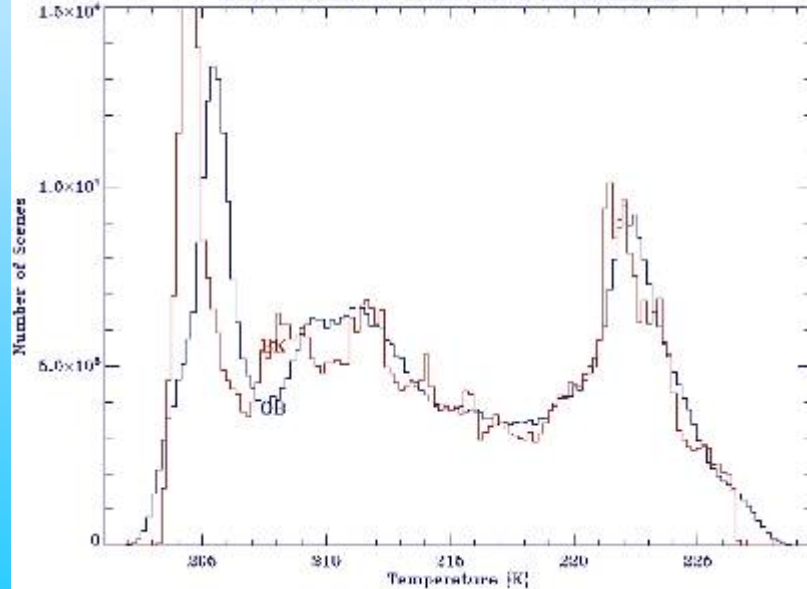


Bias Corrected DMSP F 16 SSMIS Ch. 6 57.29 GHz RCP  
DTG: 2004031708  
02128-02128

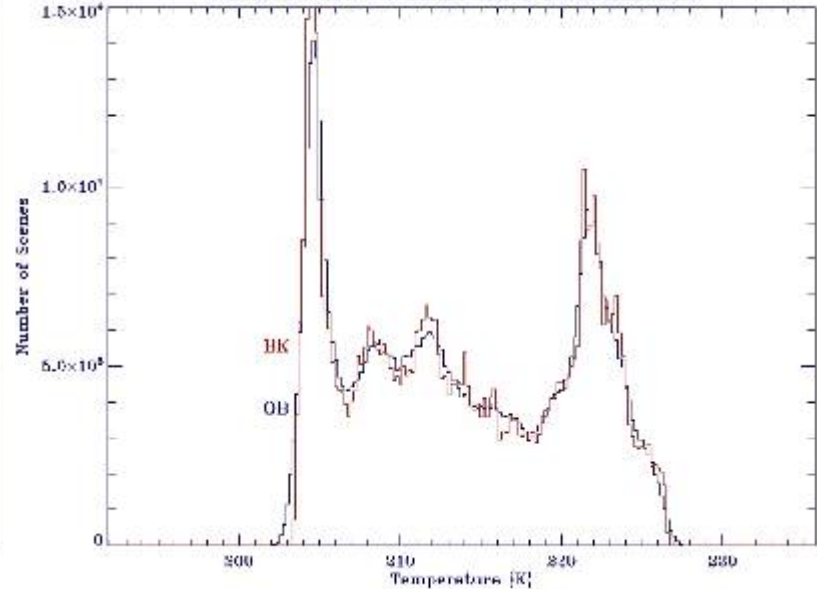
No. Scenes: 600699      Min: 201.85      MEAN: 213.71  
Max: 227.65      SDEV: 6.93



ECMWF RTTOV-7 SSMIS Ch. 6 57.29 GHz RCP



ECMWF RTTOV-7 SSMIS Ch. 6 57.29 GHz RCP



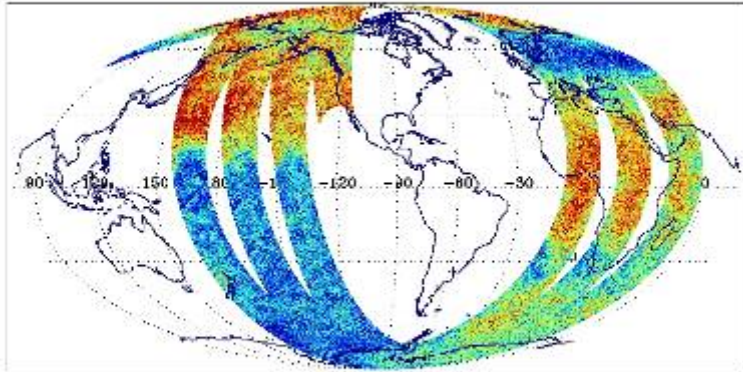


# SSMIS Cal/Val Calibration Anomaly Analysis



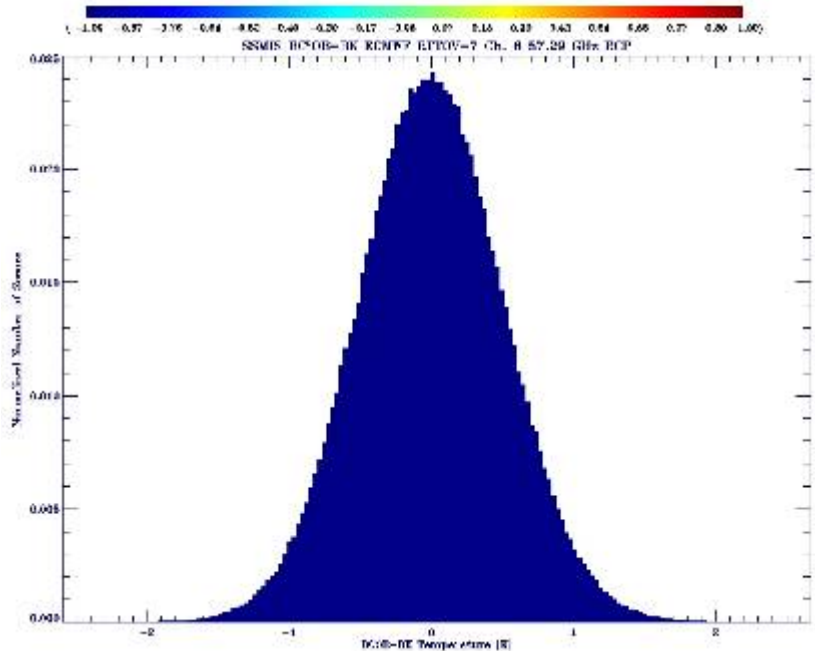
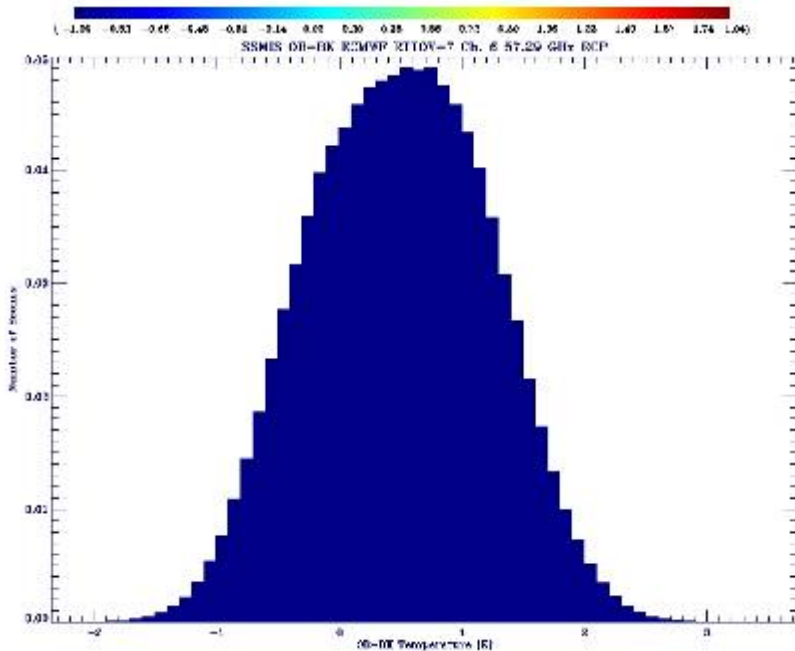
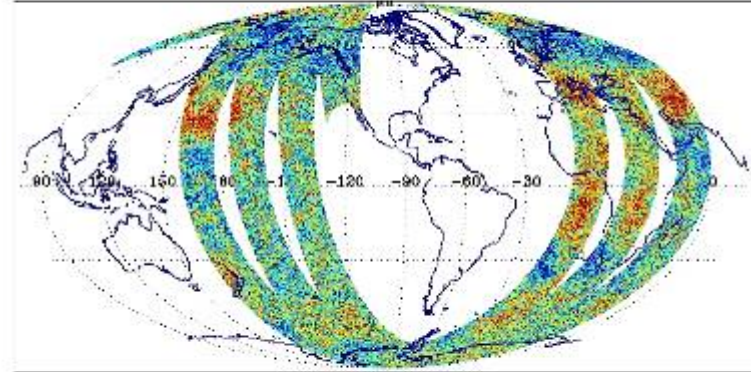
SSMIS OB BK ECMWF RTTOV 7 Ch. 6 57.29 GHz RCP  
DTG: 2004031706  
02128-02128

No. Scenes: 620039      Min -2.21      MEAN 0.49  
Max 3.50      SDEV 0.72



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 6 57.29 GHz RCP  
DTG: 2004031706  
02128-02128

No. Scenes: 620039      Min -2.47      MEAN 0.00  
Max 2.54      SDEV 0.51



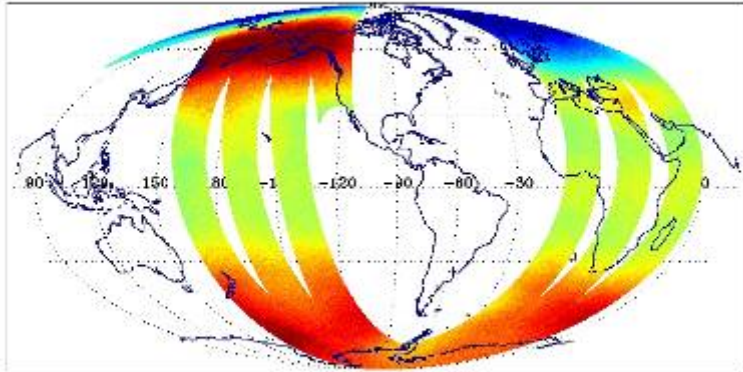


# SSMIS Cal/Val Calibration Anomaly Analysis



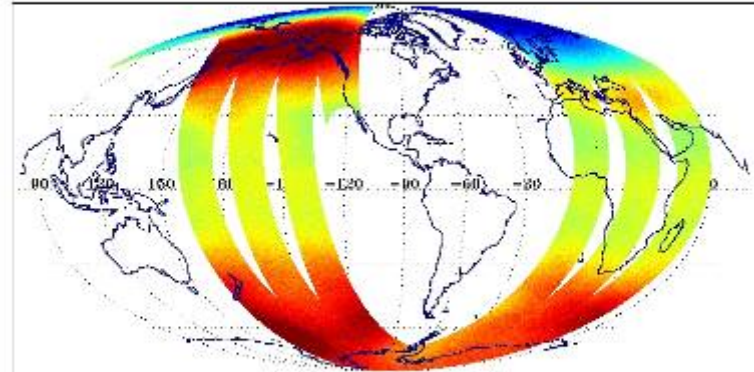
DMSP F 16 SSMIS Ch. 7 59.4 GHz RCP  
DTG: 2004031708  
02128-02128

No. Scenes: 620633      Min 81.73      MEAN 220.12  
Max 252.89      SDEV 5.19

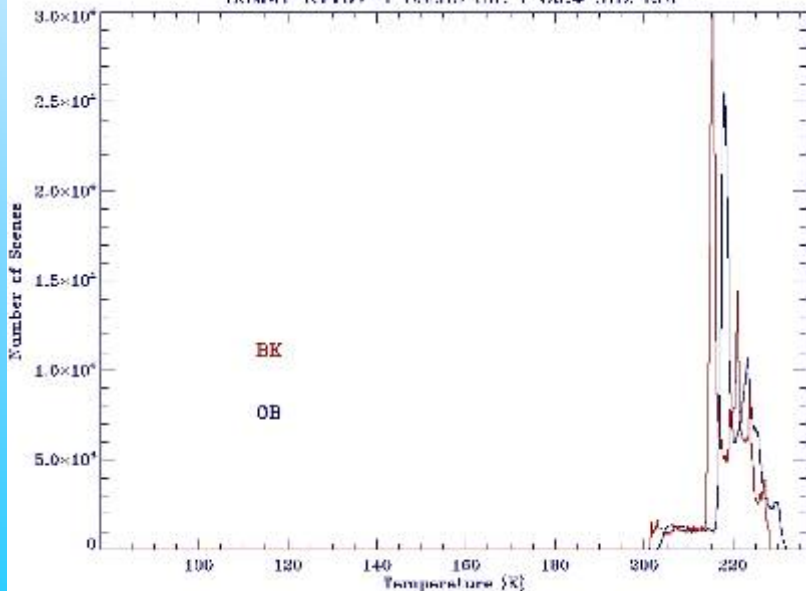


Bias Corrected DMSP F 16 SSMIS Ch. 7 59.4 GHz RCP  
DTG: 2004031708  
02128-02128

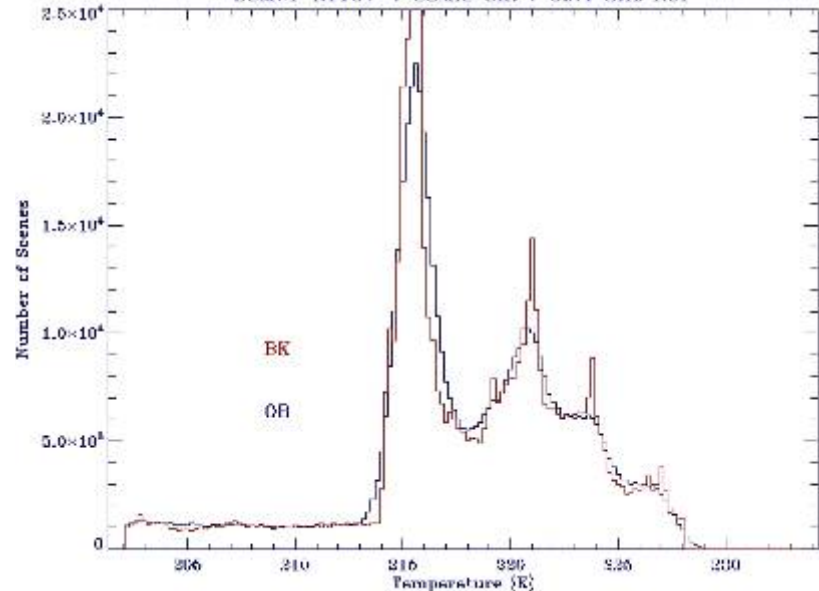
No. Scenes: 605699      Min 78.08      MEAN 217.72  
Max 229.75      SDEV 5.21



ECMWF RTDQV-7 SSMIS Ch. 7 59.4 GHz RCP



ECMWF RTDQV-7 SSMIS Ch. 7 59.4 GHz RCP





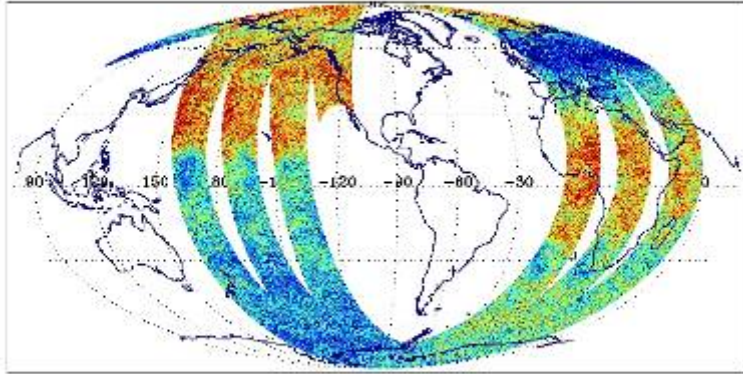


# SSMIS Cal/Val Calibration Anomaly Analysis



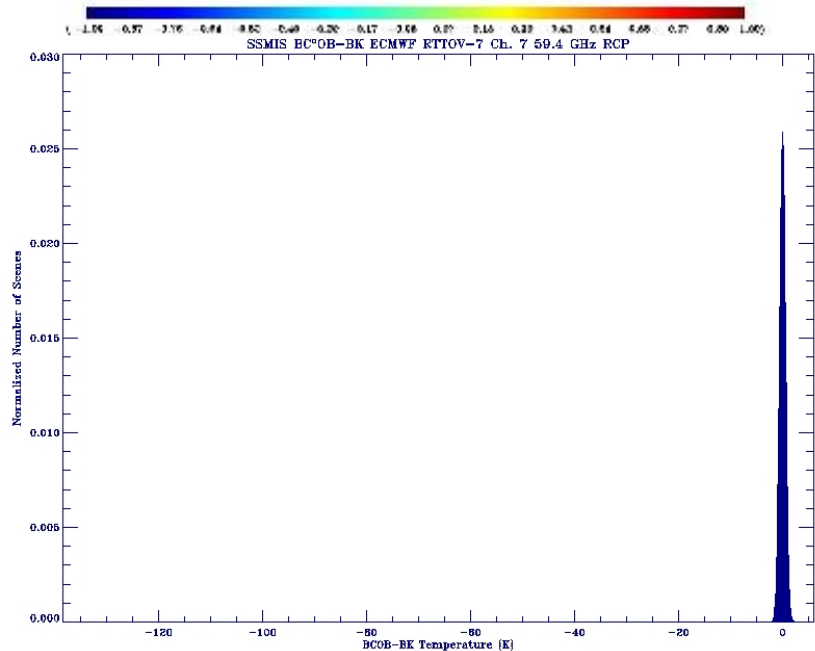
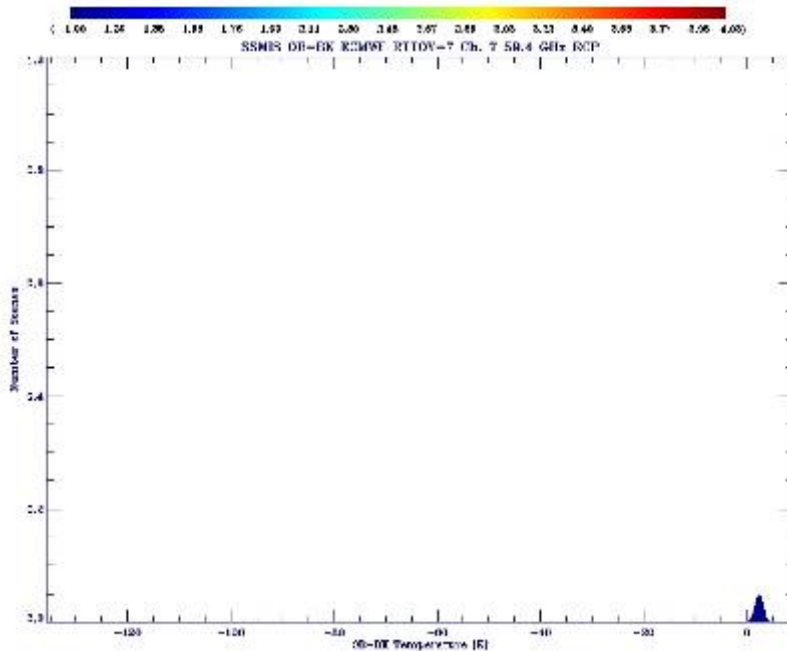
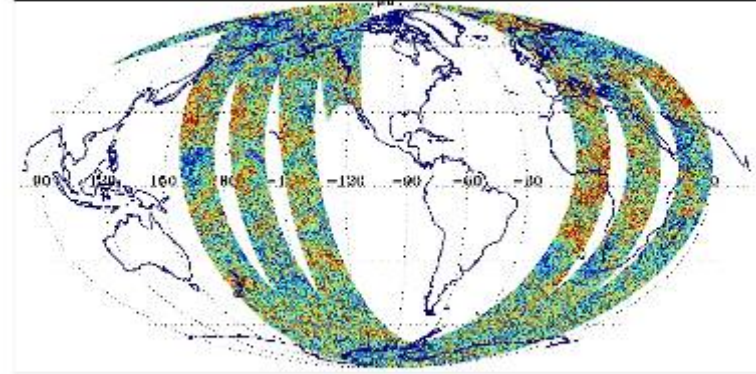
SSMIS OB BK ECMWF RTTOV 7 Ch. 7 59.4 GHz RCP  
DTG: 2004031708  
02126-02128

No. Scenes: 620039      Min -1.29      MEAN 3.47  
Max 5.58      SDEV 0.78



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 7 59.4 GHz RCP  
DTG: 2004031708  
02126-02128

No. Scenes: 620039      Min -134.96      MEAN -0.00  
Max 2.54      SDEV 0.69



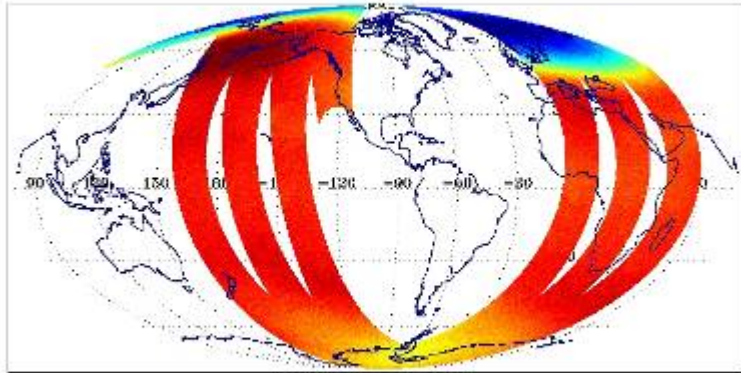


# SSMIS Cal/Val Calibration Anomaly Analysis



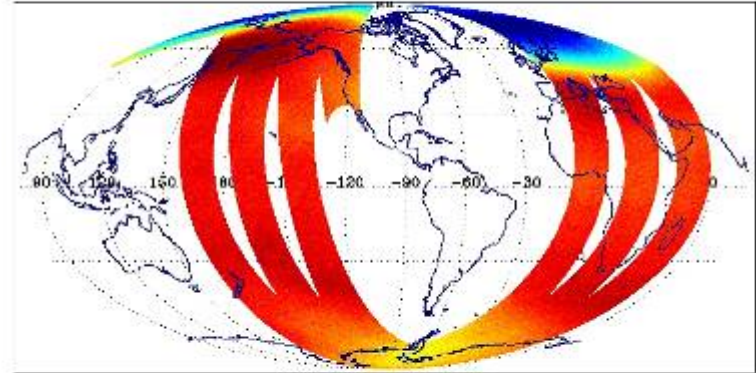
DMSP F 16 SSMIS Ch. 24 60.792668±.357892±.050 GHz RCP  
DTG: 2004031706  
02126-02123

No. Scenes: 620038      Min 197.83      MEAN 227.69  
Max 339.58      SDEV 7.11



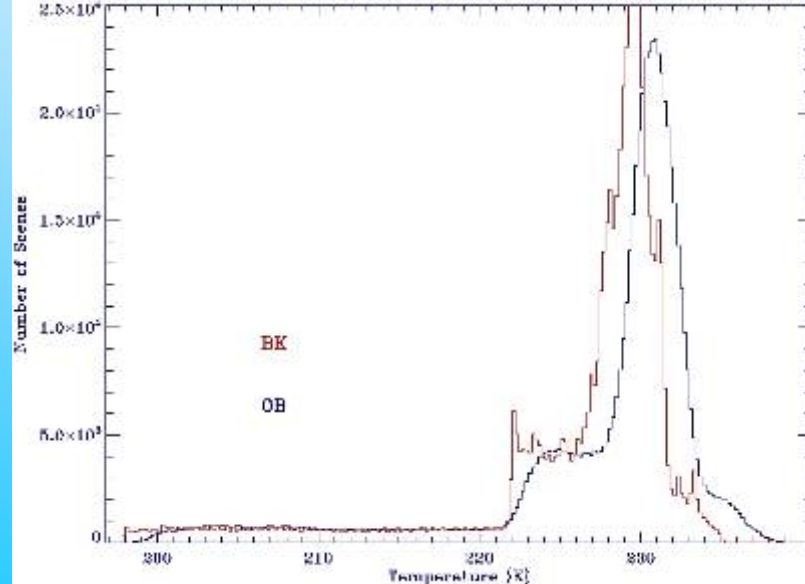
Bias Corrected DMSP F 16 SSMIS Ch. 24 60.792668±.357892±.050 GHz RCP  
DTG: 2004031706  
02126-02123

No. Scenes: 605689      Min 196.94      MEAN 226.26  
Max 257.60      SDEV 7.01



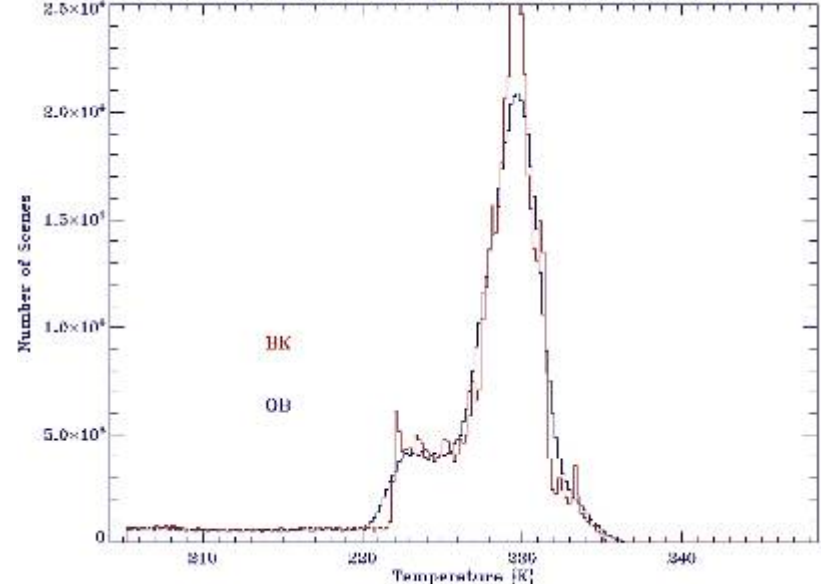
0210 204.1 206.1 208.1 210.1 212.1 214.1 216.1 218.0 220.0 222.0 224.0 226.0 228.0 230.0 232.0 234.0 236.0 238.0 240.0 242.0

RCMWF RTTOV-7 SSMIS Ch. 24 60.792668±.357892±.050 GHz RCP



0210 204.1 206.0 208.0 210.0 212.0 214.0 216.0 218.0 220.0 222.0 224.0 226.0 228.0 230.0 232.0 234.0 236.0 238.0 240.0

RCMWF RTTOV-7 SSMIS Ch. 24 60.792668±.357892±.050 GHz RCP



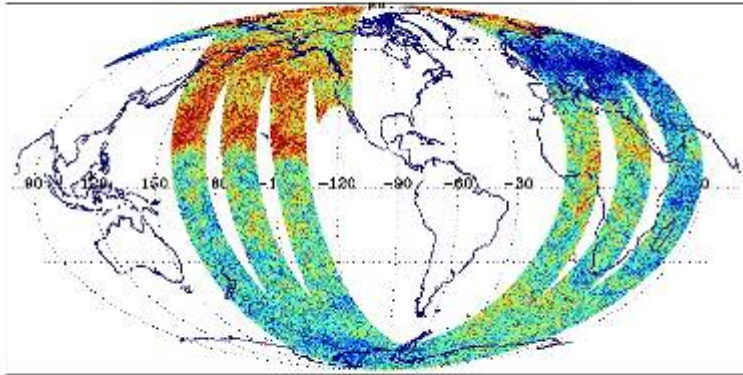


# SSMIS Cal/Val Calibration Anomaly Analysis



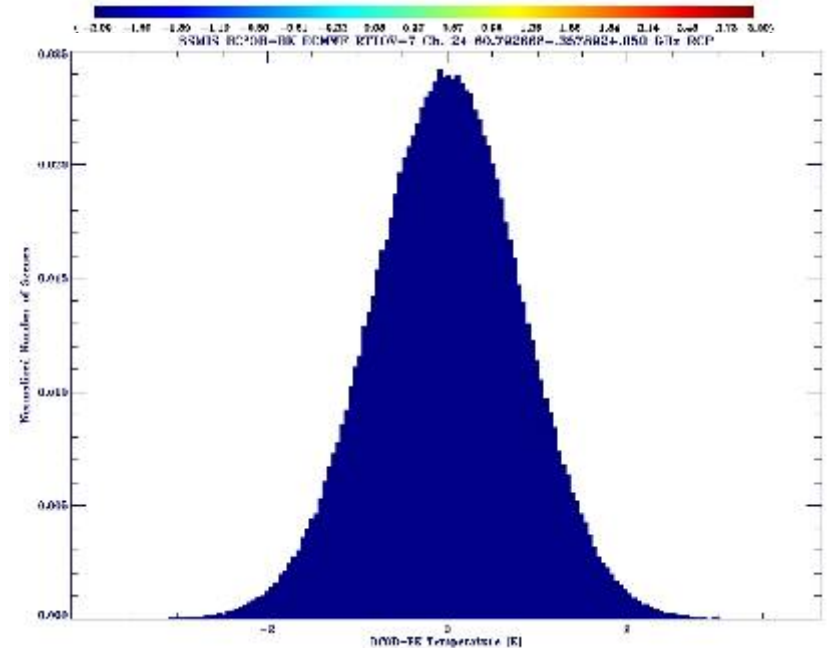
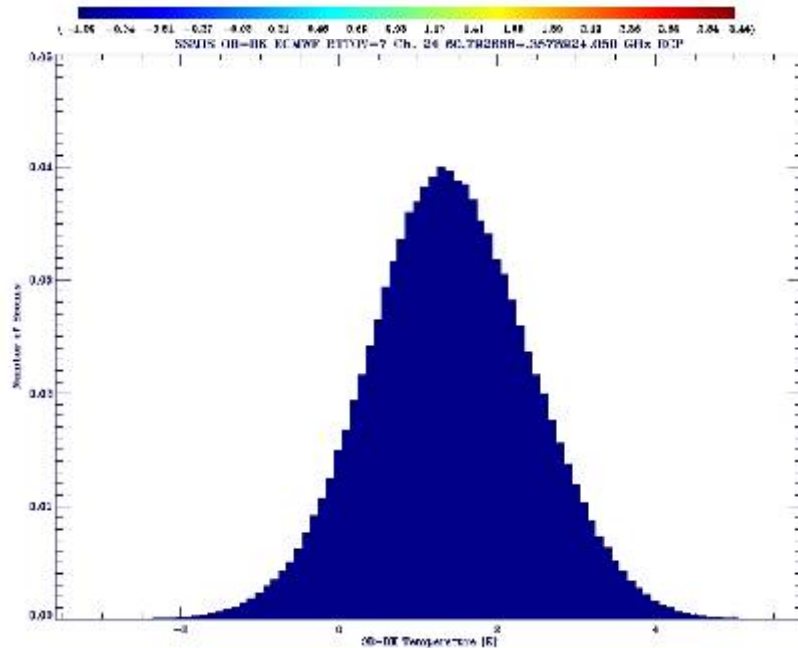
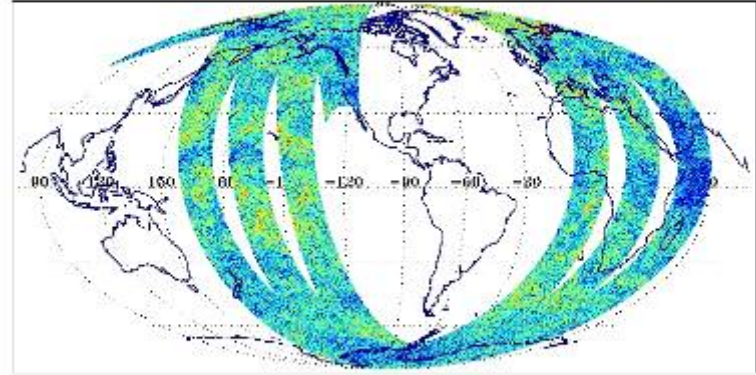
SSMIS OB BK ECMWF RTTOV 7 Ch. 24 60.792668...3578921.050 GHz RCP  
DTG: 2004031706  
02126-02128

No. Scans: 620038  
Min -3.36  
Max 5.82  
MEAN 1.40  
SDRV 1.02



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 24 60.792668...3578921.050 GHz RCP  
DTG: 2004031706  
02126-02128

No. Scans: 620039  
Min -3.98  
Max 3.95  
MEAN -0.00  
SDRV 0.82



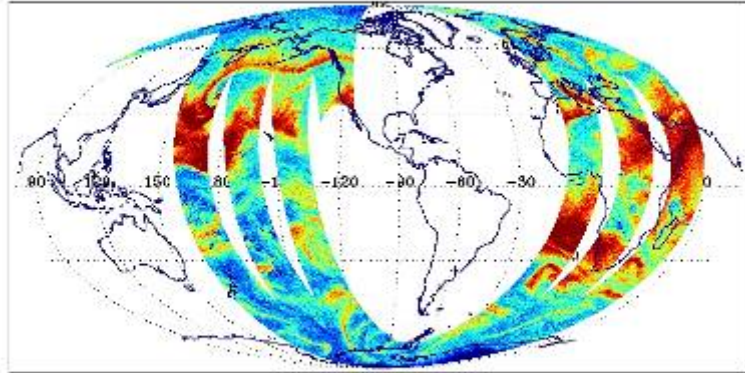


# SSMIS Cal/Val Calibration Anomaly Analysis



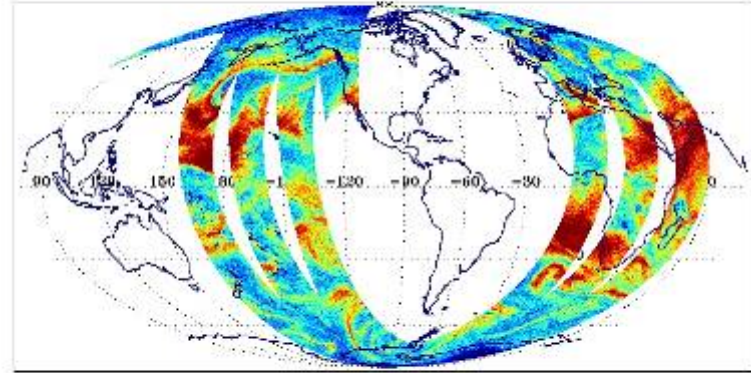
DMSP F 16 SSMIS Ch. 11 183.31±1.0 GHz H  
DTG: 2004031708  
02128-02128

