CLAMS: A Prototype for Early AIRS Evaluation

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CLAMS

- CLAMS was a field campaign for CERES/MODIS? during July 2001. (CLAMS web site down for past several weeks due to national security reasons.)
- On July 17, both S-HIS and NAST-I flew extensive patterns over the ocean, east of the mouth of the Chesapeake.
- Daytime only
- Nominally clear
- Patterns covered portions of several ECMWF grid cells
- # FOVs recorded almost same as in a single granule
- We've only worked on CLAMS for 3 weeks, so everything presented here is preliminary
- NAST and S-HIS observation times can be offset by several hours, but do overlap in space and time near the lighthouse
- Examined bands 1 and 2 with NAST, but only band 1 with S-HIS

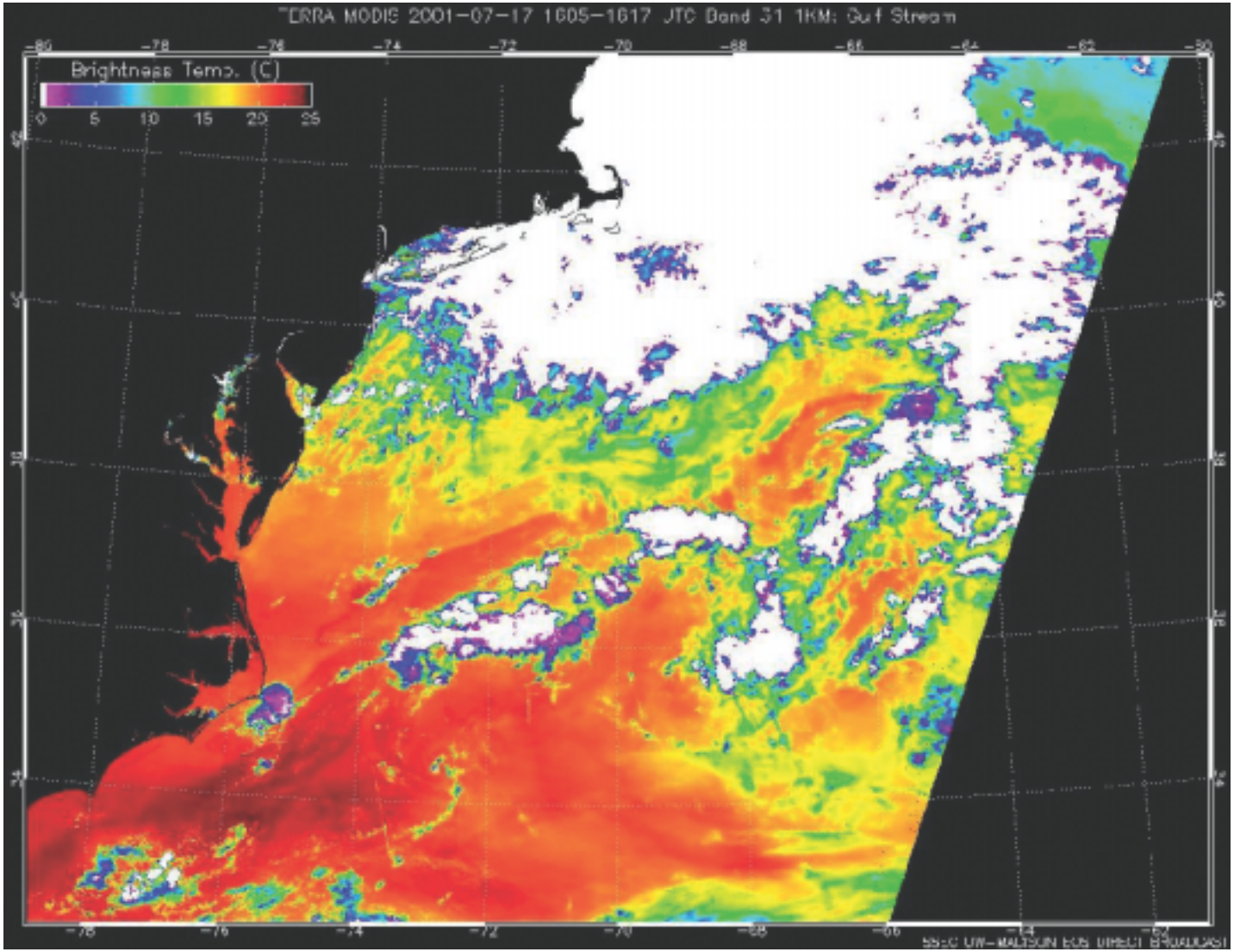
Relation to AIRS Validation

- Comparison of high-resolution radiances to ECMWF/NCEP model fields
- We had to use kCARTA, since we do not have an up-to-date fast model for S-HIS or NAST-I, so similar to early AIRS validation.
- A local sonde released for validation
- Scan angles roughly the same as AIRS
- Added benefit, two instruments.
- First time I know of that S-HIS/NAST-I compared to ECMWF model fields.
- Unfortunately, this is effectively just a 1-point test of the global models.

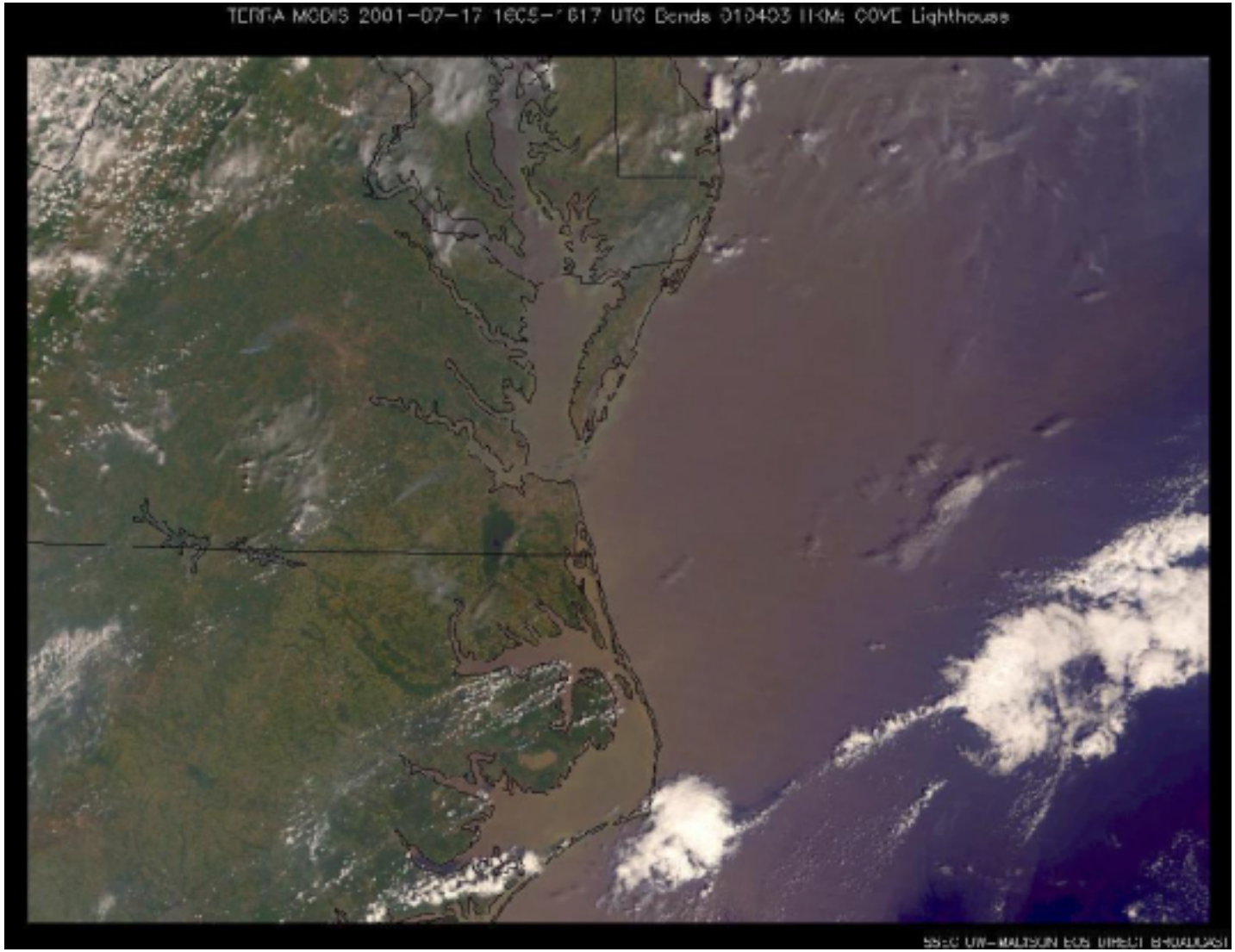
Analysis Procedures

- Determine clear FOVs using BT_{model} - BT_{obs} threshold test for 10 μm window channel(s). Histograms shows that most FOVS pass this clear test.
- Experimented using different windows channels T_s
- Computed bias and std. dev. for FOVs denoted clear.
- Multiple comparisons possible: S-HIS vs ECMWF/NCEP, NAST vs ECMWF/NCEP, S-HIS/NAST vs sonde.
- Tried to avoid from model grids with land, not totally successful …
- Some uncertainty in the NAST observation angle due to (1) roll of the Proteus?? and (2) offset in the NAST mount angle. We only used NAST FOVs with aircraft roll < 2 degrees.
- Comparisons improved when we found out S-HIS altitude was in meters, not feet …

