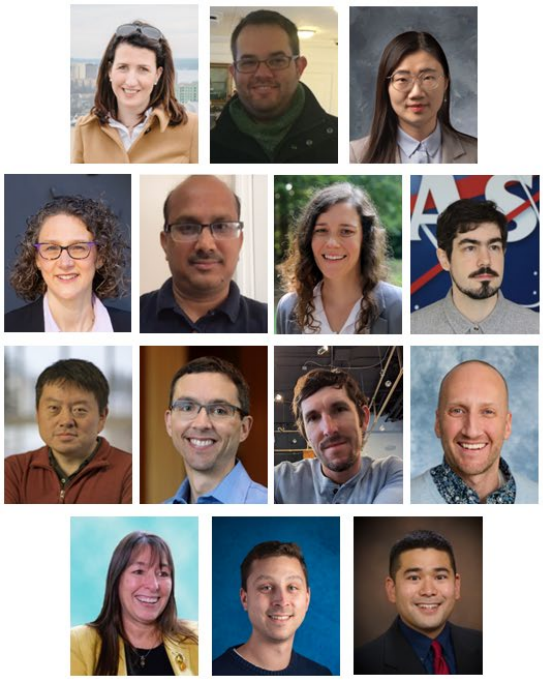
NASA Health and Air Quality
remote sensing for public health

Volume 43
April – June 2025

LAUNCH OF NASA HAQAST 2025-2029

The NASA Health and Air Quality Applied Sciences Team (HAQAST) 2025-2029 was announced in June 2025. To learn more about HAQAST accomplishments since 2011, visit the HAQAST website, view past meeting recordings, and subscribe to the newsletter.



NASA Health and Air Quality Applied Sciences Team Members (HAQAST) 2025-2029

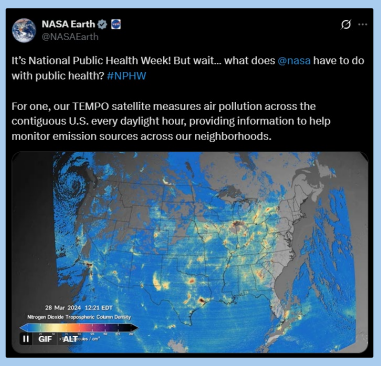
Tracey Holloway (Team Lead, UW-Madison)
Daniel Anderson (University of Maryland Baltimore County)
Xi Chen (University of Iowa)
Arlene Fiore (Massachusetts Institute of Technology)
Pawan Gupta (NASA Goddard)
Jennifer Kaiser (Georgia Tech)
Carl Malings (Morgan State University)
Jingqiu Mao (University of Alaska, Fairbanks)
Randall Martin (Washington University)
Aaron Naeger (NASA Marshall)
Jeffrey Pierce (Colorado State University)
Amber Soja (National Institute of Aerospace)
Travis Toth (NASA Langley)
Christopher Uejio (Florida State University)

haqast.org

HAQAST

NATIONAL PUBLIC HEALTH WEEK 2025

In April 2025, **National Public Health Week (NPHW)**, which is supported by the American Public Health Association (APHA), highlighted the *It Starts Here* theme. The NASA HAQ and Communications Teams **(Sofie Bates, NASA GSFC)** prepared social media communications (NASA Earth Facebook post / X post) to highlight how TEMPO data can help inform air quality management decisions that protect community health.



Social media post on NASA Earth X on April 7, 2025

HEALTH AND AIR QUALITY APPLICATIONS
EARTH ACTION PROGRAM

JOHN HAYNES
PROGRAM MANAGER
HEADQUARTERS

HELENA CHAPMAN
ASSOCIATE
HEADQUARTERS/BAH

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LANGLEY RESEARCH CENTER

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QUARTERLY HAQ PROJECT HIGHLIGHT:

GUIDING URBAN HEAT PLANNING AND MITIGATION IN LOS ANGELES COUNTY

Supported through a 2021 HAQ grant, **Peter Kalmus (Jet Propulsion Laboratory)** and his team have successfully integrated high-resolution temperature data to guide stakeholders' urban heat planning and mitigation in Los Angeles County. The team integrated 375m resolution surface air temperature (Tair) data, created from VIIRS land surface temperature within a machine learning algorithm to improve neighborhood-scale extreme humid heat applications in Los Angeles County. The team co-organized a virtual workshop with the Los Angeles County Chief Sustainability Office in April 2023 and are planning a second workshop in Summer 2025. The new Tair product has improved urban heat planning throughout Los Angeles County, with stakeholder applications focusing on prioritizing individual building retrofits (led by UCLA) and shade structure installation at dangerous pedestrian locations (led by ICF, a consulting firm).

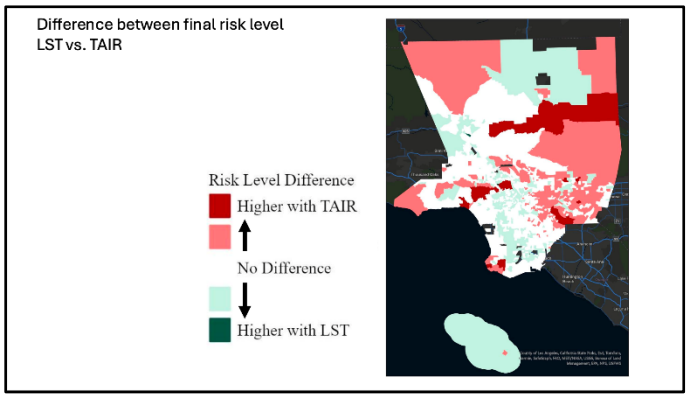


Figure 1: Visualization of change in risk level to pedestrians in Los Angeles using ultra-high-resolution surface air temperature data instead of land surface temperature. Red indicates increased risk levels indicated by the new dataset, while green represents decreased risk levels). Credits: P. Kalmus

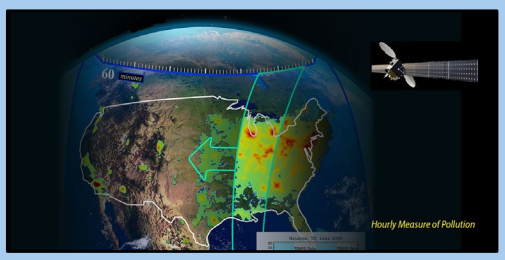
HAQ COMMUNITY ENGAGEMENT

The NASA HAQ team (**John Haynes, NASA HQ; Helena Chapman, NASA HQ/BAH**) presented webinars and engagements that introduced the HAQ program and key examples of using Earth observations for public health applications to undergraduate and graduate students and faculty.

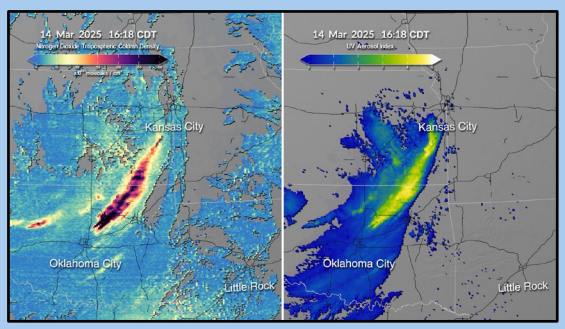
- ❑ **University of Georgia & Nova Southeastern University (Virtual):** As part of National Public Health Week, J. Haynes and H. Chapman presented an overview of the HAQ focus area and selected HAQ projects for the University of Georgia's (18 attendees) and Nova Southeastern University's (56 attendees) Schools of Public Health in April 2025.
- ❑ **George Washington Univ. (In-person & Virtual):** H. Chapman gave an invited lecture to the Global Health and Development undergraduate course (30 attendees) and the Global Health graduate seminar (5 attendees) on One Health and projects using Earth observations for health applications in April and June 2025.
- ❑ **NASA (Virtual):** J. Haynes described the HAQ program and selected projects for the NASA STEM Enhancement in Earth Science (SEES) Internship (50 attendees) in June 2025.

