QUARTERLY HAQ PROJECT HIGHLIGHT:
IDENTIFYING PUBLIC HEALTH APPLICATIONS OF SATELLITE-DERIVED DROUGHT INDICATORS: IMPROVED MONITORING FOR RESPIRATORY HEALTH

Supported through a 2021 HAQ grant, **Jesse Bell (Univ. of Nebraska Medical Center)** and his team from the Univ. of Nebraska Medical Center, Univ. of Minnesota-Twin Cities, George Mason Univ., Univ. of Nebraska-Lincoln, Univ. of Alabama-Birmingham, and Morgan State Univ. are studying the

Workshop participants. Credits: UNMC

connections between drought, air quality, and health using Earth observations to estimate air pollution and drought exposures paired with health outcome data. The team developed a drought and health messaging framework for health professionals, as an evidence-based communication tool to help communities better understand how drought may impact their health and ways to reduce potentially negative health exposures. Building on this effort, the team incorporated input from multiple public health and community stakeholders and created an online interactive tool to visualize drought conditions in real-time, paired with tailored messages based on current drought conditions. To support this work, the Univ. of Nebraska Medical Center hosted the *Drought and Health: A Workshop for Public Health Professionals* in Omaha, Nebraska in September 2024. The workshop brought together public health experts and researchers to help with drought and health product development. **Helena Chapman (HASA HQ/BAH)** and **Daniel Tong (George Mason Univ.)** presented talks at this event.

NASA CELEBRATES INTERNATIONAL DAY OF CLEAN AIR FOR BLUE SKIES

Each year on September 7th, the International Day of Clean Air for blue skies aims to increase awareness about air quality. This year, the NASA HAQ and Communications (**Sofie Bates, NASA GSFC; Jocelyn Argueta, JPL**) Teams supported a social media campaign on NASA Earth Facebook and X (Tracking India's Air Quality on Post 1, TEMPO on Post 2, EPA EJScreen on Post 3). Also, organized by UNEP, **John Haynes (NASA HQ)** served as panelist for the International Day of Clean Air for Blue Skies event, which was held at the World Resources Institute in Washington DC. Other panelists included representatives from UNEP, World Resources Institute, World Bank, U.S. State Department, U.S. EPA, and the Ambassador of Mozambique.

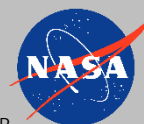J. Haynes presents his talk at the UNEP event. Credits: NASA

SPOTLIGHT
Anna Simpson, HAQ Intern

In Summer 2024, **Anna Simpson (Florida State Univ.),** a fourth-year undergraduate student studying biological sciences, joined the HAQ team as the Summer Intern. Under the mentorship of **Helena Chapman (NASA HQ/BAH)**, Anna performed a retrospective analysis of 14 HAQ funded projects from the ROSES2017 solicitation, including a bibliographic review of teams' projects, design of a project survey for researchers, and a 30-minute interview to learn about their projects and updates upon completion of the NASA-funded project period. She also conducted an informative interview with a member of the NASA/CDC partnership (National Environmental Public Health Tracking Network). She participated in monthly team meetings, attended

Credits: A. Simpson

internship events and presented her internship project at the Summer 2024 Intern Project Showcase. Over her summer internship, she learned about the One Health concept, examined the links between climate and public health, and recognized the need for interdisciplinary approaches to address complex global health challenges. Her contributions have helped our HAQ team further understand how project milestones can evolve beyond the established goals, increase in scalability, and build on stakeholder involvement and end-user capabilities.

NASA HAQ INVESTIGATOR AND TEAM UPDATES

❑ **Susan Anenberg (George Washington Univ.):** She was quoted in the *New York Times* article titled, *Western Wildfire Smoke Reaches the East Coast*, in July 2024.

❑ **Assaf Anyamba (Oak Ridge National Laboratory):** He presented the topic, *El Niño, Teleconnections and Early Warning Systems for Vectorborne Diseases*, as part of the Toward Understanding and Anticipating Extreme Weather Effects on Biodiversity, Phenology, and Ecosystems Symposium at the 2024 Ecological Society of America annual meeting in August 2024.

