



National online workshop:

Generating climate change and disasters indicators for policy decision-making in Antigua and Barbuda

03, 06 and 07 Dec 2021

The geospatial dimension of environment, climate change and disaster statistics and indicators

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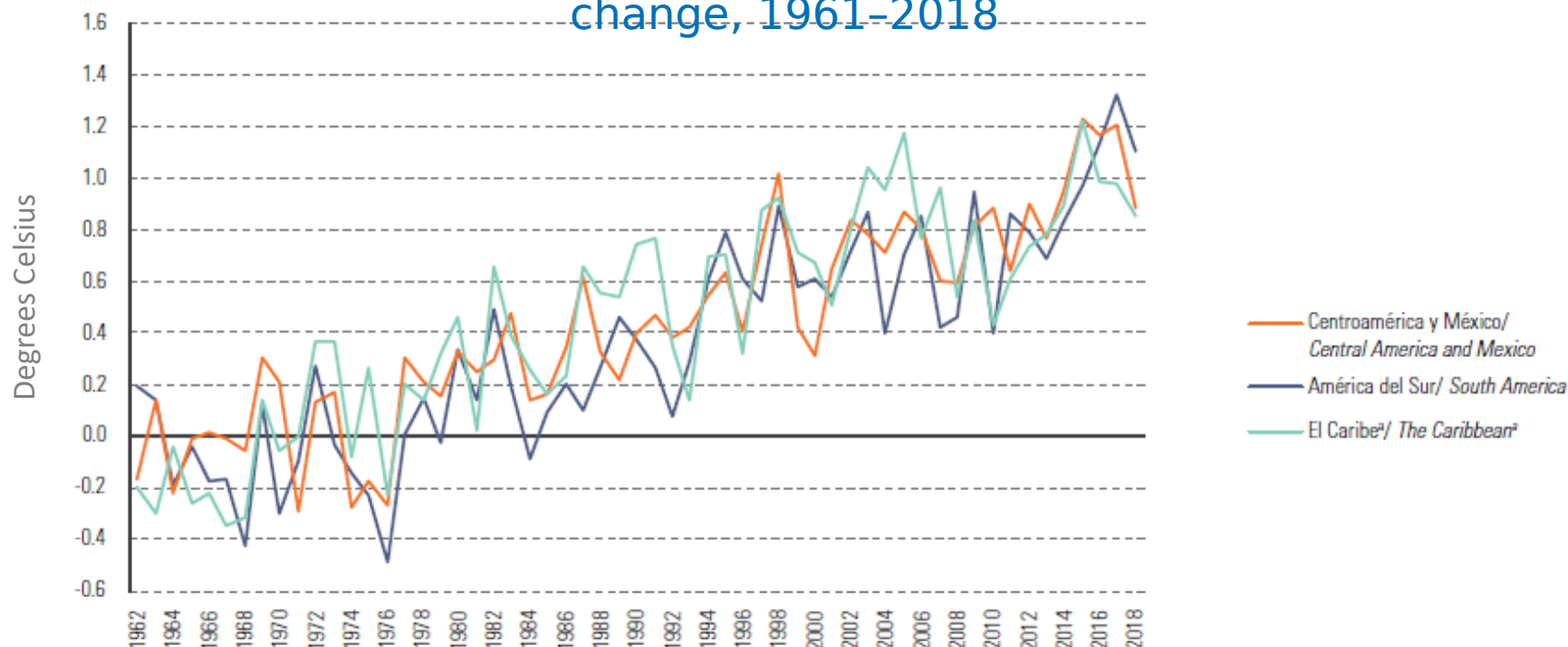


Introduction

Climate change: A permanent concern

- Latin America and the Caribbean region is especially vulnerable to climate change due to its geographical and climatic situation, socio-economic and demographic characteristics, and the high sensitivity of its natural assets to climate conditions (ECLAC, 2015).

Latin America and the Caribbean: mean annual temperature change, 1961-2018



^[A] FAO, Base de datos estadísticos (FAOSTAT) [en línea] <http://www.fao.org/faostat/es/#home>.

