

TEMPO DATA RELEASE

The TEMPO mission has been observing air pollutants every hour during the daytime across its field of regard covering greater North America since the [first light images on August 2, 2023](#). On May 20, [TEMPO data products were released](#), including level 2 and level 3 trace gas data products of nitrogen dioxide, formaldehyde, and total column ozone, with a typical latency of 5-6 hours. The level 2 granule products are provided at TEMPO's nominal footprint size of 2 x 4.75 km² at the center of the field of regard ([33.7°N, 91.7°W](#)), while the level 3 gridded products are on a regular 0.02° grid across the field of regard. Although the TEMPO data archive initially began on May 20, the archive is being backfilled to start from First Light on August 2, 2023.

On May 29, the Earth Science Data and Information System (ESDIS) communication team hosted a [webinar](#) showing users how to access TEMPO data products and documentation, perform searches and filtering, and apply subsetting and concatenation services in [Earthdata Search](#) ([free Earthdata login account](#)). Users can visualize the TEMPO level 2 and level 3 data products on NASA Worldview (Figure 1) and the level 3 nitrogen dioxide product on NASA's Earthdata Geographic Information System (EGIS). A [NASA SPoRT viewer for TEMPO data](#) has also been launched, which currently provides quick looks and animations of the TEMPO level 2 products over the field of regard and other select locations (Figure 2). For more information, please view the [NASA web feature](#) from May 2024.

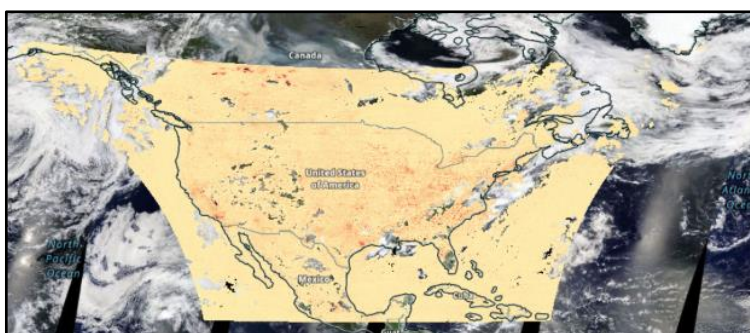


Figure 1. Using NASA Worldview, level 3 tropospheric NO₂ vertical column density are shown across Alberta and Saskatchewan from the Canadian wildfires on July 18, 2024 (~2050 UTC).

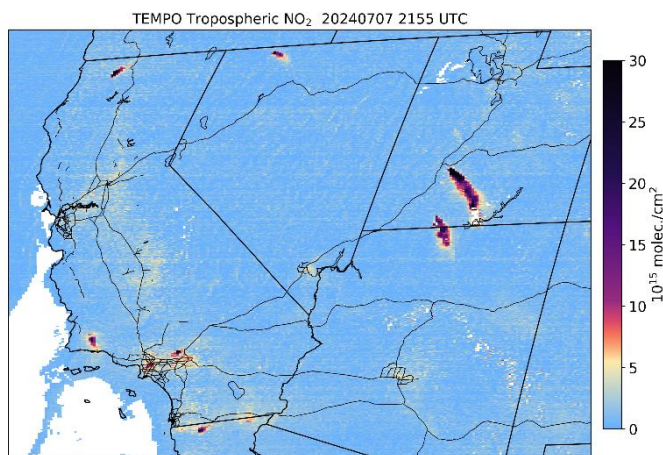


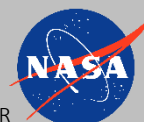
Figure 2. Using NASA SPoRT viewer, high levels of level 2 tropospheric NO₂ vertical column density are observed from the Silver King and Deer Springs fires in Utah on July 7, 2024.

