Weekly Report

SCSB/CISESS
Cooperative Research Program Division (CoRP)
STAR/NESDIS
National Oceanic and Atmospheric Administration (NOAA)

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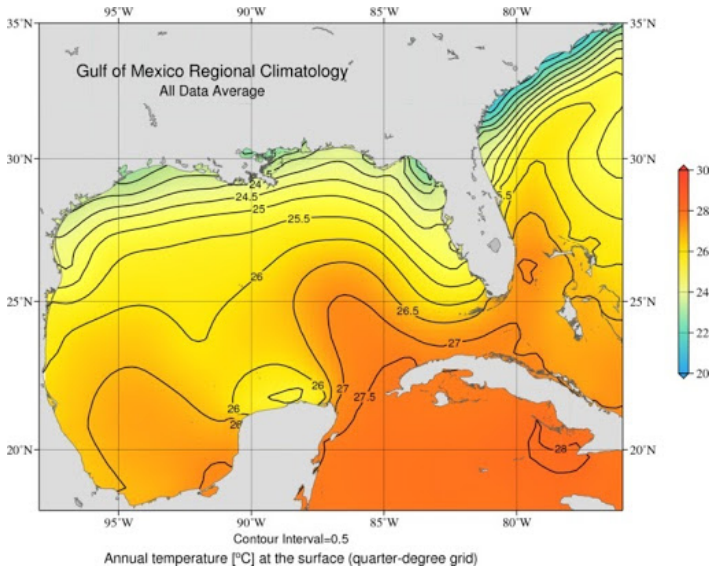
Products and Applications

NCEI Releases the Gulf of Mexico Regional Climatology: CISESS Scientist Alexey Mishonov and colleagues (NCEI/OGSSD/OSDB) announced the release of the Gulf of Mexico Regional Climatology, Version 2. The Gulf of Mexico is an economically and ecologically productive region, that connects to the Gulf Stream system via the Florida Current, and features a diverse collection of aquatic habitats. Long term climate variability within the region can impact on the fishing industry. The Gulf of Mexico Regional Climatology Version 2 includes new high-resolution temperature and salinity decadal climatologies that allow researchers to more precisely assess decadal climate change in the Gulf, substantially increasing the value of the GOM RC for ocean climate studies and other applications. This climatology also includes updated data and figures for other oceanographic variables such as oxygen and nutrients. Click here for the NOAA news item.

Figure: Annual temperature [^{o}C] at the surface on a quarter-degree resolution grid.



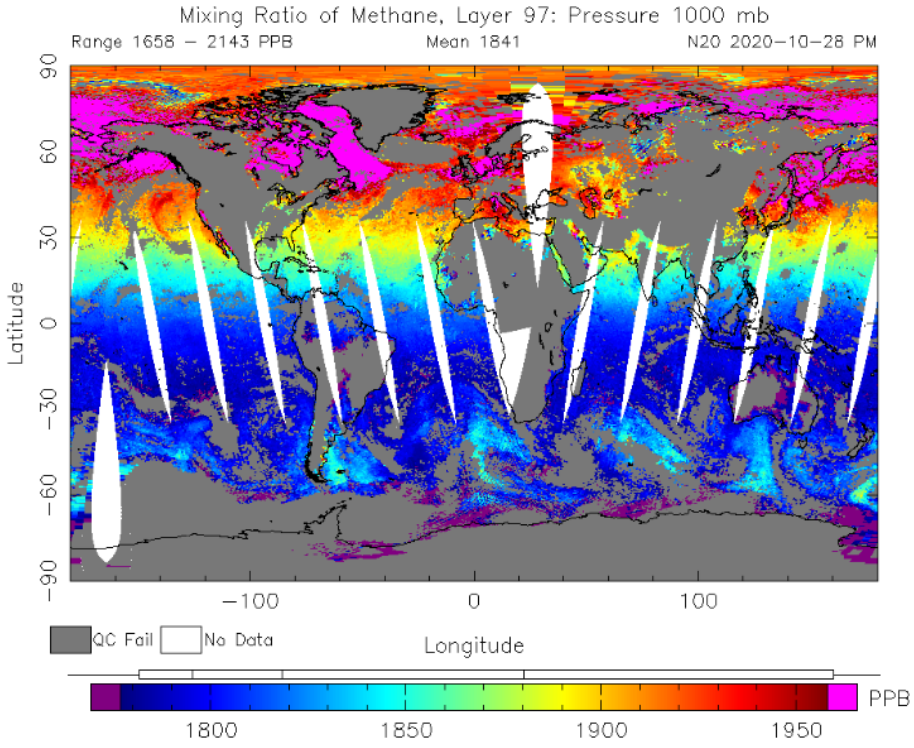
Seidov, D., **A.V. Mishonov**, T.P. Boyer, O.K. Baranova, E. Nyadjro, S.L. Cross, A.R. Parsons, and K.W. Weathers (2020), Gulf of Mexico Regional Climatology, Regional Climatology Team, NOAA/NCEI, https://www.ncei.noaa.gov/products/gulf-mexico-regional-climatology#

