NASA Health and Air Quality
remote sensing for public health

Volume 21
October – December 2019

NASA HEALTH AND AIR QUALITY TEAM SUPPORTS ONE HEALTH DAY 2019

Every November, One Health Day is celebrated to promote the development of transdisciplinary projects that address health threats to humans, animals, and the environment. On One Health Day 2019, the NASA HAQ and Communications Teams shared three projects on the NASA Making Space for Earth website that promote the use of Earth-observing satellite data to solve down-to-Earth issues that affect human and animal health. These projects included New Map Shows Risk of Sunburn Across the United States **(NASA/CDC National Environmental Public Health Tracking Network)**, NASA Helps Fight the Mosquito Bite Coast-to-Coast **(Chris Barker, U. of California, Davis)**, and NASA Data Strengthens United States' Air Quality Warnings **(Rajesh Kumar, National Center for Atmospheric Research)**. This web feature has been promoted on the One Health Commission's One Health Day global events.

Photo credit:
One Health Commission

TEMPO HEALTH APPLICATIONS CONFERENCE

In October 2019, the HAQ Team attended the TEMPO Health Applications Conference, *New Applications in the Use of Satellite Data Monitoring for Population Health*, in Huntsville, AL. A total of 84 people (45 in-person, 39 online) attended this meeting. The agenda highlighted presentations and posters divided into *Future Remote Sensing Data for HAQ Studies* and *End User Perspectives*, presented by faculty members, HAQAST researchers, and Deputy Program Applications Leads for MAIA **(Abbey Nastan, Jet Propulsion Laboratory)** and TEMPO **(Aaron Naeger, U. of Alabama, Huntsville)**. **Kelly Chance (TEMPO Principal Investigator, Harvard SAO)**, **Susan Alexander (U. of Alabama, Huntsville)**, and **Michael Newchurch (U. of Alabama, Huntsville)** introduced the event. This meeting follows two TEMPO Early Adopter meetings, held in July 2016 (Huntsville, AL) and April 2018 (Fort Collins, CO), with specific goals for this meeting, including: 1) review of the TEMPO mission and capabilities for HAQ end-users and stakeholders; 2) define needs of the health community for effective application of TEMPO data; and 3) discuss necessary next steps for ensuring these needs are met during the pre-launch phase. Additionally, a two-day ARSET Training, ***Application of Satellite Observations for Air Quality & Health Exposure***, was offered at the U. of Alabama in Huntsville campus, led by **Pawan Gupta (NASA Marshall/STI USRA)** and **Melanie Follette-Cook (NASA GSFC/GESTAR/Morgan State U.)**.


A. Naeger, A. Nastan, and K. Chance (Left to Right) present specific topics. Photo credit: H. Chapman

HEALTH AND AIR QUALITY APPLICATIONS
APPLIED SCIENCES PROGRAM

haQ

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NASA HEALTH AND AIR QUALITY TEAM PRESENTS AT APHA 2019

At the American Public Health Association (APHA) Annual Meeting & Expo 2019, held in Philadelphia, Pennsylvania, the NASA HAQ Team sponsored the session, *Using Earth Satellite observations to Understand, Detect, Prevent, Monitor, Predict and Respond to Environmentally-Sensitive Disease Outbreaks and Risks for the Future*. Presentation titles included *An Overview of Earth Satellite Observations used to Study Environmentally-Sensitive Disease Outbreaks and Risks for the Future* **(John Haynes, NASA HQ)**, *Environmental Influences on Enteric Infectious Disease Risk in Children: Results from a Multi-Site Cohort Study* **(Josh Colston, U. of Virginia)**, *Using Remote Sensing and Environmental Data to Strengthen Heat Mitigation Efforts* **(Tabassum Insaf, New York State Department of Health)**, *Predictive Assessment of Transmission of Cholera in the Environment and Human Population using Earth Observations* **(Antarpreet Jutla, U. of Florida)**, and *Early Warning of Synoptic Air Quality Events to Improve Health and Well Being in the Greater Caribbean Region* **(Pablo Mendez-Lazaro, U. of Puerto Rico)**. The NASA Hyperwall talks at the exhibit hall booth, which won the blue ribbon as best conference exhibit for the third time, included: *NASA Earth Observations Applied to a Changing World* **(J. Haynes, NASA HQ)**, *Linking Satellite Data to the One Health Approach* **(Helena Chapman, NASA HQ/BAH)**, and *Predicting Water Borne Diseases using Earth Observations* **(A. Jutla, U. of Florida)**.



