JAXA Calibration Update

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AMSR-E Joint Science Team Meeting
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Current Status

- L1B radiometric calibration differs from that of L2A
- Version-2 update : almost completed
  - Comparison of Version-1 with other data (SSM/I, TMI, AMSR-E L2A).
  - HTS Effective temperatures (T_{eff}) are similar to that of Version-1 (except offset values) based on PRT+RxT method.
  - Warm-end calibration is determined by comparing with TMI match-ups over land.
  - Non-linearity correction to absorb inconsistent calibration offsets for land- and ocean-level Tb. Correction is largest at 6.9GHz channels.
  - Scan-bias correction for 6.9GHz channels.
  - Empirical geolocation correction by EOC.

Radiometric correction

Step 1 : PRT method

- Multiple regression model of T_{eff} using eight PRT readings.
- Coefficients of the regression model were determined by using SSM/I oceanic Tb (18GHz and higher channels) and computed Tb (6 and 10GHz channels) based on the Reynolds OI-SST analysis. 1 set of coefficients were obtained from 1-year data regression.

$$T_{B_HTS} = T_0 + \sum_{i=1}^{8} F_i \cdot T_{Pt_i}$$

HTS Effective Temp. PRT readings

SSM/I data were provided by the Global Hydrology Resource Center (GHRC) at the Global Hydrology and Climate Center, Huntsville, Alabama, USA. Reynolds OI-SST dataset were made available by NOAA.

Step 2 : RxT method

- Utilize Relationship between receiver temperature and its gain variation.
- Applying this equation to HTS measurement and assuming T_{eff} derived by regression model as T_{OBS}, b_{RX} can be computed by regression analysis. Using this value, gain variations can be compensated by the equation.

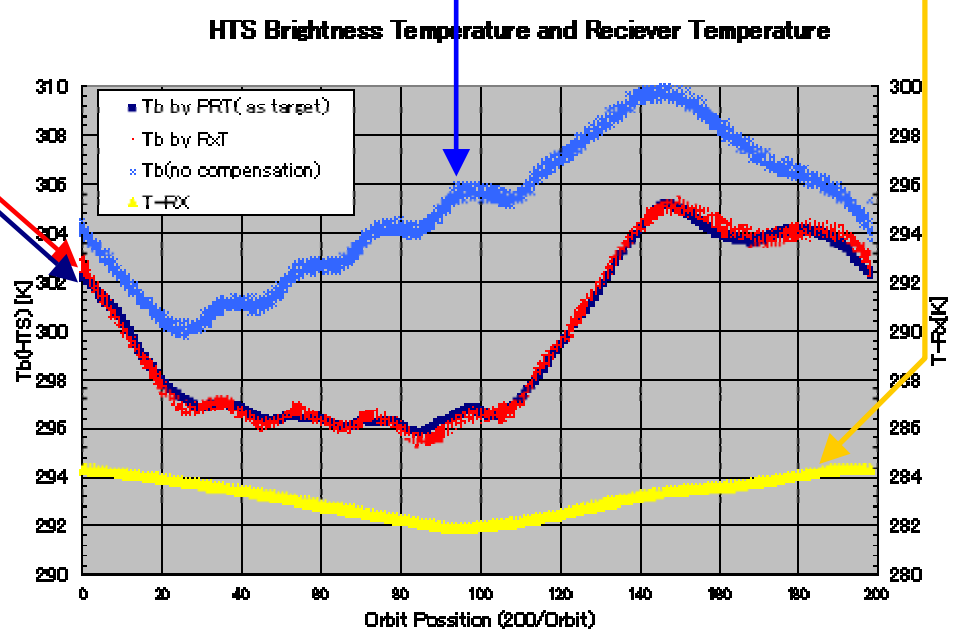
$$T_{OBS} = \frac{C'_{OBS} - C'_{CSM}}{G_0 \cdot (1 + b_{RX} \cdot \Delta T_{RX})} + T_{CSM}$$

T_{OBS}	: Scene Tb (K)
T_{CSM}	: Deep space Tb (K)
C'_{OBS}	: Digital counts of scene
C'_{CSM}	: Digital counts of deep spece
G_0	: Nominal gain
b_{RX}	: Gain sensitivity to rec. temp. (℃$^{-1}$)
ΔT_{RX}	: Rec. temp. departure from mean value (℃).

Combining PRT and RxT

From PRT method

$$T_{b_HTS(PRT)} \approx T_{b_HTS} = \frac{C'_{HTS} - C'_{CSM}}{\overline{G_0} \cdot \left\{1 + b_{RX} \cdot \left(T'_{RX} - \overline{T}_{RX}\right)\right\}} + T_{CSM}$$



23GHz Vpol T_{b_HTS} & Treciever

V1 and TMI over land

(AMSR V-H) VS (AMSR-TMI)

(AMSRE V-H) VS (AMSRE-TMI)

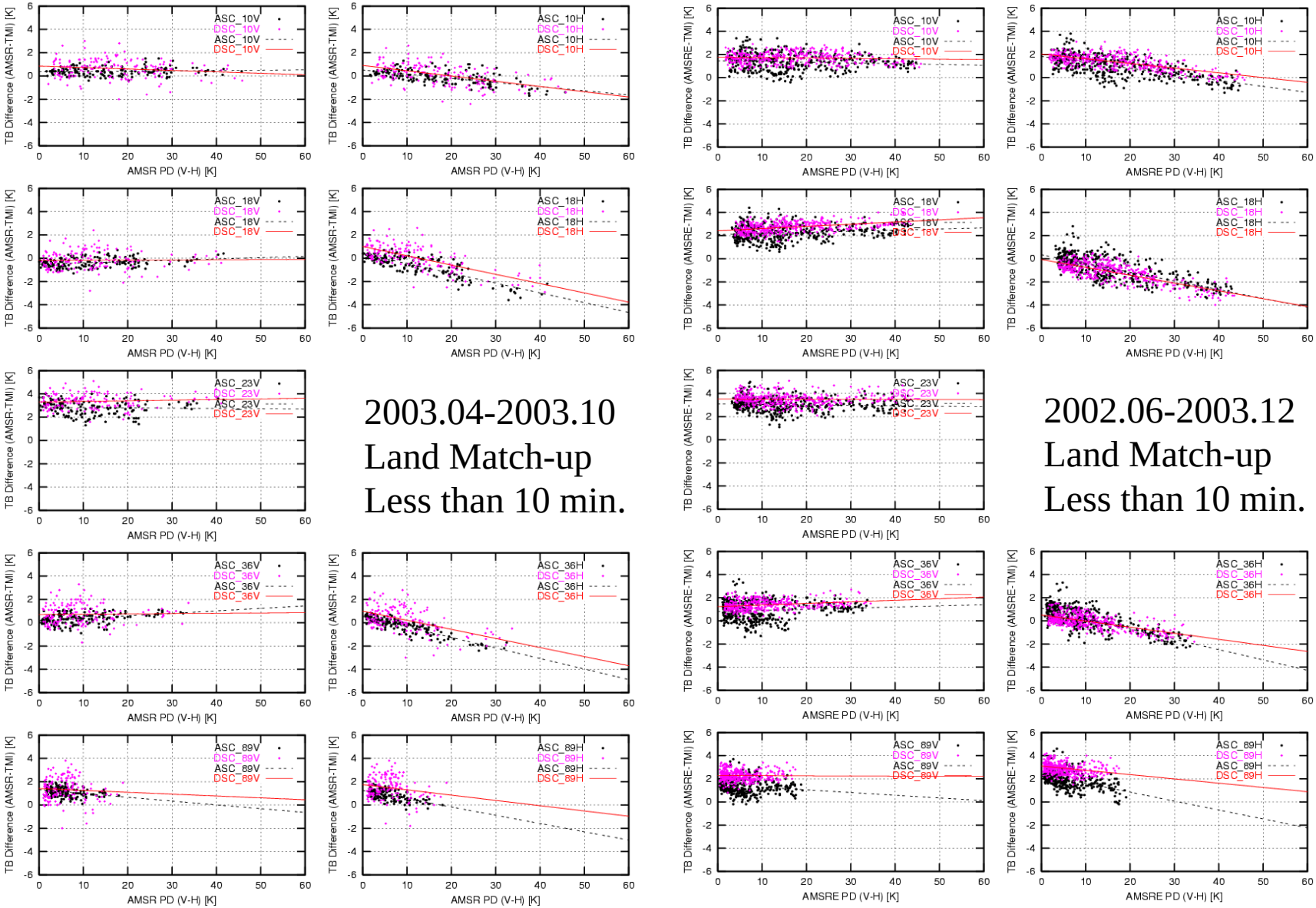
10G

18G

23G

36G

89G



2003.04-2003.10
Land Match-up
Less than 10 min.

2002.06-2003.12
Land Match-up
Less than 10 min.

