

EARTH DAY 2020: 50TH ANNIVERSARY

On April 22, 2020, the world commemorated the 50th anniversary of Earth Day. NASA reflects on how the continued growth of its fleet of Earth-observing satellites has sharpened our view of the planet's climate, atmosphere, land, polar regions, and oceans. Looking back on the past 50 years of scientific discovery and innovation, **NASA Goddard** released an informative video, [NASA Looks Back at 50 Years of Earth Day](#), and web feature, [#EarthDayAtHome with NASA](#), to showcase interactive activities and resources to enjoy "Earth Day at Home".



Photo credit: NASA/Perisha Gates

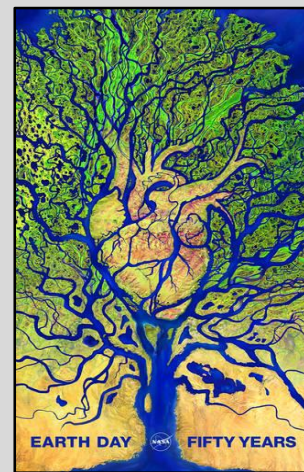


Photo credit: NASA

EARTH DAY STORY ON HEALTH AND AIR QUALITY

In April 2020, the NASA's Earth Science News Team (**Esprit Smith**) shared the web feature, [How NASA is Helping the World Breathe More Easily](#), as an Earth Day Story. This article presented the [NASA Models the Complex Chemistry of Earth's Atmosphere](#) video, produced by NASA Goddard Space Flight Center's Scientific Visualization Studio. This article highlighted several topics: Environmental Protection Agency's [AirNow](#) system; current use of Moderate Resolution Imaging Spectroradiometer (**MODIS**) and Ozone Monitoring Instrument (**OMI**) data; upcoming Tropospheric Emissions: Monitoring Pollution (**TEMPO**) and Multi-Angle Imager for Aerosols (**MAIA**) missions; and support by the HAQ Team and Health and Air Quality Applied Sciences Team (HAQAST). These contributions to Earth Day 2020 showcase the essential role of NASA Earth observation data to provide a complete picture of atmospheric chemistry, invaluable partnerships to facilitate data sharing, and innovative solutions to solve real-time global health challenges.



Photo credit: NASA

HEALTH AND AIR QUALITY APPLICATIONS APPLIED SCIENCES PROGRAM

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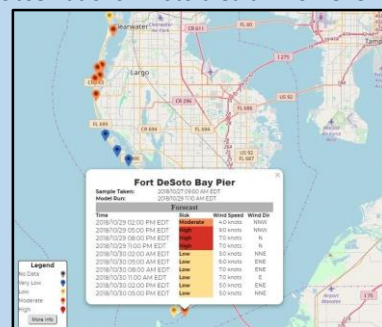


NASA HEALTH AND AIR QUALITY TEAM SUPPORTS NATIONAL PUBLIC HEALTH WEEK 2020

Every April, **National Public Health Week (NPHW)**, which is supported by the American Public Health Association (APHA), is celebrated to highlight key health priorities and encourage health educators, practitioners, and researchers to coordinate related health activities that address emphasized topics. For NPHW 2020 (*NPHW@25: Looking Back, Moving Forward*), the NASA Health and Air Quality Applications (HAQ) and Communications Teams (**Aries Keck, McRae Lenahan, Lia Poteet**) shared two projects on the NASA Applied Sciences Program's [website](#) that highlighted the valued role of citizen scientists in research applications that advance our understanding of two environmental health risks: dust storms and harmful algal blooms. These public health projects – led by **Daniel Tong (George Mason U.)** and **Richard Stumpf (NOAA)** – emphasize the benefit of transdisciplinary collaborations that integrate innovative data and technology into public health applications and advance scientific understanding of our ecosystem.