J. Haynes, S. Estes, A. Jutla, and H. Chapman present at the NASA Hyperwall exhibit at APHA2019 (Left). HAQ session panelists (Center) and P. Mendez-Lazaro (Right) at APHA 2019. Photo credit: H. Chapman

NASA INVESTIGATORS IN THE NEWS

Tracey Holloway and **Daegan Miller (U. of Wisconsin, Madison):** **HAQAST Fall 2019 Newsletter**

Chris Barker (U. of California, Davis): **NASA Helps Fight the Mosquito Bite Coast-to-Coast**: C. Barker and team developed distribution and suitability maps for invasive *Aedes* mosquitoes (California Vectorborne Disease Surveillance System, CalSurv), which were adapted to New Jersey (JerseySurv) and Utah (UtahSurv).

Aaron Naeger and **Michael Newchurch (U. of Alabama, Huntsville):** **Satellite Air Quality Tracking in South Asia Attracts $750,000 NASA Grant**: Working with SERVIR Global Team and NASA's Short-term Prediction Research and Transition Center, this grant will track atmospheric aerosols and air quality in South Asia.

William Pan (Duke U.): W. Pan presented, ***Context and Scale: Mediators of Environmental-health Relationships***, at the World Wildlife Fund's 2019 Fuller Symposium, *Healthy Planet Healthy People*, in October 2019.

Bryan Duncan (NASA GSFC): B. Duncan presented, *Satellite Datasets for Health and Air Quality Applications*, at Duke University's Division of Earth and Ocean Sciences in November 2019.

Dan Goldberg (George Washington U.): D. Goldberg presented, *Using NASA Satellite Data to Estimate Human Exposure to Air Pollution*, as part of the 2019 Research Seminar Series at the George Washington University's Milken Institute School of Public Health in December 2019.

Bryan Duncan (NASA GSFC) and **Jason West (U. of North Carolina)**: As a result of the NASA HAQAST tiger team project, *Efficacy of Environmental Regulations to Improve Air Quality in the United States*, B. Duncan, J. West, and team developed the **Clean Air Act from Space fact sheet**.

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NASA HEALTH AND AIR QUALITY TEAM PRESENTS AT FDA ONE HEALTH FORUM

In November 2019, the NASA HAQ Team participated as invited panelists at the Food and Drug Administration's (FDA) *FY2020 One Health Forum*. This first annual forum aimed to promote One Health collaborations in FDA and links to other agencies with One Health activities. The event included Welcoming Remarks by **Bernadette Dunham (Advisor, FDA One Health Initiative)** and introduction by **Rear Admiral Denise Hinton (Co-Chair, FDA One Health Initiative)**. Representatives of the eight FDA centers and offices presented 5-minute introductions to describe their objectives and activities. Then, the Stakeholder's Initiatives Panel – US Health and Human Services **(Tammy Beckham)**, US Department of Agriculture **(Jane Rooney)**, and NASA Applied Sciences Program **(John Haynes, Helena Chapman)** – highlighted objectives and activities that can foster collaborations with FDA. **J. Haynes** and **H. Chapman** presented an overview of NASA Applied Sciences Program and highlighted selected HAQ projects that integrate the use of Earth observations to public health (One Health) applications. Closing words by **Steven Solomon (Co-Chair, FDA One Health Initiative)** encouraged all attendees to seek innovative approaches to incorporate One Health activities across FDA as well as with other federal agencies. This One Health Forum was well received by over 50 attendees, showcasing their enthusiasm through active engagement with presenters.

B. Dunham (Left) and J. Haynes (Right) present at the FDA One Health Forum. Photo credit: H. Chapman

HAQAST WEBINARS

The **NASA Health and Air Quality Applied Sciences Team (HAQAST)** will be hosting a series of one-hour webinars, every Tuesday and Thursday (12PM EST and 4PM EST sessions), in February and March 2020. HAQAST members and contributors will lead informational talks on using NASA tools, assessing the health burden of PM2.5, the future of HAQAST, and other health and air quality topics. Please visit the HAQAST **event page** and register for any of the upcoming HAQAST webinars.

Photo credit: HAQAST

HEALTH AND AIR QUALITY TEAM PARTICIPATES IN ONE HEALTH SEMINARS

During November 2019, the NASA HAQ Team continued to support One Health Day events by participating in two academic activities. First, **John Haynes (NASA HQ)** and **Helena Chapman (NASA HQ/BAH)** were invited lecturers to the *MICB-800 Graduate Seminar in Global Infectious Diseases* at Georgetown University in Washington DC. They provided an overview of the NASA Applied Sciences Program and described an array of HAQ projects that use of Earth observations for public health applications. Second, **H. Chapman** participated as a virtual panelist for the One Health Young Professional Panel Discussion, moderated by **Lt. Caitlin Cossaboom (CDC Division of High-Consequence Pathogens and Pathology)**, of the *One Health Intellectual Exchange 2019*. This One Health course is an academic collaboration between Duke University, University of North Carolina, and North Carolina State University.