SSM/I and TMI over land

(F14 V-H) VS (F14-TMI)

SSM/I Local Time 20:21 (Asc)

(F15 V-H) VS (F15-TMI)

SSM/I Local Time 21:31 (Asc)

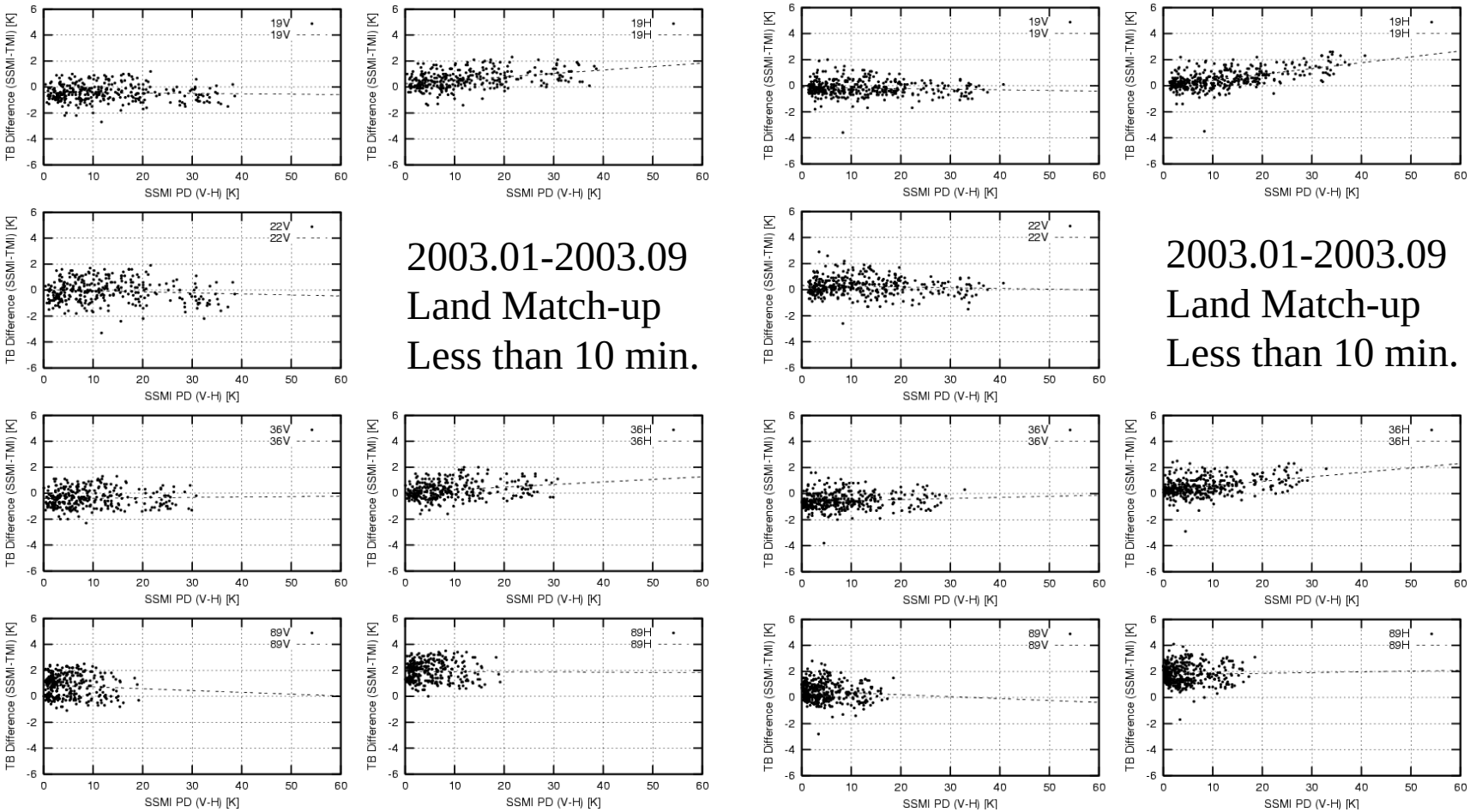
10G

18G

23G

36G

89G



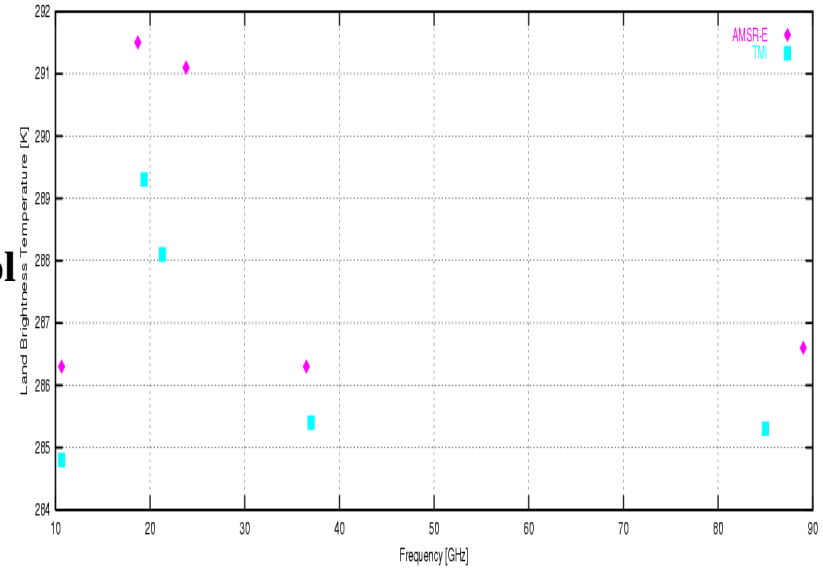
2003.01-2003.09
Land Match-up
Less than 10 min.

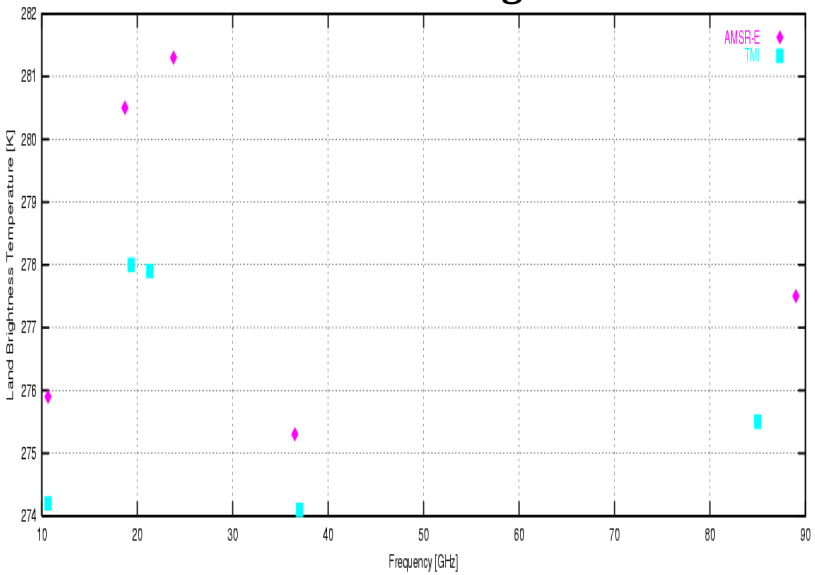
2003.01-2003.09
Land Match-up
Less than 10 min.

