

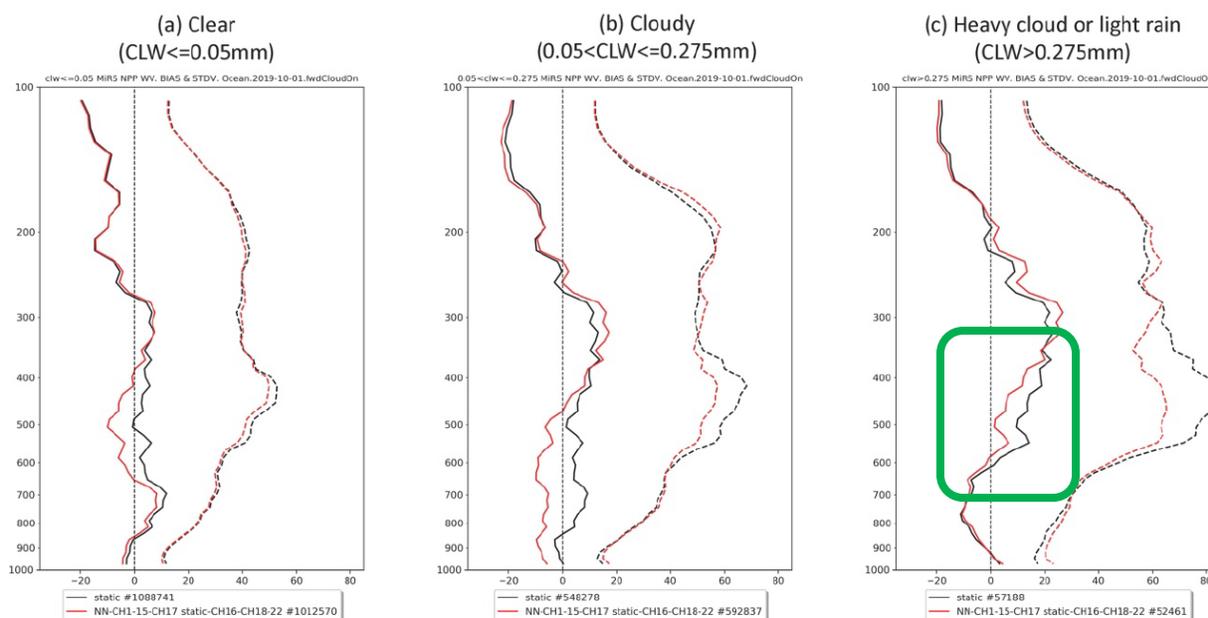
## Weekly Report

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

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### Publications

**Machine learning for bias correction in MiRS:** CISESS scientists Yan Zhou and Chris Grassotti have published an article in the October-1 2020 issue of the journal *Remote Sensing*, titled "Development of a Machine Learning-Based Radiometric Bias Correction for NOAA's Microwave Integrated Retrieval System (MiRS)". They reported on work which used a deep neural network (NN) to predict the typical differences between the observed and modelled data from the ATMS microwave instrument. Using these differences as a correction before processing the data in NOAA's MiRS system resulted in improved estimates of atmospheric water vapor and temperature, particularly in areas that had heavy cloud cover and light rainfall.



**Figure.** MiRS water vapor profiles validated with ECMWF analyses for SNPP/ATMS over ocean for (a) clear, (b) cloudy, and (c) heavy cloud or light rain conditions on 1 October 2019. The black

