

## WP23\_25: Earth Observations for Health

1294,175

### Basic Information

#### Full title of the Initiative

Earth Observations for Health (EO4Health) Initiative: Implementation Plan 2023-2025

#### Short Title or Acronym

EO4Health Initiative: Implementation Plan 2023-2025

#### Current category in the 2020-2022 GWP

GEO Initiative

#### Proposed category in the 2023-2025 GWP

GEO Initiative

### Points of Contact

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### Purpose

#### Objective

The overall goal is to support the systematic collection, analysis, and application of relevant information about areas of impending risk that inform the development of strategic responses to anticipate risks and opportunities and their evolution and communicate options to critical actors for the purposes of decision-making and response.

#### Please provide a short description of the Initiative

The Earth Observations for Health (EO4Health) Initiative serves as a global network of governments, organizations, and observers, who seek to use EO data to improve health decision-making at the international, regional, country, and district levels. The overall goal is to support the systematic collection, analysis, and application of relevant information about areas of impending risk that inform the development of strategic responses to anticipate risks and opportunities and their evolution and communicate options to critical actors for the purposes of decision-making and response. The objectives to achieve this goal include: 1) engage with end-user communities to better understand and identify their data needs and requirements; 2) develop and implement activities that address the needs and requirements of end-user communities; 3) improve the use of, and clarify future needs for, EO for health; 4) examine effectiveness and provide timely insight and feedback on future EO actions for health; and 5) participate with other individuals, GEO communities of practice, and

institutions to leverage expertise that can produce an outcome greater than that achievable otherwise.

As a GEO Initiative, EO4Health helps foster the development of integrated information systems that improve the capacity to predict, respond to, and reduce environment-related health risks. These systems combine EO monitoring and prediction; social, demographic, and health information; interdisciplinary research; application and assessment; communication; education; and training to enhance preparedness and resilience. As an element of the GEO Health Community of Practice (CoP), EO4Health supported the GEO Health CoP in the development and elaboration of the CoP Work Plan and five work groups: 1) heat; 2) infectious diseases; 3) air quality, wildfires, and respiratory health; 4) food security and safety; and 5) health care infrastructure. EO4Health leverages the continued development of global networks of stakeholders that enhance shared scientific findings and promotion of EO tools and data.

### **Why is this Initiative needed?**

The use of EO data among interdisciplinary and multi-agency teams can significantly advance scientific knowledge of existing public health threats to human, animal, and ecosystem health. The analysis of these geospatial data can enhance our understanding of the dynamic processes of the surrounding ecosystem and influence on human health and offer a sustainable framework for investment in research development and capacity building in environmental health. These data can also support disease preparedness and response actions in disease epidemic or humanitarian efforts.

### **What evidence is there to support this need?**

Using EO for health are instrumental in disaster risk reduction and relevant for tracking progress toward the Sendai Framework for Disaster Risk Reduction. Changes in biodiversity, land use, and land degradation can influence health outcomes. The technologies used at the intersection of big data and artificial intelligence in the environmental health sciences, combined with advances in bioinformatics, analytics, and modeling, have the potential to advance scientific discovery and influence population health. Hence, the availability of early warning systems can improve health outcomes and resilience of persons and communities, focusing on target g and priority 3. The World Health Organization (WHO) has identified the changing climate as one of the most important health risks of the future. The WHO Global Strategy on Health, Environment and Climate Change for 2019-2023 highlights six objectives: 1) focusing on primary prevention and health promotion to mitigate disease risks; 2) improving cross-sectoral action; 3) strengthening health sector leadership, governance, and coordination; 4) building support for governance and political and social support; 5) enhancing evidence-based information and communication approaches; and 6) monitoring progress toward the SDGs. Over the next decade, innovative data and tools include the use of space-based geospatial information in health applications and technological advancements, which inform decision-making activities and strengthen scientific communication. With pressing environmental health challenges, many countries, international organizations, and private entities are actively expanding investments in research development and capacity building in efforts to develop policies for sustainable actions that strengthen environmental security. Globally, there are several societies and communities of practice specific to certain aspects of the broader EO and health agenda. Hence, the development of the GEO Health CoP was designed to be the GEO venue where these communities convene, learn from each other, stimulate collaborative research that protects health—including human, animal and ecosystem health—and provide feedback into the critical EO needs and science gaps in environmental health sciences.