* Incluye Cuba y la República Dominicana.

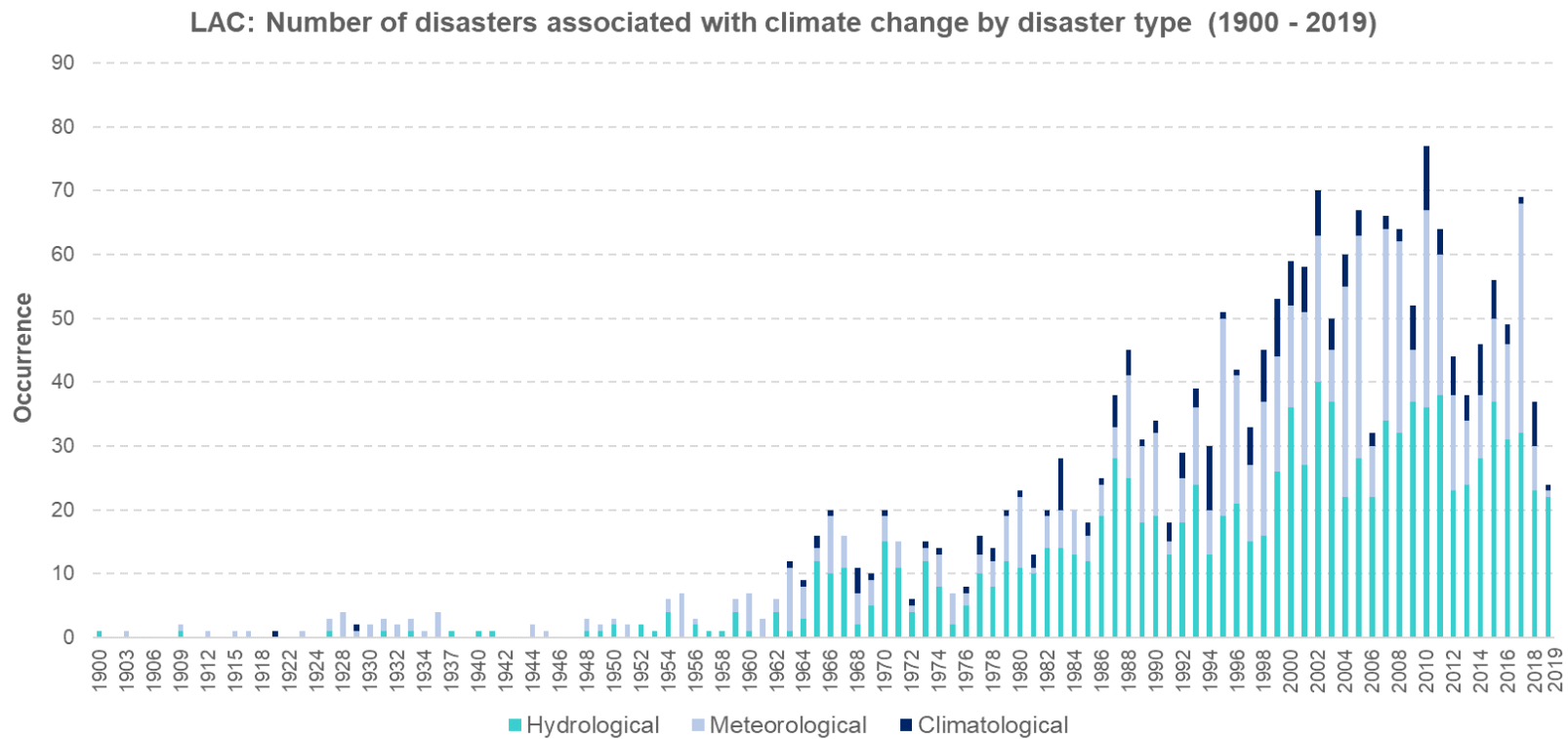
^[A] FAO, Database for Statistical Data (FAOSTAT) [online] <http://www.fao.org/faostat/en/#home>.

