United Nations World Geospatial Information Congress
Deqing, Zhejiang Province, China

Attaining Sustainable Development

Earth Observations in Support of SDGs and Disaster Risk Reduction

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U.S. Geological Survey

United Nations (2015): Sendai Framework for Disaster Risk Reduction 2015-2030

(From the Sendai Strategic Framework Preamble*)

- Geospatial information has been widely recognized as an important aspect of DRM…
- Furthermore, **DRM is central to sustainable development.** As such, the framework contributes to the achievement of the **2030 Agenda for Sustainable Development.**

*Strategic Framework on Geospatial Information and Services for Disasters (UN GGIM, 2017)

UN World Conference on Disaster Risk Reduction
2015 Sendai Japan

USGS

EO in Support of SDGs and Disaster Risk Reduction

Examples from an evolving national geospatial agency:

1. Maintaining core datasets while generating new ones as technology enables and society demands
2. Growing emphasis on Public Private Partnerships
3. Advancing from data acquisition and distribution to analytics, integration, and decision support
4. Crowd sourcing and citizen science

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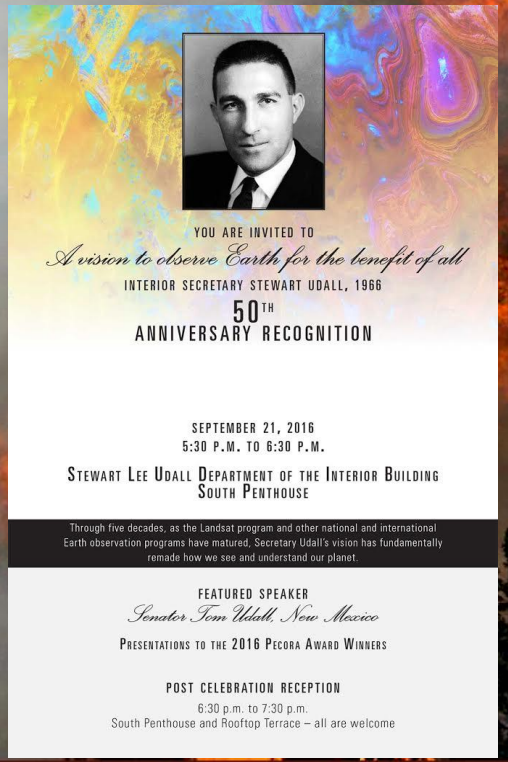
History

"A vision to observe Earth for the benefit of all."

Interior Secretary
Stewart Udall, 1966

Fifty years ago, on September 21, 1966, Secretary of the Interior Stewart Udall announced his vision to create "a program aimed at gathering facts about the natural resources of the earth from earth-orbiting satellites." It was an idealistic goal at the time, but came with encouragement and support from U.S. Geological Survey Director Bill Pecora. The announcement created "Project EROS".

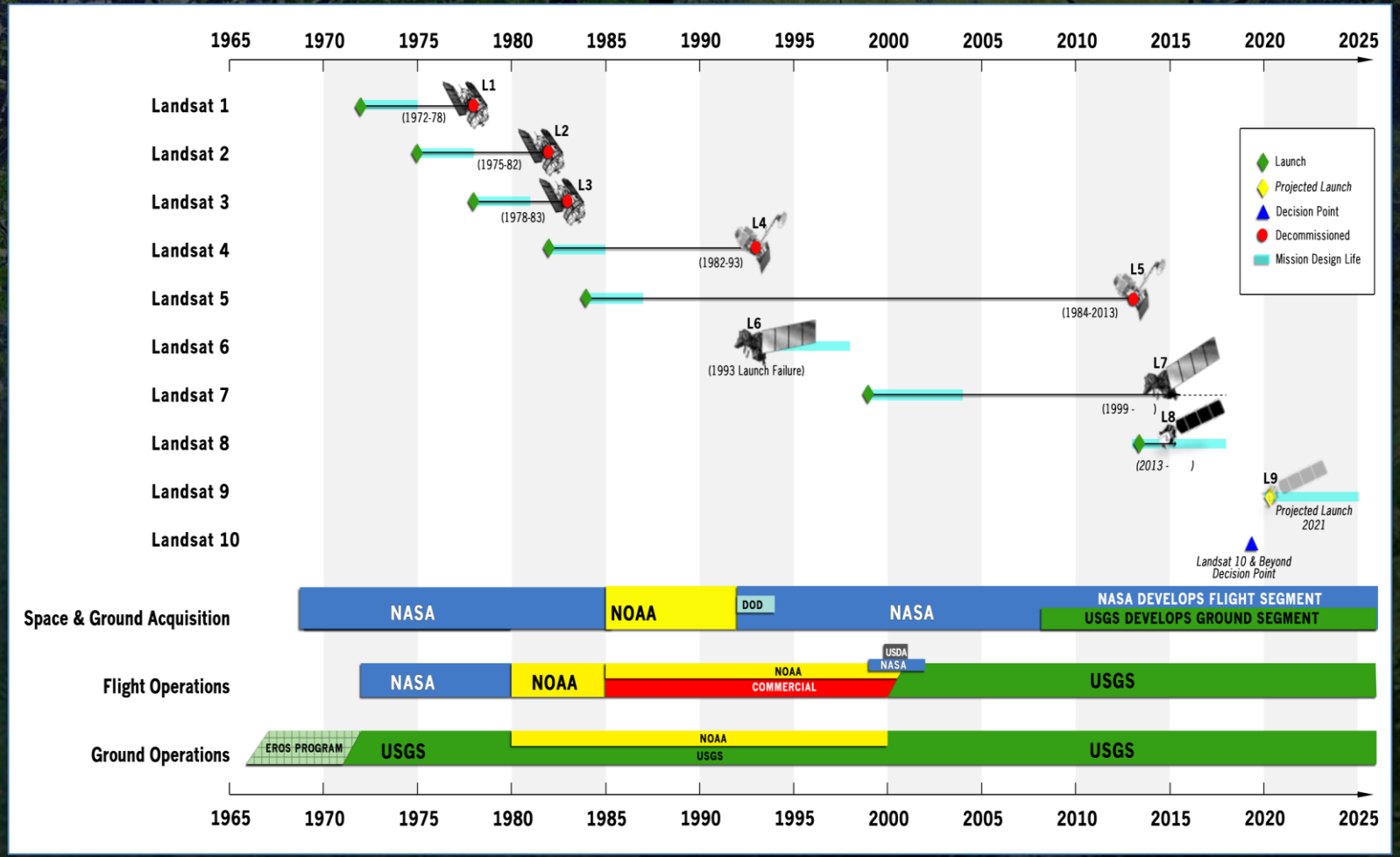
Over the past five decades, the Landsat Program and other international earth observation programs have matured. Udall's vision gave the world the confidence to create satellite systems to help people understand the intricate nature of our planet with a new perspective.



