Weekly Report – November 08, 2024

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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TRAVEL AND MEETING REPORTS

Guangyang Fang and his Interns Attend the 2024 Mid-Atlantic Severe Weather Conference

The ESSIC/CISESS Lightning and Virtual Reality research group, led by CISESS Scientist Guangyang Fang, actively participated in the 2024 Mid-Atlantic Severe Weather Conference held at the Science Museum of Virginia in Richmond, VA, on 26 October 2024. CISESS intern students Damian Figueroa and Samuel Wiggins represented the group. This annual conference is known for attracting a diverse group of attendees, including storm chasers, weather enthusiasts, amateur and professional meteorologists, weather broadcasters, and prominent researchers specializing in severe weather. Presentations spanned a variety of interests such as storm chasing, hail tracking, and damage surveys. This year, the conference introduced its first photo contest, with the first-place award going to the nature photographer and storm chaser Peter Forister. In addition, attendees also had the opportunity to view the specialized storm intercept vehicle, "StormCruzzer", designed for storm intercept missions, vehicle recoveries, and emergency assistance during severe weather. The 2024 Mid-Atlantic Severe Weather Conference successfully provided a platform for sharing expertise and experiences in severe weather phenomena, fostering both professional connections and public engagement. The participation of ESSIC/CISESS researchers and students underlined their commitment to advancing severe weather research and community outreach.

Figure: (left to right) Samuel Wiggins, Damian Figueroa, and Guangyang Fang at the conference.

(Guangyang Fang, CISESS, gfang@umd.edu; Funding: GOES-R AWG, GOES-R PGRR)

PUBLICATIONS

Examining Aerosol Variability in the North Indian Ocean
Citation: Zhang, Yongsheng, James Frech, Xuepeng Zhao, and Huai-min Zhang, 2024: Interdecadal springtime aerosol increase in the North Indian Ocean observed from the satellite AVHRR instrument. *J. Geophys. Res. Atmos.*, 129, e2024JD041028, https://doi.org/10.1029/2024JD041028.

(This lightly modified summary was written by Cazzy Medley and originally posted on the Earth System Science Interdisciplinary Center website.)

Summary: CISESS Scientists Yongsheng Zhang and James Frech and colleagues recently published a paper in the *Journal of Geophysical Research: Atmospheres* titled "Interdecadal Springtime Aerosol Increase in the North Indian Ocean Observed From the Satellite AVHRR Instrument".

In their paper, the researchers use a 38-year aerosol optical thickness satellite product from the Advanced Very High-Resolution Radiometer to investigate aerosol variabilities in the North Indian Ocean. They found that there are significant differences in aerosol levels between the equatorial region and the northern part of the Indian Ocean, especially with a noticeable increase in the Arabian Sea and Bay of Bengal since 2002.

The researchers attribute this variation to El Niño from 1983 to 2001 and a warm phase of the Atlantic Multi-decadal Oscillation (AMO) from 2002 to 2020. These climate patterns have created drier and warmer conditions along the coasts of East Africa, the Arabian Peninsula, and South Asia, which have led to higher aerosol emissions and longer-lasting aerosols. A warm phase of the AMO may aid the development of the remote teleconnection pattern in the midlatitude regions of the Northern Hemisphere, and thus reinforce the anomalies of atmospheric circulation in the subtropical regions.