(POC: Alexey Mishonov, alexey.mishonov@noaa.gov, Funding: NCEI)

Publications

SNPP/JPSS CrIS NUCAPS Trace Gas Product: CISESS Scientist Juying Warner (STAR/SMCD), has a new article in the October-1 2020 issue of *Remote Sensing*. It covers much of the work that Warner has been doing for that last three years on her task, "SNPP/JPSS CrIS NUCAPS Trace Gas Product (CRISTG) Algorithm Improvements and Validations," funded by JSTAR. This paper focuses on NOAA operational retrievals of atmospheric carbon trace gas profiles from the NOAA-Unique Combined Atmospheric Processing System (NUCAPS), an enterprise algorithm. Vertical information about atmospheric trace gases is obtained from the Cross-track Infrared Sounder (CrIS) on S-NPP and NOAA-20. The NUCAPS CO, CH_4, and CO_2 profile EDRs are rigorously validated using total column data from ground-based Total Carbon Column Observing Network (TCCON) sites, and *in situ* vertical profile data obtained from aircraft and balloon platforms via the NASA Atmospheric Tomography (ATom) mission and NOAA AirCore sampler, respectively. Statistical analyses using these datasets demonstrate that the NUCAPS carbon gas profile EDRs generally meet JPSS Level 1 global performance requirements, with the absolute accuracy and precision of CO 5% and 15%, respectively, in layers where CrIS has vertical sensitivity; CH_4 and CO_2 product accuracies are both found to be within $\pm$1%, with precisions of $\approx$1.5% and $\lesssim$0.5%, respectively, throughout the tropospheric column.

Nalli, Nicholas R.; Changyi Tan, **Juying Warner**, Murty Divakarla, Antonia Gambacorta, Michael Wilson, Tong Zhu, Tianyuan Wang**, Zigang Wei**, Ken Pryor, Satya Kalluri, Lihang Zhou, Colm Sweeney, Bianca Baier, Kathryn McKain, Debra Wunch, Nicholas M. Deutscher, Frank Hase, Laura T. Iraci, Rigel Kivi, Isamu Morino, Justus Notholt, Hirofumi Ohyama, David Pollard, Yao Te, Voltaire A. Velazco, Thorsten Warneke, Ralf Sussmann, and Markus Rettinger, 2020: Validation of carbon trace gas profile retrievals from the NOAA-Unique Combined Atmospheric Processing System (NUCAPS) for the Cross-Track Infrared Sounder (CrIS). *Remote Sens.*, **12**, 3245, https://doi.org/10.3390/rs12193245.



