

QUARTERLY HAQ PROJECT HIGHLIGHT: QUANTIFYING DISTRIBUTIONAL HEALTH DAMAGES OF EXTREME WEATHER EVENTS

Coastal flooding, caused by sea level rise (SLR), storm surge, and tropical cyclones, is a growing threat. Previous studies have modeled mortality risk as a function of SLR, assuming a uniform global death rate of those exposed to flooding. This study, led by **Julia Gohlke (Virginia Tech)** and her team, [analyzed](#) 1,985 coastal flooding events across 131 countries and territories from 1990-2024 to derive country-and territory-level estimates of deaths due to coastal flooding events. The team applied SLIDERS to estimate flood exposure, which incorporates several products that assimilate NASA Earth observation data (e.g. CoastalDEM, GTSM, ERA5). The team estimated flood mortality rates range from 0.00004% to 16% across 131 coastal countries or territories, highlighting large differences across countries and territories. By incorporating SLR projections, the team predicted that annual deaths would increase from ~33,438 to 45,840–56,603 by 2050 or 47,730–116,935 by 2100, with the largest increases expected in Mexico, Japan, parts of Central and South America, the Caribbean, and Southeast Asia (Figure 1). This analysis is part of a larger project supported through a **2021 HAQ grant**, which incorporated flood water extent data from Sentinel-1, MODIS, and AER FloodScan, and temperature data from PRISM, to [refine exposure estimates](#) in models assessing flood and heat-related health outcomes.

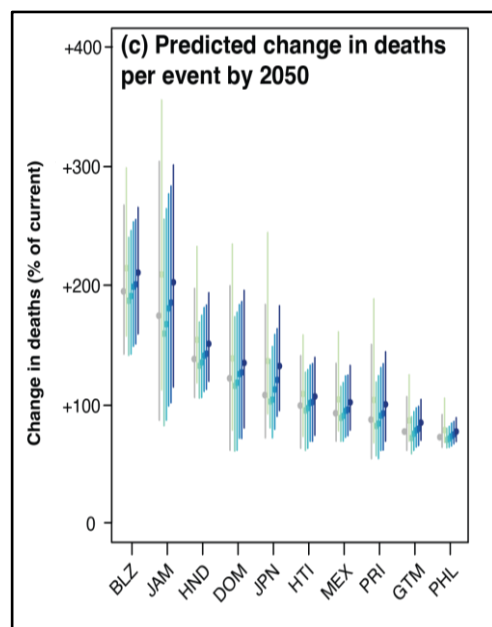
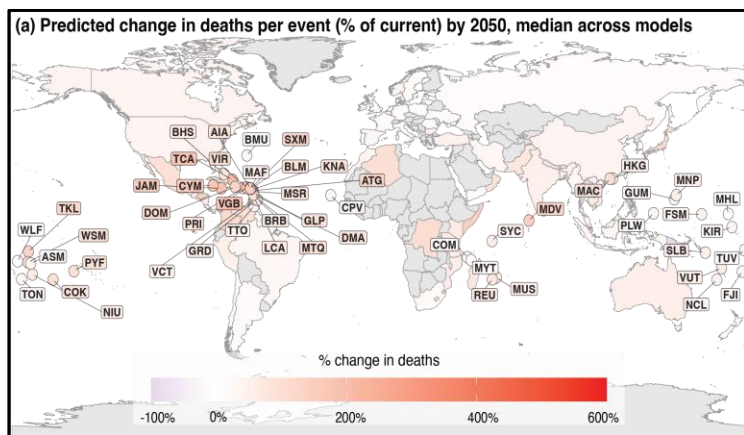


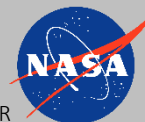
Figure 1. Modeled estimates of increases in deaths per event for all countries (median of models) by 2050 (a) and for top 10 countries (with ≥ 10 events since 1990) by mean forecasted increase by 2050 (c). Lines in (c) span 17th-83rd percentile estimates. BLZ = Belize; JAM = Jamaica; HND = Honduras; DOM = Dominican Republic; JPN = Japan; HTI = Haiti; MEX = Mexico; PRI = Puerto Rico; GTM = Guatemala; PHL = Philippines.

