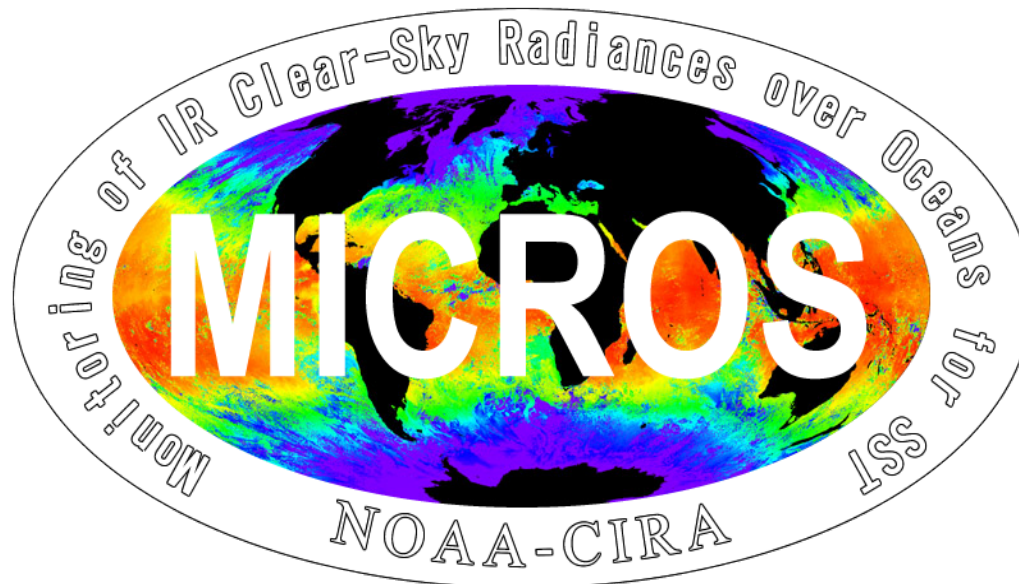




# Monitoring of IR Clear-sky Radiances over Oceans for SST (MICROS) for Himawari-8 AHI



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# Background

- Advanced Himawari Imager (AHI) is onboard Japanese Himawari-8 geostationary satellite, which was successfully launched on 7 Oct 2014;
- L1b data are available in 10-min granules, at 2 km spatial resolution in five SST bands centered at 3.9, 8.6, 10.4, 11.2, and 12.4  $\mu\text{m}$ ;
- Advanced Baseline Imager (ABI; basically the same instrument as AHI), will be launched onboard GOES-R in 2016;
- NOAA SST team adapted its Advanced Clear-sky Processor for Oceans (ACSPO) system to generate an experimental AHI Level 2 SST product;
- Clear-sky brightness temperature (BT) in 3 AHI bands centered at 3.9, 11.2 and 12.4  $\mu\text{m}$  are simulated in ACSPO using the Community Radiative Transfer Model (CRTM) [adding two remaining bands is underway];
- Canadian Meteorological Center daily 0.2° L4 SST and NCEP GFS 6hr 1° atmospheric profiles first guess fields are used as input into CRTM.

# Monitoring of IR Clear-sky Radiances over Oceans for SST (MICROS)

- A near-real time web-based MICROS system was established at NOAA to monitor model minus observations (M-O) biases for BTs and SSTs over clear-sky ocean;
- MICROS was initially developed for polar SST sensors (S-NPP VIIRS, NOAA/Metop AVHRRs, and Terra/Aqua MODISs);
- Objective of this study is to update MICROS functionality to monitor geo data, incorporate AHI data ,and check for consistency with polar data;
- MICROS will be also employed to monitor BTs and SSTs from the ABI/GOES-R.

[www.star.nesdis.noaa.gov/sod/sst/micros/](http://www.star.nesdis.noaa.gov/sod/sst/micros/)

# Interface of the Geo MICROS

[www.star.nesdis.noaa.gov/sod/sst/micros/library/micros\\_ahi\\_test/](http://www.star.nesdis.noaa.gov/sod/sst/micros/library/micros_ahi_test/)



**MICROS** Version 8.0  
Monitoring of IR Clear-sky Radiances over Oceans for SST

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Data Analysis

[Maps](#)

[Histograms](#)

[Time Series](#)

[Dependencies](#)

System Information

[Data Availability](#)

[Data Download](#)

