Products and Applications

Solar activity impact on Ozone: CISESS Scientist Chunhui Pan analyzed and evaluated solar activity impact to the data products of Suomi-NPP OMPS Nadir Profiler. Quantitatively assessed errors from the solar activity impact to the solar irradiance measurements. The percentage of unwanted signals due to solar activities to the solar measurements can be ±7 - 8 % in short wavelengths, which exceeded the performance requirement of 7% for the solar irradiance calibration. Calibration removes about 6% error from the solar activity attribution. This research is to be transfer to operation in the near further to improve solar measurements.

Figure: Study of solar activities impact to the Suomi-NPP Nadir Profiler. Left: Relative change of the MgII factor over sensor lifetime. The MgII factor is used to scale the intensity of solar activities over OMPS mission. The right figure estimates the unwanted signal from solar activities during OMPS solar observations.

(POC: Chunhui Pan, chunhui.pan@noaa.gov, Funding: JSTAR)
CCNY Graduate Student Article Published: CCNY graduate student E. Glenn published results of research linking warming Caribbean region sea-surface temperatures (SSTs) to changes in regional deep convection and rainfall, 1982-2020. The region is sensitive to SST changes, but its influence varies for different parts of the region and different seasons. The SSTs influence deep convection, and here results show that regional SSTs are warming annually and within seasons. However, regionally averaged convection-index values are decreasing annually and for the Dry Season. Spatial analyses show the convection index is better correlated with precipitation across the region than with sea-surface temperatures, annually and per season.

**Figure:** Annual-regional average SST anomalies (upper panel) and components of the annual-regional convection index (lower panels). The full index (a) shows a weak trend. The column buoyancy index (b) trend is correlated with the SST trend, while trends for the mid-level warming Index (c) and the inversion index (d) are negatively correlated.

(POC: T. Smith, tom.smith@noaa.gov, Funding: PDRA)

**Prioritizing Sequential Data Assimilation:** CISESS Scientist and AOSC Professor Jonathon Poterjoy has a new article in press at *Weather and Forecasting* the documents his collaboration with NOAA Atlantic Oceanographic and Meteorological Laboratory in a CISESS task to improve data assimilation. The article describes their experiments with the Hurricane Weather Research and Forecasting (HWRF) model package. Mesoscale models like this one periodically interrupted their sequential data assimilation with so solutions interpolated from a global model, which solves some practical problems with these models. This study uses HWRF to illustrate why next-generation modeling systems should prioritize sequential data assimilation at early stages of development. This framework permits the rigorous examination of all model system components—in a manner that has never been done for the HWRF model. Examples presented in the manuscript show how sequential data assimilation capabilities can accelerate model advancements and increase academic involvement in operational forecasting systems at a time when the United States is developing a new hurricane forecasting system.

**Figure:** *This shows the HWRF domain and the locations of satellite radiance measurements at 12 UTC 20 July 2017, color coded by satellite according to the legend on the left.*

Poterjoy, Jonathan; Ghassan J. Alaka Jr., and Henry R. Winterbottom, 2021: The irreplaceable utility of sequential data assimilation for numerical weather prediction system development:
Lessons learned from an experimental HWRF system. *Wea. Forecasting*, in press, [https://doi.org/10.1175/WAF-D-20-0204.1](https://doi.org/10.1175/WAF-D-20-0204.1).

*(POC: Jonathan Poterjoy, poterjoy@umd.edu, Funding: AOML)*