

**GEO Health Community of Practice**  
**Special Edition: The Americas**  
**August 29, 2023 from 8:30-10:30AM EDT (GMT-4)**

Description: As global health systems prepare for emerging hazards related to the effects of climate change – whether air pollution, extreme heat, or infectious disease outbreaks – robust partnerships across the Earth and Health sciences are fundamental to integrate data sources, quantify exposure or disease risk, and support public health surveillance and preparedness. Using the One Health concept, researchers, practitioners, and community members can examine local needs, leverage expertise to integrate satellite- and ground-based data with public health surveillance data, and offer actionable information to mitigate the risk of harmful environmental exposures.

**Category I: Environmental Health and Emergencies**

<b>Name</b>	<b>Institution (Country)</b>	<b>Title</b>
Camilo de los Rios Rueda	Duke University (USA)	Building a Community of Practice in the Americas to Address Challenges associated with Artisanal and Small-Scale Gold Mining (ASGM)
Paul Churchyard	HSR.health (USA)	Addressing Natural Disasters-induced Health Concerns through GeoAI
Andreas Skouloudis	iSteep.org (Greece)	Environmental Emergencies for the Health Facilities situated at the island of Crete
Shay Sharma	Stanford University/NASA (USA)	NASA Satellite Data for Population Health Protection

**Category II: Water Resources**

<b>Name</b>	<b>Institution (Country)</b>	<b>Title</b>
Felipe Lobo	Universidade Federal de Pelotas (Brazil)	Introducing AlgaeMAp - Algae Bloom Monitoring Application for Inland Waters in Latin America.
Natasha Sadoff	NASA Goddard (USA)	Enabling User-driven Environmental Management and Improving Health Outcomes using Future NASA PACE Mission Data
Matthew Romm	North Carolina State University (USA)	PACE Water Resources: Demonstrating the Use of NASA's PACE Hyperspectral Ocean Color Instrument Data for Enhanced Coastal Management

### Category III: Air Quality

Name	Institution (Country)	Title
Jenny Bratburd	University of Wisconsin-Madison (USA)	Overview of the NASA Health and Air Quality Applied Sciences Team (HAQAST)
Rajesh Kumar	University Corporation for Atmospheric Research (USA)	Enhancing the Accuracy of Air Quality Forecasts in Delhi via Assimilation of NASA Earth Observations and their Impact on Decision-making Activity
Susan Alexander	University of Alabama in Huntsville (USA)	Sub-Urban Air Pollution Exposures and Associations with Clinical Health Outcomes for Asthma in Jefferson County, Alabama
Aaron Naeger	University of Alabama in Huntsville (USA)	The NASA TEMPO Mission: Hourly Daytime Air Pollution Observations for Enhanced Health and Air Quality Studies

### Category IV: Data Management and Capacity Building

Name	Institution (Country)	Title
Yasha Moz	NASA (USA)	EOTEC DevNet: Fostering Collaboration among the Leading Global Providers of EO Training and Tools
Corena Pincham	NASA (USA)	The Earth Observations Toolkit: Creating Pathways to Healthy Cities and Human Settlements
Reyna Durón	Universidad Tecnológica Centroamericana (UNITEC) (Honduras)	Establishing a COVID-19 Observatory and a Pilot Earth Observation Center to Promote Sustainability in Honduras

### Category V: Infectious Diseases

Name	Institution (Country)	Title
Catalina Marceló-Díaz	Ministry of Health (Colombia)	Spatial Stratification of Dengue based on the Identification of Risk Factors: A Pilot Trial in the Department of Cauca, Colombia
Jean Felipe Teotonio	HSR.health (USA)	EO 4 Advancing Zoonotic Spillover Mitigation

## ABSTRACTS

### Category: Environmental Health and Emergencies

#### **Building a Community of Practice in the Americas to address challenges associated with Artisanal and Small-Scale Gold Mining (ASGM)**

*Camilo de los Rios Rueda (Duke University; USA; [camilo.de.los.rios.rueda@duke.edu](mailto:camilo.de.los.rios.rueda@duke.edu))*

Understanding the need to create a network of practitioners and a comprehensive list of past experiences and research outcomes on the artisanal and small gold mining sector (ASGM), we aim at creating and maintaining a community of practice of ASGM in the Americas. Our objectives include: (1) to use the network to create an open-access repository of information (data sources, datasets, papers, documents) on the status of current projects and results of previous ones to enable building a more sustainable ASGM sector; (2) produce a series of workshops on different topics related to ASGM; and (3) facilitate dialogue that can contribute to the development and/or testing of interventions, policies, technologies, or new approaches related to ASGM or mercury (chemical) exposures. We are currently in the building phase, gathering information and contacting potential members of the network.