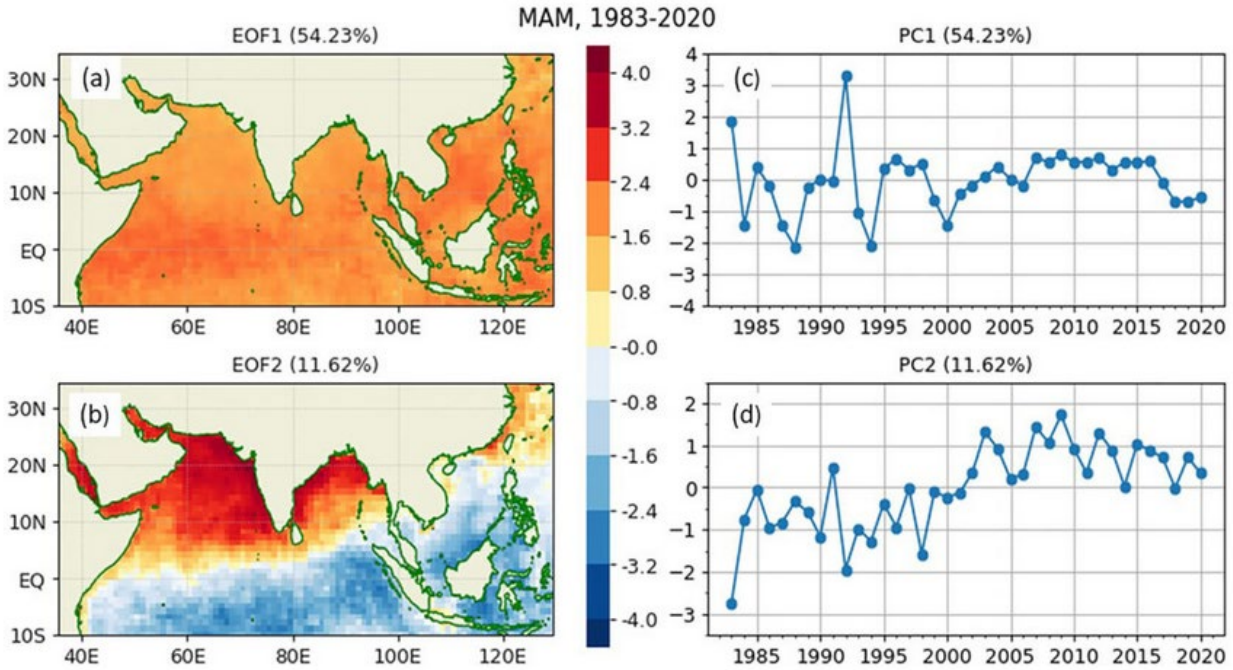

Figure: The leading spatial patterns (left panels) and the principal component (PC) time series (right panels) from the empirical orthogonal function (EOF) analysis on NCEI AVHRR aerosol optical thickness climate data records in the North Indian Ocean for March-April-May (MAM) of the years 1983 to 2020.

(Yongsheng Zhang, CISESS, yongsheng.zhang@noaa.gov, Funding: NCEI; James Frech, CISESS, james.frech@noaa.gov, Funding: NCEI)

Measuring Pollution Levels Through the Streets of Baltimore

Citation: Dickerson, Russell R., **Phillip Stratton**, Xinrong Ren, **Paul Kelley**, Christopher D. Heaney, Lauren Deanes, Matthew Aubourg, Kristoffer Spicer, Joel Dreessen, Ryan Auvil, Gregory Sawtell, Meleny Thomas, Shashawnda Campbell, and Carlos Sanchez, 2024: Mobile laboratory measurements of air pollutants in Baltimore, MD elucidate issues of environmental justice. *J. Air Waste Manag. Assoc.*, 74(11), 753–770, https://doi.org/10.1080/10962247.2024.2393178.

Summary: In their recent paper published in the *Journal of the Air & Waste Management Association*, CISESS Scientists Russell Dickerson, Phillip Stratton, and Paul Kelley, along with their colleagues, tackle the problem of black carbon in the air in Baltimore, MD. This paper is among the most read in the last year in this journal. The City of Baltimore has a history of issues with environmental justice (EJ), air pollution, and the urban heat island effect. Current chemical transport models cannot simulate pollutant concentrations at a high enough resolution to determine which neighborhoods experience unusually high air-pollution levels. Dickerson and

colleagues addressed this issue by travelling through the streets of Baltimore in NOAA's Air Resources Car, or ARC, an SUV outfitted with a roof rack supporting a sonic anemometer and inlets for trace gases and aerosols and other meteorological sensors.

They identified locations within Baltimore with high concentrations of black carbon pollution and pinpointed the likely source – diesel exhaust emissions exacerbated by stop-and-go traffic and associated turbo-lag. They offer suggestions on how to mitigate this situation for the sake of EJ, e.g., adjusting the traffic flow so that it is smoother, replacing diesel vehicles with electric vehicles, among others.