The [GLOBE Observer app](#) offers a platform for uploaded images of dust observations. Photo credit: NASA GLOBE



The [HABscope app](#) helped scientists develop harmful algal bloom forecasts in Florida (Pinellas county). Photo credit: NASA

EARTH DAY VIRTUAL PANEL FOCUSES ON AIR QUALITY

In April 2020, in honor of Earth Day 2020, Trinity College (Dublin, Ireland) hosted a livestreamed talk in partnership with the Smithsonian's Earth Optimism Summit. Using the theme, *An Air of Positivity*, this [event](#) explored positive solutions to achieving healthier and cleaner air quality. Moderated by journalist Daniel Murray, panelists included **John Haynes (NASA HQ)**, author Tara Shine ([Change by Degrees](#)), and artist Robin Price ([Fab Lab Barcelona](#)). These presentations were well received with over 300 views.



Photo credit: Trinity College

NASA INVESTIGATORS IN THE NEWS

Michael Wimberly (U. of Oklahoma): His project (*Rapid Response to Assess the Risk of Arbovirus Outbreaks Triggered by Climate Events*) highlights collaborations with public health agencies from four states (SD, LA, MI, OK) to conduct WNV forecasting in 2020. Citizen science applications are important for this project, as highlighted in the ['Citizen Scientists' Help Track Mosquito Locations](#).

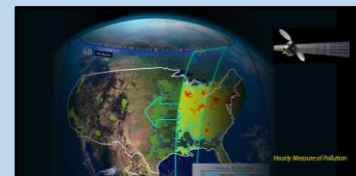
Daniel Tong (George Mason U.): Two team members (Orion McCotter, Bridget Baker) were highlighted in the *Science Friday's* [A Fever in the Dust](#) in April 2020.

Susan Anenberg (George Washington U.): Her project was highlighted as a GWU web feature, [Study Examines COVID Shutdowns and Air Quality in Cities Worldwide](#), in May 2020.

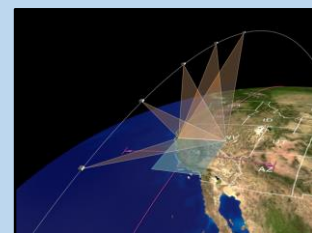
Tatiana Loboda (U. of Maryland, College Park): Her [Gathering On-the-Ground Data with Tatiana Loboda](#) profile was highlighted on the NASA webpage in June 2020.

TEMPO/MAIA EARLY ADOPTERS VIRTUAL WORKSHOP

In May 2020, NASA Applied Sciences Program hosted a joint **TEMPO/MAIA Early Adopters Virtual Workshop**. Moderated by **Abigail Nastan (Jet Propulsion Laboratory)** and **Aaron Naeger (U. of Alabama in Huntsville)**, over 140 potential [MAIA](#) and [TEMPO](#) users attended. Beyond updating participants about the missions, the workshop browsed the latest version of synthetic TEMPO data products, previewed the earliest version of the MAIA aerosol and PM data products, and gathered feedback. As a result of the workshop, specific changes to the MAIA aerosol product will be recommended to enhance user-friendliness for those desiring to make their own PM models. Furthermore, based on workshop feedback, the TEMPO team will distribute synthetic data in preferred user formats and visualization platforms to better prepare Early Adopters for operational data. Due to a high-level of interest in MAIA-TEMPO synergistic applications, future MAIA-TEMPO joint workshops are planned to continue building on collaborations and unique applications between the teams.



TEMPO. Photo credit: NASA



MAIA. Photo credit: NASA

UN OFFICE FOR OUTER SPACE AFFAIRS SPACE4HEALTH WEBINAR

In May 2020, the UN Office for Outer Space Affairs (UNOOSA) invited the HAQ Team to present at the [Space4Health webinar](#). This webinar aimed to leverage expertise and increase awareness about health applications using space-based technologies. As part of the two-part webinar, **John Haynes (NASA HQ)** presented, *Utilizing Earth Observations for Improved Air Quality and Health Decisions*, and **Helena Chapman (NASA HQ/BAH)** presented, *Using Earth Observations to Strengthen One Health Collaborations*. These presentations had over 100 views.



