

Earth Observation Solutions for the Sustainable Development Goals



Earth Observations for Sustainable Development Goals (EO4SDG)
Annual Meeting 2019 — Open Session
9th Session of UN-GGIM

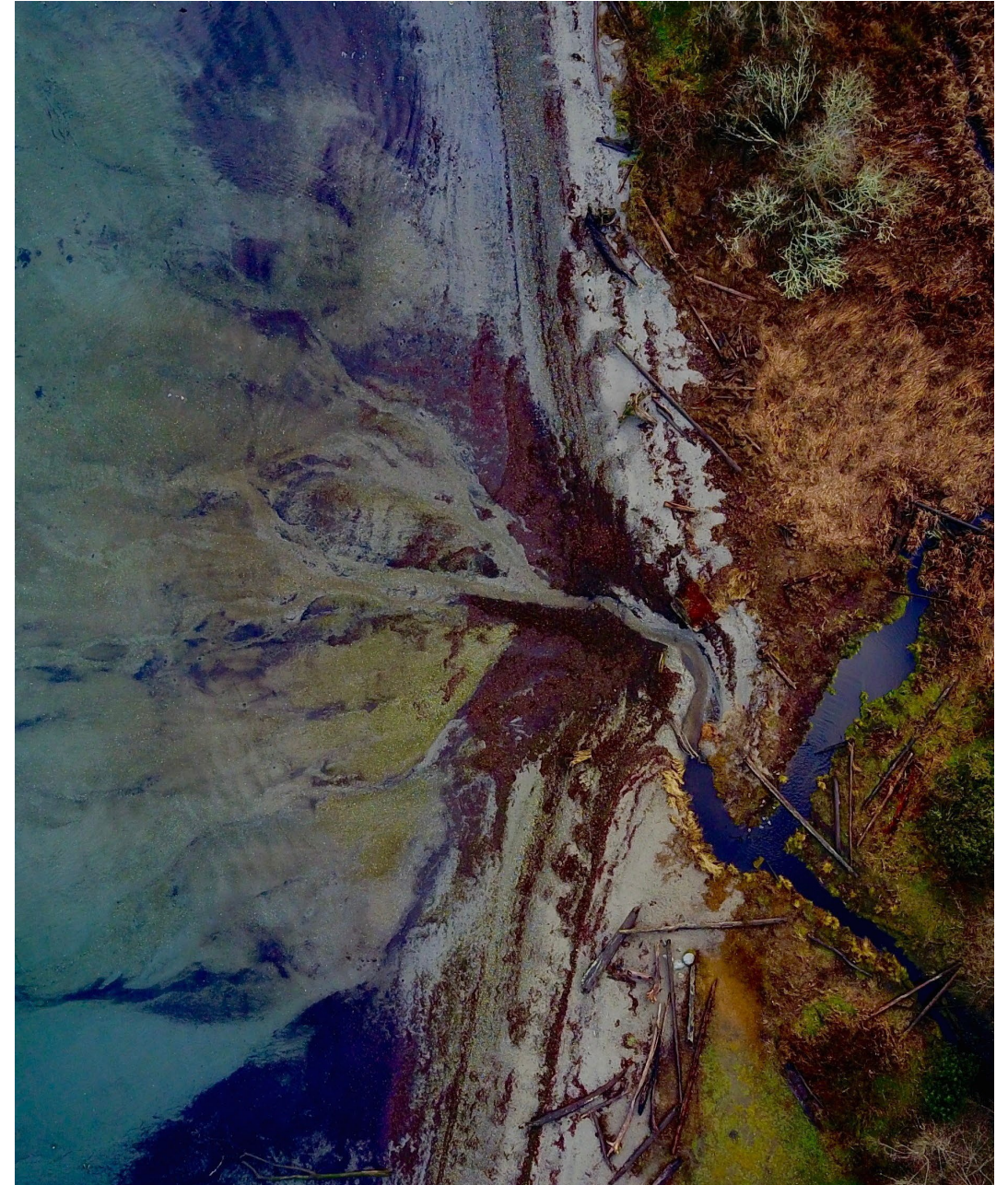
<http://eo4sdg.org>
@EO4SDG

5 August 2019 / New York, U.S.A.

Evidence Informed Policy: EO4SDG

EO4SDG Annual Meeting, 5 August 2019

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Summary and recommendations

What?

Support greater links with UN-GGIM, notably via fundamental data themes and UNSN;
Support greater connections of SDG activities across the GEO Work Programme; and
Support the international community to find missing data and provide more timely data.

How?

Share scientific papers, methods, algorithms and data to develop long-term capacity;
Work more closely with regional GEOs and align with regional UN-GGIM activities; and
Increase awareness, understanding and use of EO to inform the SDGs at a policy level:
consider developing an SDG MOOC (massive open online course) to build on the
successful webinars, as well as contributions to GEO Report on Progress 2015-2019.

GEO Vision and Mission

GEO Vision

To realize a future where decisions and actions, for the benefit of humankind, are informed by coordinated, comprehensive and sustained Earth observation information and services.

GEO Mission

GEO's mission is to connect the demand for sound and timely environmental information with the supply of data and information about the Earth. Advocacy for broad, open data policies helps ensure that the data collected through national, regional and global observing systems is both made available and applied to decision making for global priorities.