HEALTH AND AIR QUALITY APPLICATIONS APPLIED SCIENCES PROGRAM

JOHN HAYNES
PROGRAM MANAGER
HEADQUARTERS

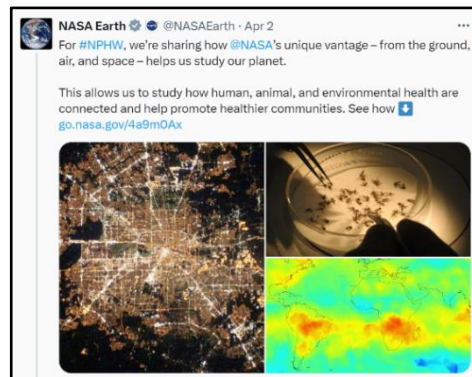
HELENA CHAPMAN
ASSOCIATE
HEADQUARTERS/BAH

LAURA JUDD
ASSOCIATE
LANGLEY RESEARCH CENTER



NATIONAL PUBLIC HEALTH WEEK 2024

In April 2024, **National Public Health Week (NPHW)**, which is supported by the American Public Health Association (APHA), highlighted the *Protecting, Connecting, and Thriving: We Are All Public Health* theme. The NASA HAQ and Communications Teams (**Sofie Bates, NASA GSFC; Jocelyn Argueta, JPL**) prepared social media communications (NASA Earth [Facebook](#) / [X posts](#)) to highlight how NASA Earth observations can help inform decision-making activities that protect community health. Project highlights included [examining the impact of artificial lights at night on health](#) (**Qian Xiao, Univ. of Texas Health Science Center at Houston**) (see [X post](#)), [monitoring and forecasting mosquito-borne diseases](#) (see [X post](#)), and visualizing the [Earth Information Center](#) (see [X post](#)).



Social media post on [NASA Earth X on April 2, 2024](#)

NATIONAL MOSQUITO CONTROL AWARENESS WEEK 2024

In June 2024, the NASA HAQ and Communications (**Sofie Bates, NASA GSFC; Jocelyn Argueta, JPL**) Teams prepared social media communications (NASA Earth [Facebook](#) / [X posts](#) and NASA Climate [Facebook](#) / [X posts](#)) to support the American Mosquito Control Association's National Mosquito Awareness Week 2024. Project highlights included [monitoring and forecasting mosquito-transmitted diseases](#) – tracking invasive mosquito species with VectorSurv in several US states (**Chris Barker, Univ. of California, Davis**), improving malaria decision support with DHIS2 in Africa (**John Beck, Univ. of Alabama in Huntsville**), and developing malaria early warning systems in the Amazonia (**William Pan, Duke Univ.**).



Credits: CDC

NASA HAQ INVESTIGATOR AND TEAM UPDATES

- ❑ **Pawan Gupta (NASA GSFC):** He led the HAQAST Tiger Team project, partnering with the Greening Diplomacy Initiative (GDI), in developing a three-day air quality forecast for PM_{2.5} for [ZephAir](#), the first air quality mobile app, described in the [DOS Press Release](#) in May 2024.
- ❑ **John Haynes (NASA HQ):** He participated in the [NASA Science Live: Climate Edition – Rising Heat](#) in June 2024, together with NASA Chief Scientist and Senior Climate Advisor Kate Calvin and other experts, to dive into the connection between Earth's climate system and people.
- ❑ **Amber Jenkins (NASA Jet Propulsion Laboratory):** The second version of MAIA's Geographic Information Visualization Tool ([GIVT](#)), which integrates dynamic surface PM monitoring data collected operationally across MAIA Primary Target Areas, was publicly released in June 2024.
- ❑ **K. Emma Knowland (NASA GSFC/Morgan State Univ.):** Her team highlighted the [Google Earth Engine Data Fusion Tool to support Air Quality Managers](#) in April 2024.
- ❑ **Shay Sharma (Stanford Univ.):** He published the [Space-based Earth Observations to Understand Heat and Vector-borne Disease Risks](#), in the APHA *One Health Newsletter* of March 2024.