### **Is this Initiative open to participation by representatives of any GEO Member, Participating Organization, and GEO Associate?**

Yes

### **Are you aware of other projects or initiatives at a global or regional scale (both in GEO and externally) that provide similar products or services?**

No

**Please identify the most important actual and/or intended outputs (products, services, etc.) produced by the Initiative, along with their intended and/or actual users. This list does not need to be comprehensive but should identify the outputs which are most**

**used and are expected to have the greatest potential impact.**

- no answer given -

**If needed, please provide additional comments or explanation to accompany the outputs table**

- no answer given -

**What kinds of decisions are the outputs of this Initiative primarily intended to support?**

- no answer given -

**How will these decisions benefit from the outputs of this Initiative?**

- no answer given -

**What kinds of impacts (for example, reduced loss of life, monetary savings, conservation of biodiversity, etc.) are anticipated as a result of the use of the outputs of this Initiative?**

- no answer given -

**Has this Initiative been asked to provide specific information (for example, reports, data, services) on an ongoing basis to an international convention, organization, or other multilateral body?**

Yes

**Please identify the requesting organization.**

World Health Organization, World Meteorological Organization

**Describe the nature of the request.**

- no answer given -

**Please provide supporting documentation of the request.**

- no supporting documents provided -

## **Technical Synopsis**

**Please provide a brief description of the methods used by the Initiative to produce its (actual or planned) outputs.**

The EO4Health Implementation Plan will build on existing activities, projects, and funding, providing a construct that facilitates greater coordination, knowledge sharing, and engagement of science and health decision-making communities. Planned activities will focus on specific tasks that support the health-related SDGs of targets 3.3, 3.9, and 3.d. Activities will include diverse applications, such as feasibility studies (e.g. testing and validation of proofs-of-concept of possible applications), development of data-fusion products with strong applications and applied research potential, demonstrations that complete the transition, adoption, and sustained use of EO, capacity building, and studies on value of EO for decision making, preparedness, response or resilience.

EO4Health supports five GEO Health CoP work groups, which were developed to facilitate the development and implementation of EO science and technology in the health sector across diverse environmental health topics. Work groups will continue to identify and engage health partners, clarify and address health needs for capacity building, and identify and address EO and prediction gaps and needs. Work groups will be aligned with the EO4Health objectives and focus on five specific topics: 1) heat; 2) infectious diseases; 3) air quality, wildfires, and respiratory health; 4) food security and safety; and 5) health care infrastructure. Cross-cutting synergies

among work groups will be instrumental in identifying critical EO needs and science gaps between coinciding environmental health challenges. The One Health framework, which promotes transdisciplinary collaborations to better understand the interlinking processes of human, animal, and environmental health, will be an integrated theme across all activities. There are no specific timelines associated with these work groups at this time.

**If you would like to provide further details on the technical methods, you may upload one or more documents here.**

- no supporting documents provided -

**Are there any significant scientific or technical challenges that need to be resolved by the Initiative during the 2023-2025 period?**

No

**Does the Initiative expect to complete any key new outputs, improvements to existing outputs, or improvements to the methods of producing outputs, in the 2023-2025 period?**

No

## **Resources**

**Have all resources required to implement the Initiative's planned work in the 2023-2025 period been secured?**

**Please list all financial and non-financial contributions to the Initiative (other than in-kind, voluntary participation by individual contributors) having a value of more than USD 50,000.**

- no answer given -

## **Lessons from the 2020-2022 Period**

**Were all planned activities for the 2020-2022 period implemented as expected?**

Yes

**Were there any key challenges faced by the Initiative in the 2020-2022 period?**

Yes

### **Please describe.**

The EO4Health and GEO Health CoP were strategically placed at the start of the COVID-19 pandemic to offer a platform for GEO members worldwide to share research applications and related activities that use Earth observations to advance knowledge on COVID-19 transmission.