TEMPO MISSION & EARLY ADOPTER PROGRAM ACTIVITIES

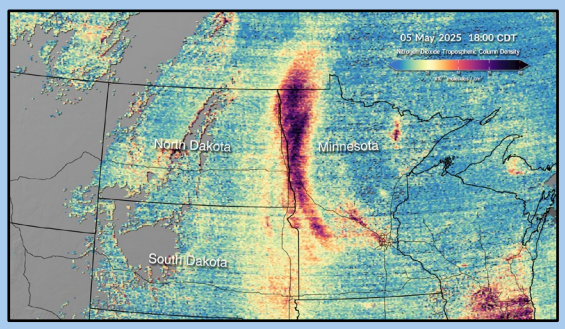
Notably, June 19 marked the successful completion of TEMPO's 20-month-long initial prime mission, with plans (based on the quality of measurements to date) for an extended mission until at least September 2026. The NASA Scientific Visualization Studio showcased two spring events that captured NO_2 and PM in a dust and wildfire event across the U.S. Central Plains (April 2025) and NO_2 driven by soil emissions over Minnesota (May 2025).



TEMPO. Source: TEMPO website

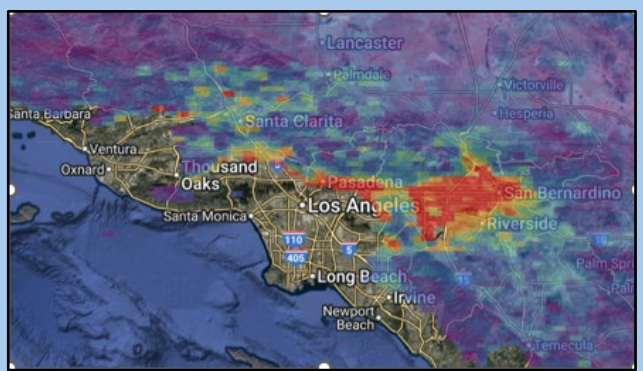


On April 14, 2025, strong winds triggered the formation of a huge dust storm in the U.S. Central Plains and fueled grassland fires in Oklahoma: NO_2 plumes from grassland fires sparked by the storm (left) and UV aerosol index of dust and smoke particles (right).



On May 5, 2025, high NO_2 columns were noted at the Red River Valley (North Dakota/Minnesota state line), driven by soil emissions in agriculturally-rich areas. Other activities seen include small fires, mining activities, and urban emissions.

Additional TEMPO visualization capabilities were launched in ArcGIS Living Atlas (formaldehyde and total column ozone data) and Google Earth Engine (with starter code for visualizing data throughout the daytime). The TEMPO team shared TEMPO mission updates and use case demonstrations with a focus on wildland fires and dust storms at the **NASA/GLOBE PM2.5 Low-Cost Sensor Workshop,** facilitating discussions on the fusion of TEMPO and low-cost sensor data with 40 participants. Also, they coordinated the implementation of several successful special operations consisting of 10-minute scans targeting a prescribed burn field experiment in Ft. Stewart, GA, on April 17, and lightning NOx across the central to eastern portions of the U.S. on June 19, 20, and 24.



Google Earth Engine visualization of tropospheric NO_2 columns from TEMPO for the 1500 UTC scan on July 13, 2025. High NO_2 columns are shown across the eastern portion of Los Angeles, while extensive cloud coverage causes coverage gaps in the west.

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GEO HEALTH COMMUNITY OF PRACTICE HOLDS MONTHLY TELECON

The Group on Earth Observations (GEO) Health Community of Practice (CoP) – led by **John Haynes (NASA HQ)**, **Juli Trtanj (NOAA)**, and **Didier Davignon (ECCC)** – continues to coordinate community teleconferences to leverage expertise across sectors and geographies and share Earth observation data and tools to support health decision-making. In April 2025, **J. Trtanj** retired from her career service at NOAA. Approximately 40 attendees participated in the telecon (see synopsis below).