NASA PARTNERS WITH ASIAN COUNTRIES FOR AIRBORNE CAMPAIGN

From February-March 2024, the Airborne and Satellite Investigation of Air Quality ([ASIA-AQ](#)) was conducted in collaboration with scientists, environmental agencies, and space agencies from South Korea, the Philippines, Thailand, and Taiwan. Supported by NASA's Tropospheric Composition Program and led by PI Jim Crawford (LaRC), over 350 hours were flown between the NASA DC-8 and the Gulfstream (G-III) with the former collecting in situ profiles of air quality parameters and the latter mapping air pollution over the megacities of Manila, Seoul, Bangkok, and the eastern coast of Taiwan. These data, in combination with satellite observations from South Korea's Geostationary Environment Monitoring Spectrometer (GEMS), a geostationary instrument similar to TEMPO, and ground-based monitoring, produce the most comprehensive view of air quality in these regions to date.



Credits: [ASIA-AQ website](#)

Within the HAQ team, participants in the field included **Laura Judd (NASA LaRC)** as the platform scientist for the NASA G-III and **Emma Knowland (Morgan State Univ.; NASA GMAO)** as one of the lead air quality forecasters. Over the next year, the ASIA-AQ science team will synthesize and produce reports with partners in each country addressing air quality concerns in each country, including how to improve integration of satellite information into assessments of air quality, better understand emission sources, and improve air quality model. More highlights and a list of collaborators from ASIA-AQ can be found on the [website](#).



Credits: Rafa Mendez Pena



Credits: Rafa Mendez Pena



Credits: Obie Cambaliza



Credits: Angelique Demetillo

NASA HAQAST MASSACHUSETTS MEETING

In June 2024, the [NASA Health and Air Quality Applied Sciences Team](#) (HAQAST), led by **Tracey Holloway (Univ. of Wisconsin, Madison)**, held the HAQAST Massachusetts Meeting with the 14 HAQAST Principal Investigators, researchers, and stakeholders. The meeting, hosted by Massachusetts Institute of Technology and **Arlene Fiore (MIT)** in collaboration with the Health Effects Institute (HEI), engaged stakeholders on uses of Earth science information for environmental health and air quality. This event highlighted how satellite data applications (including TEMPO, TROPOMI, and OMI) can help inform improved forecasts for wildfires and exceptional events; health impacts of prescribed fires; climate change adaptations related to heat and other extreme events; greenhouse gas emissions; and environmental justice. Also, over 70 attended the HAQAST/HEI Early Career Health and Atmospheric Science Workshop, which offered a platform to discuss key challenges in using satellite data for health applications, how to overcome these challenges, and opportunities for funding and collaboration. Overall, this HAQAST meeting engaged 380 people – with 200 in-person. For more information, please view the [recordings](#).



HAQ team (Left) and attendees at HAQAST Meeting (Right).
Credits: NASA HAQAST

NASA HAQ TEAM CONDUCTS ANNUAL PROGRAM REVIEW

In April 2024, the NASA HAQ Team coordinated and moderated the annual [HAQ Applications Program Review 2024](#), in Jackson, WY. A total of 20 people attended this two-day meeting. Presentations were shared by ROSES2021 NASA-funded researchers, Wyoming Department of Environmental Quality (**Amber Potts**), HAQAST (**Jenny Bratburd, Univ. of Wisconsin-Madison**), NASA Atmospheric Sciences Data Center (**Hazem Mahmoud, NASA LaRC**), NASA Capacity Building (**Xia Cai, NASA LaRC**), TEMPO (**Aaron Naeger, NASA MSFC**), MAIA (**Amber Jenkins, JPL**), and CDC partners (**Patrick Wall**). Also, **John Haynes (NASA HQ)** facilitated the Town Hall discussion on future goals, partnerships, and opportunities in the NASA Earth Action Program.