**Were there any impacts or changes to operations due to COVID-19?**

Yes

### **Please describe.**

A series of weekly teleconferences on EO and COVID-19: A Virtual Round the Room Update was coordinated to present preliminary scientific findings and encourage research collaborations that explore

**Please describe the key changes proposed for the 2023-2025 period, for example, new projects, new areas of focus, or adjustments to the activity governance.**

EO4Health Projects

Vector-borne Diseases

- Dengue Model forecasting Satellite-based System (D-MOSS) (Gina Tsarouchi, Project Manager): Developed by a consortium led by HR Wallingford and sponsored by the United Kingdom (UK) Space Agency's International Partnership Programme, D-MOSS is the first fully integrated dengue fever forecasting system incorporating Earth observations and seasonal climate forecasts to issue warnings on a routine basis. D-MOSS integrates multiple stressors such as water availability, land-cover, precipitation, and temperature with data on past dengue fever incidents. This information is used to develop statistical models of disease incidence, which can then be used to forecast dengue outbreaks based on seasonal weather and hydrological forecasts as well as other factors. D-MOSS takes the form of a web-based platform. The system's architecture is based on open and non-proprietary software, where possible, and on flexible deployment into platforms including cloud-based virtual storage and application processing. D-MOSS has been implemented in Vietnam and is being expanded to Cambodia, Laos, Malaysia, Philippines, Sri Lanka, and Thailand. This suite of innovative tools will allow beneficiaries to issue alerts for dengue fever up to eight months in advance (with a view to develop the same for Zika virus) and provide assessments of vector-borne disease risk under future climate and land use change scenarios. It will allow local communities to mobilize and eliminate mosquito-breeding sites, thus reducing dengue incidence. (Funding: HR Wallingford)
- An Early Warning System for Vector-borne Disease Risk in the Amazon (William Pan, Duke University): In the Amazonian region of South America, the countries of Colombia, Peru, Ecuador, and Venezuela have experienced a resurgence in malaria, attributed to challenges like climate change and the expansion of mosquito habitats. To inform malaria control policies, the team developed a Malaria Early Warning System for Peru, which is capable of forecasting malaria outbreaks up to 12 weeks in advance (90% sensitivity). His team integrated multi-layered data from NASA's Land Data Assimilation System (LDAS), human population density, and weekly malaria surveillance to forecast both the incidence of malaria and probabilities of an outbreak (as defined by the local Ministries of Health). The team has developed strong government and academic partnerships in Peru (Peruvian Centers for Disease Control; Climate and Infectious Disease Laboratory at the Universidad Peruana Cayetano Heredia) and Ecuador (Ecuadorian Ministry of Health; University of San Francisco de Quito) to train and implement the system locally. (Funding: NASA ROSES 2013)
- Myanmar Malaria Early Warning System (Tatiana Loboda, University of Maryland, College Park): Myanmar is one of the five countries with documented cases of emergence of artemisinin resistance. This project developed a robust satellite data driven early warning system (Myanmar Malaria Early Warning System, MMEWS) that enables spatially-explicit monitoring and forecasting of potential surges in malaria burden in Myanmar. This approach quantified malaria outbreak potential using an IPCC-defined risk-assessment framework which included hazard, exposure, and vulnerability components. Data fusion from moderate (Landsat) and coarse (MODIS) resolution optical sensors supported the 8-day dynamic spatially explicit (resolved to village level) assessment of malaria burden potential. With a team of experts in satellite remote sensing, geospatial modeling, and malariology, the project offered support for medical intervention and other decision-making activities in the Yangon office of the Institute for Global Health and regional partners and stakeholders. Unfortunately, continued political instability in Myanmar has paused efforts to bring this system to full operational use in-country. (Funding: NASA ROSES 2017, Element A.37)
- A Geospatial Surveillance and Response System Resource for Vector-borne Disease in the Americas (John Malone, Louisiana State University and A&M College): Visceral leishmaniasis (*Lutzomyia longipalpis*) and *Aedes aegypti* borne arboviruses (dengue, zika, chikungunya) have potential for epizootic spread from Latin America and the Caribbean and establishment in North America. This project developed and implemented a geospatial surveillance and response system data resource for vector-borne diseases in the Americas using NASA satellite and public health surveillance data, geographic information systems, and ecological niche modeling. It characterized the environmental suitability and potential for spread of selected endemic and epizootic vector-borne diseases in the Americas, with an initial focus on visceral leishmaniasis in Brazil. This project has offered a geospatial health resource data portal with training courses for researchers interested in mapping and modeling other vector-borne diseases. (Funding: NASA ROSES 2017, Element A.37)
- Machine Learning, Climate Variability and Disease Dynamics (MEDINA) (Assaf Anyamba, NASA Goddard Space Flight Center): Vector-borne and zoonotic pathogens comprise at least two-thirds of top infectious disease