No. Scenes: 1860113      Min 80.50      MEAN 244.11  
Max 294.21      SDEV 7.77

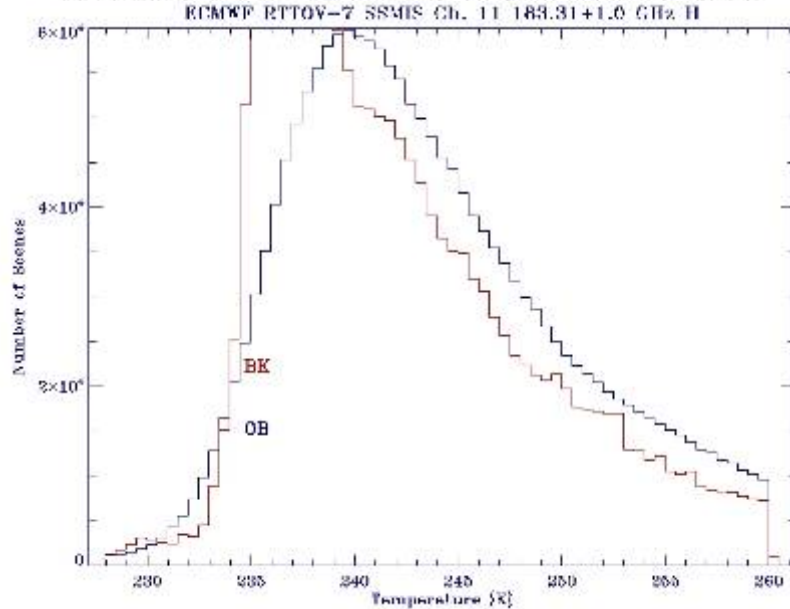


Bias Corrected DMSP F 16 SSMIS Ch. 11 183.31±1.0 GHz H  
DTG: 2004031708  
02128-02128

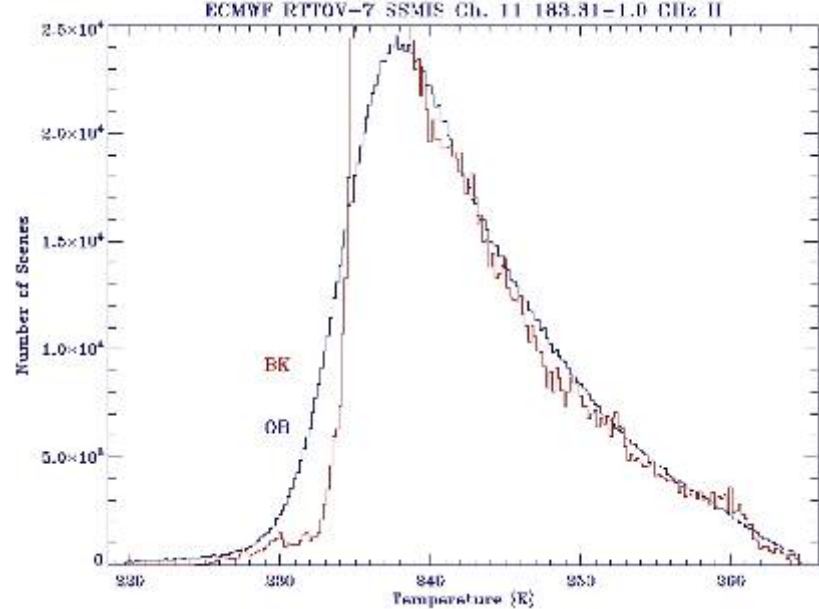
No. Scenes: 1817000      Min 77.89      MEAN 242.11  
Max 291.80      SDEV 7.47



ECMWF RTTOV-7 SSMIS Ch. 11 183.31±1.0 GHz H



ECMWF RTTOV-7 SSMIS Ch. 11 183.31±1.0 GHz H



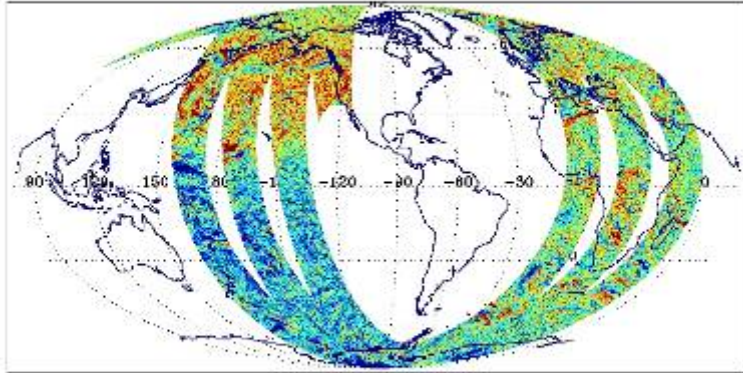


# SSMIS Cal/Val Calibration Anomaly Analysis



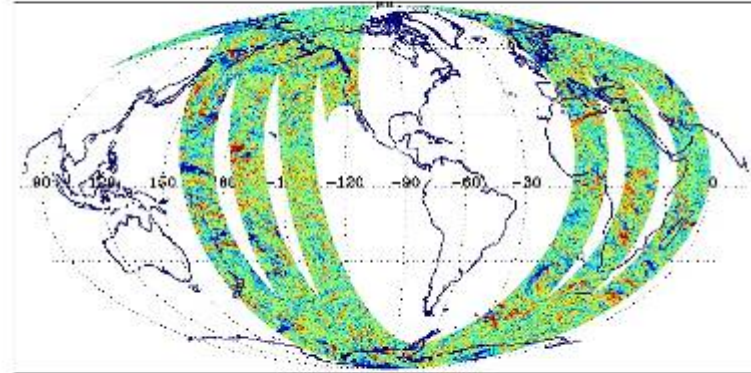
SSMIS OB BK ECMWF RTTOV 7 Ch. 11 183.31\_1.0 GHz H  
DTG: 2004031708  
02128-02128

No. Scans: 1860113      Min -49.04      MEAN 1.91  
Max 49.01      SDEV 3.70

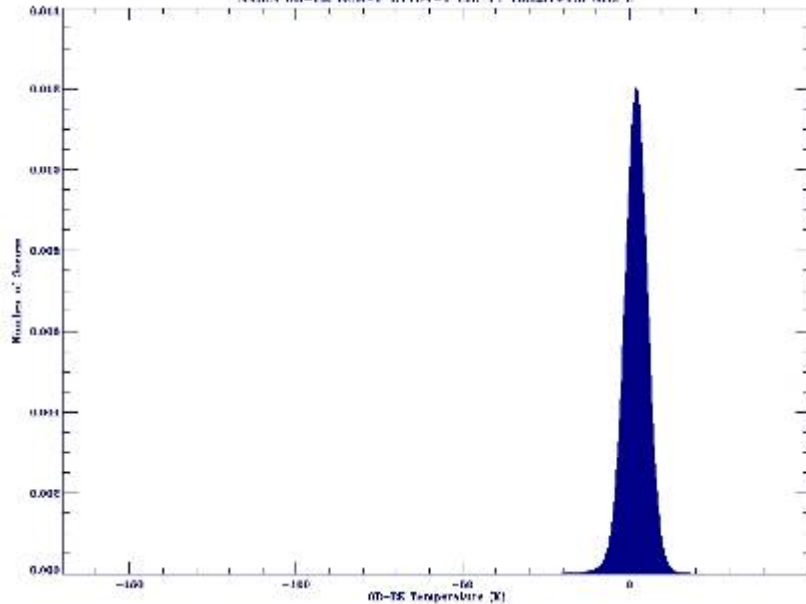


SSMIS EC\*OB BK ECMWF RTTOV 7 Ch. 11 183.31\_1.0 GHz H  
DTG: 2004031708  
02128-02128

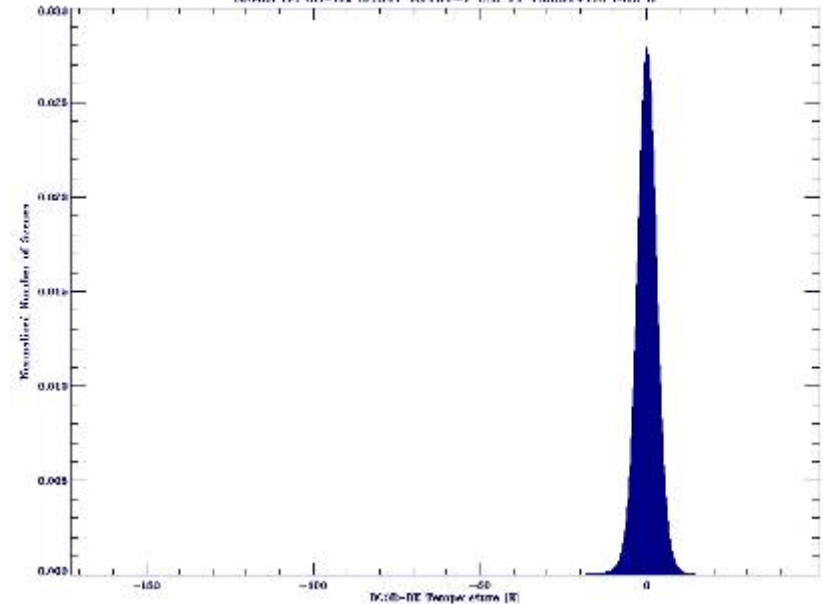
No. Scans: 620039      Min -187.26      MEAN 0.00  
Max 48.45      SDEV 3.36



SSMIS OB-BK ECMWF RTTOV-7 Ch. 11 183.31+1.0 GHz F  
Color bar: -6.26, -4.07, -2.88, -1.69, -0.50, 0.69, 1.88, 3.07, 4.26, 5.45, 6.26



SSMIS EC\*OB-BK ECMWF RTTOV-7 Ch. 11 183.31+1.0 GHz H  
Color bar: -6.26, -4.07, -2.88, -1.69, -0.50, 0.69, 1.88, 3.07, 4.26, 5.45, 6.26





# SSMIS Cal/Val Calibration Anomaly Analysis



Supplemental Slides



# SSMIS Cal/Val Calibration Anomaly Analysis



Current Situation

2005071606

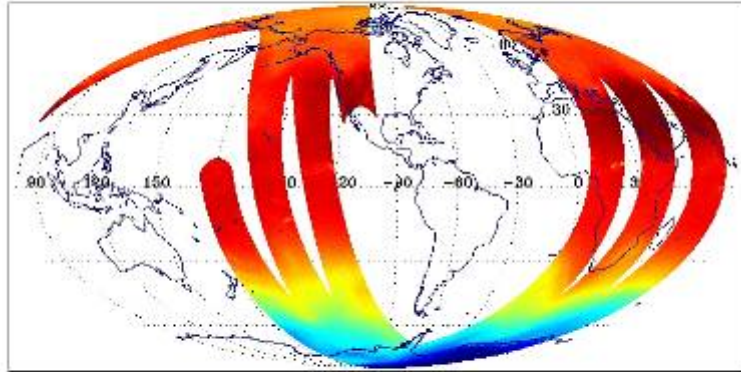


# SSMIS Cal/Val Calibration Anomaly Analysis



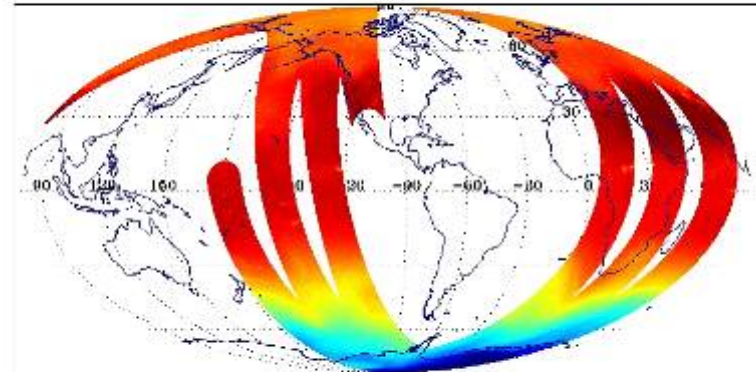
DMSP F-16 SSMIS Ch. 3 53.596 GHz V  
DTG: 2005071608  
08991-08993

No. Scenes: 582118      Min: 207.25      MEAN: 243.07  
Max: 256.33      STDV: 9.02

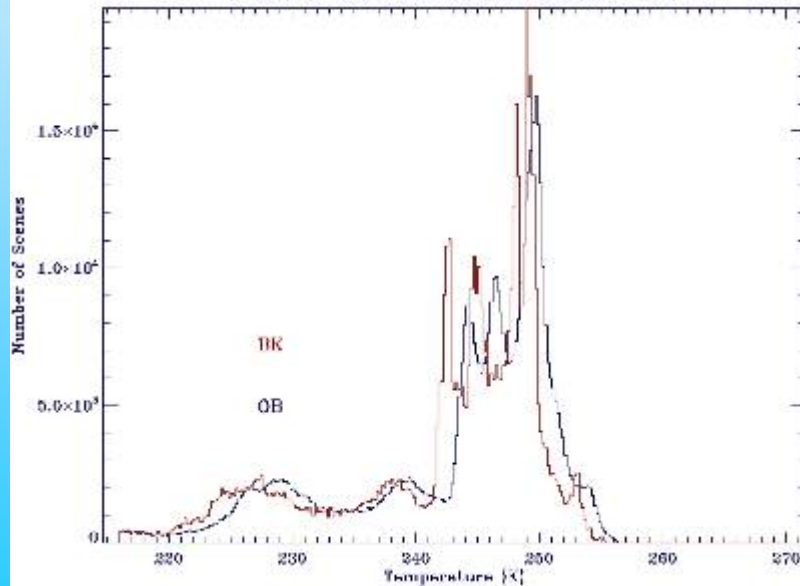


Bias Corrected DMSP F-16 SSMIS Ch. 3 53.596 GHz V  
DTG: 2005071608  
08991-08993

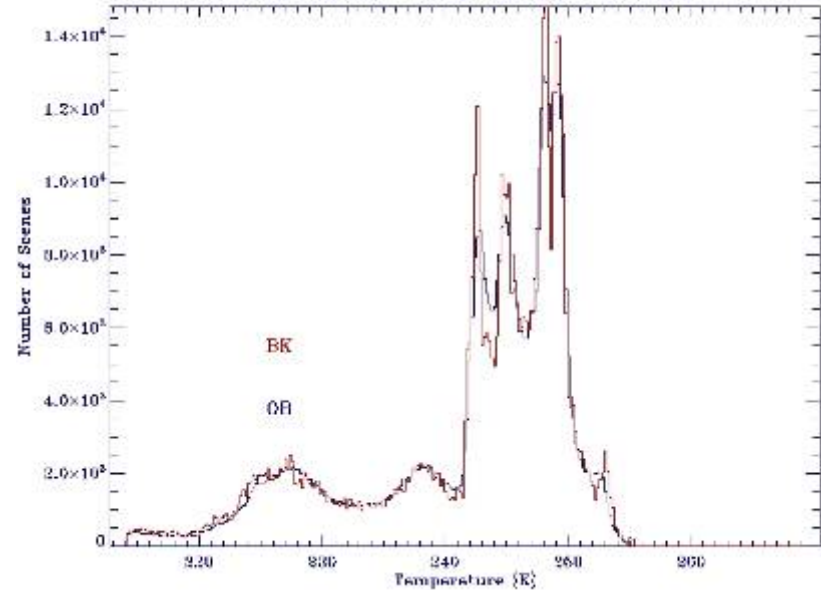
No. Scenes: 667909      Min: 206.61      MEAN: 241.63  
Max: 255.52      STDV: 9.18



RCMWF RTTOV-7 SSMIS Ch. 3 53.598 GHz V



RCMWF RTTOV-7 SSMIS Ch. 3 53.598 GHz V





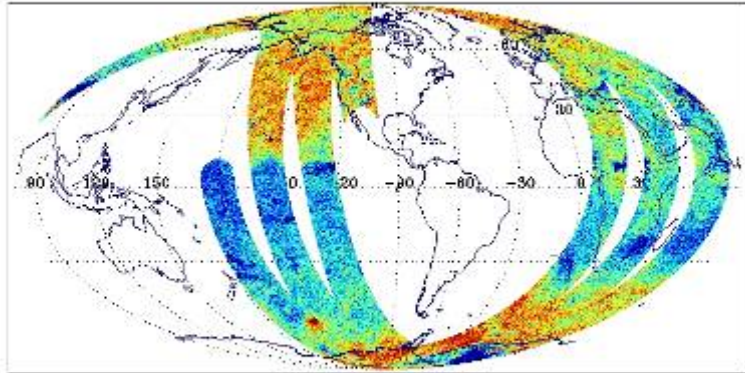


# SSMIS Cal/Val Calibration Anomaly Analysis



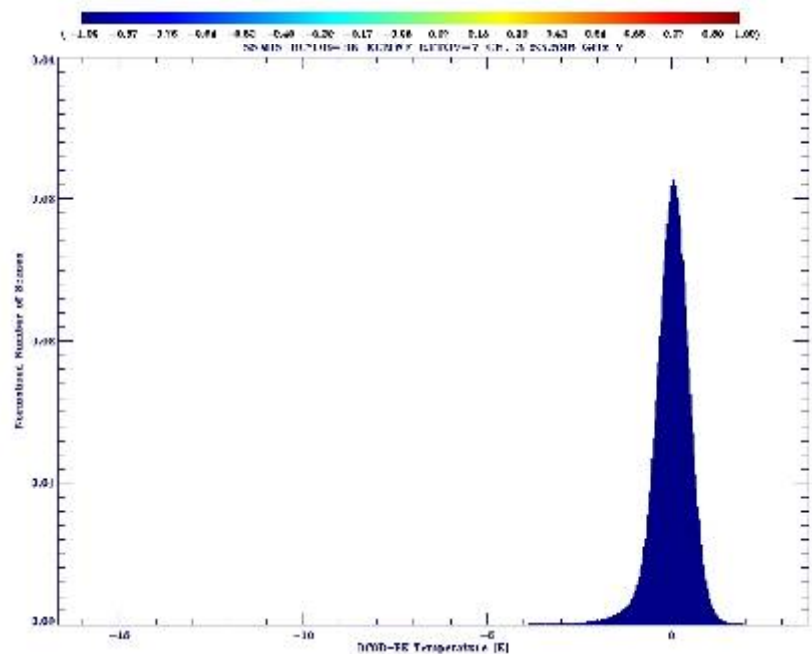
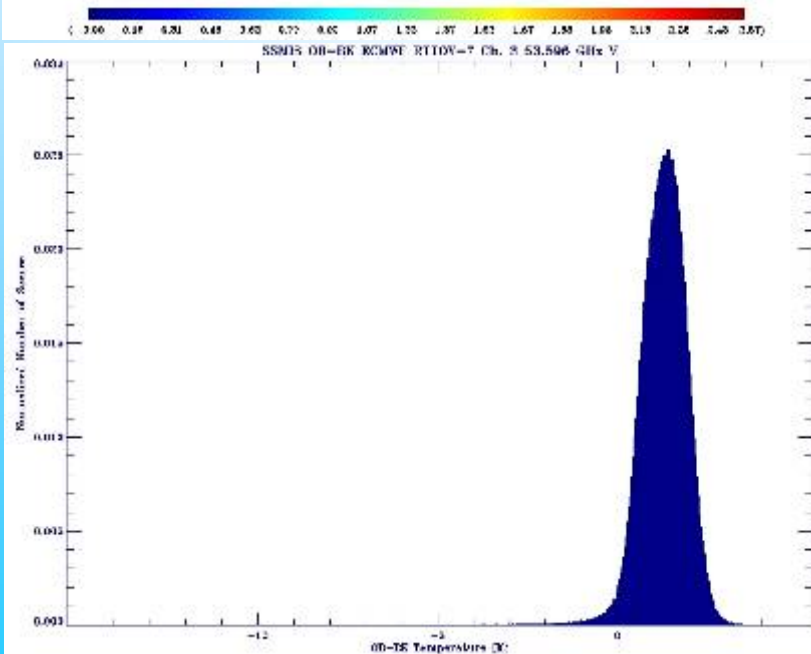
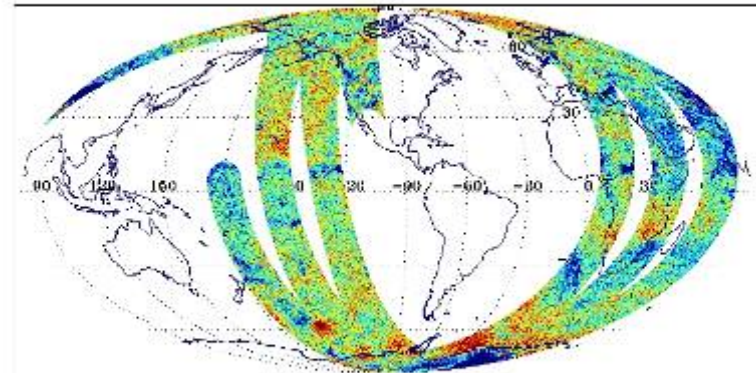
SSMIS OB BK ECMWF RTTOV 7 Ch. 3 53.506 GHz V  
DTG: 2005071808  
08991-08993

No. Scenes: 562119      Min -14.32      MEAN 1.28  
Max 4.83      SDEV 0.64



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 3 53.506 GHz V  
DTG: 2005071808  
08991-08993

No. Scenes: 562119      Min -16.19      MEAN 0.00  
Max 3.23      SDEV 0.55



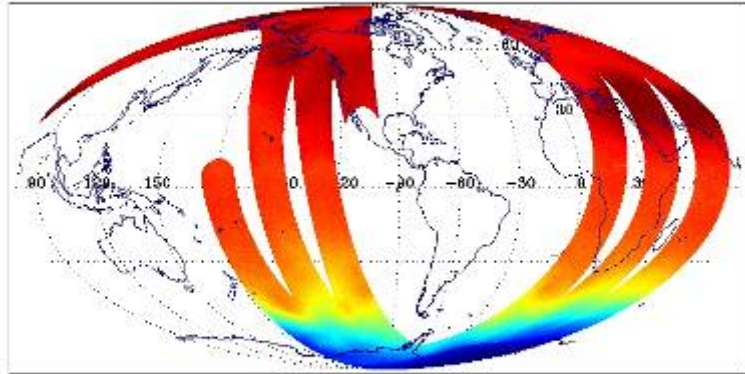


# SSMIS Cal/Val Calibration Anomaly Analysis



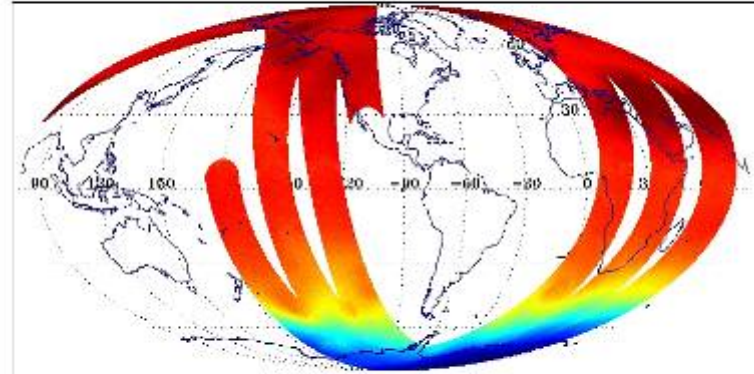
DMSP F 16 SSMIS Ch. 4 54.4 GHz V  
DTG: 2005071808  
08991-08993

No. Scenes: 562113      Min 203.33      MEAN 220.77  
Max 259.28      SDEV 7.21



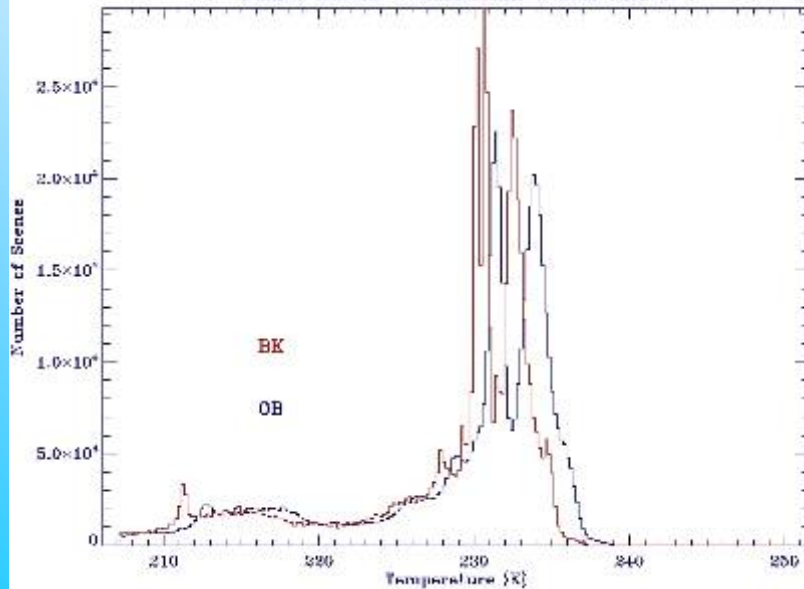
Bias Corrected DMSP F 16 SSMIS Ch. 4 54.4 GHz V  
DTG: 2005071808  
08991-08993

No. Scenes: 567909      Min 202.05      MEAN 227.40  
Max 237.68      SDEV 7.38



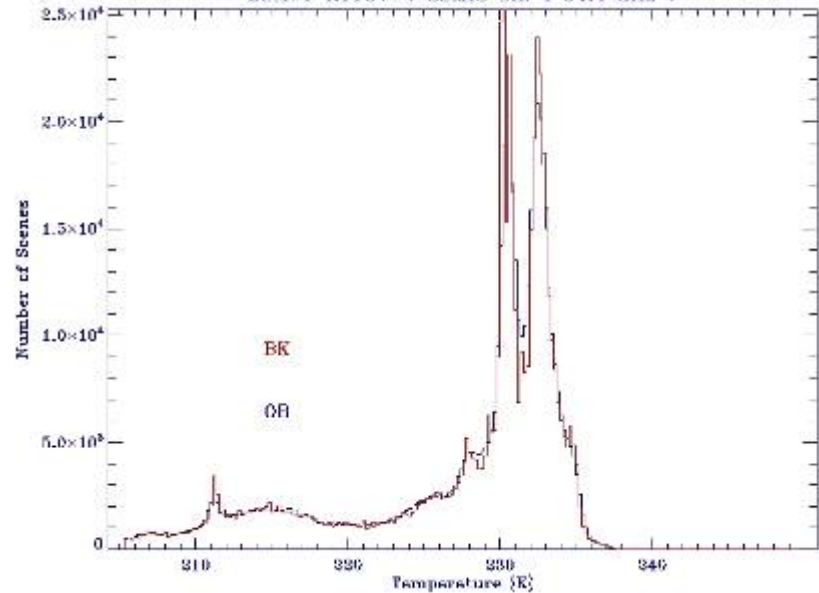
203.33 203.8 204.3 204.8 210.3 210.8 216.3 216.8 221.8 222.3 227.8 228.3 233.3 233.8 238.8 239.3 244.3 244.8 249.8 250.3 255.3 255.8 259.28

ECMWF RTTOV-7 SSMIS Ch. 4 54.4 GHz V



202.05 202.5 203 203.5 209 209.5 214.5 215 220 220.5 225.5 226 231 231.5 236.5 237 242 242.5 247.5 248 253 253.5 258.5 259 264 264.5 269.5 270 275 275.5 280.5 281 286

ECMWF RTTOV-7 SSMIS Ch. 4 54.4 GHz V



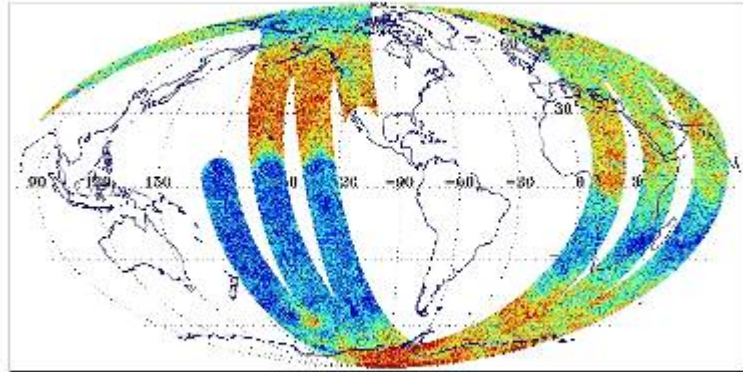


# SSMIS Cal/Val Calibration Anomaly Analysis



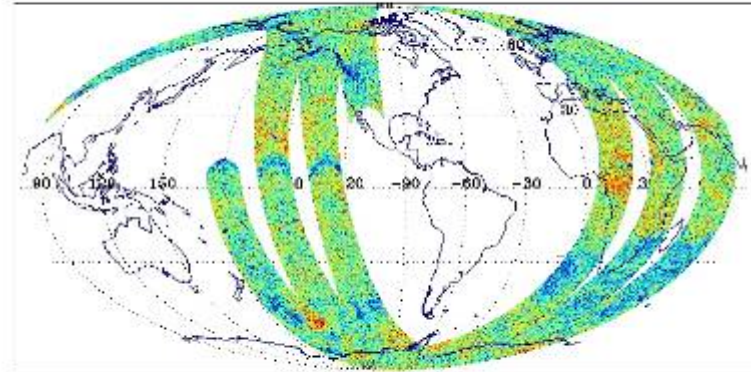
SSMIS OB BK ECMWF RTTOV 7 Ch. 4 54.4 GHz V  
DTG: 2005071606  
080931-000003

No. Scans: 592118  
Min -3.65 MEAN 1.21  
Max 3.51 SDEV 0.50

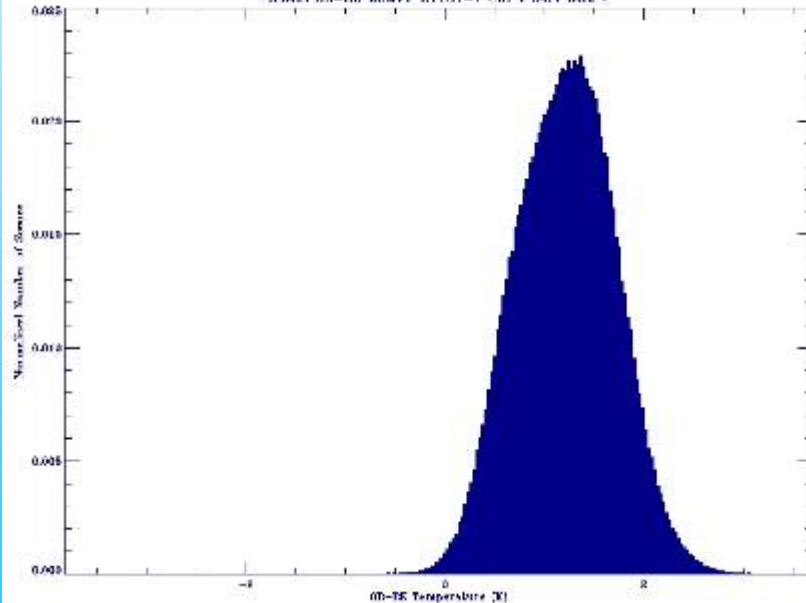


SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 4 54.4 GHz V  
DTG: 2005071606  
080931-000003

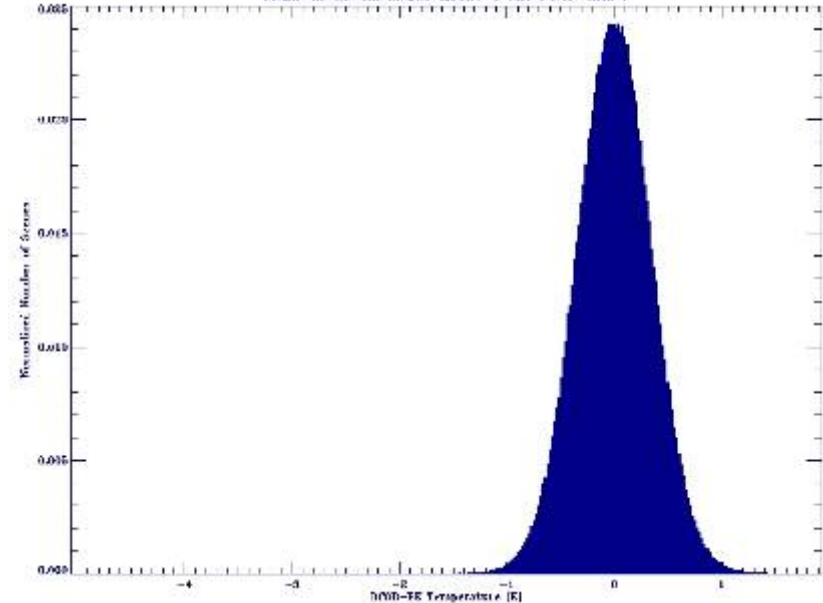
No. Scans: 562119  
Min -4.89 MEAN -0.00  
Max 1.75 SDEV 0.35