A vision to observe Earth...
50th Anniversary Celebration

September 21, 2016
Washington, D.C.

Water • Agriculture • Forests • Climate • Hazards • Ecosystems • Energy


1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
Landsat 1
Landsat 2
Landsat 3
Landsat 4
Landsat 5
Landsat 6
Landsat 7
Landsat 8
Landsat 9
Landsat 10
L1
(1972-78)
L2
(1975-82)
L3
(1978-83)
L4
(1982-93)
L5
(1984-2013)
L6
(1993 Launch Failure)
L7
(1999 -)
L8
(2013 -)
L9
Projected Launch
2021
Landsat 10 & Beyond
Decision Point
Launch
Projected Launch
Decision Point
Decommissioned
Mission Design Life
Space & Ground Acquisition
NASA
NOAA
DOD
NASA
NASA DEVELOPS FLIGHT SEGMENT
USGS DEVELOPS GROUND SEGMENT
Flight Operations
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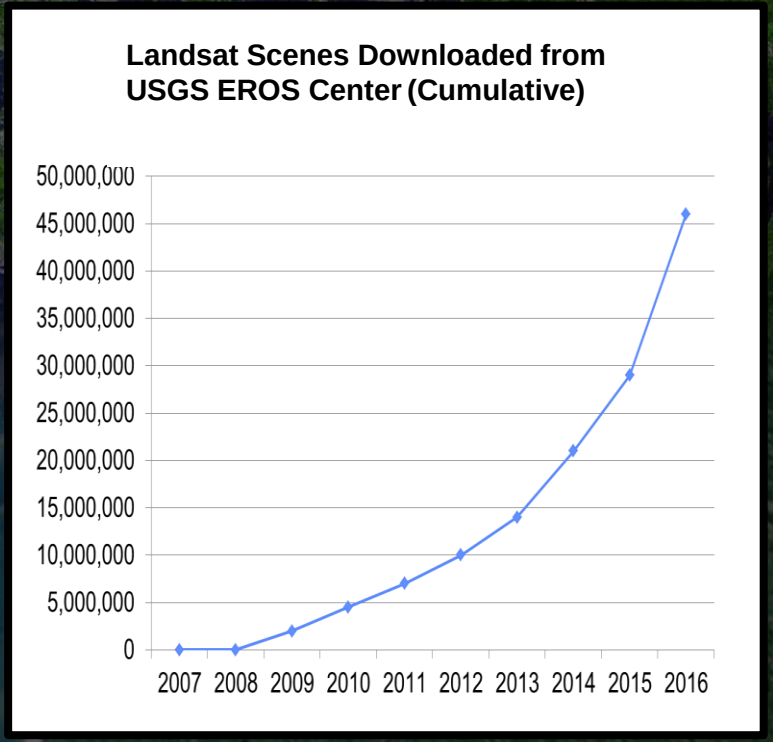


Includes only downloads from the USGS EROS. (Google Earth delivers approximately 1 billion Landsat scenes to users per month.)

Landsat series of Earth-observing satellites has created the longest, most comprehensive record of the Earth's condition ever assembled – the gold standard for tracking elements of land surface change.

With Landsats 7 and 8 currently operational - data collection anywhere on Earth every 8 days