threats to Department of Defense personnel and global public health, and account for more than 17% of all infections with more than 700,000 deaths per year. This project will develop and enhance risk mapping and forecasting of a suite of vector-borne disease models driven by extreme weather/climate conditions (i.e., dengue, Rift Valley fever, Zika, hantavirus) through prototype machine learning methods that integrate disparate climate, model, environmental, and disease outbreak data to deliver timely disease risk maps in a unified platform called MEDINA. (Funding: NASA ROSES 2021, Pending)

- Getting to Zero: Satellite Informed System to Support Elimination of Malaria in the Americas (SISTEMA) (William Pan, Duke University): Progress toward malaria elimination has stalled due to rapidly changing environmental conditions, increasing human population and mobility, social inequalities, and pathogen and mosquito adaptation. This project aims to develop real-time, satellite-informed tools to perform early and enhanced detection of novel malaria cases that improve the timing and spatial deployment of malaria interventions and speed progress toward malaria elimination. This system will be tested in Panama and Honduras, leveraging strong local presence and government collaborations of Clinton Health Access Initiative (CHAI). (Funding: NASA ROSES 2021, Pending)

#### Water-related Pathogens

- Predictive Assessment of Transmission Conditions of Cholera in the Environment and Human Population using Earth Observations (Antarpreet Jutla, University of Florida): Cholera is an acute diarrheal infection, caused by the ingestion of food or water contaminated with *Vibrio cholerae*. It remains a significant global health risk, where 40-80 million people are living in cholera hotspots in Africa. The real burden of cholera, which is underreported between 1.4 and 4 million cases, hinders the ability to predict high-risk areas of cholera outbreaks in Africa. This team integrated satellite data (MODIS, GPM, MERRA-2, ORNL LandScan) and validated a predictive model (Regional Cholera Prediction Modeling System) to produce weekly time steps for the epidemic and endemic models of cholera for Africa (Mozambique, Algeria, Zimbabwe, South Sudan, Sudan) and work with international agencies to inform cholera risk reduction in Yemen and other African nations. It developed a comprehensive regional specific capacity building plan to engage end-users to incorporate this information into decision-making and facilitate the creation and implementation of appropriate intervention strategies. (Funding: NASA ROSES 2017, Element A.37)

- Assimilation of Earth Observations to Improve and Enhance Global Predictive Ability of Forecasting Risk of Cholera Outbreaks (Antarpreet Jutla, University of Florida): Cholera, a diarrheal disease caused by drinking contaminated water containing bacterium *Vibrio cholerae*, remains a global threat to public health. This project aims to enhance the predictive ability of the cholera risk model through integration of the transmission component with the trigger component. It also aims to develop EO-based data architecture for effective dissemination and communication of cholera risks as well as an Anticipatory Decision-making toolkit for the deployment of cholera modeling systems on global scales. Deliverables include one of the first EO-based apps for predicting cholera, a web hub to monitor the risk of trigger and transmission, and an anticipatory decision-making framework for cholera on a global scale. (Funding: NASA ROSES 2021, Pending)