NUCAPS NOAA-20 methane mixing ratio product for 28 October 2020 for 1000 mb level from https://www.ospo.noaa.gov/Products/atmosphere/soundings/nucaps/NUCAPS_composite.html

(*POC: Juying Warner, juying.warner@noaa.gov , Funding: JSTAR*

On-orbit Calibration of GOES-17 Advanced Baseline Imager: CISESS scientists Zhipeng (Ben) Wang, Fangfang Yu, Hyelim Yoo, Haifeng Qian and Xi Shao (STAR/SMCD/SCDAB), recently published a new paper in the latest issue of the *Journal of Applied Remote Sensing* on the on-orbit calibration and characterization of GOES-17 Advanced Baseline Imager (ABI) infrared (IR) bands. An anomaly with its cooling system, specifically its loop heat pipe (LHP) subsystem, prevents heat from being efficiently transferred from the ABI electronics to the radiator to be dissipated into space. As a consequence, the heat accumulates inside the instrument, alleviating the temperatures of its key components for IR calibration, including the focal plane modules (FPMs), scan mirrors, and blackbody. This causes severe degradation to the data quality of ABI IR Level 1b radiance and subsequent Level 2+ products during the hot period of the day. Significant progress has been made to mitigate the effects of the LHP anomaly to optimize the IR performance of GOES-17 ABI, and this paper summarizes the efforts of NOAA's GOES-R Calibration Working Group (CWG), working collaboratively with other teams, to evaluate and alleviate the negative impacts of warmer and floating FPM temperatures on ABI IR calibration, and assess the IR performance accordingly.