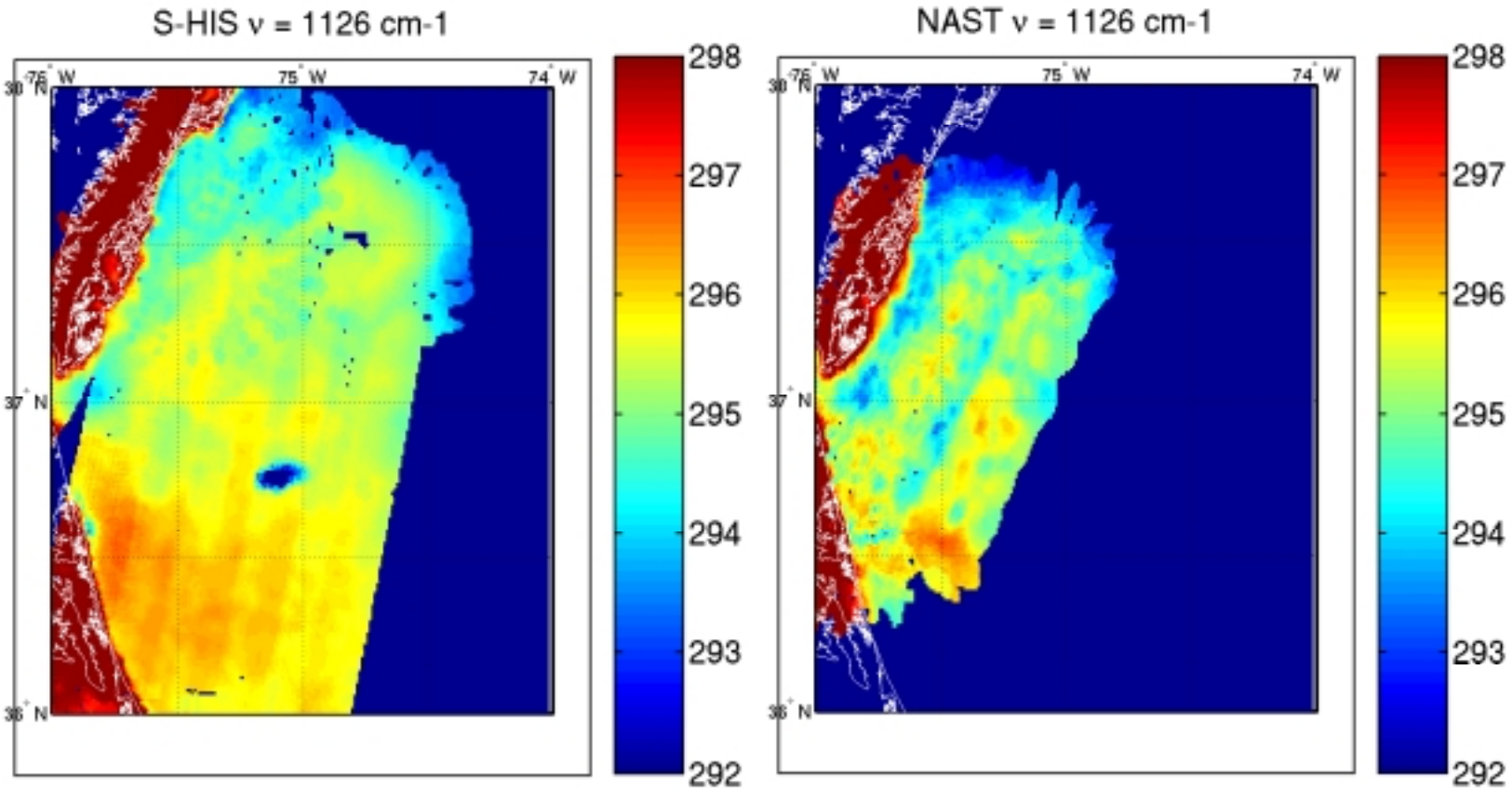
MODIS SST of Region



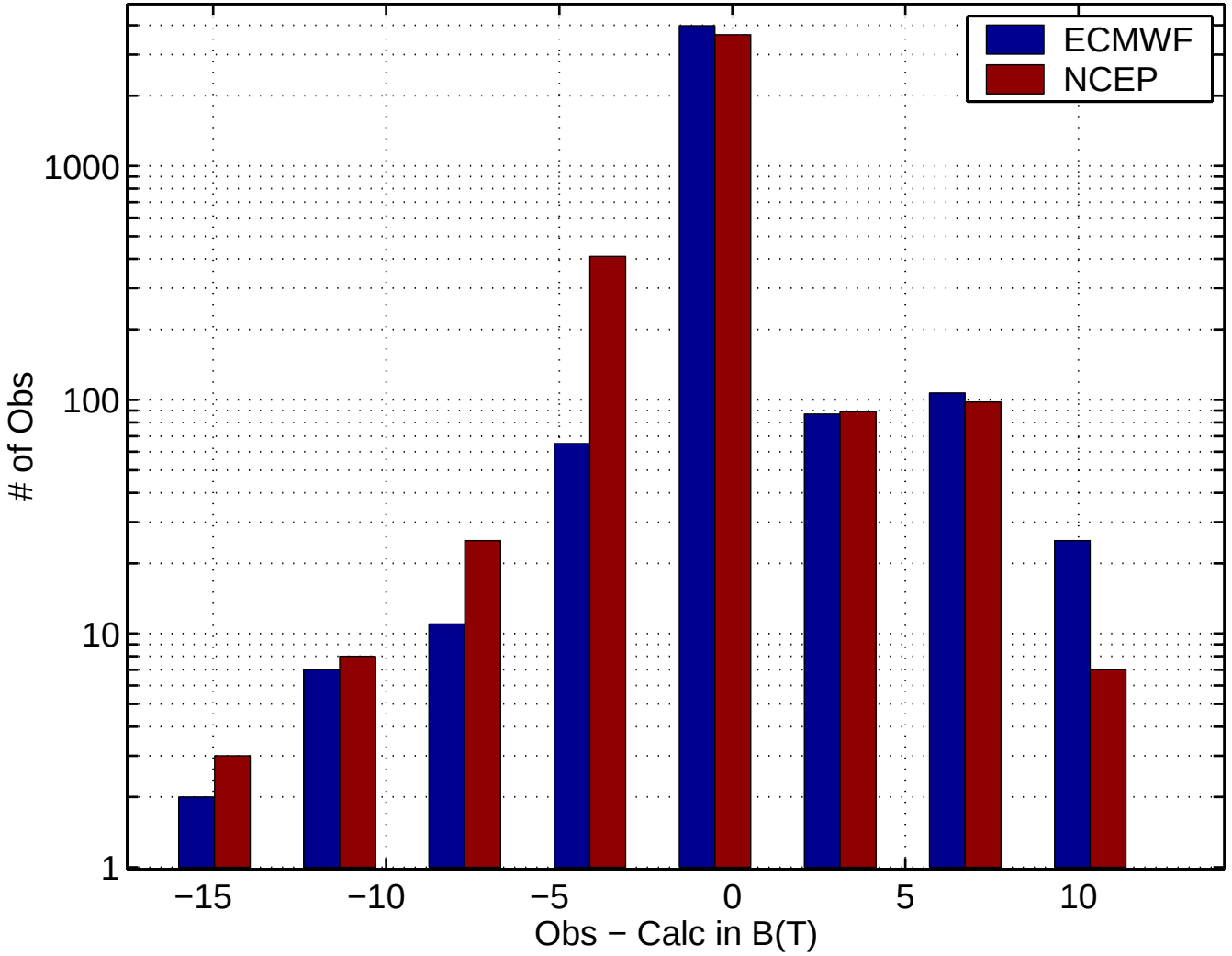
MODIS Image of Region

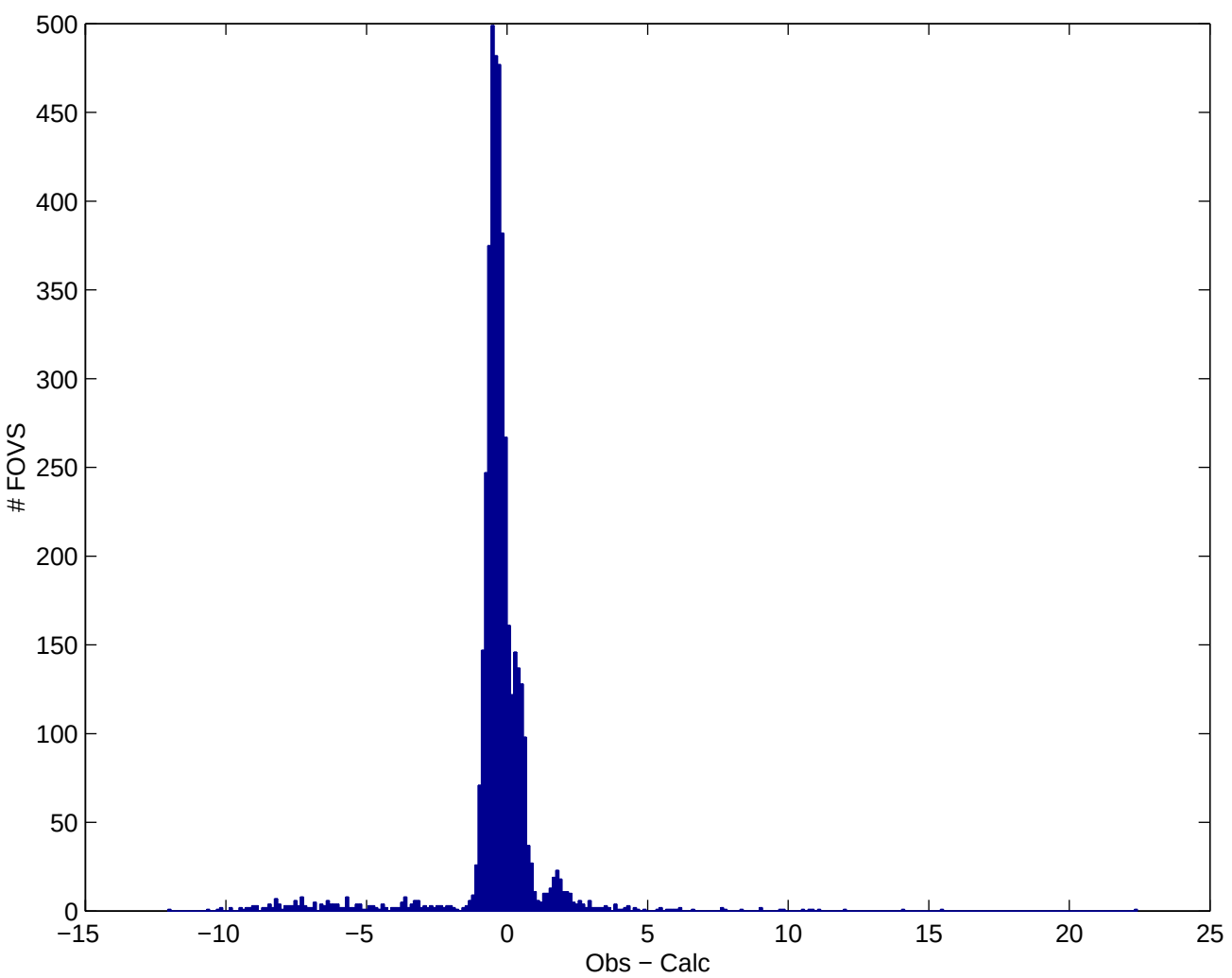


CLAMS: NAST and S-HIS Over Ocean: B(T) Imagery

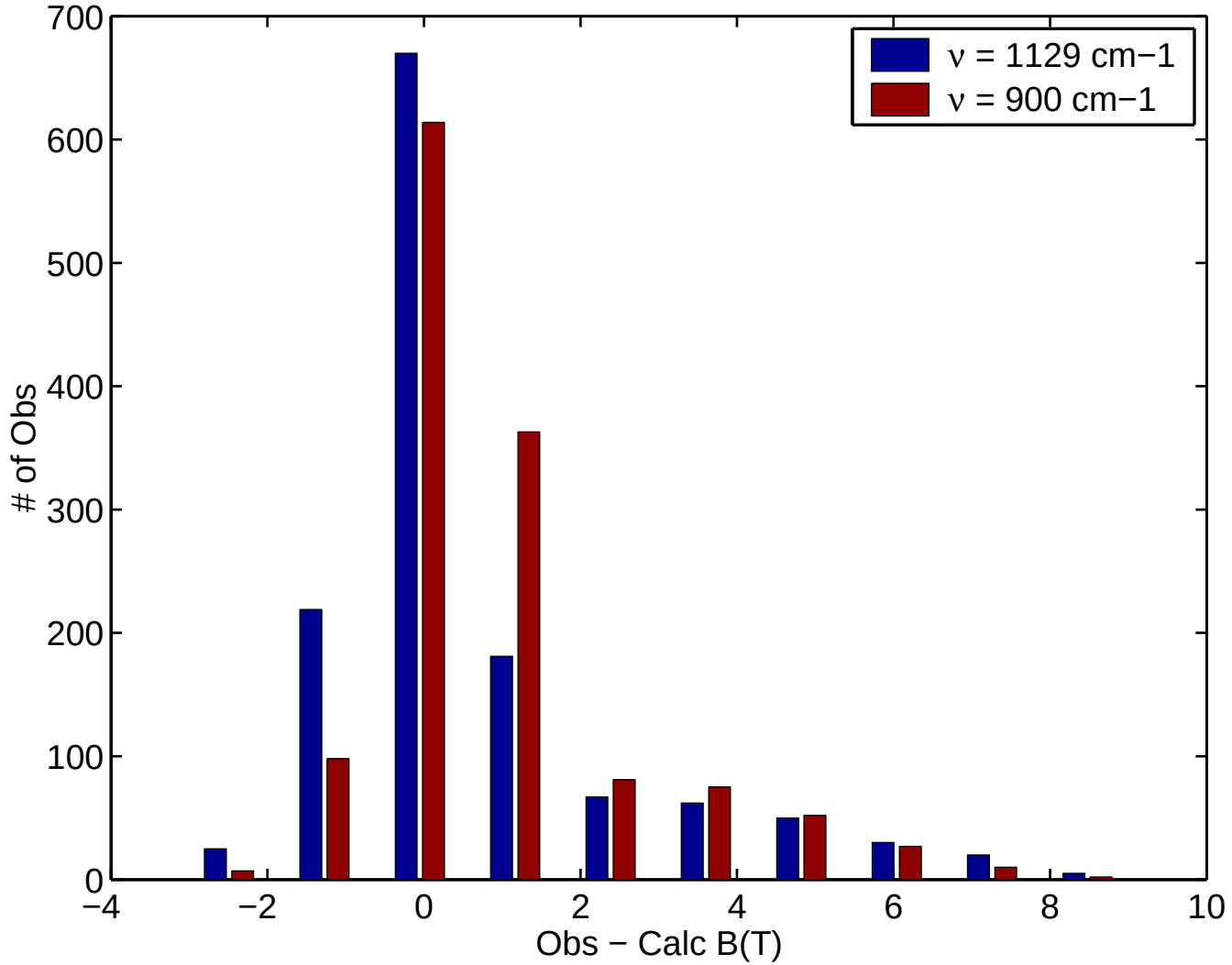


S-HIS B(T) Obs-Calcs for ν = 1127 cm^{-1}; Log Scale!