#### Air Quality

- Supporting Local Government Public Health and Air Quality Decision-Making with a Sub-City Scale Air Quality Forecasting System from Data Fusion of Models, Satellite, In Situ Measurements, and Low-Cost Sensors (Katherine Emma Knowland, NASA Goddard Space Flight Center): This project aims to address the needs of three end-user groups for sub-city scale air quality estimates and forecasts: 1) assess the impacts of new regional rail and bus rapid transit policies on spatial and temporal air quality distributions (Dakar, Senegal); 2) provide air quality forecasts across the city with early warnings to city hospitals to prepare for poor local air quality events (Rio de Janeiro, Brazil); 3) guide state, local, and tribal air quality managers on how to best incorporate data from low-cost sensors into their air quality management decision-making (United States). This project will expand the capabilities of this tool using new methods developed by the NASA GMAO which will give it the capability of providing sub-city scale resolution and hourly frequency estimates and forecasts of three key air quality indicators (PM<sub>2.5</sub>, NO<sub>2</sub>, O<sub>3</sub>). (Funding: NASA ROSES 2021, Pending)

- Enhancing Air Quality Decision-Making Activity in Indian Megacities through Assimilation of NASA Earth Observations and Development of a Decision Support System (Rajesh Kumar, National Center for Atmospheric Research): An operational air quality early warning system for Delhi was developed, in collaboration with the Indian Institute of Tropical Meteorology, the Indian Meteorological Department, and the National Center for Atmospheric Research, which has provided 72-hour air quality forecasts daily since October 2018. The system, which assimilates MODIS aerosol optical depth (AOD) retrievals, has been 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. This project aims to develop a machine learning based decision support system that will help decision-makers to assess the

relative importance of controlling target emission sources predefined in Grades Response Action Plan and implement the most effective control measures. The team will also develop high-resolution (400 m x 400 m) AQEWS for five additional Indian megacities namely Ahmedabad, Bengaluru, Pune, Indore and Bhubaneswar. (Funding: NASA ROSES 2021, Pending)

#### Environmental Health Topics

- Environmental Determinants of Enteric Infectious Disease (Ben Zaitchik, Johns Hopkins University): Gastrointestinal diseases contribute to childhood undernutrition, causing more than 50% of global deaths in children aged 5-14. This project addressed the environmental, economic, and societal impacts of the COVID-19 pandemic. The team used GPM, SMAP, LDAS, and MERRA-2 data to examine climatic and hydrometeorological factors in temporal and spatial variability that may influence COVID-19 transmission. They integrated the database of the original project (Environmental Determinants of Enteric Infectious Disease) with COVID-19 information from the Johns Hopkins Coronavirus Resource Center to investigate potential environmental factors that may influence COVID-19 transmission. His team refined the COVID-19 case record database, which assigned data to a consistent geographical hierarchy aligned with hydrometeorological variables, and completed the COVID-19 risk analyses for Brazil, the United States, and selected South and Central American countries. (Funding: NASA Rapid Response and Novel Research in Earth Science ROSES 2020)
- Neighborhood-Scale Extreme Humid Heat Health Impact (Peter Kalmus, Jet Propulsion Laboratory): In coming decades, deadly heat will intensify but will be unevenly distributed in space and wealth, disproportionately affecting the tropics and vulnerable urban populations with limited or no access to reliable air conditioning. Using global climate models, high-resolution remote sensing data sets, and health data, this project will create projections of humid heat to 2100 and connect them to human health impacts. This work will target the world's major urban centers and provide humid heat impact projections at the neighborhood scale (375 meters), capable of resolving urban heat islands and providing precise spatial guidance to enhance decision-making activities around urban climate planning for mitigation and adaptation such as cooling centers, air conditioning capacity, cool roofs and surfaces, urban forests, and parametric insurance. (Funding: NASA ROSES 2021, Pending)

#### Additional EO4Health Activities

Urban Heat Island: Members of the GEO Health CoP participated in the community-led summer campaigns, supported by NOAA's National Integrated Heat Information System and partners, to map the hottest parts of cities in 11 states across the United States (NOAA and Communities to Map Heat Inequities in 11 States). In 2021, selected communities included Albuquerque, New Mexico; Atlanta; New York City; Charleston, South Carolina; Kansas City, Missouri; Raleigh & Durham, North Carolina; San Diego; San Francisco; and parts of New Jersey, Indiana, Massachusetts, and Virginia. Ongoing work will focus on future community-led summer campaigns to map selected cities in the United States.