SSMIS OB-BK ECMWF RTTOV-7 Ch. 4 54.4 GHz V



SSMIS BC\*OB-BK ECMWF RTTOV-7 Ch. 4 54.4 GHz V



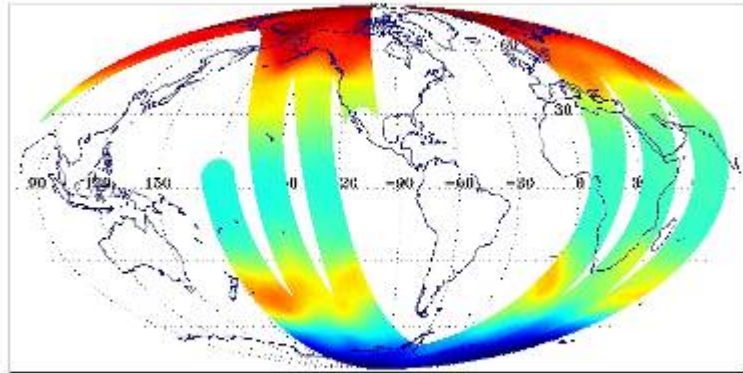


# SSMIS Cal/Val Calibration Anomaly Analysis



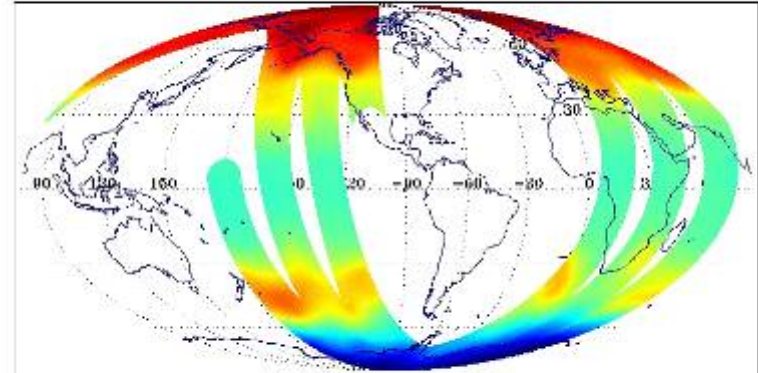
DMSP F 16 SSMIS Ch. 5 55.5 GHz V  
DTG: 2005071606  
08991-08993

No. Scenes: 592118      Min 188.72      MEAN 214.59  
Max 330.07      SDEV 9.38



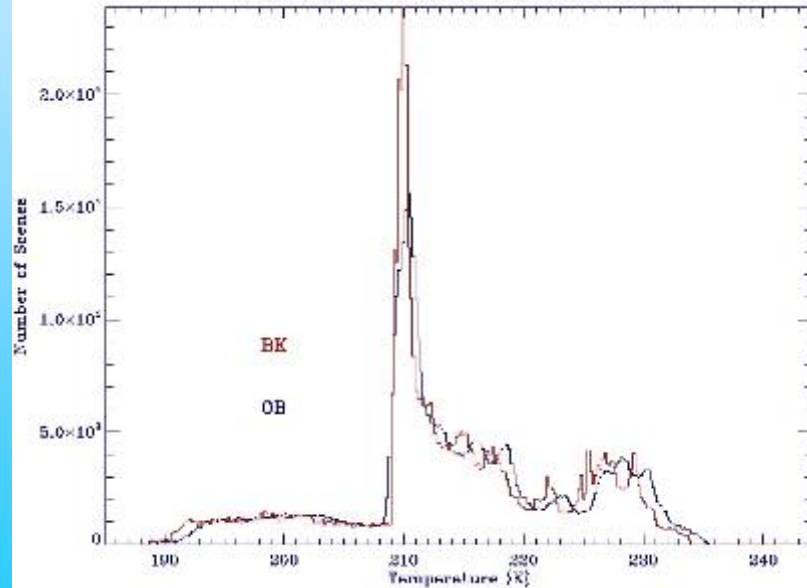
Bias Corrected DMSP F 16 SSMIS Ch. 5 55.5 GHz V  
DTG: 2005071606  
08991-08993

No. Scenes: 567959      Min 187.58      MEAN 213.85  
Max 334.97      SDEV 9.39



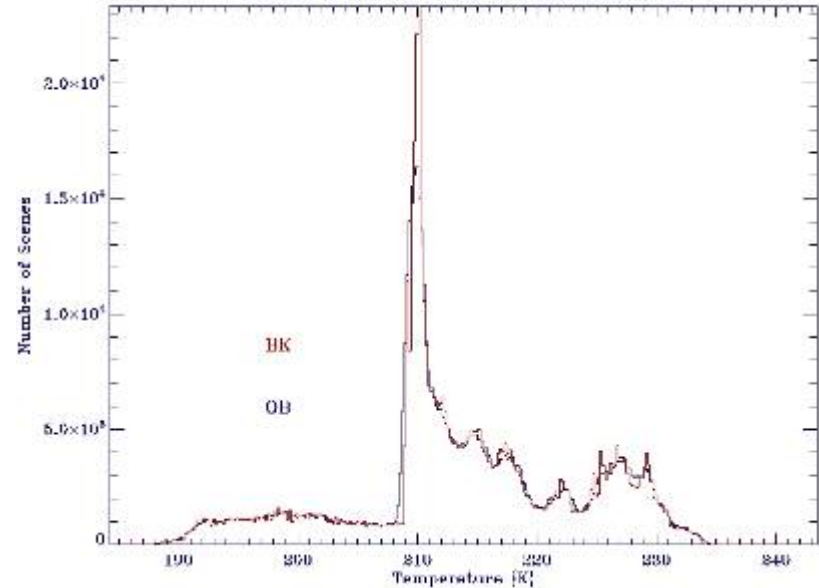
Color scale for brightness temperature: 188.0 196.0 204.0 212.0 220.0 228.0 236.0 244.0 252.0 260.0 268.0 276.0 284.0 292.0 300.0 308.0 316.0 324.0 332.0

FCMWF RTTOV-7 SSMIS Ch. 5 55.5 GHz V



Color scale for brightness temperature: 188.0 196.0 204.0 212.0 220.0 228.0 236.0 244.0 252.0 260.0 268.0 276.0 284.0 292.0 300.0 308.0 316.0 324.0 332.0

FCMWF RTTOV-7 SSMIS Ch. 5 55.5 GHz V



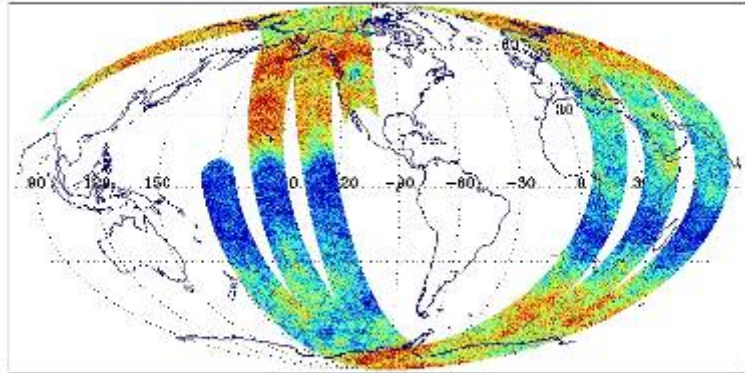


# SSMIS Cal/Val Calibration Anomaly Analysis



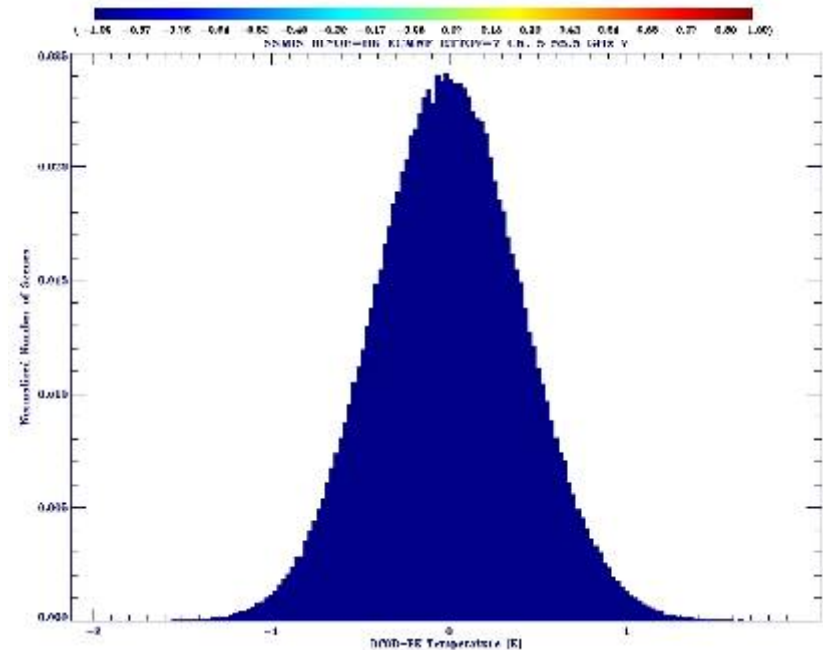
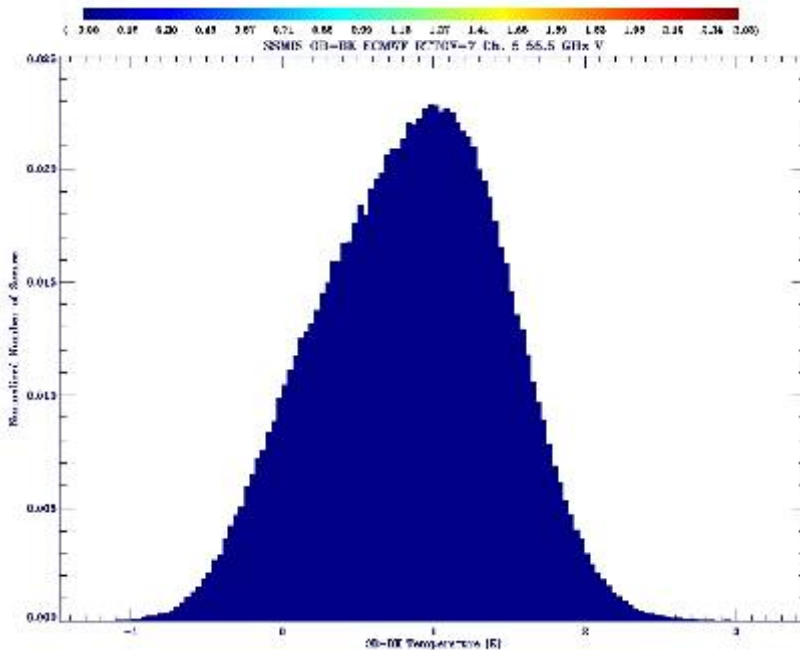
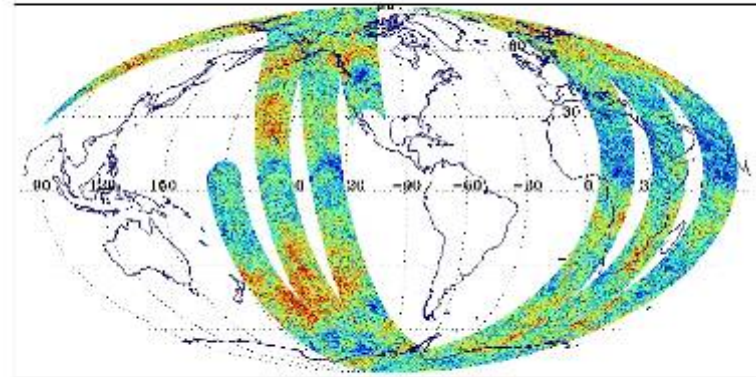
SSMIS OB BK ECMWF RTTOV 7 Ch. 5 55.5 GHz V  
DTG: 2005071808  
08991-08993

No. Scenes: 562119  
Min -1.35    MEAN 0.05  
Max 3.34    SDEV 0.59



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 5 55.5 GHz V  
DTG: 2005071808  
08991-08993

No. Scenes: 562119  
Min -2.03    MEAN -0.00  
Max 1.98    SDEV 0.41



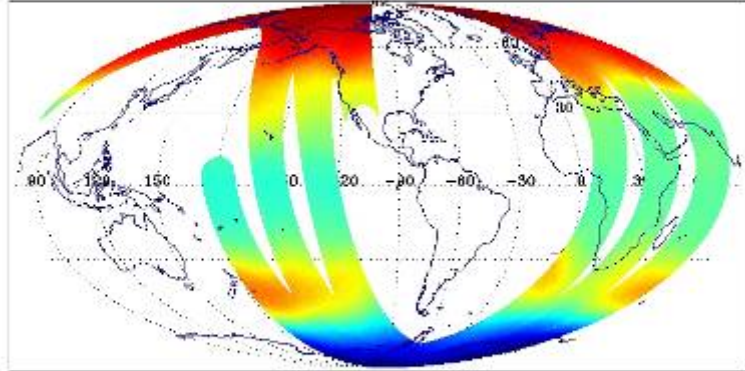


# SSMIS Cal/Val Calibration Anomaly Analysis



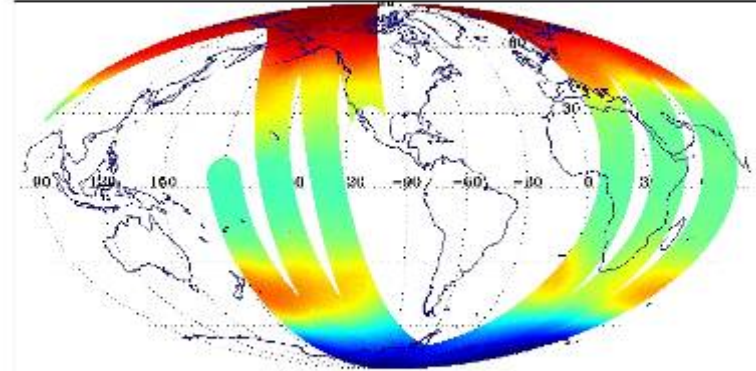
DMSP F 16 SSMIS Ch. 6 57.29 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scenes: 562113      Min 184.93      MEAN 212.25  
Max 235.28      SDEV 11.40



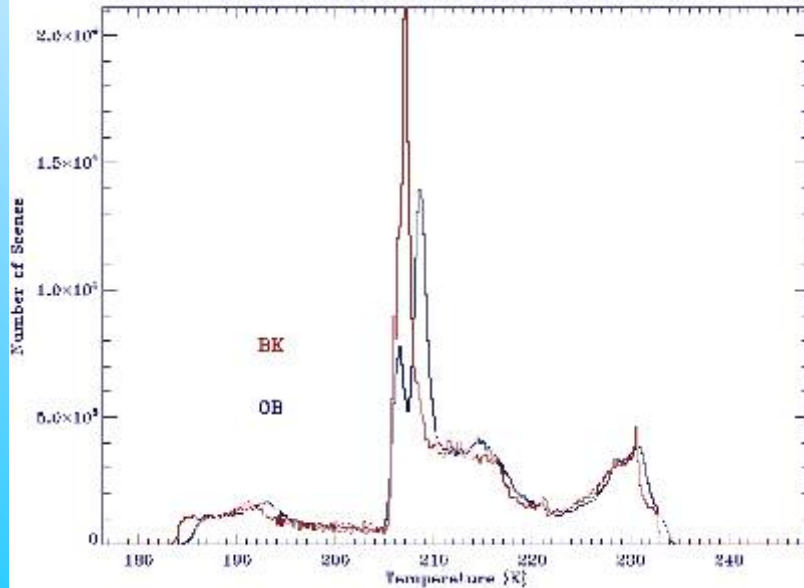
Bias Corrected DMSP F 16 SSMIS Ch. 6 57.29 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scenes: 567939      Min 182.62      MEAN 211.43  
Max 233.94      SDEV 11.51



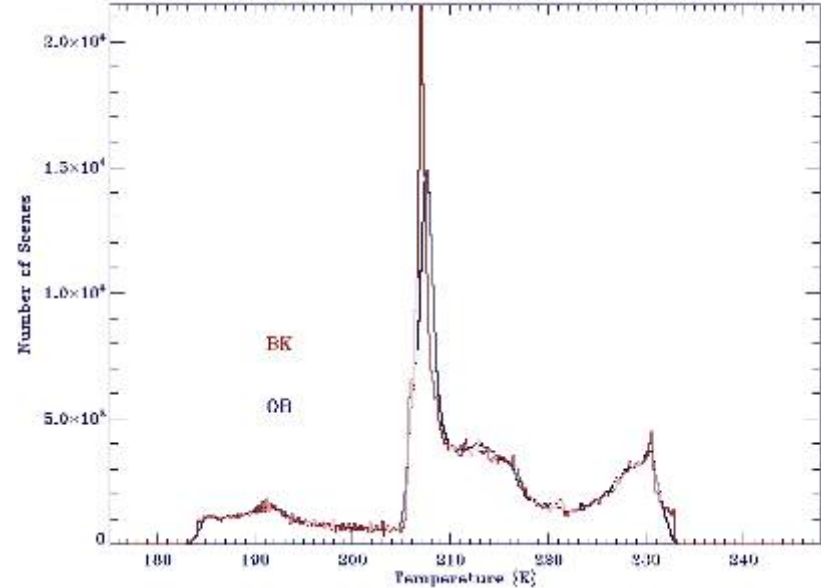
187.0 189.5 192.0 194.5 197.0 200.0 202.5 205.0 207.5 210.0 212.5 215.0 217.5 220.0 222.5 225.0 227.5 230.0 232.5 235.0 237.4

ECMWF RTTOV-7 SSMIS Ch. 6 57.29 GHz RCP



187.0 189.5 192.0 194.5 197.0 200.0 202.5 205.0 207.5 210.0 212.5 215.0 217.5 220.0 222.5 225.0 227.5 230.0 232.5 235.0 237.4

ECMWF RTTOV-7 SSMIS Ch. 6 57.29 GHz RCP



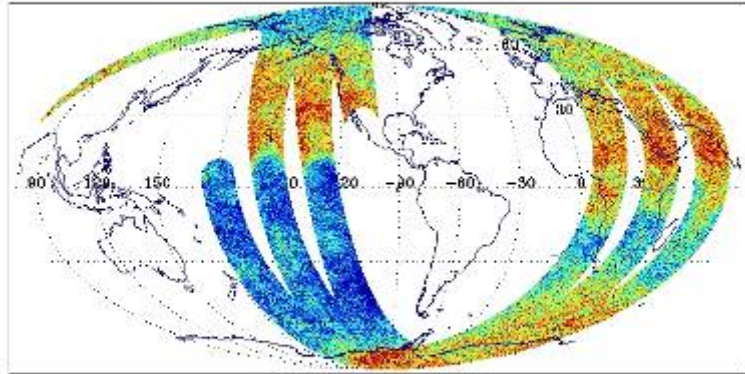


# SSMIS Cal/Val Calibration Anomaly Analysis



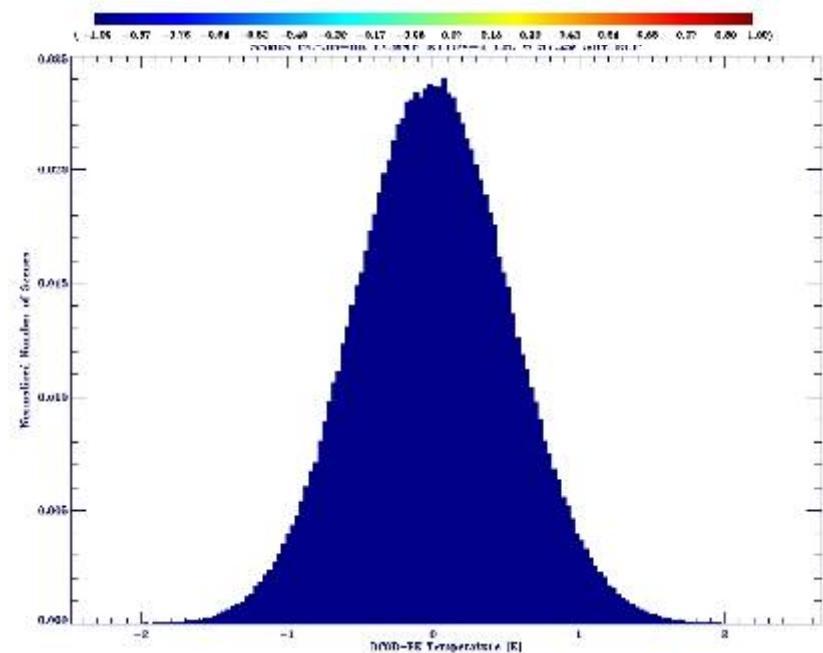
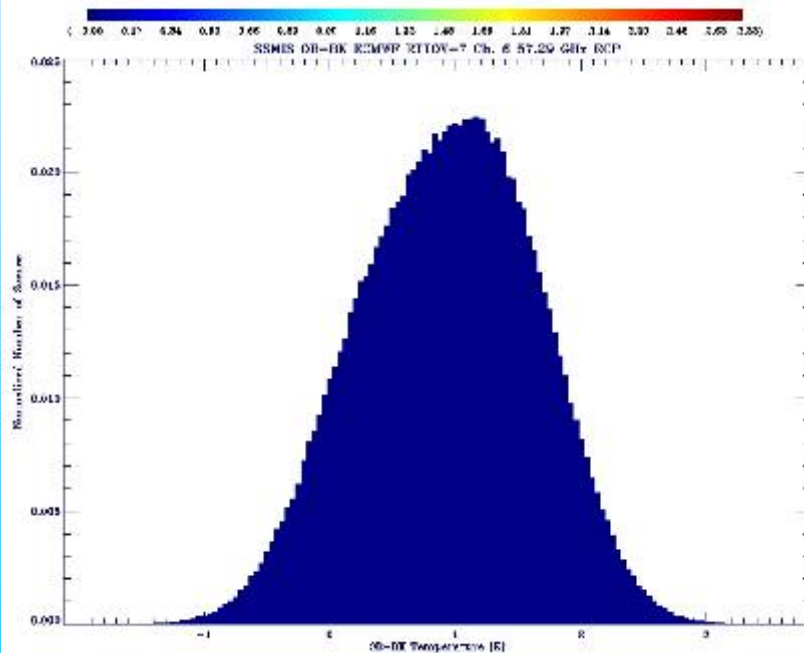
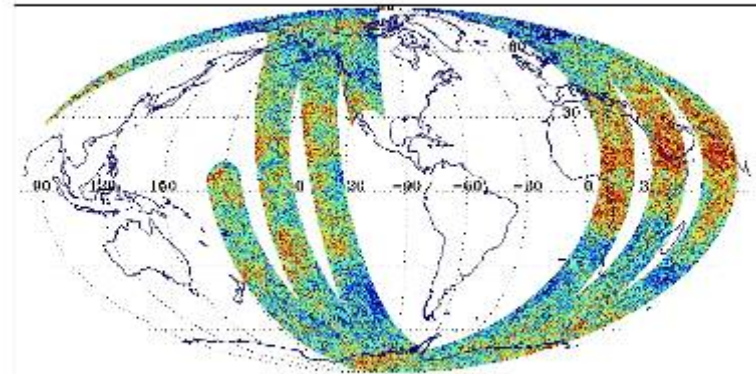
SSMIS OB BK ECMWF RTTOV 7 Ch. 6 57.29 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scenes: 662119      Min -1.08      MEAN 0.94  
Max 3.88      SDEV 0.69



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 6 57.29 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scenes: 662119      Min -2.36      MEAN 0.00  
Max 2.52      SDEV 0.52



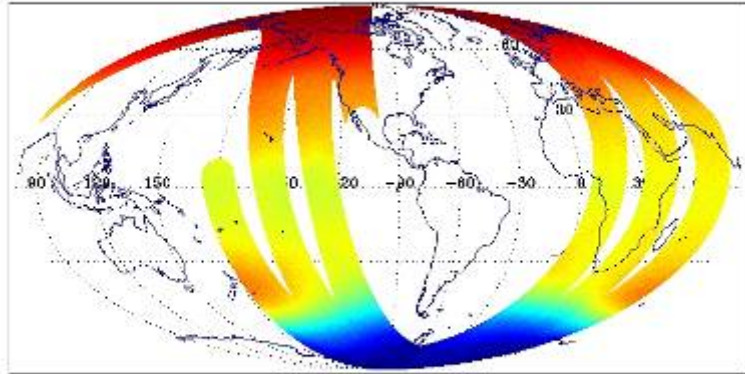


# SSMIS Cal/Val Calibration Anomaly Analysis



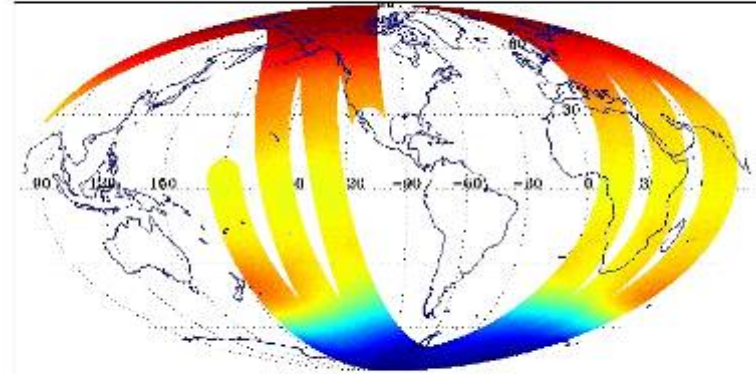
DMSP F 10 SSMIS Ch. 7 59.4 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scenes: 582113  
Min 185.41      MEAN 217.17  
Max 256.38      SDEV 13.14



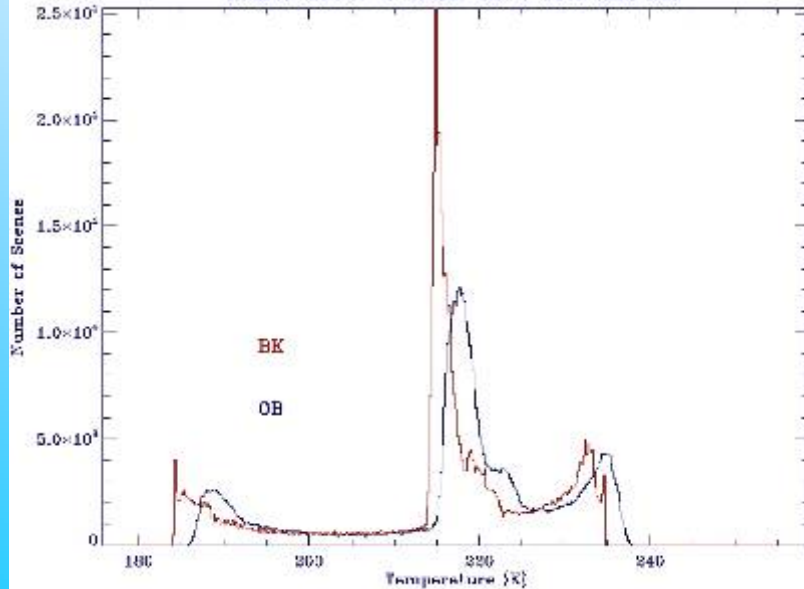
Bias Corrected DMSP F 10 SSMIS Ch. 7 59.4 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scenes: 657959  
Min 182.64      MEAN 214.66  
Max 255.65      SDEV 13.28



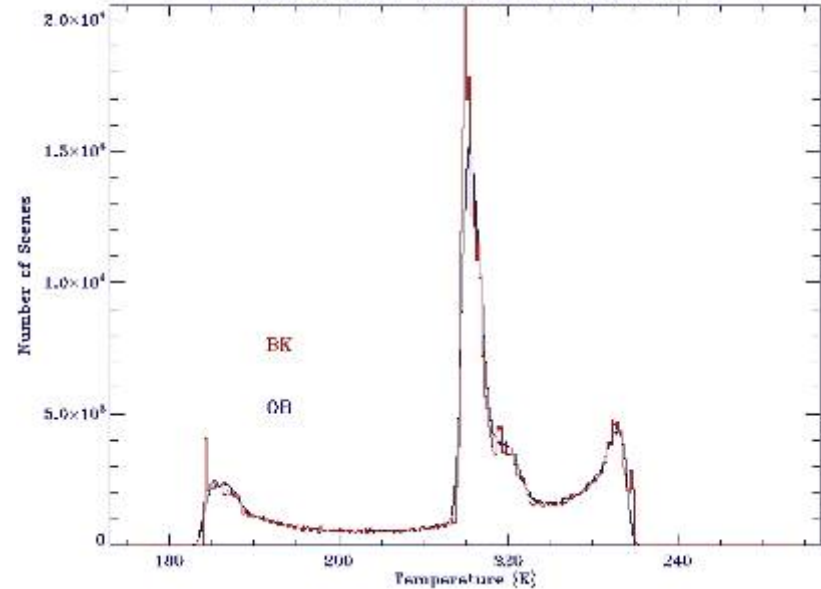
185.41 190.1 194.8 199.5 204.2 208.9 213.6 218.3 223.0 227.7 232.4 237.1 241.8 246.5 251.2 255.9 260.6

ECMWF RTDv-7 SSMIS Ch. 7 59.4 GHz RCP



182.64 187.3 192.0 196.7 201.4 206.1 210.8 215.5 220.2 224.9 229.6 234.3 239.0 243.7 248.4 253.1 257.8

ECMWF RTDv-7 SSMIS Ch. 7 59.4 GHz RCP





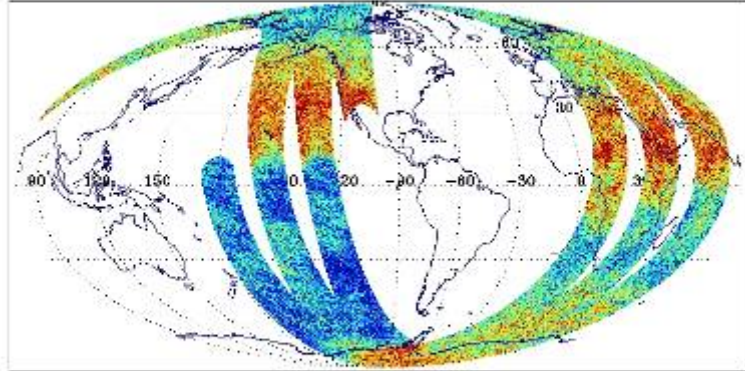


# SSMIS Cal/Val Calibration Anomaly Analysis



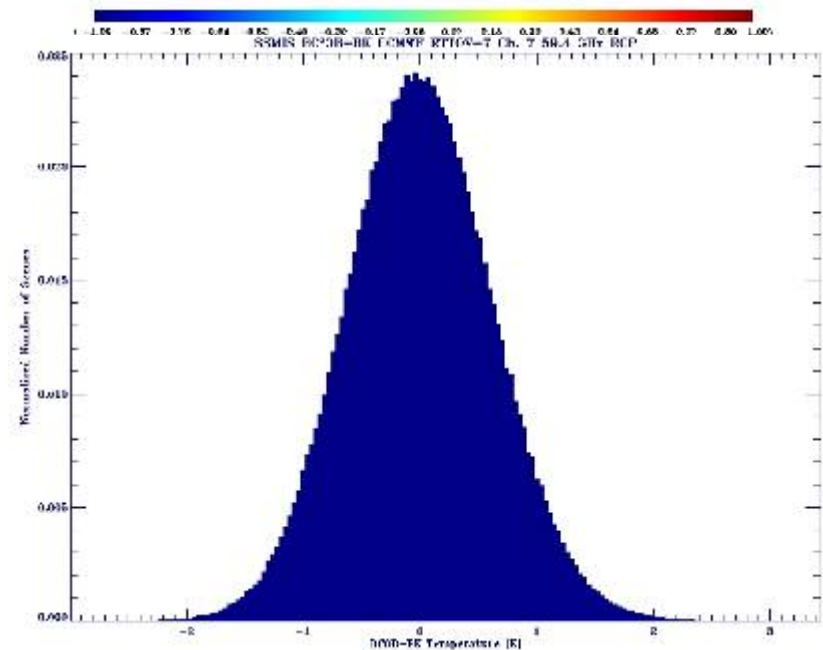
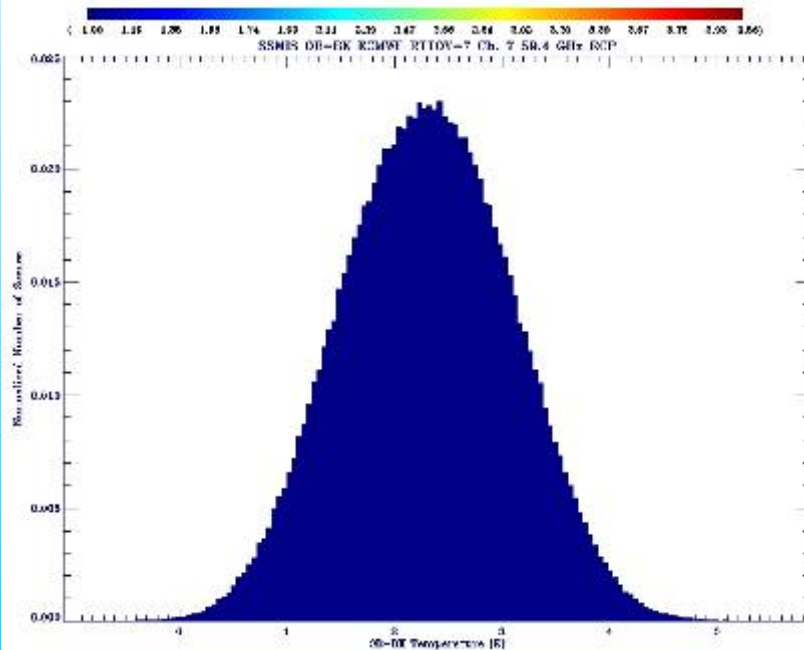
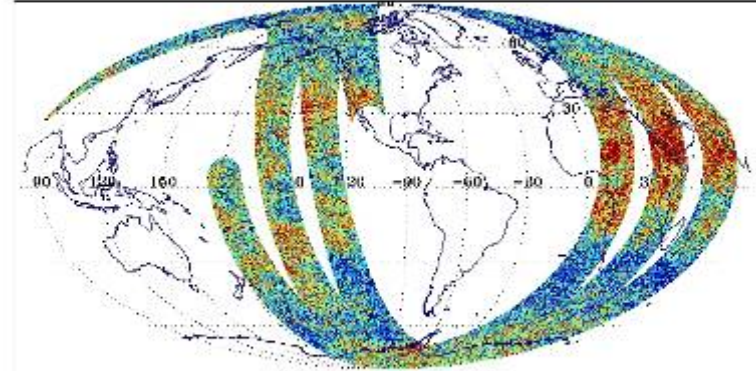
SSMIS OB BK ECMWF RTTOV 7 Ch. 7 59.4 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scenes: 562113  
Min -0.01    MEAN 3.51  
Max 5.70    SDKV 0.78