More than 2 million images in the archive

Free and available to all users since 2008

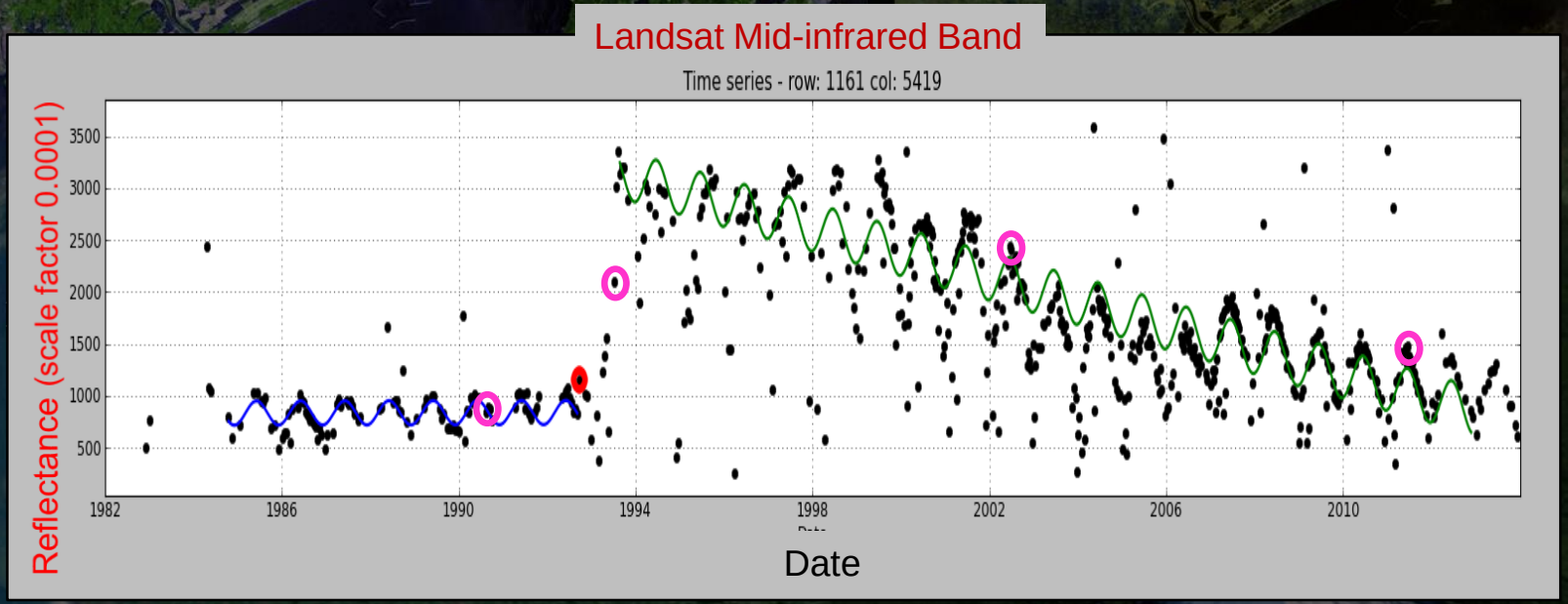
Landsat is a Public/Private Endeavor

Every Landsat mission has components built by the private sector. USGS ground system and flight ops teams rely heavily on the private sector.

USGS

NASA

After 47 years of Landsat data collection, USGS is enabling user access to "**A**nalysis **R**eady **D**ata" and a new generation of time series algorithms for land cover and land change datasets.



L4-L8 Tier 1 data processed to surface reflectance and brightness temperature measurements, (Level-2 products).

Makes the archive more accessible, easier to analyze and reduces amount of time users spend on analysis of landscape change.

Allows pixel tracking in geospatially calibrated tiles and dense temporal stacks, "datacubes".

USGS

NASA

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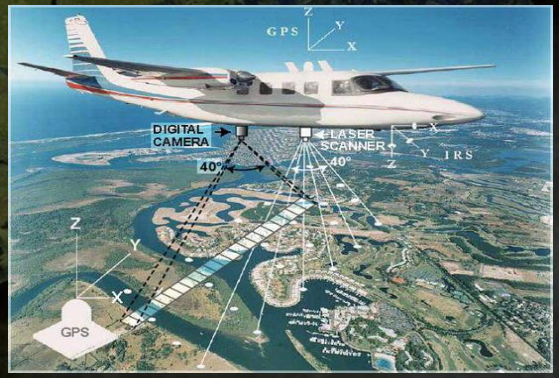
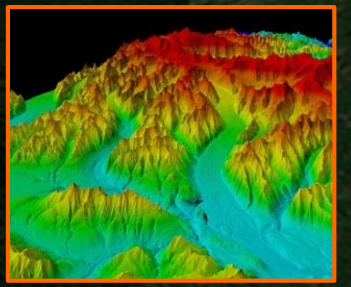
3D Elevation Program (3DEP)

Goals: complete acquisition of national lidar coverage with IfSAR in Alaska in 8 years, apply lidar technology to map bare earth and 3D data of natural and constructed features.



3DEP is a public private partnership:

- ROI 5:1, conservative benefits of $690 million/year, potential to generate $13 billion/year
- Leverage the capability and capacity of private industry mapping firms; achieves a 25% cost efficiency gain by collecting data in larger projects
- Vendors provide technology and methodologies that result in accurate and consistent data across unique and varied data collection projects
- 3DEP is working through the private sector mapping firms to investigate new technologies that have the potential to further reduce costs and increase data quality



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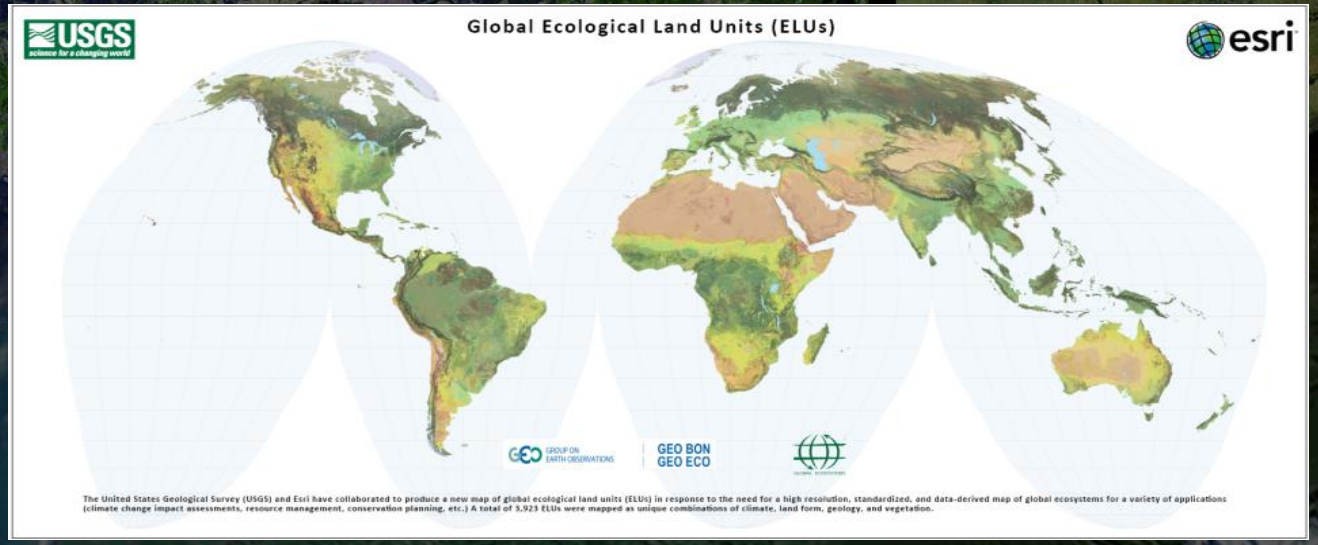
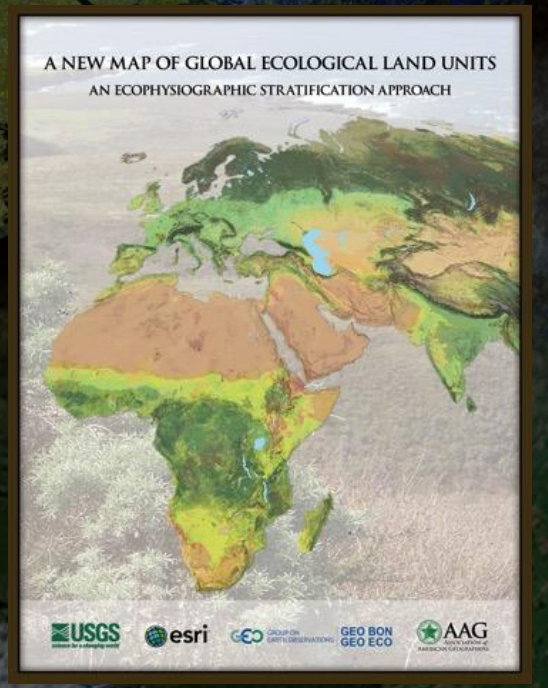
Global Ecoystem Mapping





