National online workshop:

Generating climate change and disasters indicators for policy decision-making in Saint Lucia

16 - 18 Nov 2021

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

Francisco Javier Jiménez Nava, Senior Expert Consultant

Statistics Division / Climate change and environment statistics unit
Economic Commission for Latin America and the Caribbean (ECLAC)

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- Georeferencing
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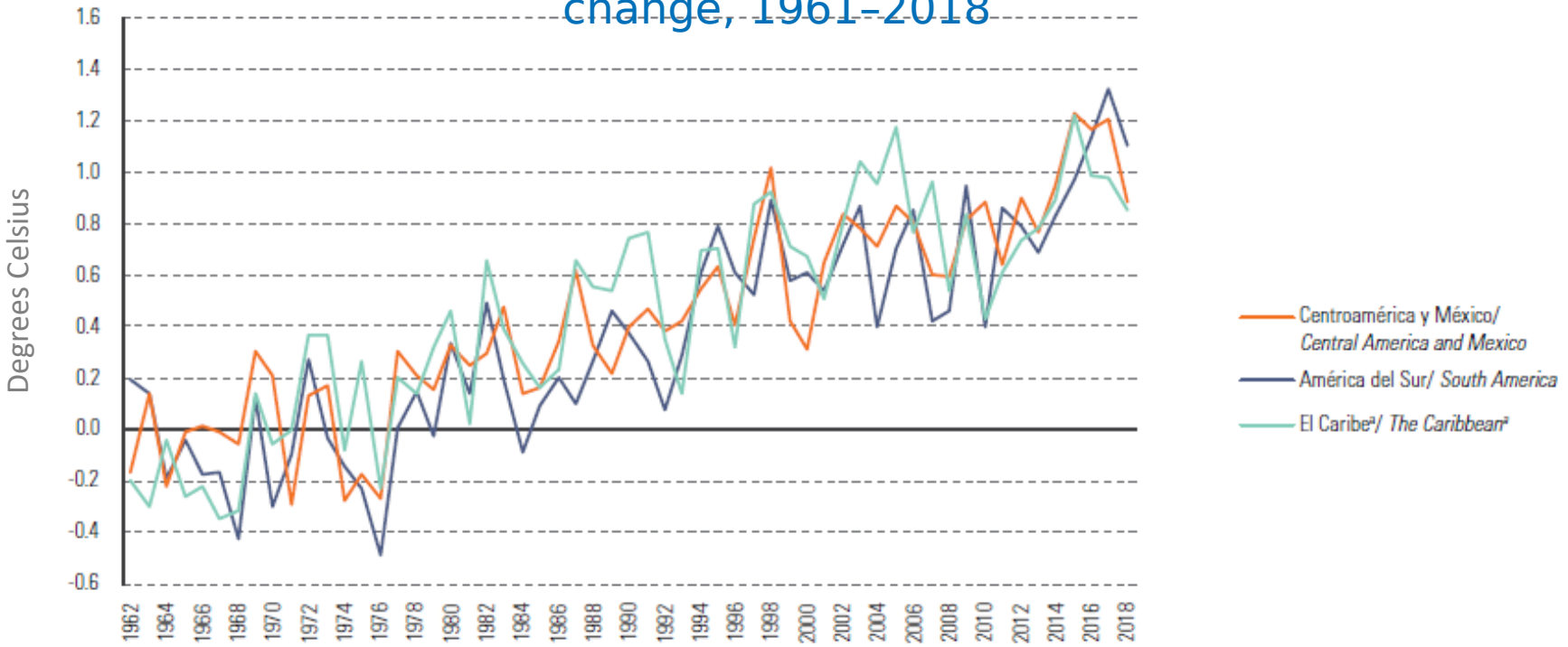
- Conclusion

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.
[a] Incluye Cuba y la República Dominicana.

