Weekly Report – December 22, 2023

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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HIGHLIGHTS FOR NESDIS LEADERSHIP

People

CISESS Scientist Fangfang Yu Commended for her Work at the Lunar Calibration Workshop
NOAA Scientist Xiangqian (Fred) Wu sent a Letter of Recognition to Fangfang Yu, who leads the GOES-R ABI Calibration Team. She was commended for her role as part of the NOAA delegation to the 4th Joint GSICS/IVOS Lunar Calibration Workshop held in Darmstadt, Germany on 4-8 December 2023. He said, "I appreciate your leadership and service at the workshop, as well as your preparation and debriefing before and after the workshop. Your contributions enhanced NOAA's leadership in the workshop. " *(Fangfang Yu, CISESS & SMCD, fangfang.yu@noaa.gov , Funding: GOES-R PGRR)*

TRAVEL AND MEETING REPORTS:

CISESS @ AGU Fall Meeting
CISESS had a large number of scientists who presented, both in-person and on-line, at the 2023 AGU Fall Meeting, held in San Francisco & Virtual from December 11 to 15. Here is a sampling of CISESS and CISESS Consortium Talks and Posters.

CISESS Talks included:

- **Nigus Demelash Melaku** (co-authors: Christopher W. Brown & Ahmad A. Tavakoly), Enhancing Process-Based Model for Predicting River Water Temperature within the National Water Model Framework;
- **Qingyuan "Richard" Zhang,** Advancements in Operational SAR Flood Extent and Depth Mapping: Addressing Challenges in Snow, Arid, and Urban Environments on a Global Scale;
- **Qingyuan "Richard" Zhang,** What granularity of DEM is recommended to map flood depth from high resolution extent?
- **Hyun Cheol Kim**, Improving Wildfire Smoke Forecast Accuracy: Application of the HYSPLIT-based Emissions Inverse Modeling System (HEIMS) to the 2023 Canadian Wildfire Events; and

- **Fangjun Li,** SDSU (co-authors: **Xiaoyang Zhang** and Shobha Kondragunta), Validation of the Regional ABI and VIIRS based Fire Emissions in High Latitudes Using Sentinel-5P TROPOMI Trace Gas Observations.

CISESS Scientists also coauthored important presentations:

- Martine De Mazière (co-author: **Jeannette Wild**), The Impact of the Network for the Detection of Atmospheric Composition Change (NDACC) on Ozone, Air Quality and Climate Sciences since the Early Nineties [Invited Talk];
- Irina V Petropavlovskikh (co-author: **Jeannette Wild**), NDACC's role in critical gap-filling for atmospheric monitoring: An international network with 35 years of quasi-global coverage, partner networks & capacity-building; and
- Zhu, A., (Coauthors: **Xiaoyang Zhang** & **Fangjun Li** (SDSU)), Long-term Record of Methane Emissions from Biomass Burning.

The posters presented included:

- **Guojun Gu,** (Co-authors: Shu-Peng Ho, Xinjia Zhou, **Xi Shao**, and Yong Chen), The Planetary Boundary Layer Height Derived from COSMIC-2 and Spire GNSS Radio Occultation Profiles;
- **Jeannette Wild,** Reconciling ozone trend differences between NDACC/WMO ground-based stations and satellite COH with updated LOTUS Regression Model
- **Tomoaki Miura (UH-M),** Snow Detection in Himawari-8 Advanced Himawari Imager NDVI for Improved Autumn Phenology Monitoring
- **Yunyao Li** (GMU) (Coauthors: **Daniel Tong** (GMU) and **Xiaoyang Zhang** (SDSU)), Using AOD and UVAI to Reduce the Uncertainties in Wildfire Emission and Air Quality Forecast
- **Kai Yang;** The NO_2 Algorithm for GeoXO-ACX and Application to GEMS and TEMPO (see the figure below)