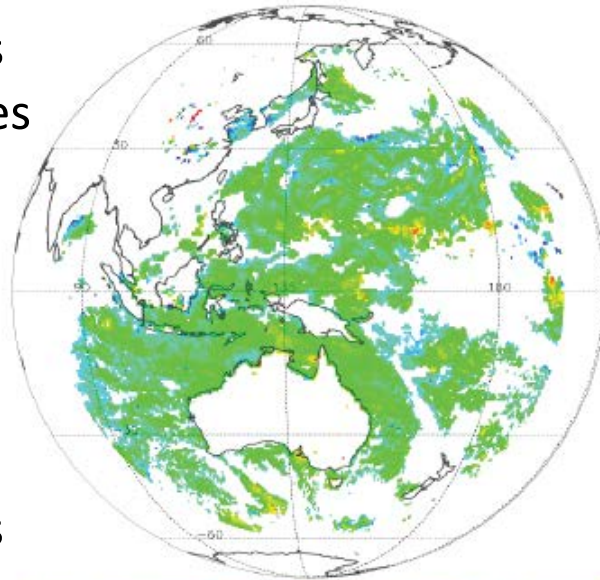
[Version Update](#)

Biases

Others

Data analysis categories

Median(Reg-Reference,K), AHI SST, 2015-08-31\_0000(Day+Night)



