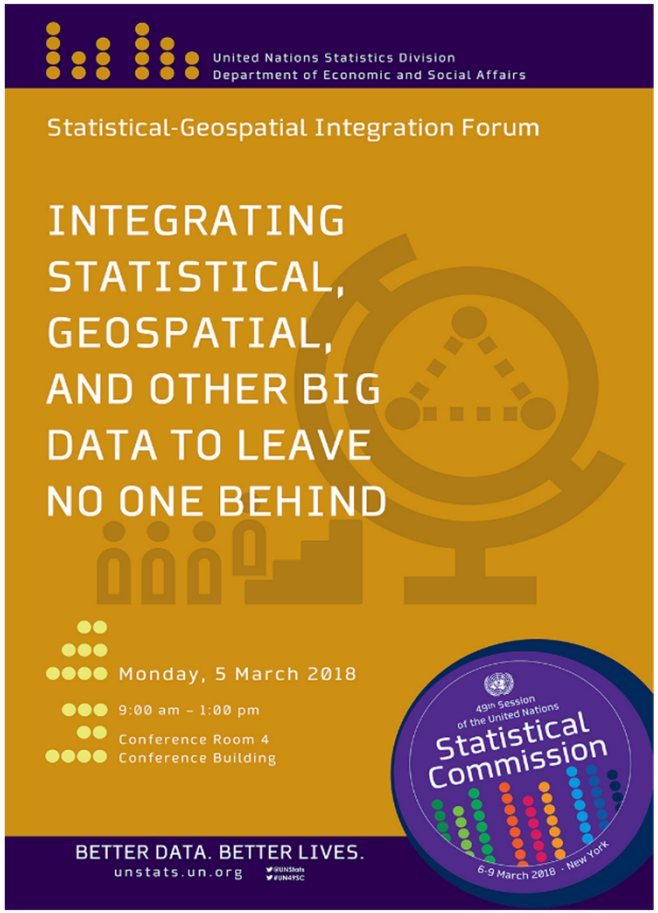


STATISTICAL-GEOSPATIAL INTEGRATION FORUM
United Nations • 5 March 2018

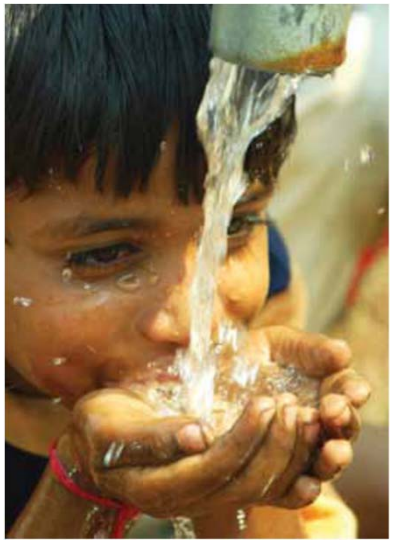
Panel III:
Satellite Observations for the Sustainable Development Goals

Argyro Kavvada
NASA Earth Science / BAH &
EO4SDG Initiative

GEO GROUP ON EARTH OBSERVATIONS

EARTH OBSERVATIONS FOR THE SUSTAINABLE DEVELOPMENT GOALS

NASA



Everything happens somewhere.

- Nancy Tosta

Mexico City Declaration
from 5TH High Level Forum on UN-GGIM

"Advocate and communicate to political decision makers the importance and impact of geospatial technologies, including ***Earth observations****, in informing policy, and that tech savvy, flexible and open leadership is fundamental to establishing and sustaining data innovation and its associated creation, systems and services, sharing and management to support the measurement and monitoring of the SDG's."*

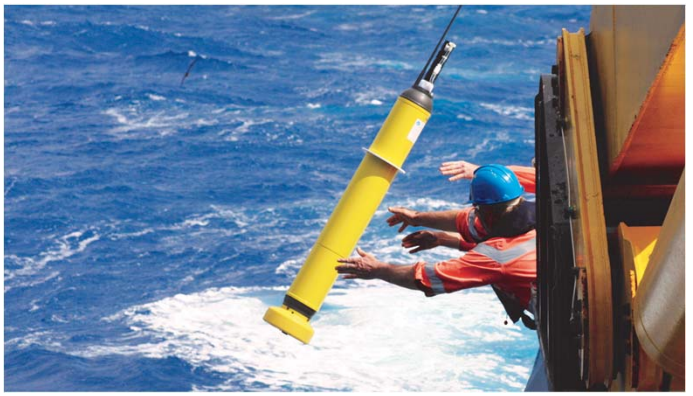
Together, we can make the full, transformative ambition of the 2030 Agenda a reality for all.

- António Guterres

Ground-based instruments used to observe precipitation include rain gauge tipping buckets, cylinders, and disdrometers & radar systems [top]

A sensor pod from NASA – Jet Propulsion Laboratory

The GOES-R Series—a collaborative program between NASA and NOAA.



