

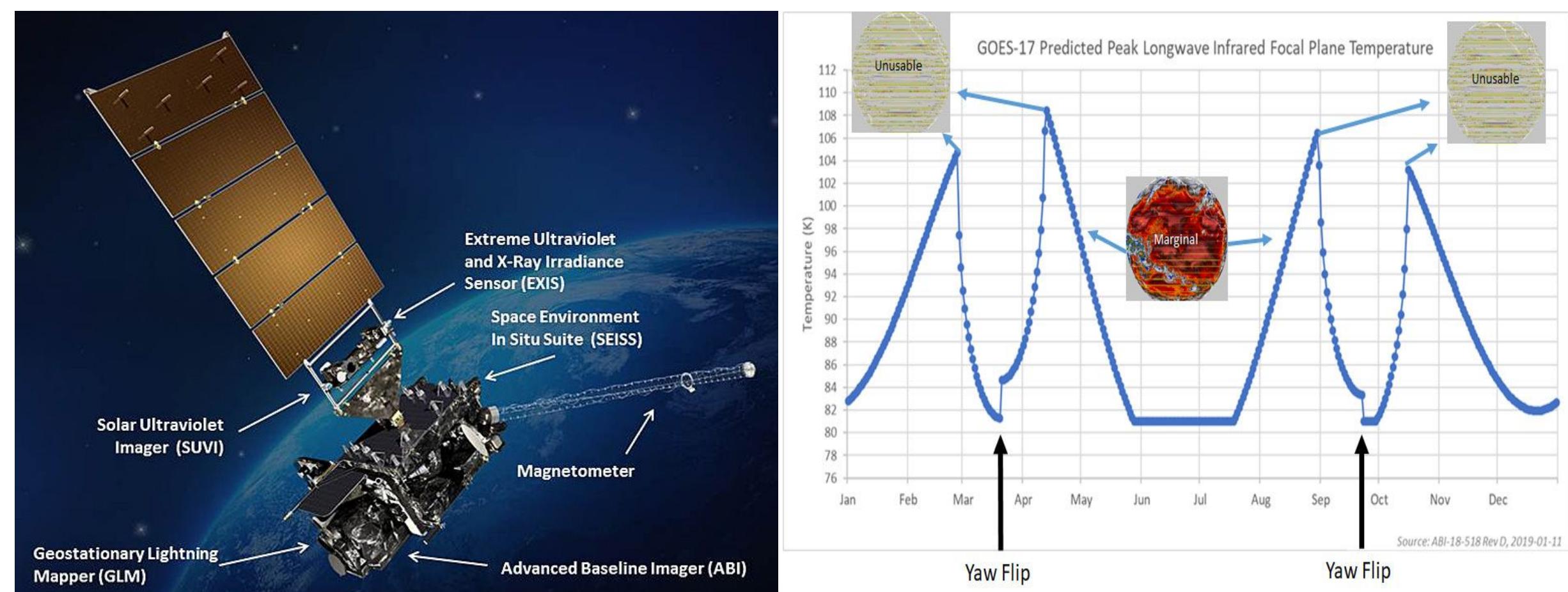
Satellite Analysis and Validation

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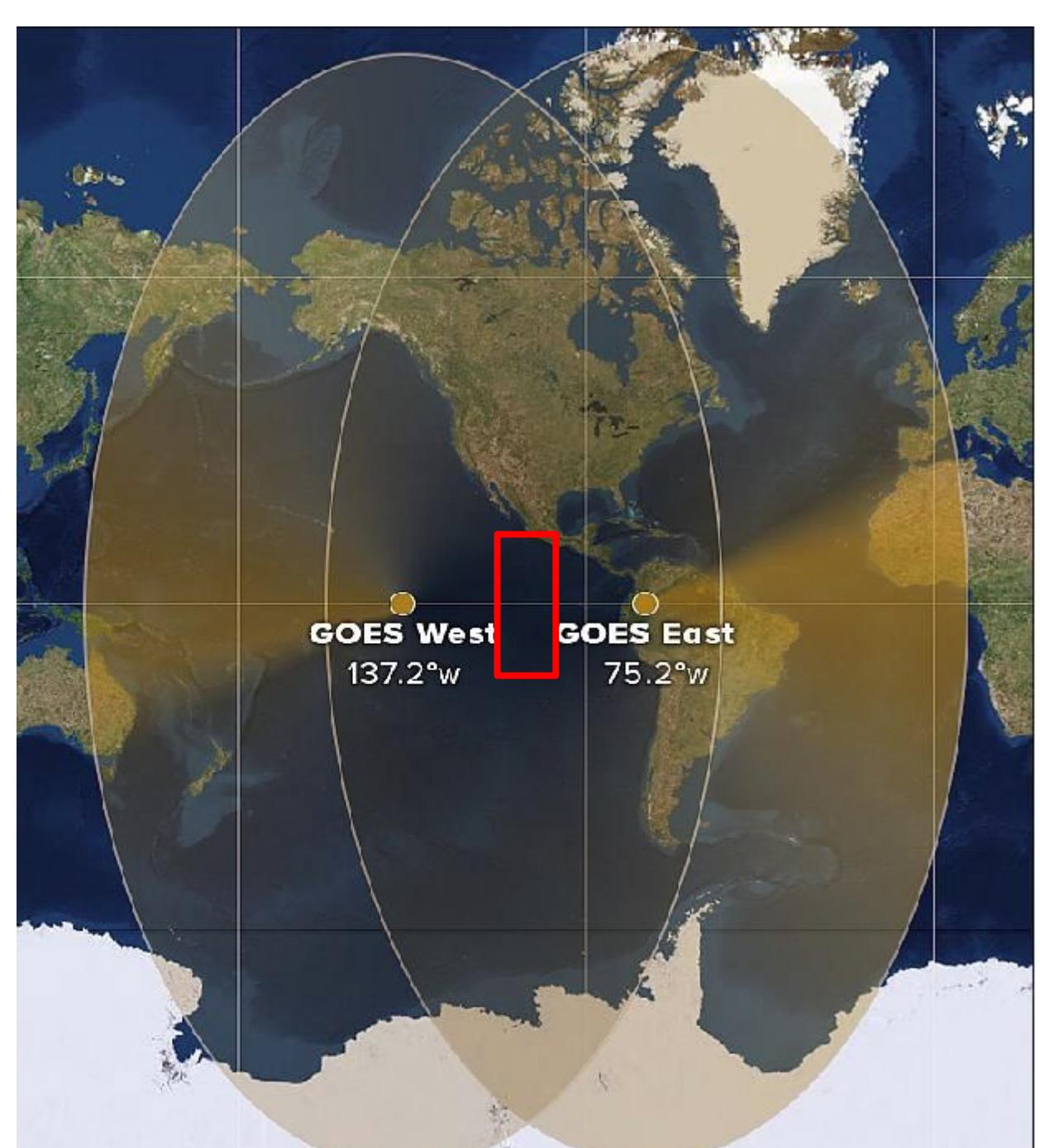
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Motivation

We analyzed and compared data from two of the most critical tools for monitoring and forecasting weather: the Advanced Baseline Imagers (ABI) on the geosynchronous satellite GOES-16 (east) and on GOES-17 (west). While maintaining an agreement between these two imagers is always important, it is even more essential because of problems with GOES-17. The loop heat pipe (LHP), a device that cools the ABI, is not operating at its designed capacity; as a result, the images in some GOES-17 ABI channels are degraded at certain times of day, and certain times of the year when the cooling system malfunctions in radiating the sun's energy.



Objective & Procedure



The goal is to compare GOES-17 GOES-16 values, then identify errors within a region of interest (ROI) chosen in the middle of the intersection—on the equator.

1. Using Python software, we carefully performed a comparison between the two ABIs where their fields of view partly overlap.
2. NOAA compared the mean value in the ROI. We confirmed their analysis and computed a histogram of the radiance values.
3. We analyzed band 8, which is the frequency channel for upper-level water vapor
4. We then filtered band 8 to only consider the radiances for clear sky grid cells.