J. Haynes presents his webinar talk.
Photo credit: H. Chapman

NASA HIGHLIGHTS ON COVID-19

Research Funding

- ☐ [NASA Funds Four Research Projects on COVID-19 Impacts Air Quality Findings](#)

Findings

- ☐ [Global Nitrogen Dioxide Monitoring](#)
- ☐ [NASA Satellite Data Show 30% Drop in Air Pollution over Northeast US](#)
- ☐ [New-generation Satellite Observations Monitor Air Pollution during COVID-19 Lockdown Measures in CA](#)
- ☐ [NASA Probes Environment, COVID-19 Impacts, Possible Links](#)
- ☐ [NASA Monitors Environmental Signals From Global Response to COVID-19](#)
- ☐ [NASA, Partners Launch Virtual Hackathon to Develop COVID-19 Solutions](#)
- ☐ [NASA, Partner Space Agencies to Release Global View of COVID-19 Impacts](#)

GEO HEALTH COMMUNITY OF PRACTICE HOLDS WEEKLY TELECONS TO LEVERAGE GLOBAL EXPERTISE DURING COVID-19 PANDEMIC



Since April 2020, the Group on Earth Observations (GEO) [Health Community of Practice](#) (CoP) – led by **John Haynes (NASA HQ)** and **Juli Trtanj (NOAA)** – has coordinated [weekly community teleconferences](#) to leverage expertise across sectors and geographies and share Earth observation data, tools, and knowledge to support COVID-19 responses. Global experts have discussed how satellite data can advance understanding of the direct and indirect impacts of COVID-19 transmission on human, animal, and environmental health. These topics have included air and water quality, disaster preparedness and management, environmental determinants and seasonality, and One Health and zoonotic disease transmission. Through these teleconferences, professional networks have expanded through small-group discussions on related topics to support global research applications. As each teleconference has engaged 40 to 120 participants, new GEO Health CoP members have joined and presented their research applications and community initiatives to the wider community. To showcase these efforts, **Helena Chapman (NASA HQ/BAH)** prepared a brief article, *Using Earth Observations for COVID-19 Response Efforts*, for the APHA Veterinary Public Health's *One Health Newsletter* ([Summer Issue 2020](#)). We welcome new CoP members to join any upcoming GEO Health CoP teleconference!

GEO VIRTUAL SYMPOSIUM 2020

In June 2020, the NASA HAQ Team participated in the [GEO Virtual Symposium 2020](#), with over 1,600 registered participants. This symposium highlighted the GEO Work Programme activities, initiatives, and flagships, sharing updates and plans to enhance the use of Earth observation data for sustainable development. It also served as a professional networking event, connecting GEO members across agencies and institutions, disciplines, and geographic regions. A total of 14 sessions had pre-recorded presentations with interactive Q&A sessions, including leveraging advanced technologies, capacity development, monitoring essential variables, and regional GEOs. The [Earth Observations for COVID-19 Response and Recovery](#) session – facilitated by **John Haynes (NASA HQ)**, **Juli Trtanj (NOAA)**, **Astrid-Christina Koch (European Commission)**, and **Helena Chapman (NASA HQ/BAH)** – coordinated a “world tour”, where seven panelists from across geographic regions shared preliminary findings on how climatological, environmental, and meteorological factors have influenced COVID-19 transmission to date, noting the lockdown restrictions implemented across countries. This virtual symposium promoted multidisciplinary collaborations that connected experts, promoted the use of innovative approaches, and aligned agendas to meet global objectives. We invite everyone to view the [pre-recorded presentations](#)!



