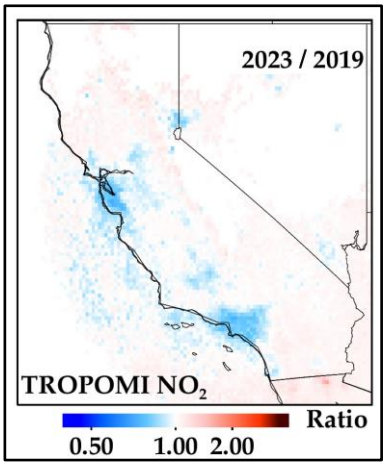
NASA Health and Air Quality
remote sensing for public health

Volume 46
January – March 2026

QUARTERLY HAQ PROJECT HIGHLIGHT:

ADOPTION OF ELECTRIC VEHICLES TIED TO REAL-WORLD REDUCTIONS IN AIR POLLUTION

When California neighborhoods increased their number of zero-emissions vehicles (ZEV) between 2019 and 2023, they also experienced a reduction in air pollution. For every 200 vehicles added, nitrogen dioxide (NO_2) levels dropped 1.1% [95% CI: -1.2%, -1.0%]. The results, obtained from a new analysis based on statewide satellite data, are among the first to confirm the environmental health benefits of ZEVs, which include fully electric and plug-in hybrid cars, in the real world. Researchers at the University of Southern California (USC), the George Washington University (GWU), the University of California Irvine (UC-Irvine), and the University of California San Diego (UCSD) published results in *The Lancet Planetary Health,* showing that TROPOMI satellite data, which covers the entire planet once per day, can reliably track changes in combustion-related air pollution. This information can offer a new way to study the effects of the transition to electric vehicles and other environmental interventions.



Change in NO_2 as observed by TROPOMI over California (2019-2023). Reductions of >20% can be seen in areas of highest ZEV adoption. Credit: D. Goldberg

ONE HEALTH AWARENESS MONTH

Each year, January is recognized as U.S. National One Health Awareness Month. To promote One Health activities, the NASA HAQ team (**John Haynes, NASA HQ; Laura Judd, NASA LaRC; Helena Chapman, NASA HQ/BAH**) presented Hyperwall talks at the American Meteorological Society annual meeting in Houston, TX.

HAQ team at the NASA Hyperwall during AMS 2026. Credits: H. Chapman and A. Naeger

HEALTH AND AIR QUALITY APPLICATIONS
EARTH ACTION PROGRAM

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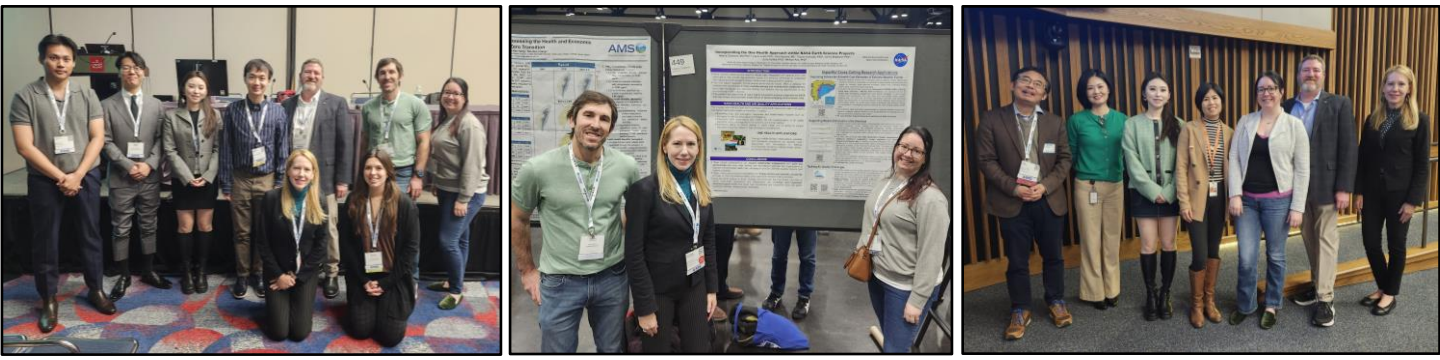
NASA HAQ TEAM HOSTS SCIENTIFIC SESSIONS AT AMS 2026

