

QUARTERLY HAQ PROJECT HIGHLIGHT: SATELLITE INFORMED SYSTEM TO SUPPORT ELIMINATION OF MALARIA IN THE AMERICAS (SISTEMA)

Supported through a 2021 HAQ grant, **William Pan (Duke Univ.)** and his team have successfully developed a climate-informed, real-time malaria early warning system (MEWS) for Panama and Honduras Ministries of Health. The team has incorporated Land Data Assimilation System (LDAS) and Land Use/Land Cover (LULC) data with vector and malaria surveillance data into the SISTEMA (Satellite-Informed System to Support Elimination of Malaria in the Americas) decision-support tool (Figure 1). The SISTEMA team, which includes experts from Duke and Johns Hopkins University, the Clinton Health Access Initiative, INDICISAT, and Ministries of Health in Panama and Honduras, are working together to integrate malaria and climate forecasts into routine programmatic decision making. The MEWS provides actionable information about malaria risk up to nine months in advance and enables preemptive action to prevent outbreaks and advance efforts to eliminate malaria from Central and North America, including the United States, where an increase of imported cases has led to locally-acquired infections.

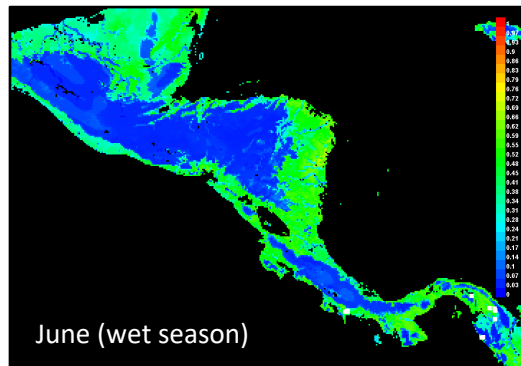


Figure 1. The MAXENT model (inputs from LDAS, LULC, and historical *Anopheles* mosquito collections) shows the vector habitat model (*Anopheles albimanus*). Colors correspond to the probability that *An. albimanus* is present (blue as unsuitable, red as suitable). Credits: W. Pan

NASA CELEBRATES ONE HEALTH DAY 2024

On November 3, 2024, the NASA HAQ and Communications Teams (**Sofie Bates, NASA GSFC; Jocelyn Argueta, JPL**) supported a social media campaign to demonstrate how NASA Earth observations can help scientists and community stakeholders develop robust air quality initiatives – ZephAir’s new PM_{2.5} forecasting capability (NASA/U.S. Department of State) ([Facebook](#) and [X](#) posts) and STAQS campaign mapping air pollutants at a neighborhood scale in three U.S. cities (NASA/NOAA) ([X](#) post). It also highlighted the GEO Health Community of Practice (CoP) [telecon](#) that offered scientific talks on building One Health capacity. This marks the eighth annual participation of the Earth Action Program in One Health Day, highlighting NASA’s role in connecting human, animal, and environmental health. Learn more about the [HAQ](#) and [GEO Health CoP](#) events on the One Health Day global map!



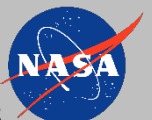
Credits: NASA

HEALTH AND AIR QUALITY APPLICATIONS EARTH ACTION PROGRAM

JOHN HAYNES
PROGRAM MANAGER
HEADQUARTERS

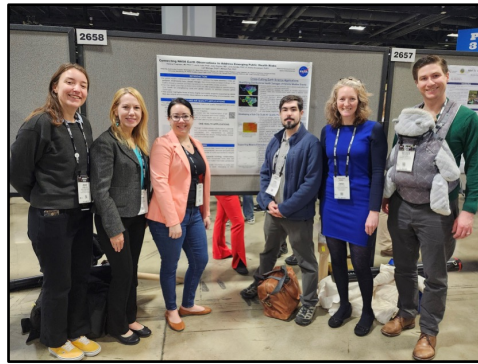
HELENA CHAPMAN
ASSOCIATE
HEADQUARTERS/BAH