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GEO HEALTH COMMUNITY OF PRACTICE HOLDS QUARTERLY TELECON AND IN-PERSON MEETING AT AGU 2019

Quarterly Telecon

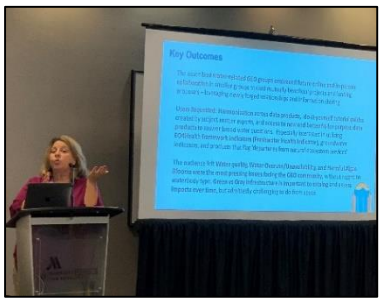
In November 2019, the Group on Earth Observations (GEO) Health Community of Practice (CoP) held a quarterly telecon to provide updates on past GEO meetings and upcoming Work Group activities. **John Haynes (NASA HQ)** shared the news that the Earth Observations for Health (EO4HEALTH) Community Activity was formally named EO4HEALTH Initiative at the GEO Plenary 2019 in Canberra, Australia. **Juli Trtanj (NOAA)** and **Helena Chapman (NASA HQ/BAH)** provided a brief summary about next steps to the Work Group activities. Invited speakers included **Gina Tsarouchi (HR Wallington)** who described the Dengue MOdel forecasting Satellite-based System (D-MOSS) and **Joy Shumake-Guillemot (WMO)** who introduced the Global Heat Health Information Network (GHHIN). A total of 25 participants, representing different agencies in public and private sectors, participated on the telecon. The next quarterly telecon is planned for March 2020.

GEO Plenary 2019

At the GEO Plenary 2019, held in Canberra, Australia, Earth observation data were highlighted in public health applications. First, the US GEO delegation **(Zdenka Willis, NASA HQ/BAH)** supported the coordination of two health stories for the US GEO Exhibit: *Cholera* **(Antarpreet Jutla, U. of Florida)** and *Harmful Algal Blooms across Florida's Gulf Coast* **(Richard Stumpf, NOAA)**. Second, with the support and coordination of **Merrie Beth Neely (NOAA)**, EO4HEALTH and GEO Health CoP were highlighted in oral and poster presentations as part of the Water for Life side event.

AGU Fall Meeting 2019

In December 2019, the GEO Health CoP and the American Geophysical Union (AGU) partnered to hold the GEO Health CoP Meeting at AGU 2019 in San Francisco, CA. Presenters included experts from the GEO Secretariat (**Doug Cripe**), AGU (**Mark Shimamoto**), NASA (**John Haynes, Helena Chapman**), NOAA (**Juli Trtanj**), NIH/NIEHS (**John Balbus**), and AquaWatch/Blue Planet (**Merrie Beth Neely**). GEO project updates were provided by **Antarpreet Jutla (U. of Florida)**, **Ben Zaitchik (John Hopkins U.)**, and **John Malone (Louisiana State U./A&M College)**. GEO Activity Updates were given by **Mike Gill** (GEO BON), **Daniel Juhn** (GEO EO4EA), and **M.B. Neely** (Blue Planet, Aqua Watch). With 41 attendees (31 in-person, 10 virtual), this meeting provided an opportunity for Earth and health scientists and practitioners to describe key international projects and updates, enhance professional networks, and discuss priority focus areas that advance GEO/AGU efforts. It also allowed active engagement for the review of the GEO Health CoP Goals and Work Group activities, which support GEO efforts and further development of the GEO Earth Observations for Health initiative.

J. Trtanj, M.B. Neely, and J. Balbus (Left to Right) present at the GEO Health CoP Meeting at AGU 2019. Photo credit: T. Castriano

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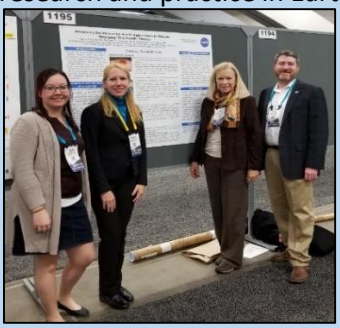
NASA HEALTH AND AIR QUALITY TEAM PRESENTS TALKS AT AGU 2019 HYPERWALL AND SCIENTIFIC SESSIONS