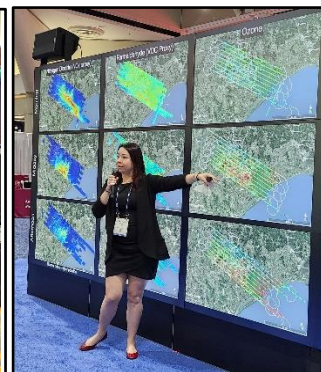
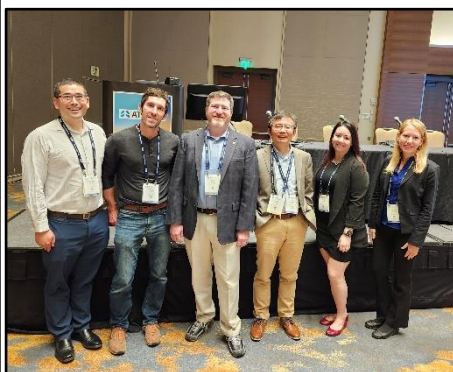


HAQ Applications Program Review 2024 in Jackson, WY. Credits: NASA

NASA HAQ TEAM SHARES EARTH SCIENCE APPLICATIONS AT ATS 2024

In May 2024, at the American Thoracic Society (ATS) International Conference 2024, the NASA HAQ team coordinated a scientific session, *Connecting NASA Earth Science Applications with Air Quality and Respiratory Health*, in San Diego, CA. This session, moderated by **Helena Chapman (NASA HQ/BAH)** and **Laura Judd (NASA LaRC)**, highlighted the NASA HAQ program, TEMPO mission, and two NASA projects to over 55 attendees. Notably, the NASA Applied Sciences Program (NASA GSFC/SSO) supported the NASA Science exhibit at ATS2024 with 6 Hyperwall presentations exploring the use of Earth observations in health and air quality applications. Also, the HAQ team presented talks at the Univ. of California San Diego's Climate and Environmental Health Research Program to 45 attendees – with 15 in-person. For more information, please view the [Medscape](#) and [Healio](#) articles.

- ❑ *Linking Earth Science Applications to Understand Respiratory Health Risks: Updates from NASA Health and Air Quality Applications* (John Haynes, NASA HQ)
- ❑ *The NASA TEMPO Mission: Hourly Daytime Air Pollution Observations from Geostationary Orbit for Advanced Health and Air Quality Applications* (Aaron Naeger, NASA MSFC)
- ❑ *Weekly Briefing of Fire and Air Quality (FireAQ): Progresses and Lessons in 2023* (Jun Wang, Univ. of Iowa)
- ❑ *Extreme Heat and Health Collaborations to Reduce Health Disparities* (Christopher Uejio, Florida State Univ.)



HAQ session panelists (Left) and NASA Hyperwall talk by L. Judd (Right) at ATS 2024. Credits: NASA

PROMOTING AIR QUALITY DECISION SUPPORT AT AWMA 2024

In June 2024, at the Air & Waste Management Association (AWMA) Annual Conference & Exhibition 2024, the NASA HAQ Team coordinated the scientific session, *Integrating Satellite Observations into Air Quality Decision Making*, in Calgary, Canada. Moderated by **Laura Judd (NASA LaRC)** and **Helena Chapman (NASA HQ/BAH)**, **John Haynes (NASA HQ)**, **Aaron Naeger (NASA MSFC)**, **Kenneth Davis (Univ. of Pennsylvania)**, and **Jenny Bratburd (Univ. of Wisconsin-Madison)** described the NASA HAQ and HAQAST programs, TEMPO mission, and improved model accuracy used within SIPs to over 35 attendees. In a complementary session, **H. Chapman** described using NASA data to promote One Health collaborations in air quality management to over 45 attendees.



HAQ session panelists at AWMA 2024 (Left) and HAQ team at the Calgary Tower (Right). Credits: NASA

GEO HEALTH COMMUNITY OF PRACTICE HOLDS MONTHLY 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 to leverage expertise across sectors and geographies and share Earth observation data and tools to support health decision-making. On average, 40 attendees participated in each telecon. Below is a synopsis of each meeting.