User choice buttons

Himawari

IR37  IR11

IR12  SST

Med  Mean

RSD  SD

Fulldisk

Day

Night

BT CM  SST CM

NRT  Reproc

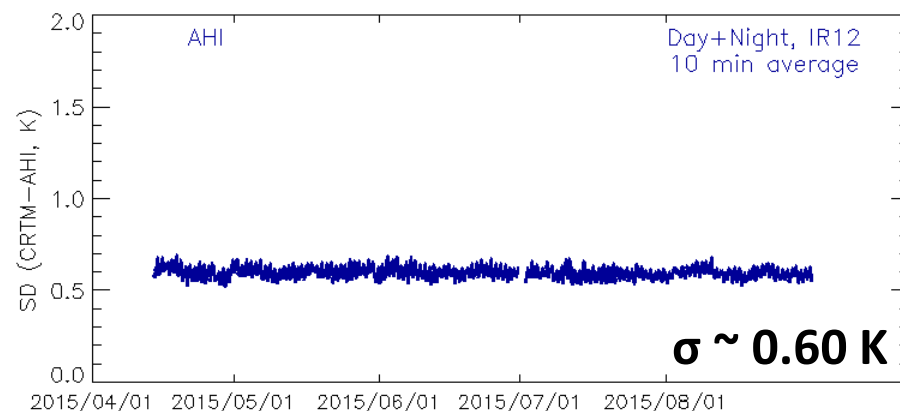
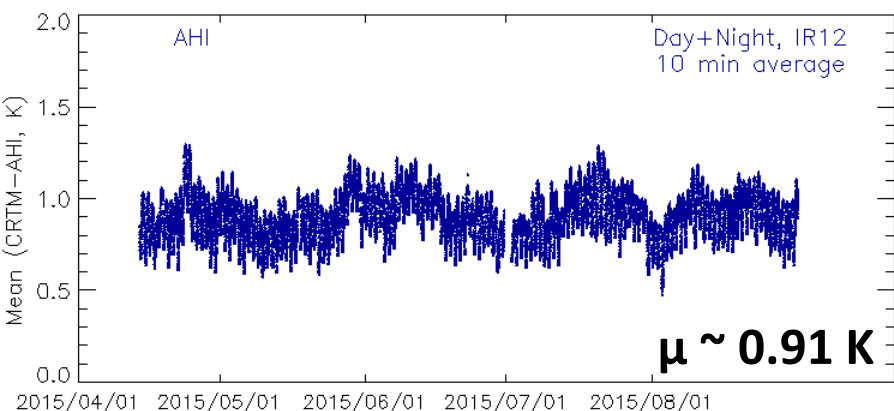
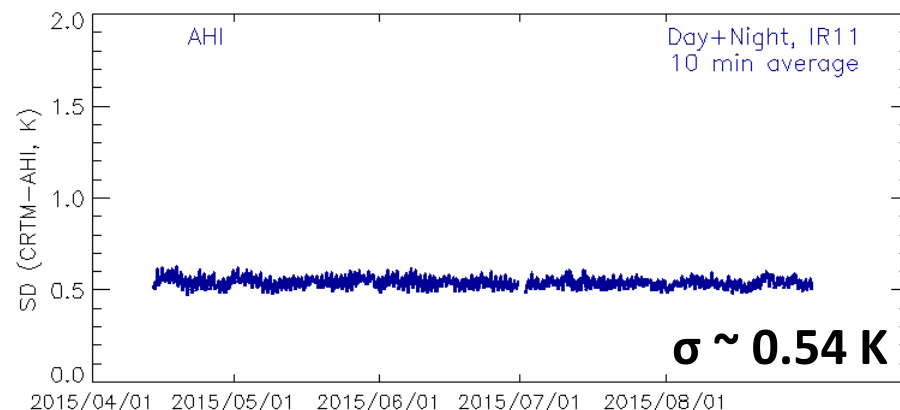
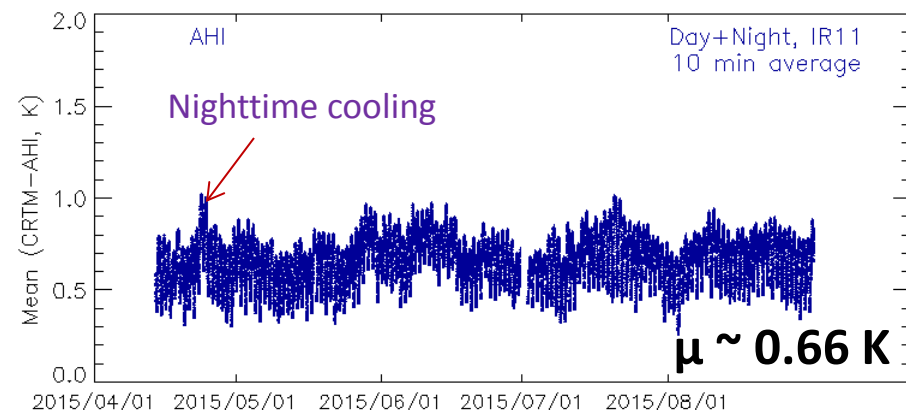
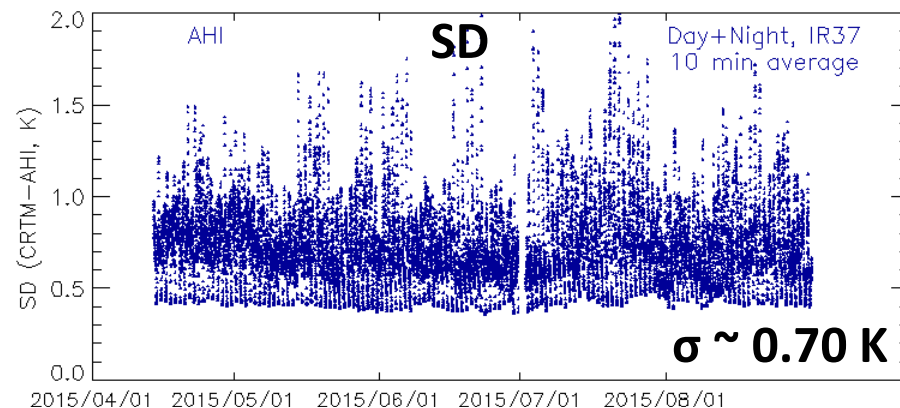
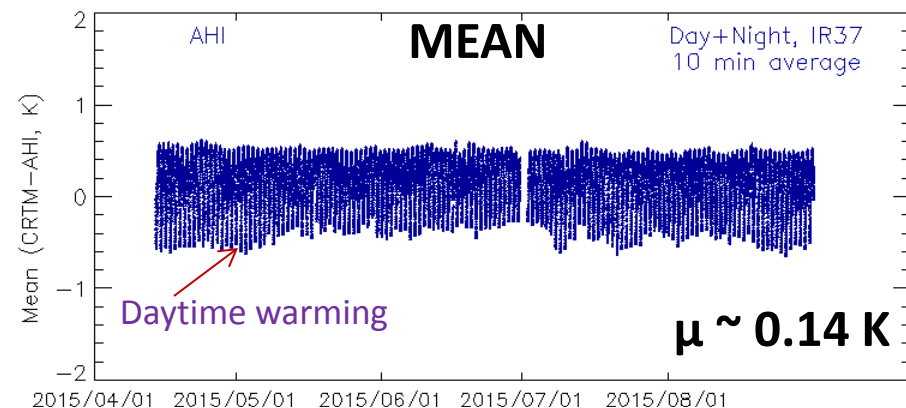
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# Preliminary results