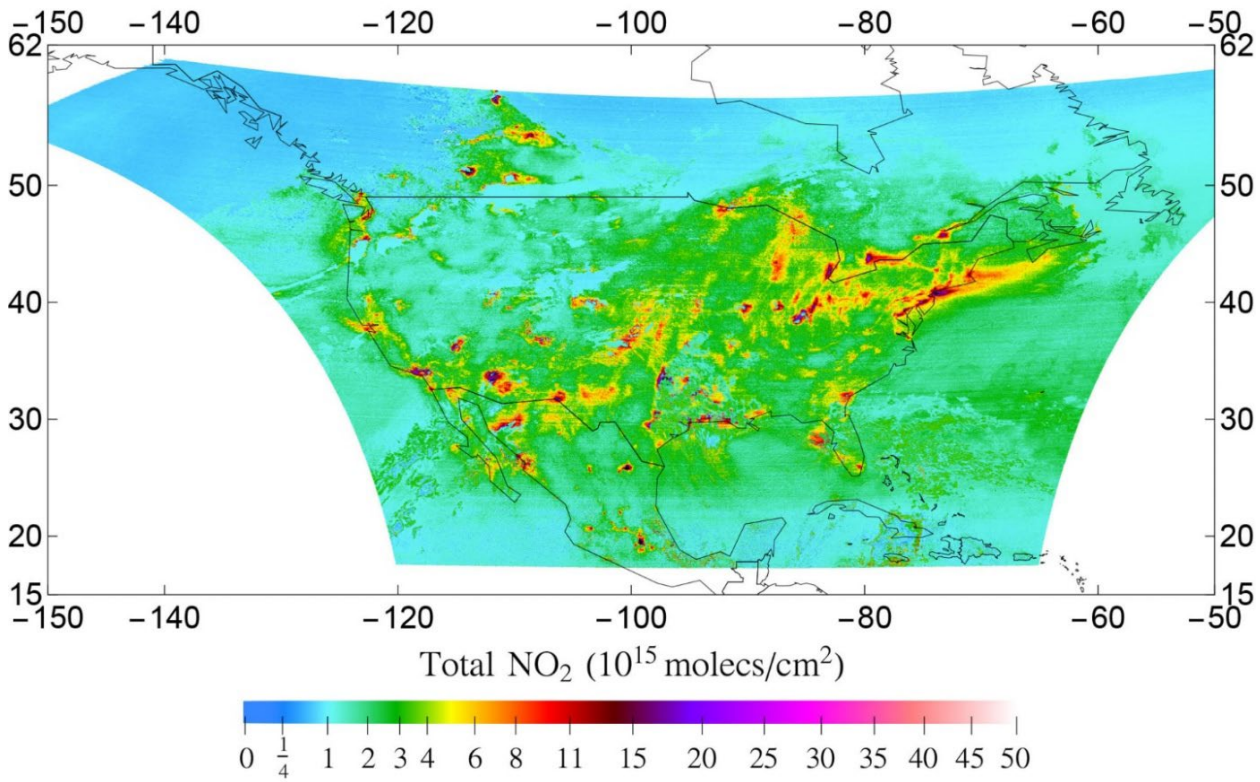

Figure: Total NO_2 over North America retrieved using NOAA's GeoXO ACX algorithm from TEMPO observation on November from: https://agu23.ipostersessions.com/default.aspx?s=E2-70-EC-CE-44-B4-7A-A0-A6-6E-79-AF-07-01-31-81&questview=true

Veljko Petković presented a poster on Exploring Machine Learning Applications in Passive Microwave Precipitation Retrievals. He also was the Session Chair for Space-Based Precipitation Observations: Innovations for Science and Applications I & II. Petkovic also chairs the AGU Fall Meeting Precipitation Technical Committee.
(Debra Baker, CISESS, drb@umd.edu; Funding: Task I)