Argo floats are used to observe the ocean [image from Commonwealth Scientific and Industrial Research Organization]

Researchers with the University of Alaska-Fairbanks (UAF) use small aircraft such as the Havilland DHC-3 Otter. Credit: UAF

Space-based Satellites

Airborne

Ground-based

In Situ

How can the Earth observation community contribute toward achieving the SDGs?

Meth
develop

Capacity Building

Analysis-ready data, tools, platforms

Scalability of Applications & Methods

GROUP ON EARTH OBSERVATIONS

Earth Observations in Service of the 2030 Agenda (EO4SDG)

Purpose:

Organize and enable the potential of Earth observations and geospatial information within GEO to advance the *2030 Agenda* and enable societal benefits through achievement of the SDGs.

Key Emphasis:

Collaborations with global statistical community, NSOs, line ministries, custodian agencies. Also, communication role in a federated approach with GEO & broader EO community.

http://eo4sdg.org

CEOS Committee on Earth Observation Satellites

Ad-Hoc Team on Sustainable Development Goals

Purpose:

Assess, showcase and promote satellite-based Earth observation contributions for the full realization of the SDGs.

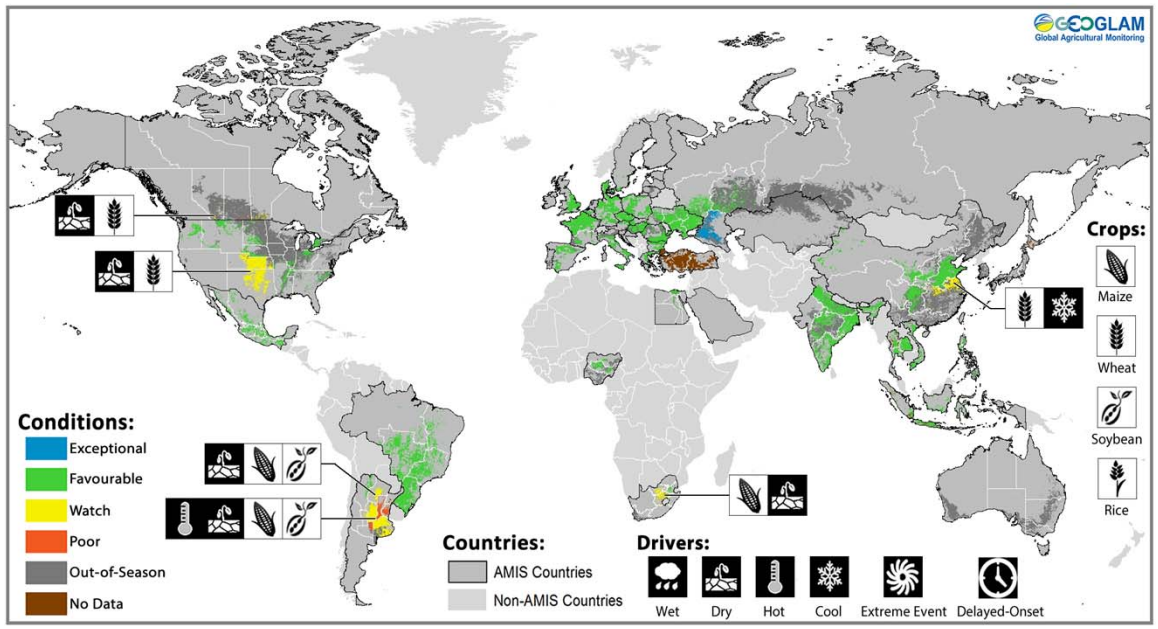
Key Emphasis:

Collaborations with GEO and global statistical community, NSOs, line ministries, custodian agencies. Also, analysis of new opportunities for satellite observations to support SDGs.

http://ceos.org/

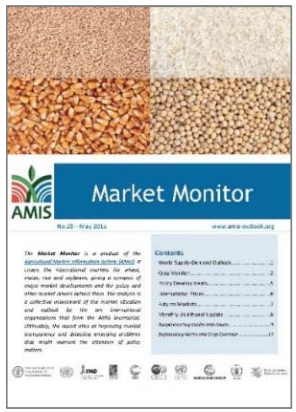
End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Condition Synthesis Maps Covering All AMIS Crops



Crop conditions and drivers are shown as of February 28. Crops that are in other than favorable conditions are displayed on the map with their crop symbol & driver.

https://cropmonitor.org/



Market Monitor: Operational monthly bulletin for primary crop types for 49 countries