- ❑ April 2025: The CoP leadership moderated a discussion about GEO updates, CoP Convener Plan for 2025-2027, opportunities to support the Post-2025 GEO Strategy (including One Health priority), and CoP members' expectations and feedback.

The leads of the CoP Work Groups – Heat, Air Quality, Infectious Diseases, Food Safety and Security, Health Care Infrastructure, and Animal Health – have continued to coordinate telecons with CoP members, offering valuable opportunities for scientific exchange and networking. Also, three GEO blog articles – Predicting cholera using remote sensing data: a glimpse into the future; 15 cutting-edge research innovations using Earth Intelligence to tackle global health challenges; and Mapping the plastic crisis from space – were published in April and May 2025.

PROMOTING AIR QUALITY DECISION SUPPORT AT AWMA 2025

In June 2025, the NASA HAQ Team coordinated the scientific session, *The Next Generation of NASA Air Quality Satellite Observations for Decision Making*, at the Air & Waste Management Association (AWMA) Annual Conference & Exhibition in Raleigh, NC. Presentations from **John Haynes (NASA HQ)**, **Aaron Naeger (NASA MSFC)**, **Yang Liu (Emory Univ.)**, and **Morgaine McKibben (NASA GFSC/SSAI)** described how TEMPO, MAIA, and PACE satellite observations can help fill data gaps in current air quality decision-making processes to over 45 attendees. Also, **J. Haynes** and **Helena Chapman (NASA HQ/BAH)** highlighted how NASA Earth science applications can help promote One Health collaborations in air quality management to 20 attendees in the Health Effects & Exposure session.

HAQAST TEAM PUBLISHES GROUND-BREAKING REVIEW OF SATELLITE DATA TO SUPPORT AIR QUALITY MANAGEMENT

Led by **Tracey Holloway (HAQAST Team Lead, Univ. of Wisconsin-Madison)**, the *Satellite Data to Support Air Quality Assessment and Management* publication was touted during the 2025 A&WMA Critical Review session at the Air & Waste Management Association (AWMA) Annual Conference & Exhibition in June 2025. This review highlighted key advancements in satellite data for air quality applications (including $PM_{2.5}$ and NO_2) over the past 15 years, including progress toward assessing health risk, constraining emissions inventories, and tracking short- and long-term trends with regulatory relevance. The primary message underscored the importance of co-developed solutions with researchers and practitioners to ensure continued improvements in the use and value of satellite data for air quality applications.

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NASA CURIOUS UNIVERSE

In April 2025, NASA's Curious Universe team launched the five-episode Season 9 (Earth Series): Episode 1 (How NASA Sees Our Blue Marble), Episode 2 (The Ocean, Now in Full Color), Episode 3 (From Space to Your Plate), Episode 4 (Monitoring the Air We Breathe), and Episode 5 (What's Next for NASA Earth Science). Notably, **Laura Judd (NASA LaRC)** shared perspectives on her air quality research from satellite observations and airborne field campaigns in Episode 4.

Credits: NASA

LOOKING AHEAD

ARSET Training:

Introducción al Monitoreo y Gestión de Incendios Forestales Mediante Observaciones Satelitales y Herramientas de la NASA
July 9-23, 2025

Meetings:

AmeriGEO Week
August 11-15 2025
Bogotá, Colombia and Virtual

TEMPO/GeoXO ACX Joint Science Team Workshop
August 19-22, 2025
Cambridge, MA

NATIONAL MOSQUITO AWARENESS WEEK 2025

In June 2025, the NASA HAQ and Communications Teams **(Sofie Bates, NASA GSFC; Jocelyn Argueta, JPL)** prepared social media communications (NASA Earth Facebook post / X post) to support the American Mosquito Control Association's National Mosquito Awareness Week 2025. Highlights included the NASA Earthdata Data Pathfinders (Diseases/Epidemics).