AWMA 2020 FEATURES PRESENTATIONS ON AIR QUALITY AND PUBLIC HEALTH APPLICATIONS FROM INVESTIGATORS

In June 2020, at the **Air & Waste Management Association (AWMA) Virtual Conference 2020**, the NASA HAQ Team coordinated the scientific session, *Resolving Critical Air Quality and Health Issues from Space with NASA's Future Earth Observing Satellites*, to an audience of more than 100 attendees. Presentation titles included *Using Satellite Data to Strengthen Air Quality Management: An Overview of NASA Health and Air Quality Applications* (**John Haynes, NASA HQ**); *Epidemiologic Opportunities: How Satellite Data Contribute to Studies of Air Pollution and Human Health* (**Allan Just, Icahn School of Medicine at Mount Sinai**); *NASA Multi-Angle Imager for Aerosols (MAIA): Connecting Particle Mixtures to Human Health* (**Abigail Nastan, Jet Propulsion Laboratory**); *Diagnosing Synthetic Data for Demonstrating Air Quality Applications of the NASA TEMPO mission* (**Aaron Naeger, U. of Alabama in Huntsville**); *Geostationary Measurements of NO₂ and Other Gases from TEMPO: Dramatic Advances in our Understanding of Air Quality* (Ronald Cohen, U. of California, Berkeley); and *Revealing TEMPO's Capability for Observing Ozone Precursors* (**Laura Judd, NASA Langley**). **Helena Chapman (NASA HQ/BAH)** also presented the talk, *One Health Collaborations: Key to Advancing Environmental Health Applications*, in the *Assessing Exposure and Health Effects and Control of Regulated and Non-Regulated Air Pollutants II* session. The NASA HAQ and Communications (**Lia Poteet, Aries Keck, U.Group**) Teams prepared a web feature, [Engaging with Waste and Air Quality Stakeholders at Virtual Conference](#), to promote this event.

ONE HEALTH SEMINARS

The COVID-19 pandemic has continued to spark a global dialogue on the [One Health concept](#), which promotes the interconnectedness among humans, animals, and the environment. In June 2020, the HAQ Team (**Helena Chapman NASA HQ/BAH**) was invited to present at international webinars in English and Spanish.

- ❑ **RedCLARA (Latin American Cooperation of Advanced Networks):** Invited presentation (*Applications of Satellite Data and Advances in Environmental Health: Focus on One Health*) for the [Climate and Health](#) webinar.
- ❑ **National Academy of Medicine (Dominican Republic):** Invited presentation (*One Health*) for the [monthly series](#) (over 430 attendees).
- ❑ **Universidad Central del Este (Dominican Republic):** Invited presentation (*One Health*) for an epidemiology and preventive medicine course (60 medical students).
- ❑ **Developing a Career in One Health: Stories from the Next Generation:** Invited panelist for the Lancet One Health Commission webinar series, *One Health – Reconnecting for Our Future* (over 350 views).



Photo credit: RedCLARA



Photo credit: U. of Oslo's Institute of Health and Society

EXPLORE NASA AT HOME

[NASA at Home](#) offers a repository of videos, podcasts, E-books on a variety of topics, do-it-yourself projects, and virtual and augmented reality tours, which include the agency's Hubble Space Telescope and International Space Station. [NASA Television](#) has weekly programming (10AM-4PM EDT) as well as broadcasting around-the-clock with recent mission events and news.



Photo credit: NASA

UPCOMING

Virtual Meetings:

[HAQAST Final Showcase](#)

July 21-22, 2020

[NASA Earth Applied Sciences Week](#)

August 3-6, 2020

[Climatological, Meteorological and Environmental Factors in the](#)

[COVID-19 Pandemic](#)

August 4-6, 2020

[TEMPO Science Team Meeting](#)

August 13-14, 2020

[International Society for Environmental Epidemiology Annual Conference](#)

August 24-27, 2020

[AmeriGEO Week](#)

September 7-8, 2020

[HAQ Annual Meeting](#)

September 15 and 21, 2020

SPACE APPS COVID-19 CHALLENGE

In May 2020, the [NASA International Space Apps COVID-19 Challenge](#) was launched. Using the theme, *Using Earth Observations to Learn about COVID-19*, NASA, ESA, JAXA, CSA, and CNES coordinated this [virtual hackathon](#) to develop COVID-19 solutions on one of 12 challenges. More than 15,000 participants from 150 countries formed more than 2,000 virtual teams.