Frequency characteristics

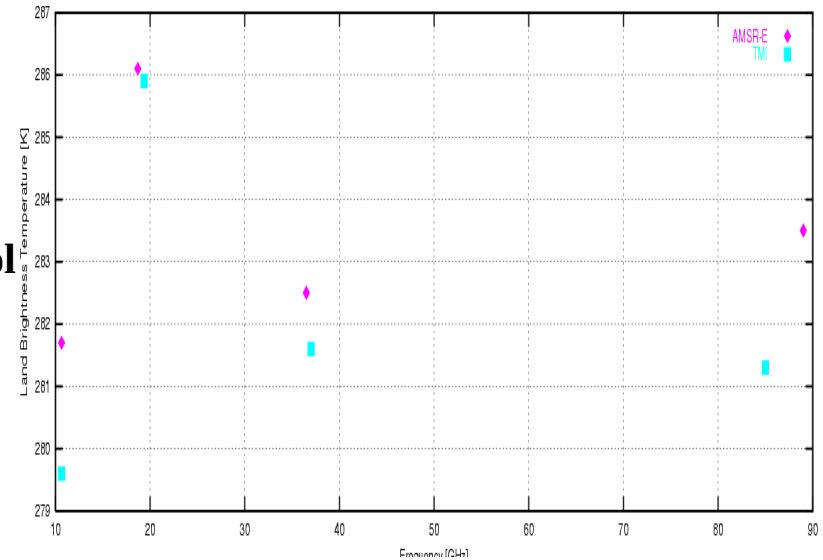
Ascending | **Descending**

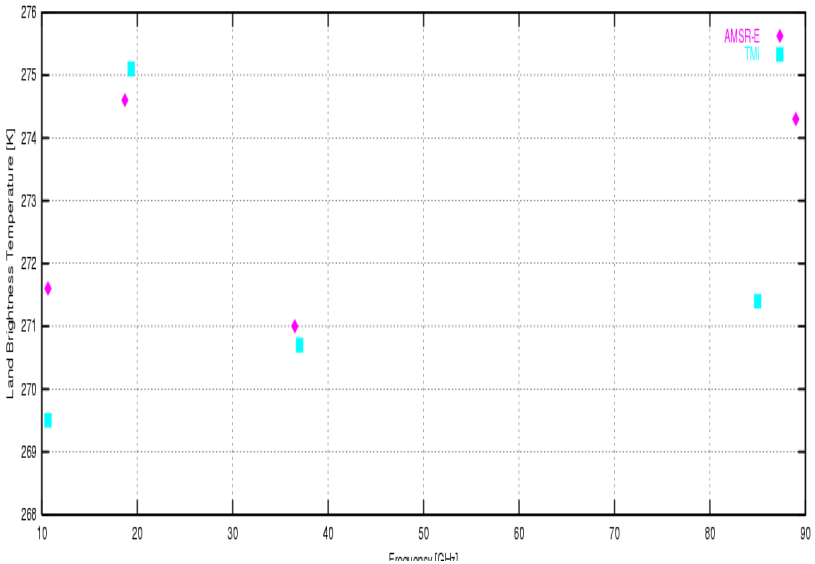
V-pol



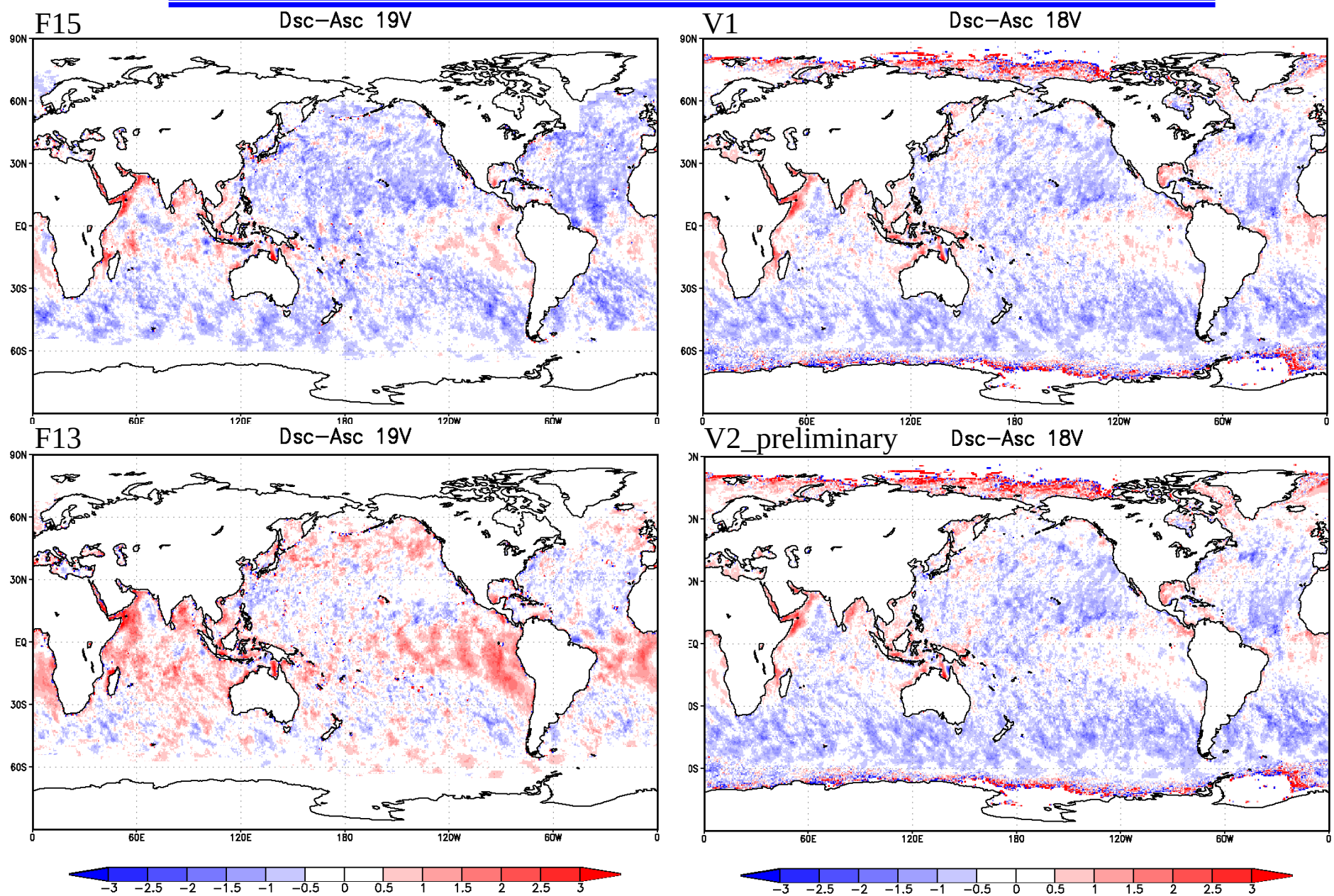


H-pol

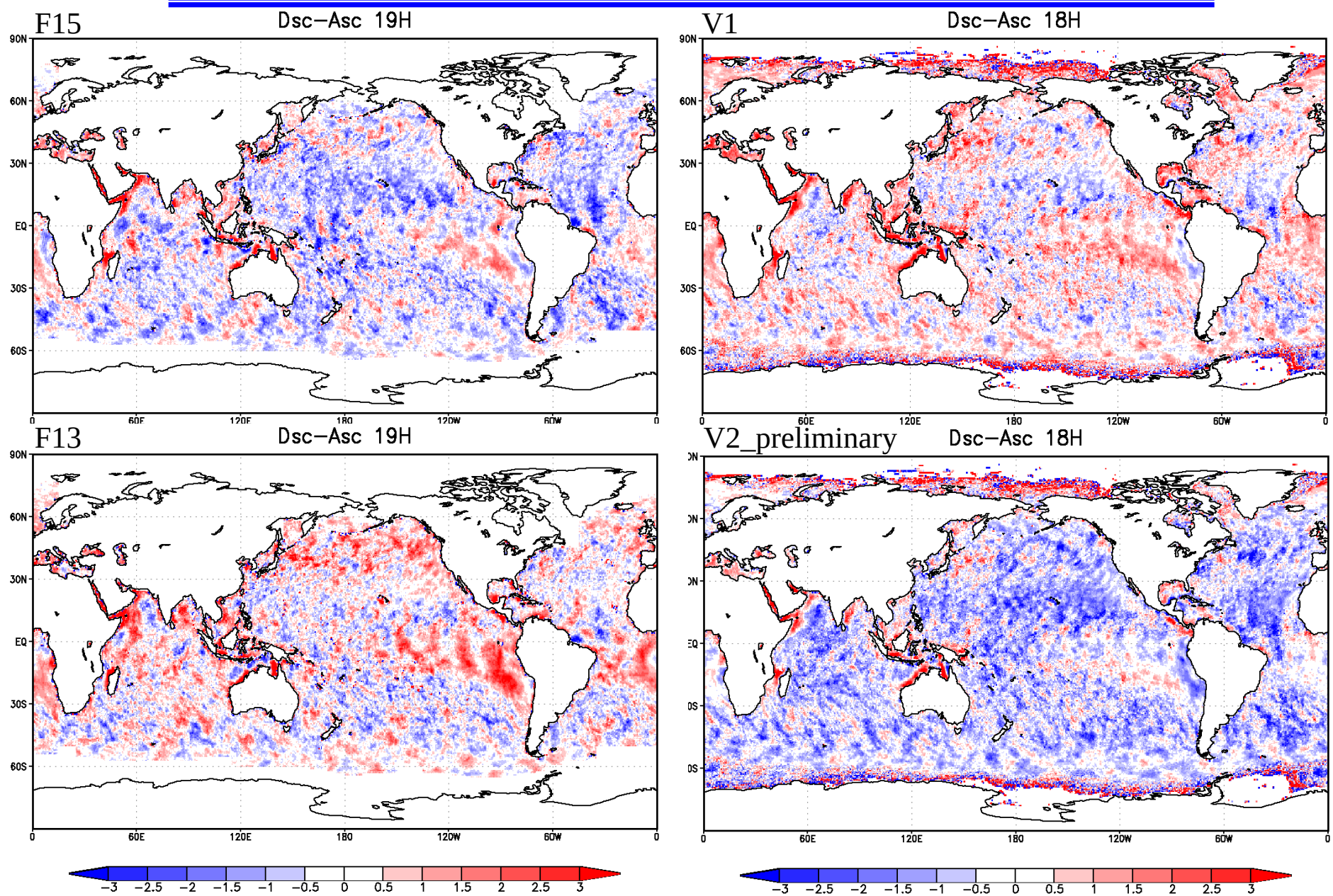




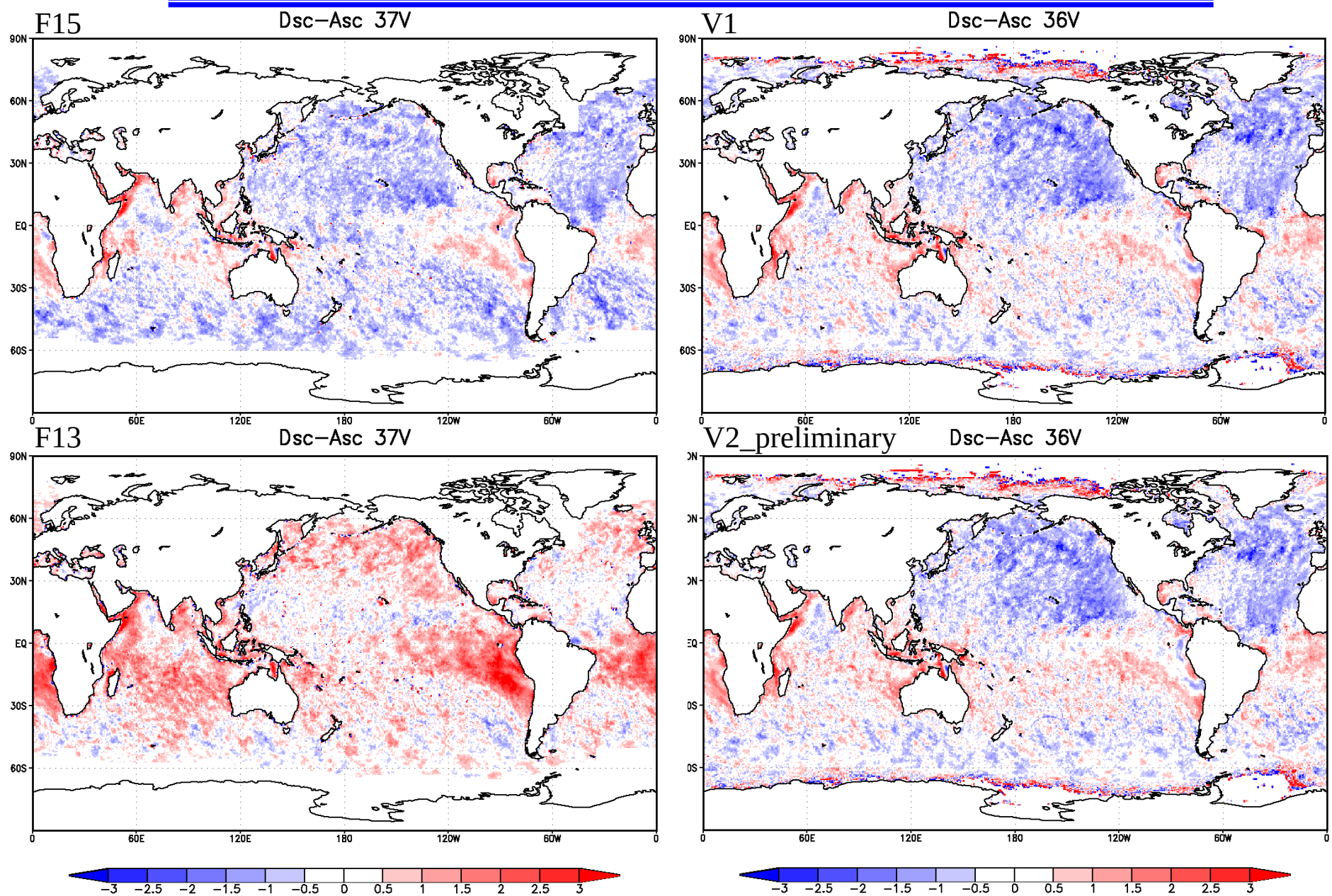
Day-Night : SSM/I and AMSR