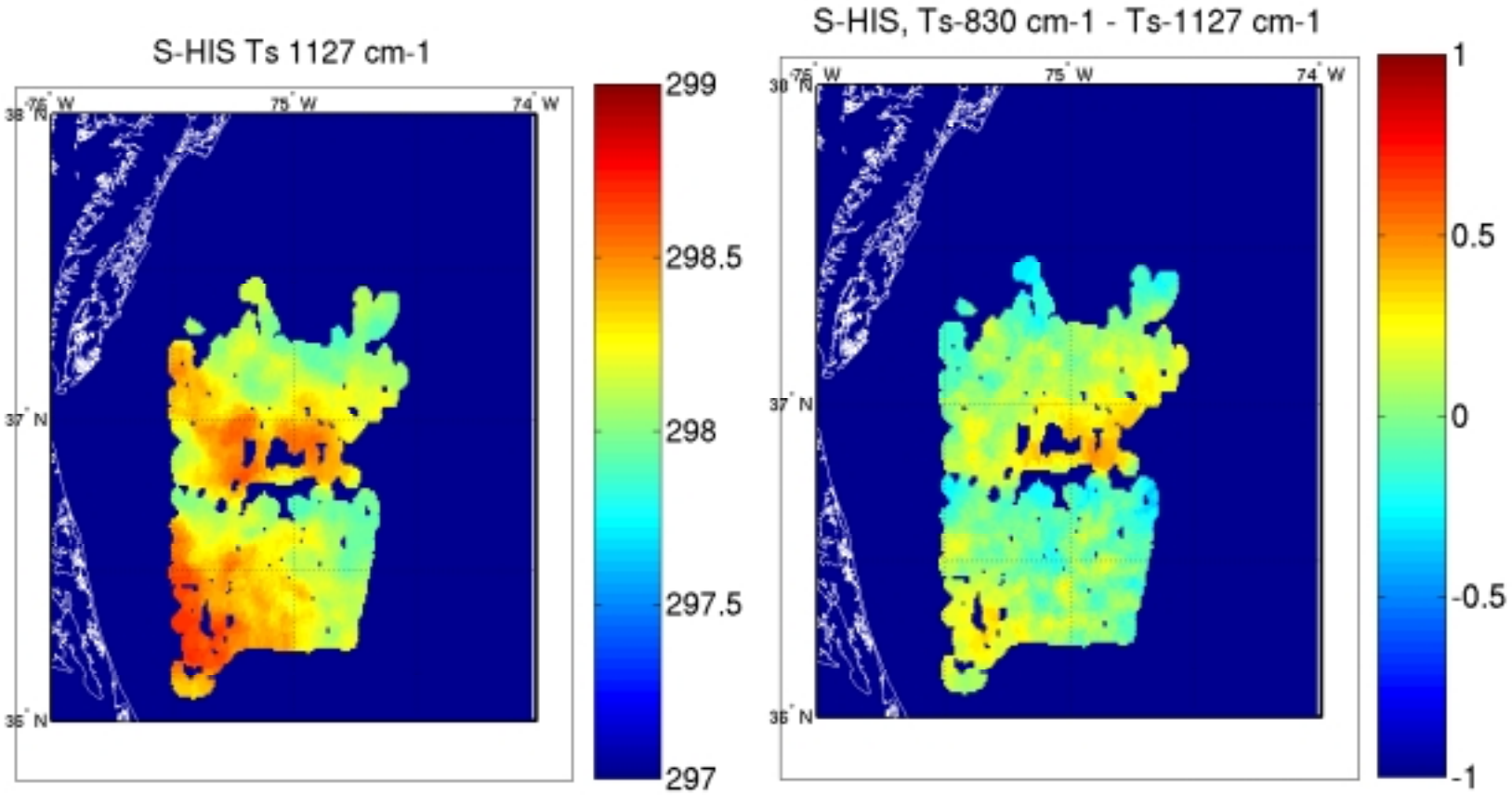



500
450
400
350
300
250
200
150
100
50
0
FOVS
−15
−10
−5
0
5
10
15
20
25
Obs − Calc

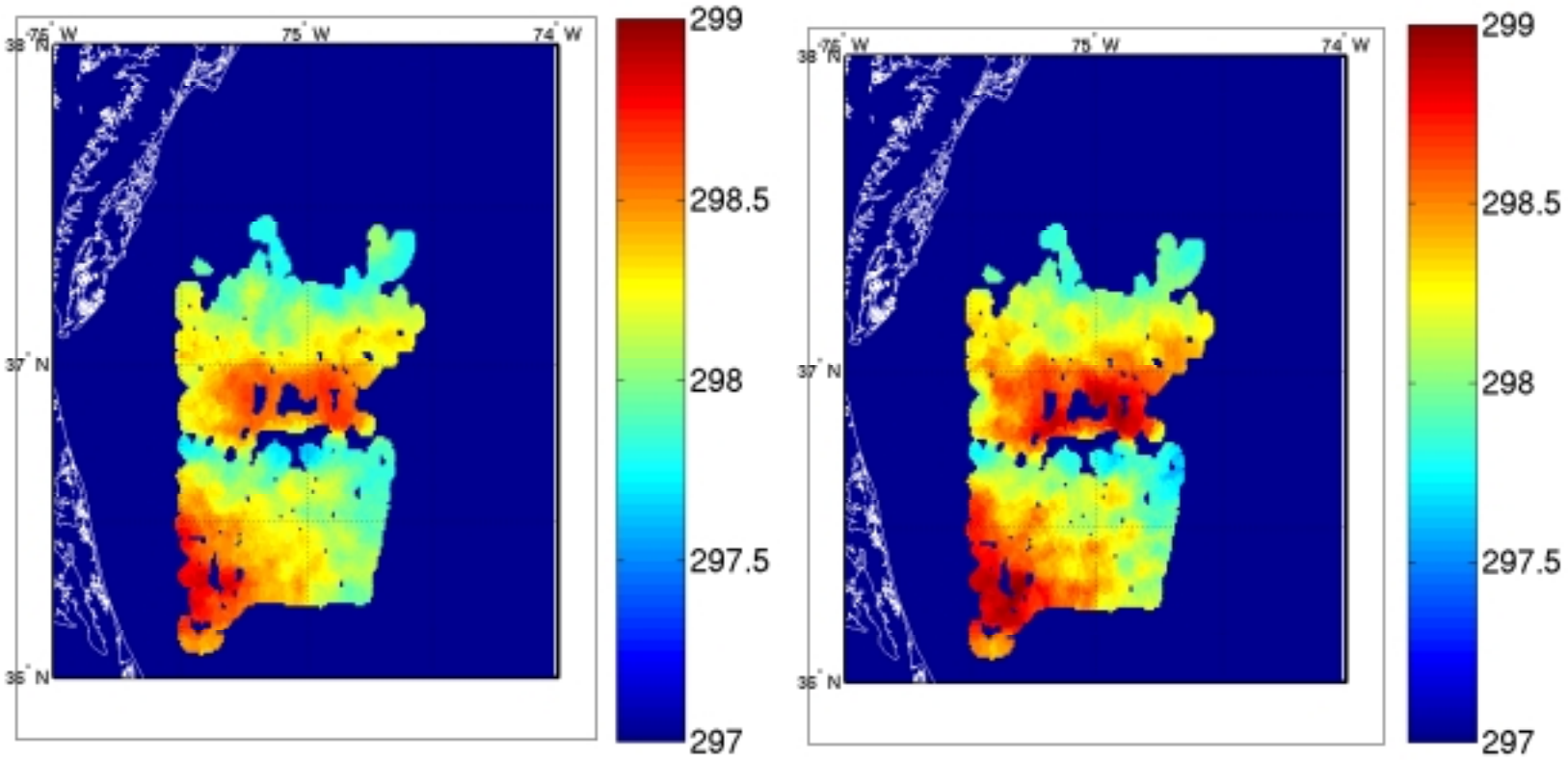
NAST B(T) Obs-Calcs (using ECMWF) for ν = 900, 1127 cm^{-1}