#### **Addressing Natural Disasters-induced Health Concerns through GeoAI**

*Paul Churchyard (HSR.health; USA; [paul@healthsolutionsresearch.org](mailto:paul@healthsolutionsresearch.org))*

When responding to natural disasters it is important to understand the underlying health and social posture of the impacted population so that supplies and resources can be distributed efficiently based on need. HSR.health has developed a Health Risk Index that identifies a priori the health and medical needs of the disaster impacted population for a variety of disasters including hurricanes, wildland fires, floods, drought, and bioaccumulation of microplastics/plastics. Our vision is for these indicators to provide emergency response personnel decision support for resourcing and personnel allocation.

#### **Environmental Emergencies for the Health Facilities situated at the island of Crete**

*Andreas Skouloudis (iSteep.org; Greece; [skoulan@gmail.com](mailto:skoulan@gmail.com))*

Emergencies that influence the Cretan Health Care infrastructure are heat waves, forest fires, and earthquakes. The perimeter of these facilities is identified by interrogating satellite images from existing portals. We seek to set intelligent criteria for automating the extraction process on near-real-time, aiming to couple local data with regular in-situ monitoring of meteorological and solar parameters.

#### **NASA Satellite Data for Population Health Protection**

*Shay Sharma (Stanford University/NASA; USA; [shayns@stanford.edu](mailto:shayns@stanford.edu))*

As part of the Research Opportunities in Space and Earth Sciences (ROSES2013)-2013 solicitation, the National Aeronautics and Space Administration (NASA) Science Mission Directorate awarded US\$9M of funding for nine projects, in efforts to advance knowledge of the changing Earth's system.

Researchers and community stakeholders can use this knowledge to better understand how emerging environmental risks affect public health. In this presentation, I will illustrate, through three supported projects, the societal benefit of Earth observation data to strengthen ecosystem risk analytics, policy decision-making, and public health surveillance through the One Health paradigm.

## **Category: Water Resources**

### **Introducing AlgaeMAP – Algae Bloom Monitoring Application for Inland Waters in Latin America**

**Felipe Lobo** (*Universidade Federal de Pelotas; Brazil; [felipe.lobo@ufpel.edu.br](mailto:felipe.lobo@ufpel.edu.br)*)

The AlgaeMAP application was developed in Google Earth Engine as an outcome from the project supported by GEO and Google Engine in 2020/2021. The application provides chlorophyll-a concentration estimation and Trophic State Index (TSI) from Sentinel-2 images. Almost 100 reservoirs, dams, and lakes can be monitored in near real-time, given the Sentinel's temporal resolution (5 days) in Brazil, Argentina, and Peru. This innovative application aims to provide useful information for water quality management.

### **Enabling User-driven Environmental Management and Improving Health Outcomes using Future NASA PACE Mission Data**

**Natasha Sadoff** (*NASA Goddard Space Flight Center; USA; [natasha.sadoff@nasa.gov](mailto:natasha.sadoff@nasa.gov)*)

The NASA Plankton, Aerosol, Cloud, and Ocean Ecosystem (PACE) mission, scheduled to launch in January 2024, will provide an unprecedented view of the entire earth every 1-2 days. PACE will extend heritage MODIS and VIIRS visible, near-infrared, and shortwave-infrared ocean color and atmospheric measurements at 1 km spatial resolution, as well as produce new hyperspectral and polarimetric advanced data products (including observation of clouds and aerosols). PACE will advance aquatic and atmospheric remote sensing in ways that fulfill real-world needs in environmental management, with opportunities to improve health outcomes before, during, and/or after events such as harmful algal blooms or air quality emergencies associated with wildfires or volcanic eruptions.