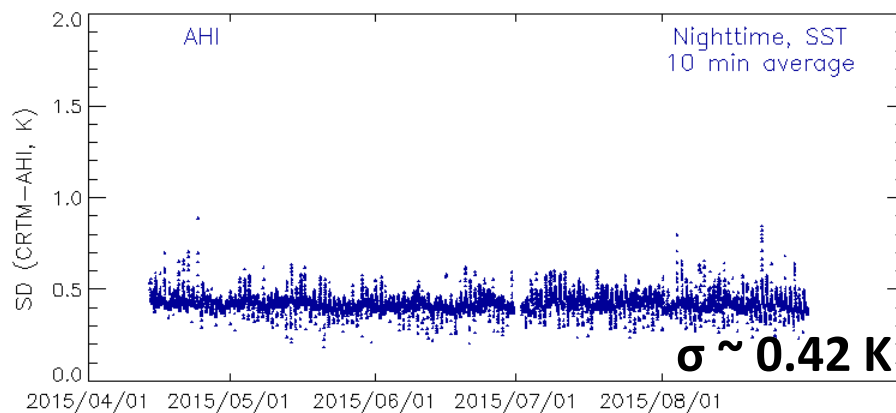
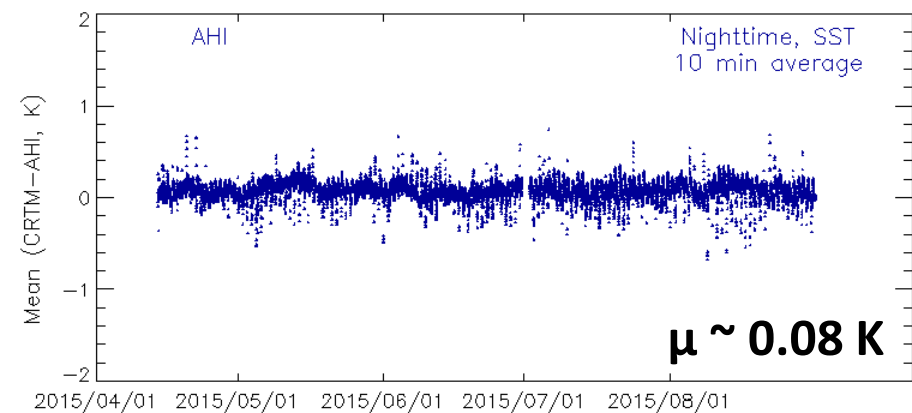
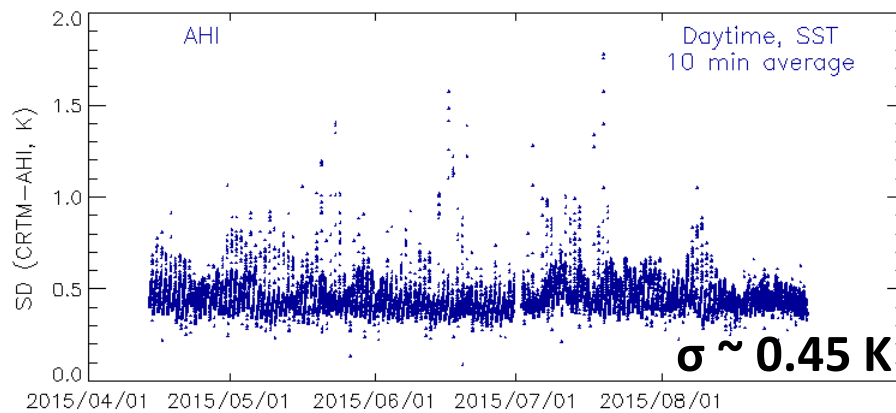
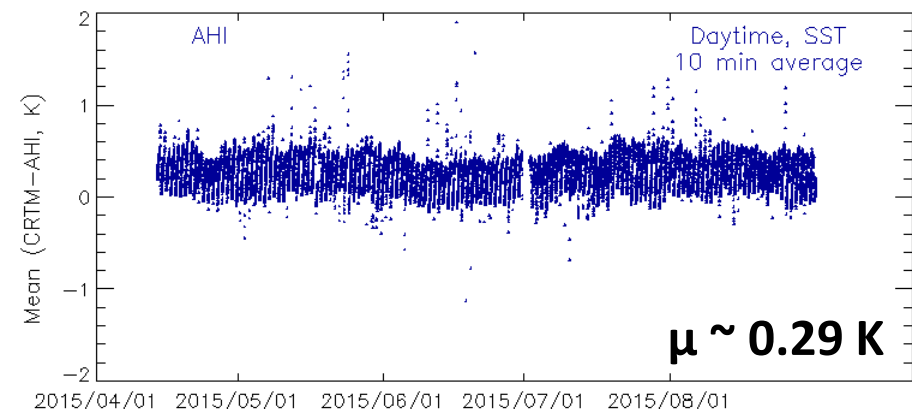
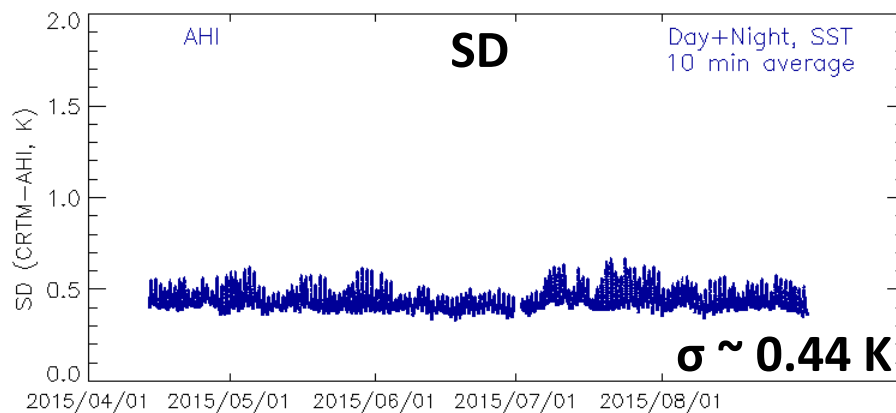
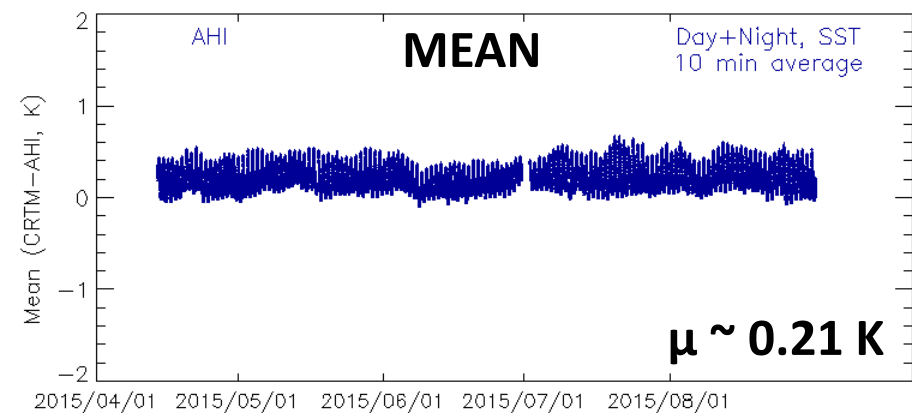
- M-O biases from 14 Apr – 31 Aug 2015;
- Time series of M-O biases for BTs (at 3.9, 11.2 and 12.4  $\mu\text{m}$ ) and SST;
- Full-Disk / Day / Night M-O biases (determined by the solar zenith angle, e.g. nighttime is  $\text{SZA} > 90^\circ$ );
- Histograms and dependencies of M-O bias.