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 7 59.4 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scenes: 562119  
Min -3.84    MEAN -0.00  
Max 3.26    SDKV 0.62



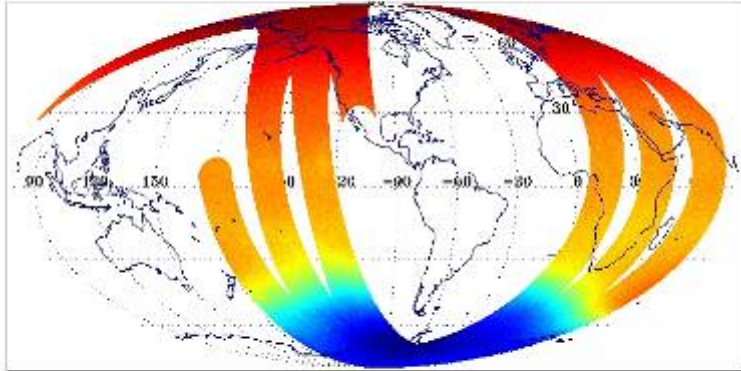


# SSMIS Cal/Val Calibration Anomaly Analysis



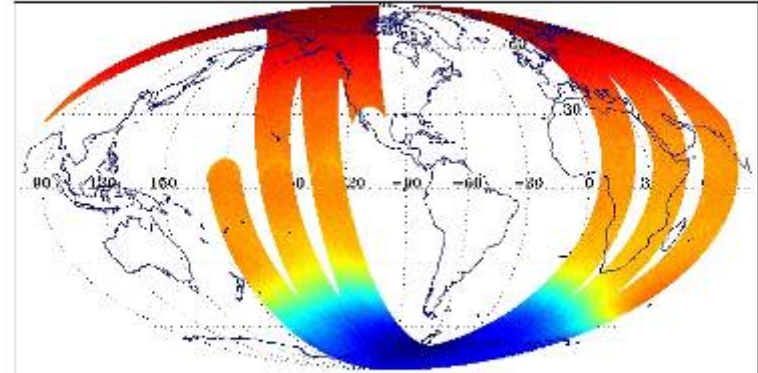
DMSP F-16 SSMIS Ch. 24 60.792668 $\pm$ .357892 $\pm$ .050 GHz RCP  
DTG: 2005071606  
08991-08993

No. Scenes: 592118      Min 184.94      MEAN 224.76  
Max 340.43      SDEV 15.31

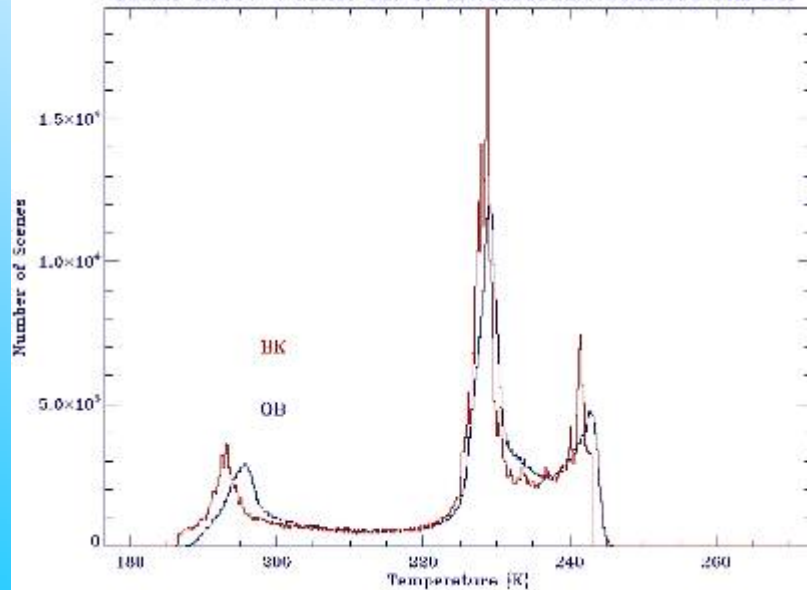


Bias Corrected DMSP F-16 SSMIS Ch. 24 60.792668 $\pm$ .357892 $\pm$ .050 GHz RCP  
DTG: 2005071606  
08991-08993

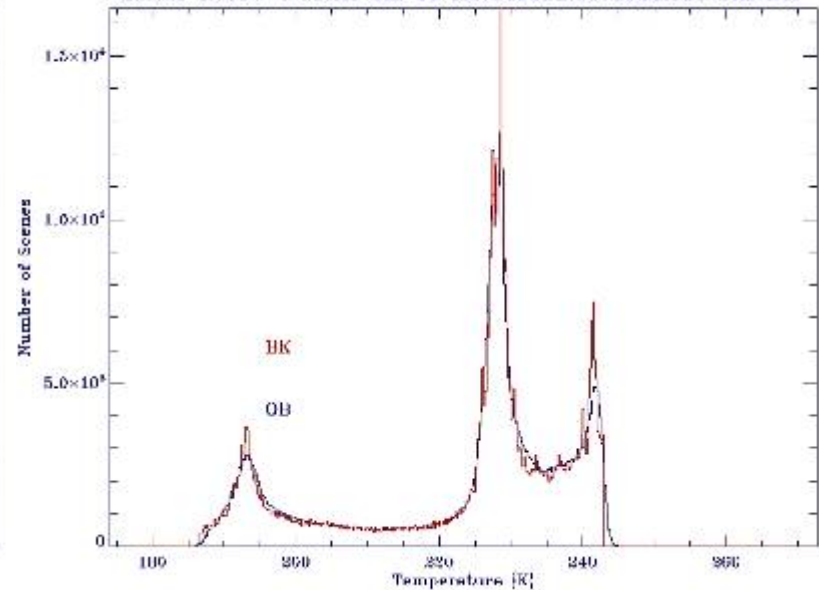
No. Scenes: 567959      Min 183.56      MEAN 223.40  
Max 345.17      SDEV 15.66



185.0 190.0 195.0 200.0 205.0 210.0 215.0 220.0 225.0 230.0 235.0 240.0 245.0  
RCMWF RTTOV-7 SSMIS Ch. 24 60.792668 $\pm$ .357892 $\pm$ .050 GHz RCP



185.0 191.4 197.7 203.9 210.0 216.0 221.9 227.9 233.9 239.9 245.9 251.9 257.9 263.9  
RCMWF RTTOV-7 SSMIS Ch. 24 60.792668 $\pm$ .357892 $\pm$ .050 GHz RCP



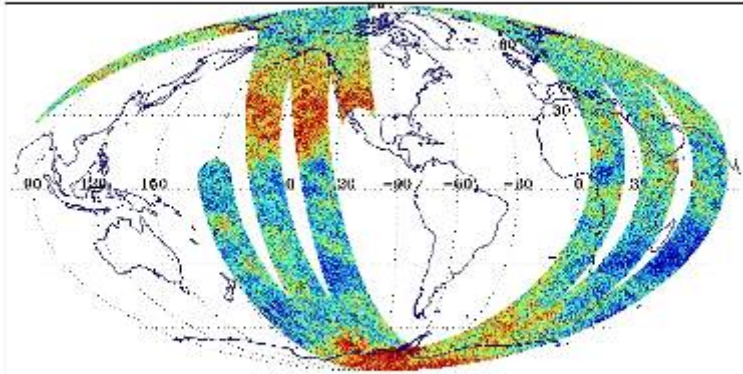


# SSMIS Cal/Val Calibration Anomaly Analysis



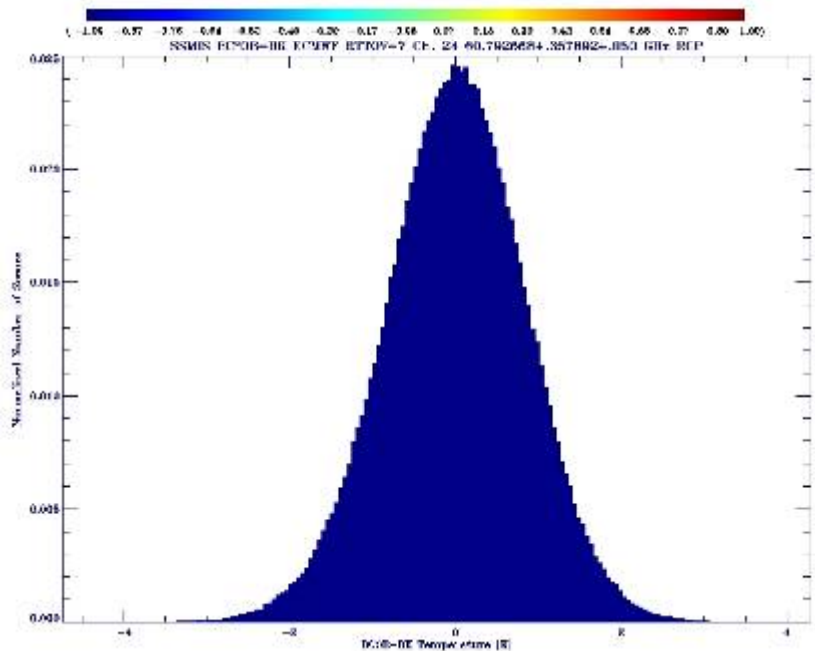
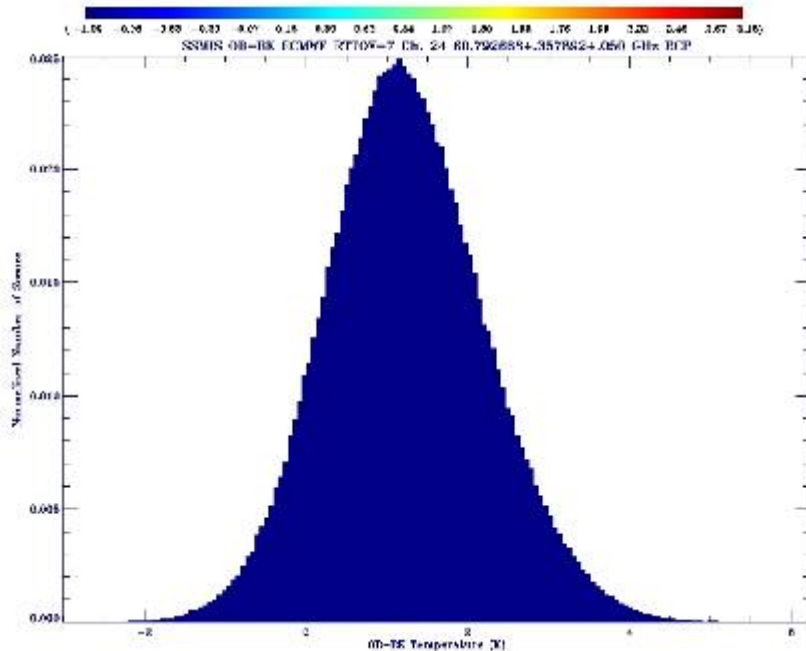
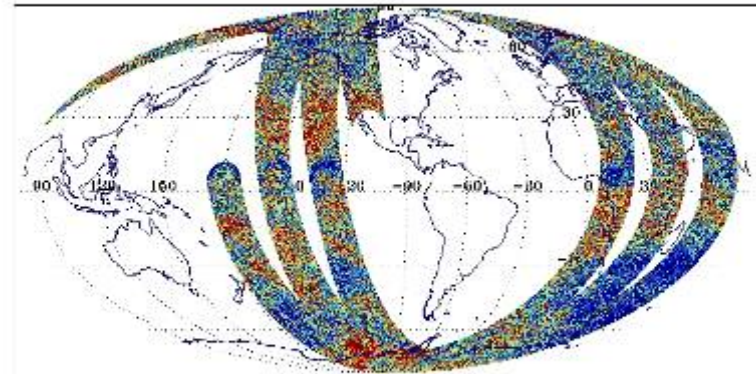
SSMIS OB BK ECMWF RTTOV 7 Ch. 24 60.792668...3578921.050 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scans: 662118  
Min -2.79    MEAN 1.24  
Max 5.98    STDV 0.97



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 24 60.792668...3578921.050 GHz RCP  
DTG: 2005071808  
08991-08993

No. Scans: 662119  
Min -4.53    MEAN 0.00  
Max 4.06    STDV 0.84



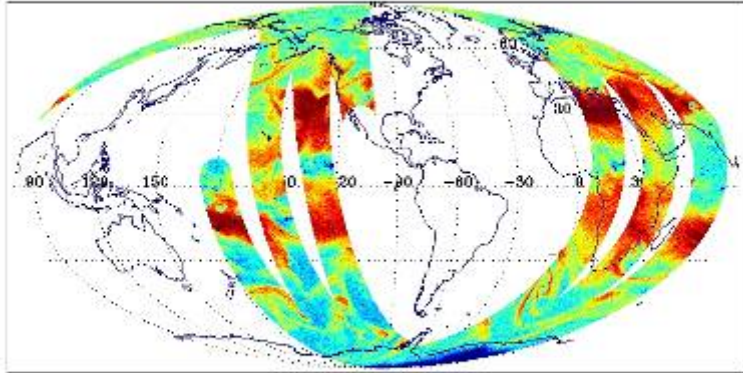


# SSMIS Cal/Val Calibration Anomaly Analysis



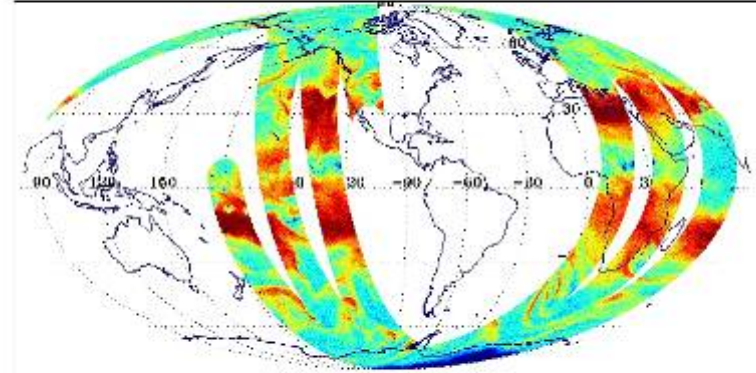
DMSP F 16 SSMIS Ch. 11 183.31±1.0 GHz H  
DTG: 2005071808  
08991-08993

No. Scenes: 582113  
Min 133.95    MEAN 246.28  
Max 280.59    SDEV 9.11

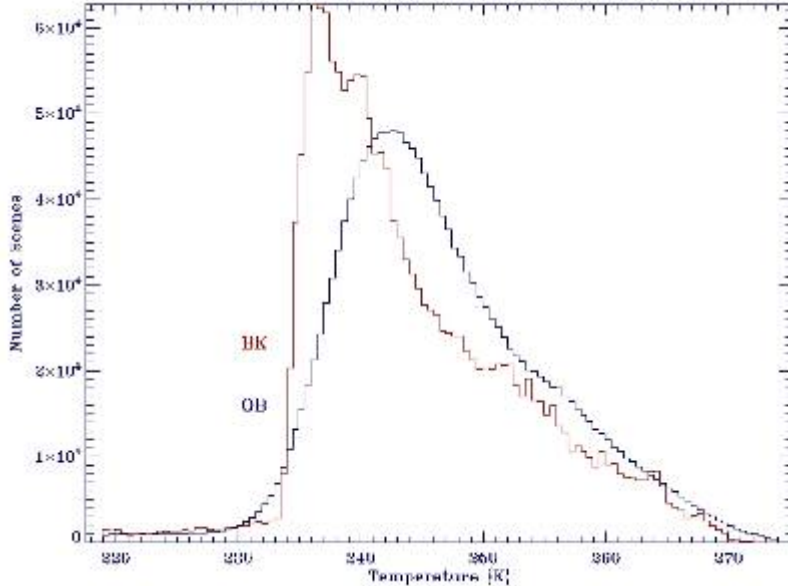


Bias Corrected DMSP F 16 SSMIS Ch. 11 183.31-1.0 GHz H  
DTG: 2005071808  
08991-08993

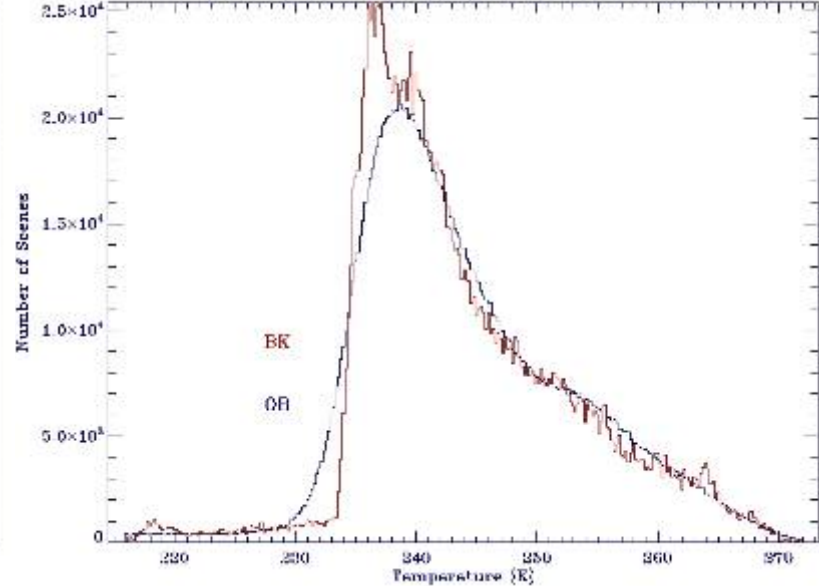
No. Scenes: 1703879  
Min 135.54    MEAN 243.67  
Max 276.96    SDEV 9.33



ECMWF RTTOV-7 SSMIS Ch. 11 183.31±1.0 GHz H



ECMWF RTTOV-7 SSMIS Ch. 11 183.31-1.0 GHz H



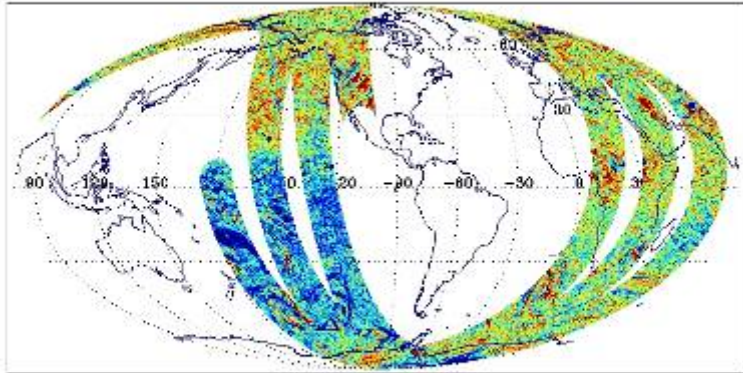


# SSMIS Cal/Val Calibration Anomaly Analysis



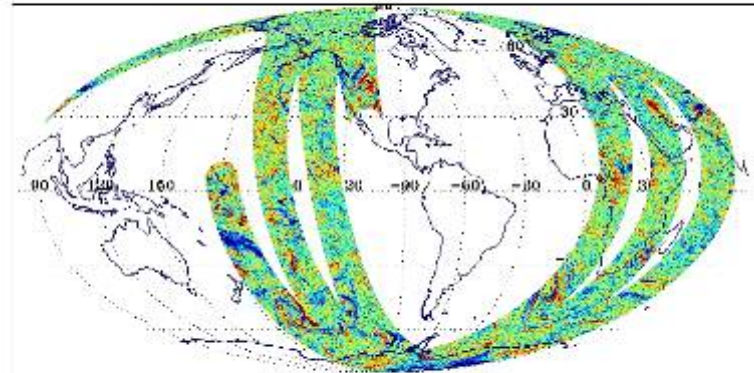
SSMIS OB BK ECMWF RTTOV 7 Ch. 11 183.31-1.0 GHz H  
DTG: 2005071808  
08991-08993

No. Scenes: 562119      Min -19.09      MEAN 3.52  
Max 20.09      SDEV 3.90

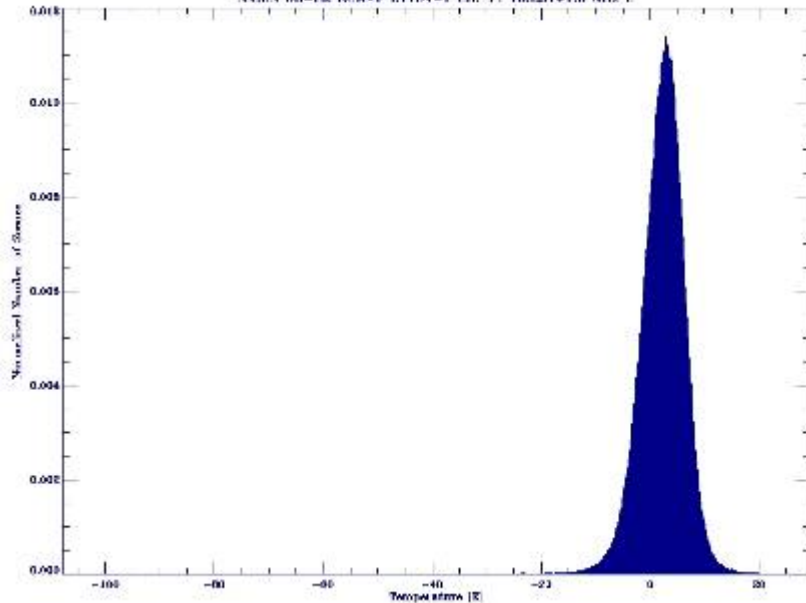


SSMIS EC\*OB BK ECMWF RTTOV 7 Ch. 11 183.31-1.0 GHz H  
DTG: 2005071808  
08991-08993

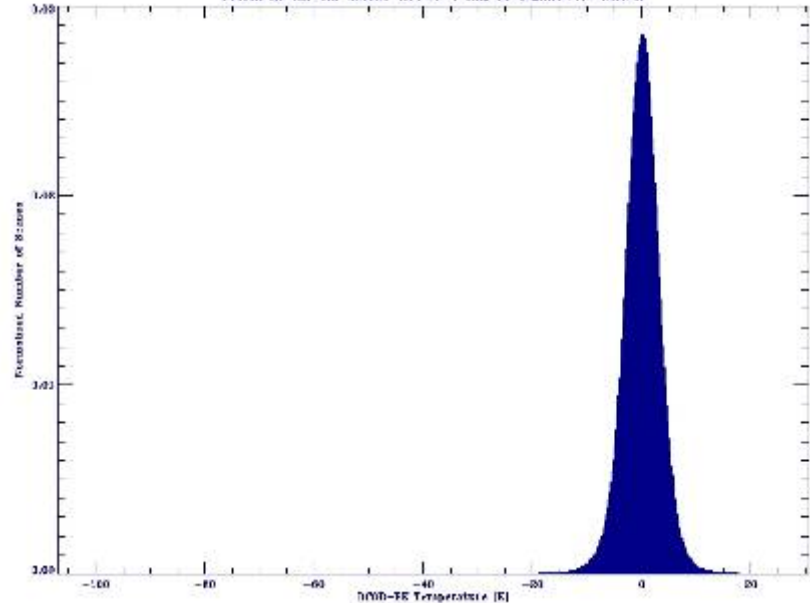
No. Scenes: 562119      Min -103.63      MEAN -0.00  
Max 27.13      SDEV 3.60



SSMIS OB-BK ECMWF RTTOV-7 Ch. 11 183.31-1.0 GHz F



SSMIS EC\*OB-BK ECMWF RTTOV-7 Ch. 11 183.31-1.0 GHz H





# SSMIS Cal/Val Calibration Anomaly Analysis



Long Shadow Case

2004080506

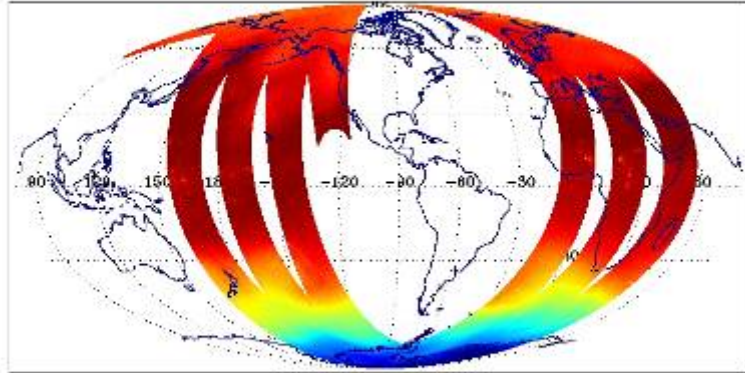


# SSMIS Cal/Val Calibration Anomaly Analysis



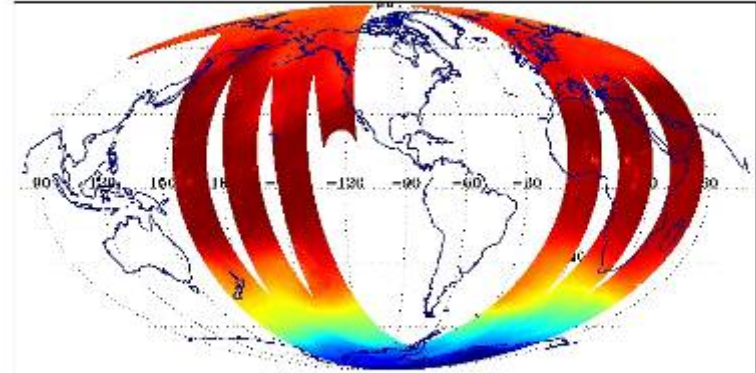
DMSP F 16 SSMIS Ch. 3 53.596 GHz V  
DTG: 2004080508  
04118-04120

No. Scenes: 651193      Min 81.28      MEAN 242.35  
Max 256.18      SDEV 10.19

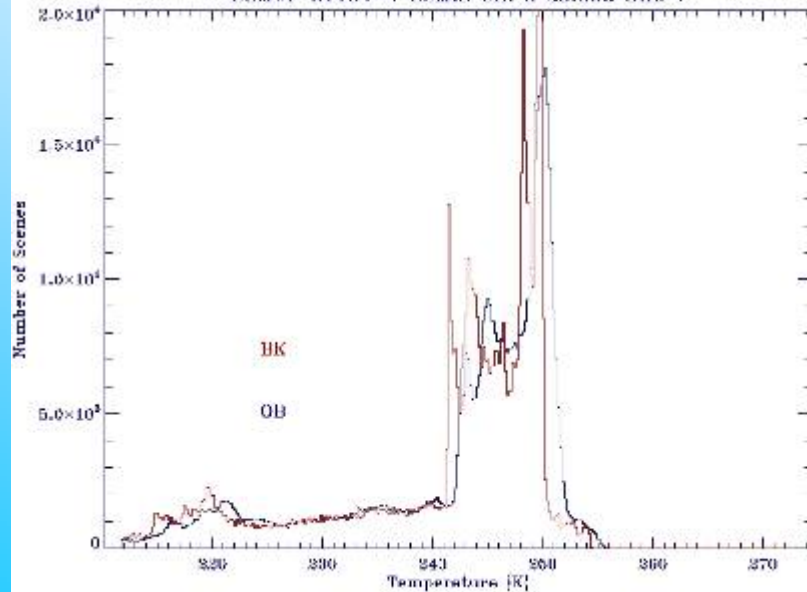


Bias Corrected DMSP F 16 SSMIS Ch. 3 53.596 GHz V  
DTG: 2004080508  
04118-04120

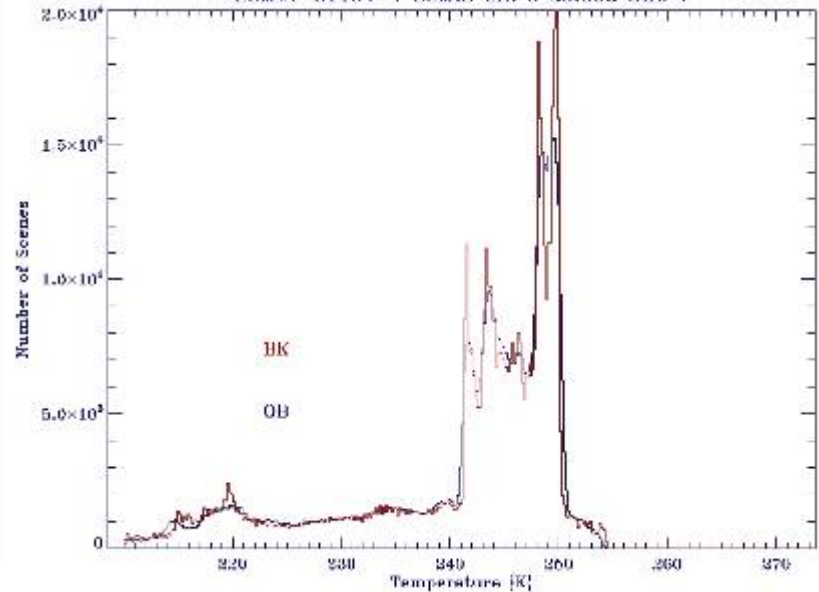
No. Scenes: 616619      Min 83.34      MEAN 241.02  
Max 254.88      SDEV 10.32



ECMWF RTTOV-7 SSMIS Ch. 3 53.596 GHz V



ECMWF RTTOV-7 SSMIS Ch. 3 53.596 GHz V



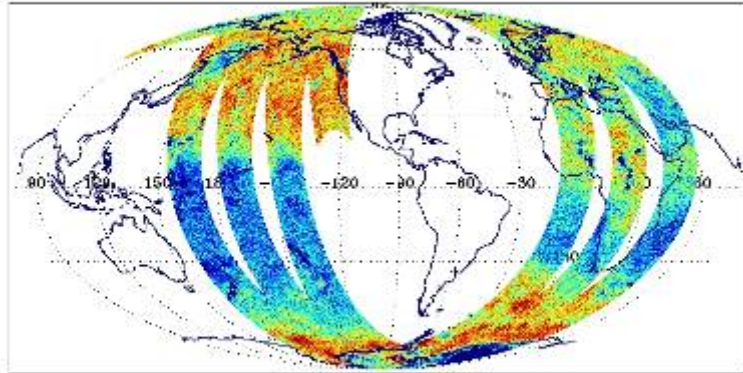


# SSMIS Cal/Val Calibration Anomaly Analysis



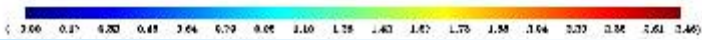
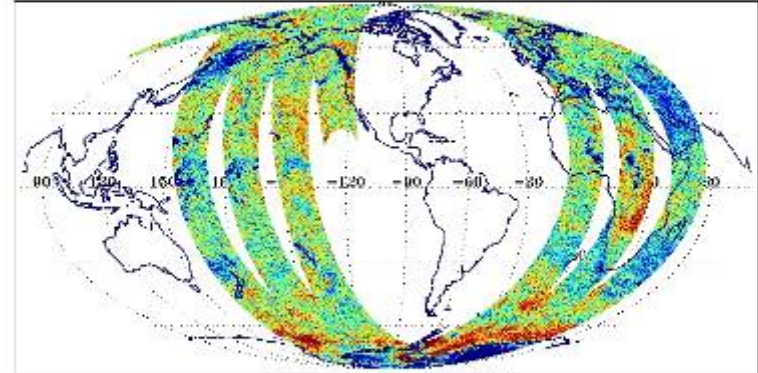
SSMIS OB BK ECMWF RTTOV 7 Ch. 3 53.506 GHz V  
DTG: 2004080508  
04113-04130

No. Scenes: 631199      Min -16.98      MEAN 1.13  
Max 3.84      SDEV 0.66

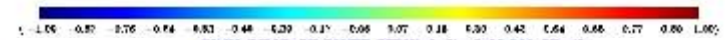
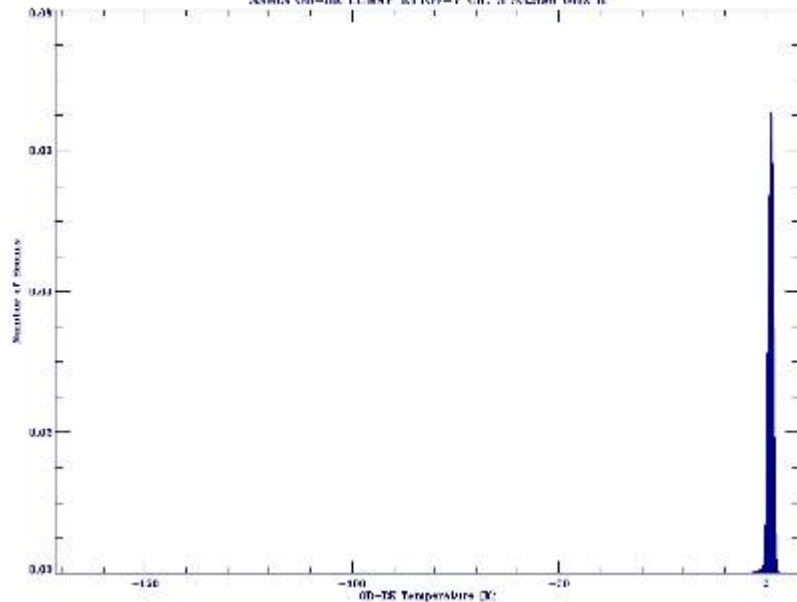


SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 3 53.506 GHz V  
DTG: 2004080508  
04113-04130