HEALTH AND AIR QUALITY APPLICATIONS EARTH ACTION PROGRAM

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SUCCESSFUL SENTINEL-6B LAUNCH ON NOVEMBER 16

On November 16, at 9:21 p.m. PST, the [Sentinel-6B satellite](#), developed by NASA, NOAA, ESA, and EUMETSAT, with technical support by CNES, was [launched](#) aboard a SpaceX Falcon 9 rocket from Vandenberg Space Force Base. Building on the [Sentinel-6 Michael Freilich](#) (launched in 2020), this instrument will collect sea level measurements, which will improve hurricane forecasts, help protect infrastructure, and benefit shipping and other commercial activities. On December 17, [first light images](#) were obtained from the satellite.



Credit: NASA

“Sentinel-6B will build upon the legacy of Sentinel-6 Michael Freilich by making sea level measurements that improve forecasts used by communities, businesses, and operations across the country.”

— Dr. Nicky Fox, Associate Administrator
Science Mission Directorate, NASA HQ

“Sentinel-6B is a testament to the value of NASA’s partnership missions to put actionable satellite information and science into the hands of decision-makers on the ground.”

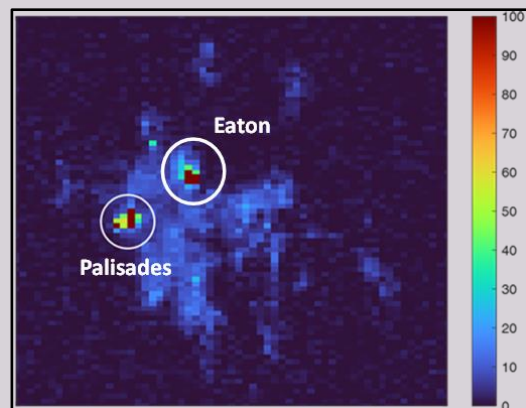
— Dr. Karen St. Germain, Director
Earth Science Division, NASA HQ

TEMPO NIGHTTIME DATA PRODUCTS

In December, TEMPO version 3 nighttime data became [publicly available](#) via NASA Earthdata. With nine months of data (excluding mid-summer months), the version 4 twilight product will be available in January 2026. Notably, over the past year, more than 2 million gigabytes of TEMPO data have been downloaded from the NASA Atmospheric Science Data Center, setting the “most data downloads” record.



Clusters of light across North America as observed by the TEMPO instrument in February 2025. This false-color image represents the total light observed from that location, with red being the brightest. Credit: NASA



TEMPO radiances from geolocated Earth radiances twilight product at 10 UTC on January 8, 2025, during the Palisades and Eaton wildfires in Los Angeles, CA. Very high radiances are observed in the “hot source” locations of wildfires. Color palette units are $nW/(cm^2 sr)$.

Credit: James Carr (Carr Astronautics)

HAQAST ST. LOUIS MEETING

In November 2025, the NASA Health and Air Quality Applied Sciences Team ([HAQAST](#)), led by Tracey Holloway (Univ. of Wisconsin, Madison), held the HAQAST St. Louis Meeting with the 14 HAQAST Principal Investigators and a myriad of researchers and stakeholders. The meeting, hosted by Washington University of St. Louis, engaged stakeholders on uses of Earth science information for air quality and environmental health. This event highlighted how satellite data applications (including TEMPO, TROPOMI, and OMI) help inform improved forecasts for dust storms, wildland fires, and exceptional events; strengthen emissions inventories; and illuminate health effects of heat and compound events. The meeting also explored expanded private sector partnerships. It included a TEMPO Earthdata Hands-on Workshop and scientific session highlighting 27 posters and flash talks. Overall, this HAQAST meeting engaged 215 people – with 75 in-person. For more information, please view the [recordings](#).