# M-O biases at 3.9, 11.2 and 12.4 $\mu\text{m}$ (Full-disk)

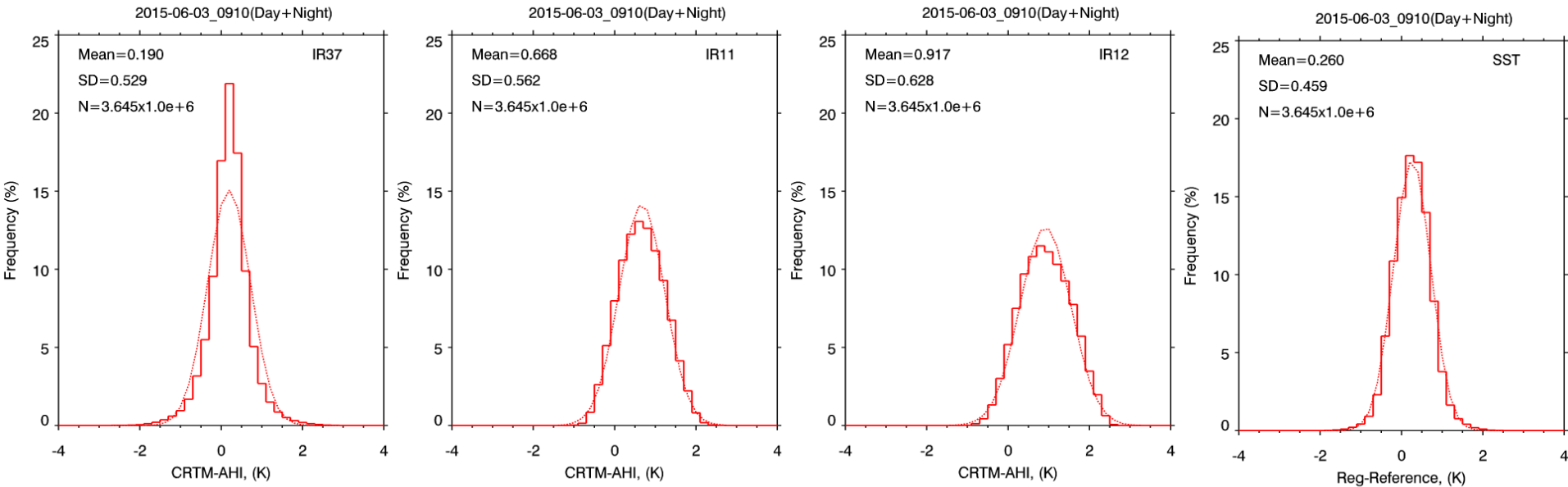


The warmer M-O biases may be due to not fully consistent CRTM simulations for AHI, possible residual cloud in ACSPO AHI data, or real cold observation biases in AHI BTs due to small residual calibration errors.