### **PACE Water Resources: Demonstrating the Use of NASA's PACE Hyperspectral Ocean Color Instrument Data for Enhanced Coastal Management**

**Matthew Romm** (*North Carolina State University; USA; [mromm@ncsu.edu](mailto:mromm@ncsu.edu)*)

The hyperspectral ocean color instrument (OCI) on NASA's upcoming PACE (Plankton, Aerosol, Cloud, ocean Ecosystem) mission has the potential to contribute greatly to monitoring harmful algal blooms (HABs). The team created a GUI tool in Python making it easier for both researchers and non-researchers to use PACE data without the need for coding or sophisticated data analysis methods. This will improve the management of coastal waters and make water activities safer.

## **Category: Air Quality**

### **Overview of the NASA Health and Air Quality Applied Sciences Team (HAQAST)**

**Jenny Bratburd** (*University of Wisconsin-Madison; USA; [bratburd@wisc.edu](mailto:bratburd@wisc.edu)*)

The NASA Health and Air Quality Applied Sciences Team (HAQAST) connects researchers and stakeholders to use NASA satellite data to help solve real-world public health and air quality problems. HAQAST has 14 primary investigators and over 60 co-investigators including stakeholders from a variety of organizations serving local, state, regional, international roles across air quality and health. Through multiple approaches to creating opportunities for dialogue, we have found ways to engage users at different levels, from novice to expert, and across disciplines and applications, including public health, environmental justice, atmospheric science, and air quality management.

## **Enhancing the Accuracy of Air Quality Forecasts in Delhi via Assimilation of NASA Earth Observations and their Impact on Decision-making Activity**

**Rajesh Kumar (University Corporation for Atmospheric Research; USA; [rkumar@ucar.edu](mailto:rkumar@ucar.edu))**

The National Center for Atmospheric Research (NCAR), the Indian Institute of Tropical Meteorology (IITM), and the Indian Meteorological Department (IMD) have collaboratively developed an operational AQEWS for Delhi that provides 72-h air quality forecasts daily. The system assimilates the Moderate Resolution Imaging Spectroradiometer (MODIS) aerosol optical depth (AOD) retrievals to improve initialization of aerosol chemical composition. The assimilation of MODIS AOD retrievals is shown to improve the accuracy of fine particulate matter (PM<sub>2.5</sub>) forecasts in Delhi by 70-86% during the crop-residue burning season. Decision-makers the Commission for Air Quality Management (CAQM) have found these air quality forecasts very useful in imposing and/or lifting-off temporary restrictions on targeted emission sources to improve air quality in Delhi.

## **The NASA TEMPO Mission: Hourly Daytime Air Pollution Observations for Enhanced Health and Air Quality Studies**

**Aaron Naeger (University of Alabama in Huntsville; USA; [aaron.naeger@nasa.gov](mailto:aaron.naeger@nasa.gov))**

The Tropospheric Emissions: Monitoring of Pollution (TEMPO) mission, launched into Geostationary Earth Orbit (GEO) on April 7, 2023, will provide hourly and sub-hourly daytime observations of aerosols and trace gases, including nitrogen dioxide, sulfur dioxide, and ozone, at high spatial resolution (e.g., 2.0 km x 4.75 km) across a Field of Regard (FoR) covering greater North America. First light images of nitrogen dioxide columns were just released to the public on August 24, providing a sneak peek at the revolutionary science applications that will be achieved using upcoming TEMPO data products. This presentation will highlight the mission, Early Adopters Program, and First Light imagery from TEMPO.

## **Sub-Urban Air Pollution Exposures and Associations with Clinical Health Outcomes for Asthma in Jefferson County, Alabama**

**Susan Alexander (University of Alabama in Huntsville; USA; [sa0010@uah.edu](mailto:sa0010@uah.edu))**

Jefferson County, Alabama, has the highest population density in the state of Alabama, densely concentrated in an urban infrastructure bordered by rural and agricultural areas, creating well-defined rural-urban gradients of air pollutant concentrations. Residents of the city of Birmingham, Alabama, located in Jefferson County, which has retained many socioeconomic characteristics dating to 1933 Redlining maps, have prevalence rates for asthma that exceed national averages, especially for vulnerable ethnicities. The proposed study will use surface-level O<sub>3</sub> and NO<sub>2</sub> measurements from the local Jefferson County Department of Public Health Air Quality Monitoring Network and clinical hospital outcomes for asthma from the University of Alabama in Birmingham to help us better understand the impact of acute and chronic exposures to patients with asthma at hyperlocal scales.