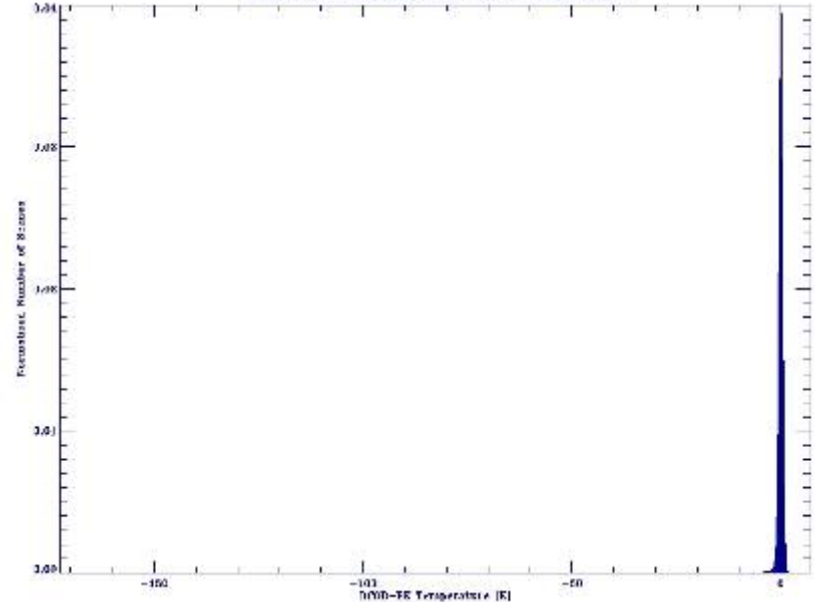
No. Scenes: 631199      Min -168.26      MEAN -0.09  
Max 2.99      SDEV 0.69



SSMIS OB-BK ECMWF RTTOV-7 Ch. 3 53.506 GHz V



SSMIS BC\*OB-BK ECMWF RTTOV-7 Ch. 3 53.506 GHz V





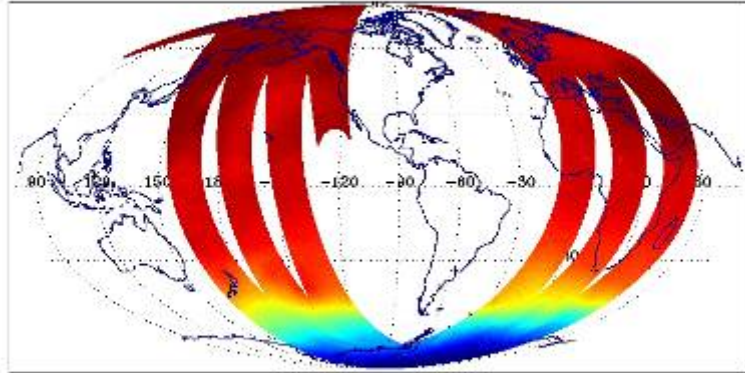


# SSMIS Cal/Val Calibration Anomaly Analysis



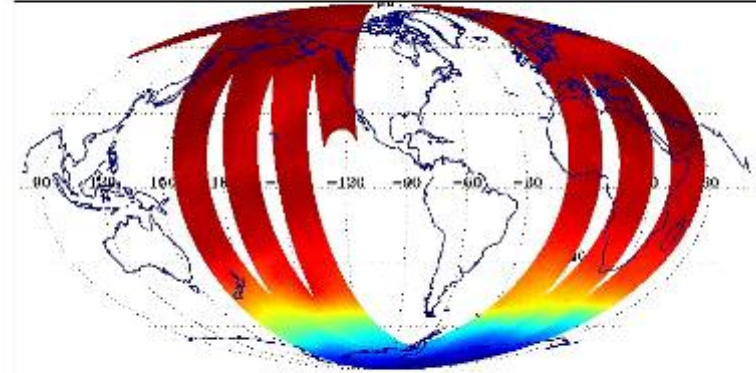
DMSP F 16 SSMIS Ch. 4 54.4 GHz V  
DTG: 2004080508  
04119-04120

No. Scenes: 651193      Min 81.21      MEAN 228.09  
Max 240.44      SDEV 8.48

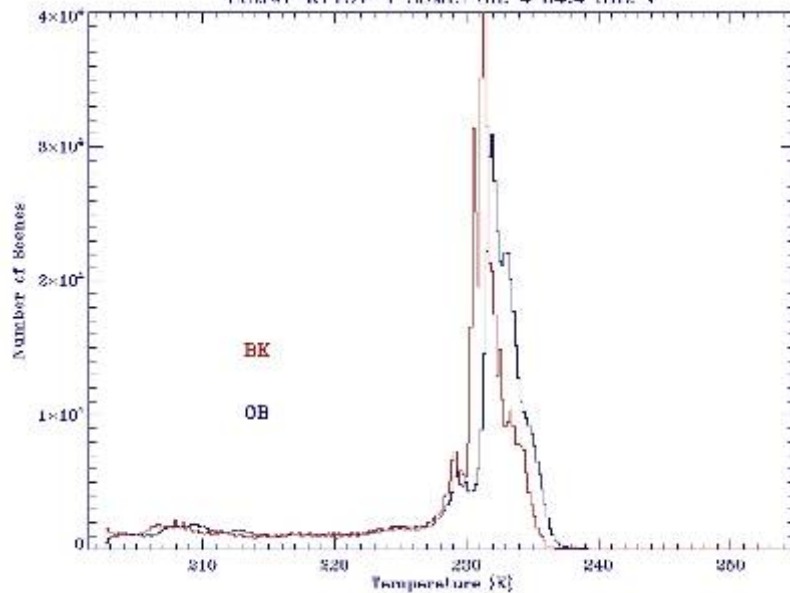


Bias Corrected DMSP F 16 SSMIS Ch. 4 54.4 GHz V  
DTG: 2004080508  
04119-04120

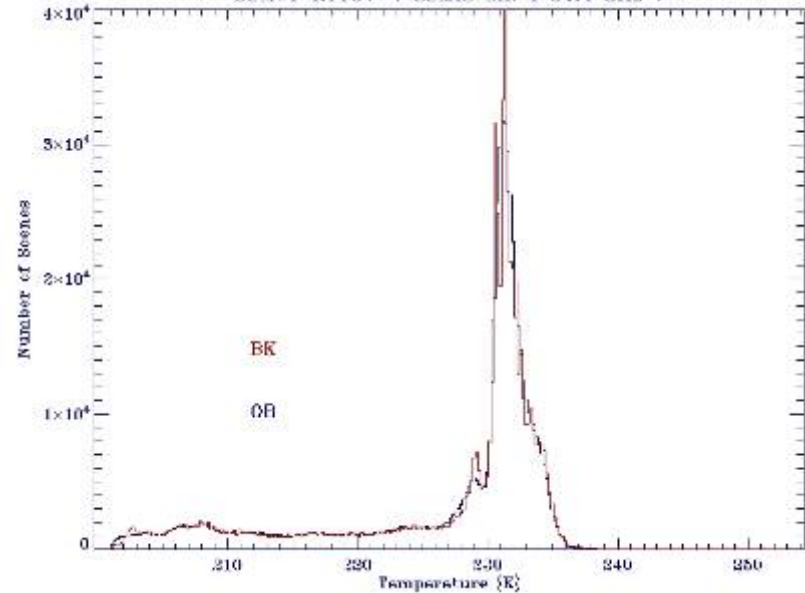
No. Scenes: 616619      Min 83.34      MEAN 226.96  
Max 250.07      SDEV 8.64



ECMWF RTTOV-7 SSMIS Ch. 4 54.4 GHz V



ECMWF RTTOV-7 SSMIS Ch. 4 54.4 GHz V



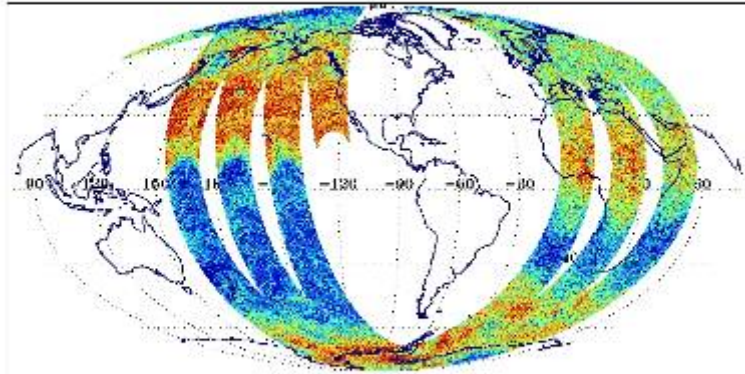


# SSMIS Cal/Val Calibration Anomaly Analysis



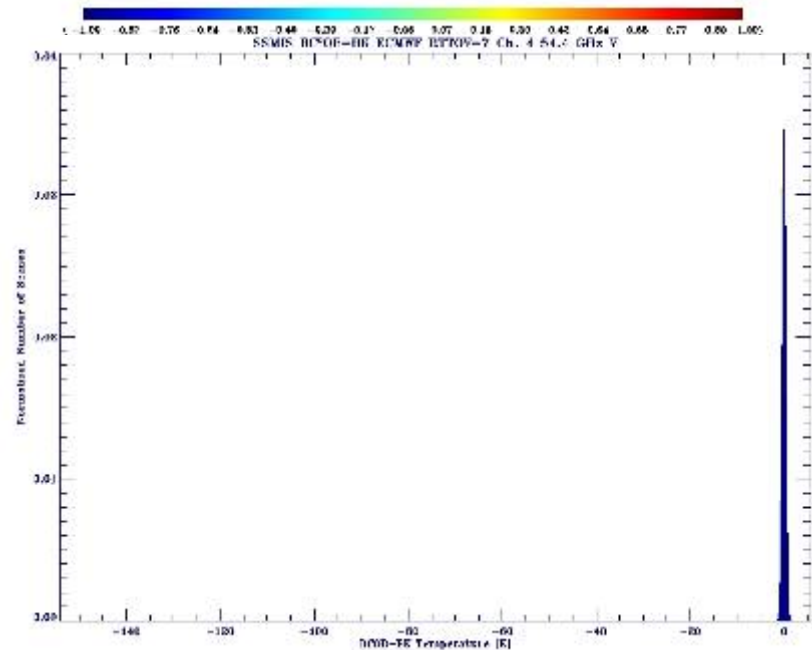
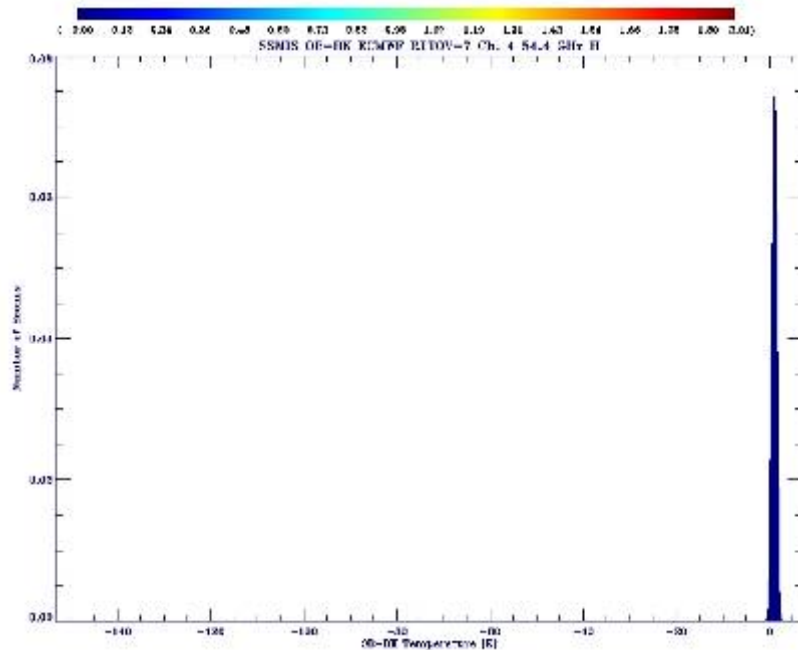
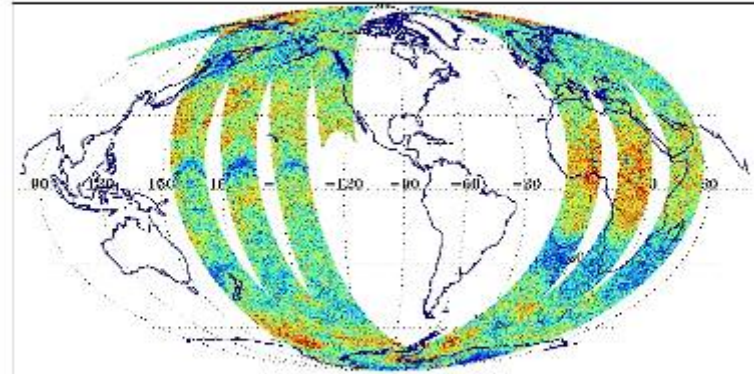
SSMIS OB BK ECMWF RTTOV 7 Ch. 4 54.4 GHz V  
DTG: 2004080508  
04118-04120

No. Scans: 631188      Min -5.29      MEAN 1.01  
Max 3.23      STDV 0.50



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 4 54.4 GHz V  
DTG: 2004080508  
04118-04120

No. Scans: 631199      Min -150.35      MEAN -0.00  
Max 1.87      STDV 0.54



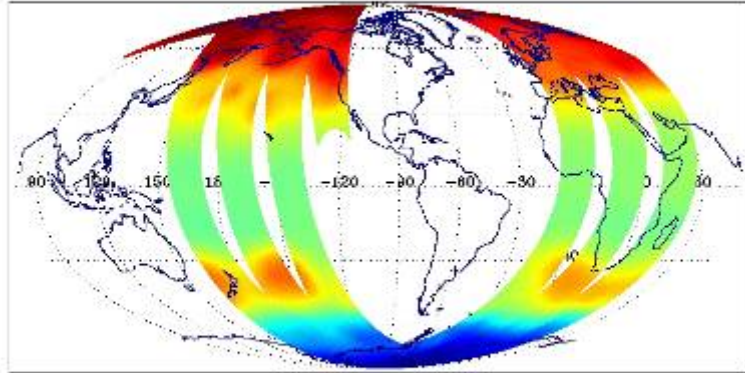


# SSMIS Cal/Val Calibration Anomaly Analysis



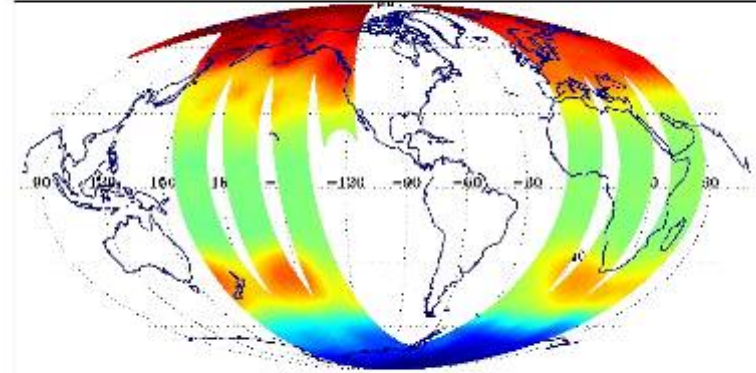
DMSP F 16 SSMIS Ch. 5 55.5 GHz V  
DTG: 2004080508  
04119-04120

No. Scenes: 651193      Min 81.29      MEAN 214.30  
Max 254.45      SDEV 9.92



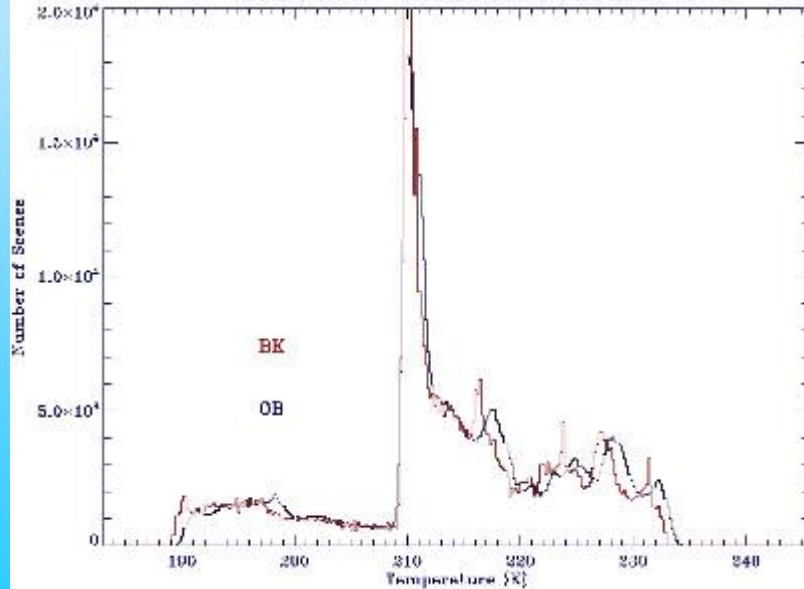
Bias Corrected DMSP F 16 SSMIS Ch. 5 55.5 GHz V  
DTG: 2004080508  
04119-04120

No. Scenes: 616619      Min 83.86      MEAN 213.63  
Max 253.68      SDEV 10.01



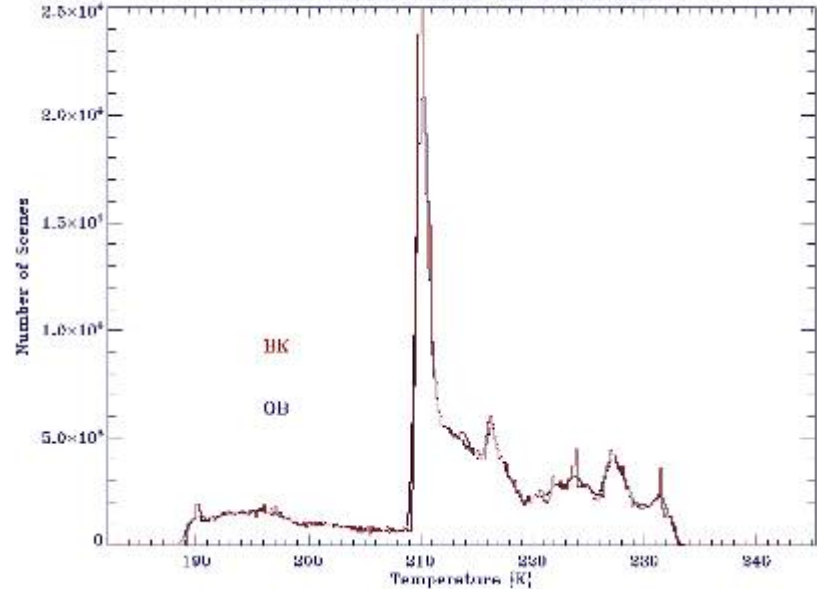
120.0 102.0 84.0 66.0 48.0 30.0 12.0 -6.0 -24.0 -42.0 -60.0 -78.0 -96.0 -114.0 -132.0 -150.0 -168.0 -186.0 -204.0 -222.0 -240.0

FCMWF RTTOV-7 SSMIS Ch. 5 55.5 GHz V



120.0 102.0 84.0 66.0 48.0 30.0 12.0 -6.0 -24.0 -42.0 -60.0 -78.0 -96.0 -114.0 -132.0 -150.0 -168.0 -186.0 -204.0 -222.0 -240.0

FCMWF RTTOV-7 SSMIS Ch. 5 55.5 GHz V



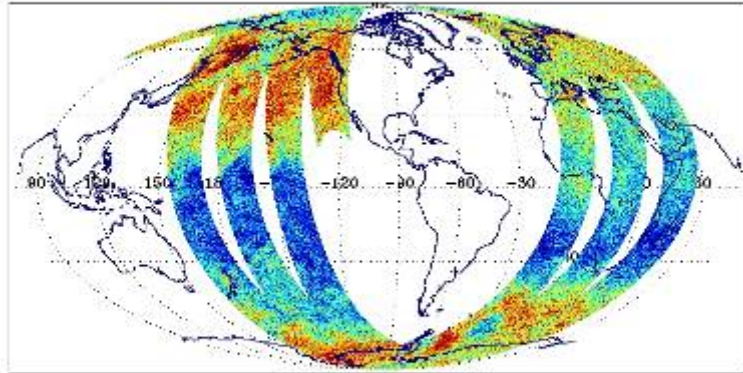


# SSMIS Cal/Val Calibration Anomaly Analysis



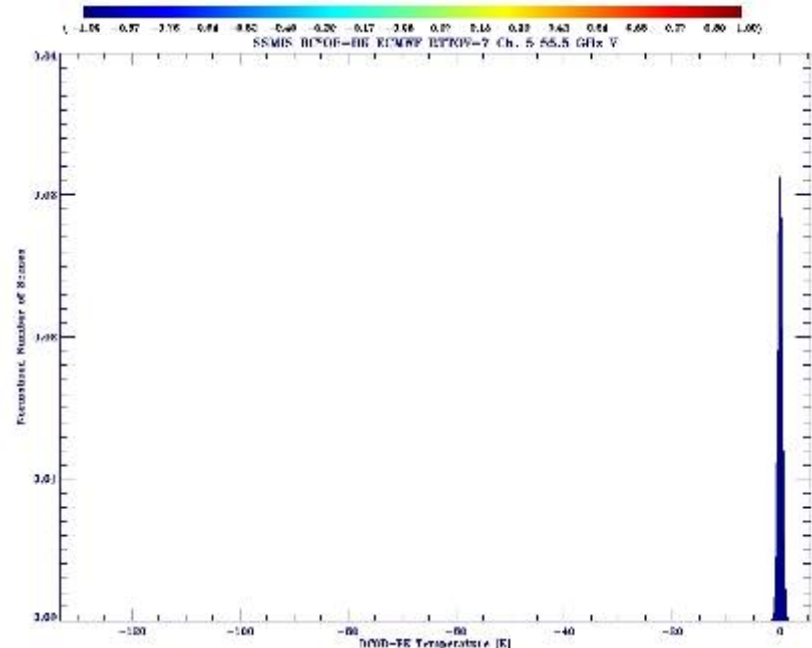
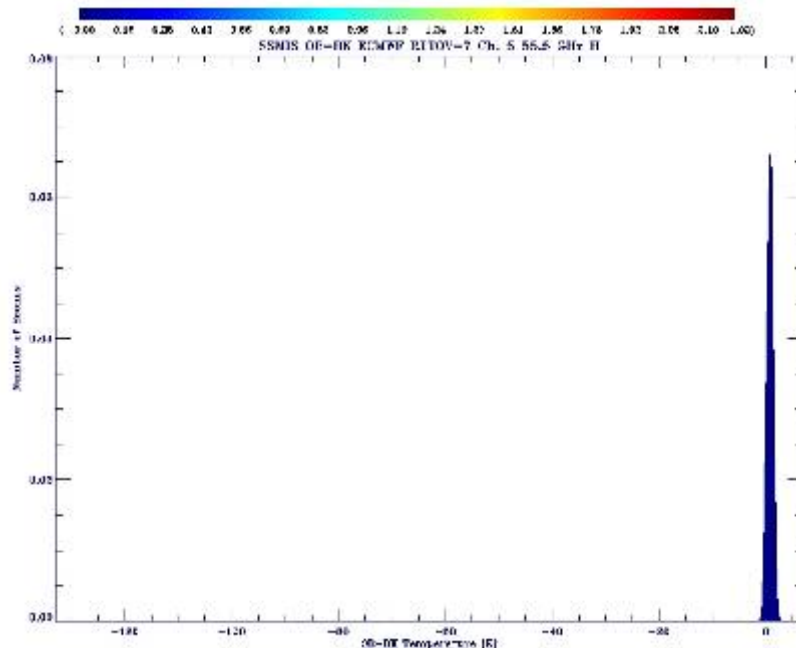
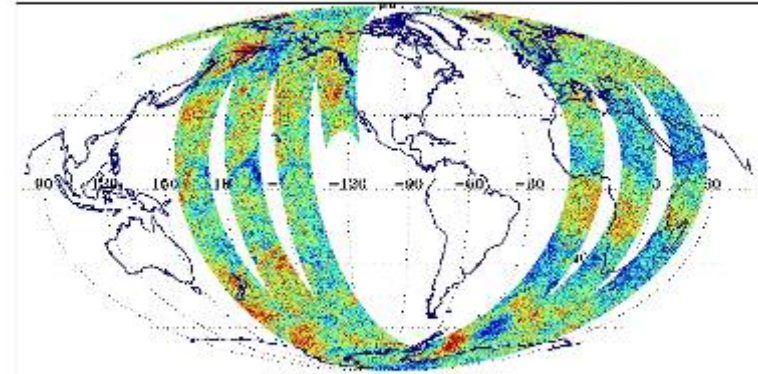
SSMIS OB BK ECMWF RTTOV 7 Ch. 5 55.5 GHz V  
DTG: 2004080508  
04119-04120

No. Scenes: 631193      Min -2.72      MEAN 1.76  
Max 3.49      SDEV 0.58



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 5 55.5 GHz V  
DTG: 2004080508  
04118-04120

No. Scenes: 631189      Min -130.04      MEAN -0.00  
Max 2.34      SDEV 0.53



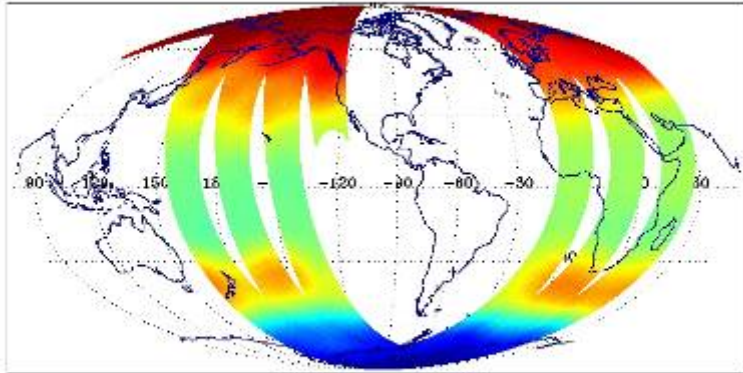


# SSMIS Cal/Val Calibration Anomaly Analysis



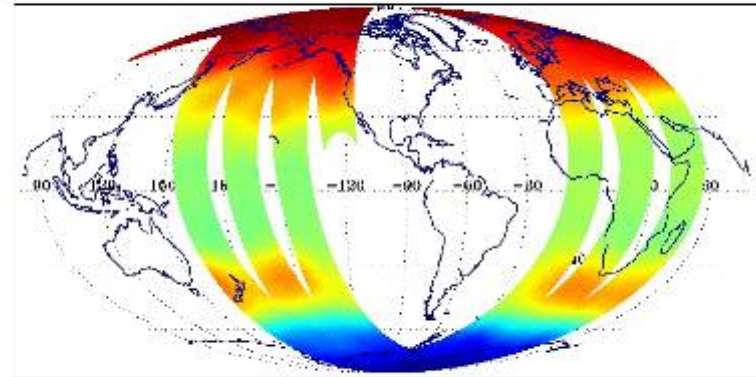
DMSP F 16 SSMIS Ch. 6 57.29 GHz RCP  
DTG: 2004080508  
04119-04120

No. Scenes: 631193      Min 81.71      MEAN 212.36  
Max 233.45      SDEV 11.25



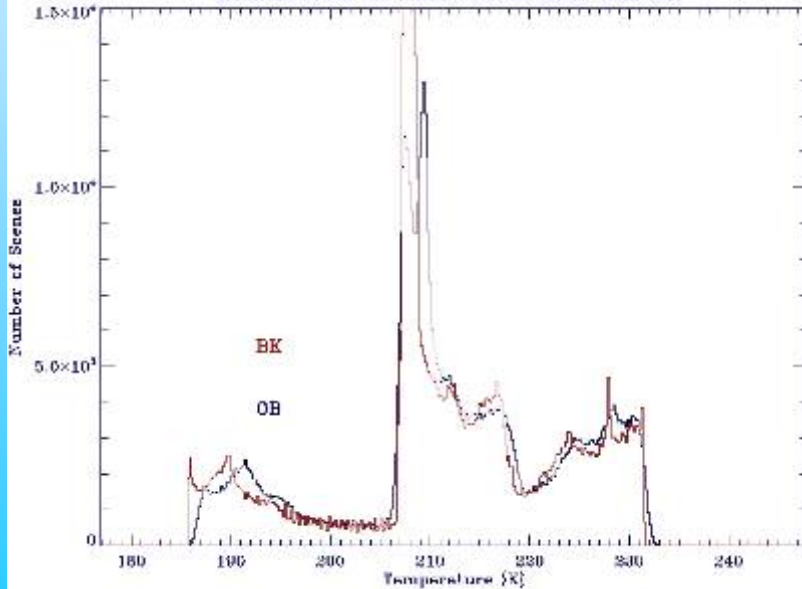
Bias Corrected DMSP F 16 SSMIS Ch. 6 57.29 GHz RCP  
DTG: 2004080508  
04119-04120

No. Scenes: 616619      Min 81.42      MEAN 211.72  
Max 233.21      SDEV 11.41



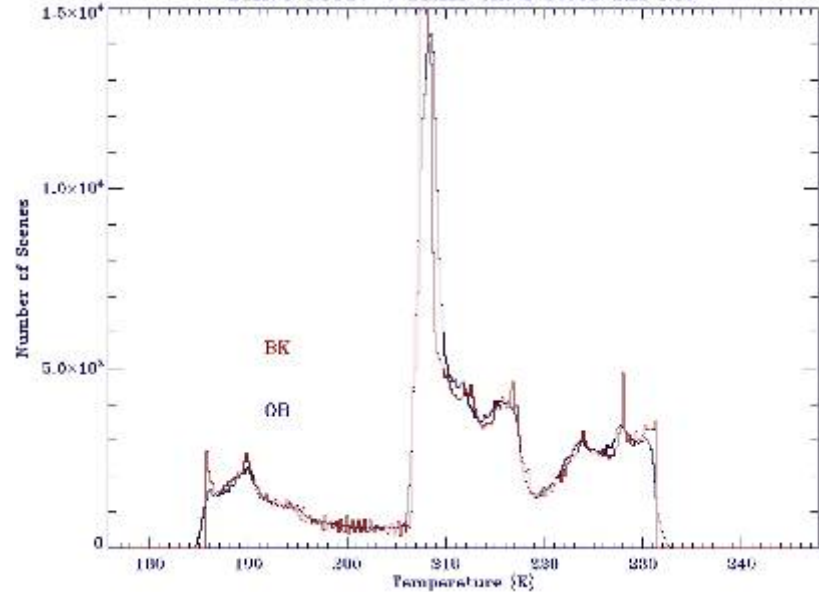
Color scale for temperature anomalies: 185.0, 185.1, 185.2, 185.3, 185.4, 185.5, 185.6, 185.7, 185.8, 185.9, 190.0, 190.1, 190.2, 190.3, 190.4, 190.5, 190.6, 190.7, 190.8, 190.9, 195.0, 195.1, 195.2, 195.3, 195.4, 195.5, 195.6, 195.7, 195.8, 195.9, 200.0, 200.1, 200.2, 200.3, 200.4, 200.5, 200.6, 200.7, 200.8, 200.9, 205.0, 205.1, 205.2, 205.3, 205.4, 205.5, 205.6, 205.7, 205.8, 205.9, 210.0, 210.1, 210.2, 210.3, 210.4, 210.5, 210.6, 210.7, 210.8, 210.9, 215.0, 215.1, 215.2, 215.3, 215.4, 215.5, 215.6, 215.7, 215.8, 215.9, 220.0, 220.1, 220.2, 220.3, 220.4, 220.5, 220.6, 220.7, 220.8, 220.9, 225.0, 225.1, 225.2, 225.3, 225.4, 225.5, 225.6, 225.7, 225.8, 225.9, 230.0, 230.1, 230.2, 230.3, 230.4, 230.5, 230.6, 230.7, 230.8, 230.9, 235.0, 235.1, 235.2, 235.3, 235.4, 235.5, 235.6, 235.7, 235.8, 235.9, 240.0, 240.1, 240.2, 240.3, 240.4, 240.5, 240.6, 240.7, 240.8, 240.9

ECMWF RTTOV-7 SSMIS Ch. 6 57.29 GHz RCP



Color scale for temperature anomalies: 185.0, 185.1, 185.2, 185.3, 185.4, 185.5, 185.6, 185.7, 185.8, 185.9, 190.0, 190.1, 190.2, 190.3, 190.4, 190.5, 190.6, 190.7, 190.8, 190.9, 195.0, 195.1, 195.2, 195.3, 195.4, 195.5, 195.6, 195.7, 195.8, 195.9, 200.0, 200.1, 200.2, 200.3, 200.4, 200.5, 200.6, 200.7, 200.8, 200.9, 205.0, 205.1, 205.2, 205.3, 205.4, 205.5, 205.6, 205.7, 205.8, 205.9, 210.0, 210.1, 210.2, 210.3, 210.4, 210.5, 210.6, 210.7, 210.8, 210.9, 215.0, 215.1, 215.2, 215.3, 215.4, 215.5, 215.6, 215.7, 215.8, 215.9, 220.0, 220.1, 220.2, 220.3, 220.4, 220.5, 220.6, 220.7, 220.8, 220.9, 225.0, 225.1, 225.2, 225.3, 225.4, 225.5, 225.6, 225.7, 225.8, 225.9, 230.0, 230.1, 230.2, 230.3, 230.4, 230.5, 230.6, 230.7, 230.8, 230.9, 235.0, 235.1, 235.2, 235.3, 235.4, 235.5, 235.6, 235.7, 235.8, 235.9, 240.0, 240.1, 240.2, 240.3, 240.4, 240.5, 240.6, 240.7, 240.8, 240.9