At the American Meteorological Society (AMS) 2026, **Laura Judd (NASA LaRC)** and **Helena Chapman (NASA HQ/BAH)** coordinated the scientific session entitled, *Benefiting Decision Support Tools using Earth Science Data,* at the 17th Conference on Environment and Health in Houston, TX. Over 45 attendees heard **John Haynes (NASA HQ)**, **Yun Hang and Zhengyi Cui (Univ. of Texas Health Science Center at Houston)**, **Weizhi Deng (Univ. of Iowa)**, and **Akihiko Nishino (Keio Univ.)** describe examples of integrating satellite- and ground-based data to improve air quality monitoring and heat surveillance in Bangladesh, Japan, and the United States. Also, the HAQ team supported the *Incorporating the One Health Approach with NASA Earth Science Projects* poster and presented talks at the NASA Hyperwall exhibit. **L. Judd** presented the *Intercomparing Results of GEMS and TEMPO NO_2 Data Evaluation with Airborne Spectrometer Data* topic in the Air Quality Insights from Satellite Retrievals II session.

As continued community engagement, the HAQ team and **Jun Wang (Univ. of Iowa)** presented a departmental seminar entitled, *Advancing Public Health with Satellite Data: Spatiotemporal Approach for Environmental Monitoring and Action*, to 40 students and faculty at the University of Texas Health Science Center at Houston's School of Public Health.



NASA HAQ session panelists (left) and HAQ poster (middle) at AMS 2026. HAQ team with UTHealth Houston team (right). Credits: H. Chapman

NASA INVESTIGATOR UPDATES

- ❑ **Paul Block (Univ. of Wisconsin-Madison)**: His HAQ project was highlighted on the NASA Science Blog entitled, NASA Looks to Advance Dengue Preparedness in Puerto Rico, in March 2026.
- ❑ **Jenny Bratburd (Univ. of Wisconsin-Madison):** She presented on the *Meaning in the Metrics: Communicating Research Insights* panel of the 2026 UW Madison Data Bazaar in March 2026.
- ❑ **Ken Davis (Penn State Univ.)**: His HAQ project was highlighted on the NASA Science Blog entitled, NASA-Supported Study Finds Irrigation Gaps in Air Quality Forecasts, in March 2026.
- ❑ **Gaige Kerr (George Washington Univ.):** He shared scientific insight on Protecting Human Health, as part of the Innovation Now series, in January 2026.
- ❑ **Yang Liu (Emory Univ.):** His research was highlighted in the Do not inhale! How wildfire smoke 'affects the whole body' article from February 2026.

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NASA HAQ TEAM HOSTS SYMPOSIUM AT AMCA 2026

In March 2026, the HAQ team coordinated the *Data Connections: NASA Earth Science Applications and Innovative Technologies to Monitor Vector Habitats* Symposium at the American Mosquito Control Association (AMCA) Annual Conference in Portland, OR. Moderated by **Helena Chapman (NASA HQ/BAH)**, 90 attendees heard **John Haynes (NASA HQ)**, **William Pan (Duke Univ.), Michael Wimberly (Univ. of Oklahoma), Tatiana Loboda (Univ. of Maryland, College Park),** and **Russanne Low (Institute for Global Environmental Strategies)** describe projects incorporating satellite and other environmental datasets to forecast risk of vector-borne disease transmission (e.g., dengue, malaria, West Nile virus) and enhance community stakeholder engagement with citizen science applications. **H. Chapman** also presented the talk, *NASA Data Visualizations to Enhance Environmental Health Messaging* (in Spanish), as part of the Latin American Symposium, with 50 attendees.