Attendees (top) and panelists (bottom) at HAQAST St. Louis. Credits: NASA HAQAST

NASA HAQ INVESTIGATORS PRESENT AT APHA 2025

In November 2025, **Muge Akpinar-Elci (Univ. of Nevada-Reno)** convened the *One Health Communication: Preparing for the Next Global Health Challenges* roundtable at the American Public Health Association (APHA) Annual Meeting & Expo 2025 in Washington, DC. **Helena Chapman**

(NASA HQ/BAH) contributed to the session preparation, where **M. Akpinar-Elci, Capt. Brianna Skinner (FDA), Catherine Machalaba (The Nature Conservancy), Thomas Doker (U.S. Air Force), Jessica Schwind (Georgia Southern Univ.), and Anna Makaretz (MA DoH)** moderated roundtable discussions on One Health communication in different disciplines and sectors, to 30 attendees. Also, as part of the Applied Public Health Statistics section, over 40 people heard **Summer Woolsey (Univ. of Nebraska Medical Center)** present on health-focused [drought communication tools](#) for public health professionals.



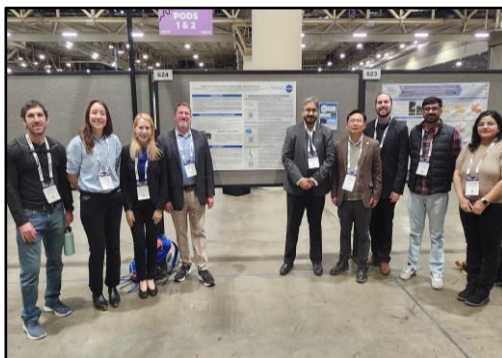
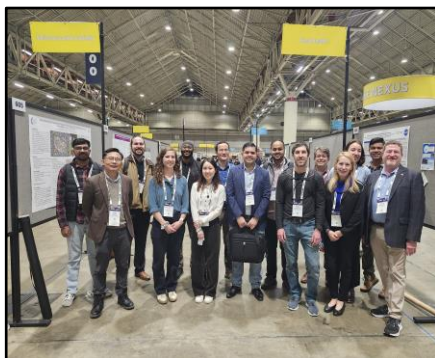
One Health Roundtable facilitators at APHA 2025. Credit: M. Akpinar-Elci

NASA HAQ TEAM UPDATES

- ❑ **Jenny Bratburd (Univ. of Wisconsin-Madison):** She presented on HAQAST at the [Drought and Health Workshop](#) in September 2025, hosted by the Univ. of Nebraska Medical Center.
- ❑ **Helena Chapman (NASA HQ/BAH):** She was selected as the University of Florida College of Public Health and Health Professions' [Alumna of the Year 2025 \(Q&A Interview\)](#) in October 2025. Also, she was selected as Chair-Elect of the American Public Health Association's One Health section.
- ❑ **Tracey Holloway (Univ. of Wisconsin-Madison):** She was selected as an [AGU Fellow](#) in September 2025. Also, she was interviewed by the Health Effects Institute's [Science on the 7th](#) in October 2025 and the Arizona PBS's [Air Quality in America program](#) in November 2025.
- ❑ **Yang Liu (Emory Univ.):** He was recognized as one of the [Clarivate's Highly Cited Researchers for 2025](#) in November 2025.
- ❑ **Daniel Tong (George Mason Univ.):** He was interviewed on the GeoHealth Frontlines' [The Dust We Breathe](#) of the AGU GeoHealth Section in November 2025.

