



EARTH SCIENCE
APPLIED SCIENCES

NASA Earth Science Climate-Related Applications Programs

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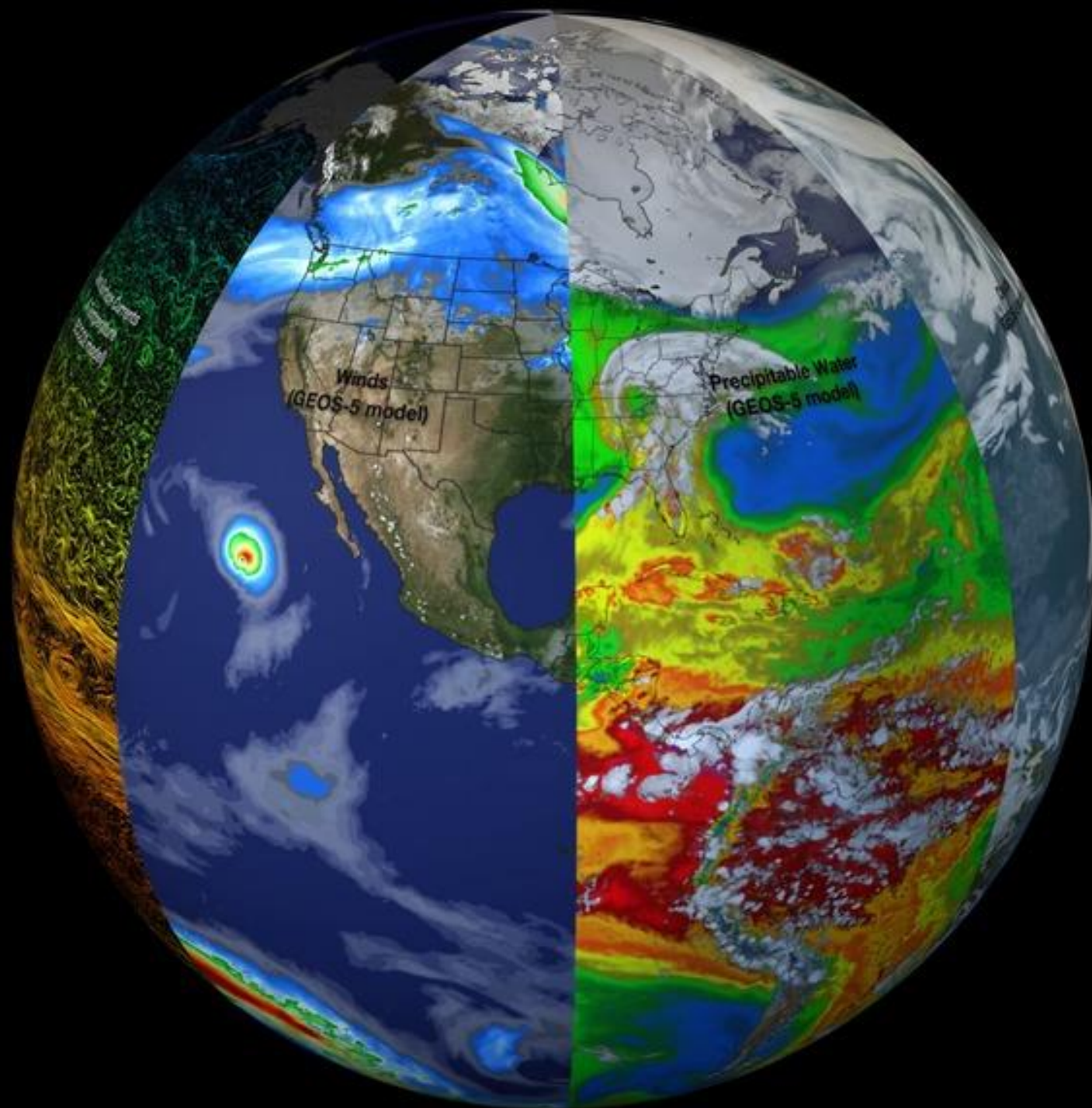
Sydney Neugebauer & Owen Hooks