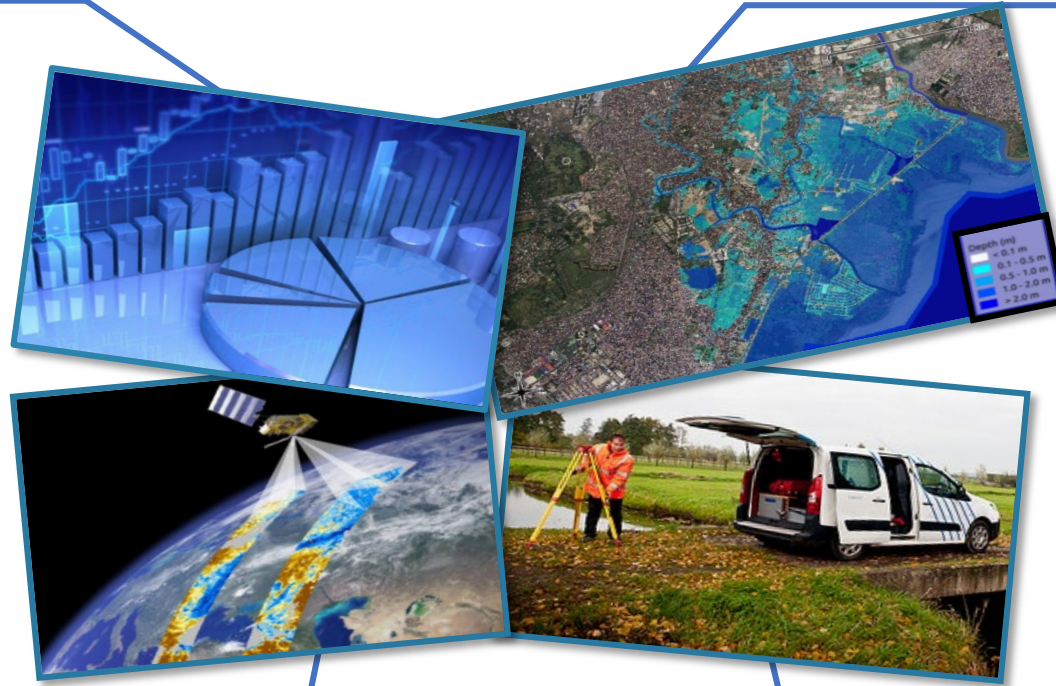
GEO Value

GEO is a **partnership convening** 105 national governments, 130+ partners comprised of international bodies with a mandate in and/or use of Earth observations. There are also international NGOs and the commercial sector contributing. Together, the **GEO community is creating** a Global Earth Observation System of Systems (GEOSS) to better integrate observing systems and share data by connecting existing infrastructures using common standards.

2030 Agenda: Integration of Information Systems

Statistics

Geospatial



Earth observations

Other data



UN-GGIM

United Nations Secretariat
Global Geospatial Information Management

ggim.un.org

GEO activities at a glance

- GEO members, partners & associates
- Regional GEOs

Core (GEO)

Operational



Group on Earth Observations (GEO)

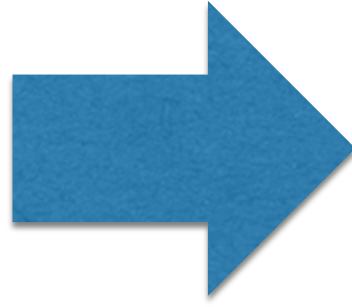
The GEO Work Programme is the primary instrument to plan and implement GEO activities. The work programme for 2020-2022 is now under review.

http://earthobservations.org/gwp2020_dev.php

Implementation Plans submitted for scores of international activities, including EO4SDG and a number of these activities include the private sector, ranging from Brockman Consulting to Esri to Zurich Insurance.



Results-oriented GEOSS



The first decade

Focus on provision of open data [ongoing challenge].

The future

Focus on results based on open science, notably reproducibility.

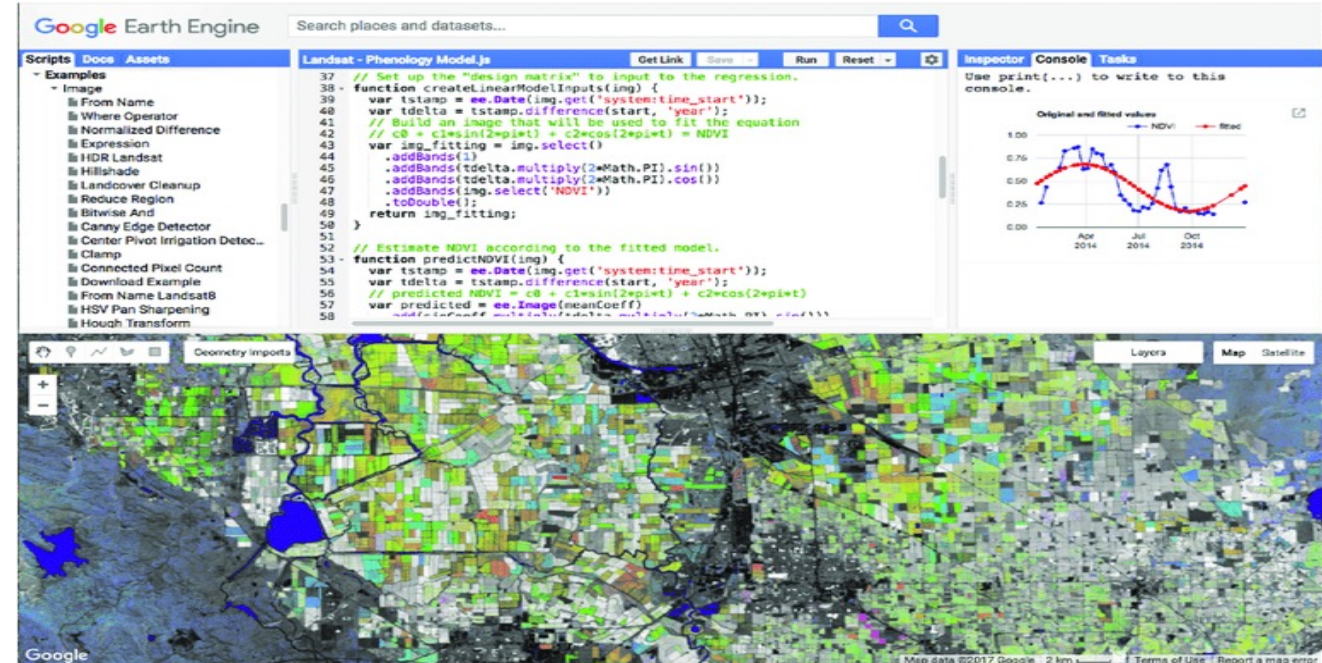
Results-oriented GEOSS

The driver for change

Easy access to the products and services developed in GEO.