At the American Geophysical Union (AGU) Fall Meeting 2019, held in San Francisco, CA, the NASA HAQ Team coordinated an oral and poster session, *NASA Earth Observation Systems and Applications for Public Health, Air Quality, Environmental Management, and Public Outreach,* moderated by **Sue Estes (U. of Alabama, Huntsville)**. With a total of 120 attendees, eight oral session topics included: *NASA Earth Observation Systems and their Applications for Public Health and Air Quality* **(John Haynes, NASA HQ)**, *Biological Oceanography Represents the Epitome of a Global Revolution in the Ocean Sciences* **(Rita Colwell, U. of Maryland, College Park)**, *Maximizing the Utility of NASA Resources for the Health and Air Quality Communities* **(Bryan Duncan, NASA GSFC),** *Northern California Wildfires* **(Sean Raffuse, U. of California, Davis),** *Expanding Applications and User Communities for Satellite Data* **(Tracey Holloway, U. of Wisconsin, Madison),** *Integrating Environmental Monitoring with Public Health Surveillance for Arbovirus Forecasting* **(Michael Wimberly, U. of Oklahoma)**, *Novel Use of Satellite Data for Improving National Air Quality Forecasts through Emission Data Assimilation* **(Daniel Tong, George Mason U.)**, *and Potential Distribution of Visceral Leishmaniasis and its Vector Lutzomyia Longipalpis in Brazil* **(John Malone, Louisiana State U./A&M College)**. A total of 19 posters were presented in the HAQ poster session, including *Advancing Environmental Health Applications to Mitigate Emerging One Health Threats* **(HAQ Team)** and *Using Airborne High-resolution NO_2 Columns to Evaluate the S5P TROPOMI Tropospheric NO_2 Product during LISTOS* **(Laura Judd, NASA LaRC/SSAI)**.

At the NASA Earth Science Division's Hyperwall, **L. Judd** presented the talk, *Air Quality Research Campaigns Supporting the Preparation for Geostationary Observations*. Additionally, **J. Haynes**, **T. Holloway**, **Jennifer Horney (U. of Delaware)**, and **Aubrey Miller (NIH/NIEHS)** served as invited panelists on the GeoHealth Early Career Panel, *Navigating a Career in GeoHealth*, with 30 attendees, sharing their career trajectory and providing advice for interdisciplinary research and practice in Earth and health sciences.

HAQ panelists (Left), HAQ poster session (Center), and GeoHealth Early Career Panel (Right) at AGU 2019.
Photo credits: T. Castriano/H. Chapman

HEALTHY PLANET, HEALTHY PEOPLE CONFERENCE

In December 2019, **John Haynes (NASA HQ)** was part of a panel session during the biennial International Centre for Earth Simulation (ICES) meeting in Geneva, Switzerland. The theme of the panel was *Healthy Planet, Healthy People*. This event was well received by 40 attendees and facilitated an open discussion on Earth observations for diverse applications related to global ecosystems.


J. Haynes presents at ICES (Left), and Antoine Flahault and J. Haynes facilitate an open discussion (Right). Photo credit: ICES

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Spotlight:

Helena Chapman, MD MPH PhD
Associate Program Manager
Health and Air Quality Applications

Photo credit: National Academies

In October 2019, **Helena Chapman (NASA HQ/BAH)** joined the NASA HAQ Team as Associate Program Manager. Trained in medicine, epidemiology, and environmental health (One Health), Helena is passionate about promoting transdisciplinary health collaborations that investigate and mitigate health risks of humans, animals, and ecosystems. Her global health interests include using the One Health approach to address environmental health risks, including infectious disease control, air/water quality, and food safety.

From September 2017 to August 2019, Helena completed the AAAS S&T Policy Fellowship in the Applied Sciences Program at NASA HQ. In this role, she continued to build on the HAQ objectives, linking Earth observations to public health applications in air quality management and infectious disease control. Prior to this position, her graduate research focused on community prevention and control of dengue fever in the Dominican Republic (MPH) and clinicians' adherence to tuberculosis infection control measures in the Dominican Republic (PhD). She received her PhD in Public Health (One Health) and MPH in Epidemiology from the University of Florida, and MD from the Iberoamerican University in the Dominican Republic.