PUBLICATIONS

Light acclimation of corals and the impact of higher temperatures
Citation**:** Mason, Robert A. B.; **William J. Skirving** and Sophie G. Dove, 2023: Photoacclimation dynamics in coral holobionts responding to thermal and irradiance changes correlate with photon pressure per symbiont. *Limnol. Oceanogr.*, **68**(11), 2529–2543, https://doi.org/10.1002/lno.12439 . Moderation of light levels by conditions within the coral tissue seems to affect the temporal dynamics of the photoacclimation response, and this finding emphasizes new avenues for photoacclimation research.
Summary: Photoacclimation is a key homeostatic process that enables photosymbiotic reef corals to flourish within highly variable light environments. However, the temporal dynamics of

photoacclimation remain poorly characterized. The authors studied photoacclimation for two types of coral (mounding *Porites* spp. and branching *Acropora muricata* – see photos below). Coral specimens preacclimated at 24°C and 171 μmol quanta m^{-2} s^{-1} were exposed to three light levels (−32%, +27%, and +65% relative to that of the acclimation period) at two temperatures (control, 24°C; mildly stressful, 29°C). Intra-tissue light environment—specifically, photon pressure per symbiont—increased dramatically with each additional light dose and again with increasing temperature in *Porites* spp.; net photosynthesis (P^{net}) rates continued to change for at least 2 weeks following light increase but not light reduction, and vice versa for symbiont densities. Intra-tissue light environments were substantially dimmer and more homogeneous among all light treatments in *A. muricata*, which continued to increase its light-use efficiency through time in most or all treatments. Consequently, prolonged change at elevated temperature in *Porites* spp. but not *A. muricata* may have been caused by differing photodamage loads. Moderation of light levels by conditions within the coral tissue seems to affect the temporal dynamics of the photoacclimation response, and this finding emphasizes new avenues for photoacclimation research.

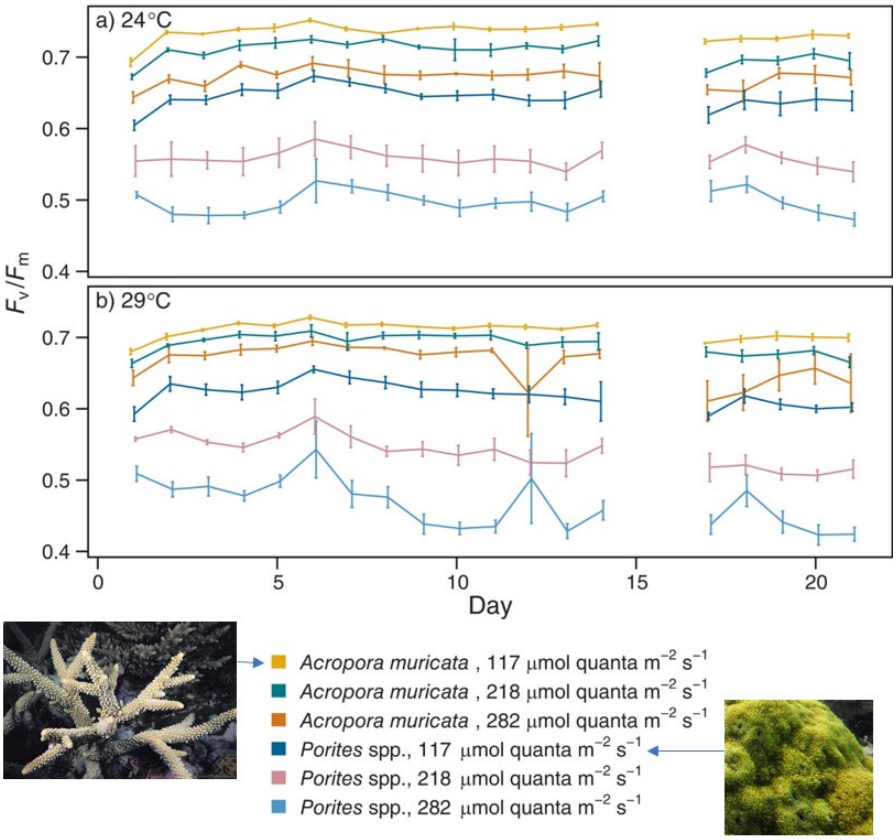

***Figure**: Time series of the dark-adapted yield of photosystem II (F_v/F_m), at (**a**) 24°C and (**b**) 29°C. All data points are the means of the median value per aquarium.*
(William Skirving, CISESS & ReefSense, william.skirving@noaa.gov, Funding: NOS)
This item was submitted in the SOCD Weekly Report in October without the final citation.