ECMWF RTTOV-7 SSMIS Ch. 6 57.29 GHz RCP



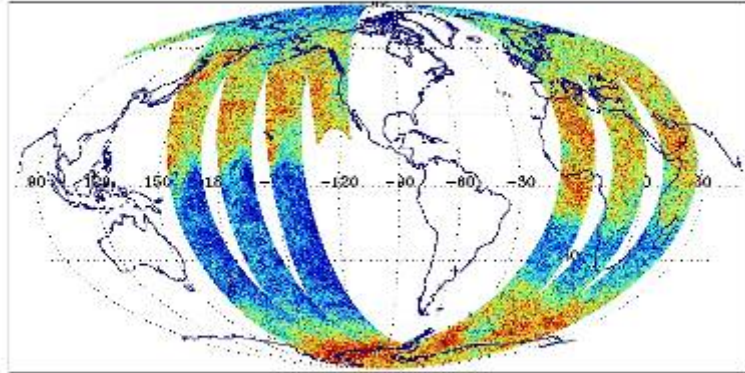


# SSMIS Cal/Val Calibration Anomaly Analysis



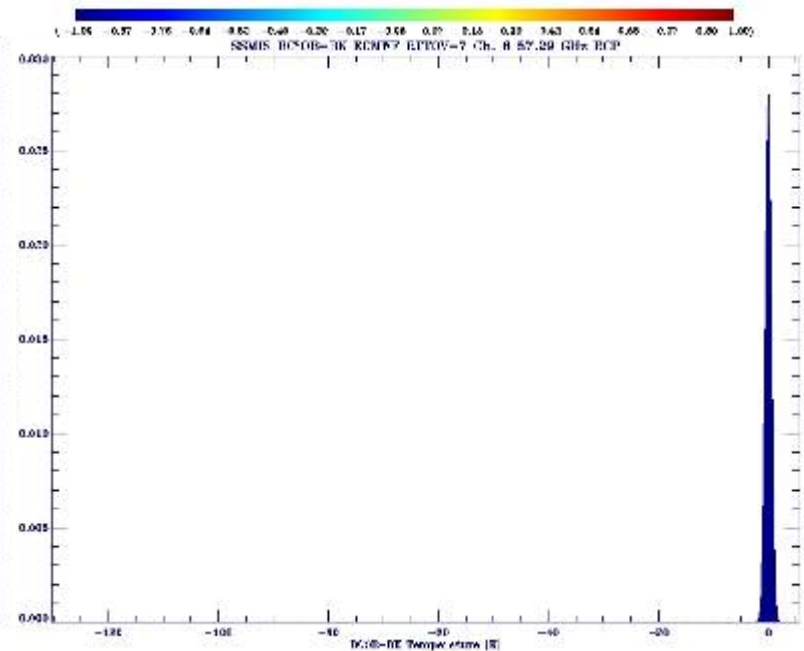
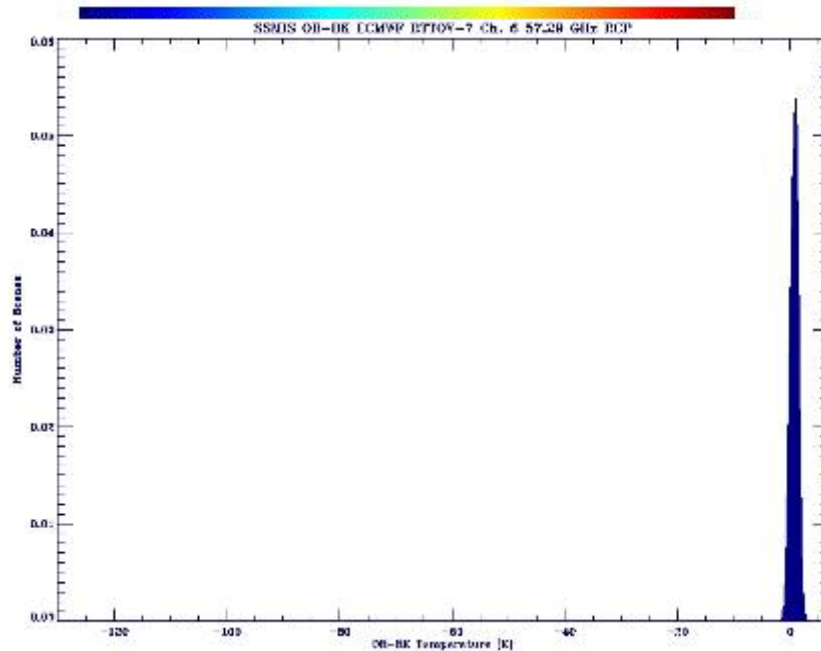
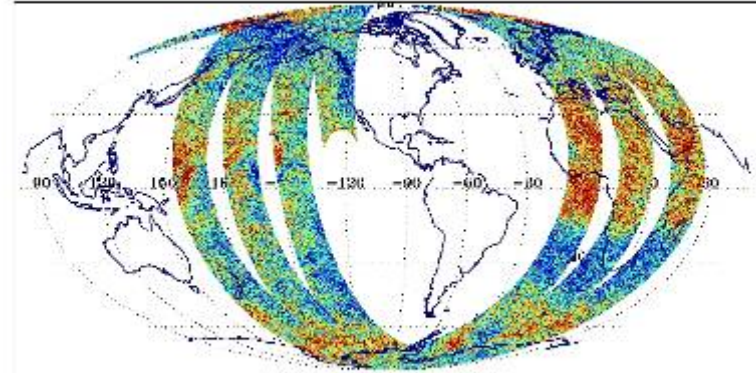
SSMIS OB BK ECMWF RTTOV 7 Ch. 6 57.29 GHz RCP  
DTG: 2004080508  
04118-04129

No. Scenes: 631193      Min -2.31      MEAN 0.71  
Max 3.45      SDEV 0.71



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 6 57.29 GHz RCP  
DTG: 2004080508  
04118-04129

No. Scenes: 631199      Min -127.09      MEAN -0.00  
Max 3.44      SDEV 0.64



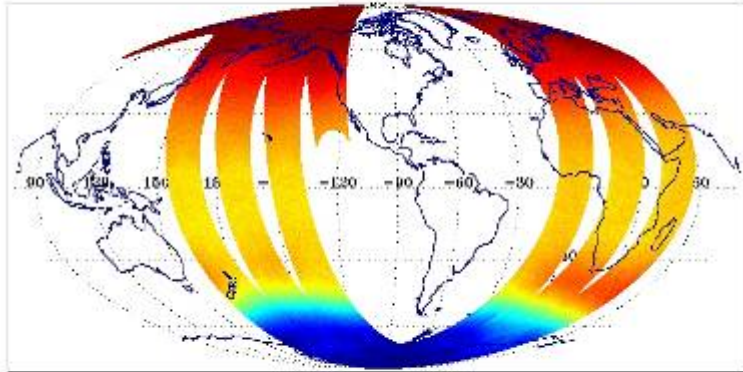


# SSMIS Cal/Val Calibration Anomaly Analysis



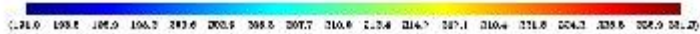
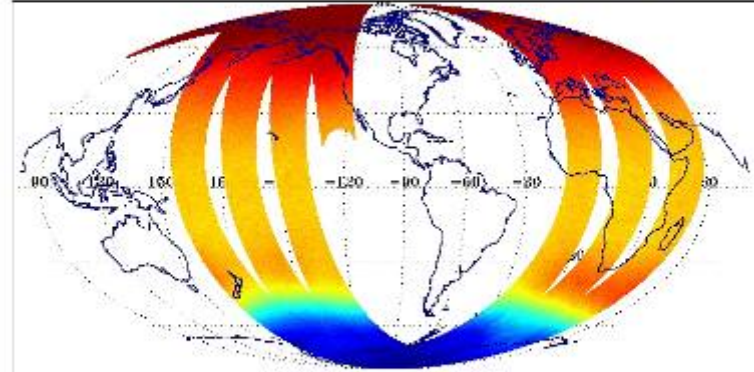
DMSP F 16 SSMIS Ch. 7 59.4 GHz RCP  
DTG: 2004080508  
04119-04120

No. Scenes: 651188      Min 81.67      MEAN 218.25  
Max 255.82      SDEV 11.88

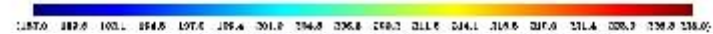
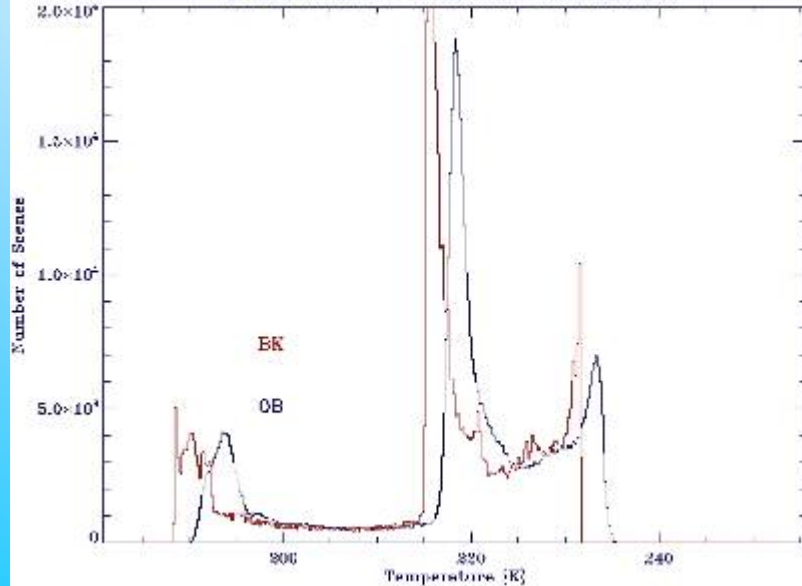


Bias Corrected DMSP F 16 SSMIS Ch. 7 59.4 GHz RCP  
DTG: 2004080508  
04119-04120

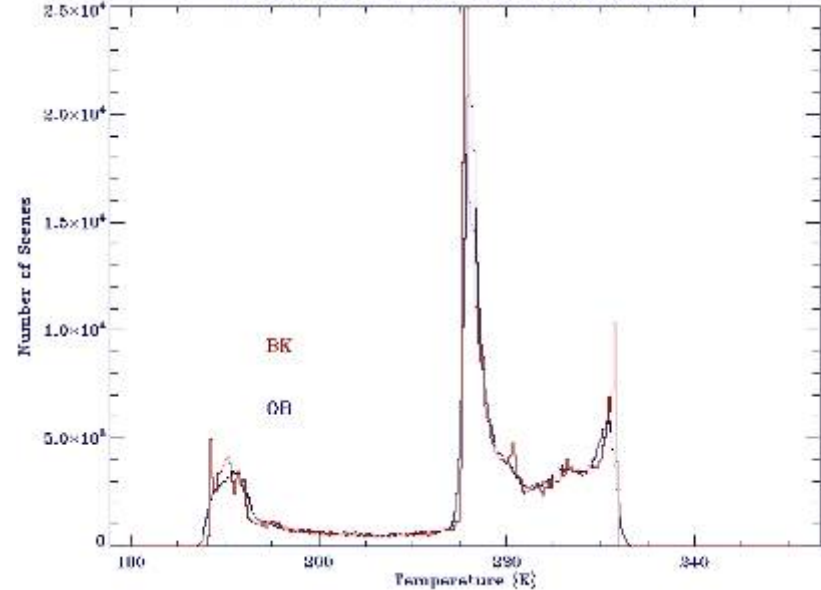
No. Scenes: 616619      Min 78.40      MEAN 215.50  
Max 255.58      SDEV 11.89



ECMWF RTTOV-7 SSMIS Ch. 7 59.4 GHz RCP



ECMWF RTTOV-7 SSMIS Ch. 7 59.4 GHz RCP



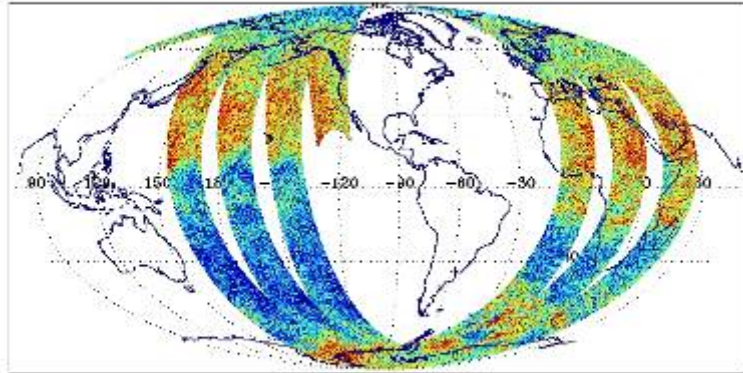


# SSMIS Cal/Val Calibration Anomaly Analysis



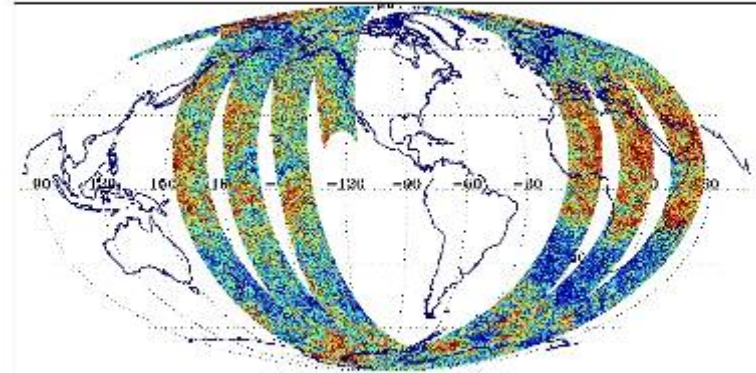
SSMIS OB BK ECMWF RTTOV 7 Ch. 7 59.4 GHz RCP  
DTG: 2004080508  
04113-04120

No. Scans: 631189      Min -0.51      MEAN 3.86  
Max 5.87      SDEV 0.73

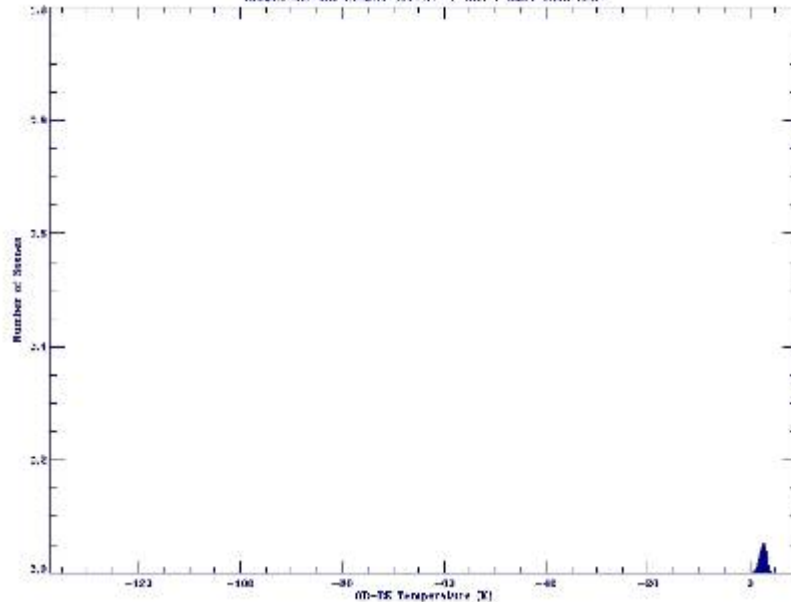


SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 7 59.4 GHz RCP  
DTG: 2004080508  
04113-04120

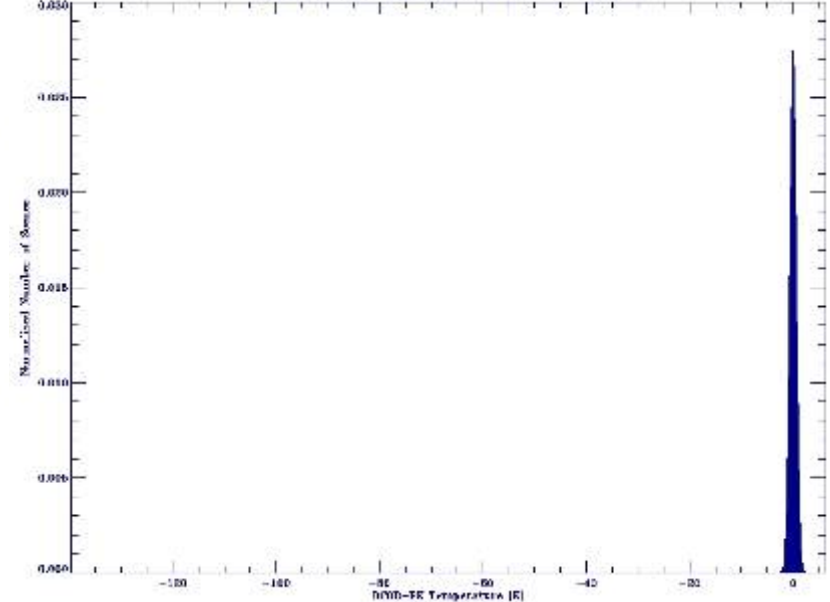
No. Scans: 631189      Min -136.18      MEAN -0.00  
Max 2.79      SDEV 0.71



SSMIS OB-BK ECMWF RTTOV-7 Ch. 7 59.4 GHz RCP



SSMIS BC\*OB-BK ECMWF RTTOV-7 Ch. 7 59.4 GHz RCP





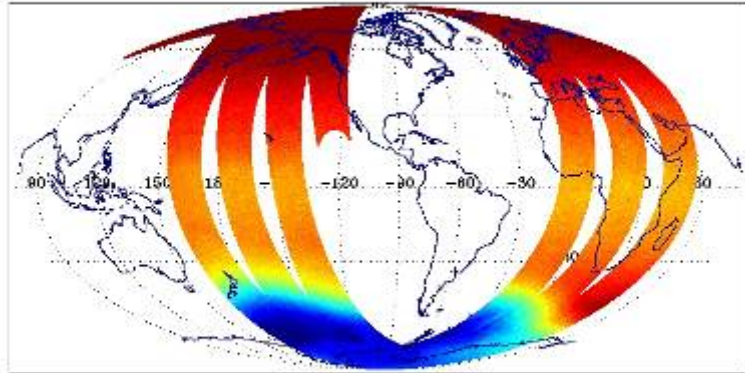


# SSMIS Cal/Val Calibration Anomaly Analysis



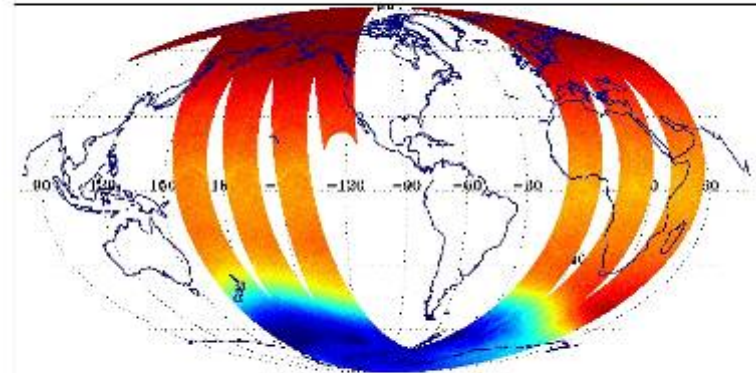
DMSP F 16 SSMIS Ch. 24 60.792668±.357892±.050 GHz RCP  
DTG: 2004080508  
04119-04120

No. Scenes: 651193  
Min 81.41      MEAN 226.08  
Max 242.42      SDEV 18.03



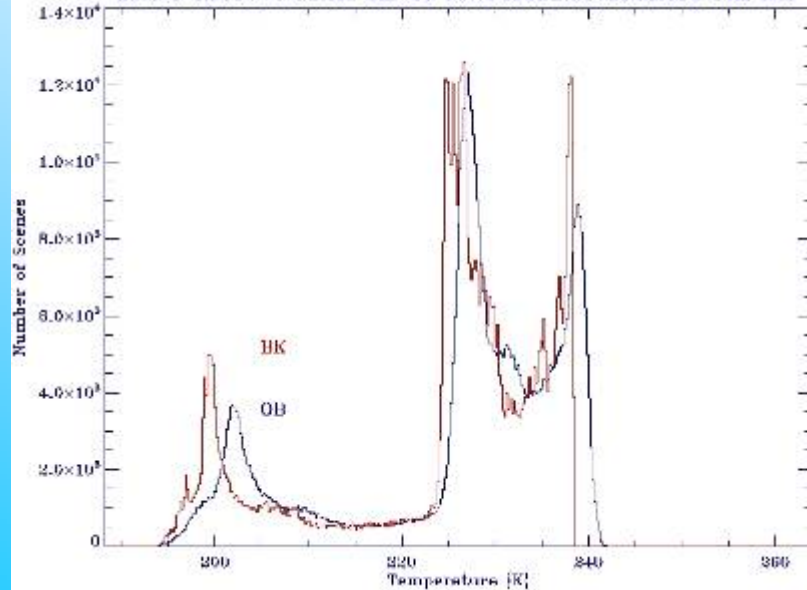
Bias Corrected DMSP F 16 SSMIS Ch. 24 60.792668±.357892±.050 GHz RCP  
DTG: 2004080508  
04119-04120

No. Scenes: 616619  
Min 83.35      MEAN 224.51  
Max 241.13      SDEV 12.24



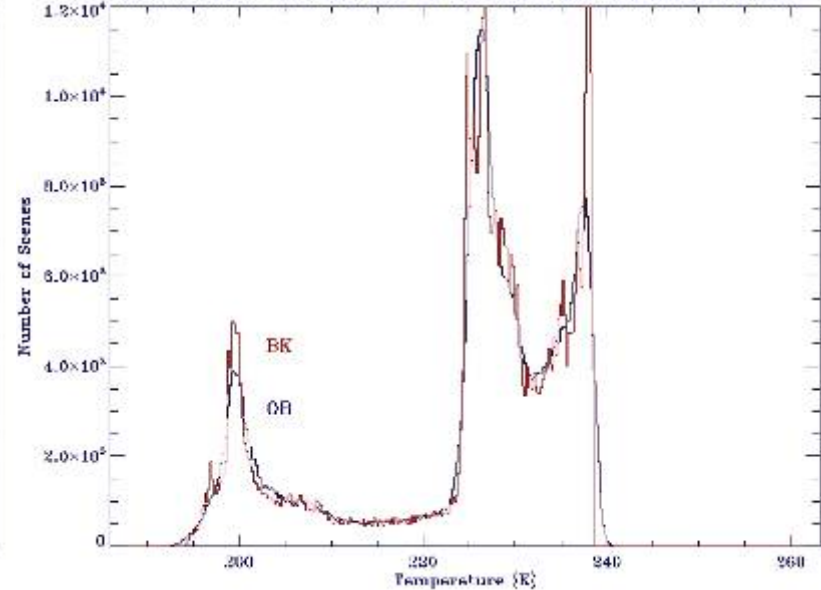
127.0 109.8 201.0 206.3 285.0 206.6 211.4 212.7 216.1 1.98 230.8 232.0 206.5 217.0 226.0 232.7 206.0 207.0

ECMWF RTTOV-7 SSMIS Ch. 24 60.792668±.357892±.050 GHz RCP



128.0 109.8 206.0 206.3 285.0 206.6 211.4 212.7 216.1 1.98 230.8 232.0 206.5 217.0 226.0 232.7 206.0 207.0

ECMWF RTTOV-7 SSMIS Ch. 24 60.792668±.357892±.050 GHz RCP



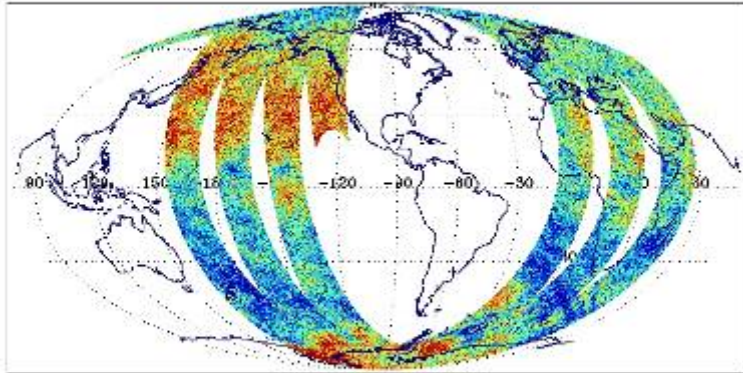


# SSMIS Cal/Val Calibration Anomaly Analysis



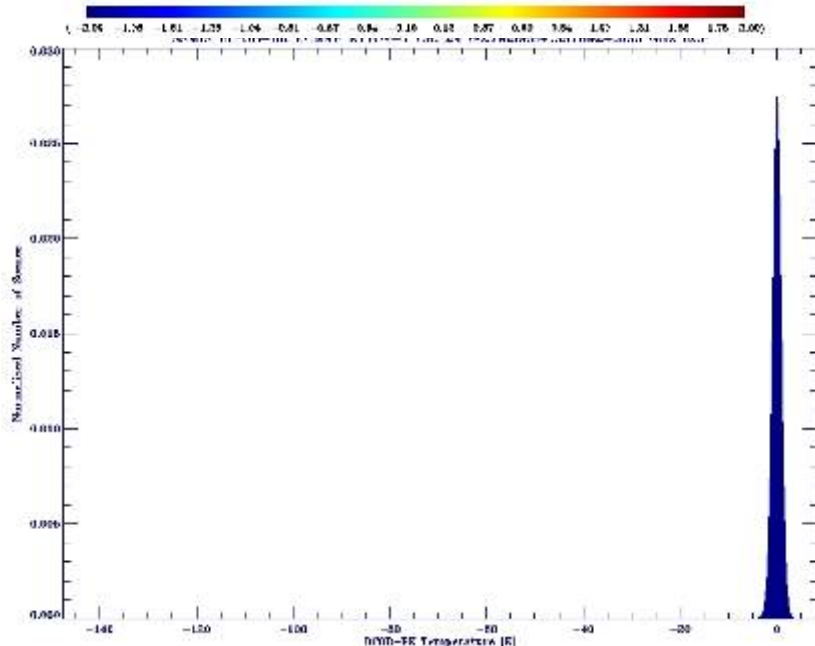
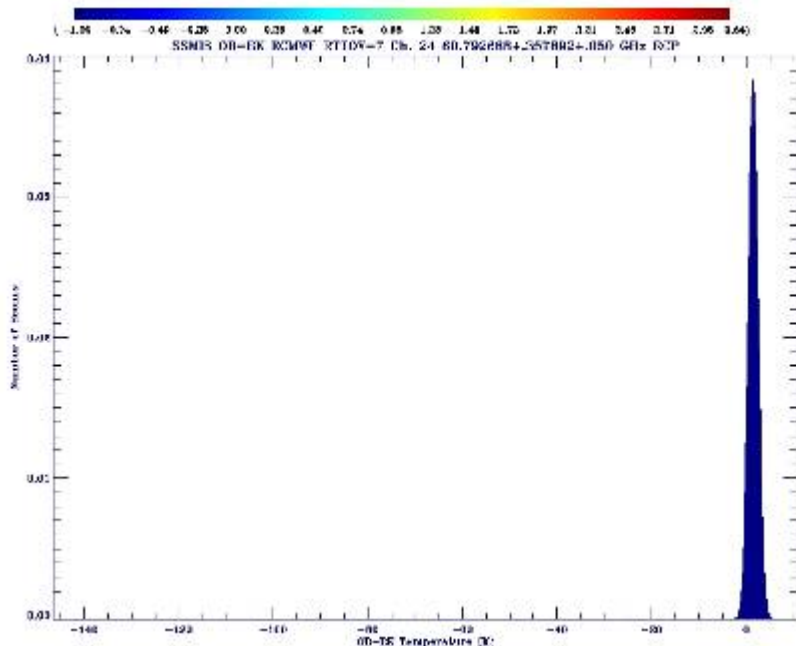
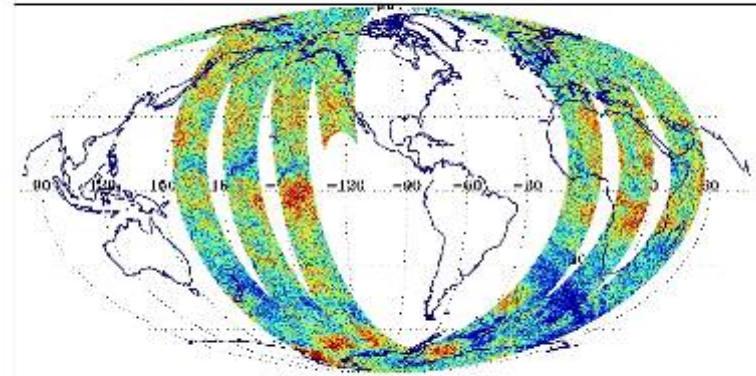
SSMIS OB BK ECMWF RTTOV 7 Ch. 24 60.792668±.357892±.050 GHz RCP  
DTG: 2004080508  
04118-04120

No. Scans: 631193  
Min -4.71  
Max 7.13  
MEAN 1.55  
SDRV 1.05



SSMIS BC\*OB BK ECMWF RTTOV 7 Ch. 24 60.792668±.357892±.050 GHz RCP  
DTG: 2004080508  
04118-04120

No. Scans: 631199  
Min -143.04  
Max 4.69  
MEAN -0.00  
SDRV 0.99



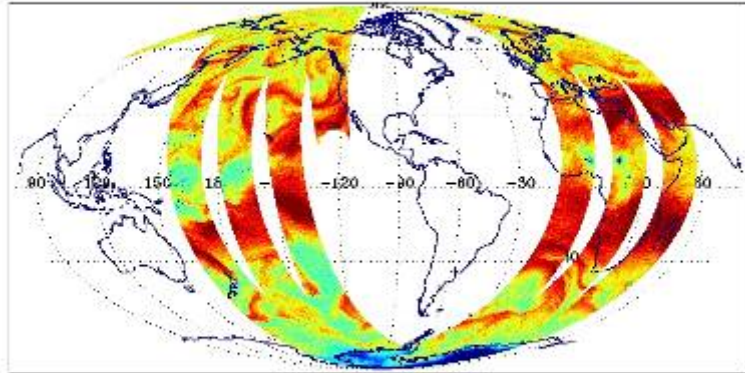


# SSMIS Cal/Val Calibration Anomaly Analysis



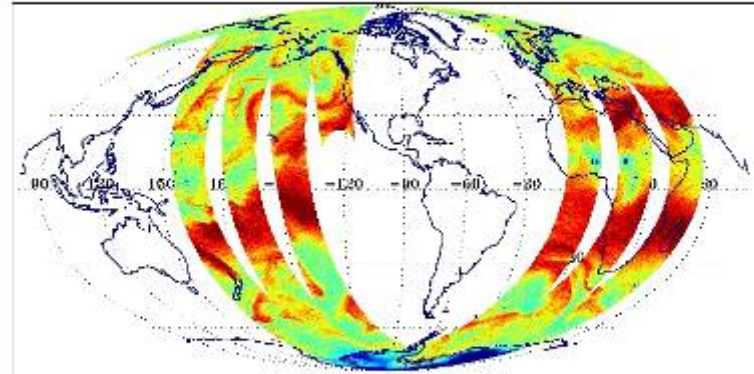
DMSP F 16 SSMIS Ch. 11 183.31±1.0 GHz H  
DTG: 2004080508  
04113-04129

No. Scenes: 1803593  
Min 80.45      MEAN 245.65  
Max 279.33      SDEV 16.23

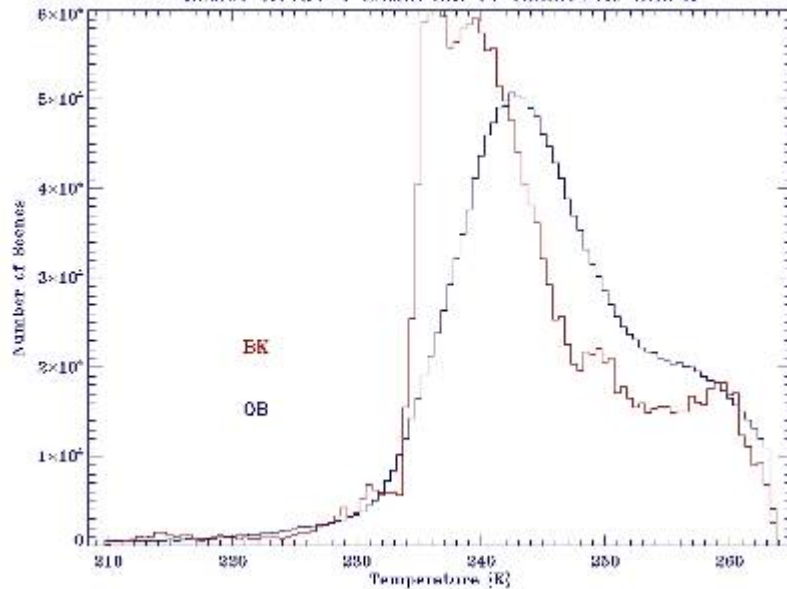


Bias Corrected DMSP F 16 SSMIS Ch. 11 183.31±1.0 GHz H  
DTG: 2004080508  
04113-04129

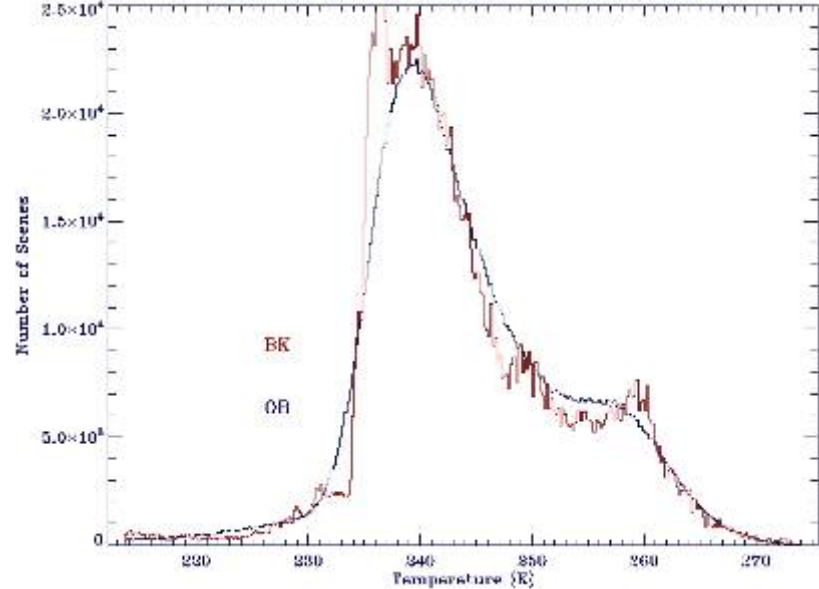
No. Scenes: 1849859  
Min 77.98      MEAN 243.74  
Max 276.97      SDEV 16.03