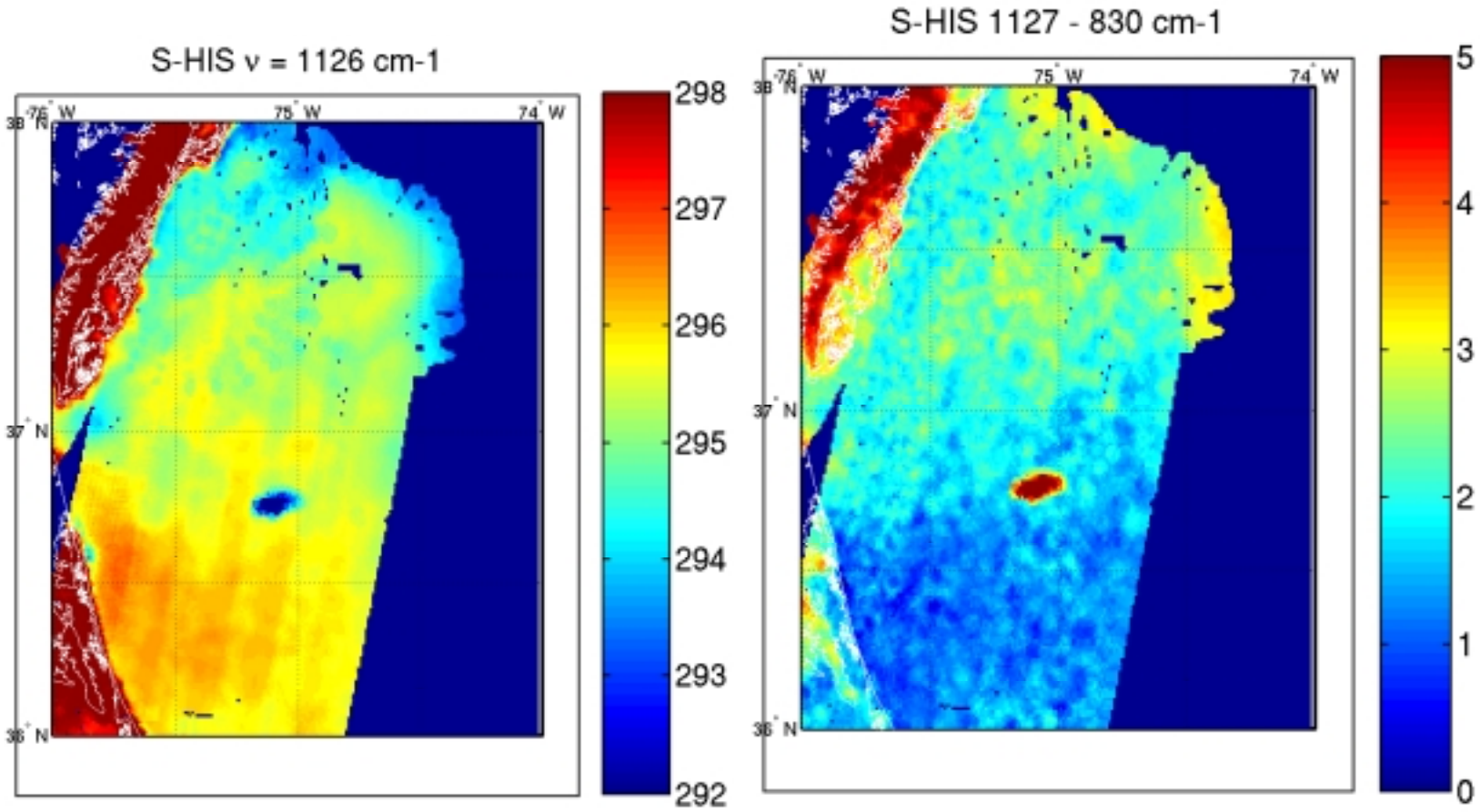
S-HIS T_s for ν=830, 1127 cm^{-1}



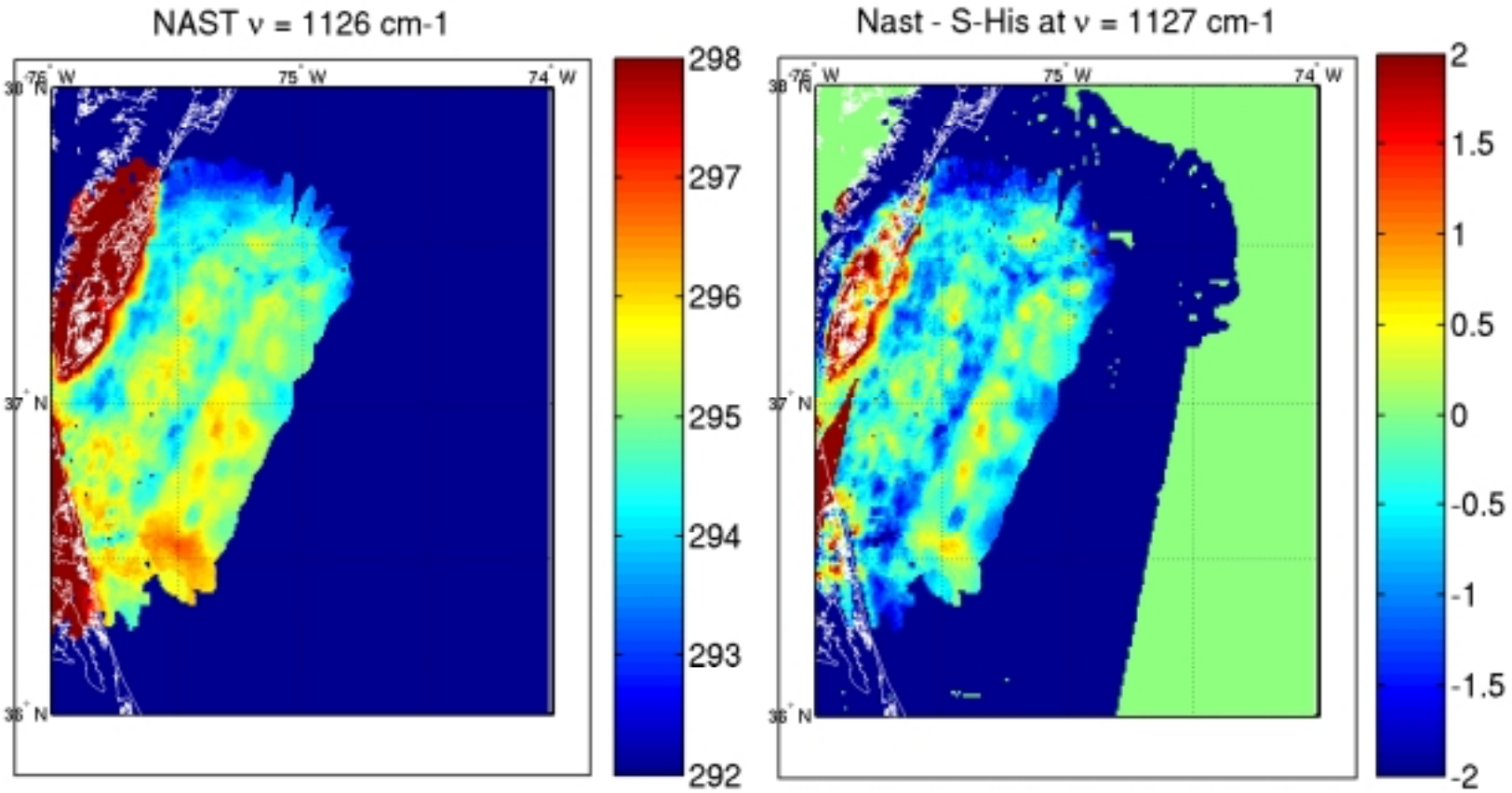
S-HIS T_s for ν=900, 830 cm^{-1}



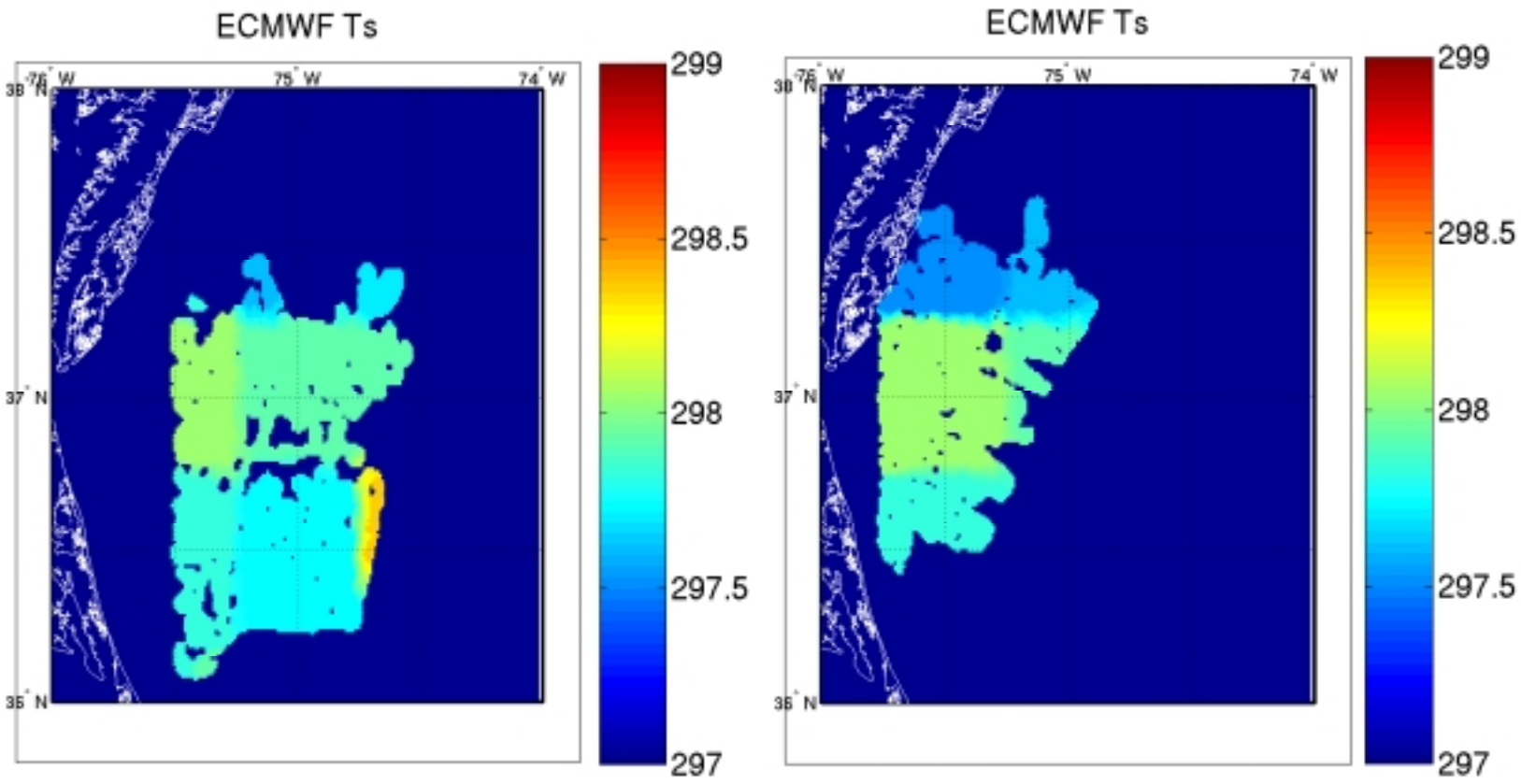
Difference between S-HIS B(T) for ν=830, 1127 cm^{-1}



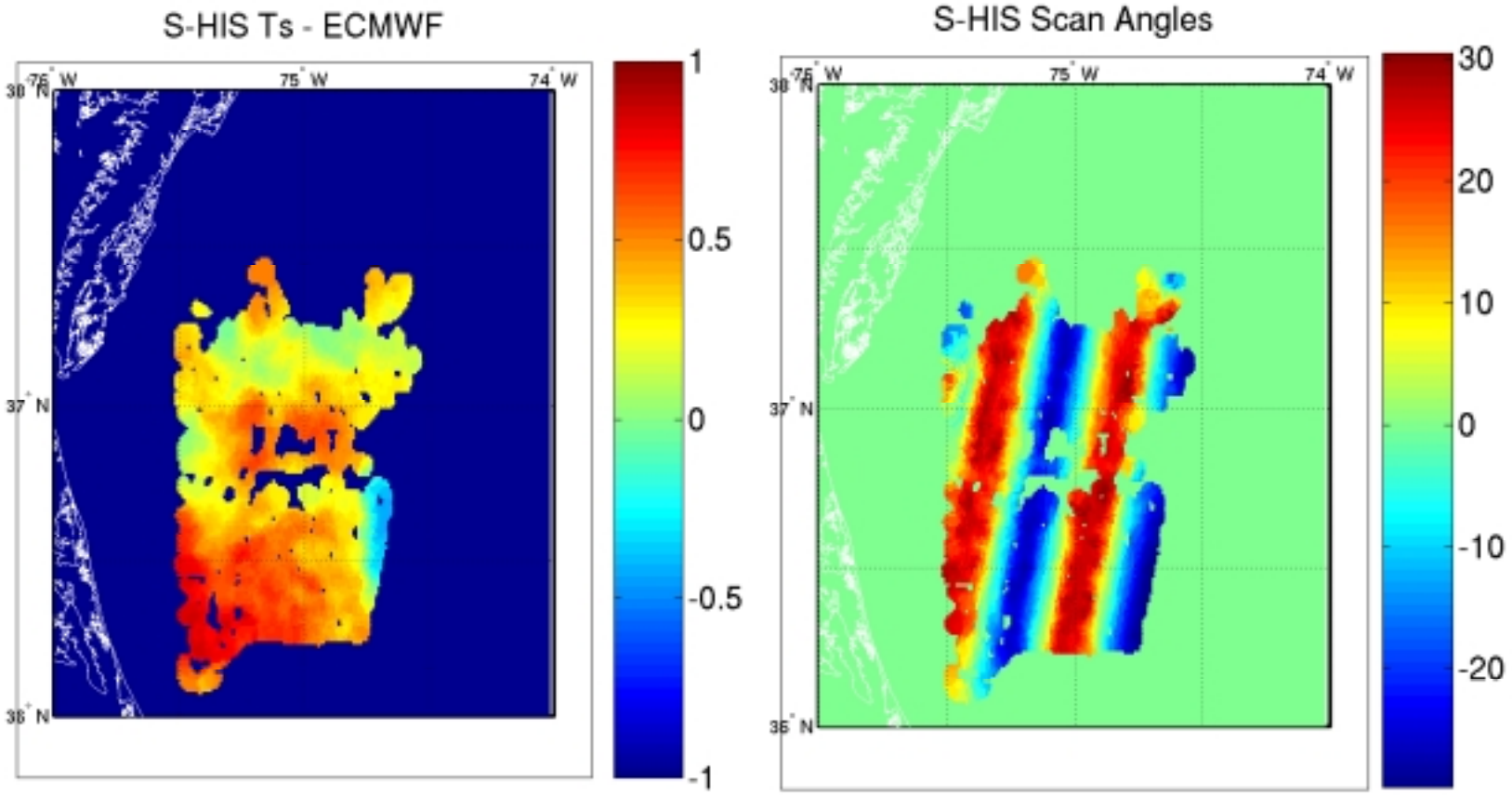
NAST vs S-HIS B(T) using ν = 1127 cm^{-1}