* Includes Cuba and the Dominican Republic.

Introduction

Climate change: Impacts and risks

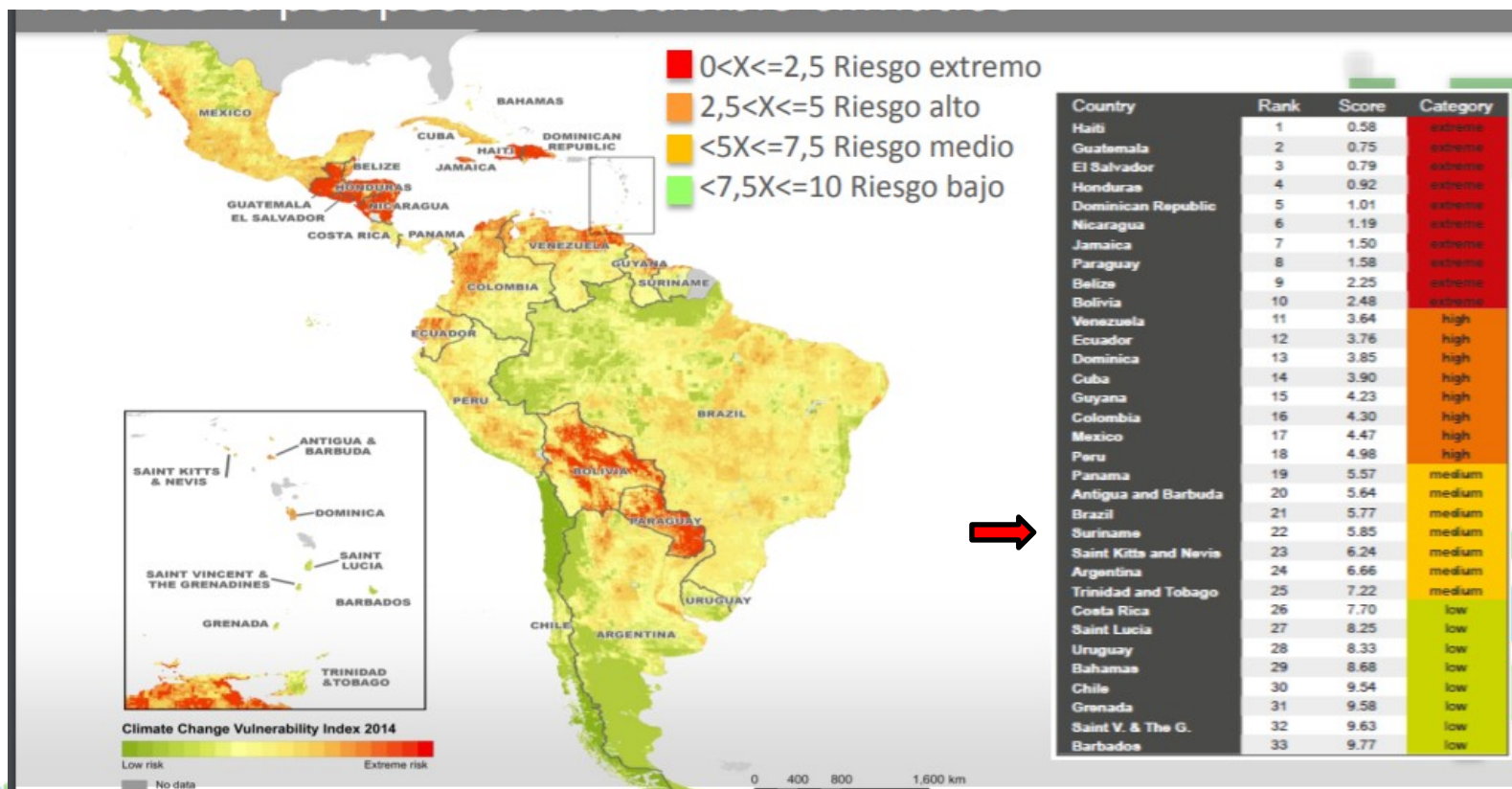
- Evidence of the impacts of climate change in LAC shows that these effects are already significant and, with a high probability, will be more intense in the future (IPCC, 2013).