NASA Equity & Environmental Justice Program



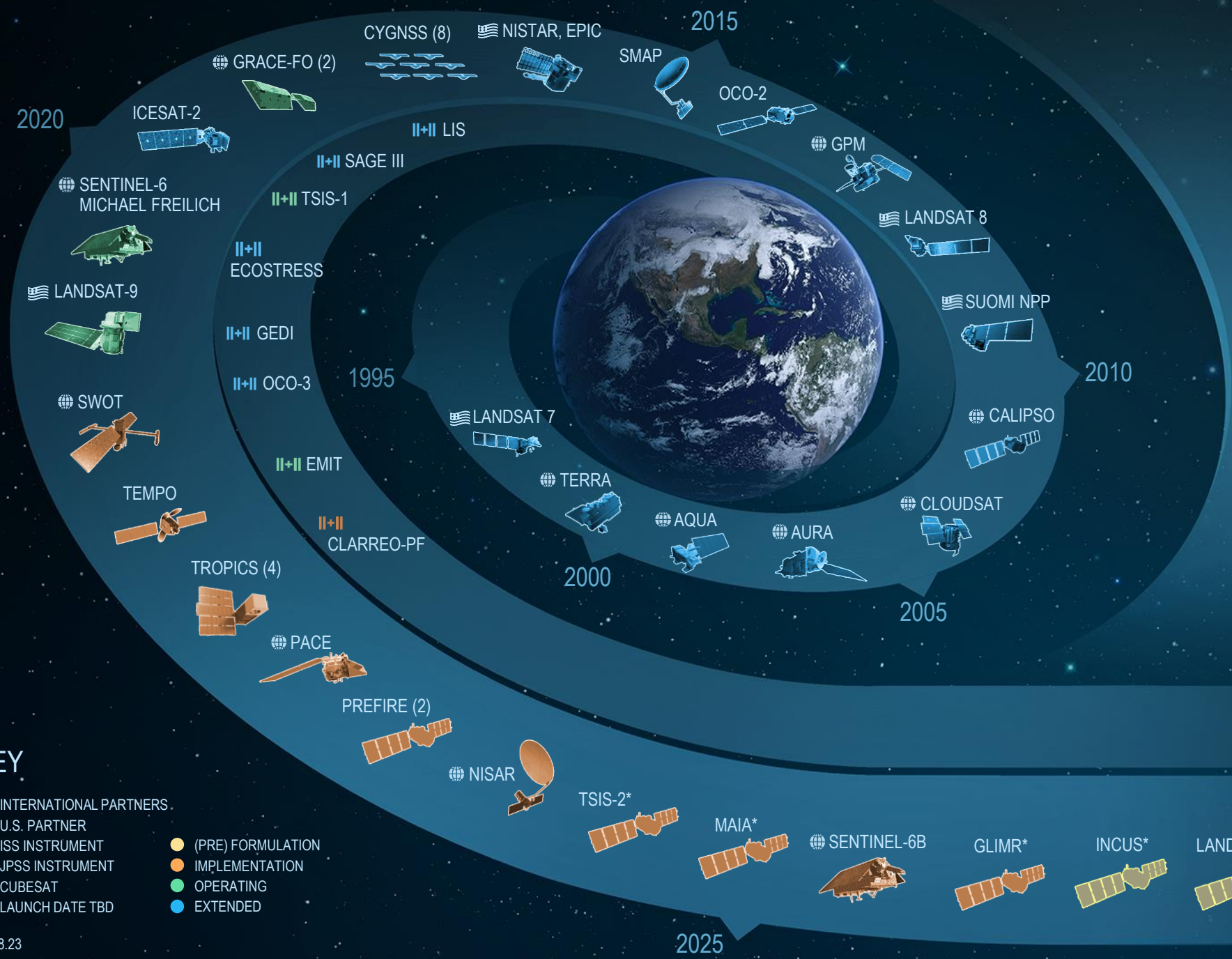
CLIMATE & RESILIENCE







EARTH FLEET



INVEST/CUBESATS

- CIRIS 2023
- NACHOS 2022
- CTIM 2022
- NACHOS-2 2022
- MURI-FD 2022
- SNOOPI* 2023
- HYTI* 2023

JPSS INSTRUMENTS

- OMPS-LIMB 2022
- LIBERA 2027
- OMPS-LIMB 2027
- OMPS-LIMB 2032

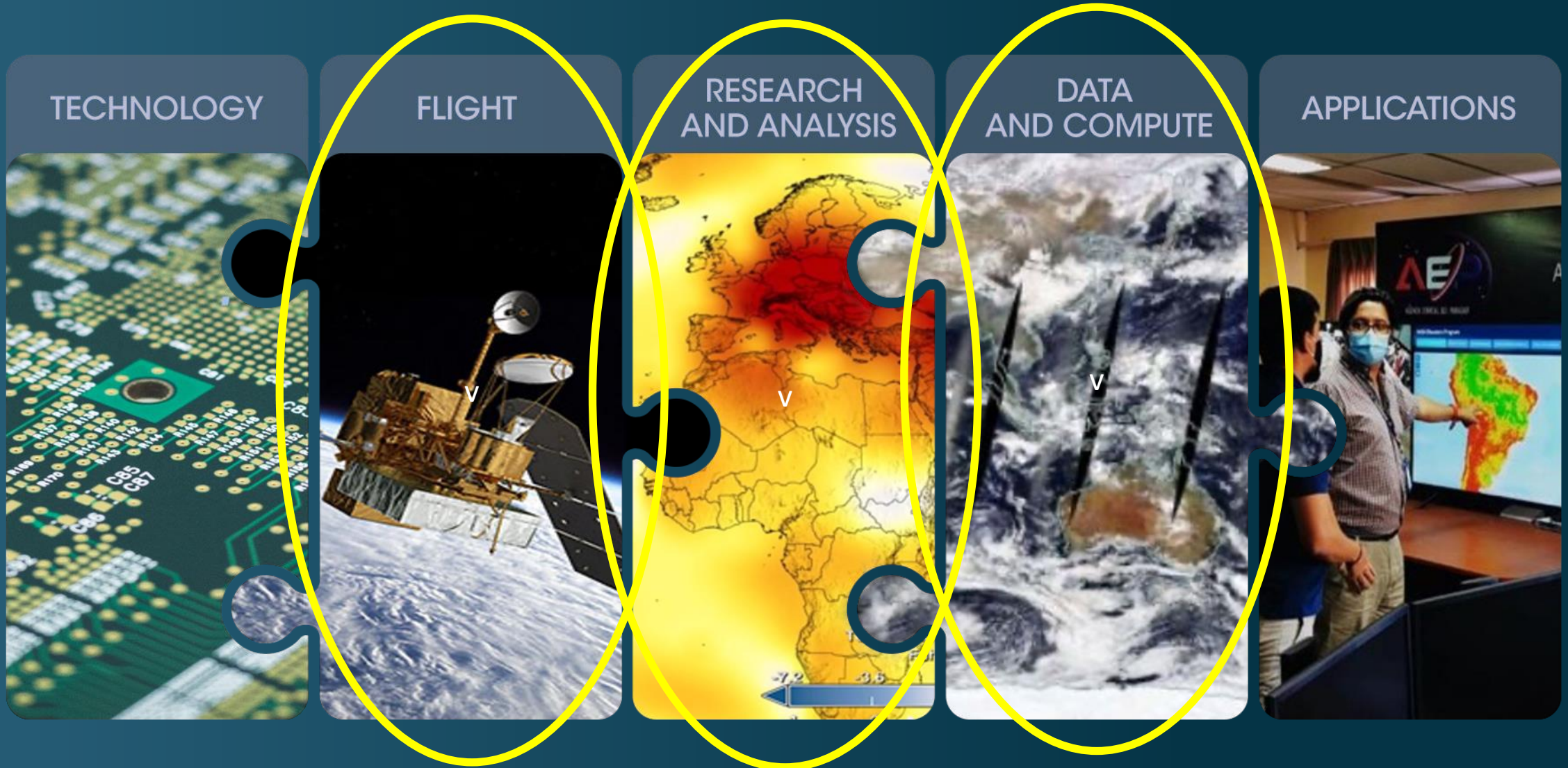
ISS INSTRUMENTS

MISSIONS

KEY

- INTERNATIONAL PARTNERS
- U.S. PARTNER
- ISS INSTRUMENT
- JPSS INSTRUMENT
- CUBESAT
- LAUNCH DATE TBD
- (PRE) FORMULATION
- IMPLEMENTATION
- OPERATING
- EXTENDED

Advancing Earth System Science End-to-end



Earth Science Division – Applied Sciences Program

Mission

Enable people & organizations to apply insights from Earth science to benefit the economy, health, quality of life, and environment.