### **Category: Data Management and Capacity Building**

## **EOTEC DevNet: Fostering Collaboration among the Leading Global Providers of EO Training and Tools**

**Yasha Moz (NASA; USA; [yakov.m.moz@nasa.gov](mailto:yakov.m.moz@nasa.gov))**

Learn about EOTEC DevNet's network of networks model connecting over 600 capacity builders and subject matter experts to develop and share training resources. Early products include flood tools tracker, global use case analysis and communications platform. Explore resources and join a relevant community of practice at <https://eotecdev.net/>.

## **The Earth Observations Toolkit: Creating Pathways to Healthy Cities and Human Settlements**

*Corena Pincham (NASA; USA; [Pincham\\_Corena@bah.com](mailto:Pincham_Corena@bah.com))*

The Earth Observations Toolkit for Sustainable Cities and Human Settlements

(<https://eotoolkit.unhabitat.org/>), co-steered by GEO's Earth Observations for the Sustainable Development Goals (EO4SDG) and UN Habitat, delivers open-source data and tools in line with SDG 11 and the New Urban Agenda to foster resilient urban growth. The presentation will spotlight the connection between sustainable urban design and public health, exploring areas such as housing, urban progression, open spaces, and transportation. Additionally, it will emphasize the Toolkit community's drive to establish "city cohorts" tailored for policymakers and underscore the importance of proactive involvement from the health sector.

## **Establishing a COVID-19 Observatory and a Pilot Earth Observation Center to Promote Sustainability in Honduras**

*Reyna M. Durón (Universidad Tecnológica Centroamericana, UNITEC; Honduras;*

*[reyna.duron@unitec.edu.hn](mailto:reyna.duron@unitec.edu.hn)); Gracia M. Pineda, Oswaldo Rodríguez, Alex Padilla, José Bardales, Héctor Villatoro, Gabriela Munguía, Rafael Delgado Elvir (Universidad Tecnológica Centroamericana, Honduras); Javier Hernández, Francisco Torres (Municipalidad, San Pedro Sula, Honduras)*

Honduras pursues the Sustainable Development Goals (SDGs), aware that proper territorial data management is critical. In July 2020, a team of researchers including students, teachers, and international collaborators of Universidad Tecnológica Centroamericana (UNITEC) established the COVID-19 Observatory and the first stage of a data integration hub for earth observations in Cortés. This action was in response to the pandemic and hurricanes Eta and Iota. The website dashboards and maps from official data and UNITEC's studies (<https://observatorio-covid19-unitec-arcgis.hub.arcgis.com/>). UNITEC plans to strengthen this initiative, promoting the One Health concept and disaster prevention and management. Strategies include bulletin communications, social media posts, basic training in visualization tools, and joining the NASA GEO Health Community of Practice. Despite challenges, progress is happening, and more governmental offices and other universities are also starting to collaborate.

### **Category: Infectious Diseases**

## **Spatial Stratification of Dengue-based on the Identification of Risk Factors: A Pilot Trial in the Department of Cauca, Colombia**

*Catalina Marcelo Diaz (Ministry of Health, Colombia; Colombia; [cmarcelo@ins.gov.co](mailto:cmarcelo@ins.gov.co))*

We developed a dashboard to analyze dengue determinants in three high-risk municipalities in Cauca, a southwestern Colombia department. Using Earth observation applications such as Sentinel 2A spectral indices (NDVI, EVI and NDWI) and Multi-Source Weather (MSWX) satellite products to analyze temperature, precipitation and relative humidity through a scaling process applied to available databases.

## **EO 4 Advancing Zoonotic Spillover Mitigation**

*Jean Felipe Teotonio (HSR.health; USA; [jean@healthsolutionsresearch.org](mailto:jean@healthsolutionsresearch.org))*

The risk of zoonotic disease transmission between wildlife and humans is influenced by multiple socioeconomic, environmental, and geographic factors. HSR.health is spearheading a multidisciplinary effort to use a variety of geographical analyses, machine learning/AI techniques, and remote sensing data to identify areas on the planet at higher relative risk for zoonotic disease spillover. Our vision is that this will be the basis of better surveillance systems for enhanced disease detection and the prevention of global outbreaks.