Photo credit: NASA

NASA HEALTH AND AIR QUALITY TEAM SUPPORTS NATIONAL MOSQUITO CONTROL AWARENESS WEEK 2020

In June 2020, the NASA HAQ and Communications (**Lia Poteet, Aries Keck, U.Group**) Teams prepared a web feature, [NASA Contributes to National Mosquito Control Awareness Week 2020](#), to support the American Mosquito Control Association's [National Mosquito Awareness Week 2020](#). Featured HAQ projects included using ECOSystem Spaceborne Thermal Radiometer Experiment ([ECOSTRESS](#)) and Global Ecosystem Dynamics Investigation ([GEDI](#)) satellites to explore mosquito habitats, the potential transmission of Zika virus in California, developing early warning systems for human West Nile virus in South Dakota and Louisiana, and mapping malaria hotspots in the Amazon.



Credit: CDC

NASA HAQ ANNUAL SUMMARY 2019

In April 2020, the NASA Applied Sciences Program disseminated the [NASA Health and Air Quality Applications Annual Summary 2019](#). This report summarized major accomplishments, project portfolio milestones, community leadership, and international activities. It highlighted the achievements of the [Health and Air Quality Applied Sciences Team \(HAQAST\)](#) and four ongoing [Earth Observations for Health \(EO4HEALTH\)](#) projects of the GEO Work Programme 2020–2022.



Photo credit: NASA

PAST

Webinars:

[An Inside Look at How NASA Measures Air Pollution](#)
May 26 and 28, 2020

Virtual Meetings:

MAIA Science Team Meeting & Early Adopters Workshop
May 5-7, 2020

Joint MAIA-TEMPO Early Adopters Workshop
May 18-19, 2020

[Air & Waste Management Association Annual Conference](#)
June 30-July 2, 2020

PUBLICATIONS

[Effects of Increasing Aridity on Ambient Dust and Public Health in the U.S. Southwest under Climate Change](#). *GeoHealth*. (P. Achakulwisut, **S.C. Anenberg**, J.E. Neumann, S.L. Penn, N. Weiss, A. Crimmins, N. Fann, J. Martinich, H. Roman, L.J. Mickley)

[Spatiotemporal Characteristics of the Association between AOD and PM over the California Central Valley](#). *Remote Sensing*. (M. Sorek-Hamer, **M. Franklin**, K. Chau, M. Garay, O. Kalashnikova)
[Satellite-Derived PM2.5 Composition and Its Differential Effect on Children’s Lung Function](#). *Remote Sensing*. (K. Chau, **M. Franklin**, W.J. Gauderman)

[Weathering the Pandemic: How the Caribbean Basin can use Viral and Environmental Patterns to Predict, Prepare and Respond to COVID-19](#). *Journal of Medical Virology*. (D. de Ángel Solá, L. Wang, M. Vázquez, **P. Méndez-Lázaro**)

[Using Satellites to Track Indicators of Global Air Pollution and Climate Change Impacts: Lessons Learned from a NASA-supported Science-stakeholder Collaborative](#). *GeoHealth*. (**S.C. Anenberg**, M. Bindl, **M. Brauer**, J.J. Castillo, S. Cavalieri, **B.N. Duncan**, **A.M. Fiore**, R. Fuller, **D.L. Goldberg**, **D.K. Henze**, **J. Hess**, **T. Holloway**, P. James, X. Jin, I. Kheirbek, **P.L. Kinney**, **Y. Liu**, A. Mohegh, J. Patz, M.P. Jimenez, A. Roy, **D. Tong**, K. Walker, N. Watts, **J.J. West**)

[Association between Mobility Patterns and COVID-19 Transmission in the USA: A Mathematical Modelling Study](#). *The Lancet Infectious Diseases*. (**H.S. Badr**, H. Du, M. Marshall, E. Dong, M.M. Squire, L.M. Gardner)

[Strengthening Global Health Content in Health Professions Curricula](#). *Health Education Journal*. (**H.J. Chapman**, B.A. Veras-Estévez)