❑ **Jenny Bratburd (Univ. of Wisconsin-Madison):** She presented on HAQAST and TEMPO Tiger Teams to the Central States Air Resources Agencies (CenSARA) in September 2024.

❑ **Helena Chapman (NASA HQ/BAH):** She was an invited virtual speaker on *Health and Air Quality: Focus from NASA*, as part of the ChromoMED Institute of Medical Genetics's First Global Health Forum, held in Santo Domingo, Dominican Republic, in September 2024.

❑ **John Haynes (NASA HQ):** He was interviewed about the current heat wave and its impact on health for KPTV Fox 12 (Portland, OR) and KSNV (NBC, Las Vegas) in July 2024. He also served as a moderator for the *Forward-thinking Solutions for Environmental and Public Health and in Response to Disasters* at the Early Adopters Showcase, held in Washington DC, in July 2024.

❑ **Tracey Holloway (Univ. of Wisconsin-Madison):** She was quoted in *The Cap Times* article titled, *Madison Expands Air Quality Monitors to Pinpoint Causes of Pollution*, in August 2024.

❑ **Daniel Tong (George Mason Univ.):** He was quote in the *Newswise* article titled, *Wildfires in the U.S. and Canada Remind Us that Health Impacts Defy Borders*, in August 2024.

RECENT HAQAST ACHIEVEMENTS

The NASA HAQAST Tiger Teams highlight short-term, high-impact, collaborative efforts between HAQAST members and stakeholders to identify and solve critical problems using NASA data and products. Learn about some recent highlights:

SATELLITE-DERIVED PM$_{2.5}$ DATA SUPPORTED THE U.S. EPA REVISED STANDARD

The U.S. EPA's Integrated Science Assessment, supplement, and final rule collectively included over 100 citations describing and applying satellite-derived PM$_{2.5}$ data supporting the new revised standard, citing work from **Randall Martin (Washington Univ. in St. Louis)** and colleagues. For more information on PM$_{2.5}$ mitigation in the U.S., please review the *ACS ES&T Air* article.

SCIENCE INFORMED HEAT ACTION PLAN

Chris Uejio (Florida State Univ.) collaborated with the world's first chief heat resilience officer in Miami-Dade County, Florida, to support the development of more evidence-based policies in the Miami-Dade County's Heat Action Plan.

NO$_2$ INDICATOR INTEGRATED INTO U.S. EPA EJSCREEN

As a result of efforts of the HAQAST Satellite Data for Environmental Justice Team, NO$_2$ from 2020 block group-level source data from the Ozone Monitoring Instrument was integrated into the updated version of U.S. EPA's EJScreen Tool. Prior to this update, EJScreen included data on ozone and fine particulate matter pollution, but not NO$_2$ pollution. The dataset was developed by **Susan Anenberg and Gaige Kerr (George Washington Univ.)** and collaborators from NASA, Institute for Health Metrics and Evaluation, and Oregon State Univ. For more information, please review the U.S. EPA's documentation and trainings and office hours.

SATELLITE MONITORING OF SMOKE AND FIRES IN SOUTH AMERICA

Ana Prados (Univ. of Maryland, Baltimore County) organized an advanced multi-week satellite course with NOAA and two Bolivian universities (Univ. Mayor de San Andres, Univ. Mayor de San Simon), on the use of satellite fire and aerosol products for air quality management in Bolivia and Peru. A total of 30 attendees participated from government agencies, private sector, and universities from Bolivia and Peru. One student (Peruvian Meteorological Service) reported that their service added satellite aerosols products to allow continuous air pollution monitoring.

NASA DATA PROTECTS U.S. EMBASSY STAFF AND THE PUBLIC FROM POLLUTED AIR

Pawan Gupta (NASA GSFC) and HAQAST Ambassador **Mary Tran (U.S. State Department)** led the NASA and the U.S. State Department collaboration to develop a powerful tool to protect the public against polluted air. The ZephAir website and mobile app now provide data for 270 U.S. embassies and consulates with three-day air quality forecasts for PM$_{2.5}$.