Access to methods, code, models, source data, scientific papers, etc.

Enable others to reuse the results in their country, based on local circumstances.



Create a broad global network of EO practitioners who control of the tools they use, they are not just consumers of information.

Results-oriented GEOSS

(a) Journal paper

ISPRS Journal of Photogrammetry and Remote Sensing

journal homepage: www.elsevier.com/locate/isprsjprs

Big earth observation time series analysis for monitoring Brazilian agriculture

Michelle Cristina Araujo Picoli^{a,*}, Gilberto Camara^a, Ieda Sanches^a, Rolf Simões^a, Alexandre Carvalho^b, Adeline Maciel^a, Alexandre Coutinho^c, Julio Esquerdo^c, João Antunes^c, Rodrigo Anzolin Begotti^d, Damien Arvor^d, Claudio Almeida^a

^a National Institute for Space Research (INPE), São José dos Campos, Brazil
^b Institute of Applied Economic Research (IPEA), Brasília, Brazil
^c Brazilian Agricultural Research Corporation (Embrapa), Campinas, Brazil
^d Université de Rennes, CNRS, L2FV - UMR 6104, F-35000 Rennes, France

(b) In-situ data

PANGAEA
Data Publisher for Earth & Environmental Science

Câmara, Gilberto; Picoli, Michelle; Simoes, Rolf; Maciel, Adeline; Carvalho, Alexandre X Y; Coutinho, Alexandre; Esquerdo, Julio; Antunes, Joao; Begotti, Rodrigo; Arvor, Damien (2017): Land cover change maps for Mato Grosso State in Brazil: 2001-2016, links to files. PANGAEA, <https://doi.org/10.1594/PANGAEA.881291>,
Supplement to: Picoli, Michelle; Câmara, Gilberto; Sanches, Ieda; Simoes, Rolf; Carvalho, Alexandre X Y; Maciel, Adeline; Coutinho, Alexandre; Esquerdo, Julio; Antunes, Joao; Begotti, Rodrigo; Arvor, Damien; Almeida, Claudio (2018): Big earth observation time series analysis for monitoring Brazilian agriculture. ISPRS Journal of Photogrammetry and Remote Sensing, 145, 328-339, <https://doi.org/10.1016/j.isprsjprs.2018.08.007>

(c) R code in github

Branch: master | [sits / demo / classify_deeplearning.R](#)

pedro-andrade-lins Close #87: Making sits_select_bands() simpler. sits_select_bands() w...

2 contributors

56 lines (41 sloc) | 2.38 KB

```
1 library(sits)
2 library(keras)
3 # install_keras()
4
5 message("Processing of a mixed landsat # - MODIS data set")
6 message("Please ensure that you have enough memory available")
```

(d) Cloud data in AWS

Amazon S3 > landsat-modis

Overview | Properties | Permissions | Management

Q Type a prefix and press Enter to search. Press ESC to clear

Upload Create folder Download Actions

| Name | Size | Last modified | Size |
|----------------------------------|------|---------------------------------|--------|
| LC8MOD_222068_2015-08-29_av1.tif | | Apr 8, 2018 1:40:48 PM GMT+0200 | 2.3 GB |
| LC8MOD_222068_2015-08-29_av1.tif | | Apr 8, 2018 1:49:12 PM GMT+0200 | 2.4 GB |
| LC8MOD_222068_2015-08-29_av1.tif | | Apr 8, 2018 1:56:01 PM GMT+0200 | 2.1 GB |

(e) Results

Strengthening Institutions

Trust is the key!

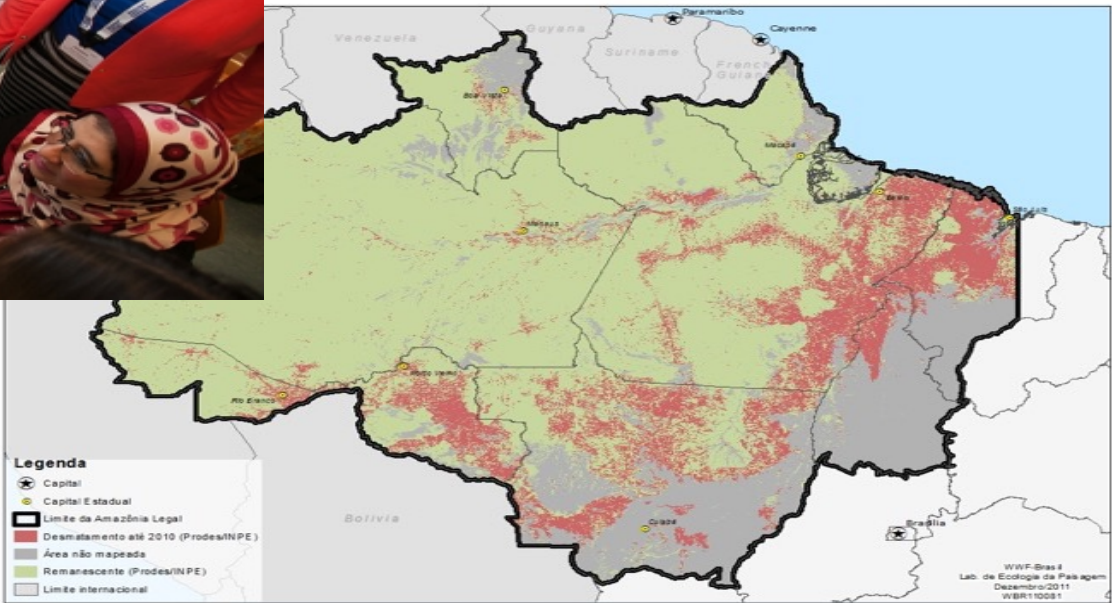
Robust
reliable results

and

EO data

Co-design
co-production

and





GEO Engagement Priorities

Focus areas are the UN 2030 Agenda for Sustainable Development, the Paris Agreement on Climate and the Sendai Framework for Disaster Risk Reduction.