Introduction

Climate Vulnerability index in LAC (CAF, 2014)

- Assesses the vulnerability of human populations to extreme weather-related events and changes over the next 30 years.
- Combines the risk of exposure to climate change and extreme events with the human sensitivity to that exposure and the country's ability to adapt to climate change or take advantage of those changes' impacts.



- The phenomena captured through the environment statistics occur or have a footprint on the earth's surface
- Phenomena happen in geographical spaces that do not always coincide with political-administrative limits
- They present gradients that go from a planetary scale to a local one



The importance of where

Spatial information allows you to understand better where and what is occurring in your world. It let you study the characteristics of places and the relationships between them.

When looking at a map, we start naturally turning that map into information by analyzing its content —finding patterns, assessing trends, or making decisions. This process is called “spatial analysis.”

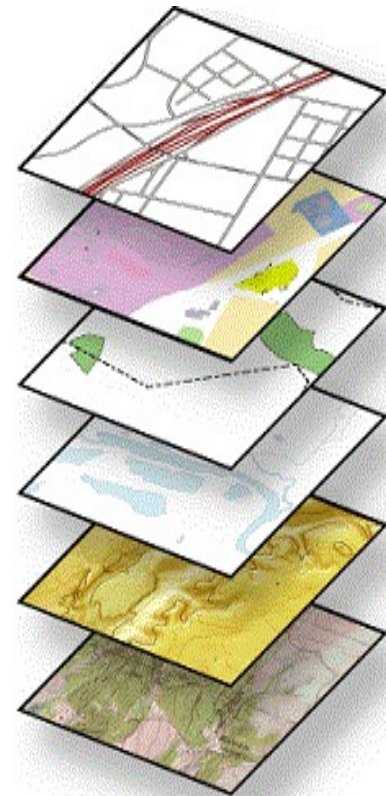
Using spatial analysis, you can combine information from many independent sources and derive new sets of information. And by employing image analysis, you can detect change over time.



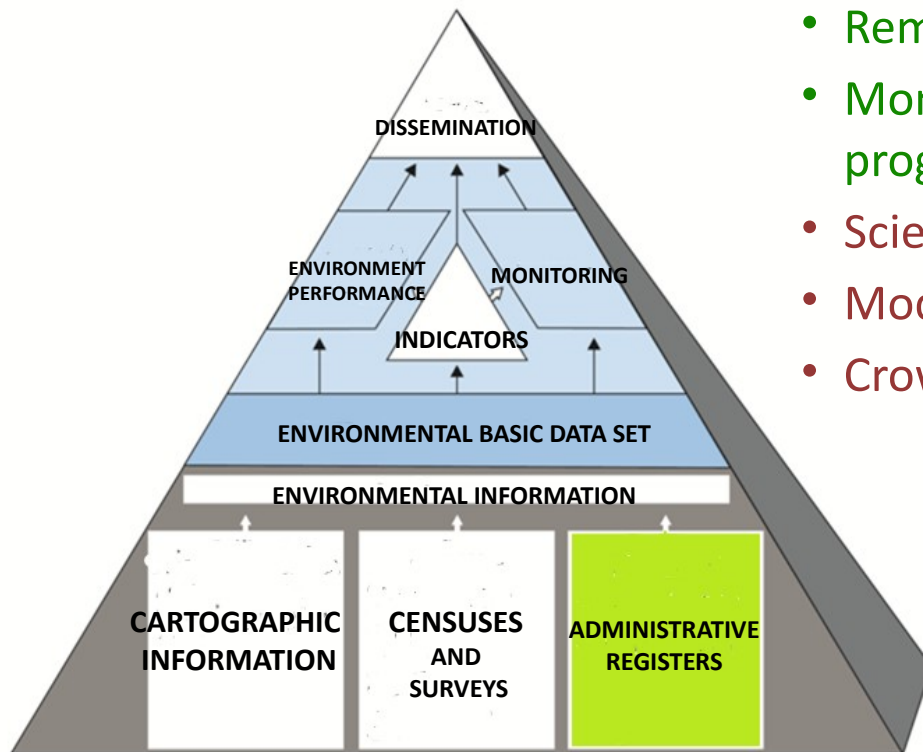
- *Georeferencing is an attribute of the data.*
- *The integration of databases (layers) in a Geographic Information System (GIS) implies the precise location of the objects / entities*
- *Geographic shapes - lines, points, areas / polygons*