SATELLITES OBSERVE IMPACTS OF WAREHOUSE EXPANSION ON AIR POLLUTION

Yang Liu (Emory Univ.) and **Susan Anenberg** and **Gaige Kerr (George Washington Univ.)** have explored the impact of expanded warehousing and e-commerce hubs on pollution. **Y. Liu** found that warehouse expansion over the last two decades in Southern California was associated with elevated PM$_{2.5}$ and elemental carbon that disproportionately affect disadvantaged populations. **S. Anenberg** and **G. Kerr** reported that NO$_2$ increased 20% near warehouses on average across the contiguous U.S.

MAIA GEOGRAPHIC INFORMATION VISUALIZATION TOOL

In August, the second version of the MAIA Geographic Information Visualization Tool (GIVT) was released, integrating dynamic surface air quality monitoring data from all MAIA Primary Target Areas. It allows users to directly download various geospatial data products (e.g. land cover, elevation, population density) for all MAIA target areas. Furthermore, researchers at the Univ. of Iowa researchers in collaboration with the MAIA science team, focused on improving the accuracy of surface $PM_{2.5}$ simulations for the MAIA mission in East Africa. By integrating surface monitoring data from U.S. State Department facilities and sensors deployed by the MAIA project in Ethiopia, the study demonstrates a significant improvement in the simulation of diurnal $PM_{2.5}$ variations, offering more accurate air quality predictions, particularly in regions with limited surface air monitoring networks.
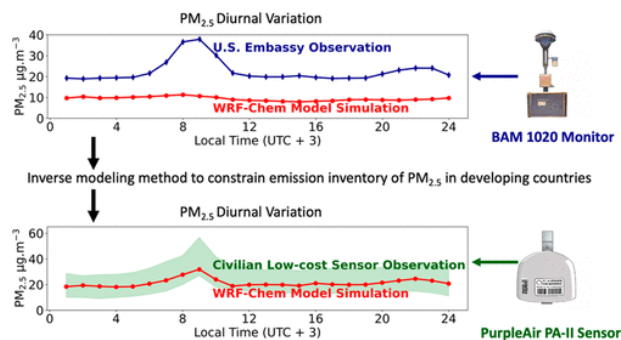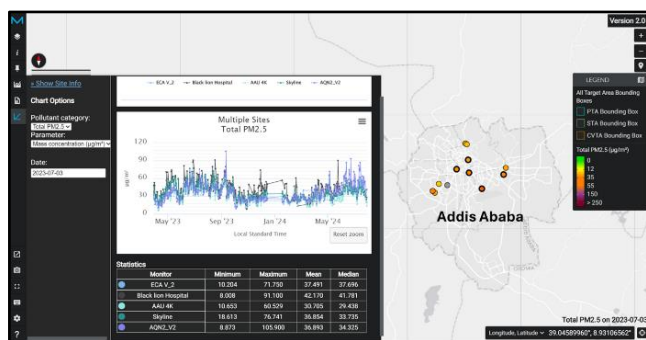
Screenshot of the Geographic Information Visualization Tool (GIVT) (Left) and $PM_{2.5}$ diurnal variation (Right). Credits: MAIA Team

TEMPO-GEMS JOINT SCIENCE TEAM WORKSHOP

In August 2024, the **TEMPO-GEMS Joint Science Team Workshop** was held in Kailua-Kona, Hawaii, with an estimated 265 participants (165 in-person, 100 online). The meeting featured TEMPO and GEMS mission status updates, validation activities, and application projects on air quality monitoring and forecasting using TEMPO and GEMS data. Presentations included the NASA HAQ program overview, use of TEMPO data in Early Adopter application initiatives, and Early Adopter talks on air quality management applications of TEMPO data at the Georgia

Source: TEMPO Meeting

Environmental Protection Division and Colorado Department of Public Health and Environment. **John Haynes (NASA HQ), Laura Judd (NASA LaRC), Aaron Naeger (NASA MSFC),** and **Jenny Bratburd (Univ. of Wisconsin-Madison)** offered scientific talks, as part of the event proceedings. More than 60 workshop posters focused on a diversity of TEMPO and GEMS research and application areas, including assessing emissions, monitoring volcanoes, estimating surface-pollutant concentrations, and air quality model assimilation and forecasting. More information can be found on the TEMPO Meetings website.