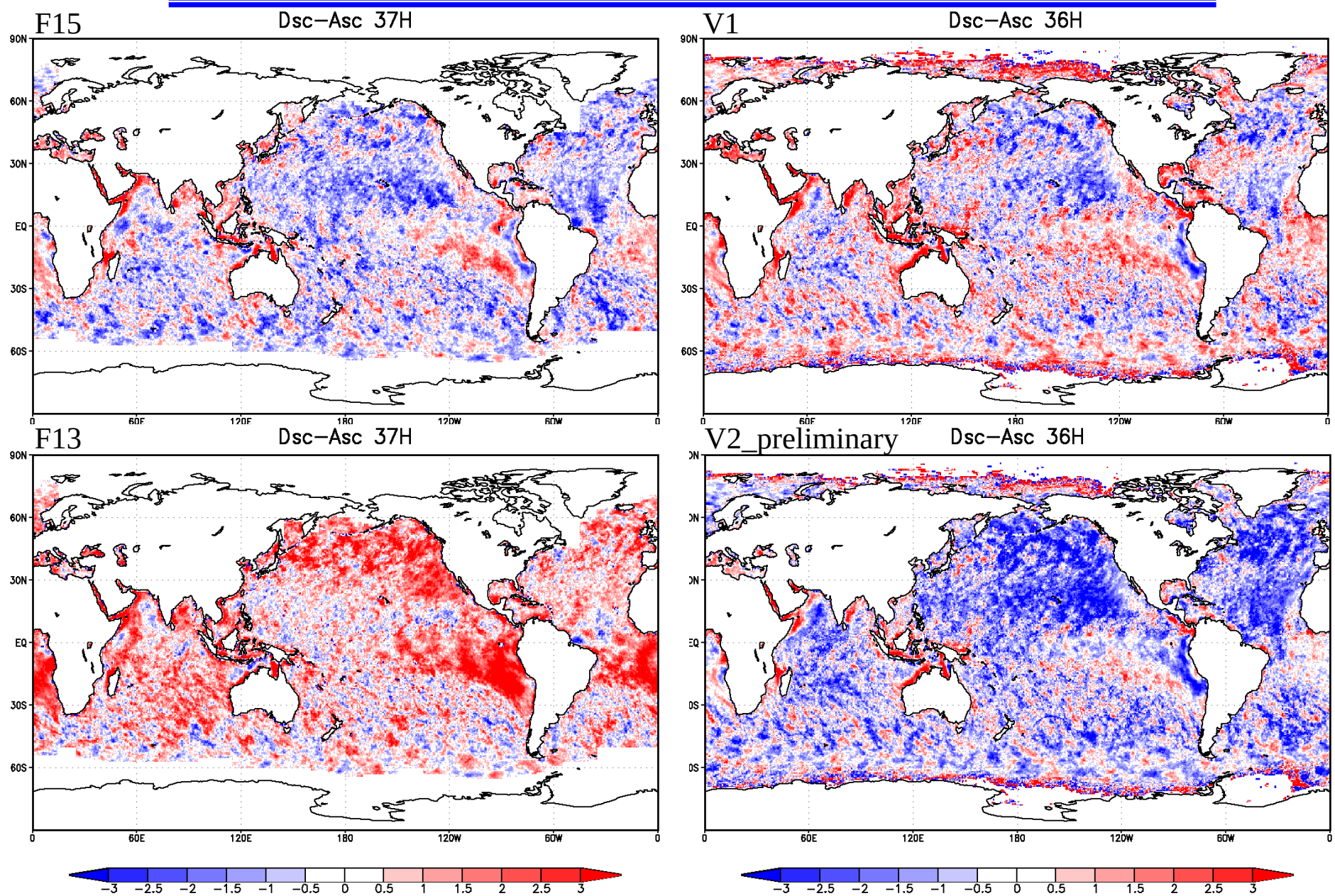
Day-Night : F15 and AMSR



Day-Night : F15 and AMSR

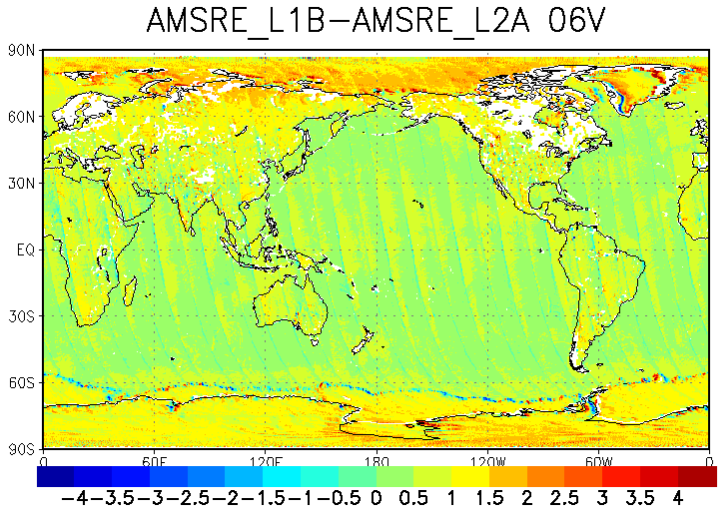


Day-Night : F15 and AMSR

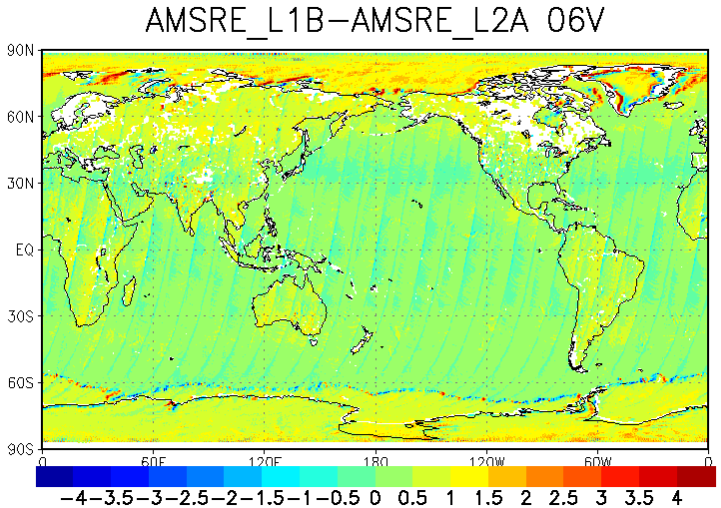


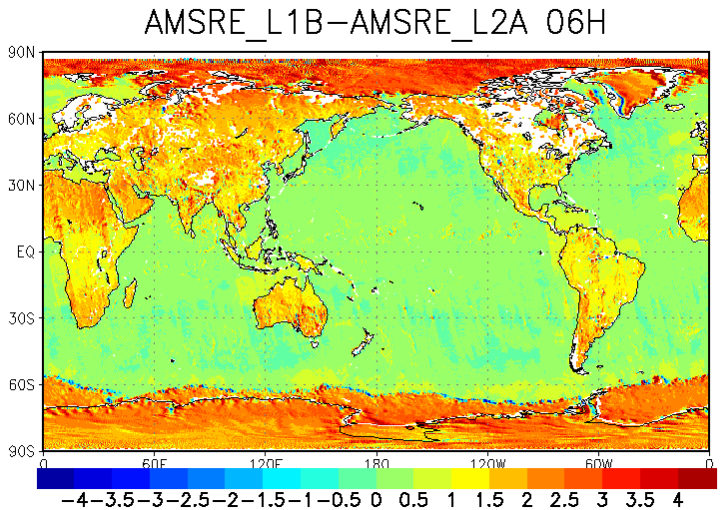
Tb difference : 6.9 GHz

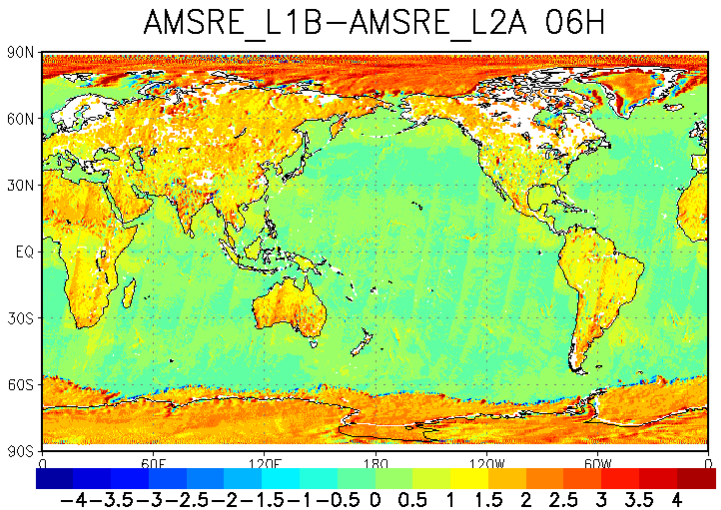
Ascending



Descending