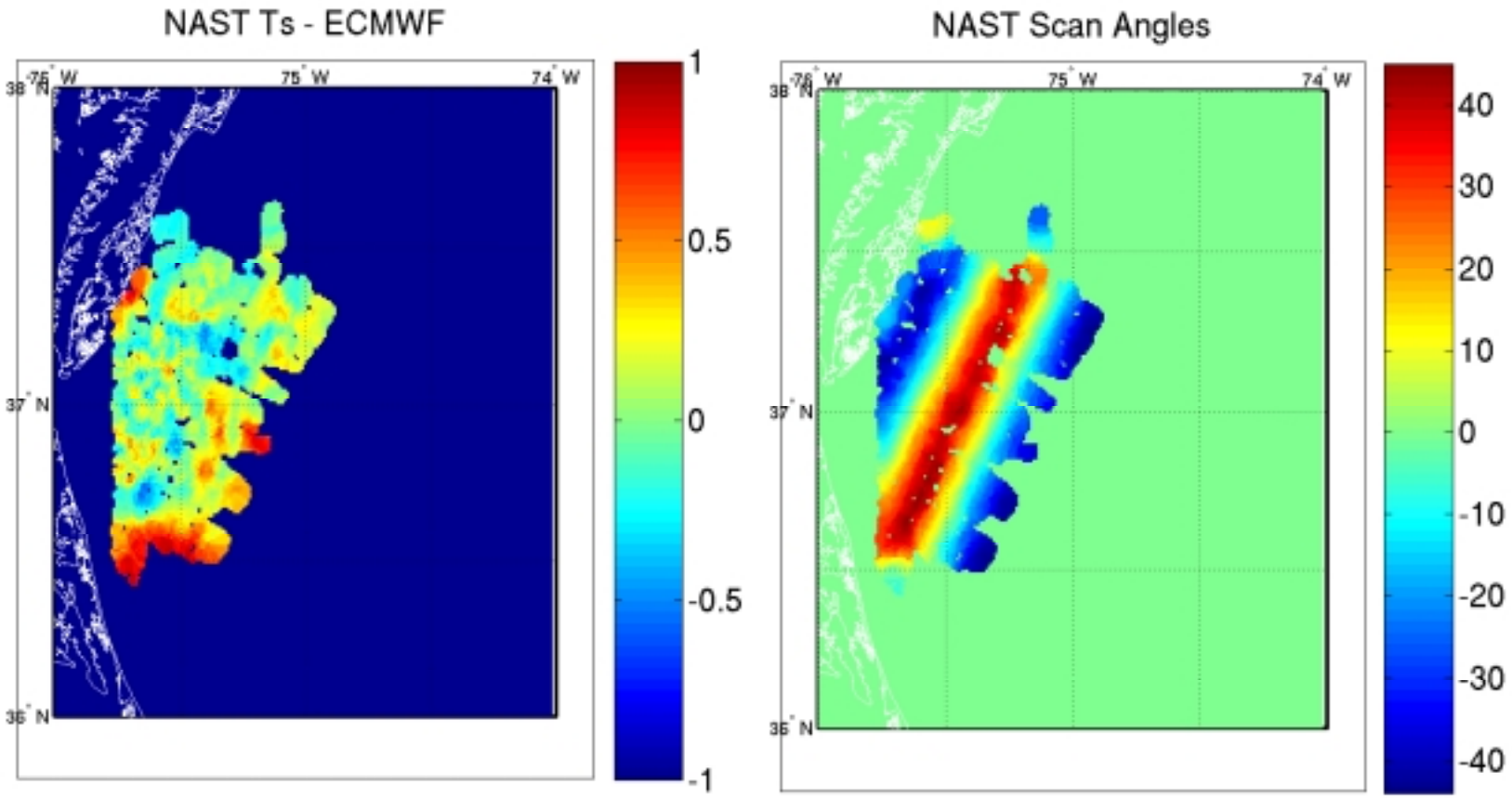
ECMWF Sea Surface for NAST/S-HIS Grids



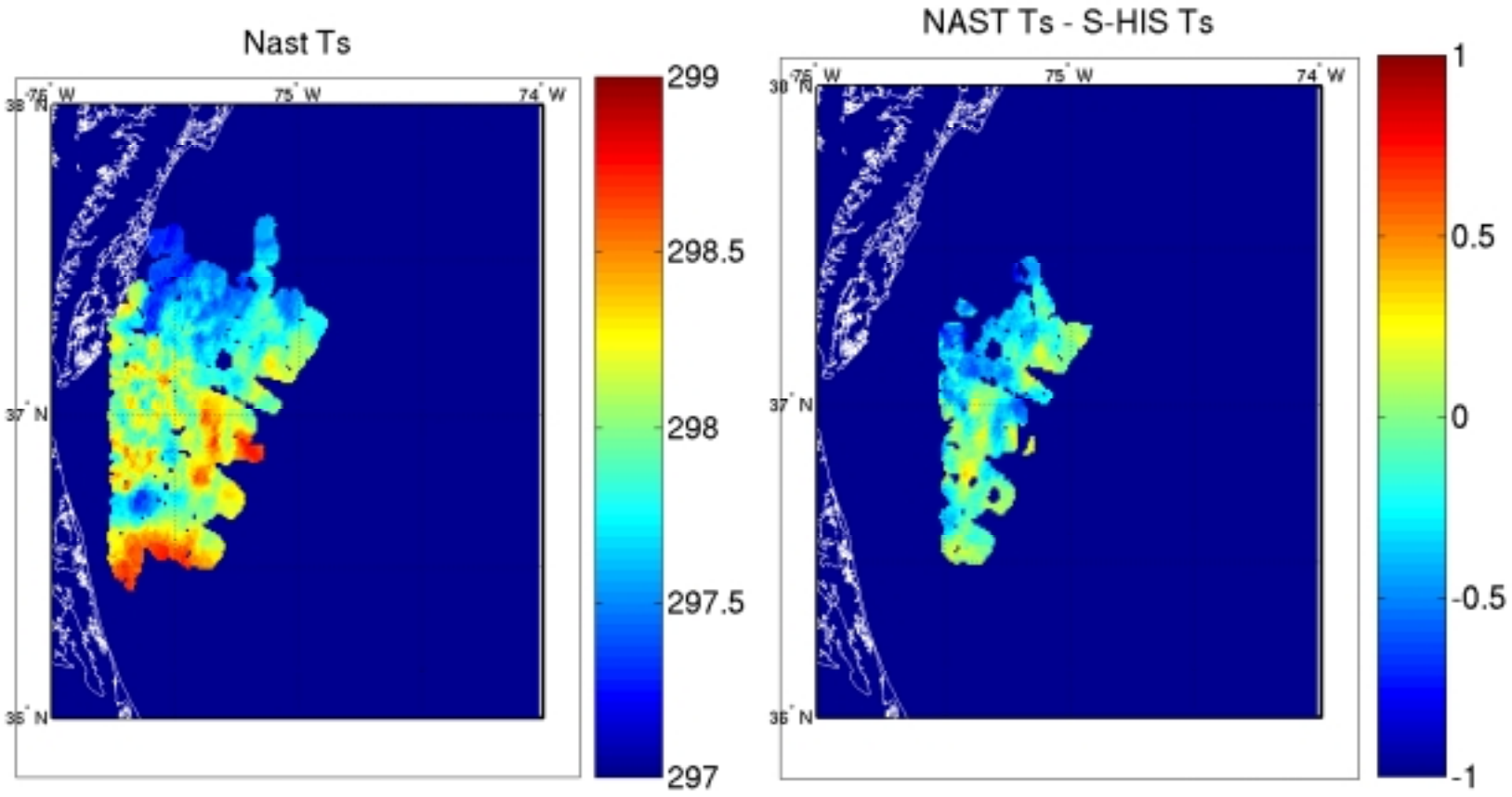
S-HIS minus ECMWF SST



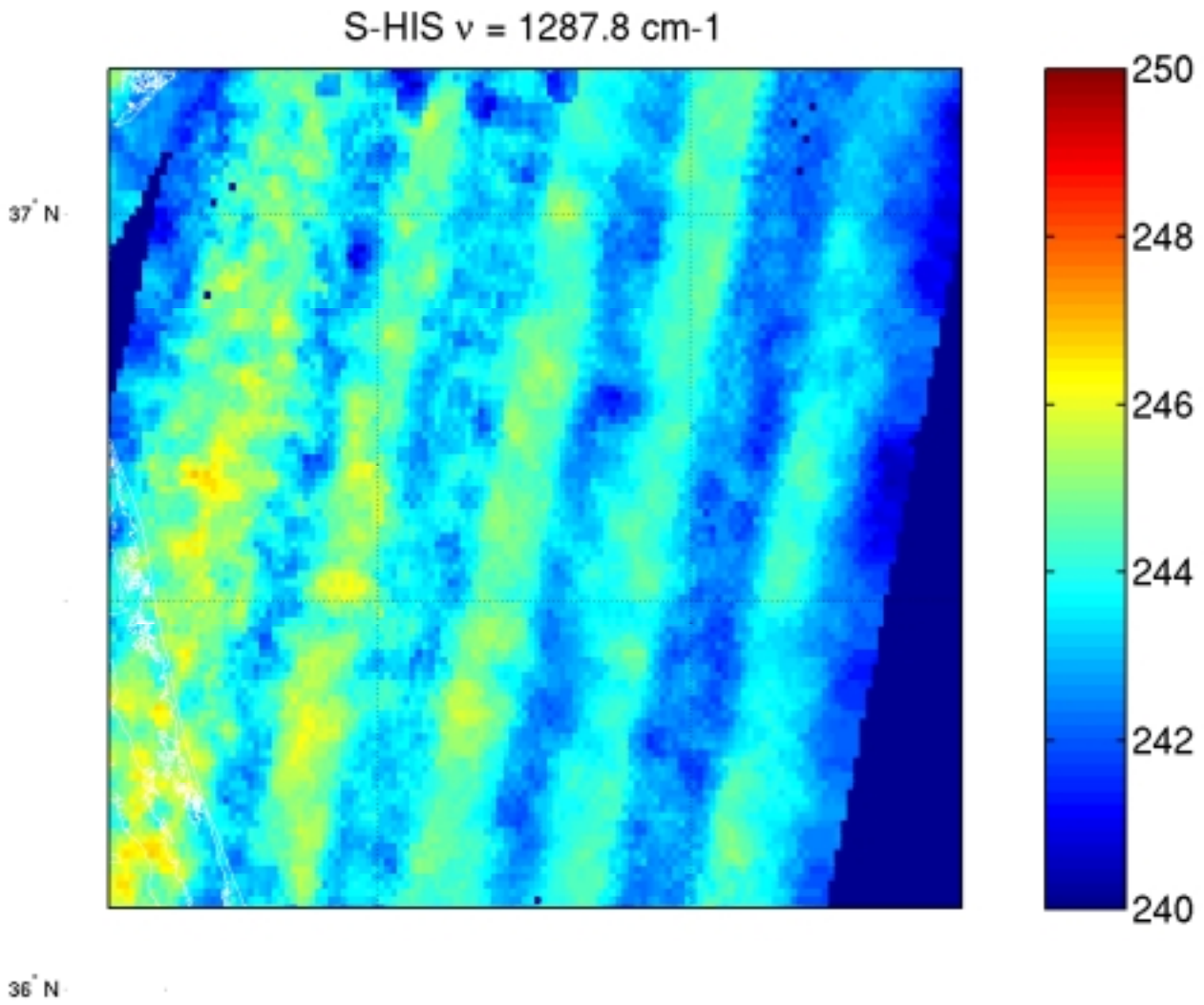
NAST minus ECMWF SST



NAST minus S-HIS SST



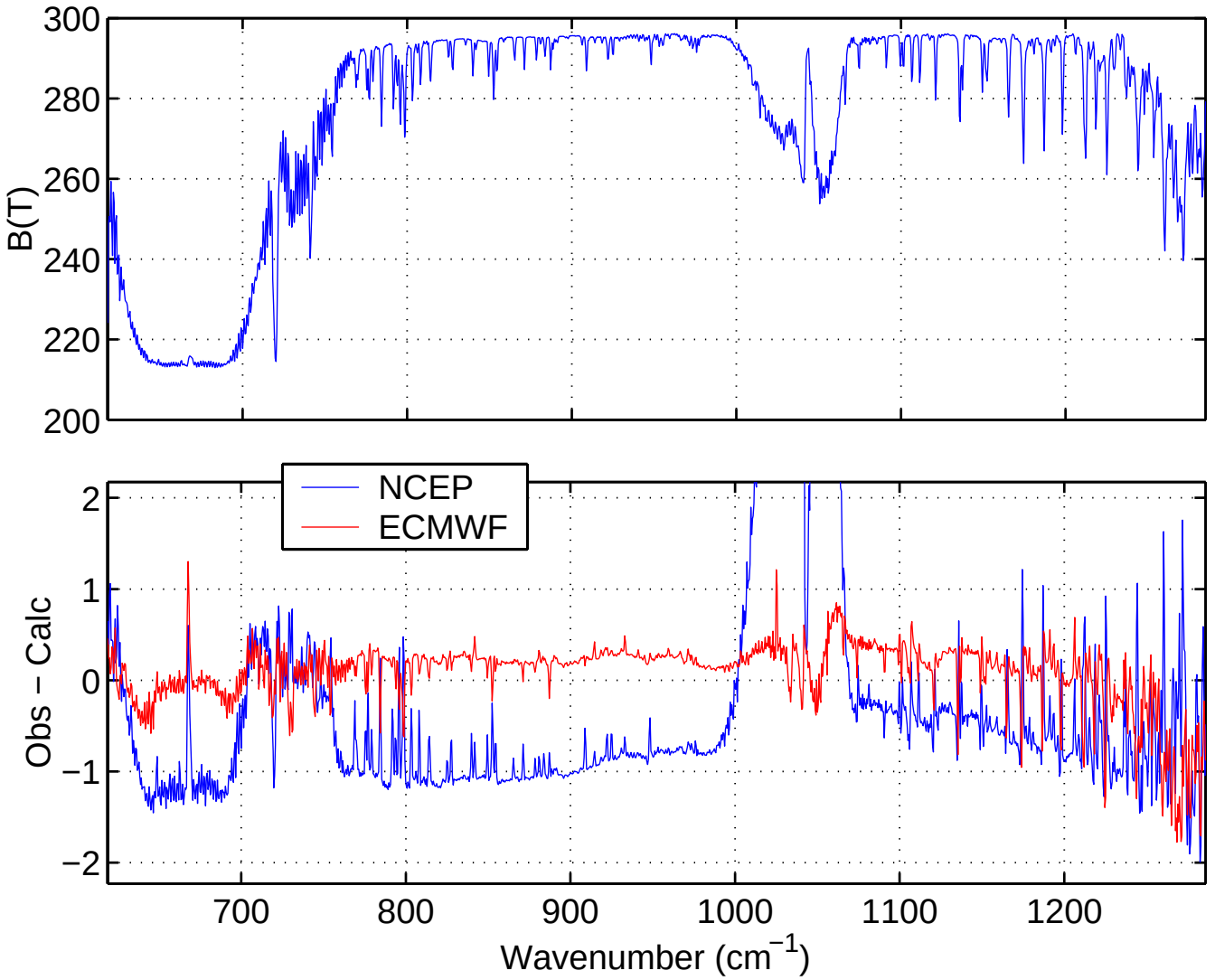
S-HIS Raw B(T) at ν = 1287 cm^{-1}



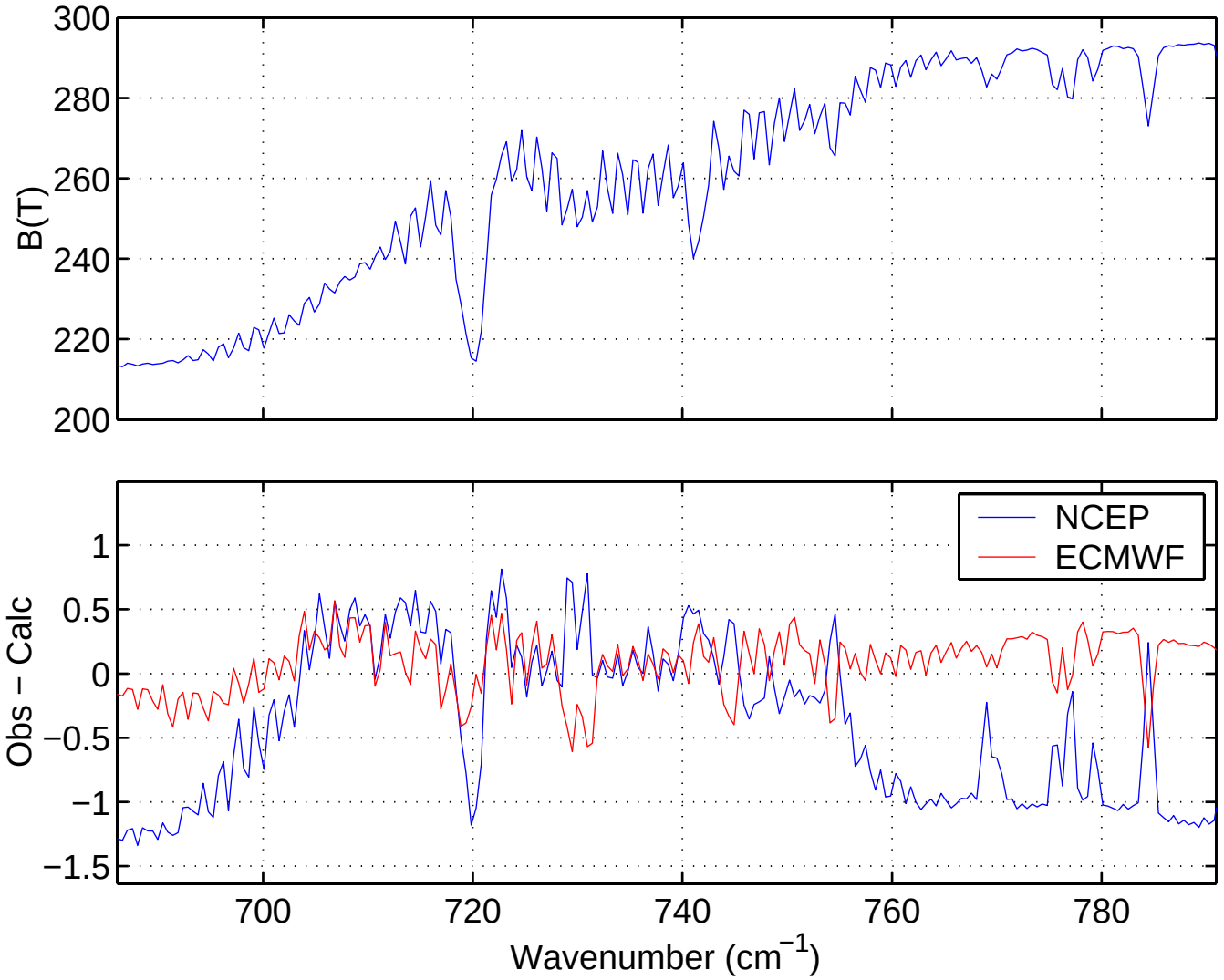
Various Statistics

Variable	Mean	STD
T_S-HIS 830 cm-1 - T_S-HIS 1127 cm-1	0.05	0.13
T_NAST - T_S-HIS (1127 cm-1)	-0.18	0.22
T_S-HIS - ECMWF (1127 cm-1)	0.37	0.23
T_NAST - ECMWF (1127 cm-1)	0.11	0.27

