GROUP ON EARTH OBSERVATIONS

GEO HEALTH COMMUNITY OF PRACTICE

GEO Earth Observations for Health (EO4HEALTH) Initiative and GEO Health Community of Practice: NASA-ORNL-RPI Student Engagement

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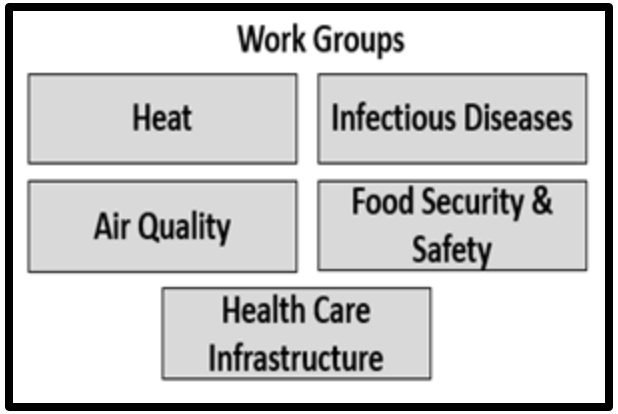
Improving Health Decision-Making Using Environmental Observations

- Objectives:
  - To develop integrated information systems that sustain engagement between scientists and decision makers to provide useful EO data that can improve the capacity to predict, respond to, and reduce environment-related health risks.
  - To broaden interest and awareness of EO data support to the SDGs and contributions to social, environmental, and economic benefits.
  - To contribute to monitoring the progress of the UN 2030 Agenda for Sustainable Development and Sendai Framework for Disaster Risk Reduction 2015-2030.
- The **One Health approach** offers a holistic view of how EO data can enhance our understanding of dynamic ecosystem processes that influence human and animal health.

EO4Health Co-Chairs:
John Haynes (NASA)
Juli Trtanj (NOAA)
Executive Coordinator:
Helena Chapman (NASA)



NASA-ORNL-RPI Student Engagement

The voices and actions of global youth can offer innovative perspectives that propel culturally appropriate, nature-based solutions to combat complex emerging health challenges.

- Since December 2020, RPI faculty, NASA, ORNL data scientists offered guidance and provided datasets, and problems sets, to RPI Data Science and Data Analytics course students in their semester projects.
- Through these experiences, students had opportunities to **learn about NASA data products and applications** and **apply relevant data analysis techniques to address real-world challenges** arising from vector-borne diseases and other environmental health topics.

Special Recognition:

Rensselaer Polytechnic Institute (**RPI**)
- Thilanka Munasinghe
- Kathy Fontaine

NASA Goddard Space Flight Center / Oak Ridge National Laboratory (**ORNL**)
- Assaf Anyamba
- Heidi Tubbs
- Bhaskar Bishnoi

Project 1
Ethan Joseph

Scraping Unstructured Data to Explore the Relationship between Rainfall Anomalies and Vector-Borne Disease Outbreaks

- Presented at the 2021 IEEE International Conference on Big Data
- Computer Science undergraduate student (Class of 2021), enrolled in Data Analytics course of Spring 2021

Project 2
Jonathan Harris

Predicting Crimean-Congo Hemorrhagic Fever Outbreaks via Multivariate Time-Series Classification of Climate Data

- Presented at the 6th International Conference on Medical and Health Informatics
- Computer Science graduate student (Class of Dec 2022), enrolled in Data Analytics course of Fall 2021

Project 3
Ajeet Parmar

2021 Monthly Rice Production in Chinese Coastal Provinces

- Presented at the 2022 IEEE 3rd International Conference on Big Data Analytics and Practices
- Computer & Systems Engineering and Computer Science undergraduate student (Class of May 2023), enrolled in Data Analytics course of Spring 2022

Lessons Learned

Student Perspectives

- Students should study the course material and **learn how to use various data formats** such as HDF5 and netCFD, and transform them to CSV format
- Students should explore **how to effectively use NASA Application Programming Interface (API)** and machine learning techniques to analyze global geospatial data
- Students can **develop oral and written communication skills** for technical and general audiences, especially presenting findings in diverse formats (e.g. writing a conference paper, creating a poster)
- Early on, students should **establish project priorities and timeline** for effective time management

Mentor Perspectives

- RPI students are technically well prepared to handle the problems posed by these engagement activities
- Students should be advised on which **EO data sets** to use for specific problem sets and appropriate data techniques
- Students should **learn about various EO metrics** (e.g. absolute values, long-term means, anomalies)
- During the semester engagement period, science advisors should **check-in with students** to ensure that they are on the right track
- **Frequent (weekly) one-on-one instructor-student sessions**, where students can discuss any challenges, are essential for project success
- Instructors can prepare **recorded video tutorials** on how to convert various EO data formats and properly use EO datasets as an additional resource. Recorded tutorials can be repurposed for future semesters.

This activity exposes students to real-world problems and possible solutions and places them in an advantageous position for graduate school and other career opportunities!

Contact Us

NASA-RPI-ORNL Student Engagement

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GEO Health Community of Practice

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Lessons from Youth Engagement in HCF projects

- **Complex questions addressing un-unanswered problems of multi-disciplines;**
  - Development and adoption of horizontal collaborations of many sciences and promote seamless data exchange among equals for the sake of key un-solved problems.
- **Handling and Sharing of Big (Heterogeneous) Data;**
  - Intelligent modules for processing massive knowledge (generalization), and test practices that are deployable globally benefiting from youth skills that until now remained unused in advanced (non-simplified) decision-making
- **Scientific Impact Beyond Existing Scientific Sensitivities;**
  - The "Openness" of data and sciences is not an issue whereas, the Impact of seeked Sciences and Technologies is more attractive and Sustainable, e.g. AI ☺.
- **Capacity Building and Technology Transfer Pioneered beyond GEO deployed Infrastructure(s);ble**
  - Address the lack of reliable or verifiable data and technologies for ensuring consistency of EO in "real time" and implement skills beyond the deployed Global infrastructure(s).
- **Global Policy and Governance Implications;**
  - Facilitate the dialogue between policymakers and technologists first by verifying several implemented policies (which can be only achieved via GEO data) and provide better expertise in policy development, implementation, and reliable impact forecasting.