NASA HAQ session panelists at AMCA 2026. Credits: H. Chapman

TEMPO MISSION & EARLY ADOPTER PROGRAM ACTIVITIES

- ❑ TEMPO data visualizations were updated with O_3 profile products (i.e., tropospheric O_3 column) in Worldview, and near real-time NO_2 and HCHO products in NASA ArcGIS.

- ❑ **ARSET Training on *Geostationary Remote Sensing of Trace Gases for Air Quality Applications in North America* (January 2026 / Virtual):** The training provided details on TEMPO's capabilities and trace gas products and demonstrated how to visualize TEMPO data using NASA Worldview (Recording). More than 416 participants representing 40 U.S. states attended the event.

TEMPO. Source: TEMPO website

- ❑ **4th International Smoke Symposium (March 2026 / Tallahassee, FL): A. Naeger** presented a keynote presentation on the TEMPO mission, and the ARSET program held the *NASA Satellite Observations and Tools for Fire and Smoke Monitoring* hands-on training session, focused on using the TEMPO trace gas products for monitoring smoke from wildland fires (Resources).

ARSET team in front of a prescribed burn conducted at the 4th International Smoke Symposium. Credit: A. Naeger

GEO HEALTH COMMUNITY OF PRACTICE & REGIONAL NETWORKS

The Group on Earth Observations (GEO) Health Community of Practice (CoP) – led by **John Haynes (NASA HQ)** and **Didier Davignon (ECCC)** – coordinates community teleconferences to leverage expertise across sectors and geographies and share Earth observation data and tools to support health decision-making. Work Group leaders continue to engage CoP members in sharing research applications and networking.

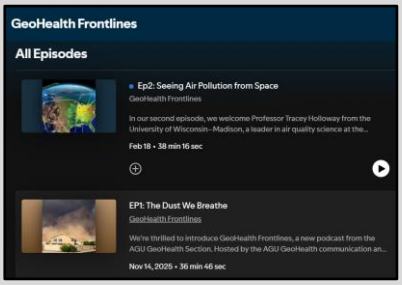
From January to March 2026, the CoP coordinated two events and published three blog articles:

- **CoP/AfriGEO Special Edition Telecon**: This third annual CoP/AfriGEO event showcased ongoing Earth science applications addressing emerging health challenges across Africa. With 165 attendees, 23 flash talks highlighted air quality (urban air pollution, wildfire/volcanic plumes, dust storms, stakeholder engagement), infectious disease forecasting and surveillance (avian influenza virus, cholera, malaria, meningitis), and health care preparedness (extreme weather). Panelists represented institutions in Ethiopia, Ivory Coast, Kenya, Nigeria, and Sudan, as well across Western Africa and globally.
- **Air Quality Workshop:** The two-day *Capacity Building Workshop to Use Earth Observations for Air Quality: Focus on Africa* showed 50 attendees (from 18 countries and 35 institutions) how to access and visualize data and highlighted examples of air quality applications in Africa using Google Earth Engine and Python via Jupyter notebooks (Resources).
- **GEO blog articles**: From Earth observations to healthier societies: One Health in action at AmeriGEO Week 2025 (Jan. 2026), How Africa uses Earth Intelligence to improve air quality: 12 projects to know (Feb. 2026), and How Africa uses Earth Intelligence to combat infectious disease (Mar. 2026).

AGU GEOHEALTH FRONTLINES

As part of the GeoHealth Frontlines podcast, led by the AGU GeoHealth section, **HAQAST Lead Tracey Holloway (Univ. of Wisconsin-Madison)** and former HAQAST/HAQ researcher **Daniel Tong (George Mason Univ.)** shared their research journeys with the GeoHealth community and advice for early-career scientists. As experts in atmospheric science and air quality modeling, they described how their research teams are using Earth observations to reduce air quality monitoring gaps and enhance predictions of air quality trends.