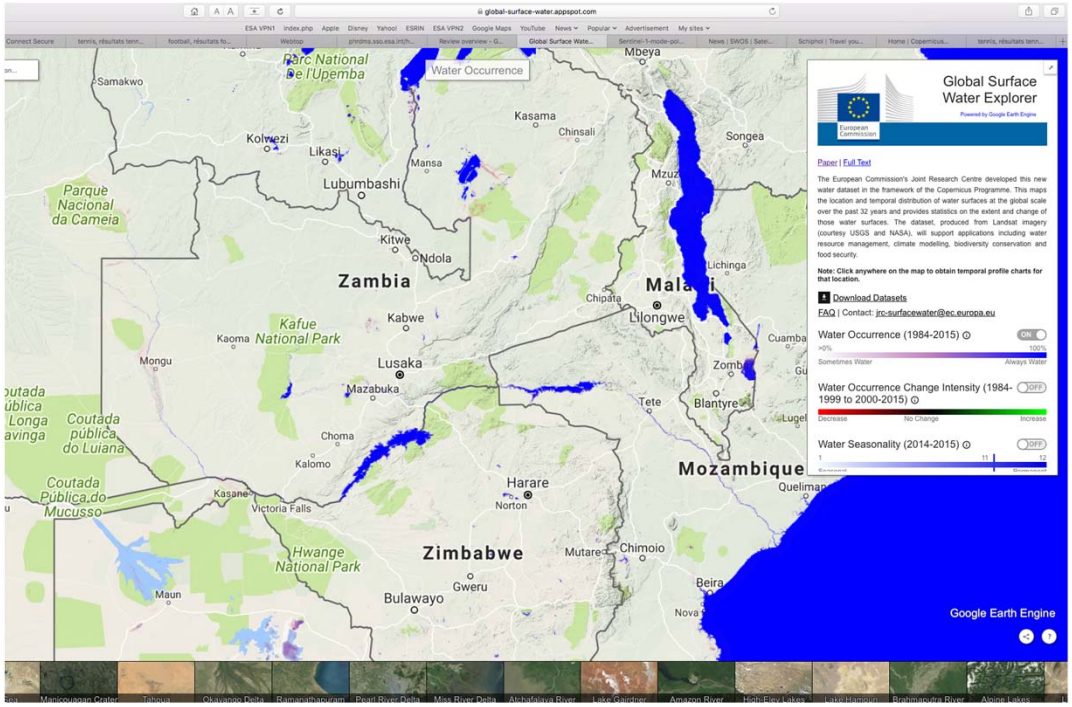
Four main crops: Rice, Wheat, Maize, Soybeans

EO Data Use

- Satellite baseline datasets - GEOGLAM Crop Calendars and Crop Masks
- Satellite observations of land - NASA & USGS (MODIS, Landsat, SMAP), ESA (Sentinel-1, Sentinel-2, Sentinel-3), CSA (Radarsat-2, RCM), JAXA (GCOM-C, ALOS-2), DLR (TerraSAR-X, TanDEM-X), CNES (Pleiades)
- In-situ & agrometeorological data sets
- Novel crowd-sourced information – GEO WIKI

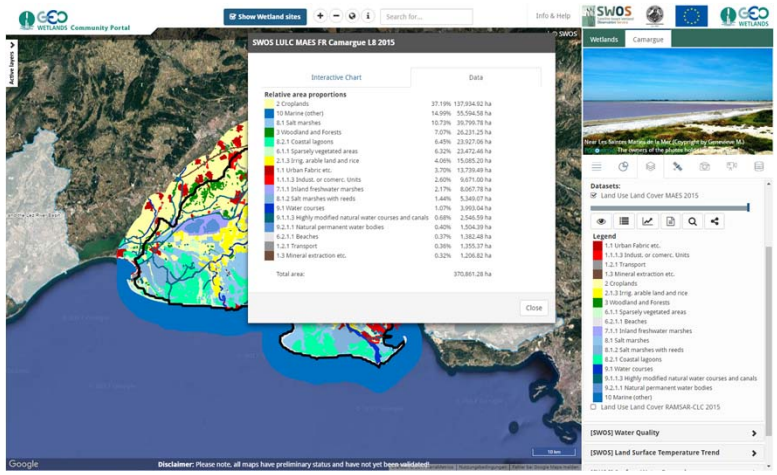
Earth observations for water-related ecosystem monitoring

High quality Global Data Set on spatial extent of inland water bodies (1984-2015, full Landsat archive, 30m, Joint Research Center supported by Google Earth Engine)



Water-related Community Portal

- Wetland-related datasets freely available
- EO best case practices & guidelines
- Portal customization for SDG 6 monitoring & reporting