What We Do

Financial and programmatic investments to:

- **Generate creative solutions** with organizations to improve their decisions and actions
- **Lower the technical and institutional barriers** to using Earth science information
- **Use connections** across sectors for multiplier effects and bring insights back to ESD



Partnerships are core to our work

Applied Sciences Program – Lines of Business



Mission Planning

Support applications throughout mission lifecycles



Capacity Building

Build capabilities in US and developing countries



Innovative & Practical Applications

Develop, test, prove-out, transition, and extol uses

Earth Science Division – Applications

- Applications refer to uses of Earth science data, models, and information products to inform organizations' decisions and actions on management, policy, and business activities.
- Satellite data and information provide evidence for different types of decisions and actions:
 - Planning, management, and response
 - Monitoring and tracking impact
 - Alert systems





Climate & Resilience Applications



NASA's Equity & Environmental Justice Program

*Program commitment: ensuring that the investment the nation has made in NASA satellites and science **benefits people** across the U.S. and helps them **make informed decisions** about the challenges they face in their communities.*

Solicitation objective: Advance progress on EEJ domestically through better understanding of community needs and increased use of Earth science, geospatial, and socioeconomic information.

→ Landscape Analyses

Increase NASA's understanding of the EEJ "landscape."

→ Community-Based Feasibility Studies

Test ways to address environmental issues facing communities with the help of Earth science information.

→ Data Integration Projects

Develop sustained use of integrated Earth science, geospatial, and socioeconomic data, tools, and applications.

-  **4** Agriculture Projects
-  **5** Wildfires Projects
-  **10** Disasters Projects
-  **13** Air Quality Projects
-  **22** Heat Projects
-  **4** Water Projects
-  **14** Ecology Projects

Integrating Scientific Study with Community Perspectives in NYC

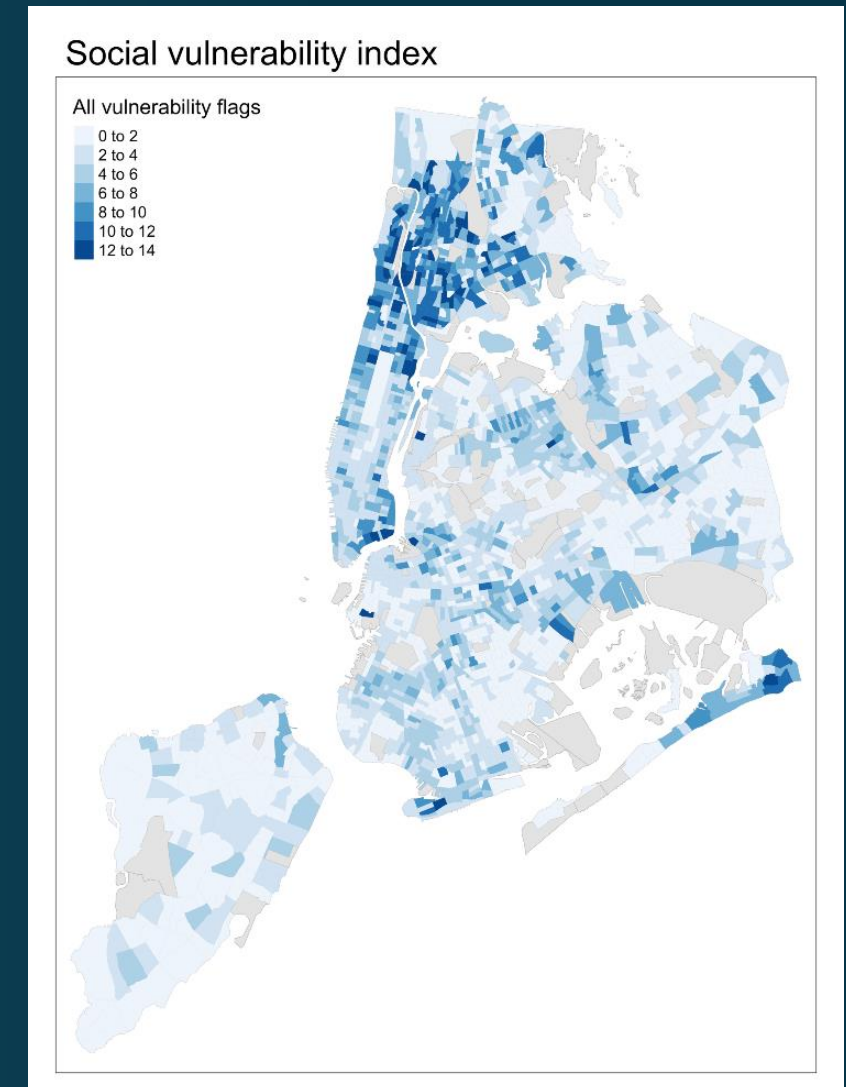
PI Peter Marcotullio, Hunter College

Project Questions:

- 1) Does LST differ within and across Home Owners' Loan Corporation (HOLC) - defined neighborhood categories?
- 2) Has biophysical greening in any parts of the HOLC neighborhoods changed over the time?
- 3) What is the relationship between LST, NDVI, city climate- and greening-related policies and socio-economic and resident health characteristics in EEJ neighborhoods?