- **Episode 1 ("The Dust We Breathe"): D. Tong** highlighted Earth science tools for studying dust events, described environmental health risks of dust storms (including Valley Fever transmission), and offered insight from the UN High-Level Meeting on Dust Storms.
- **Episode 2 ("Seeing Air Pollution from Space"): T. Holloway** demonstrated how satellite data can transform air quality and health research applications for stakeholder communities, presented the 50-year success story between U.S. air quality and energy systems, and showcased how HAQAST translates science into real-world impact.



Screenshot of the AGU GeoHealth Frontlines podcast

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HAQ COMMUNITY ENGAGEMENT

HEALTH & AIR QUALITY

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

- ❑ **UTHealth School of Public Health at Houston: J. Haynes, L. Judd**, and **H. Chapman** presented a departmental webinar on selected HAQ projects and airborne campaigns in January 2026 (40 attendees).
- ❑ **George Washington Univ.: H. Chapman** gave invited lectures on One Health and selected HAQ projects for the *Risk Management and Communication* course (8 attendees) and *Global Health and Development* course (33 attendees) in February–March 2026.
- ❑ **Instituto de Altos Estudios Nacionales (Virtual for Ecuador)**: **H. Chapman** shared the *Promoting Earth Observations and One Health* (in Spanish) talk as an invited panelist in March 2026 (30 attendees).

LOOKING AHEAD

ARSET Trainings:

Monitoring Groundwater Changes for Water Resources Management
April 23-30, 2026

Meetings:

HAQAST Madison
May 13-14, 2026
Madison, WI

American Thoracic Society International Conference
May 15-20, 2026
Orlando, FL

Air & Waste Management Association's Annual Conference & Exposition
June 21-24, 2026
Austin, TX

RECENT COMMUNICATIONS

NASA

- ❑ Temperatures Rising: NASA Confirms 2024 Warmest Year on Record (Roxana Bardan)
- ❑ How New NASA, India Earth Satellite NISAR Will See Earth and NASA-ISRO Mission Will Map Farmland From Planting to Harvest (Jet Propulsion Laboratory)
- ❑ NASA Analysis Shows Unexpected Amount of Sea Level Rise in 2024 (Jet Propulsion Laboratory)
- ❑ Arctic Winter Sea Ice Ties Record Low, NASA, NSIDC Scientists Find (James Riordon)

NASA Earth Observatory

- ❑ Happy 2025 from NASA Earth Observatory!
- ❑ 2024 Was the Warmest Year on Record (Sally Younger)
- ❑ Fuel for California Fires (Emily Cassidy)
- ❑ Sweater Weather in North America (Adam Voiland)
- ❑ Summer Heat Wave in South America (Kathryn Hansen)
- ❑ Storm Brings a Potpourri of Hazards to the U.S. and Dusty Inferno Hits Oklahoma (Adam Voiland)

NASA Earthdata

- ❑ Wildfires in Los Angeles, California
- ❑ Ranger Road Fire, Oklahoma and Kansas
- ❑ FIRMS Releases New Features to Identify Active Fires by Type (Diane Davies)
- ❑ New PACE Imagery Services in ArcGIS Living Atlas of the World (Morgaine McKibben)

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PUBLICATIONS

Classification of Global Aerosol Types and its Radiative Effects using Aerosol Robotic Network (AERONET) Data. *Atmospheric Environment.* (S. Mukhopadhyay…**P. Gupta**)

Near-Source Ammonia (NH_3) Fluxes and Evolution Observed from Airborne Measurements in Plumes up to 25 km Downwind from Large Beef Cattle Facilities. *Journal of Geophysical Research: Atmospheres*. (J.F. Juncosa Calahorrano…**J.R. Pierce**, et al.)

Improving Annual Fine Mineral Dust Representation from the Surface to the Column in GEOS-Chem 14.4.1. *Geoscientific Model Development*. (D. Zhang, **R.V. Martin**, et al.)