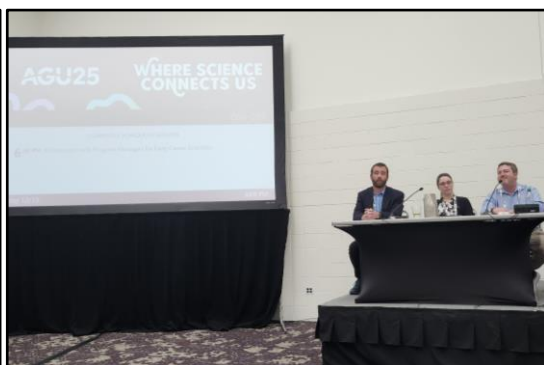
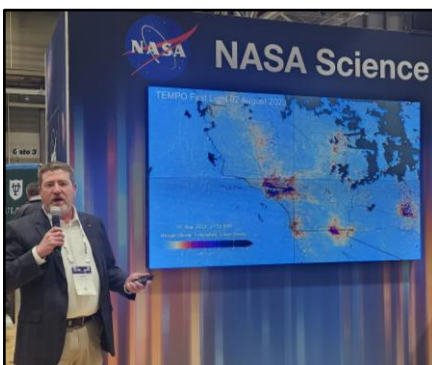
NASA HAQ TEAM HOSTS SCIENTIFIC SESSIONS AT AGU 2025

At the American Geophysical Union (AGU) Annual Meeting 2025 in New Orleans, the NASA HAQ team coordinated oral and poster sessions entitled, *Actionable Uses of Satellite Observations for Health and Air Quality*. Moderated by **Helena Chapman (NASA HQ/BAH)**, over 125 attendees participated in the oral sessions, which included 8 talks on air quality modelling for urban settings, wildfire/smoke conditions, plastic waste, and malaria and cholera forecasting, spanning research applications in Colombia, Ethiopia, and the United States. The HAQ poster session included 14 posters, including the HAQ poster entitled, *NASA Earth Observations to Guide Public Health Decisions*.



AGU 2025 presenters of the HAQ panel and poster sessions. Credits: H. Chapman

John Haynes (NASA HQ) presented an overview of the HAQ program at the Union session with *Water, Climate, and Infectious Microbes in the Environment* theme with 30 attendees. Also, he presented a NASA Hyperwall talk and served as an invited panelist for *Town Hall: Discussion with Program Managers for Early-Career Scientists*, with 80 attendees.



AGU 2025 presenters of the Union Session (left). J. Haynes at the NASA Hyperwall (middle) and Early Career Town Hall (right). Credits: H. Chapman

Several presentations highlighted the TEMPO mission, including *Constellation of Low Earth Orbit and Geostationary Satellites for Atmospheric Composition and Air Quality* and *Advances in the Integrated Global Observing System for Air Quality: Science and Societal Benefit*. They described a wide spectrum of TEMPO science applications from monitoring wildland fire smoke plumes, characterizing diurnal variations of pollutants, pollutant exposure, and disparity assessments, and improving emission inventories and lightning NOx estimates. Also, the TEMPO nighttime products presented capabilities for observing gas flaring, lights from fishing and offshore oil platforms, lightning, wildfires, city lights, and aurora.

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 **Didier Davignon (ECCC)** – offers a platform to leverage expertise and share Earth observation data and tools to support health decision-making. 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.

In December 2025, the GEO Health CoP held the CoP Annual Meeting 2025. Day 1 (63 attendees) included community updates (**Rui Kotani** and **Matt Crook, GEO Secretariat**), regional updates (**Elliott Matthews, NOAA**; **Hongbo Yang, Chinese Academy of Sciences**; **Haris Kontoes, National Observatory of Athens**; **Nale Mudau, South African National Space Agency**), and the Operationalizing One Health Panel with moderators (**Alejandro Saez Reale, WMO**; **Cascade Tuholske, Montana State Univ.**) and panelists (**Nathan Pavlovic, Air Quality WG**; **Tatiana Loboda, Infectious Diseases WG**; **Ajay K. Gupta, Health Care Infrastructure WG**).

As part of the AGU Town Hall, Day 2 (45 attendees) included updates from the six Work Group leads and recognition of 9 CoP “Unsung Hero” members for their valuable contributions to the CoP Work Group activities: **Matea Cañizares (Graduate of Johannes Kepler School, Ecuador)**, **TC Chakraborty (PNNL)**, **Jenny Bratburd (Univ. of Wisconsin-Madison)**, **Sebastián Diez (Universidad del Desarrollo, Chile)**, **Jordan Schnell (NOAA)**, **Moiz Usmani (Univ. of Alabama at Birmingham)**, **Sadie Ryan (Univ. of Florida)**, **Emmanouil Platanakis (Univ. of Bath, UK)**, and **Antonio Correias (Skymantics)**.