Partners

- NYC Mayor's Office of Climate and Environmental Justice
- NYC Department of Health and Mental Hygiene
- Climate Adaptation Partners





ARSET

Cost-free training on the use of Earth Observations for decision making

Trainings are:

- Online and in-person
- Live, instructor-led, or self-guided
- Provided at no cost, with materials and recordings available from our website
- Often multi-lingual
- All levels, from **introductory** to **advanced**

Recent Trainings



ARSET - Fundamentals of Machine Learning for Earth Science

April 20, 2023 - May 04, 2023

ARSET Trainings 2009 - 2021



162 trainings



86,000+ participants



179 countries



14,000+ organizations



SERVIR

- A joint initiative of NASA, USAID, and leading geospatial organizations in Asia, Africa, and Latin America.
- Partners with countries and organizations to address critical challenges in climate change, food and water security, water-related disasters, land use, and air quality.
- Co-develops innovative solutions through a network of regional hubs to improve resilience and sustainable resource management at local, national and regional scales.



SEDAC - Socioeconomic Data and Applications Center

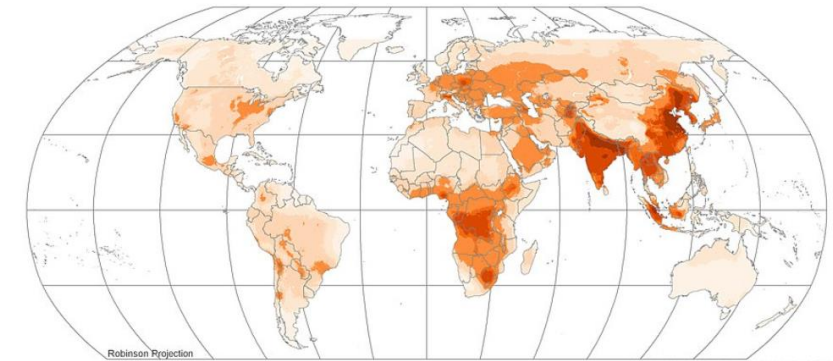
- Mission: To develop and operate applications that support the integration of socioeconomic and earth science data and to serve as an "Information Gateway" between earth sciences and social sciences.
- SEDAC data provide the ground level context for NASA's remote sensing data with a focus on human dimensions of environmental change

Resource - Thematic Guide to Night-Time Light Remote Sensing

Featured Data Sets

- Global Estimated Net Migration Grids By Decade, v1 (1970-2000)
Population Dynamics
Overview
Download Documents (18) Maps (3) WMS
- To provide estimates of net-migration (immigration minus out-migration) per one-kilometer grid cell on a decadal basis for the 1970s, 1980s, and 1990s.
- Global Grid of Probabilities of Urban Expansion to 2030, v1 (2000-2030)
Land Use and Land Cover
- Environmental Change and Migration Explored at World Bank Workshop

Global Annual PM2.5 Grids from MODIS, MISR and SeaWiFS Aerosol Optical Depth (AOD) with GWR, 2015
Satellite-Derived Environmental Indicators



The Global Annual PM2.5 Grids from MODIS, MISR and SeaWiFS Aerosol Optical Depth (AOD) with GWR, 1998-2016 consist of annual concentrations (micrograms per cubic meter) of ground-level fine particulate matter (PM2.5), with dust and sea-salt removed. This data set combines AOD retrievals from multiple satellite instruments including NASA's Moderate Resolution Imaging Spectroradiometer (MODIS), Multi-angle Imaging Spectro-Radiometer (MISR), and the Sea-Viewing Wide Field-of-View Sensor (SeaWiFS). The GEOS-Chem chemical transport model is used to relate this total column measure of aerosol to near-surface PM2.5 concentration. Geographically Weighted Regression (GWR) is used with global ground-based measurements to predict and adjust for the residual PM2.5 bias per grid cell in the initial satellite-derived values. The spatial resolution of the data is 0.01 degrees. This map represents concentrations of ground-level fine particulate matter, with dust and sea-salt removed in the year 2015.

Fine Particulate Matter (PM2.5) Concentration with Dust and Sea-Salt Removed

0 2 5 10 20 25 50 100 >100 micrograms per cubic meter
(10 micrograms per cubic meter is the World Health Organization (WHO) threshold above which health impacts are more severe)



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