GEO HEALTH COMMUNITY OF PRACTICE HOLDS BIWEEKLY TELECONS

The Group on Earth Observations (GEO) **Health Community of Practice** (CoP) – led by **John Haynes (NASA HQ)** and **Juli Trtanj (NOAA)** – continues to coordinate community teleconferences that leverage expertise and share Earth observation data and tools to support health decision-making. On average, 40 attendees participate in each telecon. Below is a synopsis of each meeting.

❑ **July 2024**: **Corena Pincham (NASA HQ/BAH)**, **Harriett Wilson (Univ. of Stirling, Scotland)**, and **Daniele Ehrlich (European Commission)** presented overviews of GEO EO4SDG, AquaWatch/WWQA, and GEO Human Planet Initiative, to examine One Health as a cross-cutting theme for GEO activities.

❑ **September 2024**: The *Special Edition: The Americas* telecon offered 16 flash talks on air quality, heat, infectious diseases, and environmental health.

ONE HEALTH SESSION AT THE GEO SYMPOSIUM 2024

In September 2024, the HAQ team virtually supported the One Health session, as part of the GEO Symposium and Open Data and Open Knowledge Workshop held in Hangzhou, China. In collaboration with the **GEO Secretariat (Rui Kotani, Wenbo Chu)**, **John Haynes (NASA HQ)**, **Juli Trtanj (NOAA)**, **Helena Chapman (NASA HQ/BAH)**, and **Alice Lau (NOAA)** developed the One Health session agenda that highlighted how the One Health approach can help scientists and decision-makers share Earth observation data, tools, and technologies to develop interdisciplinary solutions for global health issues addressing the human-animal-environment nexus. **Lawrence Friedl (NASA HQ)** and **Katy Matthews (NOAA)** moderated the session with discussion centered on identifying cross-cutting links across thematic areas to support the Post-2025 GEO Strategy. It was recognized that the GEO Health CoP can serve as a model, as it exemplifies many aspects of the Post-2025 GEO Strategy. Learn more by viewing the One Health session recording.

One Health session moderators and panelists at the GEO Symposium 2024. Credits: GEO Secretariat

#FACESEO4HEALTH CAMPAIGN

As part of the Group on Earth Observations (GEO) Health Community of Practice (CoP) activities, the GEO Secretariat (**Matthew Crook**) helped support the **#FacesEO4Health social media campaign (GEOSEC2025 on X)** for the CoP Work Group leads in Summer 2024. As a follow-up to the #FacesofGEO campaign in Summer 2021, this social media campaign highlighted the exceptional leadership of the Work Groups' leads, who facilitate regular discussions with CoP members to provide technical knowledge on health-related project tasks. Notably, several CoP members collaborated to establish the Animal Health Work Group. Please learn more about our 10 Work Group leads and join one of the CoP Work Groups by completing the form.

HEAT WORK GROUP

Earth observation data are playing a **paramount role in achieving the goals of the UN Early Warning Systems for All initiative.**

CASCADE TUHOLSKE
MONTANA STATE UNIVERSITY

The GEO Health Community of Practice is just such a fascinating group of people, all **committed to using Earth observations to make the world a better place.**

BENJAMIN ZAITCHIK
JOHNS HOPKINS UNIVERSITY

The Heat Work Group aims to build a global mapping capability that conveys heat risk and identifies the most critical used or needed heat, forecast, land cover, and social vulnerability data.

AIR QUALITY WORK GROUP

Poor air quality is a global problem requiring global solutions. We connect air quality and health professionals around the world with the Earth observations they need to understand their local air quality and the factors impacting it.

CARL MALINGS
NASA GODDARD

Earth Observations from satellite and other data sources provide a **unique, spatially resolved data source for understanding many challenges, from epidemiology and vector-borne diseases to the health effects of air pollution.** It's so gratifying to bring together experts and put our knowledge to work to protect people's health.

NATHAN PAVLOVIC
SONOMA TECHNOLOGY

The Air Quality Work Group aims to identify and disseminate recent advances in air quality applications of Earth observations, including geostationary satellites, small-sats, and data fusion, to advance management and health decision-making by targeted presentations to practitioners and publicly-available reporting.

