Weekly Report – April 22, 2022

Satellite Climate Studies Branch (SCSB)/CISESS

NOAA/NESDIS/STAR

Acting Branch Chief: John Knaff

Submitted by: John Knaff
Email: John.Knaff@noaa.gov
Phone: 970-491-8881

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TRAINING AND EDUCATION

Presentation on the Geostationary Lightning Mapper for the NWS Satellite Book Club: CISESS Scientist Joseph Patton presented virtually on Thursday, April 14th at the Satellite Book Club webinar series through the National Weather Service Office of Observations. His presentation described the lightning observations from the Geostationary Lightning Mapper (GLM) instrument on the GOES-R series satellites and how those observations can explain how thunderstorm activity affects air traffic. Examples showed that classifying lightning flashes by their size and frequency correlates to both thunderstorm intensity and the regions where airplanes tend to avoid thunderstorms in flight. This work demonstrates how GLM observations can be a powerful additional tool for aviation forecasters and other meteorologists. The audience was a mix of operational meteorologists, academics, and others involved in the weather enterprise. The webinar was recorded and is available on YouTube here: https://youtu.be/Ovn4J0l6aaY .

(POC: Joseph Patton, CISESS, jpatton4@umd.edu; Funding: GOES-R AWG & GOES-R PGRR)

MEDIA INTERACTIONS AND REQUESTS

***Maryland Today* Features CISESS-NOAA Unmanned Aircraft System (UAS) Sea Ice Study:** Yesterday (April 21, 2022), the University of Maryland's news site *Maryland Today* highlighted the work of the University of Maryland's Unmanned Aircraft System (UAS) Testing Site team and collaborating NOAA scientists who are experimenting with the use of UASs to aid in the collection of sea ice measurements. The project's goal is to collect independent on-site sea ice data for the validation satellite-based sea ice detection methods. This project is funded through CISESS and led by CISESS Scientist Jim Alexander. The article included the quote from NOAA sponsor, Sean Helfrich (NESDIS/STAR/SOCD) "We're hoping that by using such systems and equipping them with relatively low-priced cameras, we can get a valid estimation of what the satellite is seeing and how close that is to actual sea ice observations." CISESS just submitted a proposal that will extend this project another year. The article can be viewed at https://today.umd.edu/extreme-drone-ops-could-improve-ice-measurements.

(POC: Jim Alexander, CISESS & UMD UAS Test Site, jalex@umd.edu, Funding: Ocean Remote Sensing)

SOCIAL MEDIA AND BLOG POSTS

Twitter Post on Lightning and Aircraft Flight Path Observations During a Derecho Event: CISESS Scientist Joseph Patton posted to his personal Twitter account (@JosephPattonWx) an animation showing lightning flashes observed by the Geostationary Lightning Mapper (GLM) instrument on the GOES-R satellites and aircraft flight paths during the lifecycle of a large, strong complex of thunderstorms in the Midwest. The tweet received over 400 retweets/quote tweets and just under 2,000 likes, while the video itself was viewed over 53,000 times. Data analytics show that over 165,000 impressions were recorded, or events where different accounts were exposed to the tweet/video through retweets, comments, etc. The imagery serves as a powerful tool to visualize the value of the GLM in aviation forecasting. The tweet can be viewed on Twitter here: https://twitter.com/JosephPattonWx/status/1514651179539701764

(POC: Joseph Patton, CISESS, jpatton4@umd.edu; Funding: GOES-R AWG & GOES-R PGRR)

PUBLICATIONS

A New NOAA Blended Soil Moisture Product that Does Not Rely on Model Climatology:

Yin, Jifu, Xiwu Zhan, **Jicheng Liu**, and **Ralph R. Ferraro**, 2022: A New Method for Generating the SMOPS Blended Satellite Soil Moisture Data Product without Relying on a Model Climatology. *Remote Sens.*, **14**, 1700, https://doi.org/10.3390/rs14071700.