Public Private Partnership integrating bioclimate, lithology, land cover, and landform type to map 3,923 ELUs globally. Esri web application; 250 m resolution. Mapping of global Marine Ecological Units recently completed.

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Advancing from data acquisition and distribution to analytics, integration, and decision support:

EO Example: SDG 2 – Zero Hunger

2.c	Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility.

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Famine Early Warning Systems Network

An activity of the USAID Office of Food for Peace

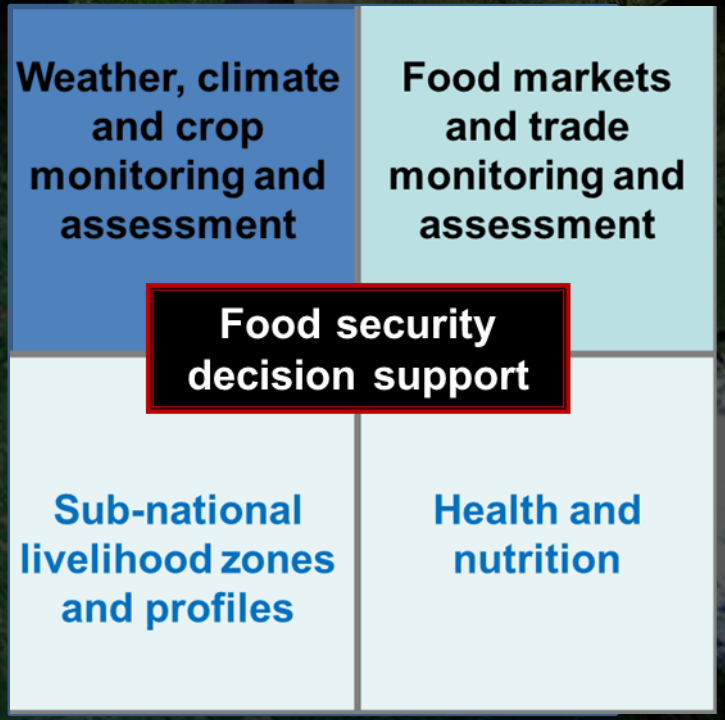
involving USGS, NOAA, NASA and USDA

- In 1986, after disastrous famines in Africa, USAID called on USGS for assistance with satellite remote sensing of drought impacts
- First monitoring of the African Sahel with vegetation index images began in 1987
- FEWS NET has matured over the past 3 decades and EO is just part of the current program

USGS

FEWS NET

Dimensions of Food Security Analysis



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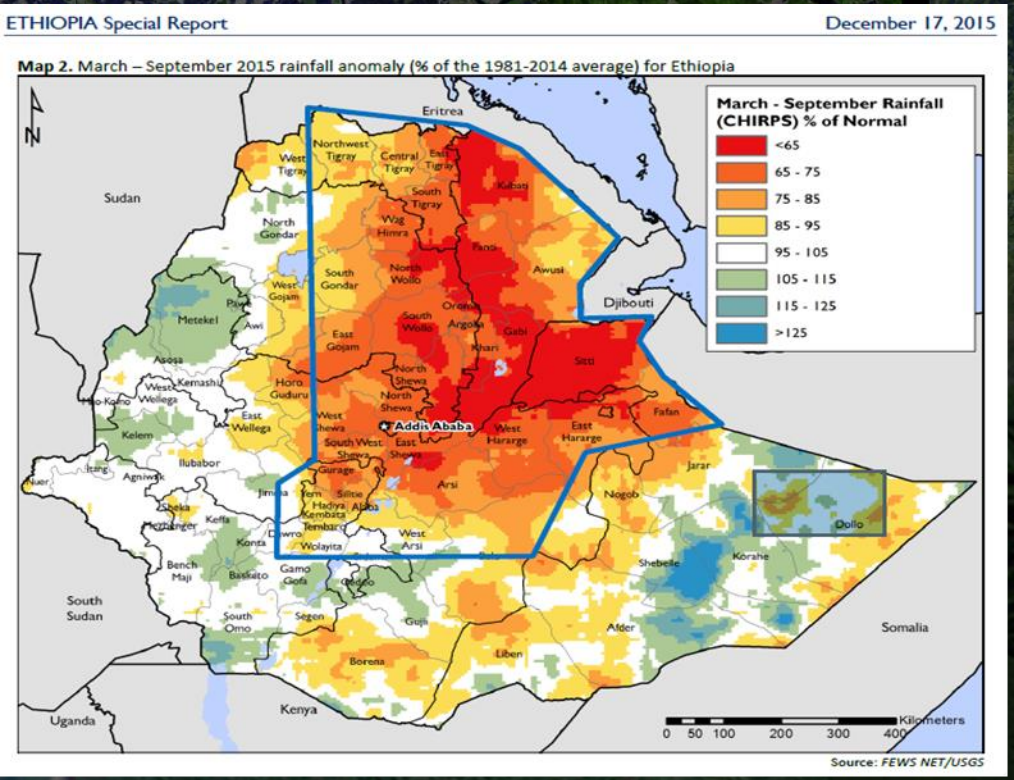
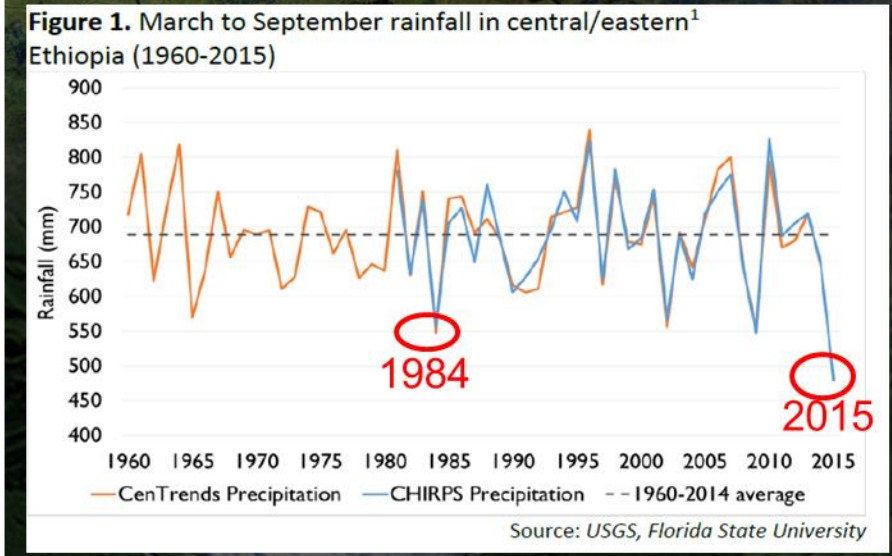