# M-O biases for SST (Full-disk, day and night)



# Histograms for M-O biases



- AHI M-O biases generally show Gaussian distribution, which is consistent with the polar sensors showed in official MICROS web page.



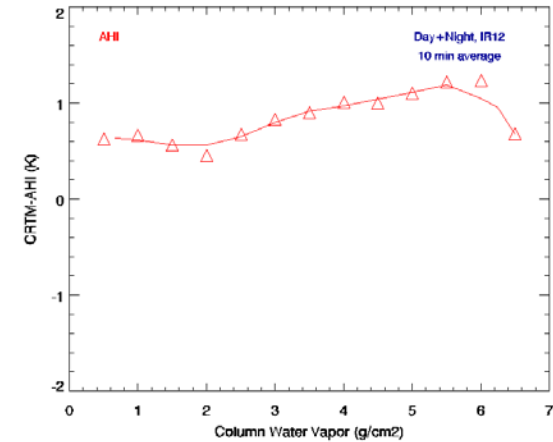
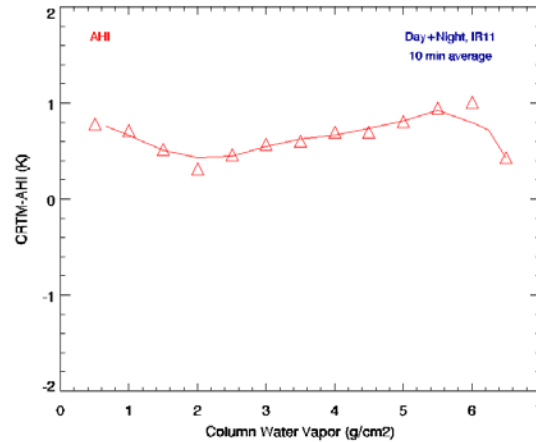
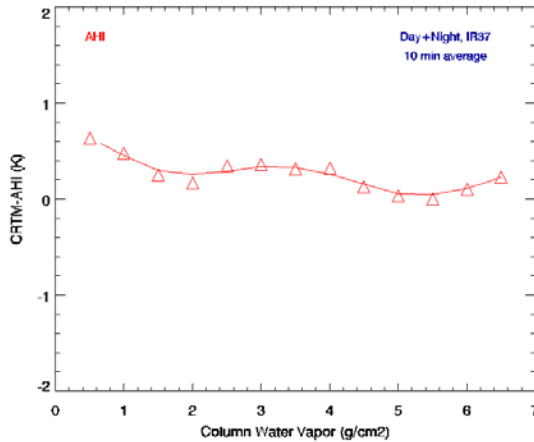
# Dependencies for M-O biases

3.9  $\mu\text{m}$

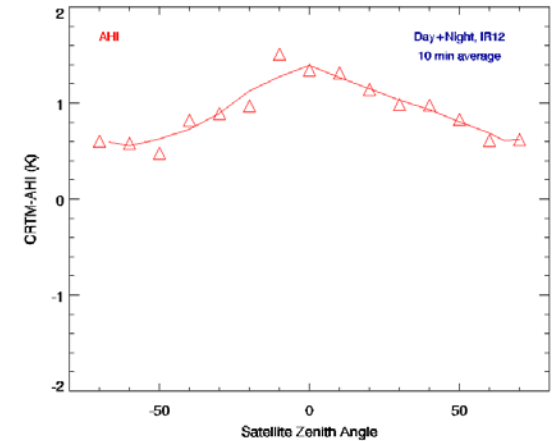
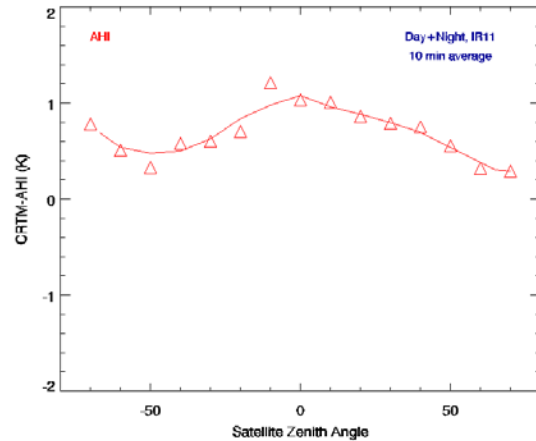
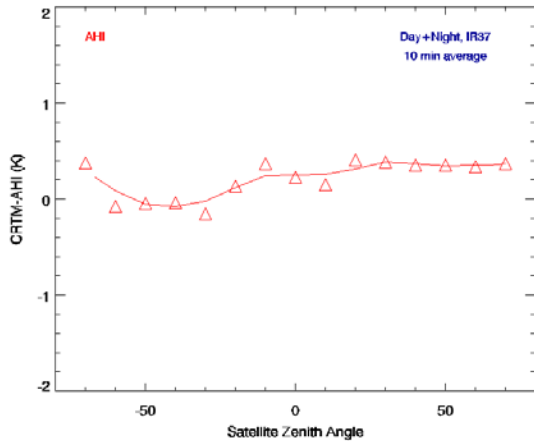
11.2  $\mu\text{m}$