WMO COVID-19 Task Team: Members of the GEO Health CoP have contributed to global scientific events, such as the WMO/WHO Workshop on Climatological, Meteorological, and Environmental Factors in the COVID-19 Pandemic (August 2020), the First Report of the WMO COVID-19 Task Team: Review on Meteorological and Air Quality Factors Affecting the COVID-19 Pandemic (March 2021), and WMO COVID-19 Task Team Virtual Roundtables (June and September 2021). Ongoing work will focus on the potential for meteorological factors to inform decision-making activities related to COVID-19 and future disease outbreaks.

Belmont Forum: The team supported the Belmont Forum's Collaborative Research Actions on Climate, Environment, and Health in the Americas Workshop, following AmeriGEO Week 2021. This workshop identified synergies for the development of research networks that address priorities related to climate, environment, and health and will guide the upcoming Collaborative Research Action (CRA) on Climate, Environment and Health (CEH2) in early 2022. Ongoing work will focus on regional training workshops, in collaboration with the Inter-American Institute of Global Change Research (IAI), in 2022.

**Does the Initiative have outputs (products, services, etc.) available to users now, even if only on a pilot or testing basis?**

No

**Do you have evidence of any impacts that have occurred in part as a result of using the outputs of the Initiative (for example, policy decisions taken, behaviour changes by**

## users, risks mitigated)?

Yes

### **Please provide examples, with evidence where available.**

WMO COVID-19 Task Team: Members of the GEO Health CoP have contributed to global scientific events, such as the WMO/WHO Workshop on Climatological, Meteorological, and Environmental Factors in the COVID-19 Pandemic (August 2020), the First Report of the WMO COVID-19 Task Team: Review on Meteorological and Air Quality Factors Affecting the COVID-19 Pandemic (March 2021), and WMO COVID-19 Task Team Virtual Roundtables (June and September 2021). Ongoing work will focus on the potential for meteorological factors to inform decision-making activities related to COVID-19 and future disease outbreaks.

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### **Please provide supporting documentation if available.**

- no supporting documents provided -

## **Have there been any internal or external reviews or evaluations of the Initiative since 2019?**

No

## **Please indicate any GEO Work Programme activities with which you have ongoing collaboration.**

- AFRIGEO - African Group on Earth Observations
- AMERIGEO - Americas Group on Earth Observations
- AQUAWATCH - AquaWatch
- BLUE-PLANET - Oceans and Society: Blue Planet

## **Please indicate any additional GEO Work Programme activities with which you would like to establish new collaborations.**

- AOGEO - Asia-Oceania Group on Earth Observations
- EO4SDG - Earth Observations for the Sustainable Development Goals
- EUROGEO - European Group on Earth Observations
- GEO BON - GEO Biodiversity Observation Network
- GEOGLAM - GEO Global Agricultural Monitoring
- HUMAN-PLANET - GEO Human Planet
- AGRI-DROUGHT - Global Agricultural Drought Monitoring
- GWIS - Global Wildfire Information System

## **Stakeholder Engagement and Capacity Building**

### **Are there specific countries or organizations that your Initiative would like to engage?**

Yes

### **Please list these countries, regions or organizations.**

The EO4Health Initiative will seek and expand sustainable long-term connections or partnerships with the public health community. The initiative will expand efforts on relevant SDGs, connecting with other GEO Work

Programme elements, including GEO Biodiversity Observation Network (GEO BON), GEO Human Planet Initiative, and Global Water Sustainability (GEOGLOWS), as well as regional GEOs, such as AfriGEO, AmeriGEO, AOGEO, and EuroGEO.

**What are your plans to engage them?**

Future opportunities for cross-collaboration between the GEO Health CoP, GEO AquaWatch, and GEO Blue Planet have been identified to explore pathogen tracking with applications to sustainable fisheries and food safety among subsistence fishers. Additional synergies between the GEO Health CoP and regional GEOs have been explored to support potential collaborations in heat, infectious diseases, air quality, food security and safety, and health care infrastructure topics. Potential GEO collaborations include developing Special Edition Webinars to bridge networks of Earth and health science communities within AOGEO and EuroGEO.