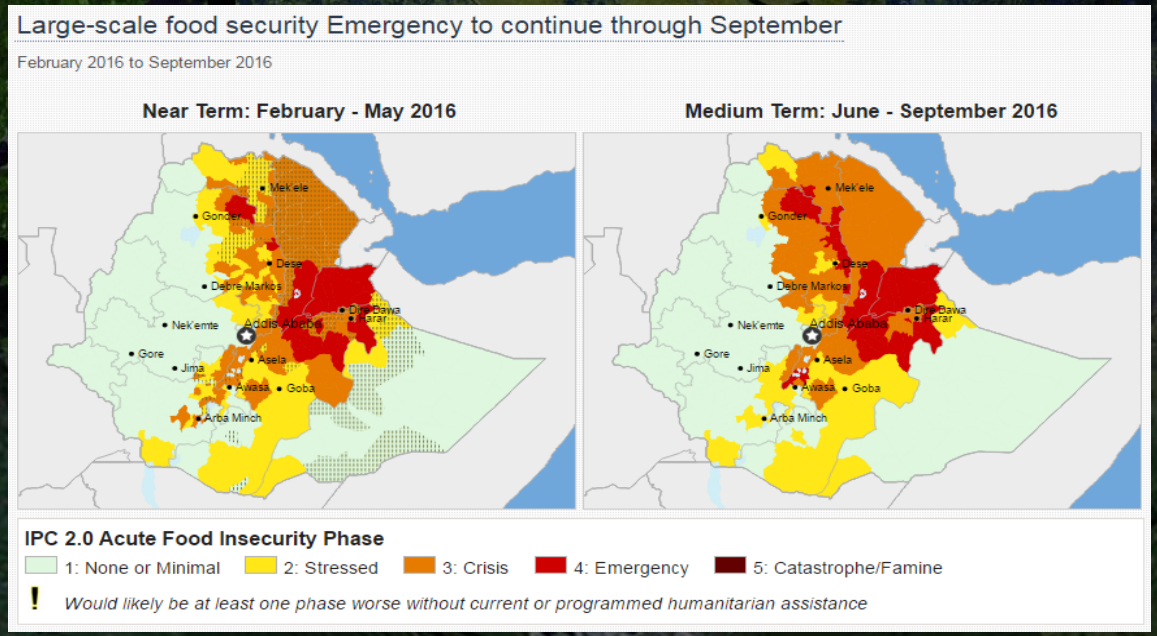


Ethiopia experienced severe drought, associated with El Nino, during the main growing season of 2015. Extensive areas in the north central region saw less than 65% of normal rainfall.

USGS

Integrated Phase Classification (IPC) of the situation in Ethiopia.

Satellite remote sensing, climate forecasting, and land surface modeling capabilities provided the agro-climatic evidence needed by FEWS NET food security analysts to project livelihood impacts many months in advance.



December 11, 2015, Government of Ethiopia issued a worldwide appeal for over $1.4 billion in emergency needs to reach over 10 million people. Though the 2015 Ethiopian drought was more severe than in 1984, a hunger crisis was averted.