Results: Mean Temperature Curve

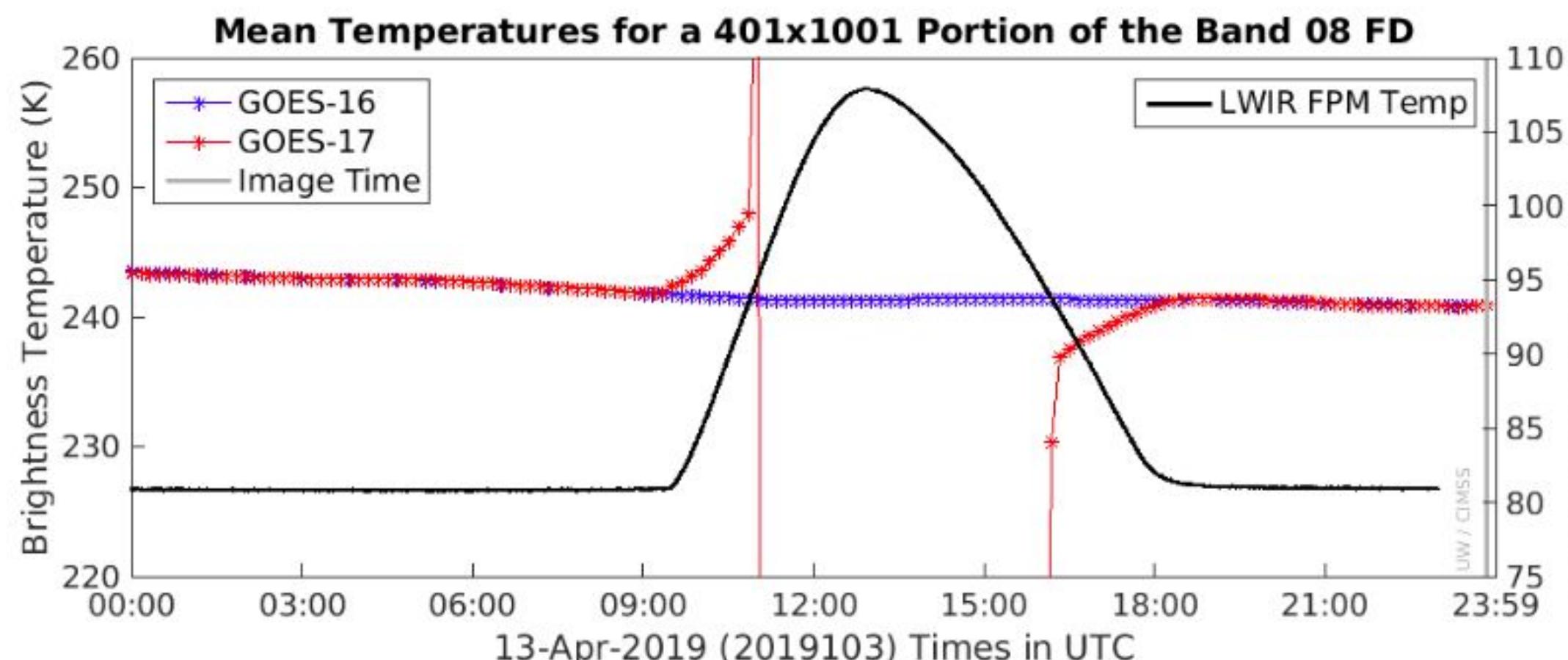


Figure 1 (Schmit, T.)