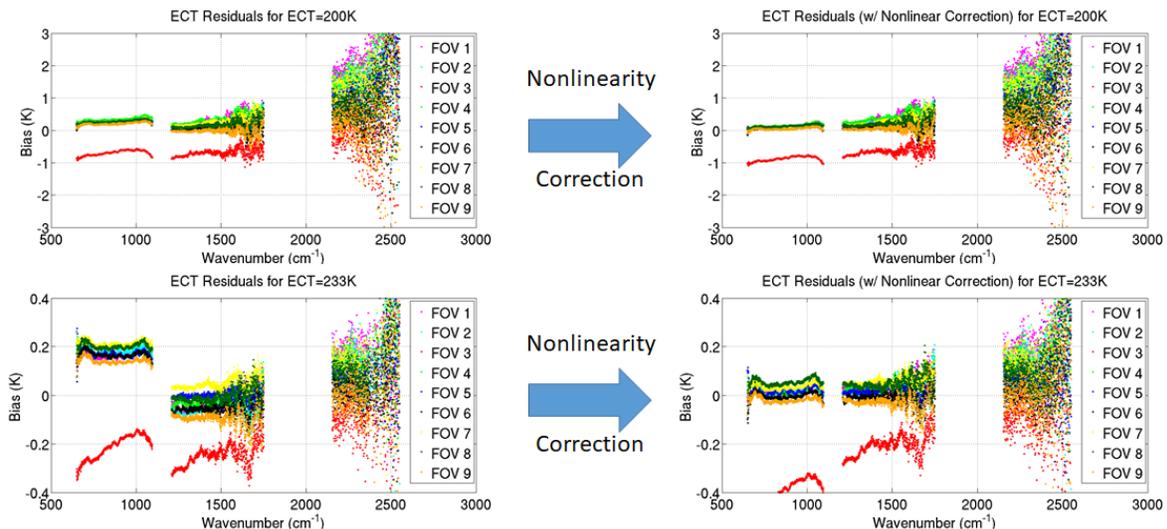
lines are for MiRS using the static bias correction method, and red for the NN bias correction method. Solid lines are for bias, and dashed lines for standard deviation. The green box shows the improvement for heavy cloud/light rain weather.

**Zhou, Yan, and Christopher Grassotti, 2020:** Development of a machine learning-based radiometric bias correction for NOAA’s Microwave Integrated Retrieval System (MiRS). *Remote Sens.*, **12**, 3160, <https://doi.org/10.3390/rs12193160>.

(POC: Christopher Grassotti, [christopher.grassotti@noaa.gov](mailto:christopher.grassotti@noaa.gov), Funding: JSTAR & PSDI JSTAR)

### Workshops, Conferences, and Meetings

**JPSS-2 CrIS Calibration Presentation at IGARSS 2020:** CISESS Scientist Peter Beierle presented “Progress toward Evaluating Prelaunch Thermal Vacuum Tests of the JPSS-2 CrIS Instrument” at the IEEE IGARSS 2020 Conference session “Passive Optical, Hyperspectral Sensors and Calibration I.” This presentation covered detector nonlinearity and the two different ways in which it is computed, along with an update on the scientific assessment of the detector nonlinearity for JPSS-2 CrIS. The CrIS instrument destined for JPSS-2 has undergone Thermal Vacuum Testing (TVAC) to assess instrument noise, derive spectral calibration coefficients, and validate the radiometric calibration. This also includes the evaluation of detector nonlinearity, which is one of the largest sources of radiometric uncertainty. Current work on the evaluation of the radiometric nonlinearity coefficients include the computing of the External Calibration Target Residuals (i.e., the difference between the measured calibrated scene and the idealized calibrated blackbody scene) for six stepped temperatures, and minimizing the RMSE of this residual in the most sensitive spectral region to determine the nonlinearity coefficients. Initial evaluation of this has shown consistent results with estimates performed at the University of Wisconsin SSEC.



**Figure:** JPSS-2 CrIS External Calibration Target Residuals before and after nonlinearity correction for ECT stepped temperatures of 200K and 233K. (Although the change is difficult to see in the top two graphs, note that the green line between 500 and 1000  $\text{cm}^{-1}$  is above the 0 bias line in the left graph and on the 0 line in the right graph).

**Beierle, Peter**, Flavio Iturbide-Sanchez, Yong Chen, Denis Tremblay, Kun Zhang, **Erin Lynch**, David Johnson, and Lawrence Suwinski, Progress toward Evaluating Prelaunch Thermal Vacuum Tests of the JPSS-2 CrIS Instrument, Passive Optical, Hyperspectral Sensors and Calibration I Session; IGARSS 2020.

(POC: Peter Beierle, [Peter.Beierle@noaa.gov](mailto:Peter.Beierle@noaa.gov), Funding: JSTAR )

**NOAA Annual Water Team Meeting:** SCSB's R. Ferraro participated at the 3-day virtual annual meeting of the NOAA Water Team (October 13-15). The meeting consisted of one day of objective team annual highlights and plans, one day of plenary (which included preparations for the next 5-year strategic plan), and lastly, a day of engagement with the NOAA Weather, Water and Climate Board (WWCB). Co-leading the NESDIS team with E. Mecray (NCEI), we stressed the importance of NESDIS' ongoing contributions in the areas of service delivery and observations. Overall, it was a productive meeting. We will continue to support the activities of NESDIS on the WWCB, encourage engagement of NESDIS subject matter experts on the objective teams, and those from NESDIS headquarters (M. Goldberg, S. Volz).

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