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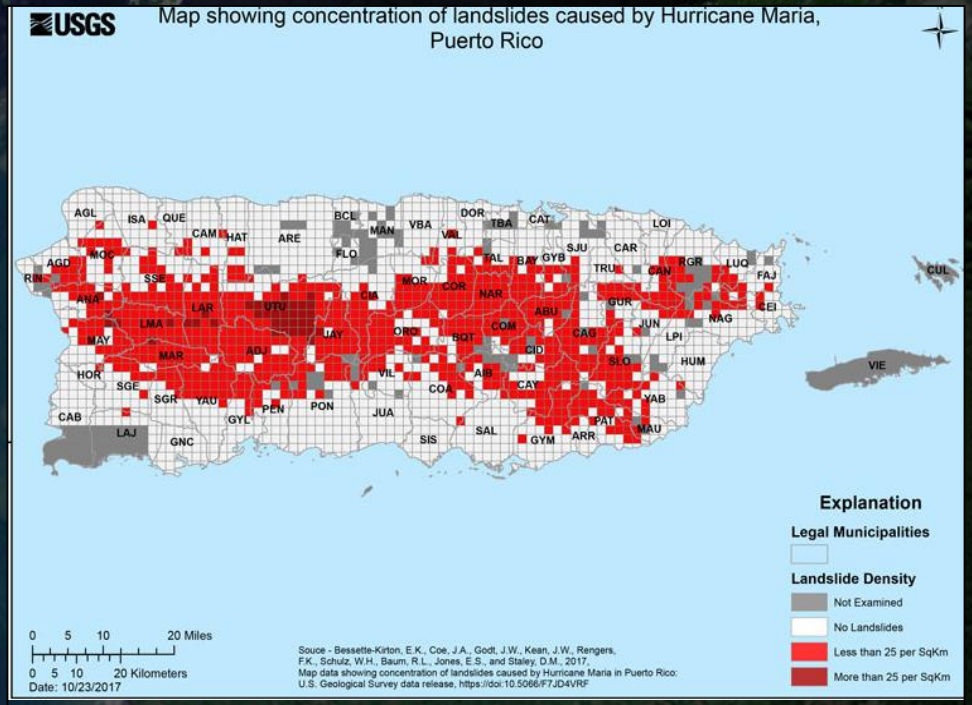
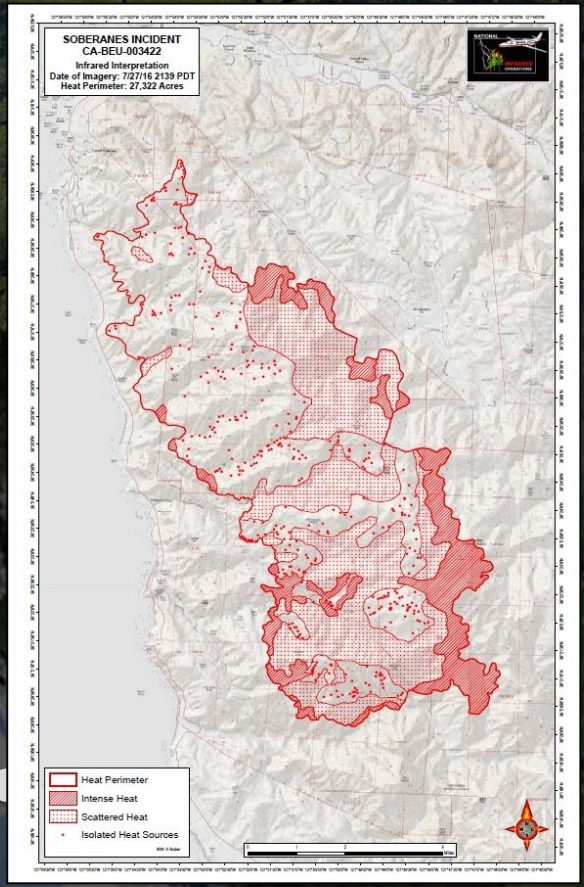
Geospatial data plays an essential role in reducing the risk of disasters associated with hazards such as earthquakes, volcanic eruptions, landslides, wildfires, floods, coastal storms, and tsunamis.

Situational awareness in disaster response





Fire perimeter map used by the National Interagency Fire Center for incident command, daily planning, and dispatch.

Science Applications for Risk Reduction (SAFRR)

Tsunami hazard assessments and evacuation maps for 73 US Pacific Coast communities; integrating land use, population and elevation data in a geospatial format.

USGS Pedestrian Evacuation Analysis Tool Training

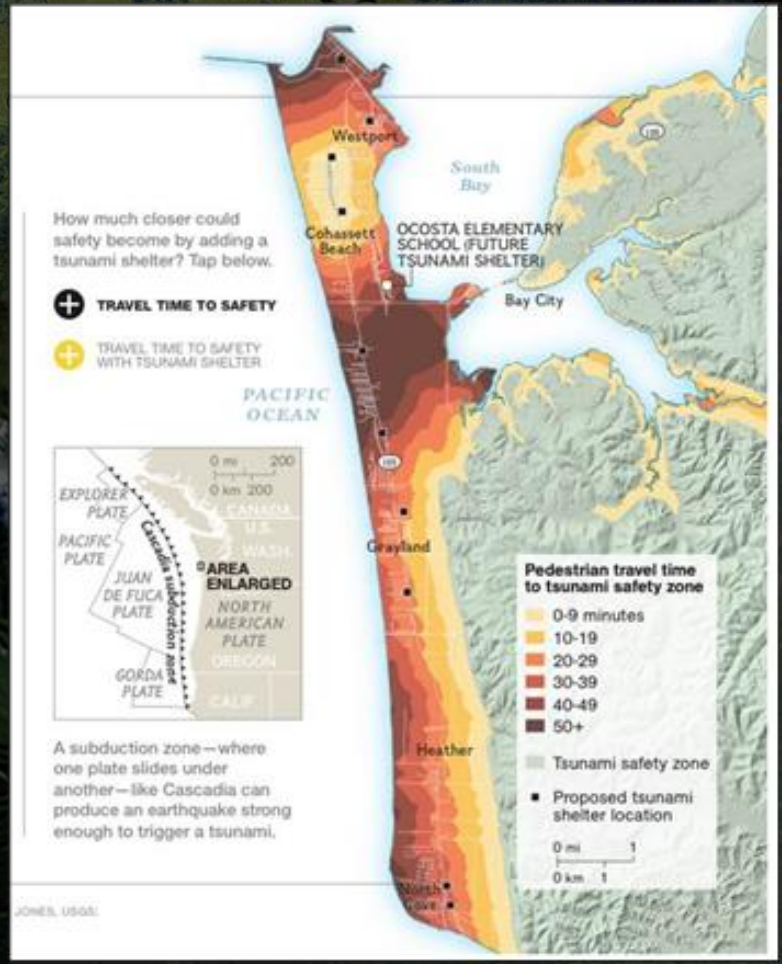
Monday July 27, 2015 10am – 4pm
San Francisco State University
Main Campus, HSS Building, Room 290
1600 Holloway Avenue, San Francisco, CA 94132.

Email us to reserve one of the 24 spots available!

Kevin Miller: kevin.miller@caloes.ca.gov
Jeanne Jones: jmjones@usgs.gov
Jeff Peters: jpeters@usgs.gov
Mathew Schmidtlein: schmidtlein@csus.edu

USGS science for a changing world

Cal OES GOVERNOR'S OFFICE OF EMERGENCY SERVICES



Evacuation model of a portion of Washington State's coast.