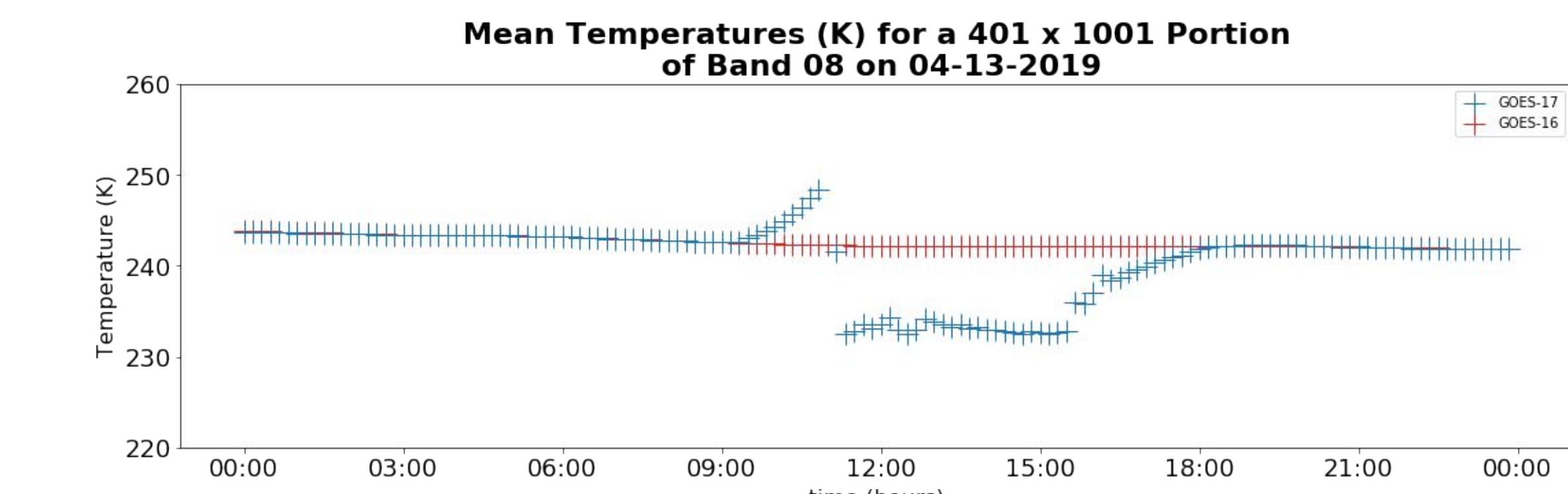


Figure 2

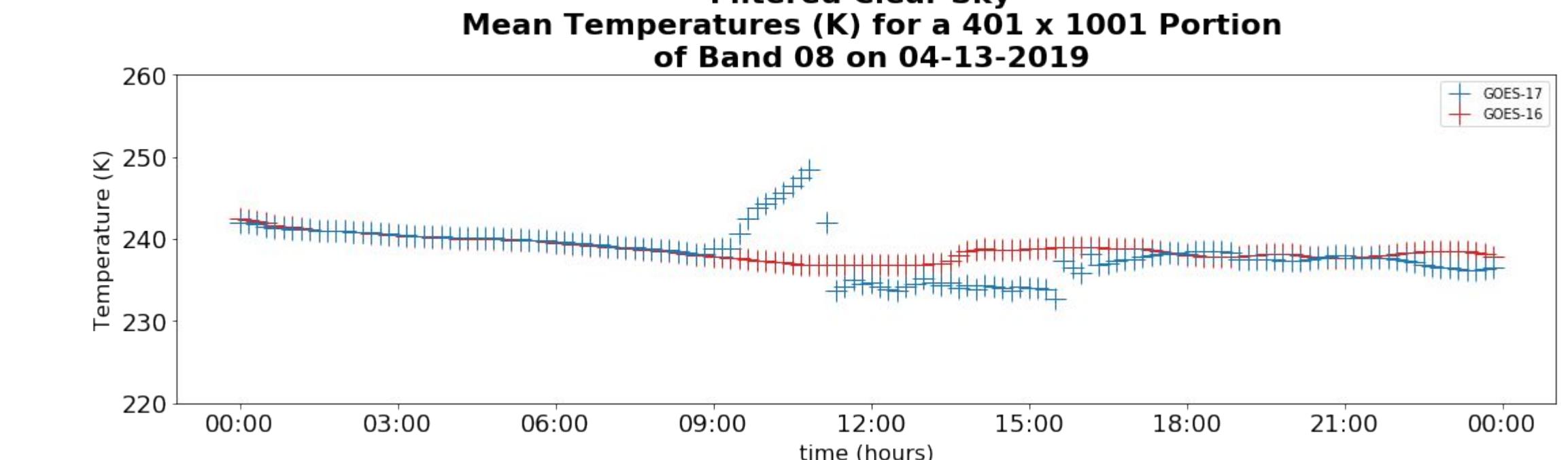


Figure 3

Discussion

Figure 1 shows GOES-16 and GOES-17 in alignment just before and after the critical LHP problem. Figure 2 reproduces Schmit's findings. Figure 3 indicates that restricting to the clear-sky grid cells leads to some differences in second half of the day. Investigating these differences will be the subject of future work.