ECMWF RTTOV-7 SSMIS Ch. 11 183.31±1.0 GHz H



ECMWF RTTOV-7 SSMIS Ch. 11 183.31±1.0 GHz H



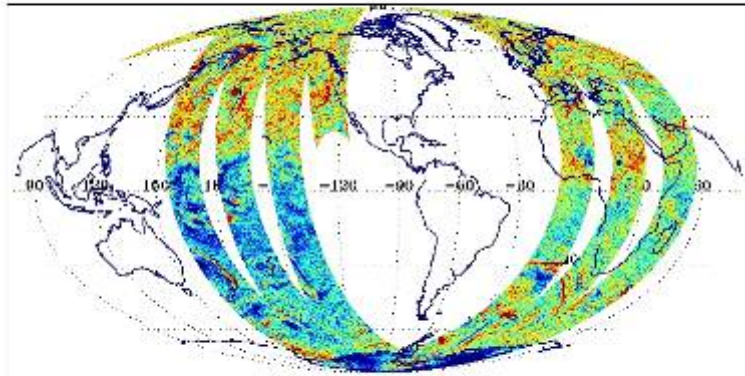


# SSMIS Cal/Val Calibration Anomaly Analysis



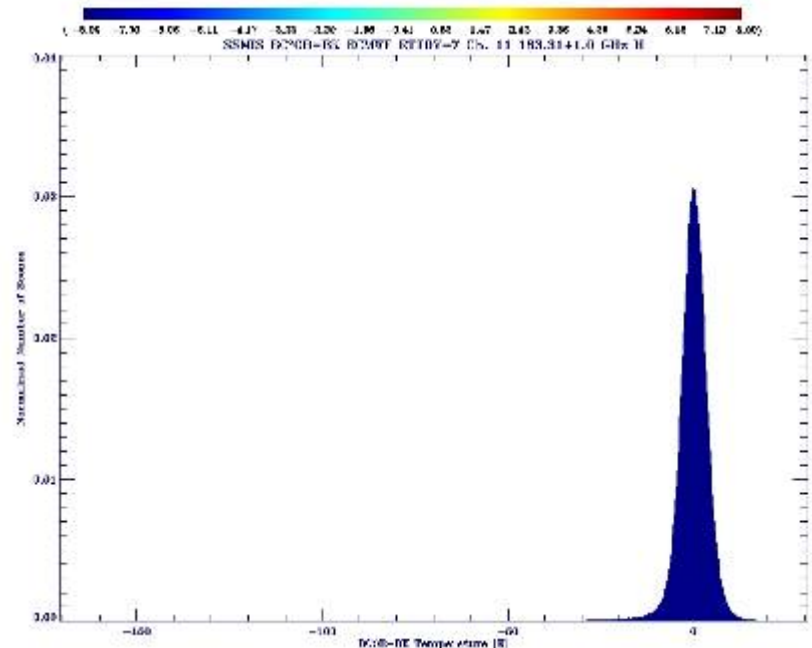
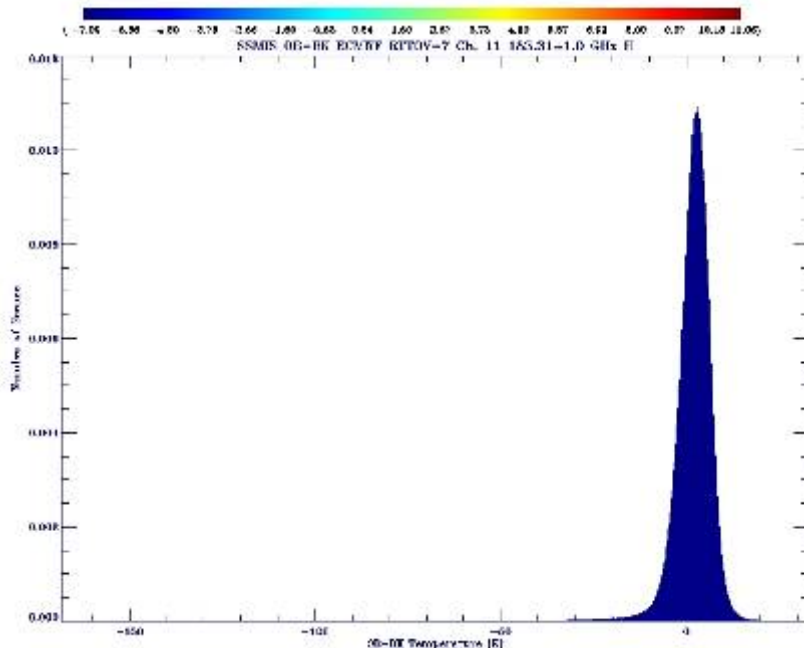
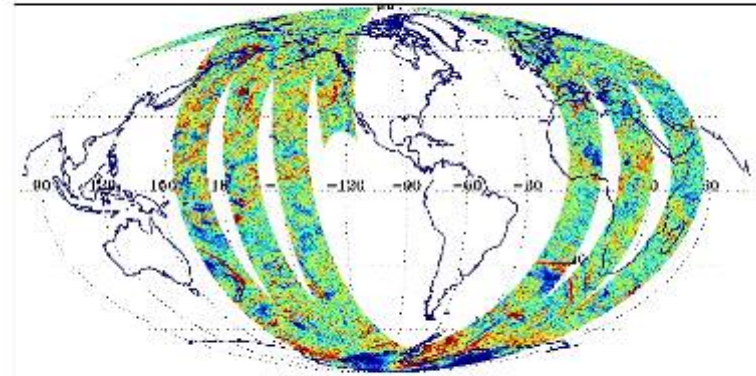
SSMIS OB BK ECMWF RTTOV 7 Ch. 11 183.31±1.0 GHz H  
DTG: 2004080508  
04118-04120

No. Scans: 1893588      Min -40.64      Mean 1.99  
Max 28.13      SDRV 4.53



SSMIS EC\*OB BK ECMWF RTTOV 7 Ch. 11 183.31±1.0 GHz H  
DTG: 2004080508  
04118-04120

No. Scans: 631189      Min -163.90      Mean 0.00  
Max 25.94      SDRV 4.12





# SSMIS Cal/Val Calibration Anomaly Analysis





# SSMIS Cal/Val Calibration Anomaly Analysis



## Reflector Emission Term

$$\begin{aligned} T_{\text{Apparent}} &= (1 - \epsilon_R) T_{\text{Scene}} + \epsilon_R T_{\text{Reflector}} \\ &= T_{\text{Scene}} + \epsilon_R (T_{\text{Reflector}} - T_{\text{Scene}}) \end{aligned}$$

Using  $T_{\text{Reflector Arm}}$  for the  $T_{\text{Reflector}}$

And looked at plots of

$\epsilon_R (T_{\text{Reflector}} - T_{\text{Scene}})$  vs. OB-BK

Where  $T_{\text{Scene}}$  can be TB from OB or BK

Use the  $\epsilon_R (T_{\text{Reflector}} - T_{\text{Scene}})$  Term as a correction to the SSMIS OB



# SSMIS Cal/Val Calibration Anomaly Analysis



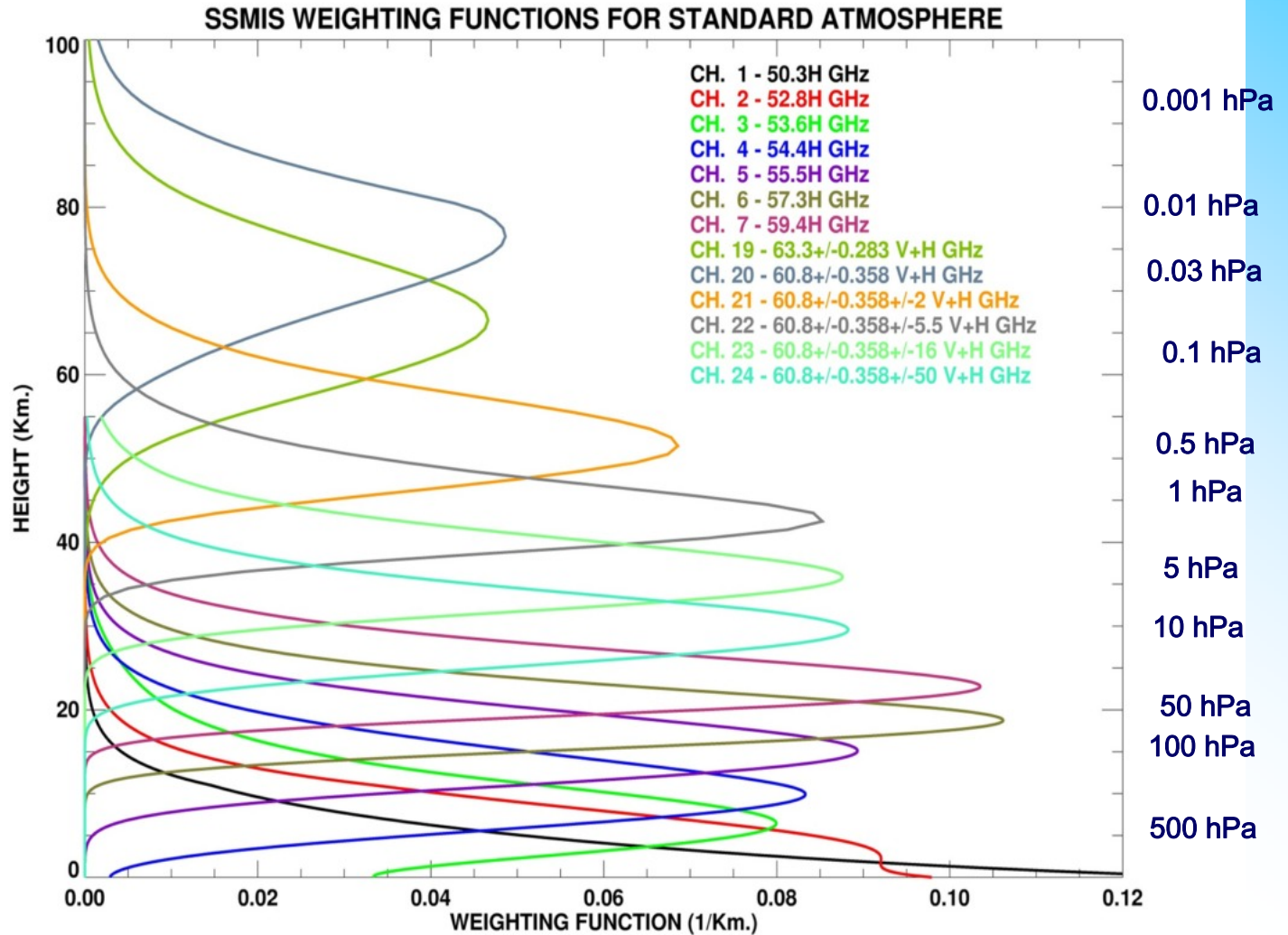
## OB-BK In Radiance Space Depict Antenna Emissions

### Theoretical SSMIS Reflector Surface Parameters (NRL Multilayer Antenna Model)

Freq. (GHz)	Emissivity (V-pol/20deg) [ $\epsilon$ R ]			
	Al	GrEp	SiOx	SiOx/Al
19.35	0.00051	0.012	0.91	0.00051
37.0	0.00071	0.016	0.91	0.00071
60.0	0.00090	0.020	0.91	0.00090
91.65	0.00111	0.025	0.91	0.00111
183.0	0.00157	0.035	0.91	0.00157



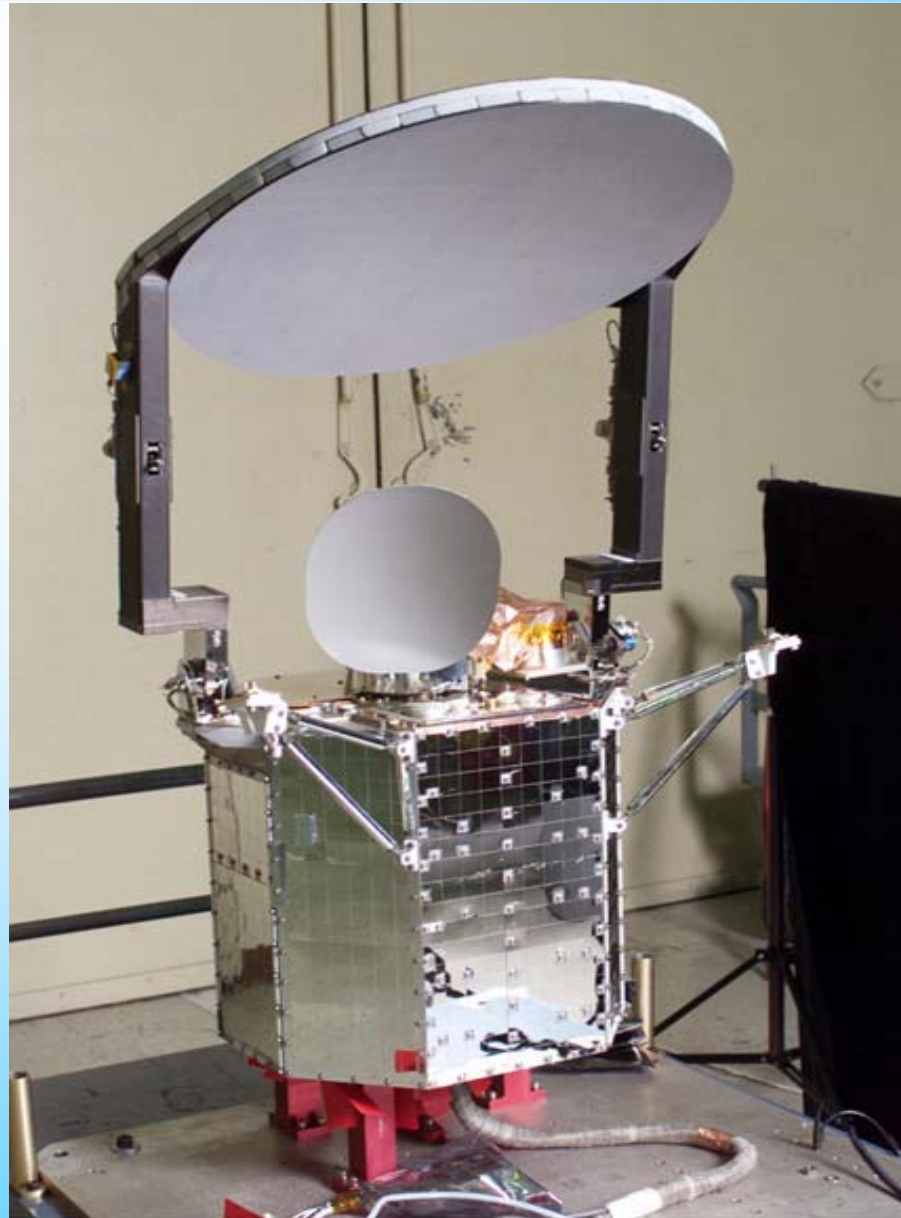
# SSMIS Cal/Val Calibration Anomaly Analysis







# SSMIS Cal/Val Calibration Anomaly Analysis



CN600-136-D



# SSMIS Cal/Val Calibration Anomaly Analysis





# SSMIS Cal/Val Calibration Anomaly Analysis





# SSMIS Cal/Val Calibration Anomaly Analysis





# SSMIS Cal/Val Calibration Anomaly Analysis





# SSMIS Cal/Val Calibration Anomaly Analysis



## Continued Efforts and the Road to Quality SSMIS Data

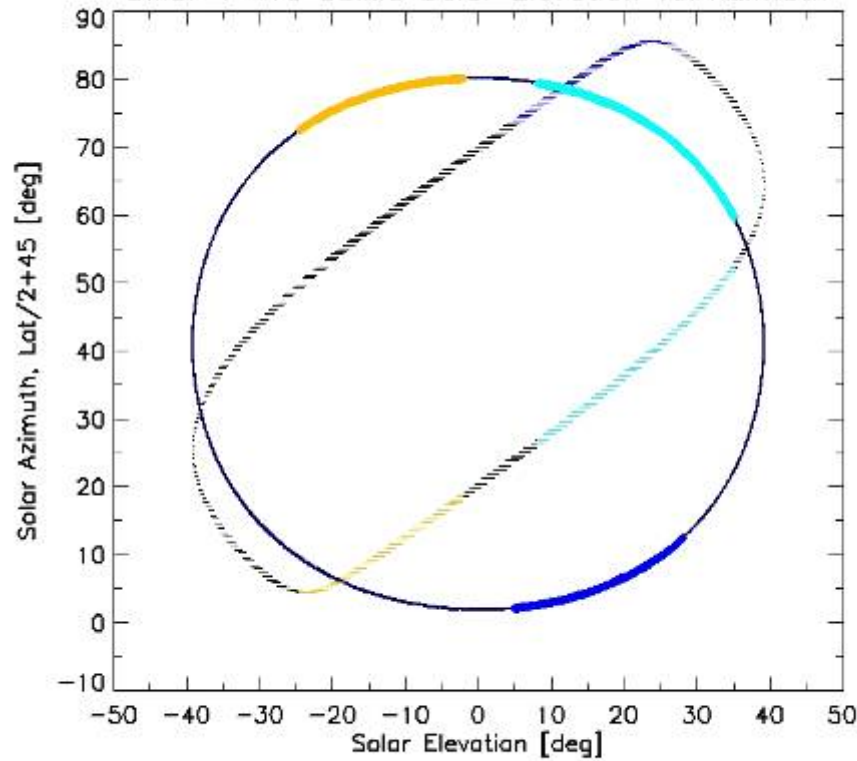
- Further Refine the Gating Algorithm
- Develop Automated Gain Fitting/Filtering Algorithm
- Implementation of Gain and Emission Corrections
  - Add to GDPS as part of SDRP
  - Post-Processor Operating on TDRs
- Minimize Effect on SDR and EDR Products
- A Look Ahead at F-17 Solar Intrusions



# SSMIS Cal/Val Calibration Anomaly Analysis



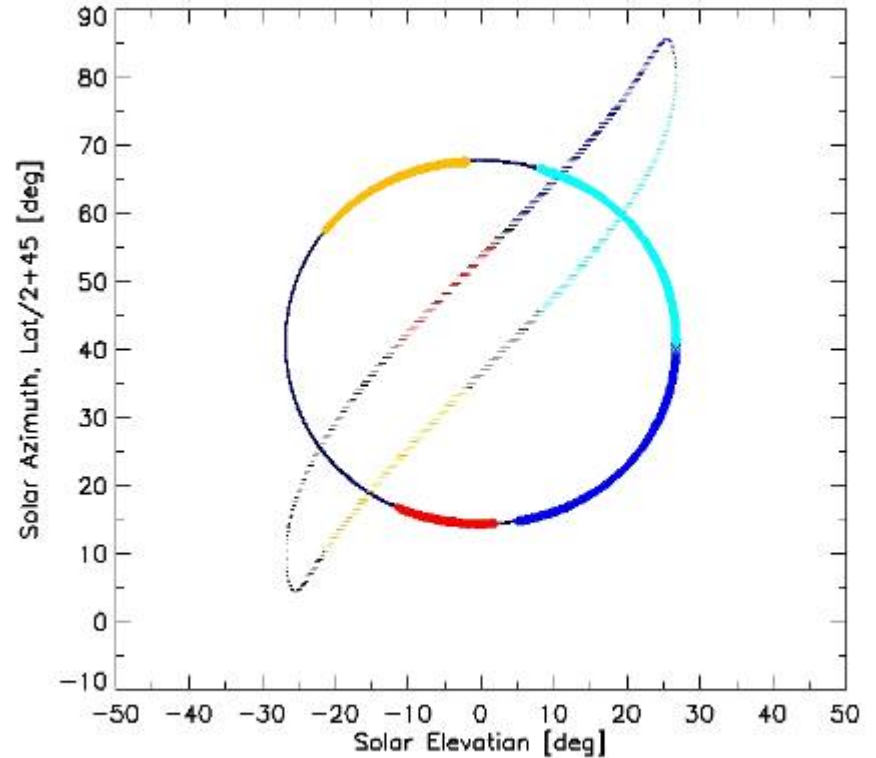
DMSP F-16 SSMIS Solar Elevation vs. Azimuth



DTG: 2004080506  
TDR Revs: 04118-04120

Direct 1    Reflection 1  
Direct 2    Reflection 2

DMSP F-17 SSMIS Solar Elevation vs. Azimuth



DTG: 2004080506  
TDR Revs: 04118-04120

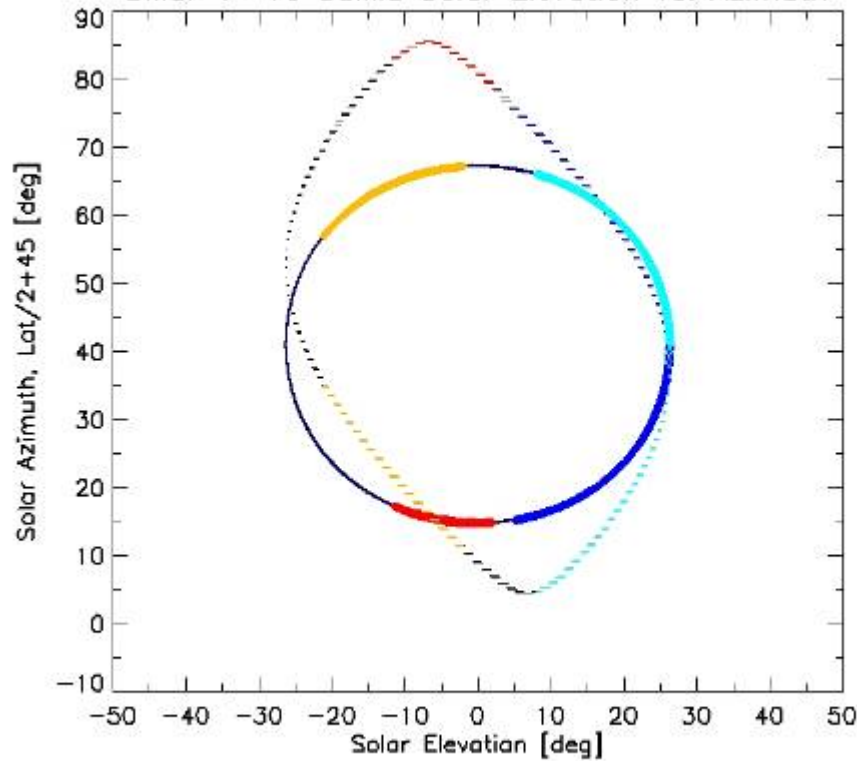
Direct 1    Reflection 1  
Direct 2    Reflection 2



# SSMIS Cal/Val Calibration Anomaly Analysis



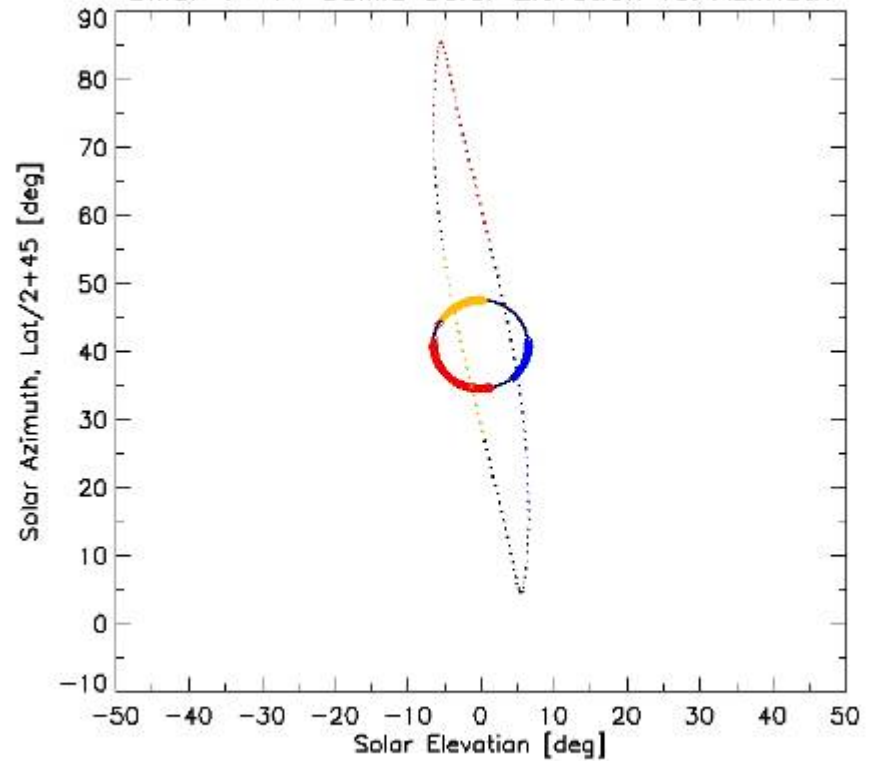
DMSP F-16 SSMIS Solar Elevation vs. Azimuth