- ❑ [April 2024](#): The **Work Group leads** (Heat, Infectious Diseases, Air Quality, Food Security and Safety, Health Care Infrastructure) provided activity updates.
- ❑ [May 2024](#): **Sijin Zhang (Institute of Environmental Science and Research Limited, ESR)** shared their use of remote sensing technology to enhance monitoring and modelling of public health issues (infectious disease database) in New Zealand. **Rowena Christiansen (Univ. of Melbourne)** described the first Space Health course for medical students in the Southern hemisphere.
- ❑ [June 2024](#): **Martyn Clark (GEO Secretariat)** provided an update on the [Post-2025 GEO Work Programme Development](#). **Aaron Naeger (NASA MSFC)** and **Amber Jenkins (NASA JPL)** offered the TEMPO and MAIA missions, respectively. **Jenny Bratburd (Univ. of Wisconsin-Madison)** described the [HAQAST Flowchart for Health and Air Quality Resources and Data Products](#).

Over this term, the leads of the CoP Work Groups – Heat, Air Quality, Infectious Diseases, Food Safety and Security, and Health Care Infrastructure – have continued to coordinate regular telecons with CoP members, offering valuable opportunities for scientific exchange and networking opportunities. Notably, the CoP members have regularly met to develop the goals, objectives, and deliverables of the Animal Health Work Group.

As a follow-up to the [#FacesofGEO social media campaign](#) in Summer 2021, the GEO Secretariat has helped support the [#FacesEO4Health social media campaign](#) for CoP leadership in Summer 2024.



“
The GEO Health Community of Practice is committed to expanding the **use of Earth observations for air quality, heat, infectious disease, and other environmental health topics**

JOHN HAYNES
NASA HEADQUARTERS

GEO GROUP ON EARTH OBSERVATIONS



“
The health of the planet, her animals and our own health are inextricably linked. My goal is to help bring the power, potential and principles of using Earth observations to predict and prevent health risks, and protect the environment.

JULI TRTANJ
NOAA

GEO GROUP ON EARTH OBSERVATIONS



“
Together, we can build global connections across scientific disciplines, strengthen stakeholder engagement, and demonstrate how **innovative data and technologies like Earth observations can help inform health decision-making** to address One Health challenges.

HELENA CHAPMAN
NASA HEADQUARTERS

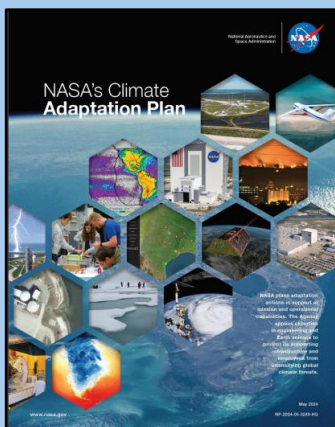
GEO GROUP ON EARTH OBSERVATIONS

NASA CLIMATE ADAPTATION PLAN

In May 2024, NASA and more than 20 federal agencies released their updated [Climate Adaptation Plans](#), to help advance the U.S. administration's [National Climate Resilience Framework](#). This plan aims to align climate resilience investments across the public and private sectors through common principles and opportunities. For more information, please read the [NASA Climate Adaptation Plan](#).

“NASA’s decades of Earth observation are key to building climate resiliency and sustainability across the country and the world.”

— Bill Nelson, NASA Administrator



Credits: NASA

LOOKING AHEAD

ARSET Training:

[Applications of Carbon Dioxide Measurements for Climate-Related Studies](#)

July 9-16, 2024

[NASA Atmospheric Composition Ground Networks Supporting Air Quality and Climate](#)

[Applications](#)

August 8-22, 2024

Meetings:

[DEVELOP Day](#)