**Does your Initiative engage users in the work of the Initiative (for example, consultation, testing, co-design)?**

No

**Does the Initiative have a user engagement strategy or similar kind of document?**

No

**Are there categories of users that are not represented at this time, but you would like to engage?**

Yes

**Please list these user categories or regions.**

EO4Health would like to continue engaging with user categories (e.g. early-career professionals, clinicians, public health professionals) and geographic regions (AOGEO).

**What are the plans for further engagement of users in the Initiative?**

EO4Health will explore potential collaborations to expand engagement with user categories (early-career professionals, health community) and geographic regions (AOGEO) through community telecons, conference presentations, and work group activities (heat, infectious diseases, air quality, food security and safety, health care infrastructure).

**Does the Initiative have a documented capacity development strategy?**

No

**Please describe the approach to capacity development that is being implemented by the Initiative?**

EO4Health will explore ways to enhance capacity development, including student engagement, on projects that integrate EO in public health applications, as evidence of the Rensselaer Polytechnic Institute-NASA Student Engagement collaboration (<http://www.geohealthcop.org/workshops/2021/11/16/telecon-nov2021>). Additional opportunities may be available with the five work groups on heat, infectious diseases, air quality, food security and safety, and health care infrastructure topics.

**Are there any commercial sector organizations participating in this Initiative?**

Yes

**Please list the commercial sector organizations.**

Organization name	GEO Member/PO/...	Country in which the organization is based	City in which the organization is based
DailyBreath	United States	United States	Virginia
Esri	United States	United States	California

**Are there opportunities for commercial sector uptake of the outputs of the Initiative?**

Yes

**Please describe these opportunities.**

EO4Health will explore opportunities for commercial sector uptake of Initiative outputs, including data and products from the work group activities.

**Is there already commercial uptake occurring?**

No

**Are there opportunities for further commercial sector participation in the Initiative?**

Yes

**Please describe these opportunities.**

EO4Health will explore opportunities for commercial sector uptake of Initiative outputs, including data and products from the work group activities.

**Does the Initiative have a plan for commercial sector engagement?**

No

**Governance**

**Please describe the roles of each of the key leadership positions, as well as any team structures involved in day-to-day management.**

The EO4Health organizational chart offers integral links to strengthen the framework of the EO4Health Initiative. The guidance of the GEO Secretariat staff is beneficial as it facilitates integrated functions in activities as well as supports connections to other GEO flagships, initiatives, and regional networks. The Co-Chair Leadership and Executive Coordinator roles are instrumental to provide scientific expertise, technical coordination, and programmatic support for the EO4Health Initiative.

**Is there a steering committee or other governance bodies that advise the Initiative but are not involved in day-to-day management?**

No

**What methods does the Initiative use to communicate with its participants?**

- Email / e-newsletters
- Regular conference calls
- Website
- Regular events

**Please describe the key risks that could delay or obstruct the completion of the planned activities and outputs of the Initiative, along with any actions taken to mitigate these risks.**

- no answer given -

### **What methods are used by the Initiative to monitor its effectiveness?**

- Informal discussions with users / beneficiaries
- Other

#### **Please describe.**

Other methods include attendance at community teleconferences and work group updates.

### **Would the Initiative be interested in assistance from the GEO Secretariat for developing an impact plan?**

Yes

### **How are the results of the monitoring and evaluation activities shared with participants and the wider GEO community?**

In order to promote EO for health in scientific exchanges, EO4Health and the GEO Health CoP have coordinated community telecons and virtual and in-person meetings with established agendas that meet the needs of the CoP members. A GEO Health CoP website was designed and launched in 2017, with a community listserv, where upcoming activities, news, and other updates, calls for scientific publications, and funding opportunities are shared with CoP members and the global community (<http://www.geohealthcop.org/>).

### **Are any monitoring or evaluation activities required by funders/contributors?**

No

## **Participants**

**Please list the active individual participants in the Initiative**

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## Other information

**Please provide any other comments or information that was not included in the previous sections, but you would like to appear in the Implementation Plan.**

- no answer given -

- no supporting documents provided -

## Co-Editor Management

**List of co-editors for this initiative**

- no answer given -