#FACESEO4HEALTH CAMPAIGN

GEO HEALTH
COMMUNITY OF PRACTICE

INFECTIOUS DISEASES WORK GROUP

Earth observation-based disease prediction models can **save lives**.

ANTARPREET JUTLA
UNIVERSITY OF FLORIDA

In our rapidly changing world, infectious diseases morph and adapt to their environment and **it takes the global community to contain or eliminate them.**

TATIANA LOBODA
UNIVERSITY OF MARYLAND

The Infectious Diseases Work Group seeks to improve prediction and prevention systems for environmentally-sensitive infectious diseases (e.g. vector-borne and water-related diseases) that enhance decision-relevant risk monitoring to mitigate human health risks in vulnerable communities.

FOOD SECURITY AND SAFETY WORK GROUP

Earth observations **help us understand the intricate links between water, food, climate, and health systems** that are shaping our planetary health.

MAHESH JAMPANI
INTERNATIONAL WATER MANAGEMENT INSTITUTE

The work of GEO Health **helps communities** address the rapidly evolving challenges of a rapidly changing planet.

ORHUN AYDIN
ST LOUIS UNIVERSITY

The Food Security and Safety Work Group aims to strengthen applications that address food- and water-borne diseases that undermine health, food safety, and monitoring and prediction of pathogens and toxins, including marine and coastal environments.

HEALTH CARE INFRASTRUCTURE WORK GROUP

Satellite imagery represents **cutting-edge technology** needed to address tomorrow's complex health challenges exacerbated by rising and ageing populations, climate change and human encroachment on animal habitats.

AJAY K GUPTA
HSR.health

The combined use of **satellite imagery with tools of artificial intelligence** will facilitate the use of predictions instead of postdicting interventions and avoid negative impacts on the environment and health.

ANDREAS SKOULOUDIS
ISTEEP.ORG

The Health Care Infrastructure Work Group seeks to develop an informational resource with Earth observation data that can help decision-makers assess the vulnerability and adequacy of health care infrastructures to local environmental stressors and regional extreme catastrophes.
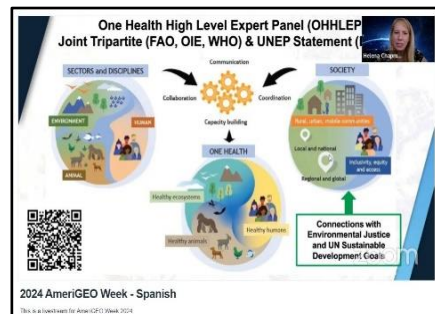
AMERIGEO WEEK 2024

In August 2024, the NASA HAQ Team participated in AmeriGEO Week 2024, hosted by the Ecuador's National Secretary of Risk Management in Quito, Ecuador. This event highlighted how Earth observations are contributing to AmeriGEO's five thematic priorities. The EO4Health team, together with the Ecuador Ministry of Health, supported three One Health activities, with more than 150 in-person attendees at the scientific event, 122 attendees (including 70 in-person) at the Dengue workshop, and 132 attendees (with 33 in-person) at the Air Quality workshop.

❑ **Scientific Session**: The *Looking toward COP29: One Health Partnerships to Accelerate Climate Action* session – facilitated by **Juli Trtanj (NOAA), Helena Chapman (NASA HQ/BAH),** and **Elena Gabriela Chicaiza Mora (Ecuador Ministry of Health)** – focused on building valuable One Health partnerships in the Americas region, to identify inequities (including disease hotspots) and strengthen climate and health decision-making activities. Panelists gave flash talks on dengue and malaria early warning systems, heat risk mapping campaigns, and air quality monitoring and communication strategies within the Americas region.

❑ **Dengue Workshop**: The *Earth Observations for Managing Dengue in the Americas* workshop, led by **Hunter Jones (NOAA), Alice Lau (NOAA),** and **Avriel Díaz (GCSE)**, offered an in-depth dialogue about existing barriers in dengue prevention and control across the Americas.