August 6, 2024

Washington, DC

[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

RECENT COMMUNICATIONS

NASA

- [The Ocean Touches Everything: Celebrate Earth Day with NASA](#) (Julia Tilton, NASA GSFC)
- [International SWOT Mission Can Improve Flood Prediction](#) (Alan Buis, NASA JPL)
- [NASA Is Helping Protect Tigers, Jaguars, and Elephants. Here’s How.](#) (Emily DeMarco, NASA HQ)
- [NASA Releases New High-Quality, Near Real-Time Air Quality Data](#) (Charles Hatfield, NASA LaRC)
- [NASA Scientists Take to the Seas to Study Air Quality](#) (Erica McNamee, NASA GSFC)
- [NASA Analysis Confirms a Year of Monthly Temperature Records](#) (Sally Younger, GISS)
- [NASA-Led Mission to Map Air Pollution Over Both U.S. Coasts](#) (Erica McNamee, NASA GSFC)

NASA Earth Action Program

- [NASA Is Helping Forecast Cholera Outbreaks](#)
- [App Using NASA Data Alerts Beachgoers to Toxic Red Tides](#)

NASA Earth Observatory

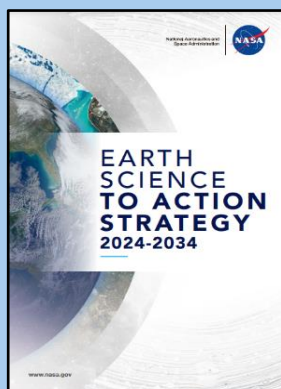
- [Temperature Extremes 2024](#)

ESD LAUNCHES EARTH SCIENCE TO ACTION STRATEGY

In March 2024, NASA released the [Earth Science to Action Strategy 2024-2034](#), with two main objectives: 1) integrating and advancing our scientific knowledge and 2) delivering trusted information based on that knowledge. This strategy will extend NASA's capability to provide unique, trustworthy, accurate, and validated information that enhances knowledge and directly supports a wide range of actions, decisions, and policymaking across sectors at global, national, regional, and local scales.

“These challenges are global in nature, interconnected, and therefore are best addressed through collaborations, partnerships and by joining forces.”

— Dr. Karen St. Germain,
Director, NASA Earth
Science Division



Credits: NASA

PAST

ARSET Training:

[Earth Observations for Humanitarian Applications](#)

June 6-20, 2024

Meetings:

[World Medical Association Council Meeting](#)

April 18-20, 2024

Seoul, Republic of Korea

[HAQ Annual Program Review 2024](#)

April 23-24, 2024

Jackson, WY

[MAIA Science Team Meeting](#)

May 6-8, 2024

Pasadena, CA

[American Thoracic Society International Conference](#)

May 17-22, 2024

San Diego, CA

[NASA HAQAST Massachusetts](#)

June 4-5, 2024

Cambridge, MA

[Air & Waste Management Association's Annual Conference & Exposition](#)

June 24-27, 2024

Calgary, Alberta, Canada

PUBLICATIONS

[Low-Cost Hourly Ambient Black Carbon Measurements at Multiple Cities in Africa.](#) *Environmental Science & Technology.* (A. Anand...**S. Hasheminassab**, et al.)

[Delivering Revolutionary Satellite Data with NASA's Tropospheric Emissions: Monitoring of Pollution \(TEMPO\) Mission.](#) *A&WMA EM Plus Magazine.* (**A.R. Naeger**, **L. Judd**, X. Liu, K. Chance, C.R. Nowlan, G. González Abad)

[Existing Challenges and Opportunities for Advancing Drought and Health Research.](#) *Current Environmental Health Reports.* (J.D. Berman, A.M. Abadi, **J.E. Bell**)

[Impact of Climate and Land Use/Land Cover Changes on Malaria Incidence in the Ecuadorian Amazon.](#) *PLOS Climate.* (A.L.A. Navas, M.M. Janko...**B. Zaitchik**, **W.K. Pan**, C.F. Mena)

[Integrating Satellite and Model Data to Explore Spatial-Temporal Changes in Aerosol Optical Properties and their Meteorological Relationships in Northwest India.](#) *Science of the Total Environment.* (P.S. Pippal, **R. Kumar**, R. Kumar, A. Singh)