References & Software

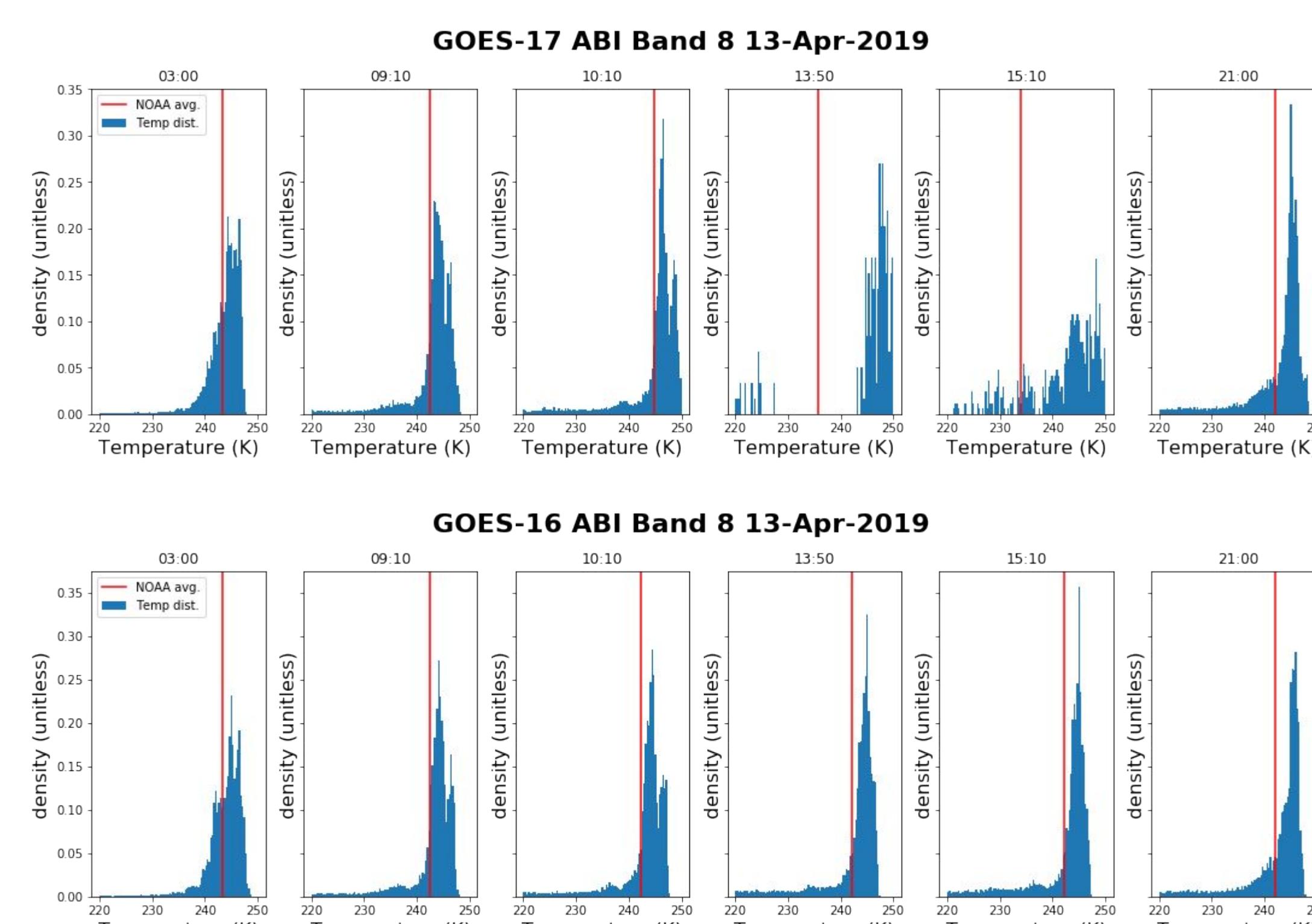
1. Blaylock, B. (2019). Goes-16/17 on amazon download page: home.chpc.utah.edu/~u0553130/Brian_Blaylock/cgi-bin/goes16_download.cgi
2. Schmit, T., et al. (2012, July 30). "Goes-r advanced baseline imager algorithm theoretical basis document for cloud and moisture imagery product": <http://www.star.nesdis.noaa.gov/goesr/docs/ATBD/Imagery>
3. GOES-R Series Activities GOES-R Series Activities. (n.d.): http://cimss.ssec.wisc.edu/goes-r/abi-band_statistics_imager.html

NumPy, Xarray, Metpy, Matplotlib, Cartopy, Pyresample, and Seaborn

Acknowledgements

This study is partially supported and monitored by The National Oceanic and Atmospheric Administration – Cooperative Science Center for Earth System Sciences and Remote Sensing Technologies under the Cooperative Agreement Grant #: NA16SEC4810008. The author(s) would like to thank The City College of New York and NOAA Office of Education, Educational Partnership Program with Minority Serving Institutions (EPP/MSI) for support for Ronald Adomako. The statements contained within the poster are not the opinions of the funding agency or the U.S. government, but reflect the author's opinions. We thank Hannah Aizenman, PhD candidate, City College of New York for guidance.

Mean Temperature Histograms



The histogram of the day when the LHP problem is most severe is compared to NOAA's recorded mean temperature in 10 minutes.