UN-Habitat recently invited the GEO Secretariat to support ongoing efforts around Sustainable Development Goal 11 and the **New Urban Agenda** through the GEO Work Programme.



EO4SDG key results achieved in 2017-2019

EO in SDG Methodologies

- SDG indicators 6.6.1, 6.3.2, 11.3.1, 11.7.1, 15.3.1
- Feasibility studies, pilot projects, in-depth endeavors
- Focus on scalability & replicability of methods

Capacity Development

- In-person training: UN-GGIM 8, RCMRD Intern. Conf. 2018, AMERIGEO 2019
- Webinars (SDG awareness; thematic webinars)
- Contribution to UN-Habitat, UNEP and UNCCD

Stakeholder Engagement

- UN IAEG-SDG WGGI, UN-GGIM, UN Custodian Agencies
- Line ministries, NSOs, Mapping Agencies, GEO Community

Data & Information Products

- Survey to GEO Member Countries on EO data use with SDG
- Satellite data requirements, data acquisition, access, discovery and usability (with CEOS, GEOGLAM)

GEO Report, 'Earth Observations and Sustainable Development Goals'



EO4SDG website: <http://eo4sdg.org>



SDG 6.6.1 Technical Brief,
<http://eo4sdg.org>



SDG 11.3.1 Retrieved from: Training Module by UN-Habitat



CEOS EO Handbook on SDGs,
<http://eohandbook.com>



EO4SDG Session: 2018 UN World Data Forum



EO4SDG Side Event – GEO Week 2018



Associates Category

GEO Associates means commercial and non-governmental, not-for-profit and civil society organizations can join national governments and international organizations as official GEO collaborators with no fees involved.

GEO Associates enable the application and use of GEO's global solutions at regional and local scales. GEO Associates must be registered in the territory of a GEO member country, it's the lead national government agency (GEO Principal) that reviews and approves Associates.





AfriGEO – value provided

- Framework for strengthening partnerships within Africa : AfriGEO foster intra-continental partnership and connects Africa to international partners and programmes;
- Coordination framework and platform for Africa's participation in GEO: understanding who is doing what where? Identifying capabilities, synergies and linkages and reducing duplication;
- “Co-design enabler”: gathering user requirements, translating policy needs to observations requirements by scientific community to satellite specifications; and establishing communities of practice;
- Pan African initiative to raise awareness on EO : raising awareness on the value of EO, availability of resources and tools to the EO community and engaging with policy makers;
- Infrastructure: AfriGEO is working on a coordinated EO data acquisition strategy for Africa Gateway into Africa for international partners; and
- Centralized capacity building to guide implementation and adoption of Earth observation to address key societal benefit areas (SBAs).





1

The AmeriGEOSS Platform is a regional community resource to *promote collaboration and coordination* among the GEO members of the American continent.

2

Data

Tools

Products

Services

Resources

Share, find, discover, learn and participate

Capacity Building

Address User Needs

Actionable Data & Information



AmeriGEO



Together, the Americas are advancing use of Earth Observations
Social, Economic, Environmental and other data, tools and services

GEO GROUP ON

Amerigeoss.org

3

Communities



Agriculture



Biodiversity & Ecosystems



Disasters



Water



AOGEO – regional tasks

AOGEO Symposium

Integrated Priority Studies

Integrated Priority Studies 1: Mekong River Basin

Integrated Priority Studies 2: Small Island States

Integrated Priority Studies 3: Himalayan Mountains

Applications and services

| Task1. | Task2. | Task3. | Task4. | Task5. | Task6. | Task7. | Task8. | Task9. |
|------------------------------|---|---------------------------|----------------------------|-------------------------------|-----------------------------------|---|---------------------|-----------------|
| Asian Water Cycle Initiative | Asia-Pacific Biodiversity Observation Network | Carbon and GHG Initiative | Oceans, Coasts and Islands | Agriculture and Food Security | Drought monitoring and evaluation | Environmental Monitoring and Protection | Disaster Resilience | Himalayan GEOSS |

Foundational tasks

Task 10. Data Sharing

Task 11. Data Hubs and Cubes

Task 12. Users Engagement and Communication

AOGEO Workshop

EuroGEO – value provided

- Delivering an integrated European contribution to GEOSS and increasing GEOSS benefits for Europe;
- Acting as an incubator in cooperation with Copernicus/European countries/organisations to produce & test EO services and applications
- Delivering specific EO applications benefiting from integrating global datasets made available through GEOSS;
- Promoting, scaling up and developing EO applications in association with users;
- Building on Copernicus Data & Information Access Services (DIAS) + Horizon 2020 resources; and
- Compliance with GEO engagement strategy: **supporting the implementation of UN 2030 Agenda for Sustainable Development.**



GEO-AMAZON WEB SERVICES – EARTH OBSERVATION CLOUD CREDITS PROGRAMME

GEO and AWS have awarded \$1.5 million in grants, cloud services and technical support for projects in developing countries to use Earth observations to support sustainable environmental development based on GEO priorities.

DevelopmentSeed and Sinergise have both supported this programme from a European and North American perspective.

21 projects announced in 17 developing countries.