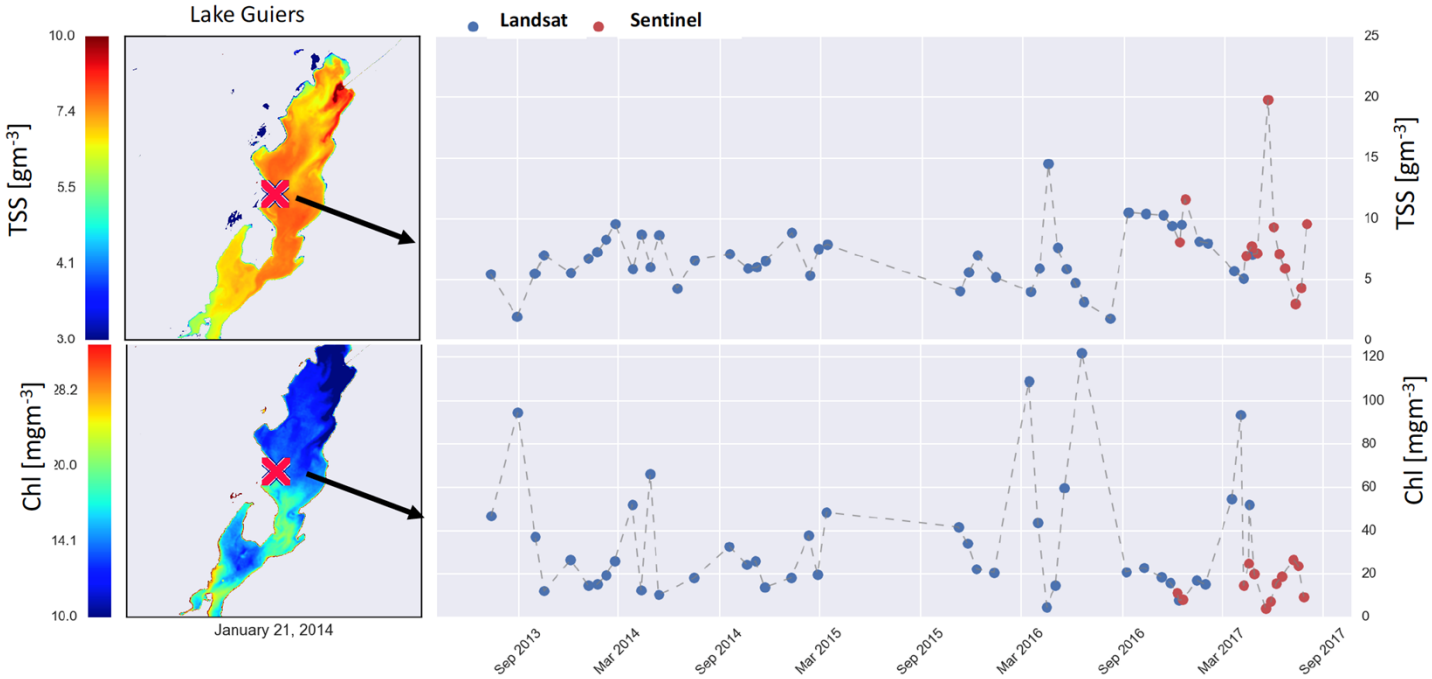
Earth observations for water-related ecosystem monitoring

Analysis of water-quality indicators (Chl-a, TSS)

- Water Anomaly detection using Landsat (NASA-USGS) & Sentinel 2 (ESA)
- Spatial Resolution: 20-30 m
- NASA's SeaWiFS Data Analysis System (SeaDAS)
- Forthcoming work with UN Environment & countries to build capacity for algorithm development/validation and support SDG monitoring & reporting

Lake Guiers – Senegal

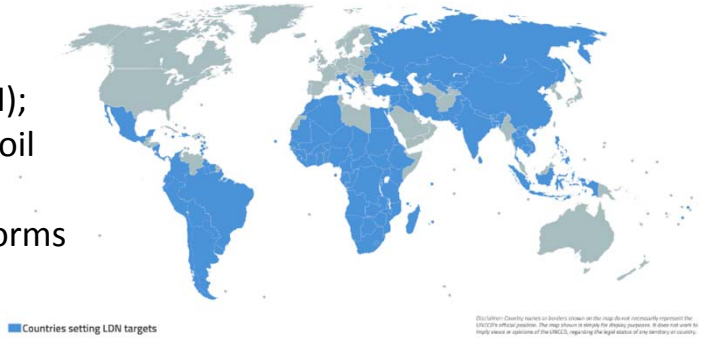
Concentrations of chlorophyll-a (Chl), which is the primary pigment in phytoplankton, and the total suspended solids (TSS) can be used as proxies to infer other important parameters like oxygen level, nutrients, or chemicals. Chl and TSS are both listed as parameters under SDG indicator 6.6.1.



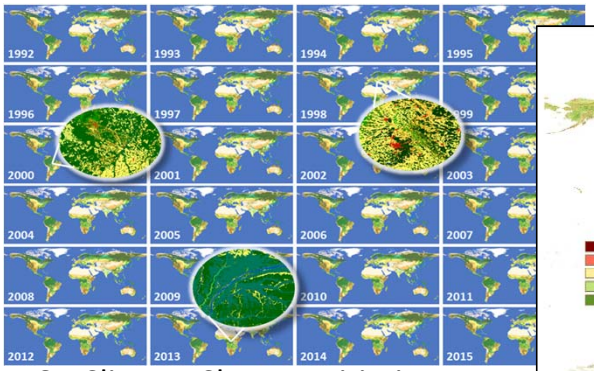
15.3.1. Proportion of land that is degraded over total land area