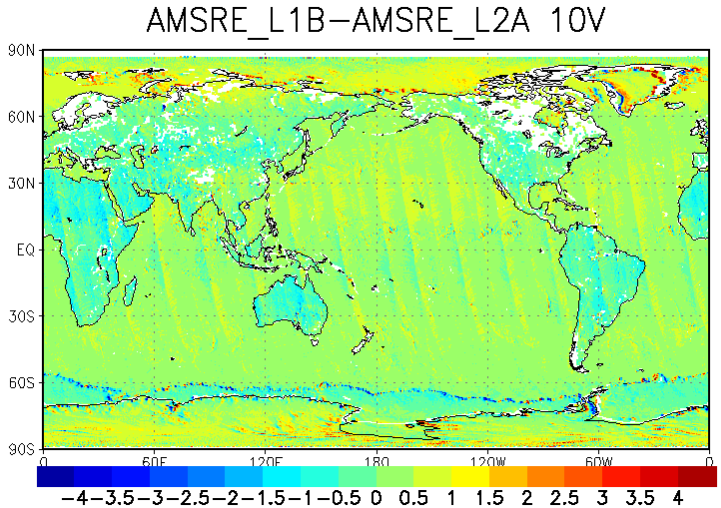




July 1-2, 2003
L1B: V2

Tb difference : 10.65GHz

Ascending



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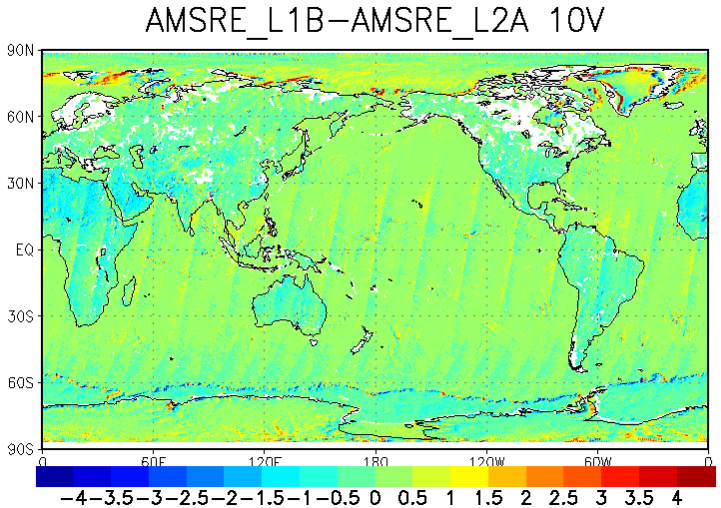
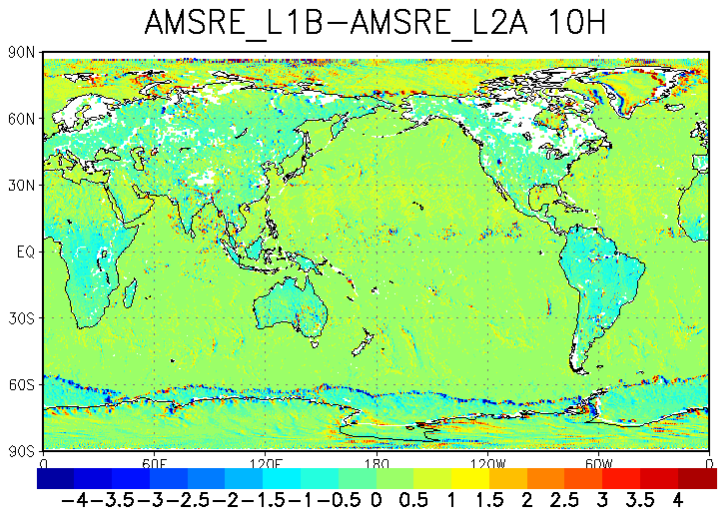
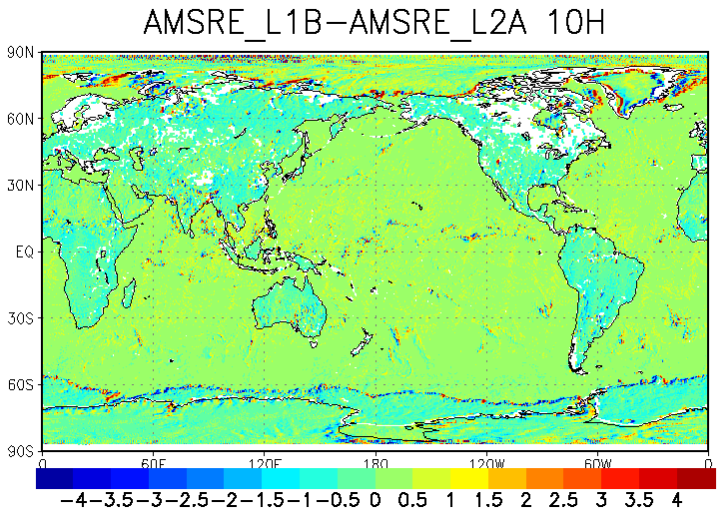
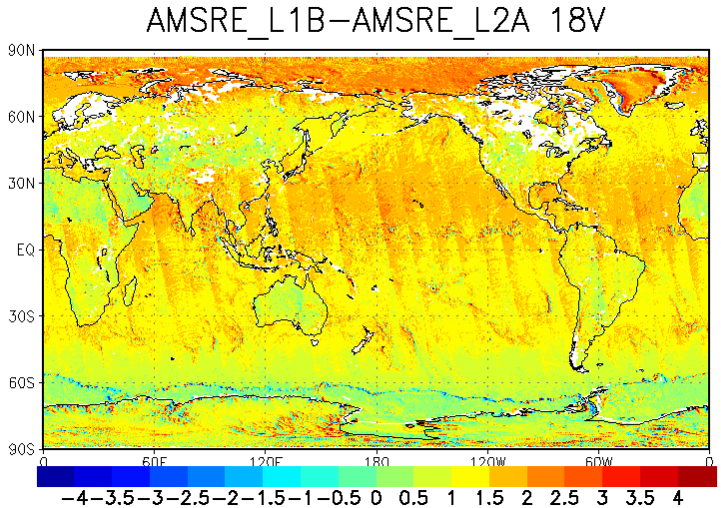