<http://www.earthobservations.org/article.php?id=362>



| | | |
|--|--|------------|
| Brazilian Earth Observation Data Cube using AWS for Land Use and Cover Change | National Institute for Space Research (INPE) | Brazil |
| Fire Monitoring Service | Tsinghua University/China | China |
| A Global Modeling Tool for Nature’s Contributions to People in Sustainable Development | Ministry of Environment and Energy | Costa Rica |
| Filtered Alert Hub Toolset | Cairo University, Electronics and Electrical Communications Engineering Department | Egypt |
| Computing Groundwater Potential in Arid and Semi-arid parts of Ethiopia. | Ministry of Water, Irrigation and Energy | Ethiopia |
| Capacity Building on Monitoring of SDGs | Remote Sensing and Climate Center Ghana Space Science and Technology Institute | Ghana |
| Integrating Earth Observation Data with Censuses and Sample Surveys to Estimate Development Indicators for India | Indian Institute for Human Settlements | India |
| AWS4AgriSAR-Crop inventory mapping from SAR data on cloud computing platform | Centre of Studies in Resources Engineering (CSRE) Indian Institute of Technology Bombay | India |
| Global Mobile Tsunami Warning System using Amazon Web Sever—A Life-Saving Platform | Ikatan Ahli Tsunami Indonesia, Tsunami Research Foundation | Indonesia |
| agriBORA - Geodata for actionable farm intelligence | Kenya Agricultural and Livestock Research Organization (KALRO) | Kenya |

| | | |
|---|--|-----------------|
| EO For Sustainable Development | National Institute of Statistics and Geography (INEGI, Mexico) | Mexico/Colombia |
| South Asian drought monitoring and outlook system to support agricultural advisory processes | ICIMOD | Nepal |
| Operational monitoring system of ground deformations in Nigeria | Department of Geoinformatics and Surveying, University of Nigeria | Nigeria |
| Spatial Agricultural Intelligence | African Regional Institute for Geospatial Information Science and Technology (AFRIGIST) | Nigeria |
| Implementation of a service of information to monitor the degradation of Zones Marino Coastal | Ministry of Environment / Direction of Monitory and Evaluation of the Natural Resources of the Territory. | Peru |
| Automation of processes in the cloud, for the generation of mosaics of annual satellite images free of clouds, to contribute in the generation of information on changes in forest cover. | National Program for the Conservation of Forests for the Mitigation of Climate Change of the Ministry of the Environment of Peru | Peru |
| Air Quality Forecasting for Africa | Kigali Collaborative Research Center (KCRC) | Rwanda |
| AfriCultuReS Decision Support System (ADSS) Community Version | South African National Space Agency | South Africa |
| Methodology for SDGs indicators assessment | Space Research Institute NAS Ukraine and SSA Ukraine | Ukraine |
| Deep Learning for Satellite Monitoring of Illegal Amber Mining in Ukraine | Kharkiv National University | Ukraine |
| Monitoring Rice Paddy and Flood in the Lower Mekong Basin | HCMC Space Technology Application Center | Vietnam |

GEO–AWS
21 projects from
17 developing countries

Explore the latest news and
perspectives from the GEO community.
all news / observations blog

GEO and Amazon Web Services Announce Cloud Grants to Improve Understanding of Our Planet

News / 10 June 2019



Today, the Group on Earth Observations (GEO) announced the 21 projects from 17 developing countries that will be awarded \$1.5 million USD worth of cloud services, grants and technical support through the Earth Observation Cloud Credits Programme.

Under the Amazon Sustainability Data Initiative (ASDI), this programme will enable Earth observations and applications to support sustainable environmental development including the United Nations Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, and the Paris Agreement on Climate Change.

What's New



Ready for take-off:
Earth Observation
Cloud Credits
Programme
Updates



5 ways to
promote women
in STEM: Lessons



WORLD VIEW • 17 JULY 2019

Sustainable development will falter without data



Unless governments establish competent monitoring systems, the world will not reach the UN Sustainable Development Goals, says Jessica Espey.

With daily Earth observation data, governments could monitor erosion, sand mining and illegal development and then act to stabilize fragile coastlines. Interconnected administrative systems could help to give vulnerable people access to health facilities, social services and entitlements. Data systems are the mortar with which a sustainable planet and society will be built.

Landsat's Earth Observation Data Support Disease Prediction, Solutions to Pollution, and More

A Case Study of Landsat
Prepared by SDSN TReNDS

SDSNTReNDS.org/ValueOfData

Landsat has produced **annual cost savings in the United States ranging from US\$350 million to \$436 million** for federal and state governments, nongovernmental organizations, and the private sector.

Landsat has provided an **estimated worldwide economic benefit as high as \$2.19 billion** as of 2011.

[Home](#)[About](#)[Find Data](#) ▼[Compare Data](#) ▼

POPGRID Data Collaborative

- Improving accessibility and documentation of data sets and data services
- Comparing and contrasting methods and implications of different data sources
- Convening technical experts from the geospatial and demographic monitoring communities at events and conferences worldwide
- Developing an intercomparison report and tool that clarify how different data sets fit different needs for statisticians, policymakers, development practitioners, and other applied users

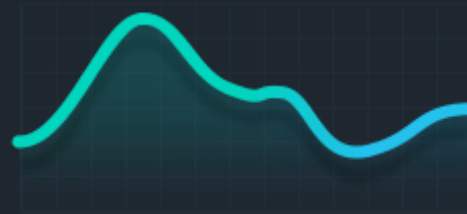


DATA4NOW

We will increase the sustainable use of robust methods and tools that improve the timeliness, coverage, and quality of SDG data through collaboration and partnership, technical and capacity support, and information sharing.