UPCOMING

Funding Opportunities:
ROSES-2020 will be released in February 2020

Webinars:
HAQAST Webinar Series
February 18 – March 10, 2020
(Tuesdays/Thursdays)

Meetings:
National Council for Science and the Environment Annual Meeting
January 6-9, 2020
Washington, DC

American Meteorological Society Annual Meeting
January 12-16, 2020
Boston, MA

American Mosquito Control Association Annual Meeting
March 16-20, 2020
Portland, OR

ONE HEALTH IN THE NEWS

In December 2019, the U.S. Department of State Bureau of Educational and Cultural Affairs sponsored 14 participants representing 13 countries on a three-week International Visitor Leadership Program on *Combating Infectious Diseases*. The participants interacted with government officials, academia, nonprofit institutions, and private sector companies in six cities (regarding prevention and control of infectious diseases. **Helena Chapman (NASA HQ/BAH)** was invited to give a keynote presentation on the topic, *One Health and Combating Infectious Diseases*. She stressed that innovative data and technology are essential to address emerging One Health threats, including air pollution and vector-borne disease transmission.

S5PVT WORKSHOP

In November, **Laura Judd (NASA LaRC/SSAI)** traveled to ESA/ESRIN in Frascati, Italy to participate in the Copernicus Sentinel-5 Precursor (S5P) Validation Team Workshop. Copernicus S5P was launched in October 2017 and hosts one instrument, TROPOMI, which monitors key tropospheric constituents related to air quality. This workshop gathered feedback about the quality and uncertainty characteristics of all publicly released TROPOMI products. The workshop also fed discussions about best data-use practices.

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Spotlight:

Laura Judd, PhD
Associate Program Manager
Health and Air Quality Applications

Photo credit: NASA

In November 2019, **Laura Judd (NASA LaRC/SSAI)** joined the HAQ Team as Associate Program Manager. With a background in atmospheric science and air quality (AQ), she is excited for the upcoming NASA missions that improve the monitoring and awareness of air pollution. She hopes that her role will contribute toward efforts striving to improve the air we breathe.

Laura completed her NASA post-doctoral fellowship at NASA Langley Research Center in October 2019. During this fellowship, she gained expertise in high spatiotemporal resolution UV-VIS remote sensing measurements of air pollutants from airborne mappers during collaborative research campaigns, such as the Long Island Sound Tropospheric Ozone Study (LISTOS), which used integrated observing strategies to better understand the role of emissions and meteorology in regions with persistent poor air quality in partnership with state and federal agencies as well as academia. In addition to her role in NASA's HAQ program, she will continue in her research role through the planning and implementation of future air quality research campaigns in preparation for geostationary AQ observations.

Laura received her BS in Meteorology/Climatology from the University of Nebraska-Lincoln in 2012 and her PhD in Atmospheric Science from the University of Houston in 2016.

PAST

In-Person Training:

Application of Satellite Observations for Air Quality and Health Exposure
October 9 and 11, 2019
Huntsville, AL

Webinar:

Applications of Integrated Multi-Satellite Retrievals for GPM (IMERG) V6
October 15, 2019

Meetings:

TEMPO Health Applications Conference
October 10, 2019
Huntsville, AL

American Public Health Association Annual Meeting & Expo
November 2-6, 2019
Philadelphia, PA

American Geophysical Union Fall Meeting
December 9-14, 2019
San Francisco, CA

PUBLICATIONS

Engaging with One Health Audiences *The Clinical Teacher* (**H.J. Chapman**, B. Dunham)

Compilation and Spatio-temporal Analysis of Publicly Available Total Solar and UV Irradiance Data in the Contiguous United States *Environmental Pollution* (Y. Zhou, X. Meng, J.H. Bele, H. Zhang, C. Kennedy, M.Z. Al-Hamdan, J. Wang, **Y. Liu**)

Examination of Nudging Schemes in the Simulation of Meteorology for Use in Air Quality Experiments: Application in the Great Lakes Region *Journal of Applied Meteorology and Climatology* (**M.T. Odman**, A.T. White, K. Doty, R.T. McNider, **A. Pour-Biazar**, M. Quin, Y. Hu, E. Knipping, Y. Wu, B. Dornblaser)

Estimating Daily PM2.5 Concentrations in New York City at the Neighborhood-scale: Implications for Integrating Non-regulatory Measurements *Science of the Total Environment* (K. Huang, J. Bi, X. Meng, G. Geng, A. Lyapustin, K.J. Lane, D. Gu, **P.L. Kinney**, **Y. Liu**)

Correlation of the Basic Reproduction Number (R_0) and Eco-environmental Variables in Colombian Municipalities with Chikungunya Outbreaks during 2014-2016 *PLOS Neglected Tropical Diseases* (V.H. Peña-García, R.C. Christofferson)