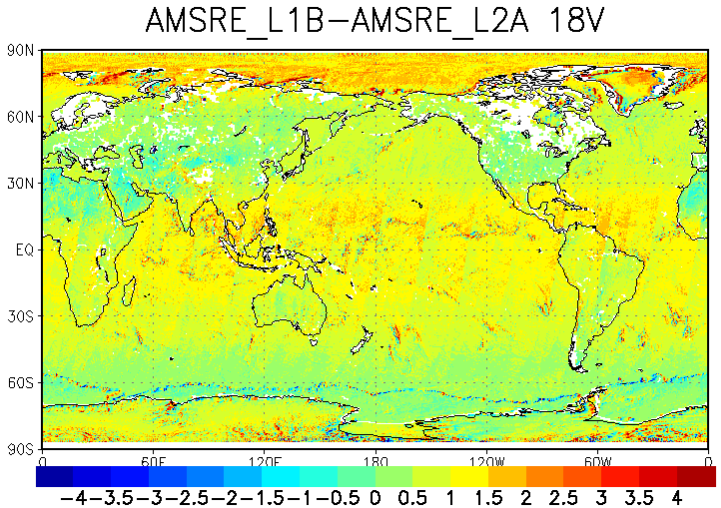


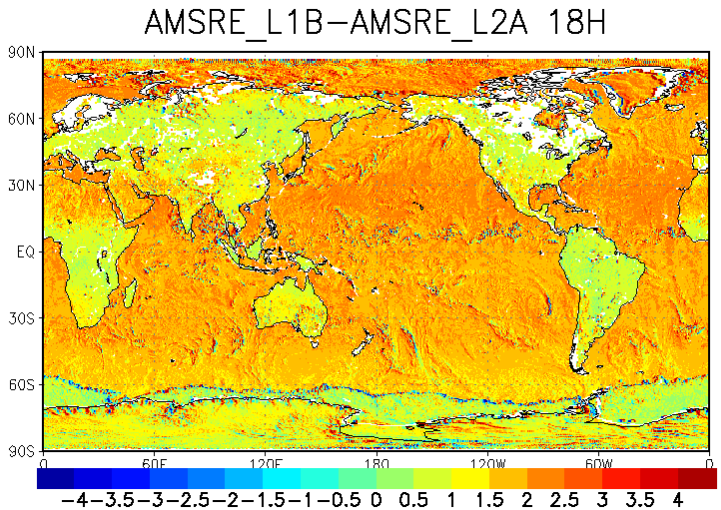
Tb difference : 18.7 GHz

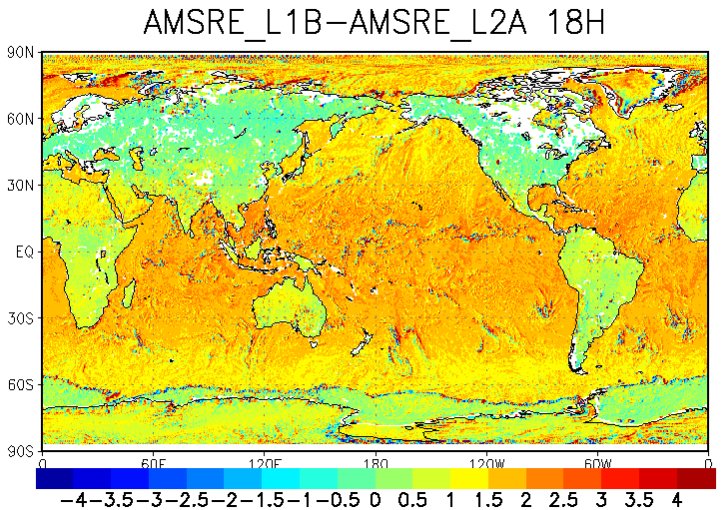
Ascending



Descending



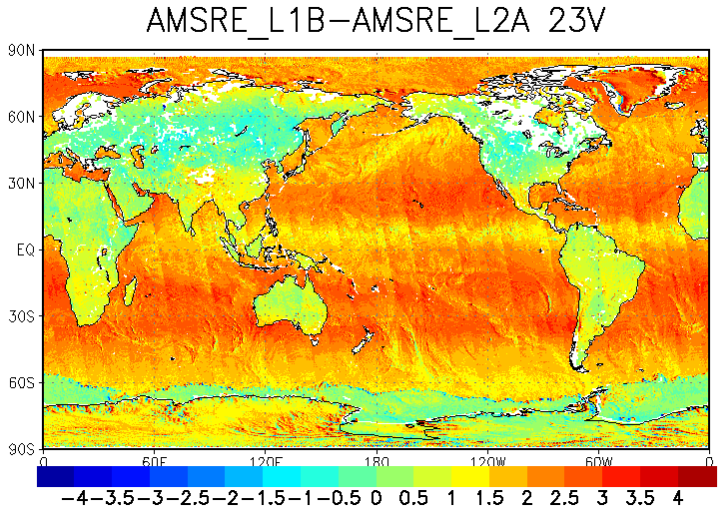




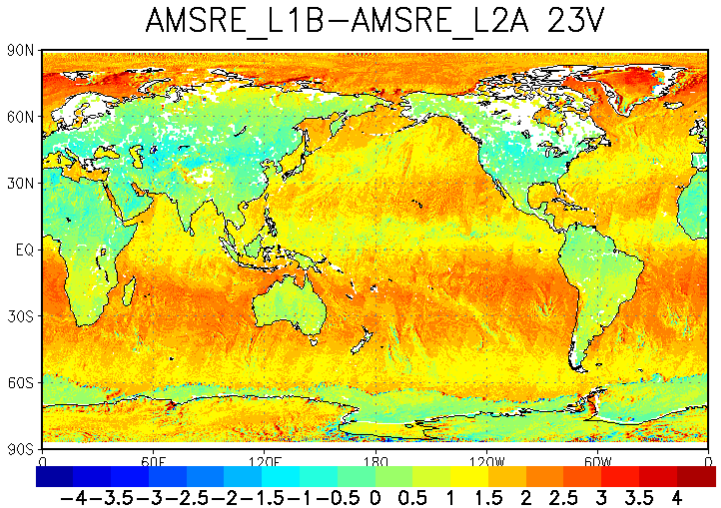
July 1-2, 2003
L1B: V2

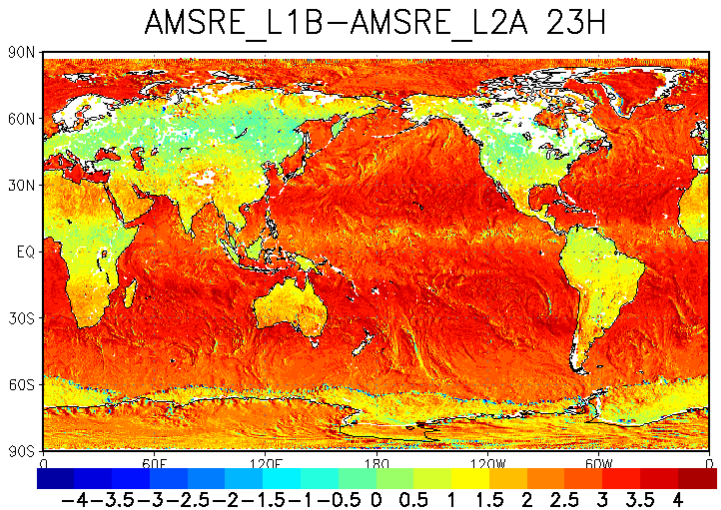
Tb difference : 23.8 GHz

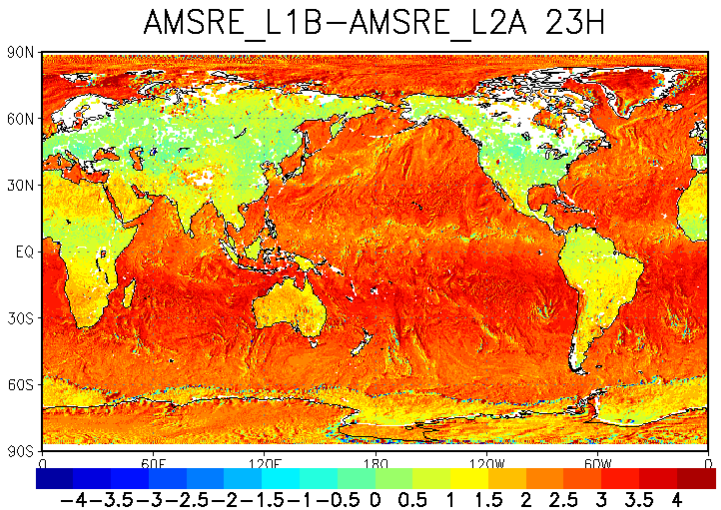
Ascending



Descending