Attendees at CoP Annual Meeting at AGU2025.

Credits: H. Chapman

GEO HEALTH COP CELEBRATES ONE HEALTH DAY 2025

The GEO Health CoP’s Work Groups – Air Quality, Animal Health, Food Security and Safety, Health Care Infrastructure, Heat, and Infectious Diseases – prepared the [One Health Blog Series](#) (published on the [GEO Blog](#)) that describe global health challenges and showcase activities that incorporate novel approaches to using Earth observation data to enhance health decision-making. The six articles were titled: 1) [How Earth Intelligence can help improve air quality and respiratory health](#); 2) [How Earth Intelligence can help advance extreme heat and health resilience](#); 3) [Transforming food security and safety: the role of Earth Intelligence in global food systems](#); 4) [Earth intelligence and One Health: applying transdisciplinary insights to animal health](#); 5) [The contributions of Earth intelligence to infectious disease surveillance and risk monitoring](#); and 6) [Earth Intelligence and health care infrastructure: strengthening global health security](#)). Learn more about the [CoP event](#) on the One Health Day global map!

HAQ COMMUNITY ENGAGEMENT



HEALTH & AIR QUALITY

The NASA HAQ team (**Helena Chapman, NASA HQ/BAH**) presented a talk that introduced the HAQ program and key examples of using Earth observations for public health applications.

- ❑ **George Washington Univ. (In-person):** H. Chapman gave an invited lecture to the Global Health and Development undergraduate course (28 attendees) on One Health and projects using Earth observations for health applications in November 2025.

LOOKING AHEAD

ARSET Trainings:

[Advanced NASA Earth Observations and Tools for Active Fire, Smoke, and Post-Fire Monitoring](#)

January 14-21, 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

RECENT COMMUNICATIONS

NASA

- ❑ [NASA Welcomes 15th Administrator Jared Isaacman](#) (Jessica Taveau)
- ❑ [NASA Ignites New Golden Age of Exploration, Innovation in 2025](#) (Jessica Taveau)
- ❑ [NASA, SpaceX Launch US-European Satellite to Monitor Earth's Oceans](#) (Jessica Taveau)
- ❑ [NASA, NOAA Rank 2025 Ozone Hole as 5th Smallest Since 1992](#) (Sally Younger)
- ❑ [NASA Instrument Reveals New Ability to Gather Nighttime Light Data](#) (James Riordon)
- ❑ [25 Years on the International Space Station](#)

NASA Earth Observatory

- ❑ [Antarctic Sea Ice Saw Its Third-Lowest Maximum](#) (James Riordon)
- ❑ [A Hot and Fiery Decade for Kīlauea](#) (Adam Voiland)
- ❑ [A Subtle Return of La Niña](#) (Kathryn Hansen)
- ❑ [City Lights Glow Along Moonlit Waters](#)

NASA Earthdata

- ❑ [NASA-Funded Tool Tracks Floods and Water Risks in North Carolina](#) (Melody Pederson)
- ❑ [Let the Water Quality Information Flow with NASA STREAM](#) (Sarah Cutshall)
- ❑ [Sentinel-6B Continues 30-Year Legacy of Sea Level Measurements](#) (Severine Fournier, Ian Fenty)

PUBLICATIONS

[Supporting Undermonitored Regions with Satellite Data and Model Outputs](#). *EM Magazine*. (J. Bratburd, P. Gupta, C. Malings, R. Martin)

[Discussion of “Satellite Data to Support Air Quality Assessment and Management”](#). *Journal of the Air & Waste Management Association*. (S.S.G. Wierman...T. Holloway, J.R. Bratburd, A. Fiore, G. Kerr, J. Mao)

[Effects of Fire Plume Height on the Geophysical Estimation of Surface Fine Particulate Matter from Satellite Aerosol Optical Depth during North American Wildfires](#). *ACS ES&T Air*. (I. Singh, R.V. Martin, et al.)