12.4  $\mu\text{m}$

Column water vapor



Satellite zenith angle



- M-O biases show slight dependencies on column water vapor density (CWV) and satellite zenith angle (SZA, under investigation and improvement).

# Conclusion

- AHI is being tested using MICROS functionality;
- M-O biases for AHI generally show Gaussian distribution, which is consistent with polar sensors;
- AHI M-O biases show slight dependencies on CWV and SZA;
- Warmer M-O biases may be due to:
  - not fully consistent CRTM simulations for AHI,
  - possible residual cloud in ACSPO AHI data,
  - real cold observation biases in AHI BTs due to small residual calibration errors.

# Future Work

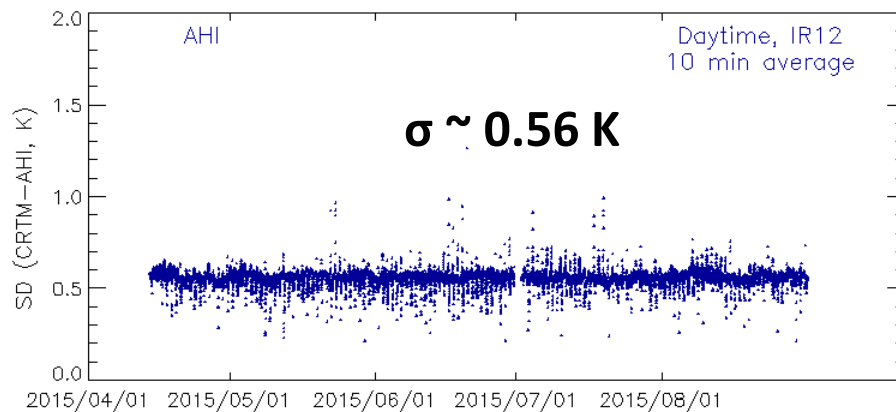
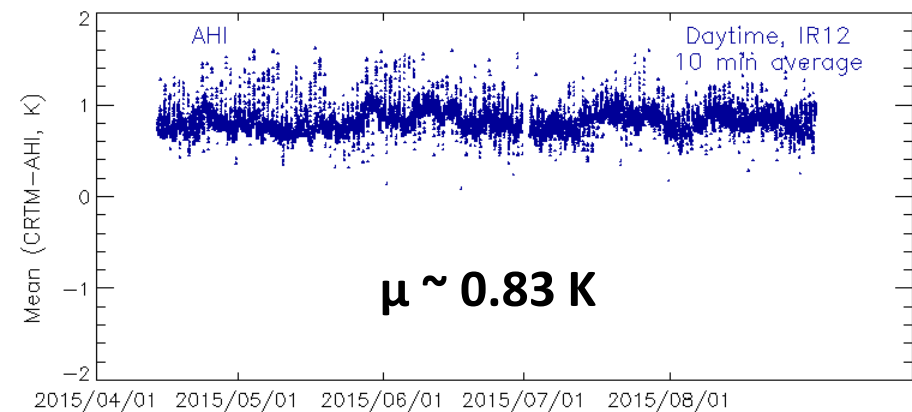