United Nations Convention to Combat Desertification

- Good Practice Guidance produced by UNCCD
- National official data sources, complemented by EO.
- EO Data: Land Cover – NASA (Landsat, MODIS),USGS (Landsat), ESA (Land Cover CCI); Land Productivity Dynamics (LPD) – JRC; Soil Organic Carbon (SOC) - International Soil Reference and Information Centre
- UNCCD - GEO regional capacity building workshops & federated collaborative platforms

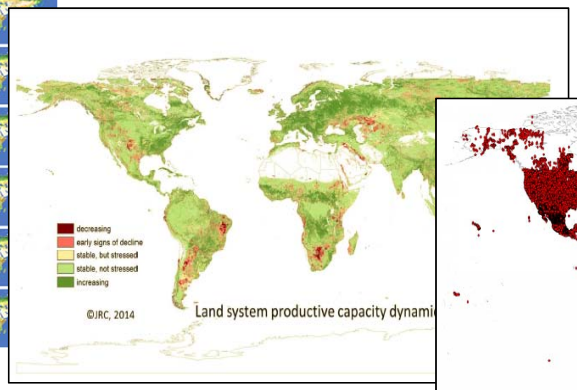


Out of the 113 countries that have committed to set LDN targets, 64 countries have already established a baseline



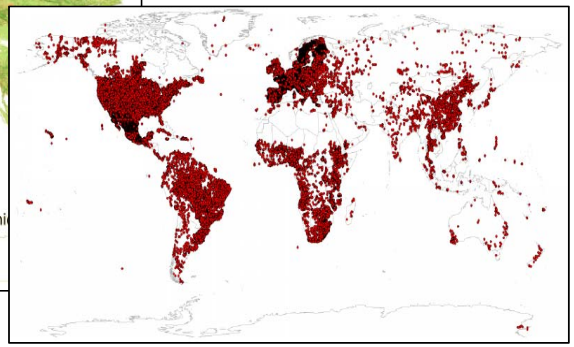
ESA Climate Change Initiative Land Cover

esa



JRC Land Productivity Dynamics

JOINT RESEARCH CENTRE



ISRIC SoilGrids250m

ISRIC World Soil Information

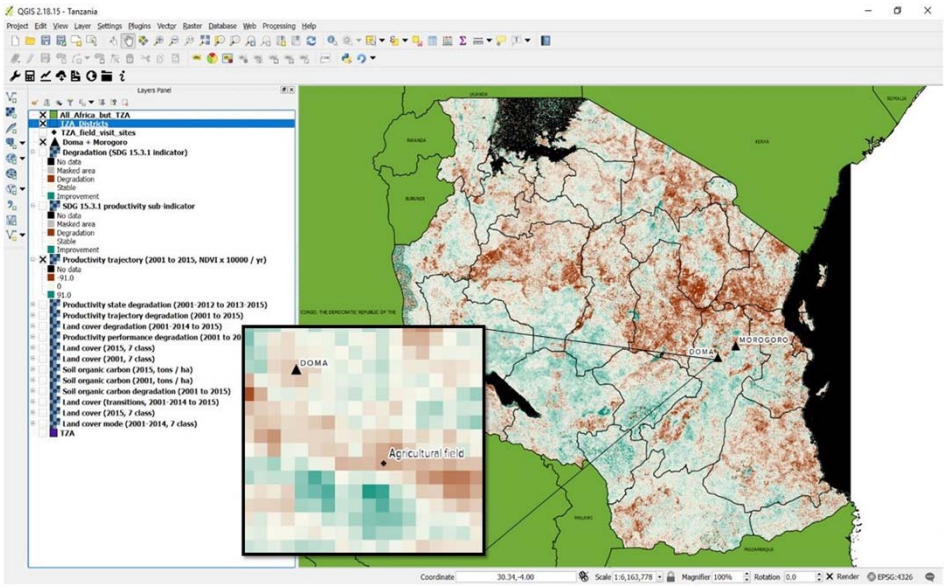
GEO BON

EARTH OBSERVATIONS FOR THE SUSTAINABLE DEVELOPMENT GOALS

GEOGLAM Global Agricultural Monitoring

GFOI

15.3.1 – Land Degradation Monitoring Tool



Above: A screenshot of the Trends.Earth tool in use. Provided by Tristan Schnader, Vital Signs Senior Project Manager at CI.

- GEF-funded project.
- Focus on: Senegal, Tanzania, Uganda, Kenya
- EO Data: AVHRR, MODIS (NDVI), GOME-2 (chlorophyll fluorescence), MERRA-2 (soil moisture), Landsat 8, Sentinel 2A & 2B , 50 cm commercial satellite data
- Open source platform, qGIS, GEE
- SDG Monitoring & Reporting

Pilot Country Workshops & Lessons Learned

Guidelines on dataset standardization to allow for valid comparisons • Request for finer spatial res. EO, preprocessed and ready for analysis • Need for further capacity building around indicators & tools • Internet access could limit usefulness of fully online platforms

Building capacity around SDGs and EO data and tools

EARTH OBSERVATIONS FOR THE SUSTAINABLE DEVELOPMENT GOALS

Past Webinar Series (June 2017

Learning Objectives:

- Acquire satellite observations of land cover used to assess SDG indicators 15.1.1 and 15.3.1
- Develop a basic understanding of image classification and change detection

Impact

445 individuals from 79 countries, 27 U.S. (states, territories, and D.C.), and 350 organizations

"[I] hope to combine skills accessing & using this data along with higher resolution data to produce better derivative synthetic populations w/ estimated demographic attributes." - U.S. Attendee

"It will help me create map of species distribution coupled with habitat characteristics" - Malaysian Attendee

http://arset.gsfc.nasa.gov

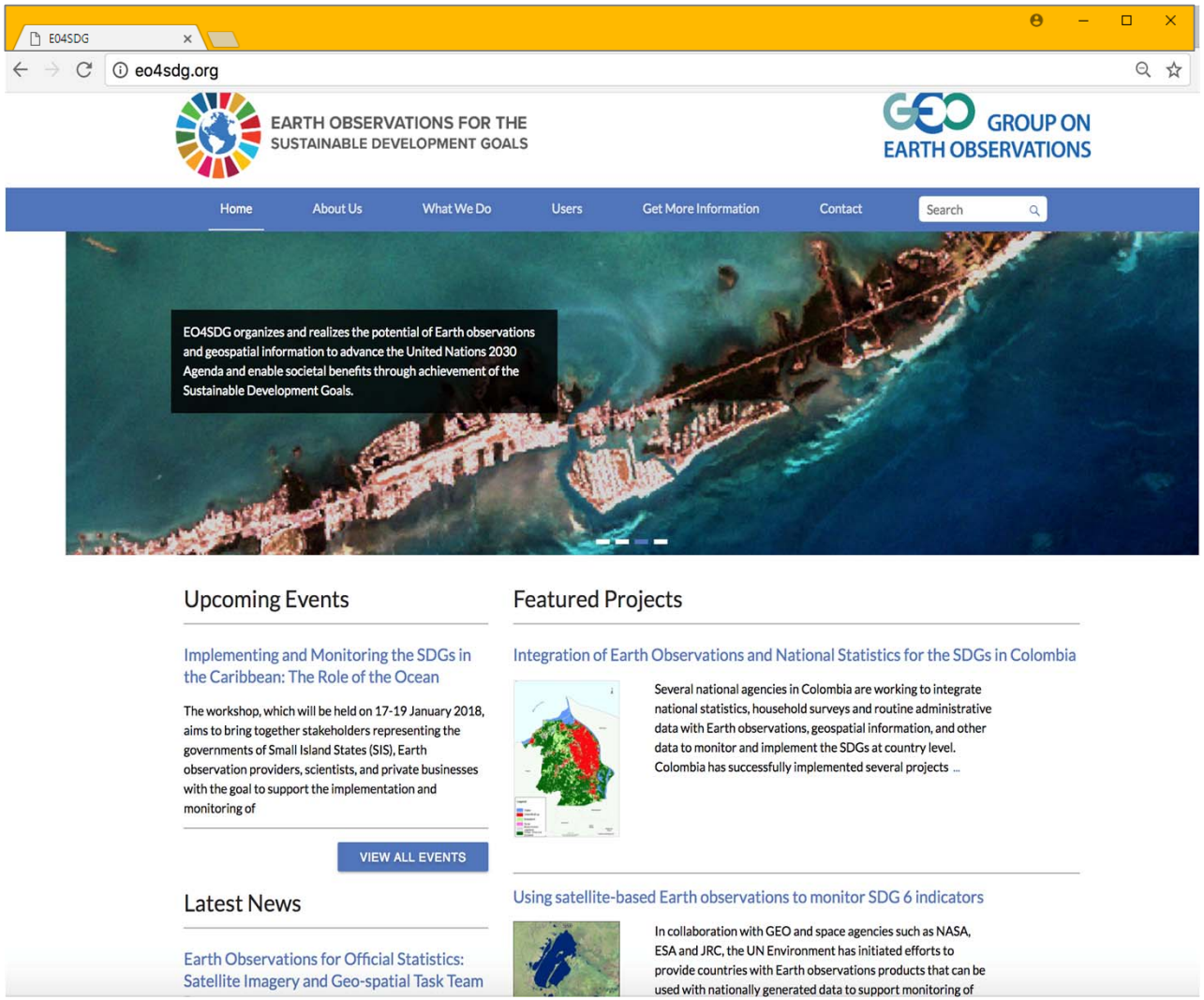
CAPACITY BUILDING:
Support institutions and individuals in the ideation, development, and implementation of methods, building capabilities directly with the SDG methods and more broadly with accessing and applying Earth observations.