DTG: 2004021106  
TDR Revs: 01631-01633

Direct 1      Reflection 1  
Direct 2      Reflection 2

DMSP F-17 SSMIS Solar Elevation vs. Azimuth



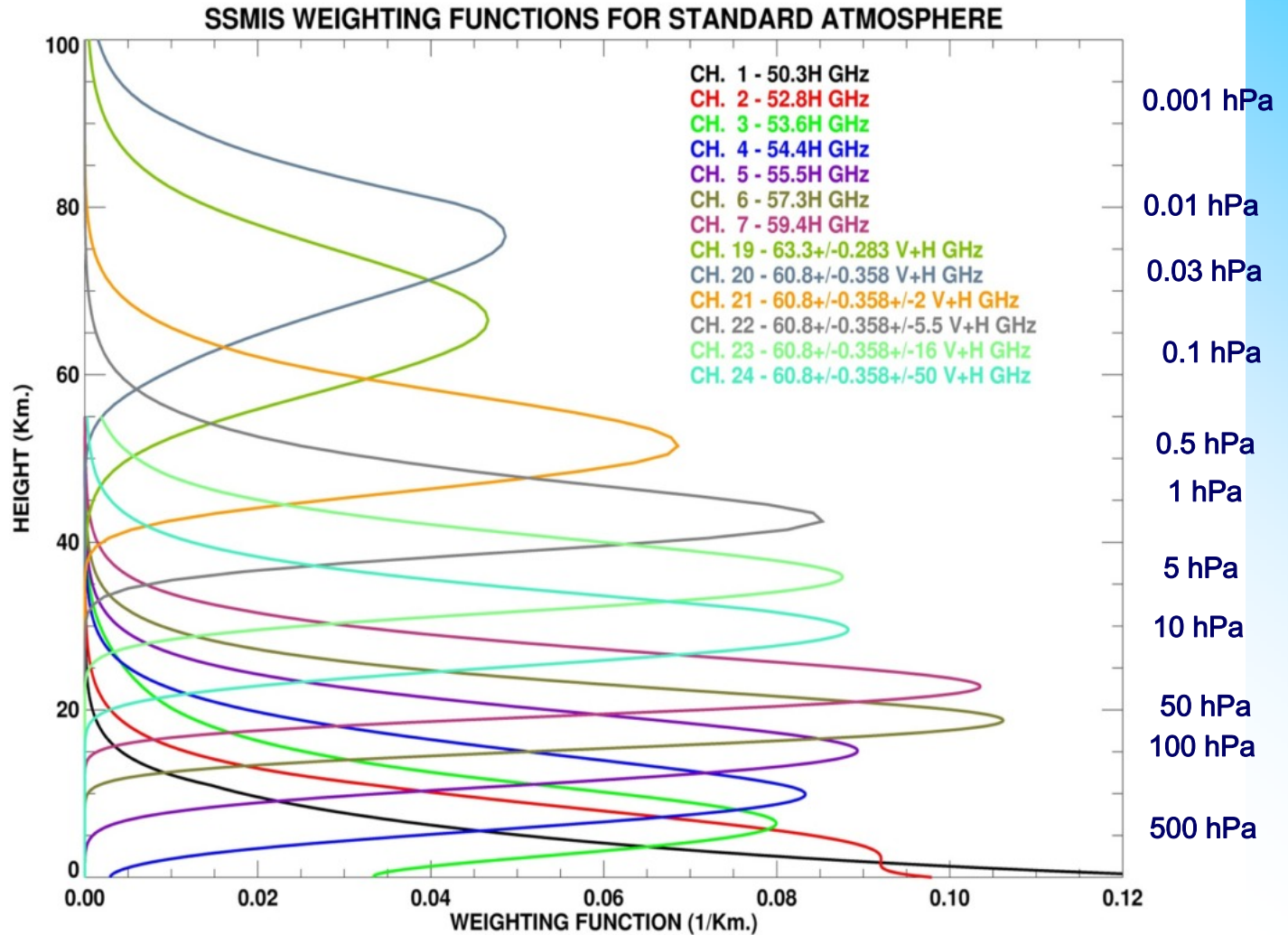
DTG: 2004021106  
TDR Revs: 01631-01633

Direct 1      Reflection 1  
Direct 2      Reflection 2



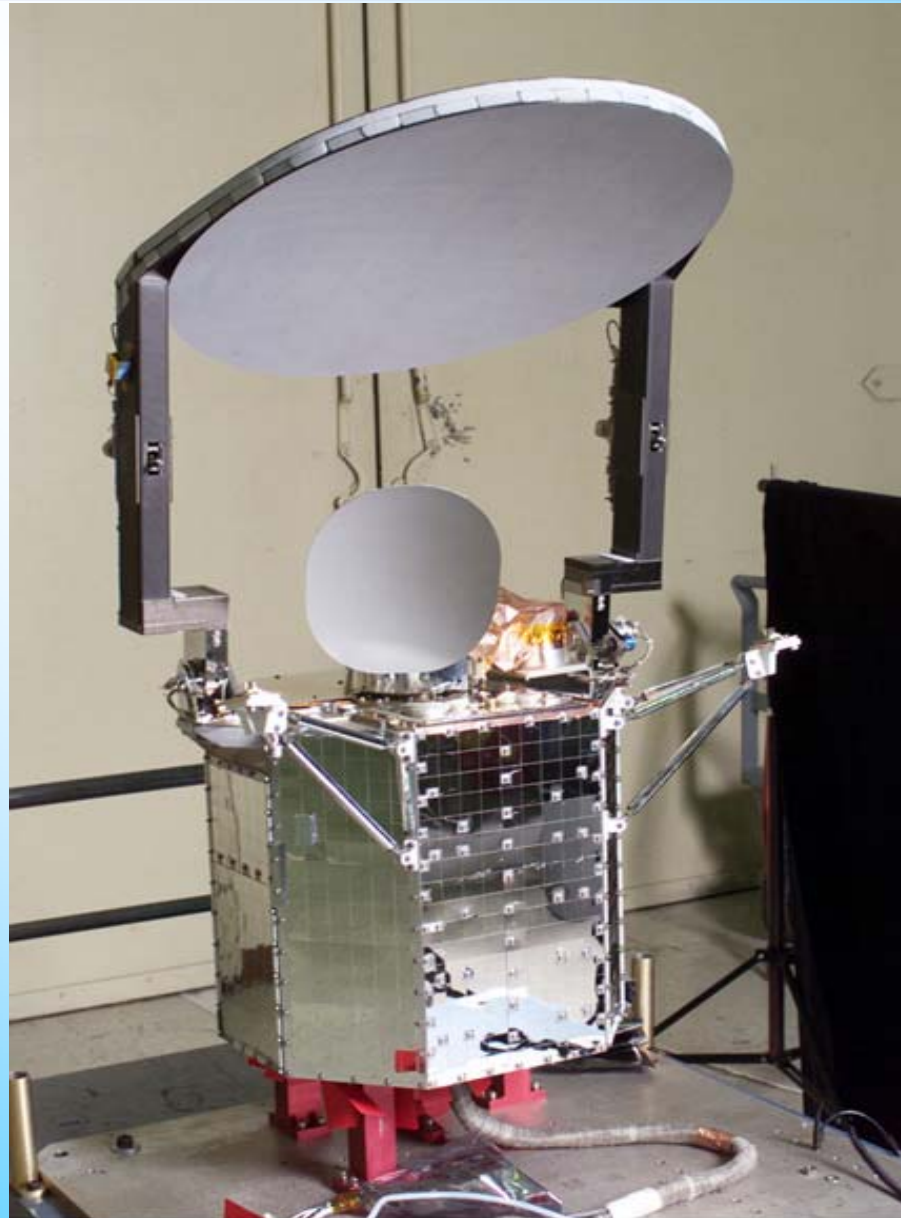


# SSMIS Cal/Val Calibration Anomaly Analysis





# SSMIS Cal/Val Calibration Anomaly Analysis



CN600-136-D



# SSMIS Cal/Val Calibration Anomaly Analysis

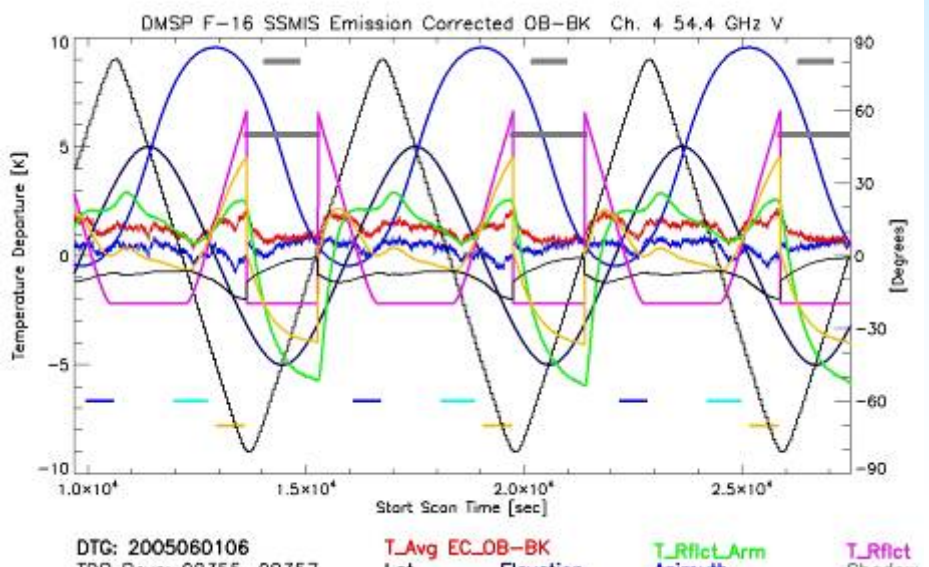
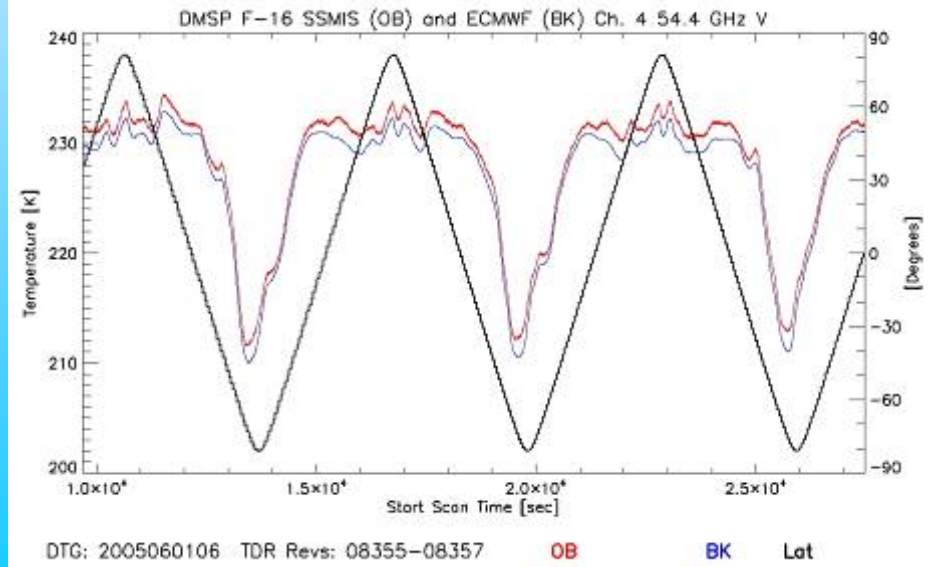
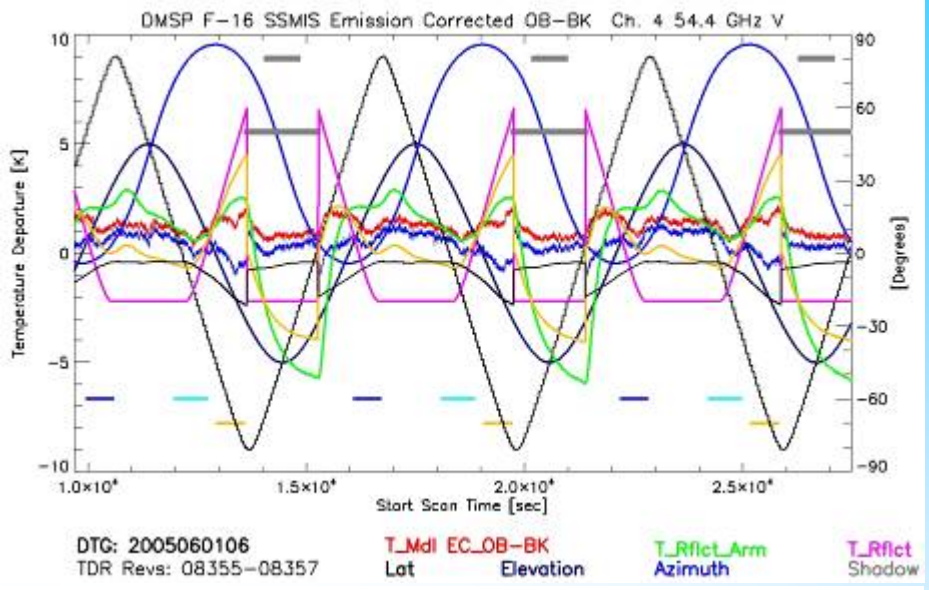
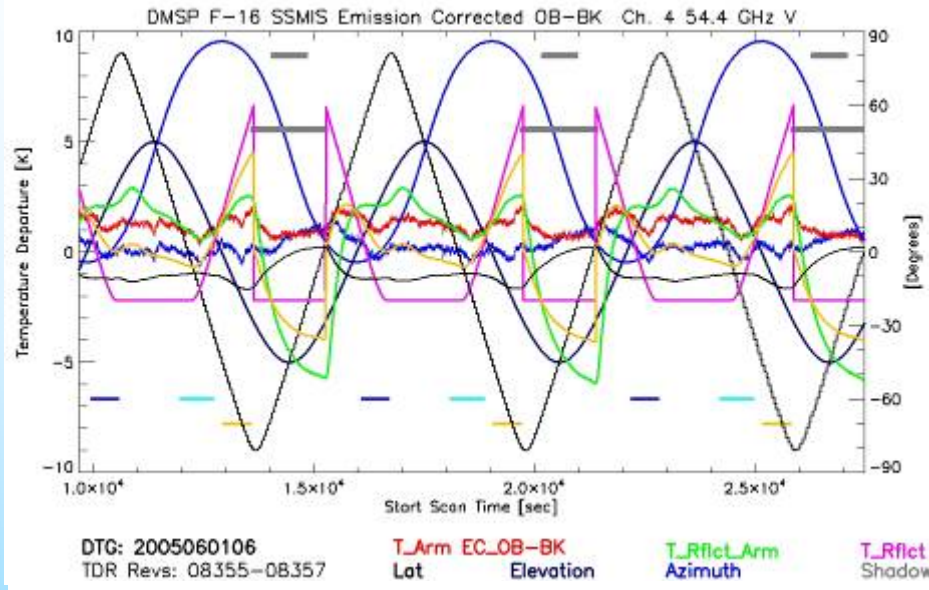


## Emission Correction Strategies

- $\epsilon_R (T_{\text{Reflector}} - T_{\text{Scene}})$  Term
- Reflector Temperature =  $T_{\text{ARM}}$
- Reflector Temperature =  $T_{\text{Reflector Model}}$
- Reflector Temperature =  $0.5*(T_{\text{ARM}} + T_{\text{Reflector Model}})$
- Reflector Temperature =  $a_1*T_{\text{ARM}} + a_2*T_{\text{Reflector Model}}$
- Reflector Temperature =  $a_1*T_{\text{ARM}} + a_2*T_{\text{Reflector Model}}$

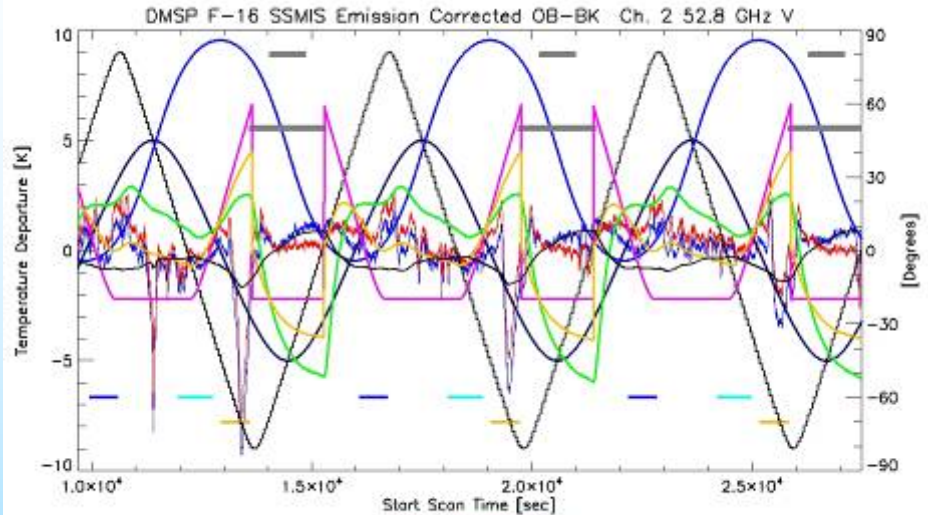


# SSMIS Cal/Val Calibration Anomaly Analysis



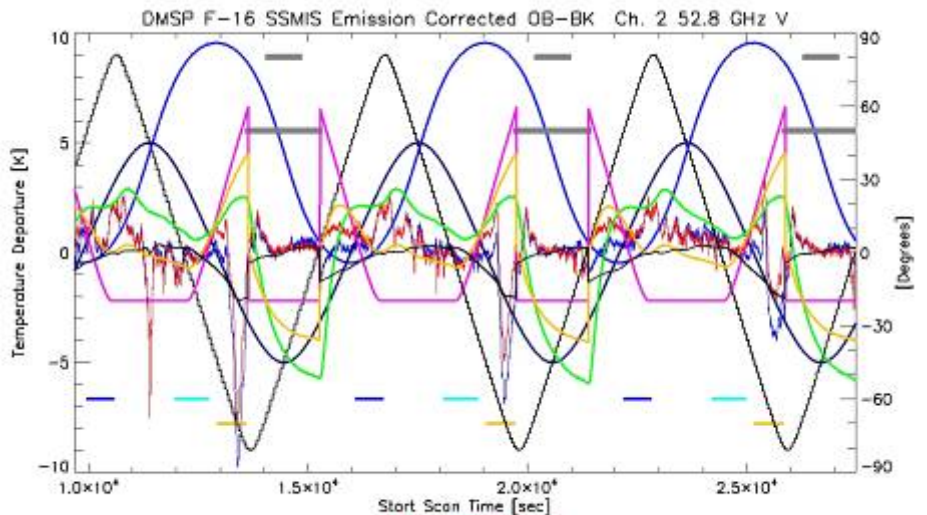


# SSMIS Cal/VaI Calibration Anomaly Analysis



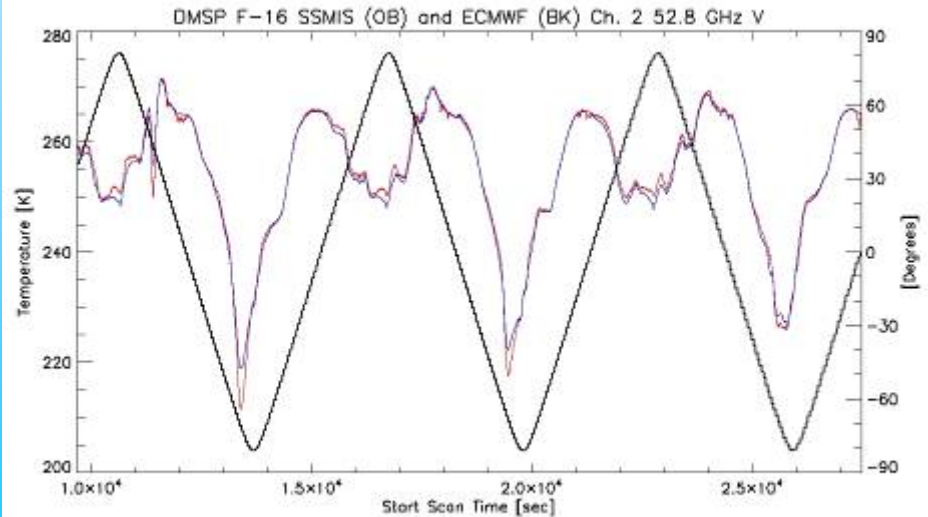
DTG: 2005060106  
TDR Revs: 08355-08357

T\_Arm EC\_OB-BK Lat  
T\_RflicLArm Azimuth  
T\_Rflic Shadow  
T\_Mdl EC\_OB-BK Elevation



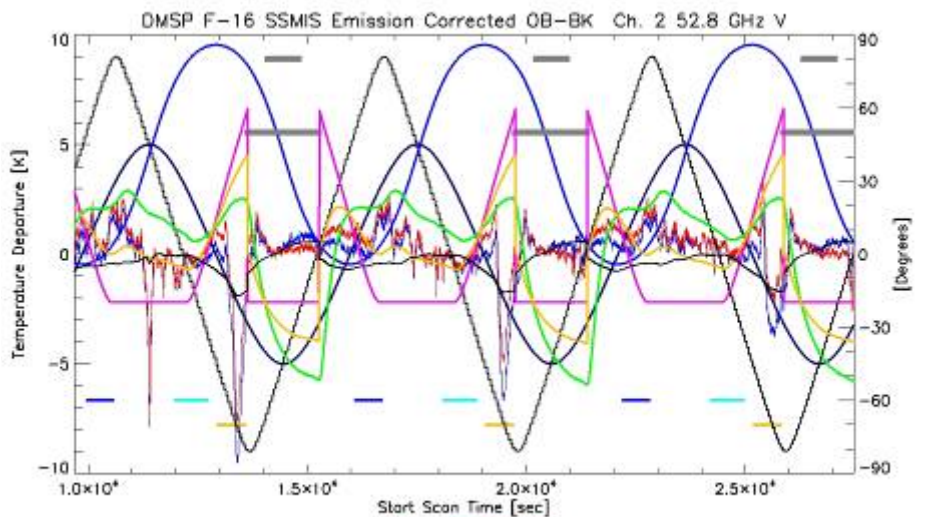
DTG: 2005060106  
TDR Revs: 08355-08357

T\_Mdl EC\_OB-BK Lat  
T\_RflicLArm Azimuth  
T\_Rflic Shadow  
T\_Arm EC\_OB-BK Elevation



DTG: 2005060106 TDR Revs: 08355-08357

OB BK Lat

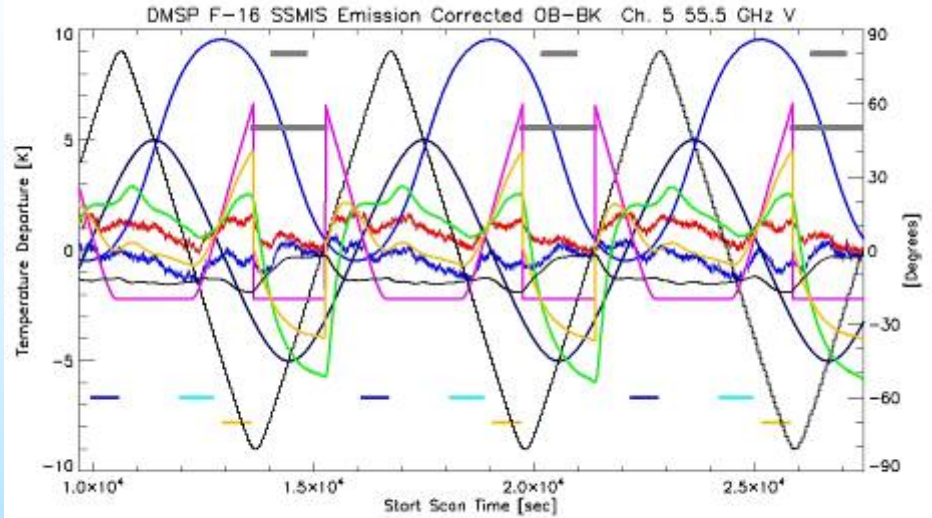


DTG: 2005060106  
TDR Revs: 08355-08357

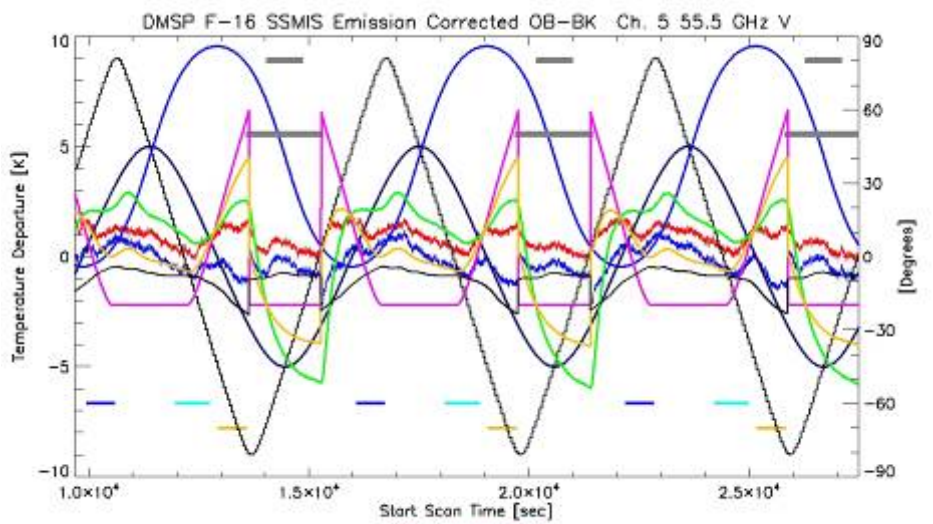
T\_Avg EC\_OB-BK Lat  
T\_RflicLArm Azimuth  
T\_Rflic Shadow  
T\_Mdl EC\_OB-BK Elevation



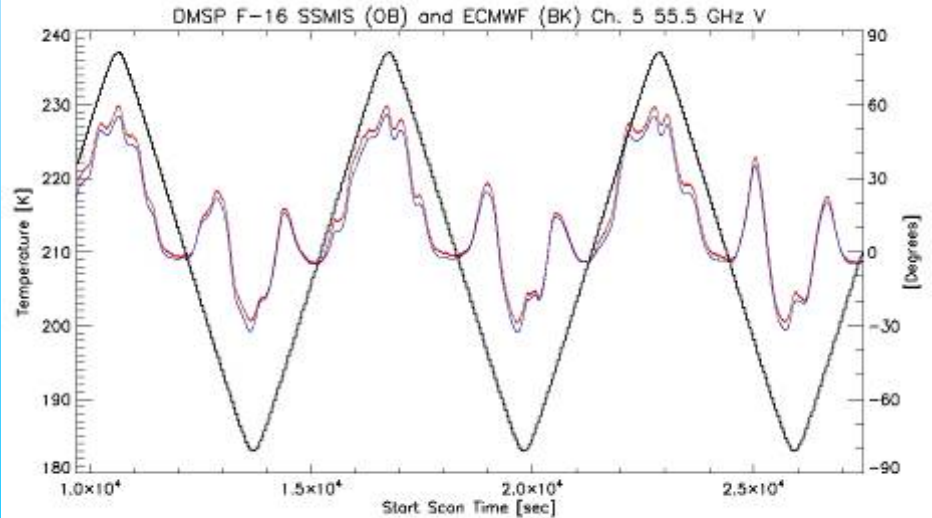
# SSMIS Cal/Val Calibration Anomaly Analysis



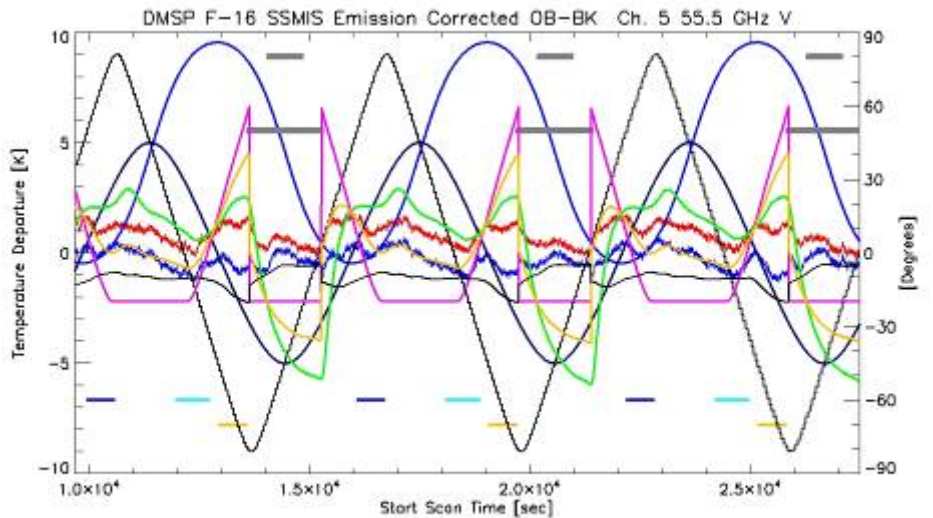
DTG: 2005060106  
TDR Revs: 08355-08357  
T\_Arm EC\_OB-BK Lat  
Elevation  
T\_RflcL\_Arm Azimuth  
T\_RflcI Shadow



DTG: 2005060106  
TDR Revs: 08355-08357  
T\_Mdl EC\_OB-BK Lat  
Elevation  
T\_RflcL\_Arm Azimuth  
T\_RflcI Shadow



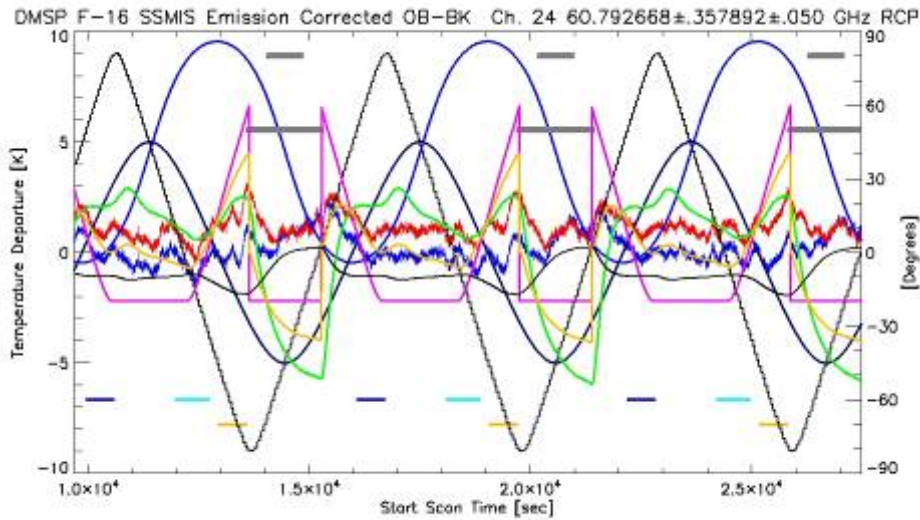
DTG: 2005060106 TDR Revs: 08355-08357  
OB BK Lat



DTG: 2005060106  
TDR Revs: 08355-08357  
T\_Avg EC\_OB-BK Lat  
Elevation  
T\_RflcL\_Arm Azimuth  
T\_RflcI Shadow



# SSMIS Cal/Va Calibration Anomaly Analysis



DTG: 2005060106

TDR Revs: 08355-08357

T\_Arm EC\_OB-BK

Lot

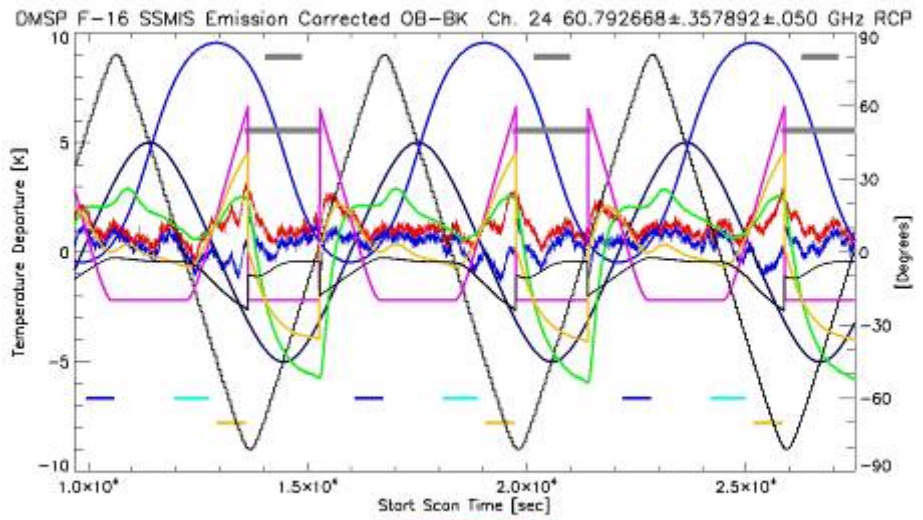
Elevation

T\_RflcL\_Arm

Azimuth

T\_Rflct

Shadow



DTG: 2005060106

TDR Revs: 08355-08357

T\_Mdl EC\_OB-BK

Lot

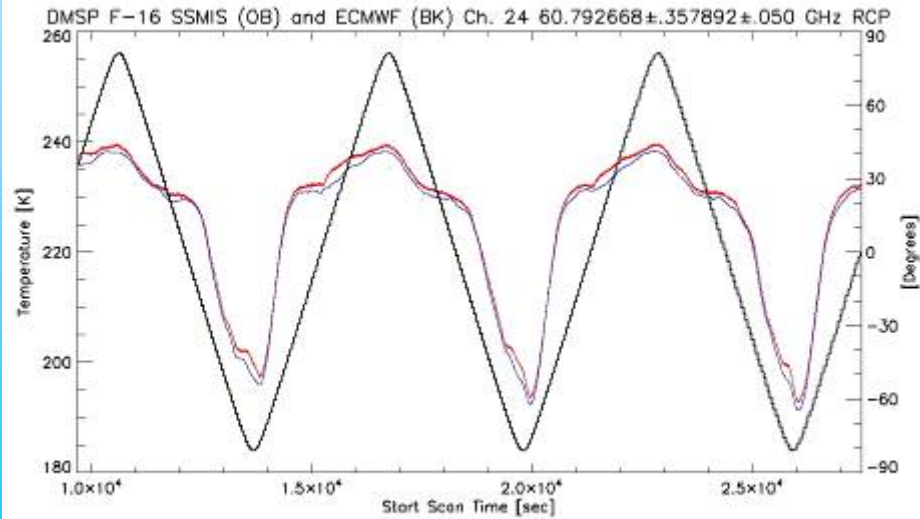
Elevation

T\_RflcL\_Arm

Azimuth

T\_Rflct

Shadow



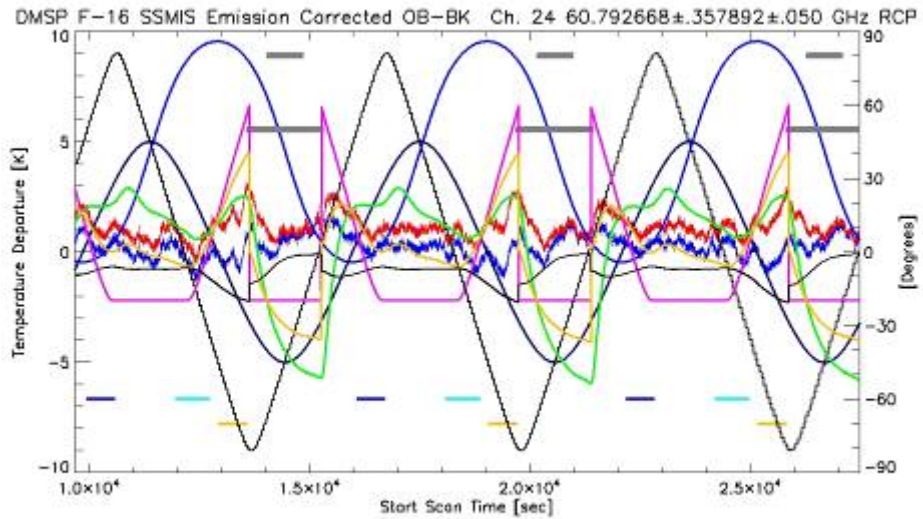
DTG: 2005060106

TDR Revs: 08355-08357

OB

BK

Lot



DTG: 2005060106

TDR Revs: 08355-08357

T\_Avg EC\_OB-BK

Lot

Elevation

T\_RflcL\_Arm

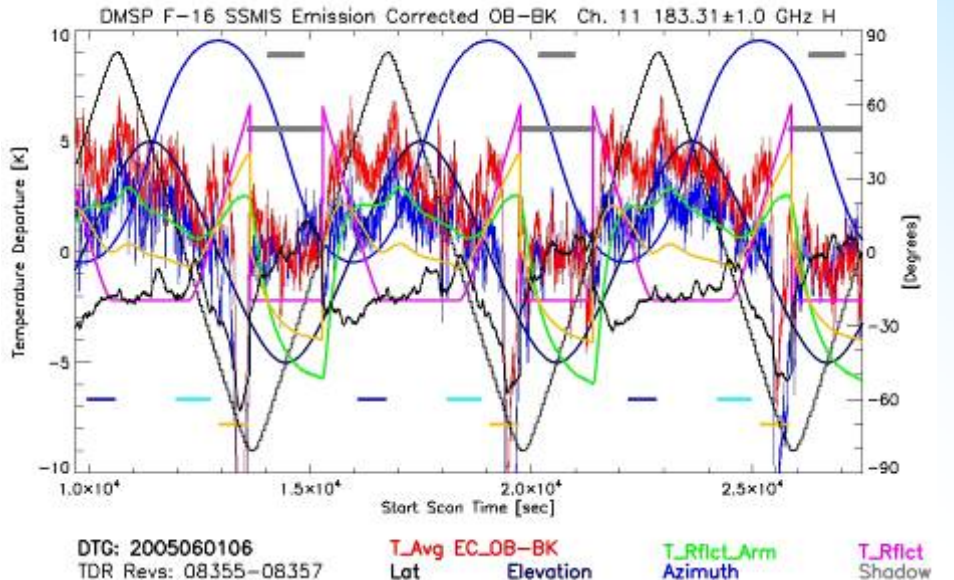
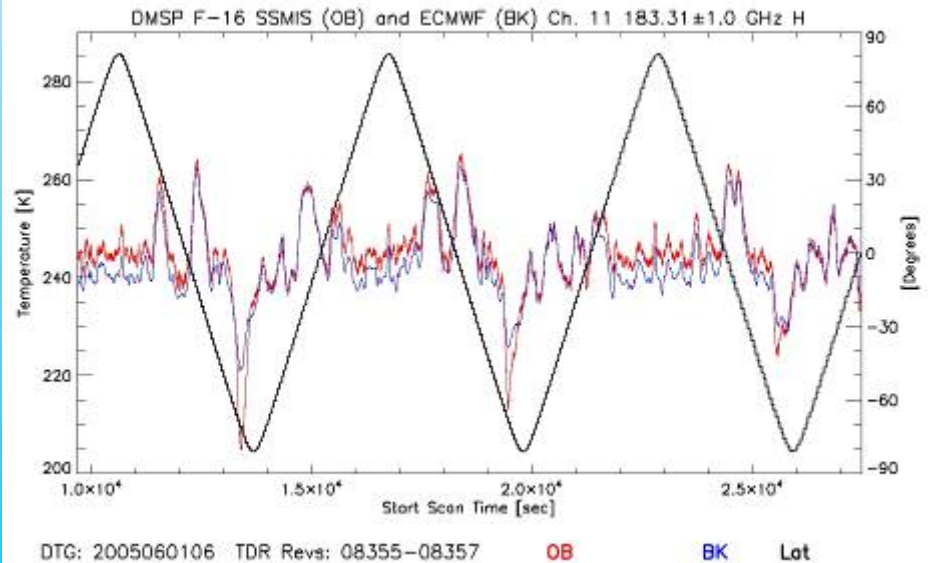
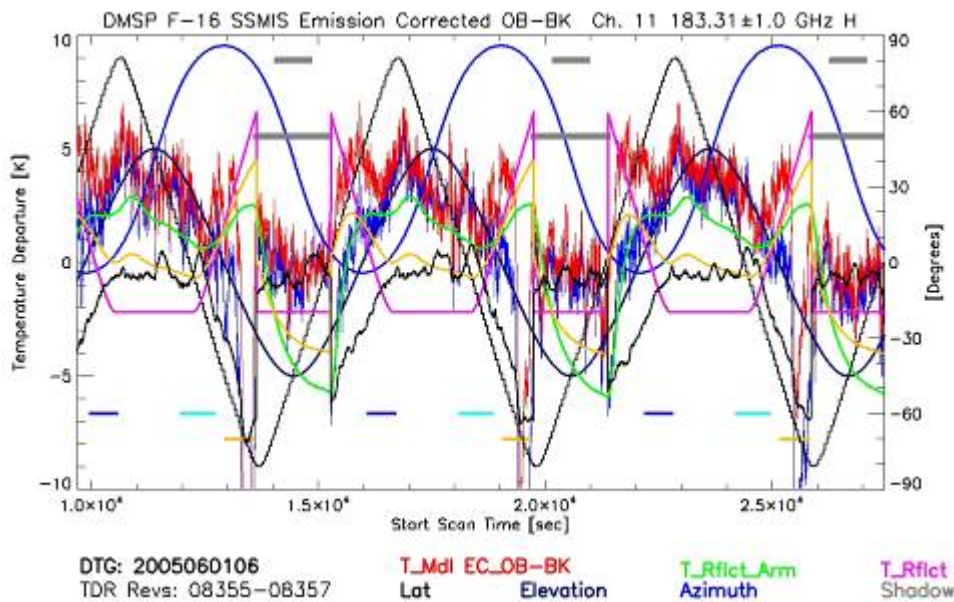
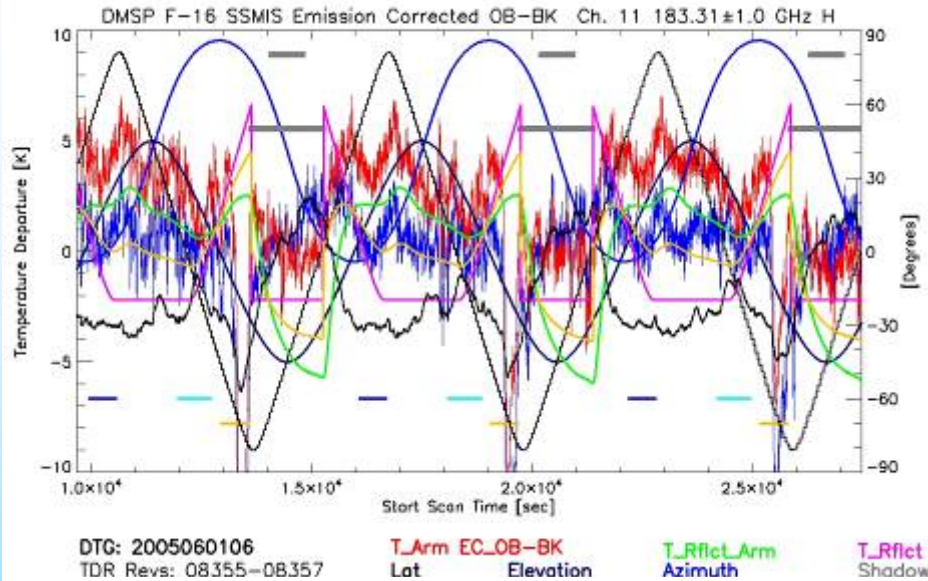
Azimuth

T\_Rflct

Shadow



# SSMIS Cal/Va Calibration Anomaly Analysis







# SSMIS Cal/Val Calibration Anomaly Analysis





# SSMIS Cal/Val Calibration Anomaly Analysis