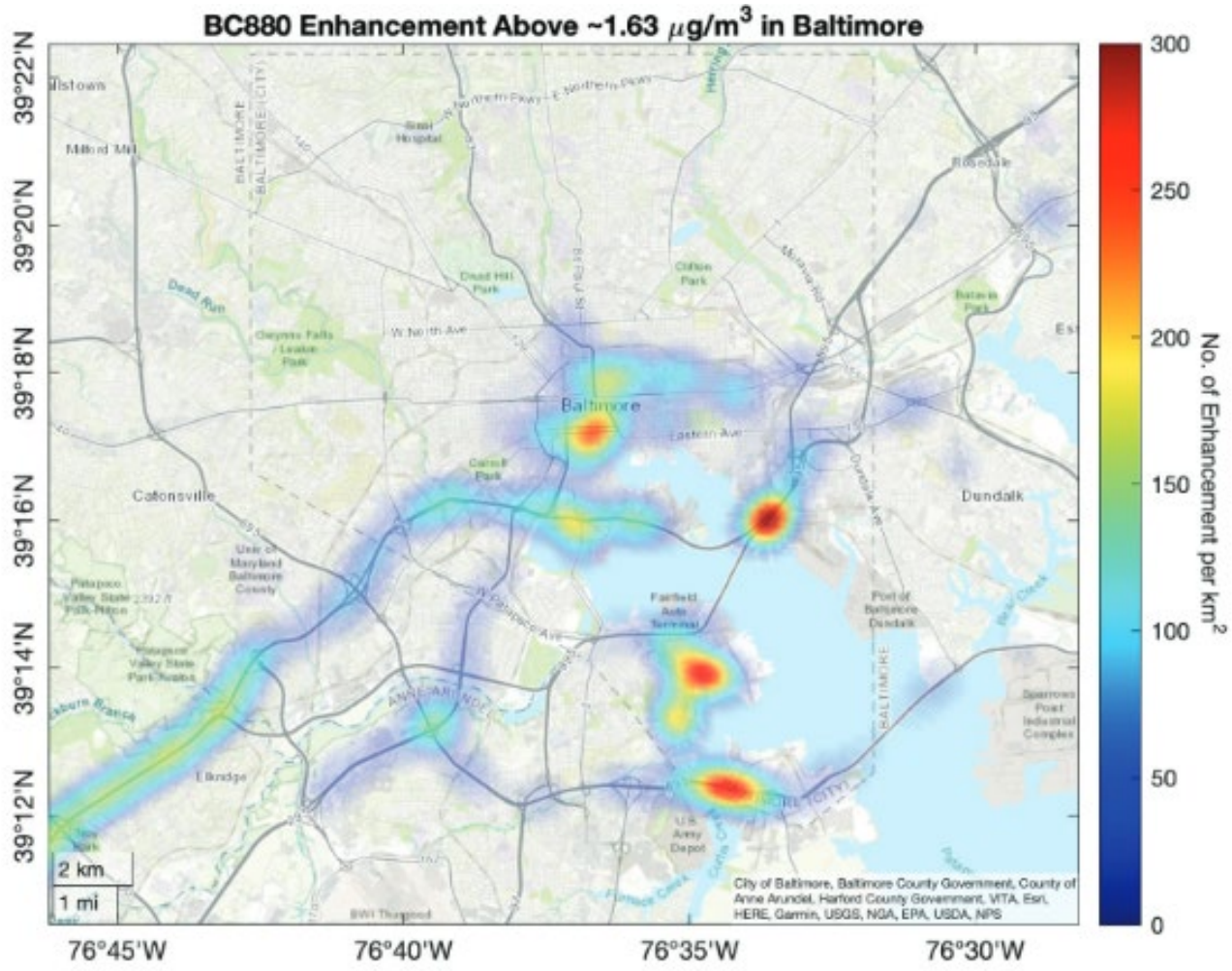

Figure: Intensity plot of the number of times black carbon levels above 1.63 µg m−3 were observed during 29 cruises of NOAA's ARC between March and May 2022, generally near midday of weekdays. Note maxima along major highways, downtown, and around Curtis Bay.

(Russell Dickerson, CISESS, rrd@umd.edu, Funding: ARL; Phillip Stratton, CISESS, pstratto@umd.edu, Funding: ARL; Paul Kelley, CISESS, paul.kelley@noaa.gov, Funding: ARL)

(Maureen Cribb, CISESS, mcribb@umd.edu, Funding: CISESS Task I)