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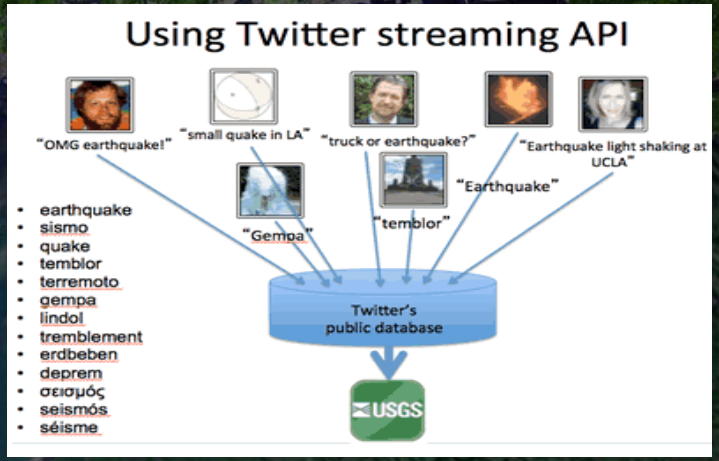
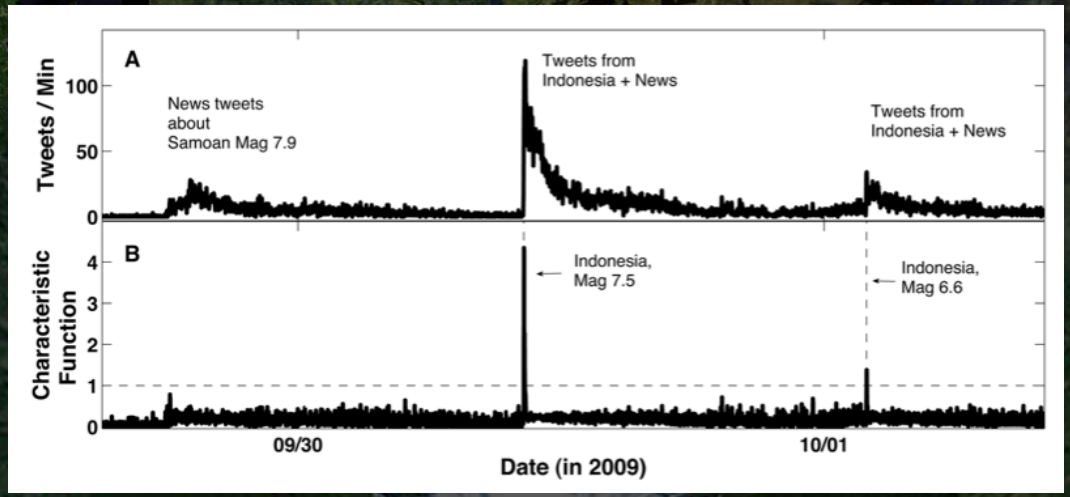
Crowd Sourcing and Citizen Science:
Earthquake Early Warning





TED detects two to three earthquakes a day, on average. Especially in regions with few seismometers, TED reports often come in before traditional seismic networks detect an earthquake, giving seismologists early warning. TED sometimes detects earthquakes entirely missed by USGS's automatic processing system. In addition, the tweet text and attached images sometimes offer a rapid qualitative assessment of an earthquake's impact.

USGS

Tweet Earthquake Dispatch complements Did You Feel It?

US National Map Corps

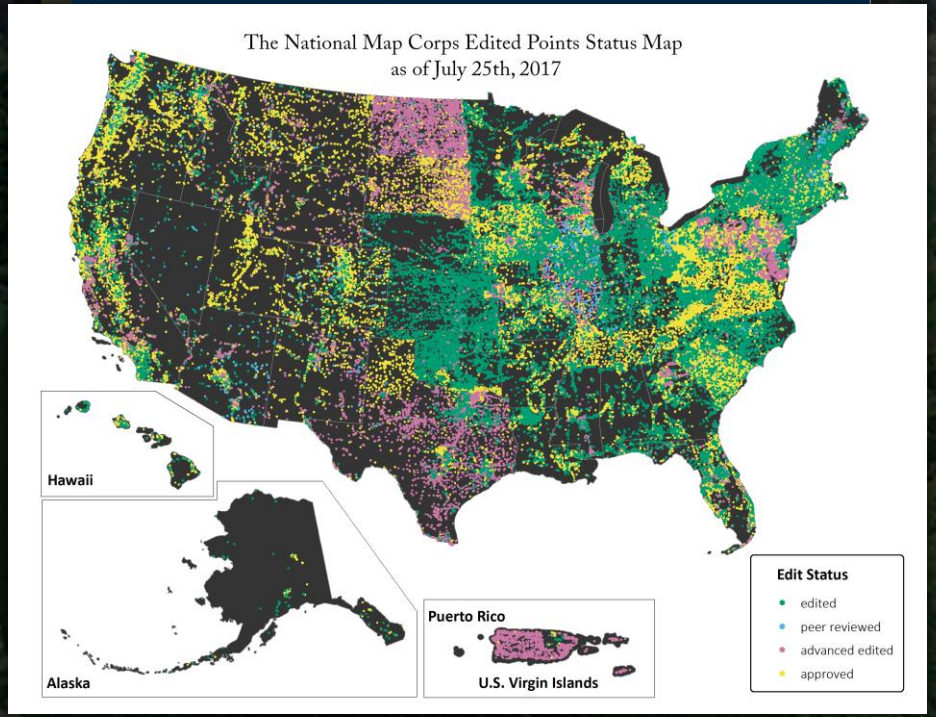
Using an online web mapping application, volunteers update structures in all 50 states, Puerto Rico, & US Virgin Islands in support of The National Map & US Topo Maps