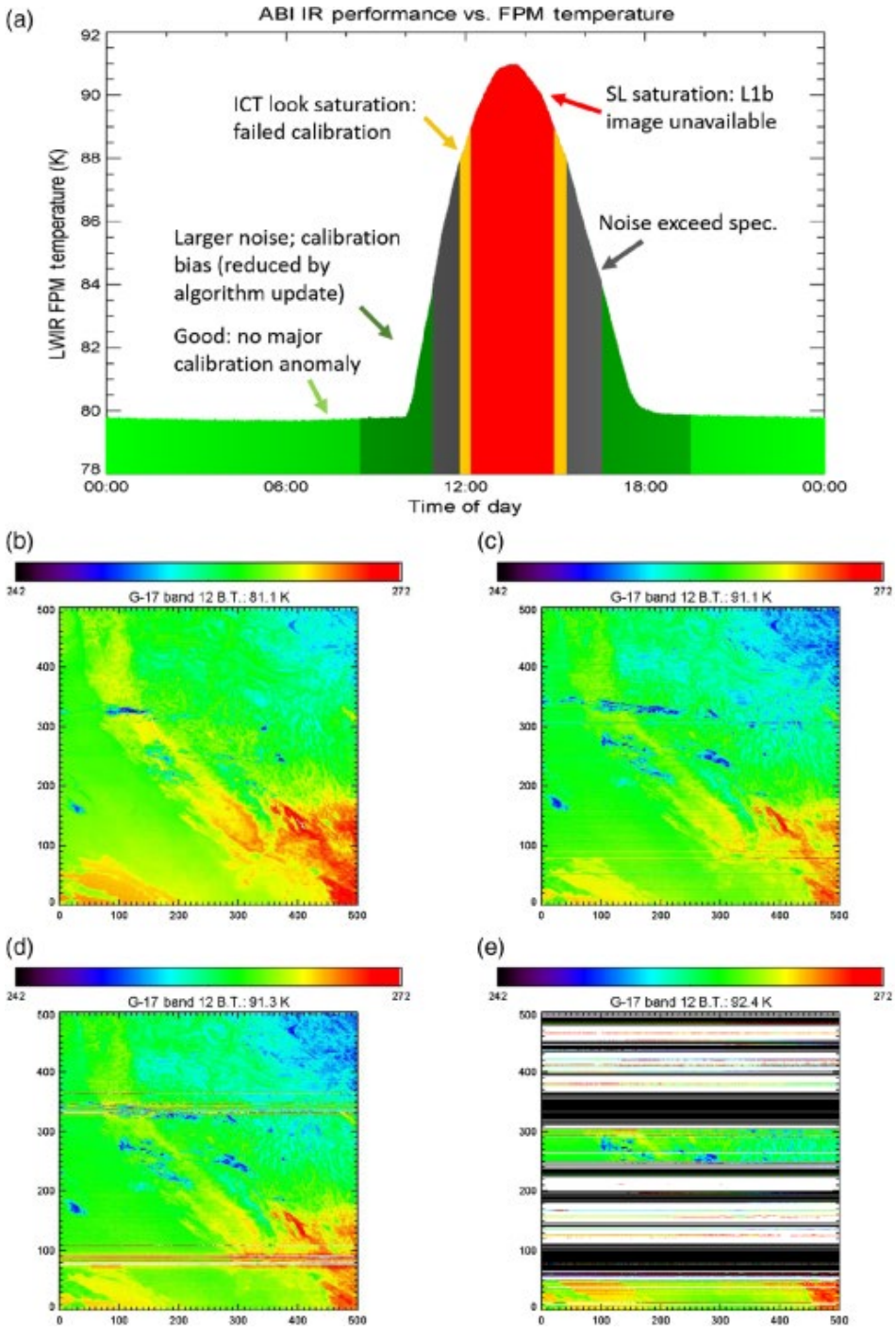


Figure: (a) A sketch summarizing the dependence of ABI IR performance on the focal plane module (FPM) temperatures that oscillate daily. The MESO images from (b) to (e) demonstrate how L1b qualities degrade with rising FPM temperatures for a period from 0930 UTC to 1045 UTC on August 28, 2019.

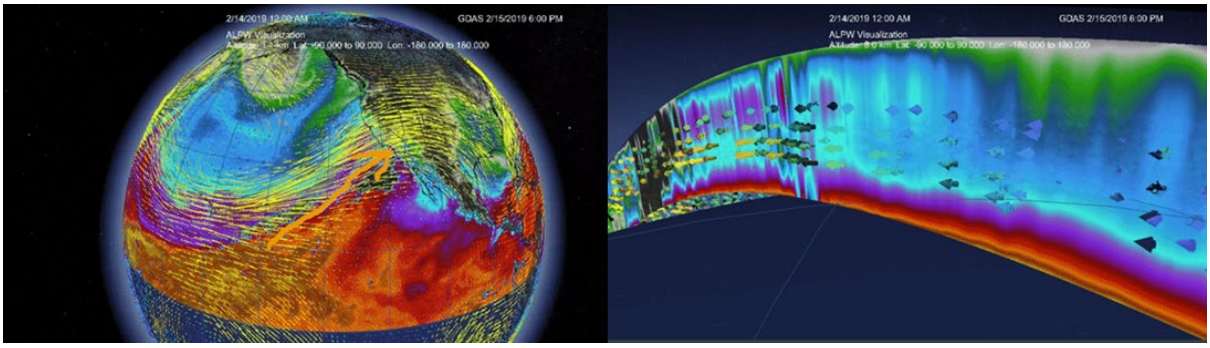
Zhipeng (Ben) Wang, Xiangqian Wu, **Fangfang Yu**, Jon P. Fulbright, Elizabeth Kline, **Hyelim Yoo**, Timothy J. Schmit, Mathew M. Gunshor, Monica Coakley, Mason Black, Daniel T. Lindsey,

Haifeng Qian, Xi Shao, and Robbie Iacovazzi, "On-orbit calibration and characterization of GOES-17 ABI IR bands under dynamic thermal condition," *J. Appl. Remote Sens.,* **14**, 034527, https://doi.org/10.1117/1.JRS.14.034527.

(POC: Zhipeng Wang, zhipeng.wang@noaa.gov, Funding: GOES-R)

Media and Outreach

Interview on Virtual Reality to View Satellite Data: On October 21, Scott Rudlosky and CISESS Scientist Mason Quick (STAR/CoRP/SCSB) participated in a video interview with reporters from the government-operated Voice of America news organization. The interview will be edited to produce a two minute television segment highlighting the development of cutting edge virtual reality software. This software is used to analyze NOAA operational and experimental datasets produced by satellite, airborne, and ground based observational instrument systems. This work is conducted in collaboration between CISESS and the Maryland Blended Reality Center at the University of Maryland. The interview will eventually be available for viewing on the VOA website.



(S. Rudlosky, scott.rudlosky@noaa.gov, Funding: HPCC)