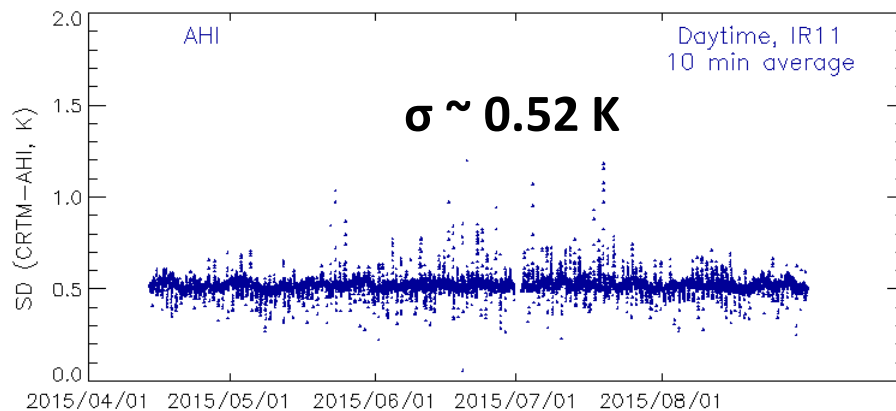
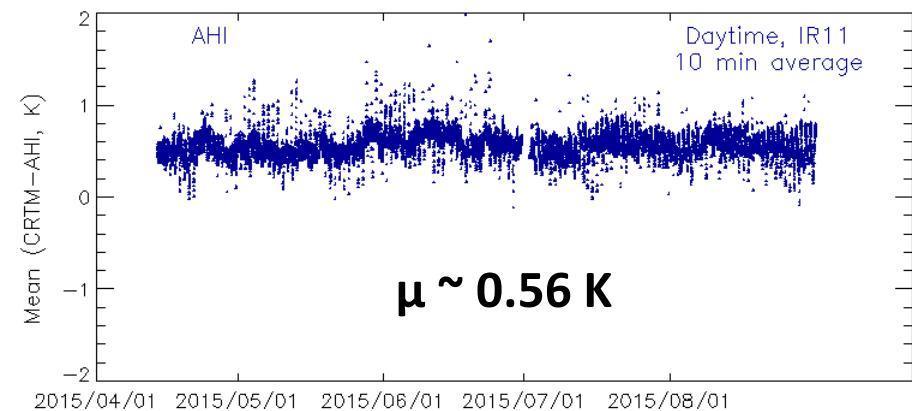
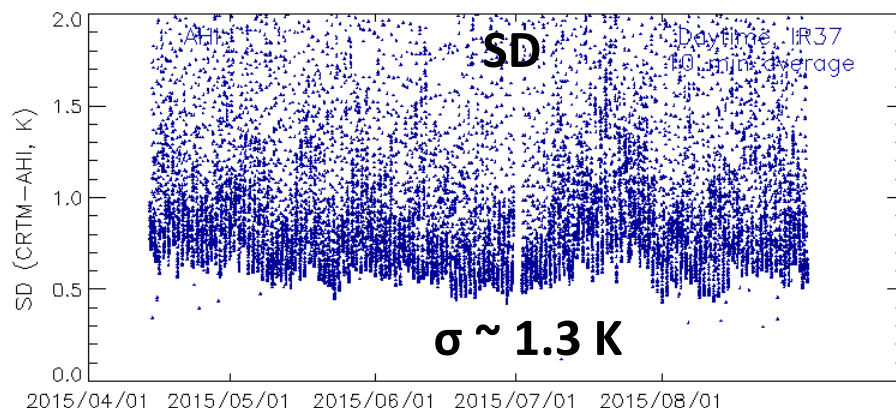
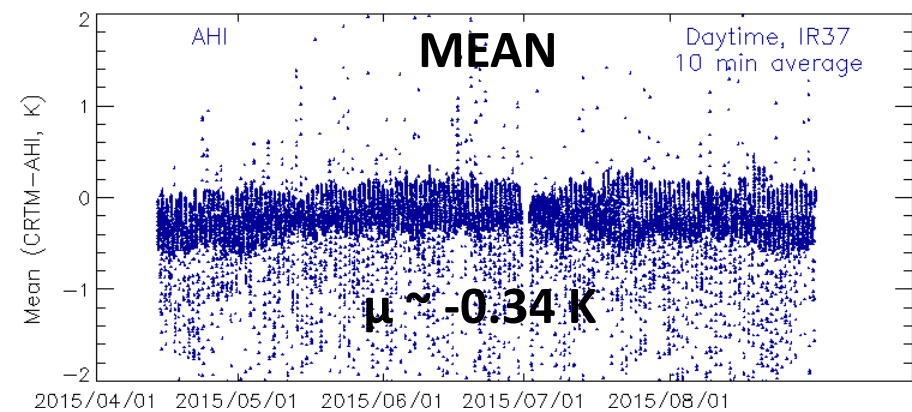
- Investigate possible causes for M-O biases in collaboration with CRTM and AHI sensor calibration teams;
- Extend AHI analyses to include two additional AHI bands currently used in SST retrievals (centered at 8.6 and 10.4  $\mu\text{m}$ );
- Integrate AHI data in the official MICROS;
- Include GOES-R ABI in MICROS data after launch in 2016.

# Acknowledgement

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- SST team at NOAA for helpful discussions.

# Backup slides

# M-O Biases at 3.9, 11.2 and 12.2 $\mu\text{m}$ (Day)



# M-O Biases at 3.9, 11.2 and 12.2 $\mu\text{m}$ (Night)