Hectares Of Forest Cover

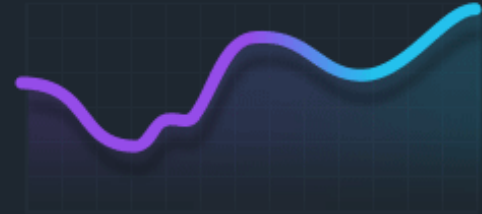


1680h

+4.33%

+269

Number Of People In Extreme Poverty



320h

-2.73%

76%

Number Of Women w/ Bank Account



Volume Of Freshwater Resources







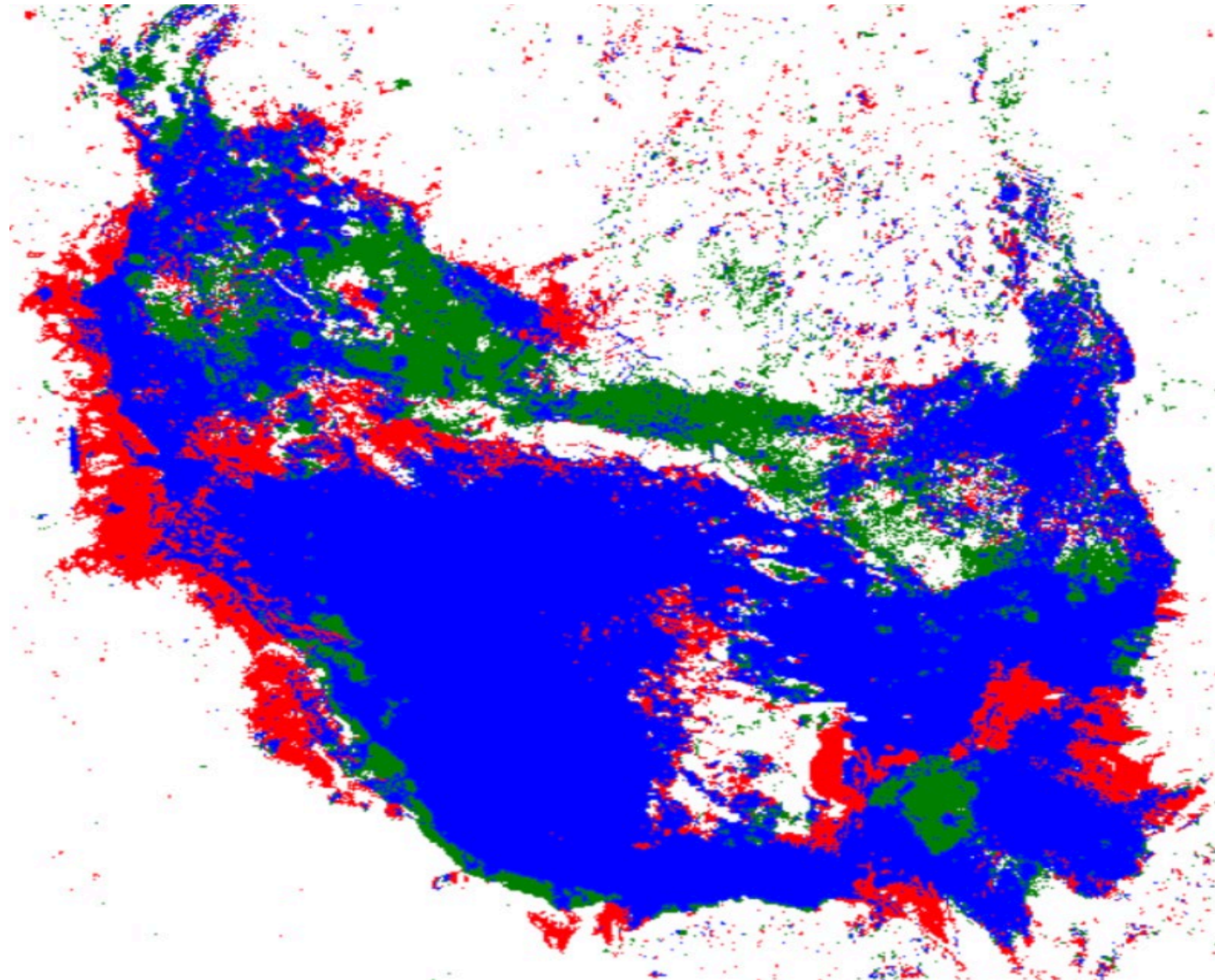
Building on the work done in the Africa Regional Data Cube by CEOS, GPSDD and others, Digital Earth Africa will provide a unique continental-scale platform that delivers analysis ready data for operational purposes.

It will track changes across Africa in unprecedented detail, and provide data on a vast number of issues, including soil and coastal erosion, forest and desert development, water quality and changes to human settlements.

Announcement in March 2019, that almost \$18m USD has been raised to support the launch of Digital Earth Africa.