Decoding Clues on Dominant Combustion Phase and Aerosol Chemical Regimes via Key Tracers of Fire Plumes. *npj Clean Air*. (E. Dovrou, **A.J. Soja,** E. Gargulinski, A. Voulgarakis)

A Machine Learning-Based Dynamic SST Index for Long-Lead Malaria Prediction in the Peruvian Amazon. *GeoHealth*. (M. Pan, S. Hu, M.M. Janko, B.F. Zaitchik…**W.K. Pan**)

Evaluating Surface Fluxes in WRF using Eddy-covariance Flux Measurements in the Western and Eastern U.S. *Agricultural and Forest Meteorology*. (F. Wu, **K.J. Davis**, et al.)

Three-decade Dust Climatology and Trend (1988-2022) from Ground Monitoring over the Western United States. *Journal of Geophysical Research: Atmospheres*. (C. Shu, **D. Tong**)

A Survey of Applications of the NASA GEOS-CF Global Atmospheric Composition Forecasts: Case Studies for NASA Open Data and Earth Science to Action. *Bulletin of the American Meteorological Society*. (**C.A. Malings**, V. Shah, P.A. Wales, **K.E. Knowland**, et al.)

The Heartland Environmental Alliance or Resilience & Transformation (HEART) – Improving the Lives and Livelihoods of People across the Heartland through Environmental Change Resilience Research, Education, and Outreach. *Perspectives of Earth and Space Scientists*. (G.R. Carmichael, R.J. Swap, E.D. Hunt, **J. Bell**, et al.)

Effects of Soil Moisture and Soil Temperature on Coccidioidomycosis. *GeoHealth*. (Q. Li, B. Zhang, R. Wang, H. Li, Y. Zhan, **D. Tong**, **J.E. Bell**)

Comparative Impacts of Freight and Non-truck Traffic on NOx and Ozone Concentrations in the Los Angeles Basin. *ACS ES&T Air*. (A.C. Moore, T.N. Skipper, **A.G. Russell**, **J. Kaiser**)

Zero-emissions Vehicle Adoption and Satellite-measured NO_2 Air Pollution in California, USA, from 2019 to 2023: A Longitudinal Observational Study. *Lancet Planetary Health*. (S.P. Eckel, F. Chen, S.J. Silva, **D.L. Goldberg**, et al.)

Global NO_2 Changes between 2019 and 2024 as Observed by TROPOMI in Urban Areas and Emerging Hotspots. *Atmospheric Chemistry and Physics*. (D.E. Huber, G.H. Kerr…**S.C. Anenberg**, **D.L. Goldberg**)

Top-down Estimates of U.S. NOx Emissions Using TEMPO and TROPOMI NO_2 Remote Sensing Observations with WRF-Chem/Chem-DART. *Journal of Geophysical Research: Atmospheres*. (C-H Hsu…**R.B. Pierce**, et al.)

Advancing Operational Global Aerosol Forecasting with Machine Learning. *Nature*. (K. Gui…**J. Wang**, **P. Gupta**, et al.)

Characterizing Particulate Matter Impacts of Smoke From 2022 to 2023 Agricultural Burning in South Florida. *GeoHealth.* (O. Sablan…**E. Gargulinski**…**A.J. Soja…S. Magzamen**, E.V. Fischer, **J.R. Pierce**)

Association of Regional Agricultural Smoke Exposure with Sociodemographic Factors in Rural and Urban Communities. *GeoHealth*. (K. D. Slater…**E. Gargulinski**, G.L. Henery, **J.R. Pierce**…**A. Soja**…**S. Magzamen**)

PAST

ARSET Trainings:

Advanced NASA Earth Observations and Tools for Active Fire, Smoke, and Post-Fire Monitoring
January 14-20, 2026

Geostationary Remote Sensing of Trace Gases for Air Quality Applications in North America
January 20-22, 2026

Meetings:

American Meteorological Society Annual Meeting
January 25-29, 2026
Houston, TX

American Mosquito Control Association Annual Meeting
March 23-27, 2026
Portland, OR