Credits: CDC

RECENT COMMUNICATIONS

NASA

- ❑ NASA's Houston We have a Podcast; Small Steps, Giant Leaps; and Universo Curioso de la NASA
- ❑ NASA Airborne Sensor's Wildfire Data Helps Firefighters Take Action
- ❑ NASA's PACE Mission Reveals a Year of Terrestrial Data on Plant Health
- ❑ NASA's Hurricane Science, Tech, Data Help American Communities

NASA Earth Observatory

- ❑ 2025 Fires in the Northern Hemisphere
- ❑ Sizzling Start to Summer
- ❑ Dusty Skies in California Farm Country

NASA Earthdata

- ❑ Flooding in the Midwest and Southeast U.S.
- ❑ Severe Weather in Central Europe
- ❑ High Aerosol Index from Canadian Wildfires

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EARTH DAY 2025

For over 50 years, NASA has observed Earth from space, with cutting-edge scientific technology that has revolutionized our understanding of our planet and provided benefits to all humanity. Read Celebrating Earth as Only NASA Can, download the Earth Day 2025: Posters and Virtual Backgrounds, and create Your Name in Landsat.

Credits: NASA

PAST

ARSET Trainings:

Introduction to the Integration of Animal Tracking and Remote Sensing
May 20-22, 2025

LiDAR Profiling Satellite Observations for Air Quality Applications
June 4-11, 2025

Meetings:

American Thoracic Society International Conference
May 16-21, 2025
San Francisco, CA

Air & Waste Management Association's Annual Conference & Exposition
June 9-12, 2025
Raleigh, NC

PUBLICATIONS

Assessment of Water Scarcity as a Risk Factor for Cholera Outbreaks. *Science of the Total Environment*. (B. Magers, M. Usmani, K.D. Brumfield, A. Huq, **R.R. Colwell**, **A.S. Jutla**)

A Health Impact Assessment of Progress towards Urban Nature Targets in the 96 C40 Cities. *Lancet Planetary Health*. (G.K. Martin, D. Rojas-Rueda, K.C. Fong…**S.C. Anenberg**)

Changing Ecosystems and the Role of One Health: Engaging Public Health Professionals. *American Journal of Public Health*. (**H.J. Chapman**, M. Akpinar-Elci, L.H. Kahn, T.J. Doker)

Tracking Air Pollution and CO2 Emissions in 13,189 Urban Areas worldwide using Large Geospatial Datasets. *Nature Communications Earth & Environment*. (S-Y Kim…**R.V. Martin**, J.J. West, **S.C. Anenberg**)

Satellite Data to Support Air Quality Assessment and Management. *Magazine for Environmental Managers*. (**T. Holloway**, **J. Bratburd**, **A. Fiore**, G. Kerr, **J. Mao**)

Global Health Benefits of Policies to Feduce On-road Vehicle Pollution through 2040. *Environmental Research Letters*. (L. Jin, J. Benoit, M.O. Nawaz…**S. Anenberg**)

Compound Drought and Heatwave Extreme Weather Events: Mortality Risk in Individuals with Chronic Respiratory Disease. *Environmental Epidemiology*. (A. Rau, A.K. Baldomero, **J.E. Bell**, et al)

Potential Errors in CMAQ NO:NO2 Ratios and Upper Tropospheric NO2 Impacting the Interpretation of TROPOMI Retrievals. *ACS EST Air*. (A.S. Lawal…**D.L. Goldberg**, J. Kaiser, **A.G. Russell**)

Prenatal Exposure to Fine Particulate Matter Composition and Risk of Cerebral Palsy: A Population-Based Retrospective Cohort Study in Ontario, Canada. *Environmental Pollution.* (A. Ahmed…**R.V. Martin**, É. Lavigne)

Insights Into Summertime Surface Ozone Formation From Diurnal Variations in Formaldehyde and Nitrogen Dioxide Along a Transect Through New York City. *JGR Atmospheres.* (M. Tao, **A.M. Fiore**…**L.M. Judd**…**D. Tong**, S. Ma, S.B. Adamo, **T. Holloway**)

Tracking air pollution and CO2 emissions in 13,189 urban areas worldwide using large geospatial datasets. *Communications Earth & Environment.* (S-Y Kim…**R. V. Martin**, J.J. West, **S.C. Anenberg**)