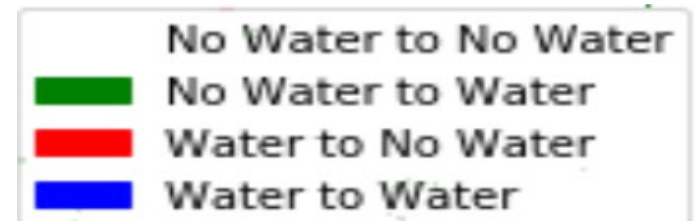


SDG 6.6.1 - Water Extent

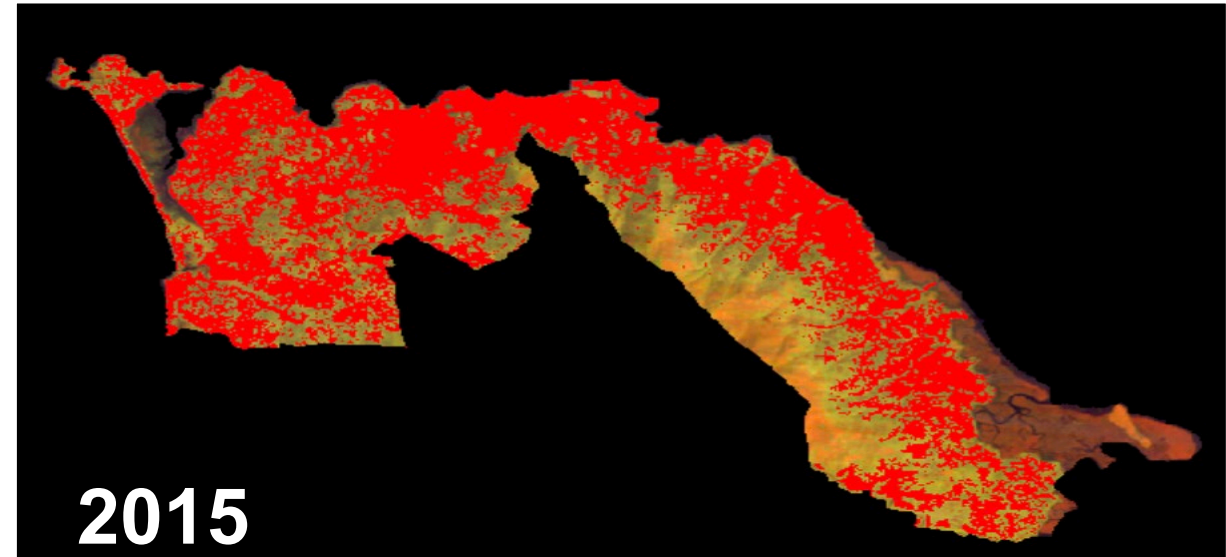
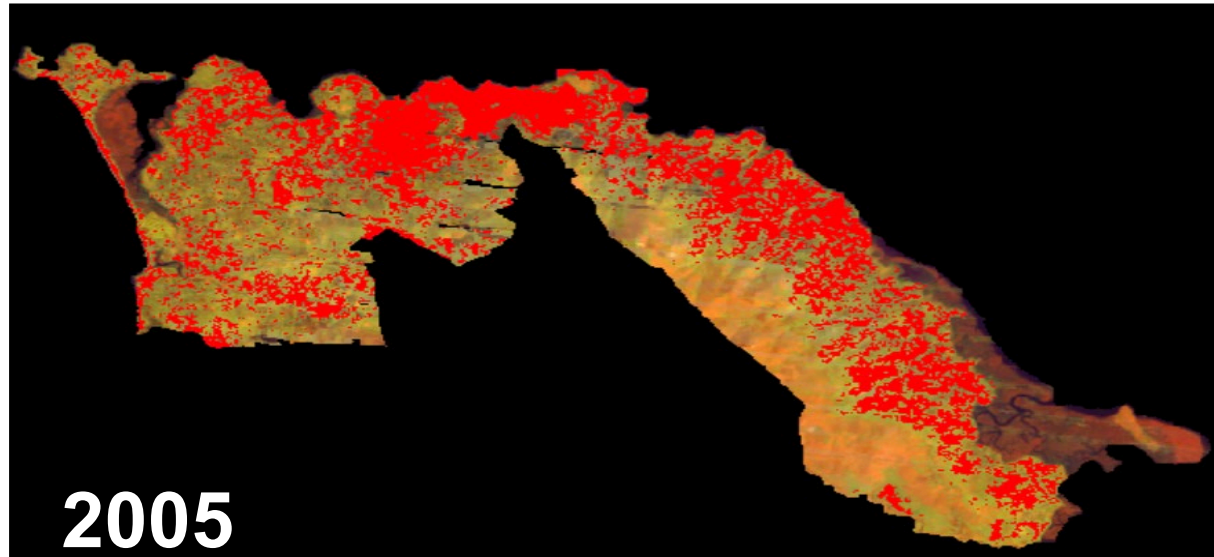