- The possibility of overlay and correlate different layers of GIS data allows having a geographical position and thematic attributes, spatial relationships with other entities (topology) and temporal patterns.
- It is also possible to perform calculations, build indicators, analyze distributions, prepare thematic maps, and obtain new variables.



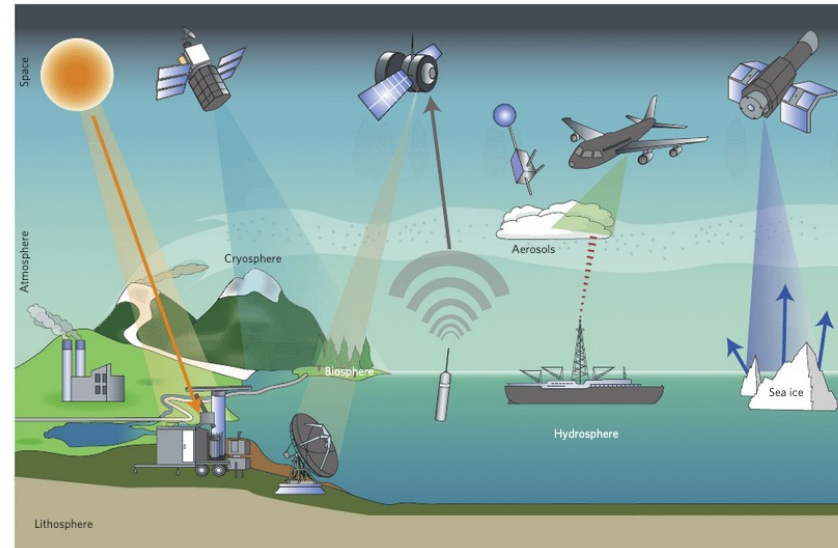
Data/information sources



- Cartography
- Census and surveys
- Administrative records
- Remote sensing
- Monitoring stations and field monitoring programs
- Scientific research
- Modelling and Estimation
- Crowd sourcing

Other sources

- Remote sensing offers a broad spectrum of geo-referenced environmental data that provides a synoptic view of the different components of the environment.
- Data is obtained in digital format from instruments that measure the electromagnetic response of the different elements over the earth's surface.
- These data are subject to be processed applying classification techniques supported by field validations



NASA products

Product Gallery Hurricane Dorian

- Event Specific Products
- Relevant Near Real-Time Products and Dashboards
- Story Map

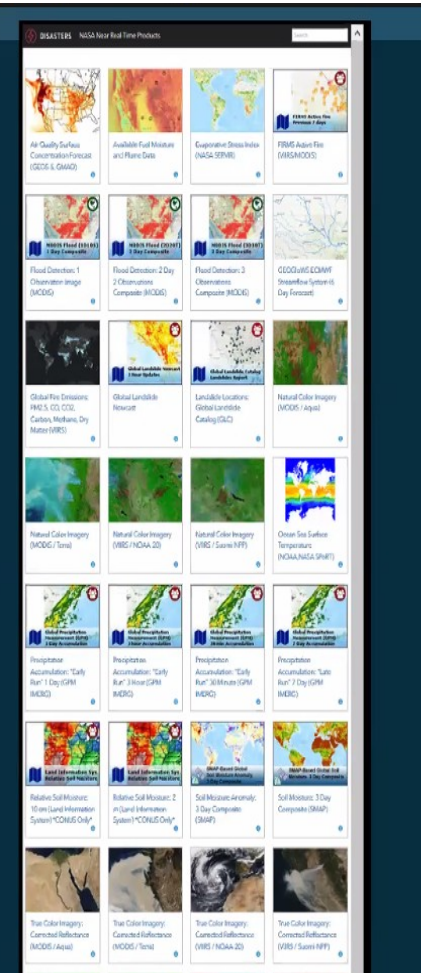
DISASTERS NASA Products for Hurricane Dorian 2019 Search