❑ **Air Quality Workshop:** The *Satellite-Derived Air Quality Information for the Americas* workshop, led by **Carl Malings (NASA GSFC/Morgan State Univ.), Nathan Pavlovic (Sonoma Technology), Didier Davignon (Environment and Climate Change Canada),** and **Megan Damon (NASA GSFC/SSAI),** provided an overview of satellite capabilities and limitations for air quality applications, case study examples of their application to regional air quality assessment, and online tools and resources for interacting with these datasets.

As part of the AmeriGEO Week 2024's award ceremony, AmeriGEO leadership presented the **Innovation Award 2024** to the GEO EO4Health Initiative and GEO Health CoP, showcasing their dedicated efforts to bring Health (specifically One Health) to the forefront of AmeriGEO dialogue. They recognized their dedicated efforts to collaborate with medical students for the first time at AmeriGEO Week 2023, develop Work Group's white papers on One Health as a cross-cutting theme for GEO, connect with regional GEOs through flash talk webinars on using Earth observations for health applications, publish in journals in English and Spanish, and collaborate with the Ecuador Ministry of Health on three One Health events at AmeriGEO Week 2024.

Dengue Workshop attendees (Left) and AmeriGEO Week awardees (Middle), including Juli Trtanj (NOAA) (second from Left). H. Chapman gave a virtual talk during the One Health session (Right). Credits: AmeriGEO

HAQ COMMUNITY ENGAGEMENT

The NASA HAQ team (**John Haynes, NASA HQ; Helena Chapman, NASA HQ/BAH**) presented talks and webinars that introduced the HAQ program, TEMPO mission, and key examples of using Earth observations for public health applications.

❑ **Georgetown University**: J. Haynes and H. Chapman gave lectures on *From Sky to Earth: Spatialization and Dynamics of Infectious and Vector-borne Diseases*, as part of the Seminars on Global Infectious Diseases course (11 graduate students).

❑ **WMO Pan-American Center & Dust Alliance for North America**: J. Haynes gave a talk on NASA satellite capabilities to observe dust storms, as part of the joint webinar in recognition of International Dust Day in July 2024 (90 virtual attendees).

LOOKING AHEAD

ARSET Trainings:

Overview of Earth Observations for Societal Benefit
October 28, 2024

Methane Observations for Large Emission Event Detection and Monitoring
November 19-21, 2024

Meetings:

American Public Health Association Annual Meeting & Expo
October 27-30, 2024
Minneapolis, MN

American Geophysical Union Annual Meeting
December 9-13, 2024
Washington, DC

PUBLICATIONS

Incorporation of Environmental and Geospatial Tools in Medical Training. *Innovare*. (**H.J. Chapman**, C. Barboza Pizard, R.M. Durón)

Association between Summertime Emergency Department Visits and Maximum Daily Heat Index in Rural and Non-rural Areas of Virginia (2015–2022). *Science of the Total Environment*. (A. Mendrinos, J. O'Brien, M. Davis, A. Baldwin, **B.F. Zaitchik**, A. Britton, I. Mwanja, **J.M. Gohlke**)

Impact of Warehouse Expansion on Ambient PM2.5 and Elemental Carbon Levels in Southern California's Disadvantaged Communities: A Two-decade Analysis. *GeoHealth*. (B. Yang…**Y. Liu**)

Air Pollution Impacts from Warehousing in the United States Uncovered with Satellite Data. *Nature Communications*. (**G.H. Kerr**, M. Meyer, **D.L. Goldberg**, J. Miller, **S.C. Anenberg**)

Forecasting with the GEOS-CF System and other NASA Resources to Support Air Quality Management. *Advances in Air Quality Research in Africa*. (C. Malings, **K.E. Knowland…B. Duncan**, N. Pavlovic)

Ground Urban Heat Island: Strengthening the Connection Between Spaceborne Thermal Observations and Urban Heat Risk Management. *GeoHealth*. (L. Hu, **C. Uejio**)

Impact of Model Spatial Resolution on Global Geophysical Satellite-Derived Fine Particulate Matter. *ACS ES&T Air*. (D. Zhang, **R.V. Martin**, A. van Donkelaar, C. Li, H. Zhu, A. Lyapustin)