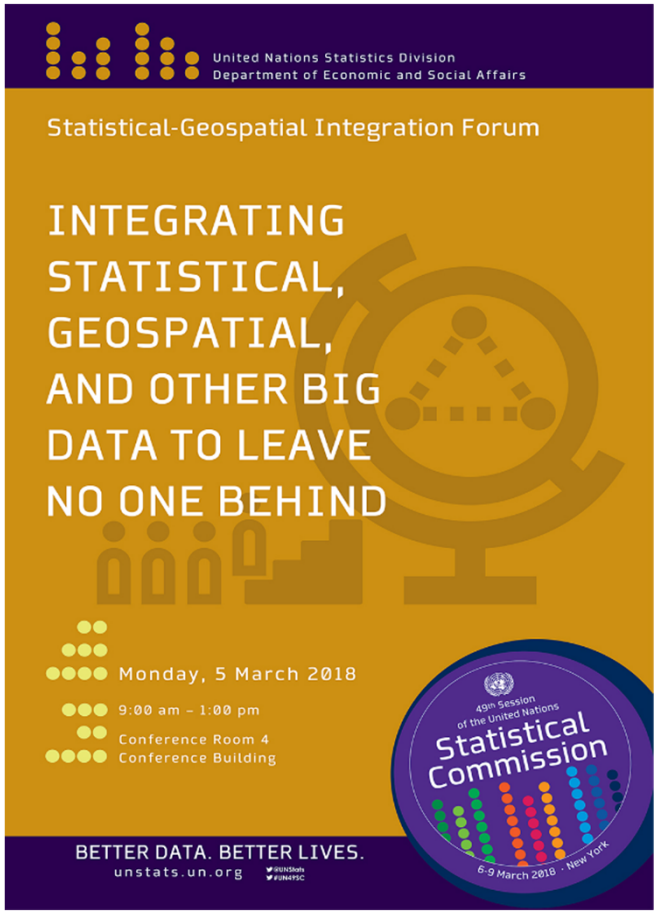
EO4SDG

EARTH OBSERVATIONS FOR THE SUSTAINABLE DEVELOPMENT GOALS

http://eo4sdg.org

Twitter: @EO4SDG





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Thank you!

GEO GROUP ON EARTH OBSERVATIONS

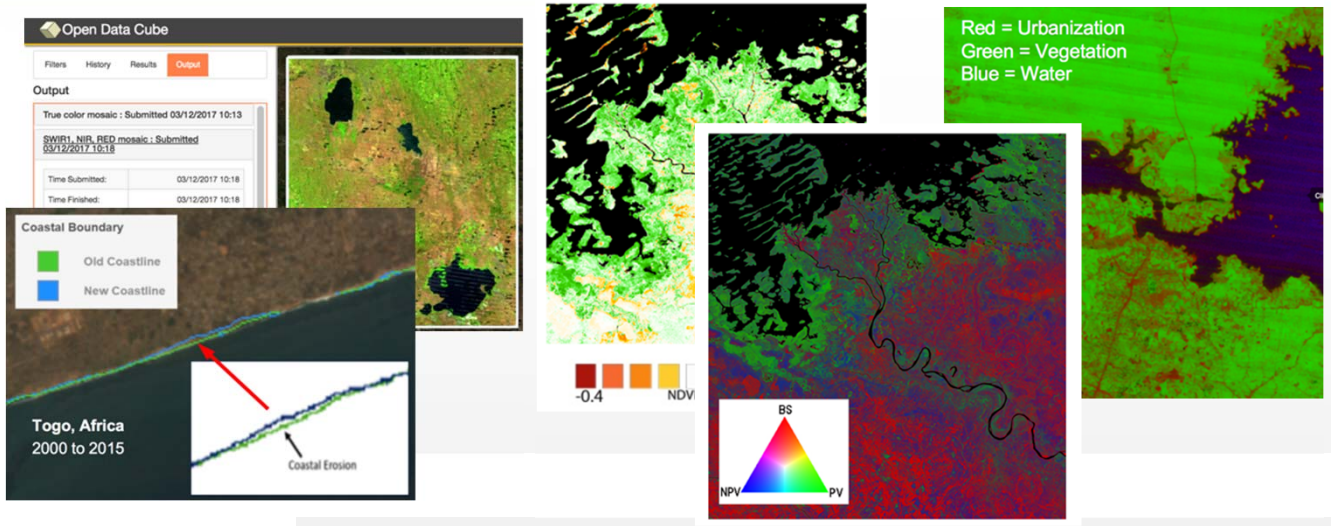
EARTH OBSERVATIONS FOR THE SUSTAINABLE DEVELOPMENT GOALS

NASA

EXTRA SLIDES

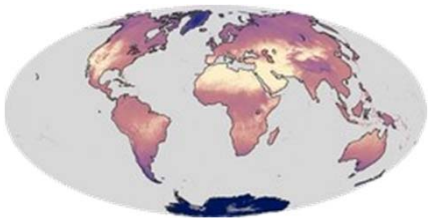
Data Cubes - Application Products

- Cloud-free Mosaics
- Land Change Detection
- Water Detection
- Water Quality
- Fractional Cover
- Vegetation Anomaly
- Coastal Change
- Urbanization