LAURA JUDD
ASSOCIATE
LANGLEY RESEARCH CENTER

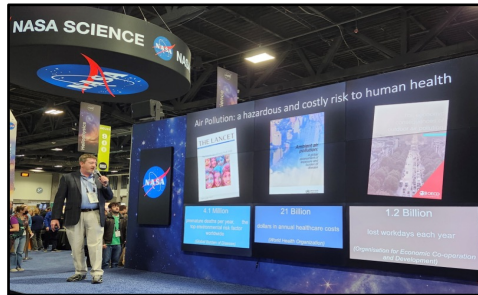


NASA HAQ TEAM HOSTS SCIENTIFIC SESSIONS AT AGU 2024

At the American Geophysical Union (AGU) Annual Meeting 2024, the NASA HAQ team coordinated oral and poster sessions, *Actionable Uses of Satellite Observations for Health and Air Quality*, in Washington, DC. Moderated by **Laura Judd (NASA LaRC)** and **Helena Chapman (NASA HQ/BAH)**, over 95 attendees participated in the oral sessions, which included 16 talks on air quality modelling for urban settings and wildfire/smoke conditions, drought- and heat-related health risks, and cholera forecasting, spanning research applications in China, India, Italy, United States, and West Africa. The HAQ poster session included 17 posters, including the HAQ poster entitled, *Connecting NASA Earth Observations to Address Emerging Public Health Risks*. **John Haynes (NASA HQ)** presented an overview of the HAQ program at the Union session with One Health, Microbes, and Geosciences theme with 100 attendees, and later presented the *Accelerating Air Quality Solutions through Earth Observations* Hyperwall talk at the NASA exhibit booth.



Top: AGU 2024 panelists of the HAQ scientific session (left), and PI teams at the HAQ poster (right).



Bottom: AGU 2024 presenters of the Union session (left), and J. Haynes at the NASA Hyperwall (right). Credits: H. Chapman

NASA HAQ INVESTIGATOR AND TEAM UPDATES

- ❑ **Antarpreet Jutla (Univ. of Florida):** His research was described in the *Eos* article entitled, [Climate Change is Driving Dangerous Bacteria farther North](#), in December 2024.
- ❑ **Rajesh Kumar (UCAR):** He was [awarded](#) the Baron Nicolet prize for the 13th Biennial Period (2022-2023) by the Royal Belgian Academy of Sciences in December 2024.
- ❑ **Yang Liu (Emory Univ.):** He contributed to the analyses of the [2024 Report of the Lancet Countdown on Health and Climate Change](#) that was published in October 2024.
- ❑ **Shay Sharma (Stanford Univ.):** His article entitled, [Using NASA Satellite Data to Examine Environmental Health Risks](#), was published in the Kansas State University's *One Health Newsletter* in October 2024.
- ❑ **Jun Wang (Univ. of Iowa):** He was awarded the [Joanne Simpson Medal](#) at AGU 2024 and inducted into the AGU College of Fellows in December 2024.

NASA HAQ TEAM PRESENTS AT APHA 2024

In October 2024, **Helena Chapman (NASA HQ/BAH)** and **Laura Judd (NASA LaRC)** convened the *Applying Satellite Data to Monitor Emerging Environmental Health Risks* symposium at the American Public Health Association (APHA) Annual Meeting & Expo 2024 in Minneapolis, MN. As part of the Applied Public Health Statistics section, over 45 people heard **John Haynes (NASA HQ)**, **Jesse Belle (Univ. of Nebraska Medical Center)**, **Sheryl Magzamen (Colorado State Univ.)**, **William Pan (Duke Univ.)**, and **Antarpreet Jutla, (Univ. of Florida)** highlight preparing public health stakeholders for drought impacts and response in the United States, assessing the impact of wildfire smoke in New Mexico, and developing early warning systems for cholera in Africa and malaria in the Americas.

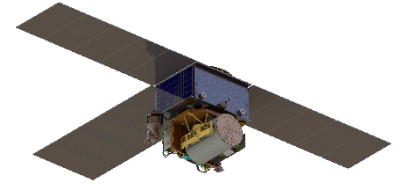
As part of the One Health section, **H. Chapman** and **Muge Akpinar-Elci (Univ. of Nevada-Reno)** moderated the *Community Connectedness and the Role of One Health: Communication, Data Integration, and Policy* session, where **M. Akpinar-Elci**, **J. Haynes**, **J. Bell**, and **Capt. Brianna Skinner (FDA)** presented on public health messaging within communities, incorporating satellite data for operational disease forecasting and air quality management, decision-making tools for drought preparedness and response, and using the animal health lens to frame policy development, to over 45 attendees. **H. Chapman** also highlighted the topic, *Using NASA data visualizations to strengthen environmental health messaging*, for the Public Health Education and Health Promotion section to over 60 attendees. Also, the NASA GSFC team supported HAQ and PI talks at the NASA Hyperwall at this event.