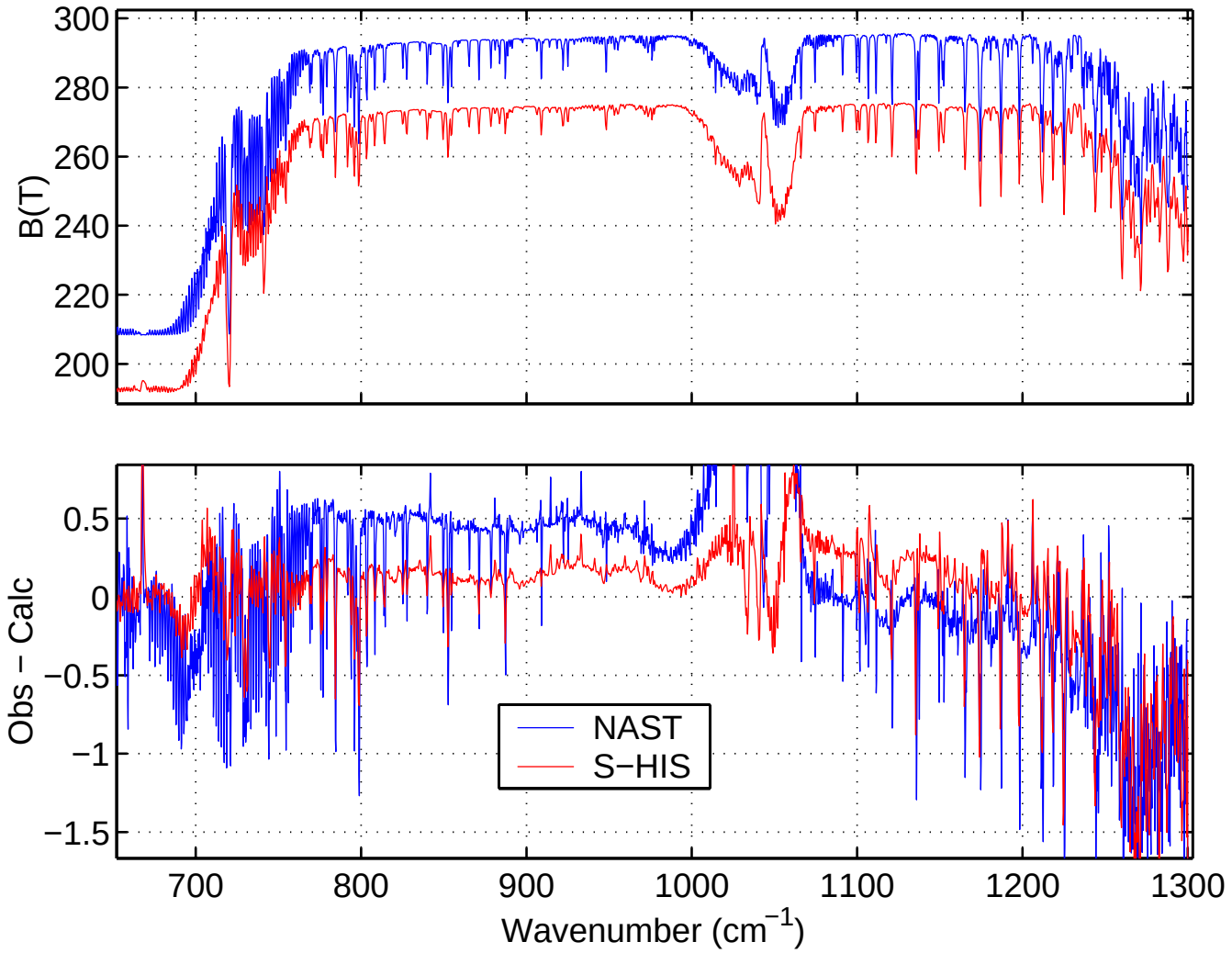
S-HIS vs NCEP/ECMWF



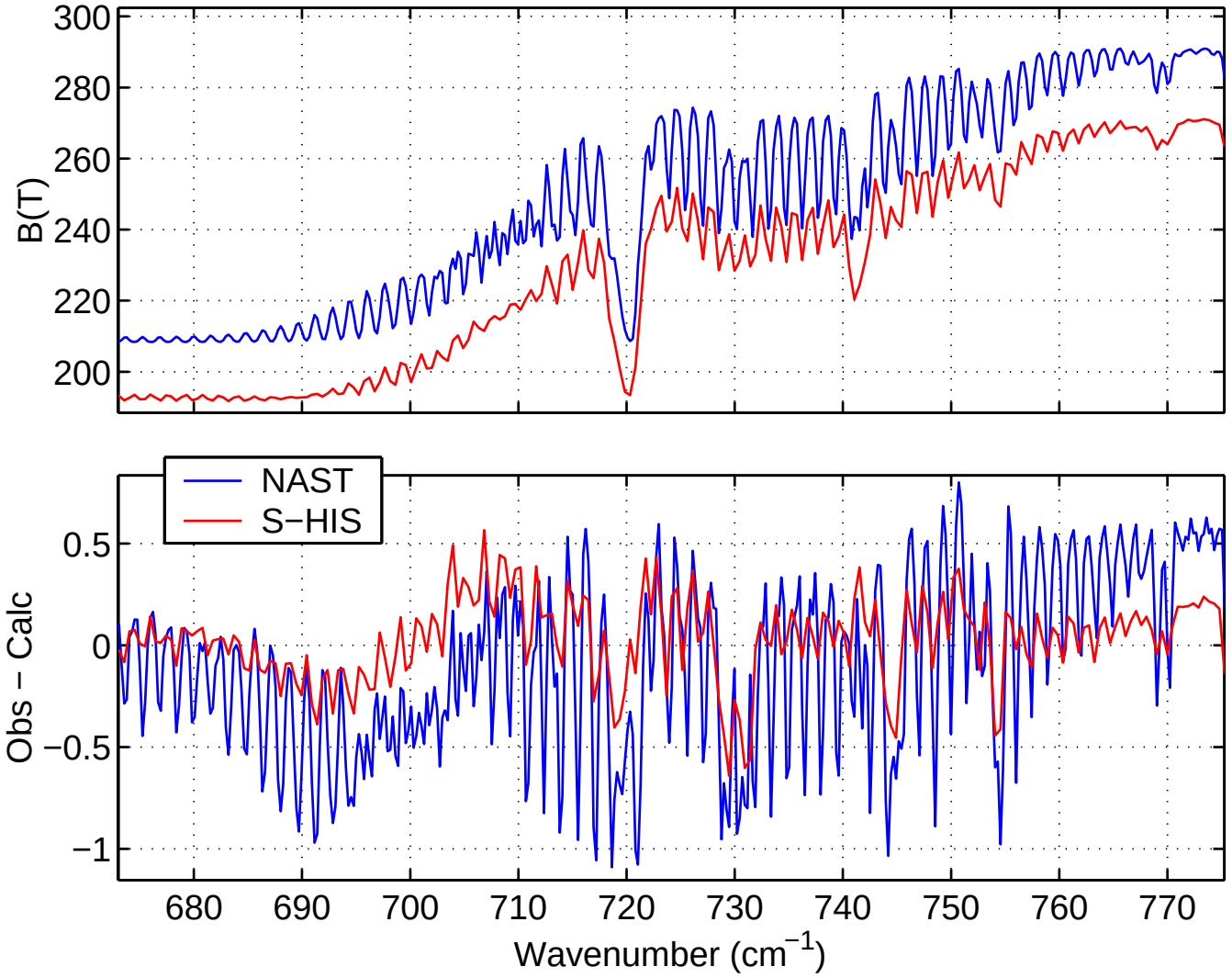
NCEP vs ECMWF in Longwave CO_2 Region



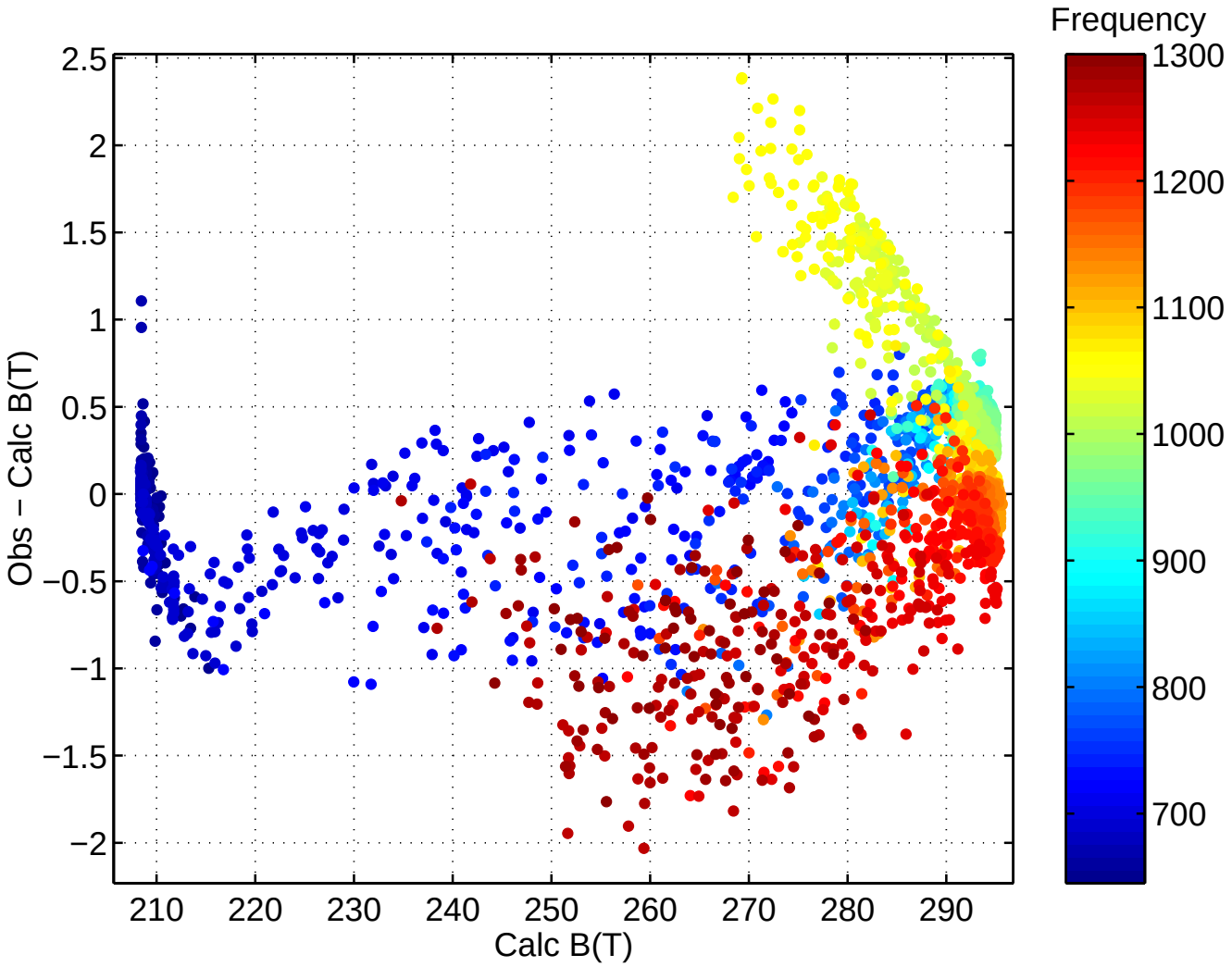
Mean of NAST/S-HIS Obs minus ECMWF Calcs