Lake Sulunga in Tanzania

net loss of 3.8%

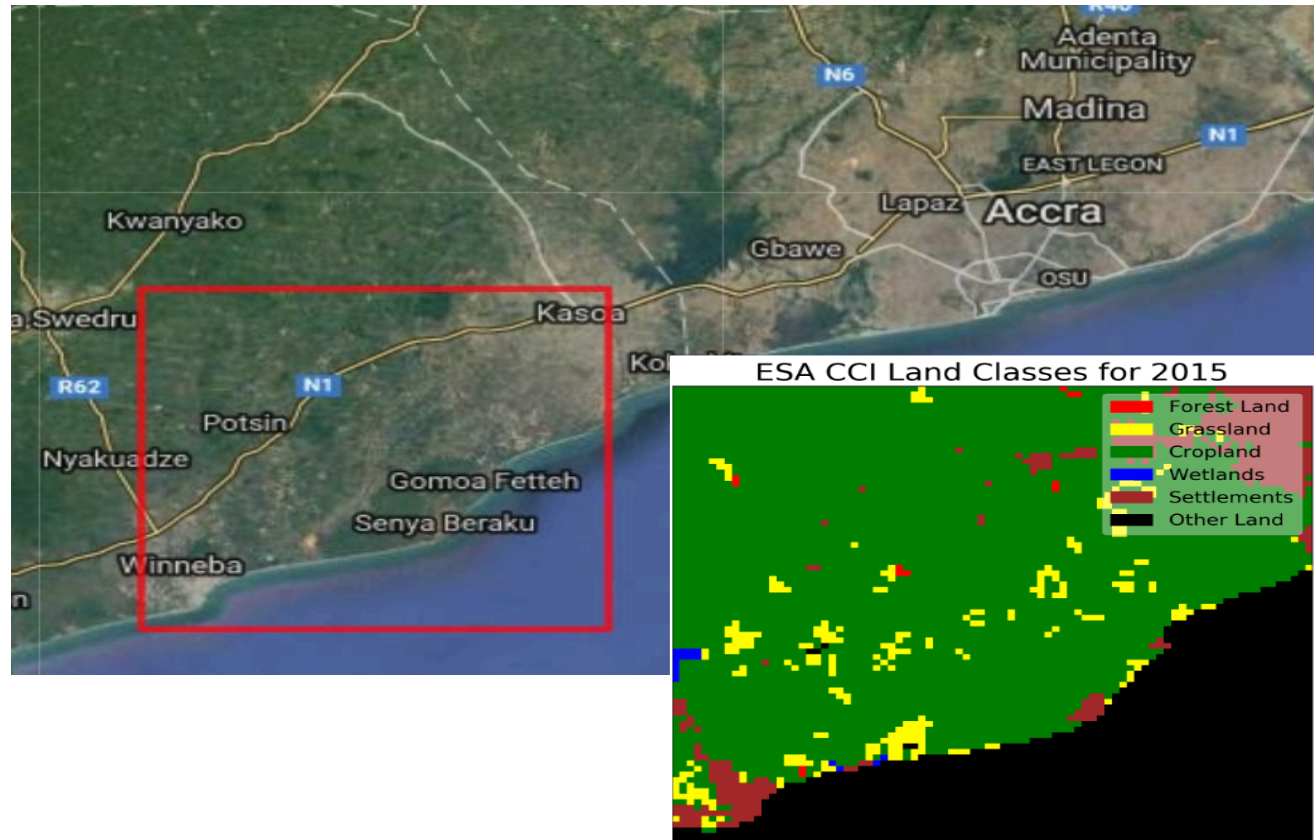


SDG 11.3.1 - Urbanization



Urbanization in Freetown, Sierra Leone – 2005 to 2015

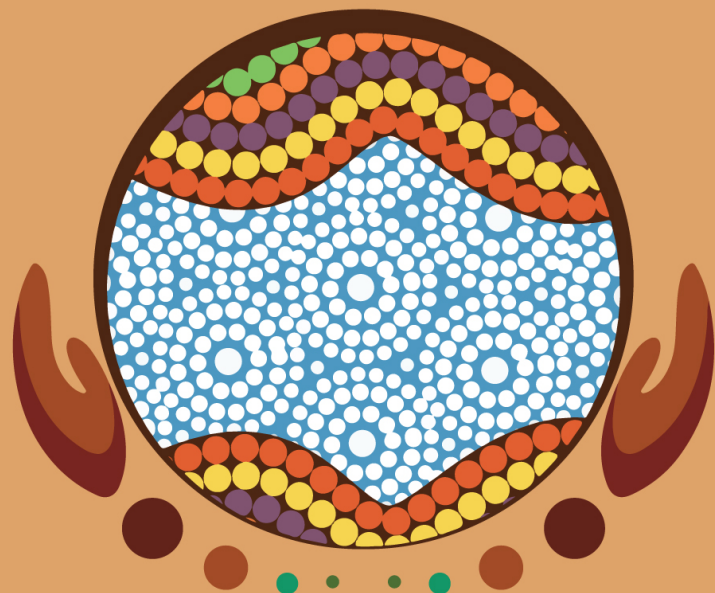
SDG 15.3.1 – Land Degradation



Change Matrix between Years 2000 and 2015

| | Forest Land | Grassland | Cropland | Wetlands | Settlements | Other Land |
|-------------|--------------------------|---------------------------------|------------------------------|-----------------------------|------------------------|---------------------------------|
| Forest Land | 0.14% Stable | 0.00% Vegetation Loss | 0.00% Deforestation | 0.00% Inundation | 0.00% Deforestation | 0.00% Vegetation Loss |
| Grassland | 0.01% Afforestation | 3.70% Stable | 0.00% Agricultural Expansion | 0.00% Inundation | 0.84% Urban Expansion | 0.00% Vegetation Loss |
| Cropland | 0.01% Afforestation | 0.00% Withdrawal of Agriculture | 61.68% Stable | 0.00% Inundation | 3.57% Urban Expansion | 0.00% Vegetation Loss |
| Wetlands | 0.00% Woody Encroachment | 0.00% Wetland Drainage | 0.00% Wetland Drainage | 0.22% Stable | 0.00% Wetland Drainage | 0.00% Wetland Drainage |
| Settlements | 0.00% Afforestation | 0.00% Vegetation Establishment | 0.00% Agricultural Expansion | 0.00% Wetland Establishment | 1.22% Stable | 0.00% Withdrawal of Settlements |
| Other Land | 0.00% Afforestation | 0.01% Vegetation Establishment | 0.00% Agricultural Expansion | 0.00% Wetland Establishment | 0.04% Urban Expansion | 28.52% Stable |

4.4% Urban Expansion



GEO WEEK 2019

MINISTERIAL SUMMIT

4 - 9 NOVEMBER / CANBERRA, AUSTRALIA / #GEOWEEK19



Australian Government

GEO GROUP ON
EARTH OBSERVATIONS



GEO WEEK 2019 EVENTS

GEO WEEK 2019 EVENTS

| Monday 4/11 | Tuesday 5/11 | Wednesday 6/11 | Thursday 7/11 | Friday 8/11 | Saturday 9/11 |
|-------------|-----------------------------|-----------------|------------------------|--------------------|-----------------------------|
| Side Events | | GEO-XVI Plenary | | Ministerial Summit | Executive Committee Meeting |
| | Executive Committee Meeting | Industry Track | | Press Conference | |
| | Exhibition | | | | |
| | | Gala Dinner | Ministerial Roundtable | | |
| | | | Ministerial Dinner | | |



GEO WEEK 2019



GEO WEEK 2019
MINISTERIAL
SUMMIT



Canberra Ministerial Summit 2019

“Earth observations: investments in the digital economy”

The importance of 2019 to GEO

Four years on from Mexico City

In 2015, Ministers adopted a new Strategic Plan for GEO focussed on three key priorities: sustainable development, climate change and disaster risk reduction.

From 2015-2018, the GEO community has restructured itself around these priorities.

In 2019, Ministers and the broader GEO community will decide how they will step up and accelerate delivery of the GEO strategy.

Policy issues that need Ministerial attention

Ministerial Summits enable Ministers to connect GEO to the bigger picture

Topics will include:

- Engagement of GEO with the multilateral economic cooperation architecture
- Engaging with vulnerable and developing nations
- Future of Work
- Trade in Digital Services
- Privacy in a Big Data World
- Sharing Economy



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www.earthobservations.org/geoweeek19

#GEOWEEK19



GEO WEEK 2019
MINISTERIAL
SUMMIT



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#GEOWeek19

Collaborate and communicate with GEO:



Questions & Moderated Discussion

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@EO4SDG

5 August 2019 / New York, U.S.A.