APHA 2024 panelists for One Health (top left), Applied Public Health Statistics (top right), and Public Health Education and Health Promotion (bottom left) sessions. L. Judd at the NASA Hyperwall (bottom right). Credits: NASA

RELEASE OF MAIA SURFACE MONITOR DATA PRODUCT

In December 2024, the NASA Jet Propulsion Laboratory's Multi-Angle Imager for Aerosols (MAIA) project and NASA Langley's Atmospheric Science Data Center (ASDC) announced the release of the [MAIA Surface Monitor Data Product](#). These data products include ground-based measurements of total PM_{2.5}, total PM₁₀, and chemically speciated PM_{2.5} within MAIA's globally distributed set of Primary Target Areas. Although exact start dates may vary by target area and data source, data coverage for [total PM](#) and [speciated PM_{2.5}](#) measurements began in November 2022 and January 2021, respectively. The product files are regularly updated as new measurements become available. For more information, visit the MAIA's [Surface Monitoring Network](#) and the MAIA Geographic Information Visualization Tool ([GIVT](#)).

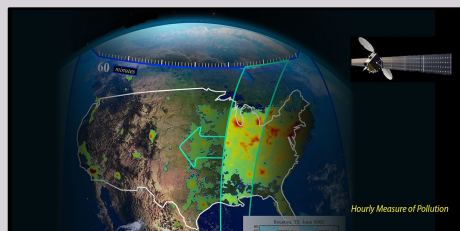


MAIA. Source: [MAIA website](#)

TEMPO EARLY ADOPTER ACTIVITIES

In December 2024, the TEMPO validation team [approved](#) the upgrade of TEMPO Version 3 (V03) Level 1, 2, and 3 data products of tropospheric column NO₂, total column HCHO, and total column ozone from beta to provisional maturity status, meaning that the product performance was demonstrated through a large (seasonally or otherwise) limited number of independent measurements. The V03 products are potentially ready for testing by operational users and may be suitable for scientific publications. If users have already downloaded the TEMPO V03 data (previously labeled as Beta), they do not need to re-download the data since no changes were made to the TEMPO V03 data files. Data (August 2023 to present) and resources are available via NASA [Earthdata Search](#) and [Data User Guides and Technical Documents](#).

At the American Geophysical Union annual meeting, the TEMPO team coordinated the *Geostationary Satellite Observations of Atmospheric Composition* session that focused on latest mission updates, air quality management and policy applications, evaluation of TEMPO data, aerosol product updates, and monitoring soil NO_x emissions. Presentations during other sessions included use of TEMPO data for monitoring lightning NO_x emissions and wildland fire smoke in addition to machine learning models.



TEMPO. Source: [TEMPO website](#)

SCOAPE-2 OBSERVATIONS FOR TEMPO SATELLITE VALIDATION

As a follow-on to the Satellite Coastal and Oceanic Atmospheric Pollution Experiment ([SCOAPE](#)) campaign from May 2019, NASA and university scientists, led by PI **Ryan Stauffer (NASA GSFC)**, embarked on the R/V *Point Sur* vessel and a B200 aircraft for the [SCOAPE-II](#) campaign from June 2-13, 2025. It represents the continuation of Interagency Partnerships between NASA and the Bureau of Ocean Energy Management (BOEM) that began in 2017. SCOAPE-II aims to understand the ability of satellite measurements to monitor air quality (principally NO_2) and greenhouse gas emissions (principally CH_4) near oil and gas operations in the Gulf of Mexico, including aircraft measurements of CH_4 from the JPL AVIRIS-3 instrument and targeted satellite CH_4 measurements from GHGSat and EnMAP. As dozens of strong methane emissions were observed from gas platforms by ship and aircraft, SCOAPE-II observations will inform BOEM's fugitive methane mitigation efforts, and enforcement by their partner agency (Bureau of Safety and Environmental Enforcement). Air quality measurements (e.g. ozone, NO_2) were focused on TEMPO satellite validation with surface and ship-based Pandora spectrometer data.

After the main SCOAPE-II campaign period in June 2024, NO_2 aircraft measurements were collected from the GeoCAPE Airborne Simulator (GCAS) instrument on the NASA/LaRC B200 aircraft from October 7-13, 2024. Dozens of NO_2 plumes were measured by GCAS from oil and gas platforms, large drill ships, and support vessels, which will serve as a key validation dataset for TEMPO and our understanding of the satellite instrument's ability to detect isolated point source emissions over water. To learn more about these airborne field campaigns, please visit the [SCOAPE website](#).