A Comparison of Regression Methods for Inferring Near-Surface NO_2 with Satellite Data. *JGR Atmospheres*. (E.J. Kim, **T. Holloway**…**D.L. Goldberg**, C. Heck)

Observational Constraints on the Aerosol Optical Depth–Surface $PM_{2.5}$ Relationship during Alaskan Wildfire Seasons. *ACS ES&T Air*. (T. Zhao, **J. Mao**, **P. Gupta**, H. Zhang, **J. Wang**)

Spatiotemporally Detailed Quantification of Air Quality Benefits of Emissions Reductions-Part 1: Benefit-per-Ton Estimates for Canada and the U.S. *ACS ES&T Air*. (S. Zhao…**A. Russell,** A. Hakami)

Local Scale Air Quality Impacts in the Los Angeles Basin from Increased Port Activity during 2021 Supply Chain Disruptions. *Environmental Science: Atmospheres. (*T.N. Skipper…**A.G. Russell**)

Health-Damaging Climate Events Highlight the Need for Interdisciplinary, Engaged Research. *GeoHealth*. (J.D. Stowell, **S. Anenberg**, **B.F. Zaitchik**, **D. Tong**, et al.)

OSTP ROUNDTABLE ON EMERGING TECHNOLOGIES FOR HEALTH EMERGENCIES

In August 2024, **Helena Chapman (NASA HQ/BAH)** and eight HAQ researchers **Tatiana Loboda (Univ. of Maryland-College Park)**, **Michael Wimberly (Univ. of Oklahoma)**, **Daniel Tong (George Mason Univ.)**, **Ben Zaitchik (Johns Hopkins Univ.)**, **Antarpreet Jutla (Univ. of Florida)**, **Assaf Anyamba (Oak Ridge National Laboratory)**, **William Pan (Duke Univ.)**, and **Susan Anenberg (George Washington Univ.)** (not pictured) contributed to the *OSTP White House Roundtable on Emerging Technologies for Preventing Health Emergencies*. This event included four lightning talks (CDC, NASA, NSF, USGS), followed by roundtable discussions on how technologies from outside of biomedicine (satellite-based Earth observation; drone-based wildlife sampling; in situ ground monitors for zoonotic spillover risk assessment; wastewater surveillance for disease emergence) can help protect us from health emergencies across the One Health nexus.

HAQ researchers at the OSTP event. Credit: NASA

PAST

ARSET Trainings:
[NASA Atmospheric Composition Ground Networks Supporting Air Quality and Climate Applications](#)
August 8-22, 2024

[Ask NASA ARSET: Remote Sensing Observations for Air Quality Applications](#)
September 19, 2024

Meetings:
[AmeriGEO Week](#)
August 26-30 2024
Quito, Ecuador and Virtual

TEMPO/GEMS Joint Science Team Meeting
August 26-30, 2024
Kailua-Kona, HI

Drought and Health – A Workshop for Public Health Professionals
September 9-10, 2024
Omaha, NE

Program Applications Leads/Mission Applications Leads Annual Meeting
September 10-12, 2024
Pasadena, CA

[GEO Symposium](#)
September 23-26, 2024
Hangzhou, China

RECENT COMMUNICATIONS

NASA
- [NASA Data Helps Protect US Embassy Staff from Polluted Air](#) (by Emily DeMarco, NASA HQ)
- [NASA, EPA Tackle NO2 Air Pollution in Overburdened Communities](#) (by Emily DeMarco, NASA HQ)
- [New TEMPO Cosmic Data Story Makes Air Quality Data Publicly Available](#) (NASA Science)
- [NASA Finds Summer 2024 Hottest to Date](#) (Sally Younger)
- [NASA Celebrates 20 Years of Earth-Observing Aura Satellite](#) (Erica McNamee, NASA GSFC)

NASA Earth Observatory
- [2024 North Atlantic Hurricane Season](#) and [2024 Fires in the Northern Hemisphere](#)
- [Lake Erie Blooms](#) (Lindsey Doermann)
- [Tracking Elephants Across Namibia](#) (Madeleine Gregory, Landsat Science Outreach Team)