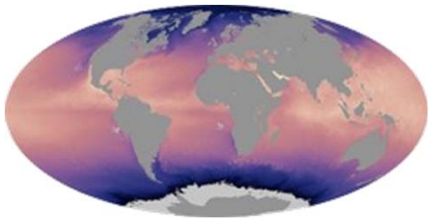


- Country Example: Australian, Colombian, and Swiss national Data Cubes
  - Reduced data preparation burden … uses ARD
    - Enables data interoperability
    - Efficient time series analyses
  - Open source software and free access

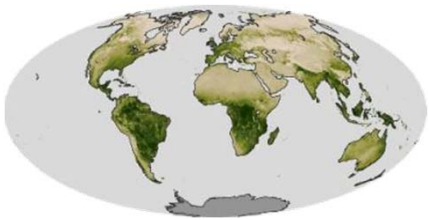
Combining Earth observations to support informed decision-making



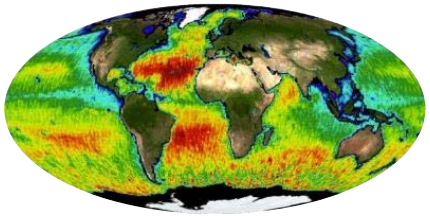
Land Temperature



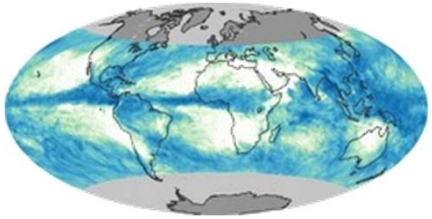
Sea Surface Temperature



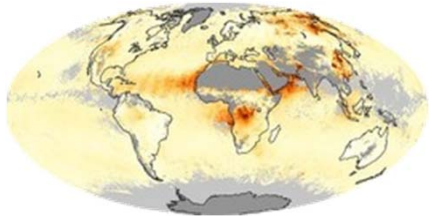
Vegetation



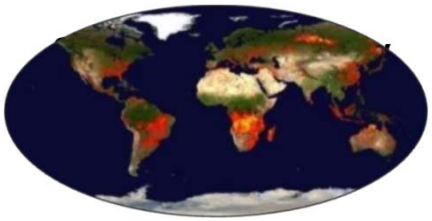
Sea Surface Salinity



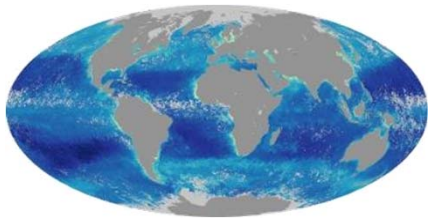
Total Rainfall



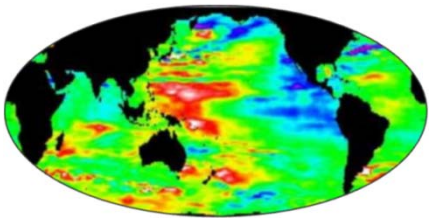
Aerosols



Fires & Thermal Anomalies



Chlorophyll



Sea Surface Height

Target Contribute to progress on the Target, not necessarily the Indicator									Goal	Indicator Direct measure or indirect support to the Indicator					
							1.4	1.5	1 No poverty	1.4.2					
						2.3	2.4	2.c	2 Zero hunger	2.4.1					
					3.3	3.4	3.9	3.d	3 Good health and well-being	3.9.1					
									4 Quality education						
								5.a	5 Gender equality	5.a.1					
		6.1	6.3	6.4	6.5	6.6	6.a	6.b	6 Clean water and sanitation	6.3.1	6.3.2	6.4.2	6.5.1	6.6.1	
					7.2	7.3	7.a	7.b	7 Affordable and clean energy	7.1.1					
								8.4	8 Decent work and economic growth						
					9.1	9.4	9.5	9.a	9 Industry, innovation and infrastructure	9.1.1	9.4.1				
						10.6	10.7	10.a	10 Reduced inequalities						
	11.1	11.3	11.4	11.5	11.6	11.7	11.b	11.c	11 Sustainable cities and communities	11.1.1	11.2.1	11.3.1	11.6.2	11.7.1	
				12.2	12.4	12.8	12.a	12.b	12 Responsible consumption and production	12.a.1					
					13.1	13.2	13.3	13.b	13 Climate action	13.1.1					
		14.1	14.2	14.3	14.4	14.6	14.7	14.a	14 Life below water	14.3.1	14.4.1	14.5.1			
	15.1	15.2	15.3	15.4	15.5	15.7	15.8	15.9	15 Life on land	15.1.1	15.2.1	15.3.1	15.4.1	15.4.2	
								16.8	16 Peace, justice and strong institutions						
17.2	17.3	17.6	17.7	17.8	17.9	17.16	17.17	17.18	17 Partnerships for the goals	17.6.1	17.18.1				

EARTH OBSERVATIONS FOR THE SUSTAINABLE DEVELOPMENT GOALS

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GROUP ON EARTH OBSERVATIONS

EO4SDG

Alignments of the Goals with types of Earth observations and geospatial information