Left: R/V *Point Sur* science crew (top), and AVIRIS-3 methane plume measured from a gas platform (bottom). Right: Mars and Olympus deepwater oil platforms (top), GCAS NO_2 column amounts at the Mars, Olympus, and Ursa deepwater oil platforms (middle), and NASA/LaRC B200 and GCAS science team (right). Credits: SCOAPE

CONTINUED GEO HEALTH COMMUNITY OF PRACTICE ENGAGEMENT



The Group on Earth Observations (GEO) [Health Community of Practice](#) (CoP) – led by **John Haynes (NASA HQ)** and **Juli Trtnanj (NOAA)** – continues to coordinate community teleconferences that leverage expertise and share Earth observation data and tools to support health decision-making. More than 40 attendees attend each telecon.

- ❑ **October 2024:** Alice Lau (NOAA) and Hunter Jones (NOAA) led the follow-up discussion on dengue prediction models from the *Earth Observations for Managing Dengue in the Americas Workshop* held at AmeriGEO Week 2024.
- ❑ **November 2024:** Stacie Dunkle (WHO) described the Competencies for the One Health Field Epidemiology (COHFE) framework. Alice Hughes (Univ. of Hong Kong) presented examples that highlighted spillover risk across landscapes.



CoP leadership team. Credits: H. Chapman

In December 2024, the GEO Health CoP held the CoP Annual Meeting 2024. [Day 1](#) (64 attendees) included community updates (**Wenbo Chu and Matt Crook, GEO Secretariat**), regional updates (**Haris Kontoes, National Observatory of Athens; Elliott Matthews, NOAA; Brian Leung, USGCRP**), and the Operationalizing One Health Panel with moderators (**Helena Chapman, NASA HQ/BAH**); **S. Dunkle; A. Hughes; Patrice Klein, USDA**) and panelists (**Alice Lau, NOAA; Antarpreet Jutla, Univ. of Florida; Carl Malings, NASA GSFC/Morgan State Univ.**) [Day 2](#) (160 attendees) was part of the AGU town hall that showcased the CoP, SERVIR (NASA/USAID partnership), and Agricultural Model Intercomparison and Improvement Project (AgMIP), as three examples that expand the use of satellite data to address critical challenges in food security, water security, weather and climate resilience, ecosystem and carbon management, and air quality and health.



CoP members at AGU Geohealth Reception (top) and CoP Annual Meeting (bottom) at AGU 2024.

Credits: H. Chapman

USGEO ANNUAL WORKSHOP 2024



In October 2024, the two-day **2024 USGEO Annual Workshop** was held at NASA HQ in Washington DC. As part of the agenda, **John Haynes (NASA HQ)** was an invited panelist for the *U.S. Role in the Post-2025 GEO Work Programme* session, where he shared updates on how the GEO Health CoP activities has incorporated activities aligned with the Post-2025 GEO Strategy. Also, **Ajay K. Gupta (HSR.health)** presented in the *Enabling Data Technology* session, focusing on the heat-health risk index with pilot projects in Manhattan and Broome County, NY. Discussions centered on how the Post-2025 GEO Strategy can be implemented across thematic areas.

PUBLICATION

In October 2024, the American Lung Association launched the [*Something in the Air 2024 Report: Bridging the Air Quality Data Gap with Satellite Technology*](#), which builds on the success of *State of the Air* series. This report highlighted that satellite data can provide valuable information that complements and fills in existing coverage gaps of regulatory ground-based monitoring stations.

These collective findings can offer a comprehensive understanding of air quality information across areas. Notably, **Tracey Holloway (Univ. of Wisconsin-Madison) (HAQAST Lead)**, and team conducted the analysis of satellite-derived air quality data for this report.