[Contrasting Air Pollution Responses to Hourly Varying Anthropogenic NO_x Emissions in the Contiguous United States](#). *EGUsphere*. (M. Tao, A.M. Fiore, L.K. Emmons, J.R. Scott, G.G. Pfister, D.S. Jo, W. Tang. (Pre-print)

[Multispectral Land Surface Reflectance Reconstruction Based on Non-Negative Matrix Factorization: Bridging Spectral Resolution Gaps for GRASP TROPOMI BRDF Product in Visible](#). *Remote Sensing*. (W. Hou, X. Liu, J. Wang, C. Chen, X. Xu)

[Evaluating the Performance of Regional and Global Forecasting Models for Accurate PM_{2.5} Prediction and Air Quality Index Assessment in Delhi, India](#). *Journal of Geophysical Research: Atmospheres*. (P.P. Yadav, R. Jat, S.D. Ghude, G. Govardhan, R. Kumar...P. Gupta, et al.)

[Summertime Diurnal Variability of Formaldehyde Over the Contiguous United States: Constraints From Pandonia Global Network](#). *Geophysical Research Letters*. (T. Zhao, J. Mao...J. Kaiser, et al.)

[Prenatal Exposure to Fine Particulate Matter Components and Autism Risk in Childhood](#). *JAMA Network Open*. (M. Cloutier...R.V. Martin, et al.)

[Risk Communication, Respiratory Health Risks, and Air Pollution Forecasting in the City of Rio de Janeiro, Brazil](#). *Brazilian Journal of Pulmonology*. (K.D.H. Park, K. Cromar...K.E. Knowland)

[A Comprehensive Dataset of Residential Air Conditioning Prevalence in the Continental United States](#). *Scientific Data*. (Y. Ahn, C.K. Uejio)

[Clear-sky and Cloudy-sky Differences in NO₂ Concentrations over the United States: Implications for Satellite Measurement Applications](#). *Atmospheric Chemistry and Physics*. (D.L. Goldberg...S.C. Anenberg)

[Ammonia Observations over Large North American Cities](#). *Journal of Geophysical Research: Atmospheres*. (E.R. Lill...J.R. Pierce, E.V. Fischer)

[Reconstructing Wildland Fire Burned Area for Asian Russia \(1979–2000\) using AVHRR GAC Satellite Data to Provide an Improved Baseline for Assessing Long-term Change](#). *Journal of Photogrammetry and Remote Sensing*. (D.R. Cahoon, A.J. Soja, et al.)

[Air Aware: A Theory-driven, Co-designed Air Quality Communication Campaign to Promote Health Protective Behaviors among Outdoor Workers](#). *Journal of Applied Communication Research*. (C. Bice...S. Magzamen, J.R. Pierce, E.V. Fischer)

[A Coastal Flood Mortality Risk Model with Projected Changes under Sea Level Rise](#). *ESS Open Archive*. (R.S.D. Calder, S. Timilsina, B. Brewer, B.F. Zaitchik, S. Swarup, J.M. Gohlke)

[Evaluation of Remotely Sensed Inundation Data Sets to Estimate Flood-Associated Emergency Department Visits after Hurricane Harvey](#). *GeoHealth*. (B. Ramesh, J.M. Gohlke, B. Zaitchik, et al.)

PAST

ARSET Training:

[Remote Sensing for Climate-Sensitive Infectious Diseases](#)
October 7-9, 2025

Meetings:

[American Public Health Association Annual Meeting & Expo](#)
November 3-5, 2025
Washington, DC

[HAQAST St. Louis](#)
November 6-7, 2025
St. Louis, MO

[American Geophysical Union Annual Meeting](#)
December 15-19, 2025
New Orleans, LA