<p>Hurricane Dorian 2019</p>	<p>ARIA Flood Proxy Map (Copernicus Sentinel-1) on 9/4/19 for Hurricane Dorian</p>	<p>ARIA Damage Proxy Map (Copernicus Sentinel-1) on 9/2/19 for Hurricane Dorian</p>	<p>ARIA Damage Proxy Map (Copernicus Sentinel-1) on 9/4/19 for Hurricane Dorian</p>	<p>ARIA Flood Proxy Map (Copernicus Sentinel-1) on 9/2/19 for Hurricane Dorian</p>
<p>Near Real-Time Products for Tropical Cyclones</p>	<p>Total Rainfall (GPM) from 8/30/19 to 9/4/19 for Hurricane Dorian</p>	<p>RGB Composite Imagery (Copernicus Sentinel-1) for Hurricane Dorian</p>	<p>True Color Imagery (Copernicus Sentinel-2) for Hurricane Dorian</p>	<p>Natural Color Imagery (Copernicus Sentinel-2) for Hurricane Dorian</p>
<p>True Color Imagery (Landsat 8) for Hurricane Dorian</p>	<p>Panchromatic Band Imagery (Landsat 8) for Hurricane Dorian</p>	<p>Natural Color Imagery (Landsat 8) for Hurricane Dorian</p>	<p>Day Night Band Imagery (VIIRS) for Hurricane Dorian (mosaic)</p>	

NASA products

Near Real-Time Products

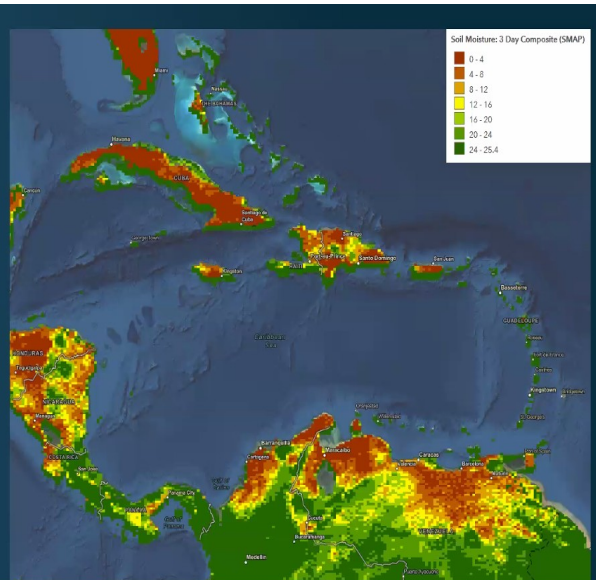
- Global unless noted otherwise
- Coarser resolution
- Automatically updated every few hours to daily or weekly
- Many products for the Caribbean
 - Black Marble Nighttime Blue/Yellow Composite
 - FIRMS Active Fire Points (MODIS, VIIRS)
 - Global Landslide Nowcast
 - Flood Detection – 2, 3 Observations (MODIS)
 - Precipitation Accumulation – 30 min, 3 hour, 1 day (GPM IMERG)
 - Soil Moisture and Soil Moisture Anomaly – 3-Day Composite (SMAP)
 - Evaporative Stress Index – weekly
 - Global Fire Emissions – Daily (VIIRS)
 - True Color Imagery – Daily (MODIS at 250m, VIIRS at 375m)
 - Natural Color Imagery – Daily (MODIS at 250m, VIIRS at 375m)