Credits: ALA

LOOKING AHEAD

ARSET Trainings:

[Datos de Metano para la Detección y Monitoreo de Grandes Emisiones](#)

January 7-9, 2025

Meetings:

[American Meteorological Society Annual Meeting](#)

January 12-16, 2025

[American Mosquito Control Association Annual Meeting](#)

March 30-7, 2025

San Juan, Puerto Rico

[Association of Schools and Programs of Public Health Annual Meeting](#)

March 19-21, 2025

Arlington, Virginia

RECENT COMMUNICATIONS

NASA

- ☐ [NASA Study: Crops, Forests Responding to Changing Rainfall Patterns](#) (Sally Younger)
- ☐ [NASA's PACE, US-European SWOT Satellites Offer Combined Look at Ocean](#) (Jet Propulsion Laboratory)
- ☐ [NASA-Funded Study Assesses Pollution Near Los Angeles-Area Warehouses](#) (Jet Propulsion Laboratory)
- ☐ [NASA, Smithsonian Open New Exhibit to Showcase Our Dynamic Earth](#) (Jessica Taveau)
- ☐ [Six Ways Supercomputing Advances Our Understanding of the Universe](#) (Michelle Moyer)
- ☐ [NASA Data Reveals Role of Green Spaces in Cooling Cities](#) (NASA Science Editorial Team)

NASA Earth Observatory

- ☐ [Charting the Exceptional, Unexpected Heat of 2023 and 2024](#) (Emily Cassidy)
- ☐ [Drought Expands Across the U.S.](#) (Emily Cassidy)
- ☐ [Intense, Widespread Drought Grips South America](#) (Adam Voiland)
- ☐ [Where Warehouses Are Built, Air Pollution Follows](#) (Andrew Wang)
- ☐ [Hurricane Helene Stirs Up Gulf Coast Waters](#) (Kathryn Hansen)
- ☐ [Flash Floods Swamp North Carolina](#) (Adam Voiland)
- ☐ [Hurricane Milton Crosses Florida](#) (Kathryn Hansen)

NASA Earthdata

- ☐ [From MODIS to VIIRS: Continuing the Legacy](#) (Minnie Wong)

CONTRIBUTIONS TO GEOCAFE

In November 2024, the GeoCAFE, a NSF-funded Research Coordination Network, held the *Federal Investments to Accelerate Research at the Intersection of Geoscience and Health Sciences* webinar. During the GeoCAFE roundtable, **Thomas Wagner (NASA HQ)**, together with leaders from CDC, EPA, NIH, NOAA, NSF, and USGS, shared their perspectives on novel opportunities to drive interdisciplinary research applications in geosciences and health. Discussion topics included data integration, cross-agency collaborations, and research priorities for the next decade. To learn more about this GeoCAFE webinar, please view the [recording](#).

PAST

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

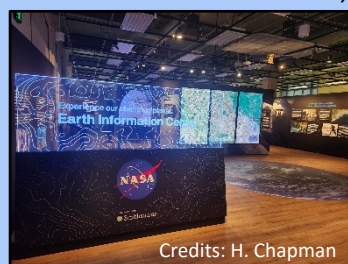
[American Geophysical Union Annual Meeting](#)

December 9-13, 2024

Washington, DC

EARTH INFORMATION CENTER OPENS AT THE SMITHSONIAN

In October 2024, NASA and the Smithsonian's National Museum of Natural History [opened](#) the Earth Information Center in Washington, DC. This in-person and [virtual](#) exhibit provides easily accessible Earth information, which enables global understanding of our changing planet.



Credits: H. Chapman

"The Earth Information Center at the Smithsonian Museum of Natural History will expand access to NASA's data and our decades of Earth observation to even more people. Together with the Smithsonian, we are providing detailed, usable, and scalable information to enable the public to better understand the climate crisis and take action in their community."

– NASA Administrator Bill Nelson

PUBLICATIONS

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

[Long-term Mortality Burden Trends Attributed to Black Carbon and PM_{2.5} from Wildfire Emissions across the Continental USA from 2000 to 2020: A Deep Learning Modeling Study](#). *Lancet Planetary Health*. (J. Wei, J. Wang...S. Anenberg, et al.)

[FireAQ: Monitoring Fire and Air Quality Forecasts](#). *Magazine for Environmental Managers*. (L. Castro García, J. Wang, M. Christiansen, M. Zhou, X. Chen, K.E. Knowland, et al.)

[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. Mendrinós, J. O'Brien, M. Davis, A. Baldwin, B.F. Zaitchik, A. Britton, I. Mwanja, J.M. Gohlke)

[Global Burden of Disease from Environmental Factors](#). *Annual Review of Public Health*. (S.N. Clark, S.C. Anenberg, M. Brauer)

[Climate Change and Vibrio vulnificus Dynamics: A Blueprint for Infectious Diseases](#). *PLoS Pathogens*. (J.M. Jayakumar, J. Martinez-Urtaza, K.D. Brumfield, A.S. Jutla, R.R. Colwell, O.X. Cordero, S. Almagro-Moreno)