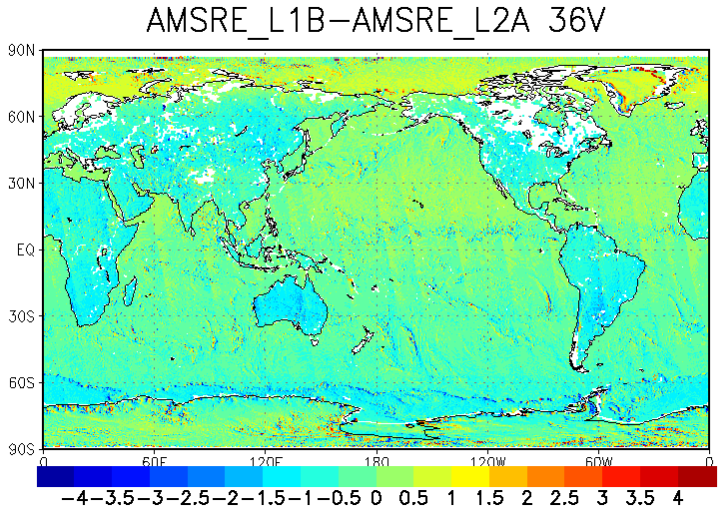




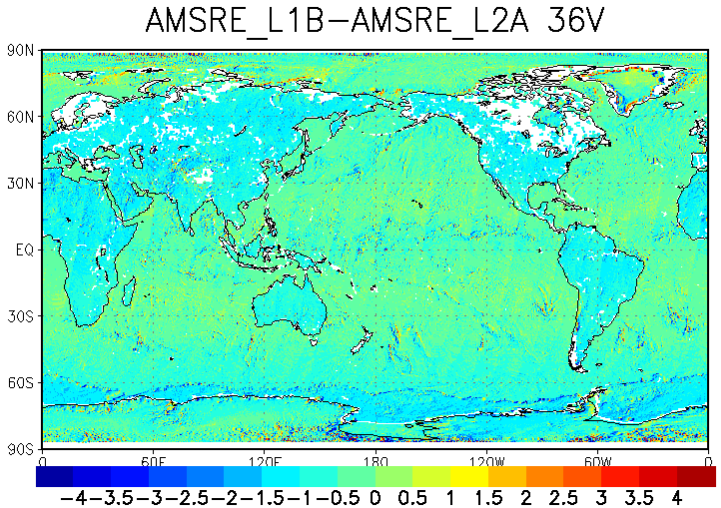
July 1-2, 2003
L1B: V2

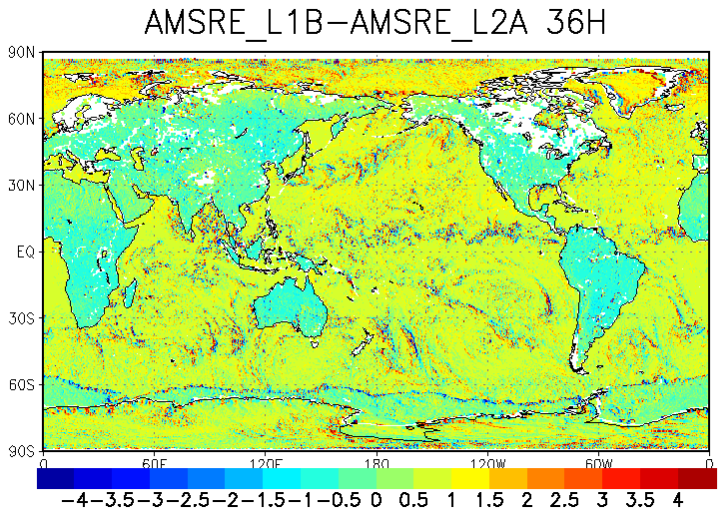
Tb difference : 36.5 GHz

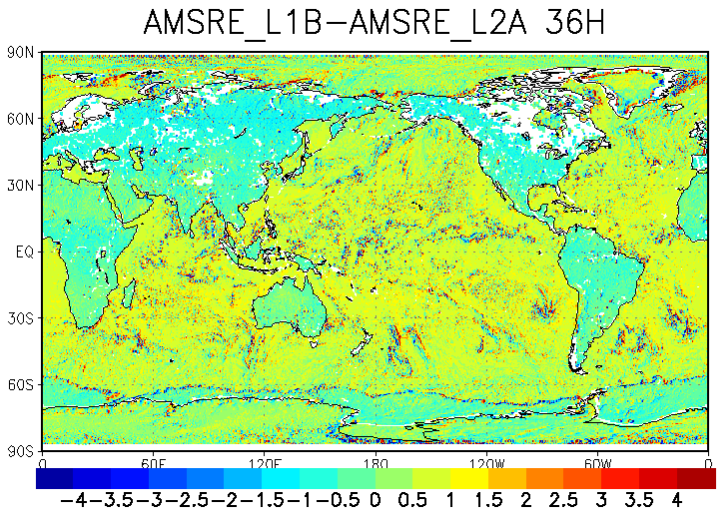
Ascending



Descending



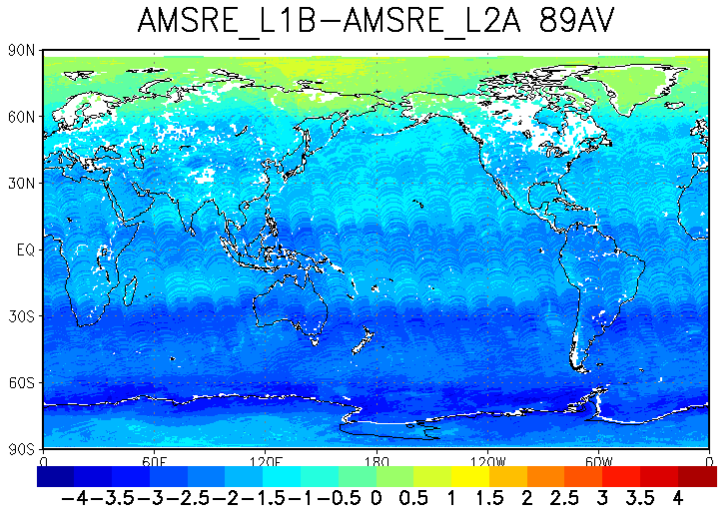




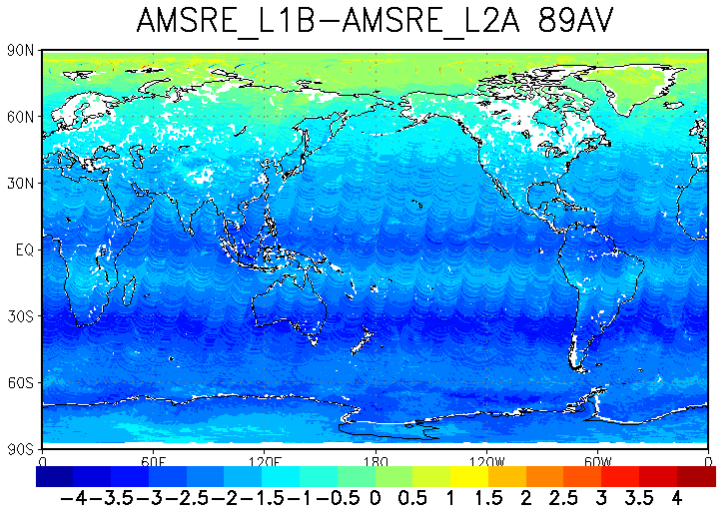
July 1-2, 2003
L1B: V2

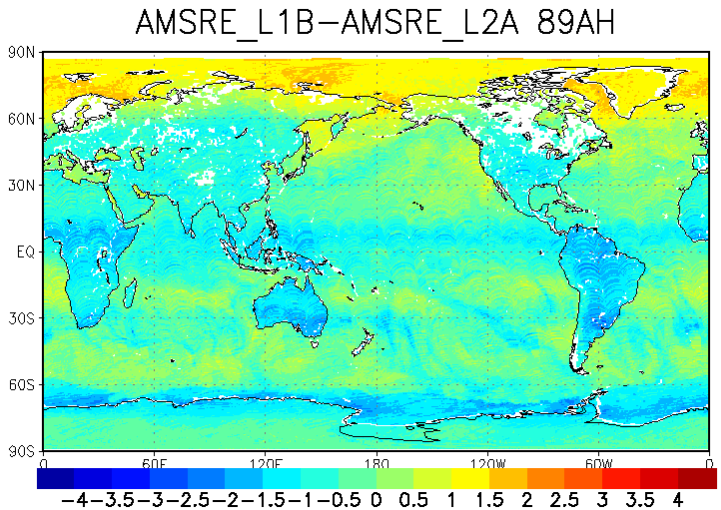
Tb difference : 89.0 GHz (A)