CISESS Scientists Jifu Yin, Jicheng Liu and Ralph Ferraro published a new article last month that grew out their work with NOAA's Soil Moisture Operational Product System (SMOPS). SMOPS is developed by National Oceanic and Atmospheric Administration (NOAA) to provide the real time blended soil moisture (SM) for Numeric Weather Prediction and National Water Model applications. However, all individual satellite SM data ingested into the current operational SMOPS are scaled to Global Land Data Assimilation System (GLDAS) 0-10 cm SM climatology before the combination. As a result, the useful information from the original microwave SM retrievals could be lost and the GLDAS model errors could be brought into the final SMOPS blended product. Considering the requirements of model-free satellite SM observations are growing, we propose to scale the individual SM retrievals to the Soil Moisture Active Passive (SMAP) data through building regression models. The rescaled individual SM data and the SMAP observations then have similar climatology and dynamics, which allows to produce the SMOPScdr (distinguishing with the current operational SMOPSopr) data using an equal-weight averaging approach. Allowing the product features to purely depend on readily available microwave SM observations, the method is feasible for operational implementation without requiring ancillary datasets. With respect to the in-situ SM measurements, the developed SMOPScdr more successfully tracks the surface SM status than the individual satellite SM products with significantly decreased errors. The proposed method also preserves the climatology of the reference SMAP data for the period when SMAP is not available, allowing us to produce a long-term SMOPScdr data product.

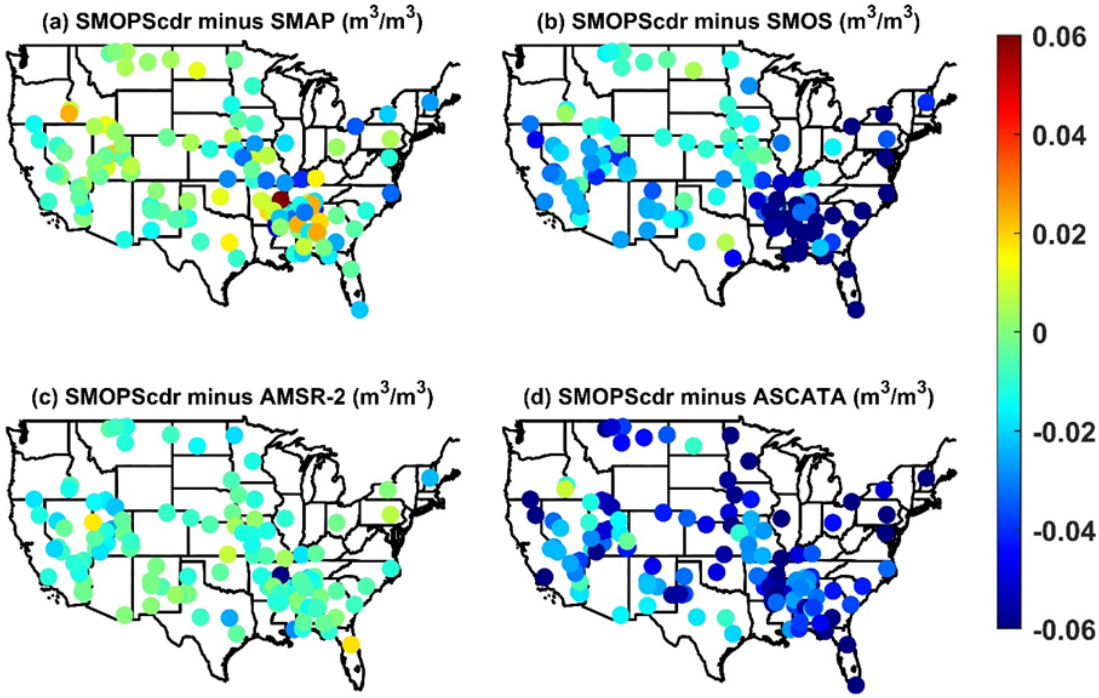

Figure. Differences in SCAN observations-based ubRMSE during 1 April 2015-30 August 2021 time period: (a) SMOPScdr minus SMAP, (b) SMOPScdr minus SMOS, (c) SMOPScdr minus AMSR-2, (d) SMOPScdr minus ASCATA. Patterns for ASCATA and ASCATB are very similar. Sites in blue color highlight better performance.

(POC: Jifu Yin, CISESS, jifu.yin@noaa.gov, Funding: JPSS PGRR, JSTAR GCOM, Legacy Migration, CPO MAPP & STAR)