Data/information sources

Soil Moisture

- Soil Moisture Active Passive (SMAP) derived product
- 3-Day Composite
- 25.4mm = saturated
 - Red = dry
 - Green = wet
- Resolution: .25°
 - Best for larger Countries



Evaporative Stress Index

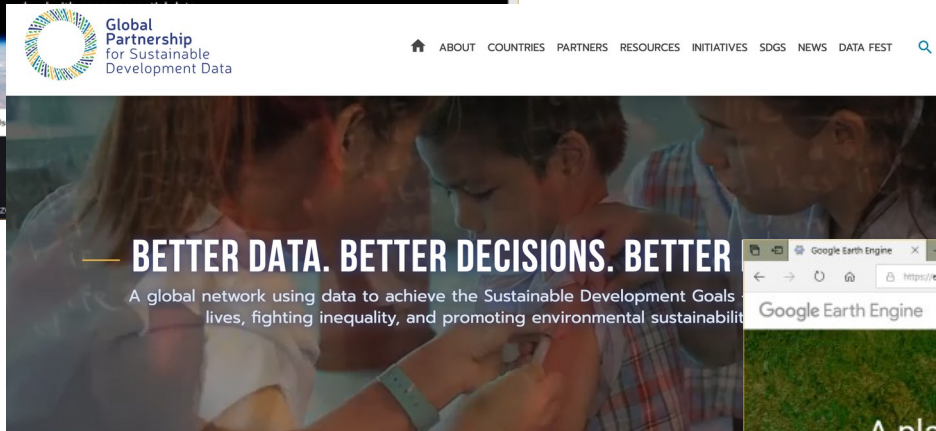
- Weekly product
- Yellow to Red = Dry, stressed vegetation
- Latency = ~2 weeks
- Resolution: 5km



Data availability through other platforms

Amazon Web Services:

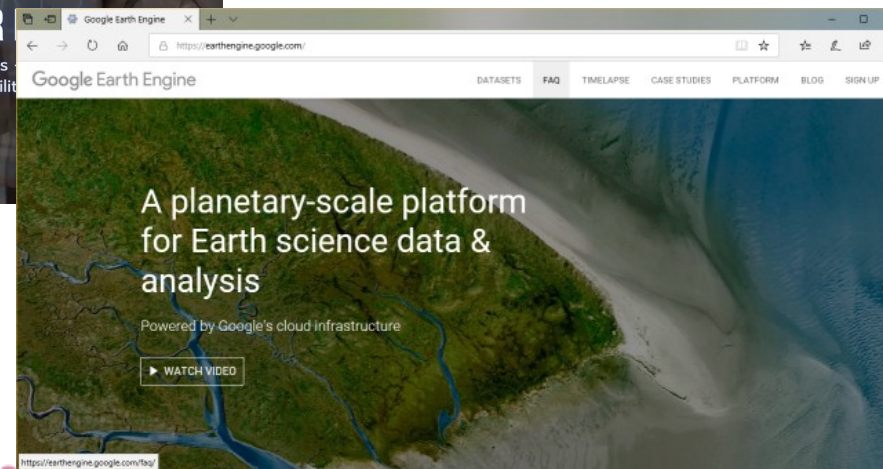
<https://aws.amazon.com/earth/>



<http://www.data4sdgs.org/>

Google Earth Engine

<https://earthengine.google.com/>



Conclusion

The idea that location matters is no longer just the geographer's doctrine; its value has been widely recognized and embraced — Geography matters.

Location intelligence is the ability to analyze and find spatial patterns in data to provide powerful insights for understanding our world and communicating our needs.

This is possible through a combination of local data and advanced geospatial tools, together with training for everyone working on geospatial challenges across the region.



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Thank you for your attention!

<https://www.cepal.org/en/topics/environmental-statistics>