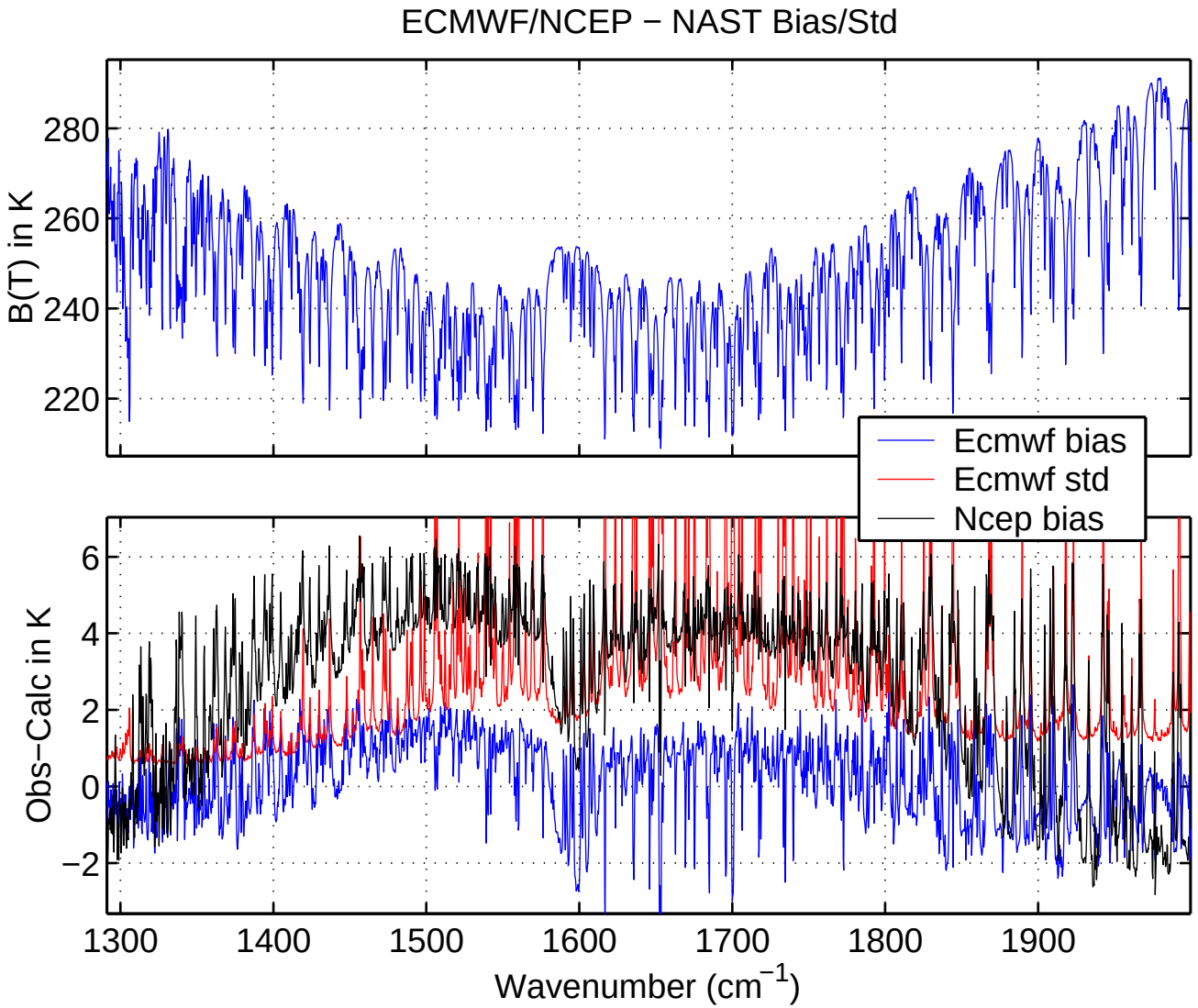
Mean of NAST/S-HIS Obs minus ECMWF Calcs: Zoom



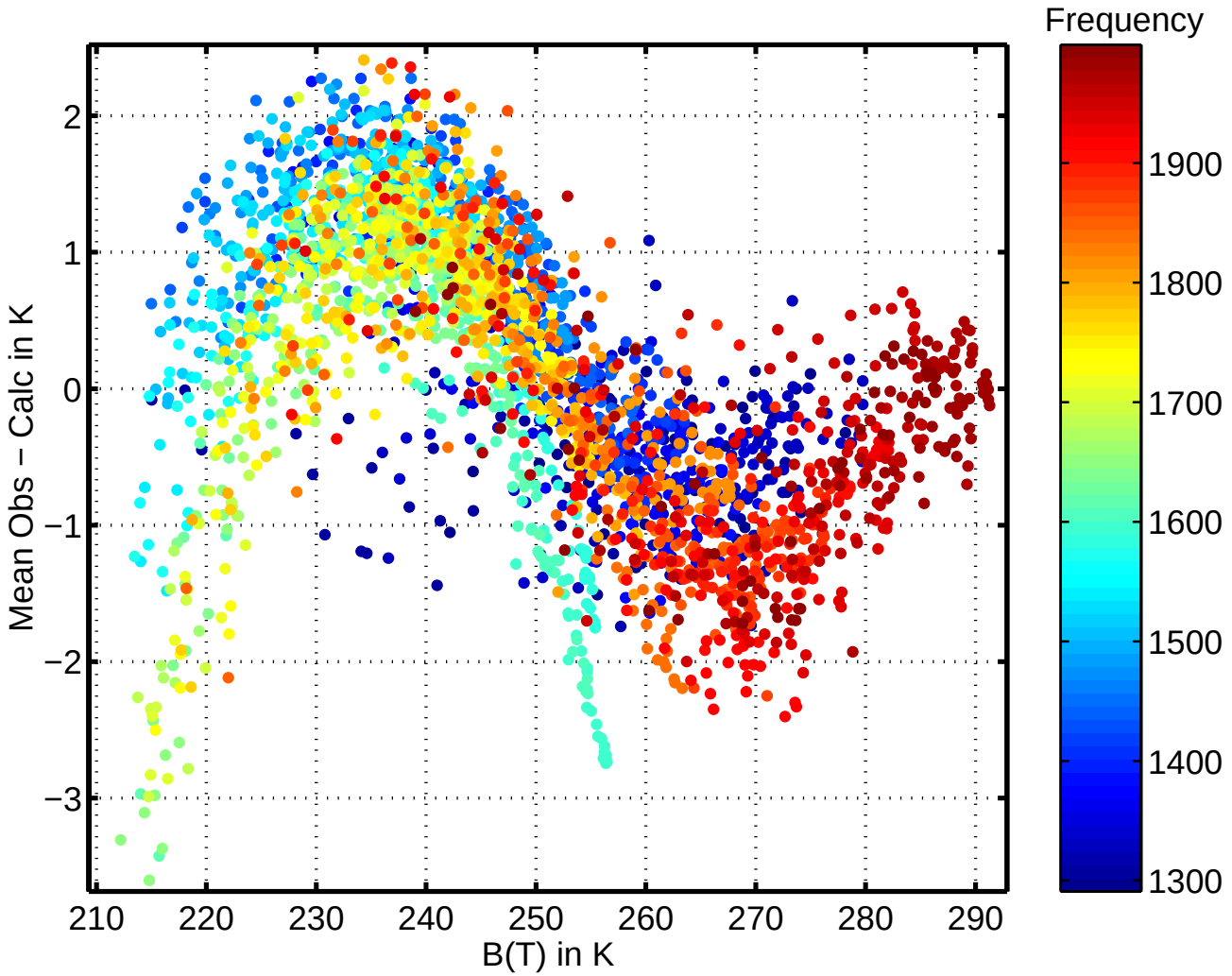
NAST - ECMWF as a Function of B(T), CO_2 Region



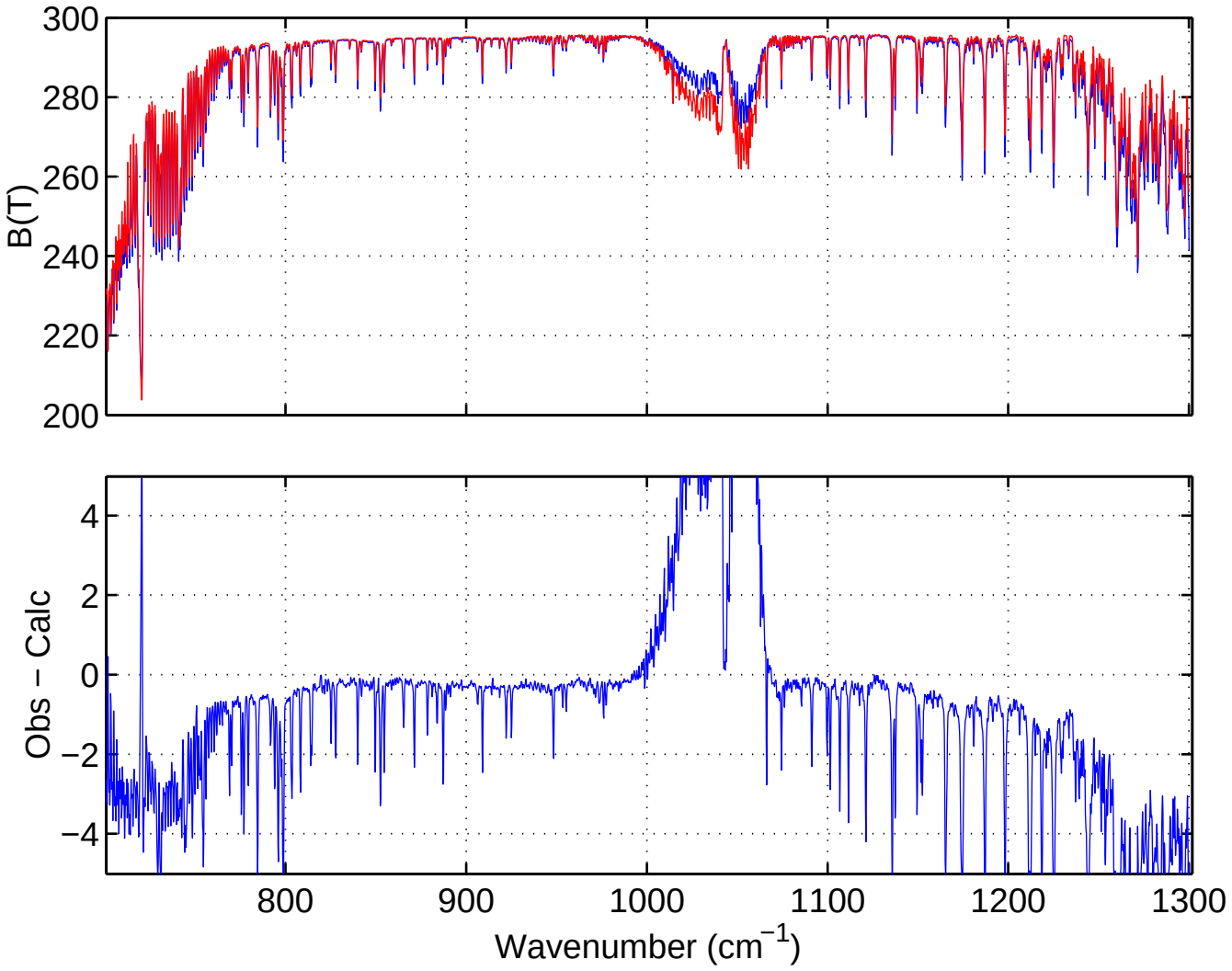
Mean of NAST Obs - NCEP/ECMWF in Water Region



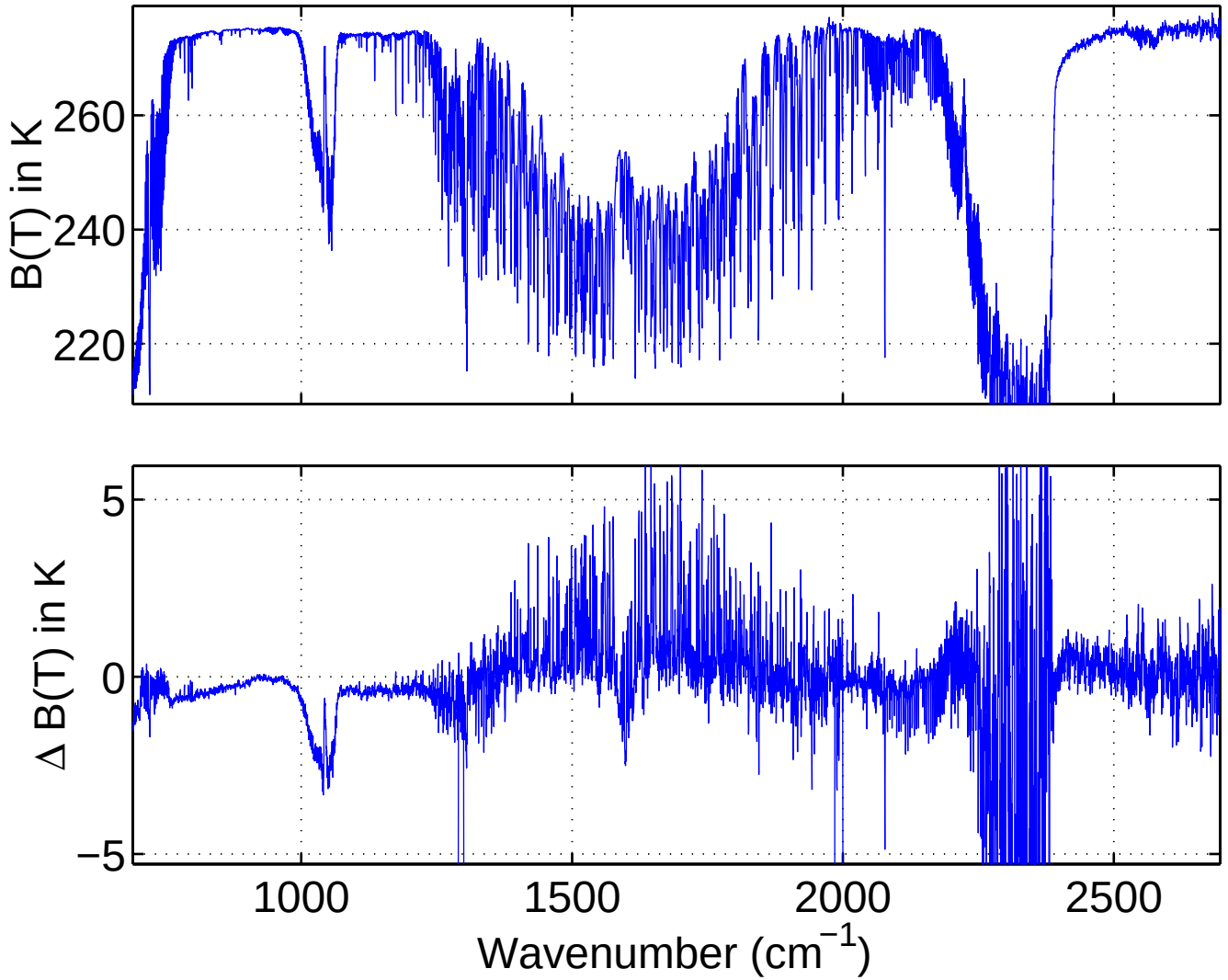
NAST - ECMWF as a Function of B(T), Water Region