Participants – 725 active volunteers

Process - Verify, update, add or delete points

Required: Check location and Name

Optional: Address, City, Zip



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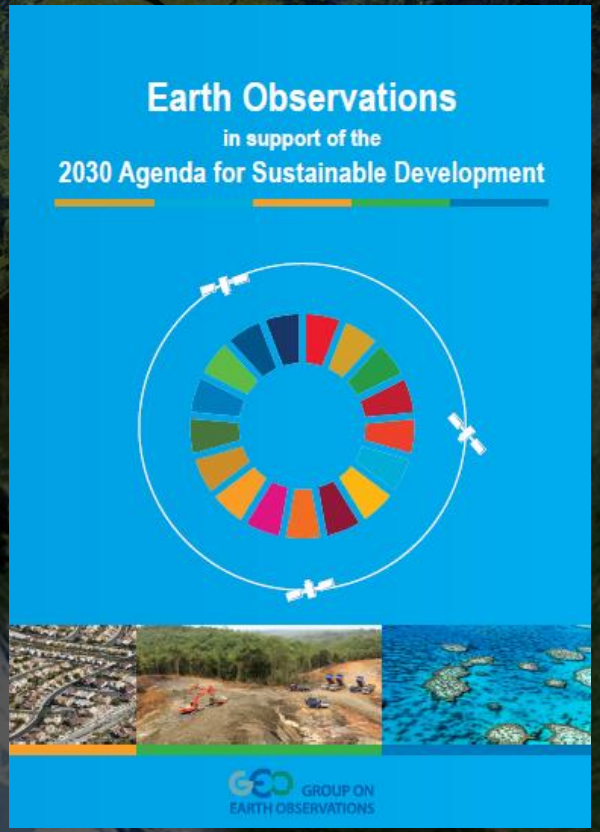
GEO and the SDGs

Priority Engagement Area

GEO is instrumental in integrating Earth observation data into the methodology of measuring, monitoring and achieving the SDG indicators

Brochure gives many more illustrations of EO data allowing decision-makers to help identify the status of conditions they need to report, as well as visualize solutions.

https://www.earthobservations.org/documents/publications/201703_geo_eo_for_2030_agenda.pdf



EO Case Studies

USGS

GEO Initiative: Earth Observations for the Sustainable Development Goals (EO4SDG)

EO4SDG Initiative goals:

GOAL I: Demonstrate how EO and geospatial information, with socio-economic and other data contribute in novel and practical ways to support achievement of the SDGs.

GOAL II: Increase skills and capabilities in use of EO for SDG activities and their broader benefits.

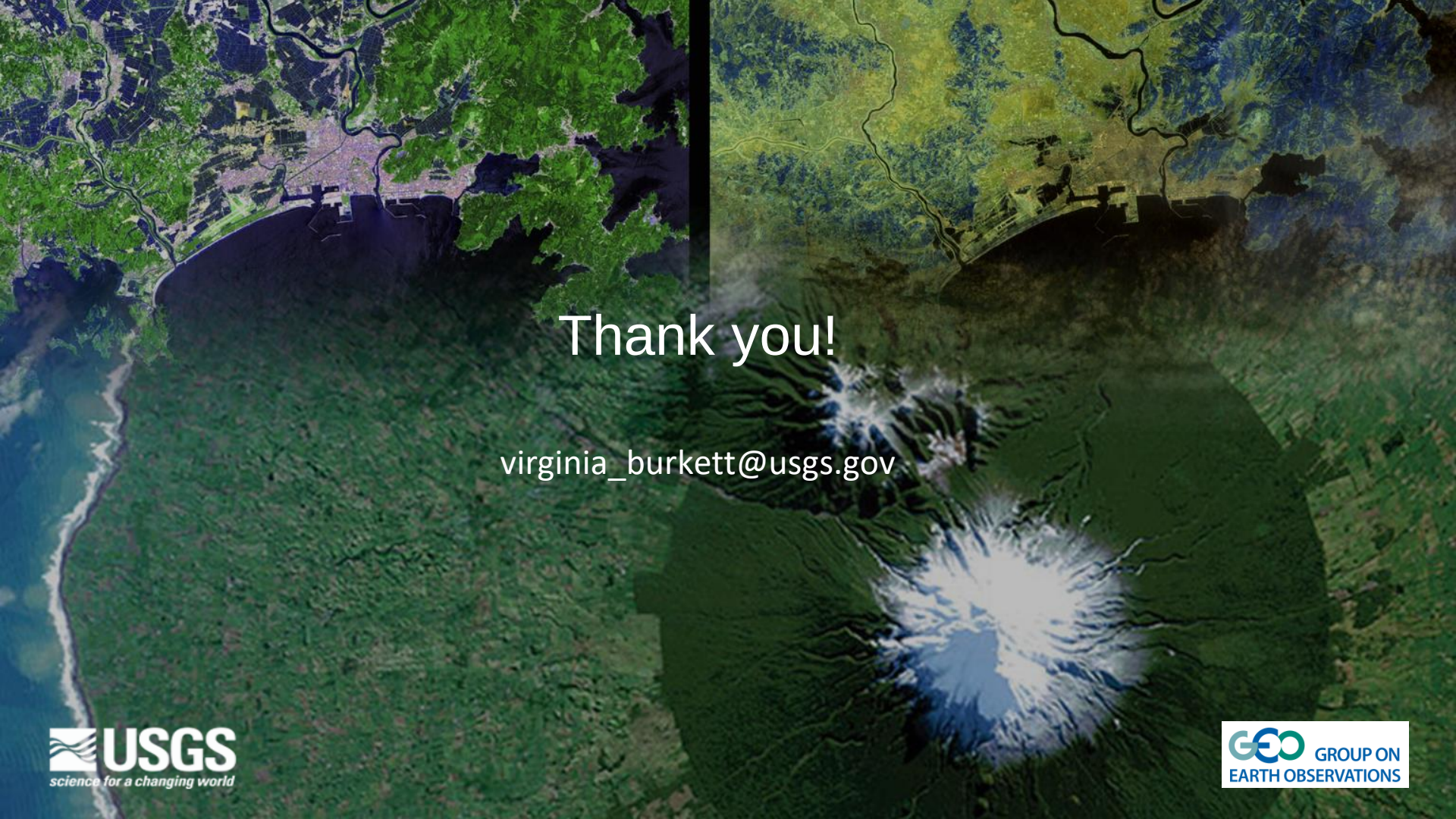
GOAL III: Broaden interest and awareness of EO support to the SDGs and contribution to social, environmental, and economic benefits.

EARTH OBSERVATIONS FOR THE SUSTAINABLE DEVELOPMENT GOALS

www.eo4sdg.org

@EO4SDG

GEO GROUP ON EARTH OBSERVATIONS


Thank you!
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