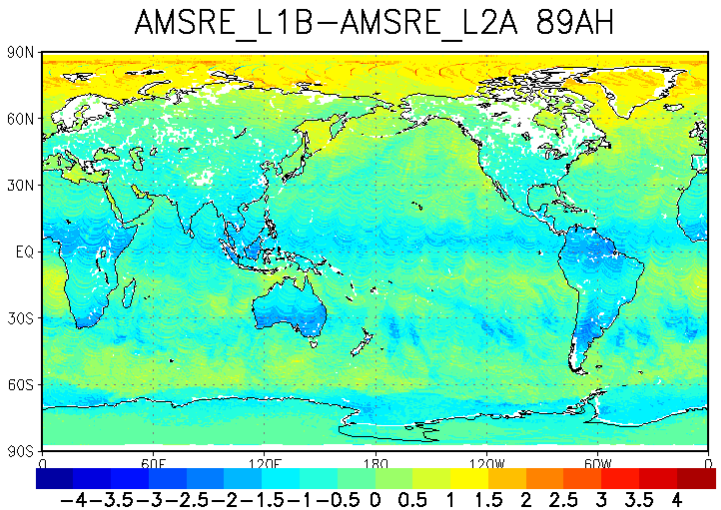
Ascending



Descending

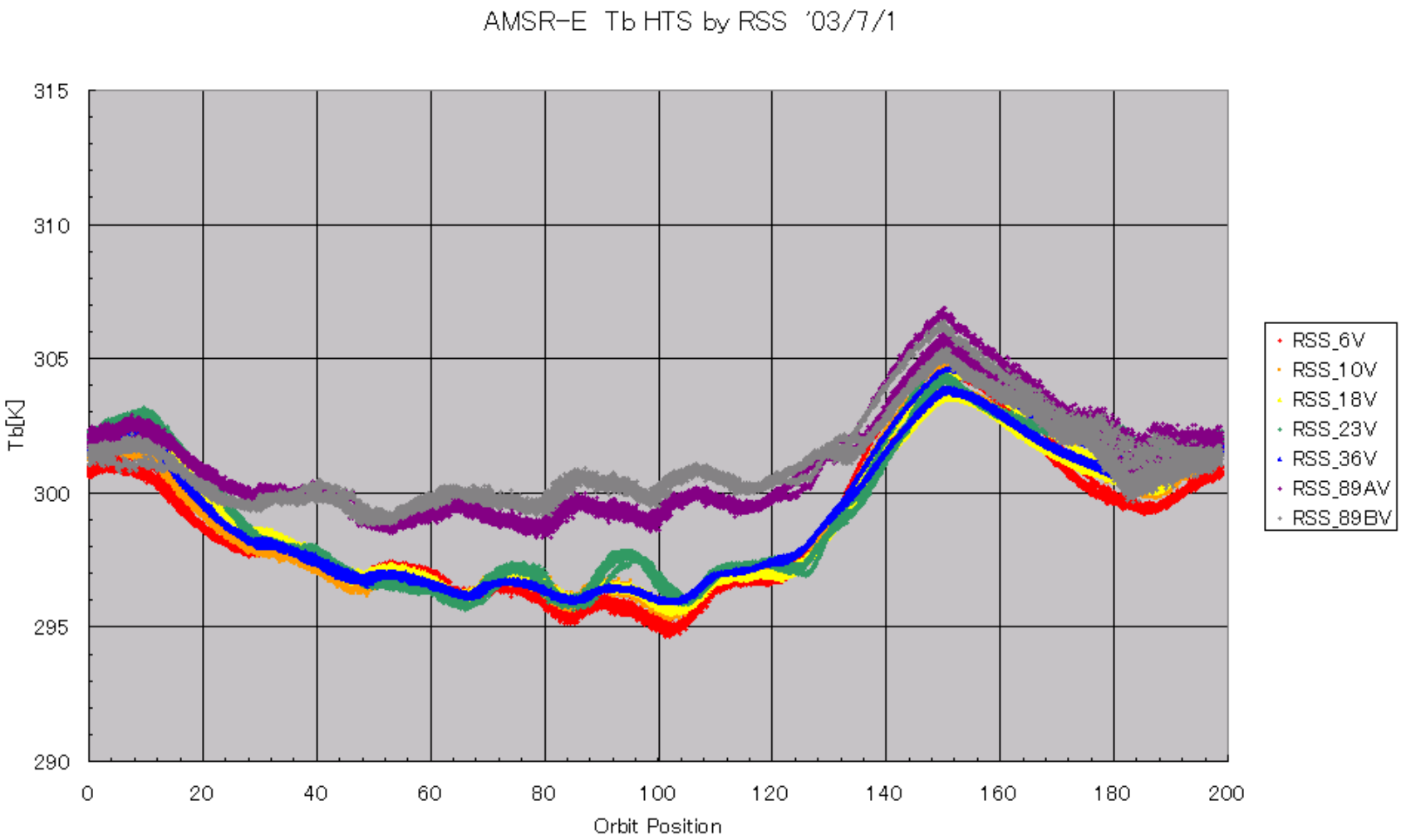






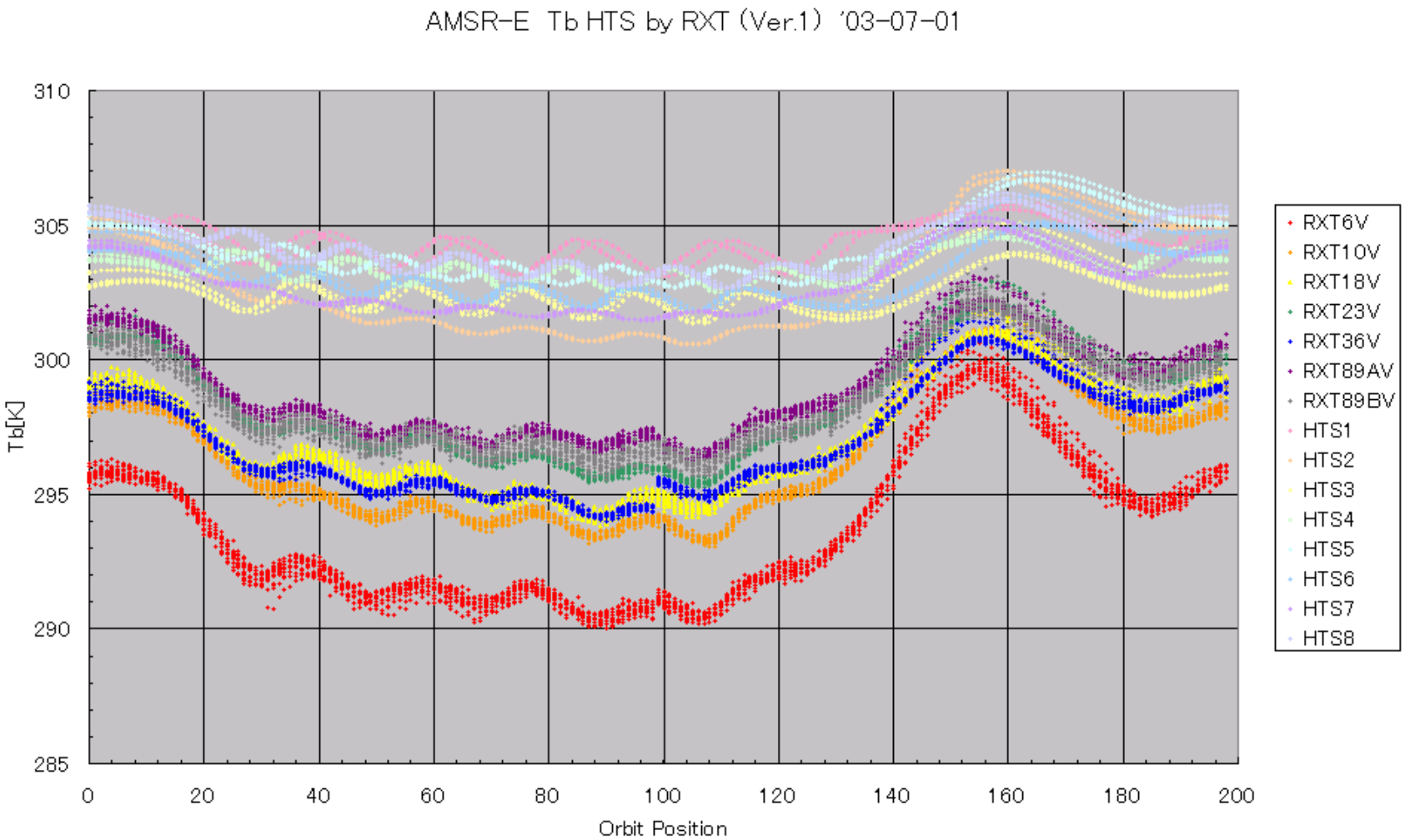
July 1-2, 2003
L1B: V2

HTS Teff in L2A



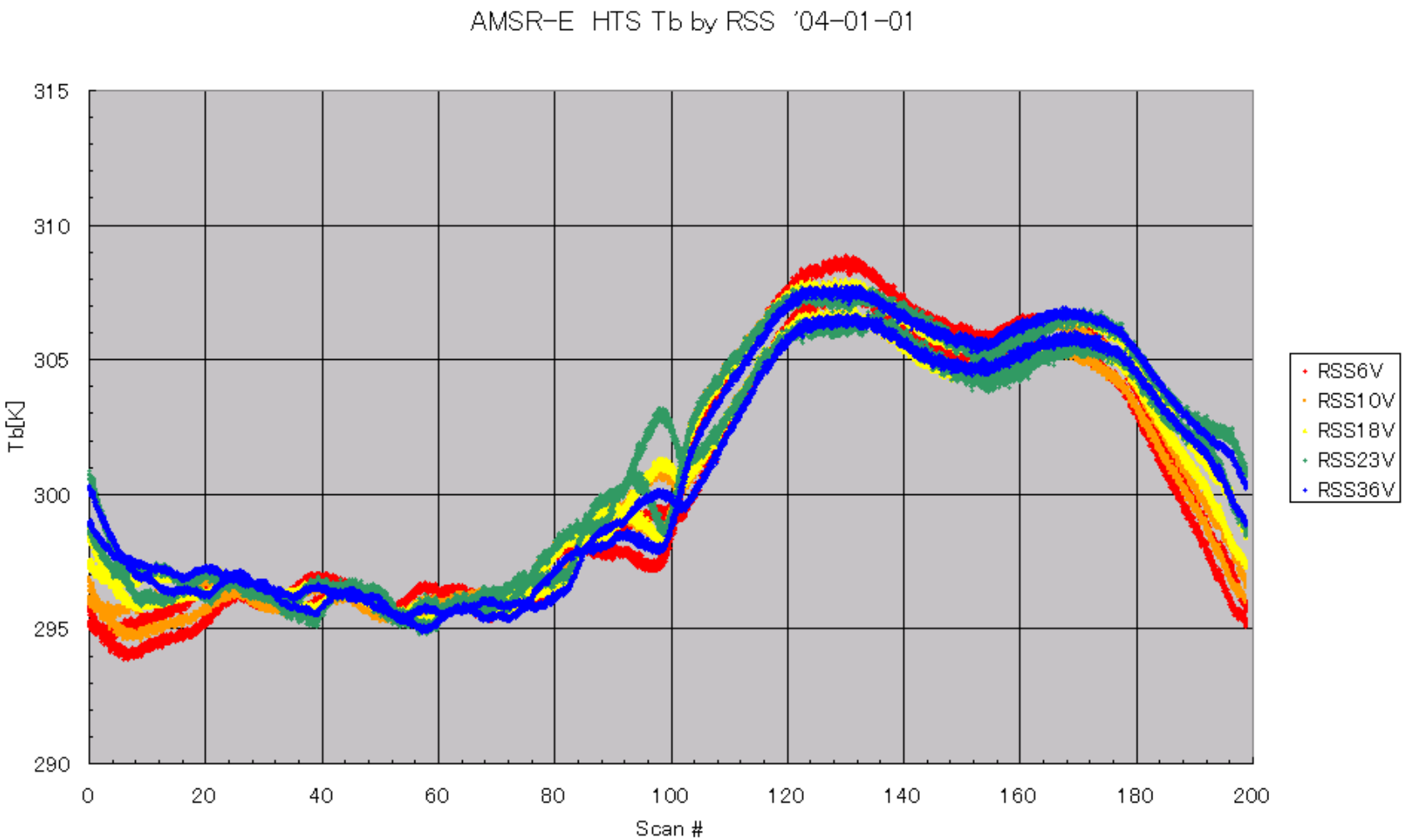
Values from L2A HDF files distributed by NSIDC

HTS Teff in L1B-V1



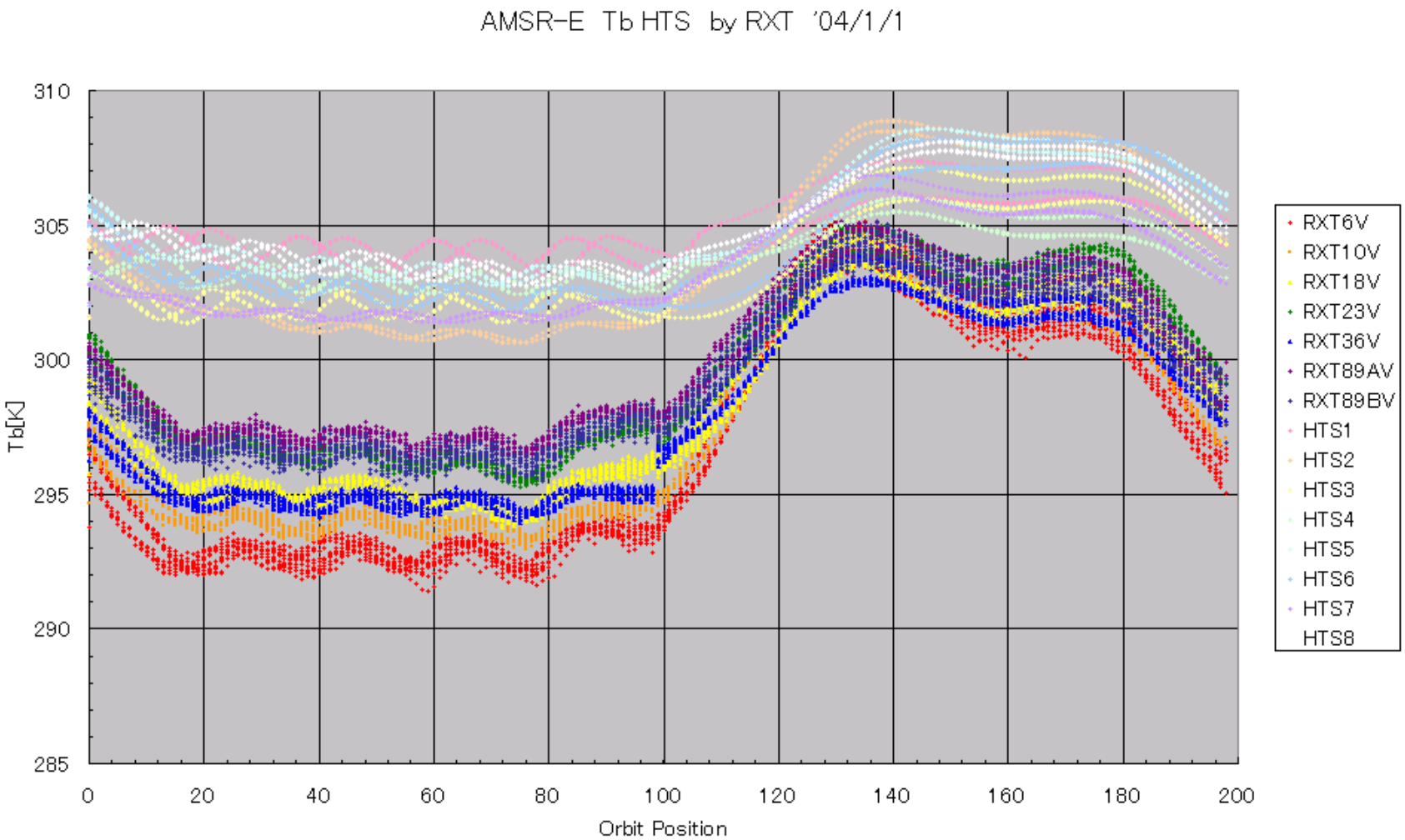
Note that offsets are intentionally changed

HTS Teff in L2A



Values from L2A HDF files distributed by NSIDC

HTS Teff in L1B-V1



Note that offsets are intentionally changed

Summary

- JAXA L1B calibration update was introduced and some comparisons with other data were shown.
- For inter-comparison, WindSat data are desirable particularly for 6.9GHz channels.