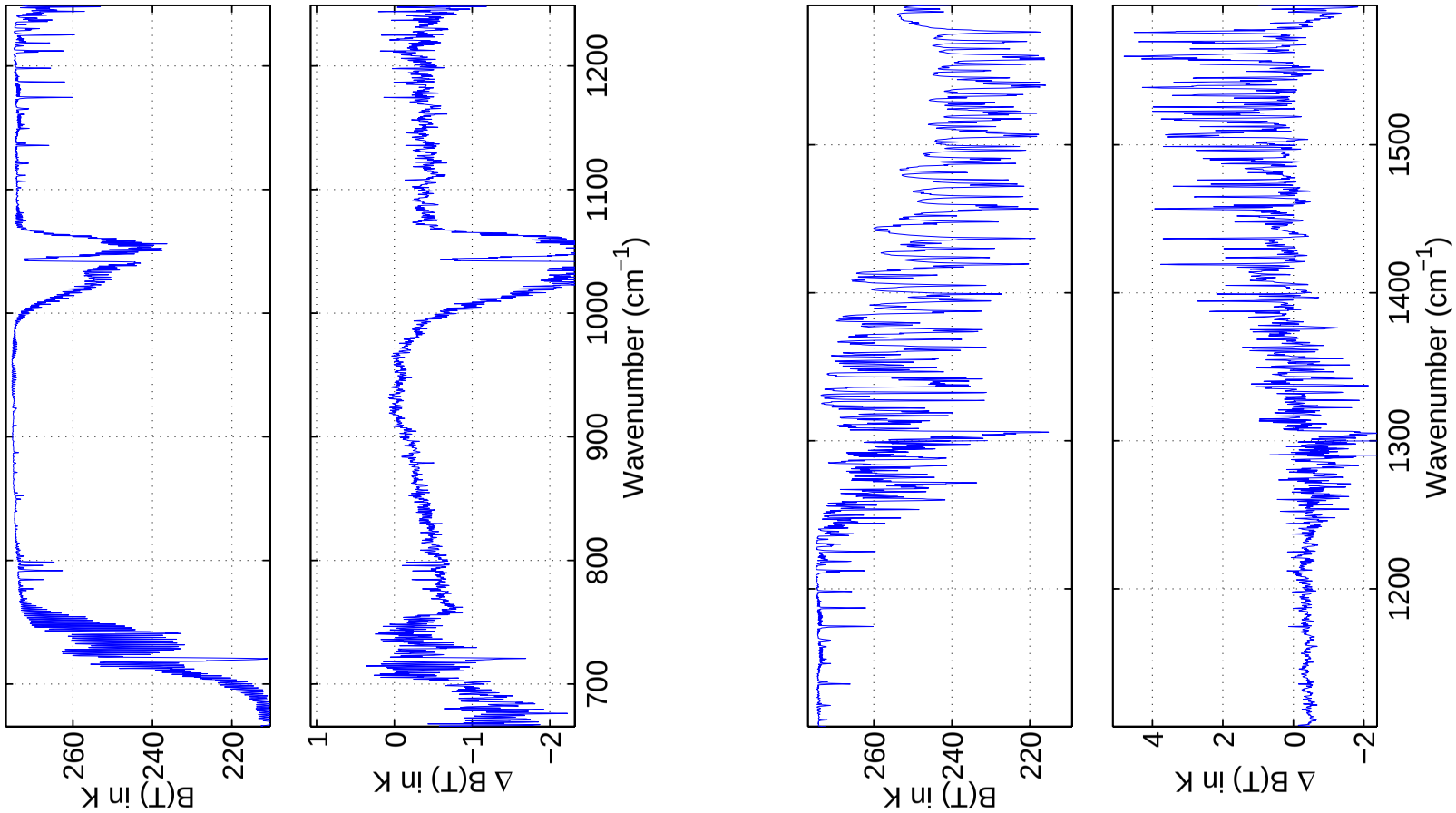
NAST Obs - Calcs using Sonde Profile



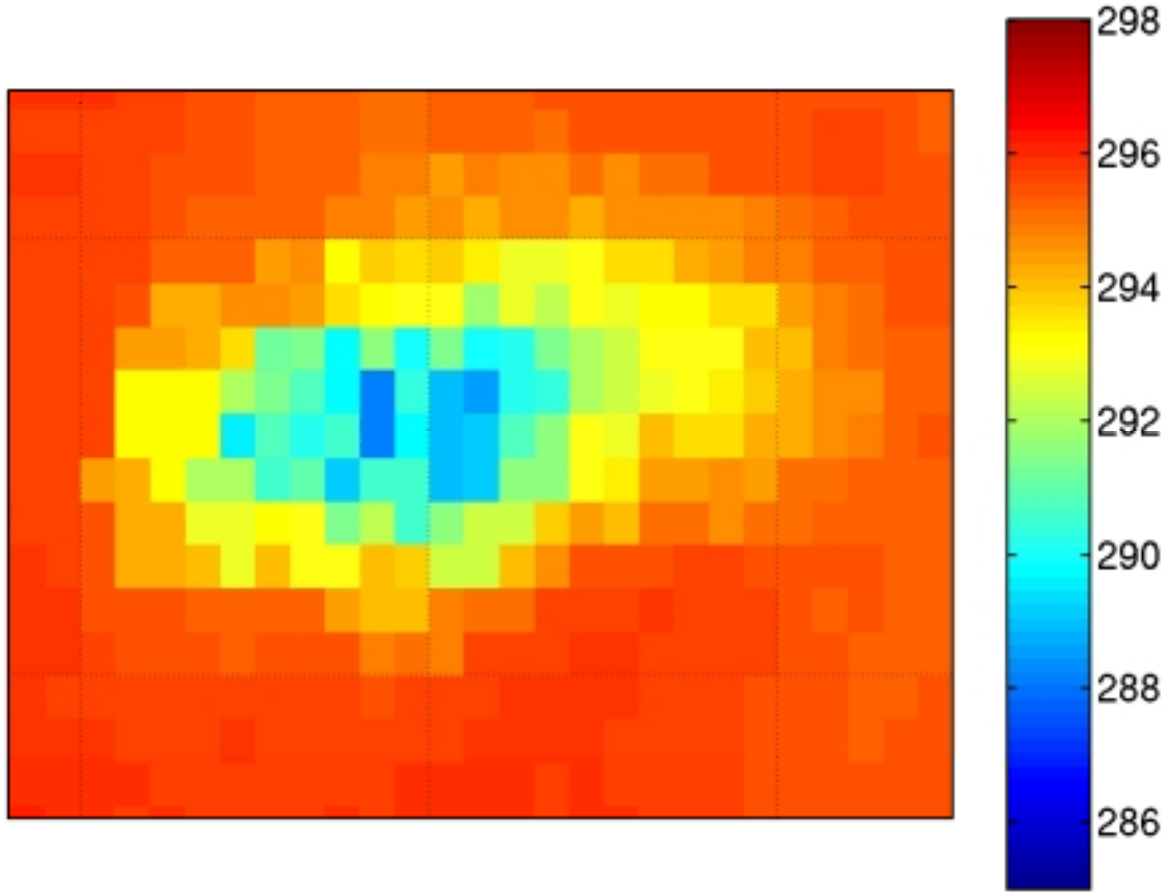
NAST-I Obs-Calcs (WINTEX)



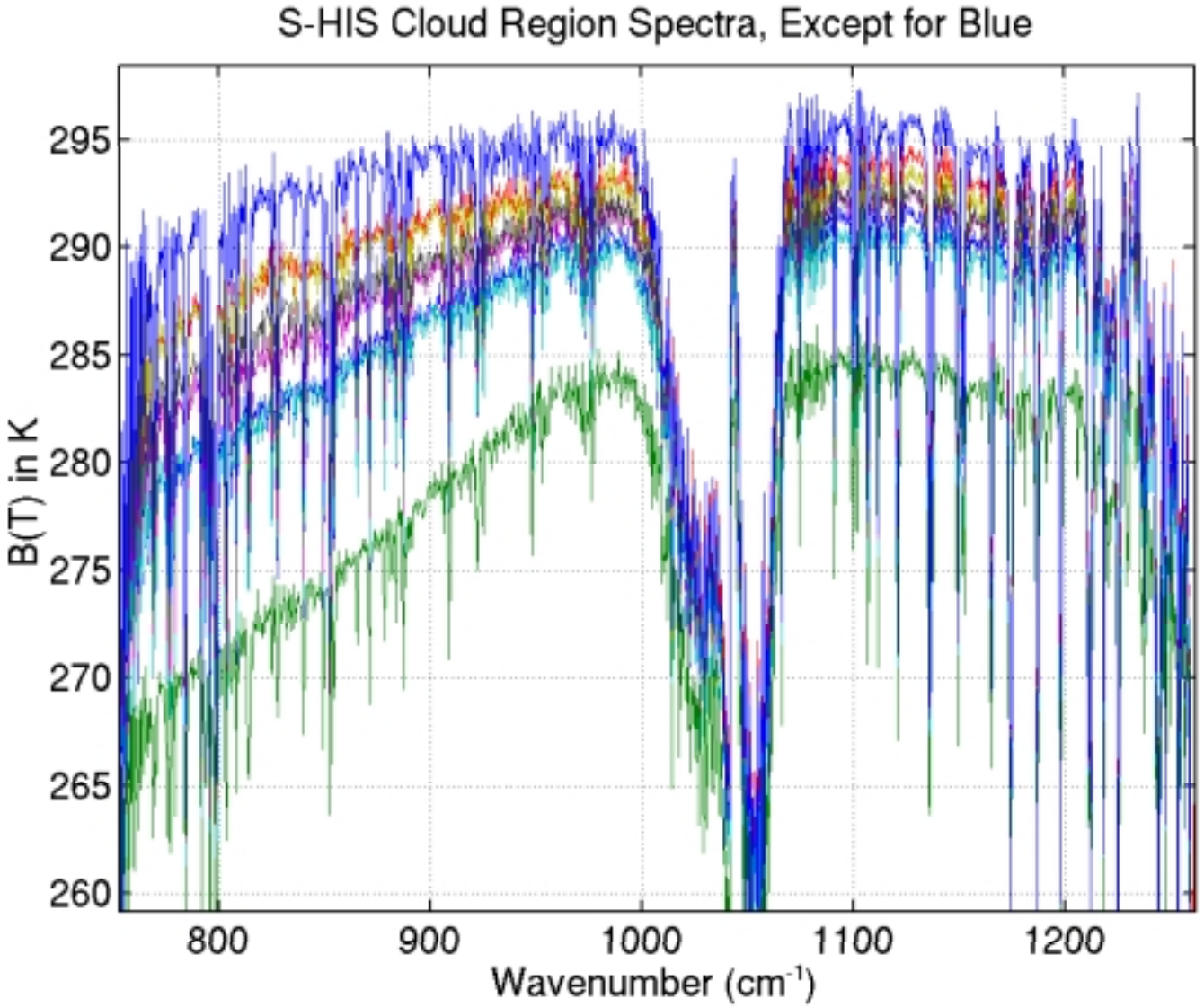
NAST-I Obs-Calcs (WINTEX)



S-HIS B(T) at ν = 1127 cm^{-1} Surrounding Cloud



Spectral of Cloudy FOVS during CLAMS



Lessons Learned?

- ECMWF much more accurate than NCEP *for this data point*
- ECMWF water fields better than sonde fields (based on a number of NAST/S-HIS/HIS comparisons with sondes)
- Even 1 granules is a lot of computation time for kCARTA (already knew that, just experienced it)
- I learned how important it is to grid point data for intercomparisons. Had to quickly find a RTP (point data) to grid converter.
- Read the documentation carefully - and keep the web pages up if you can.