[A] FAO, Database for Statistical Data (FAOSTAT) [online] http://www.fao.org/faostat/en/#home.
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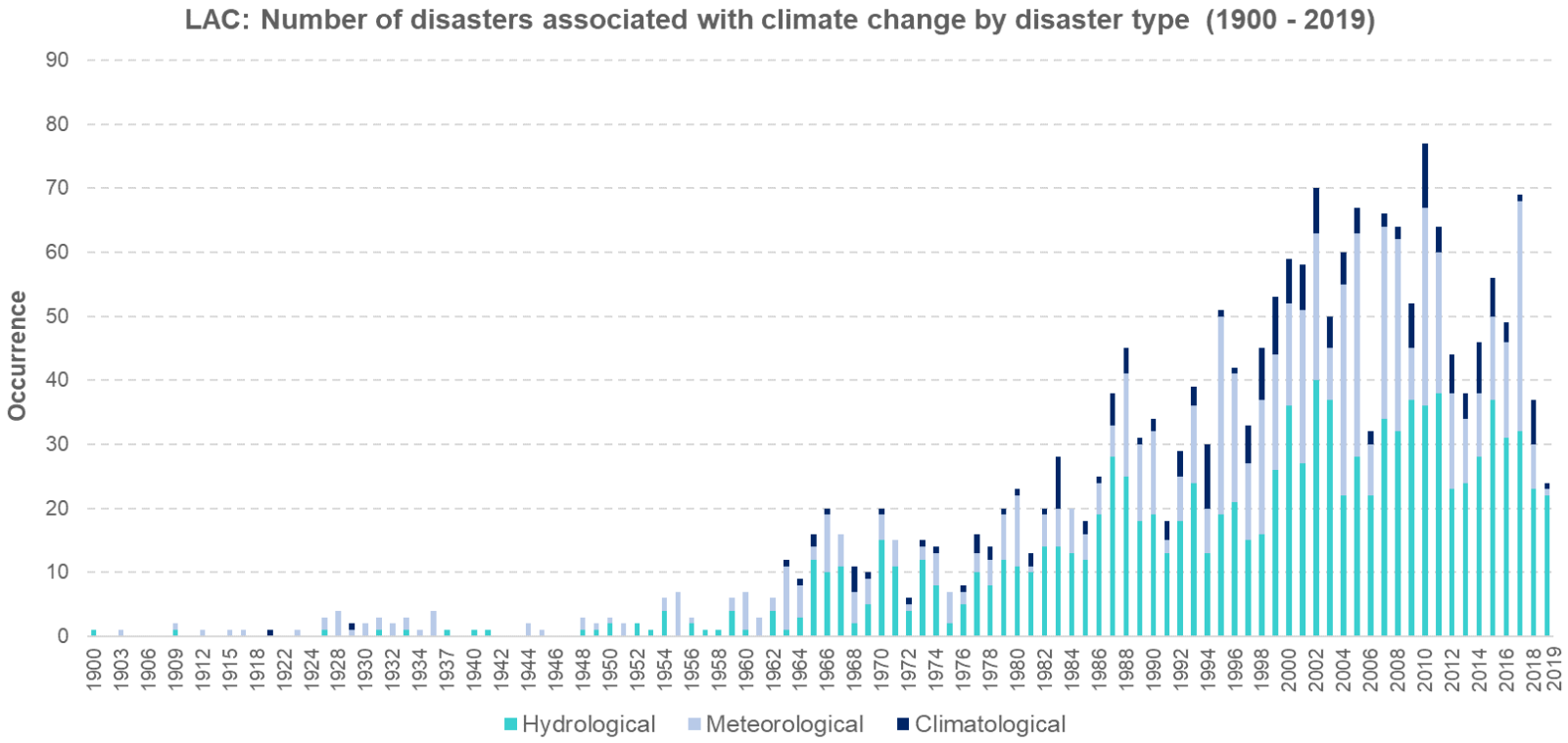
Climate change: Impacts and risks

- 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).

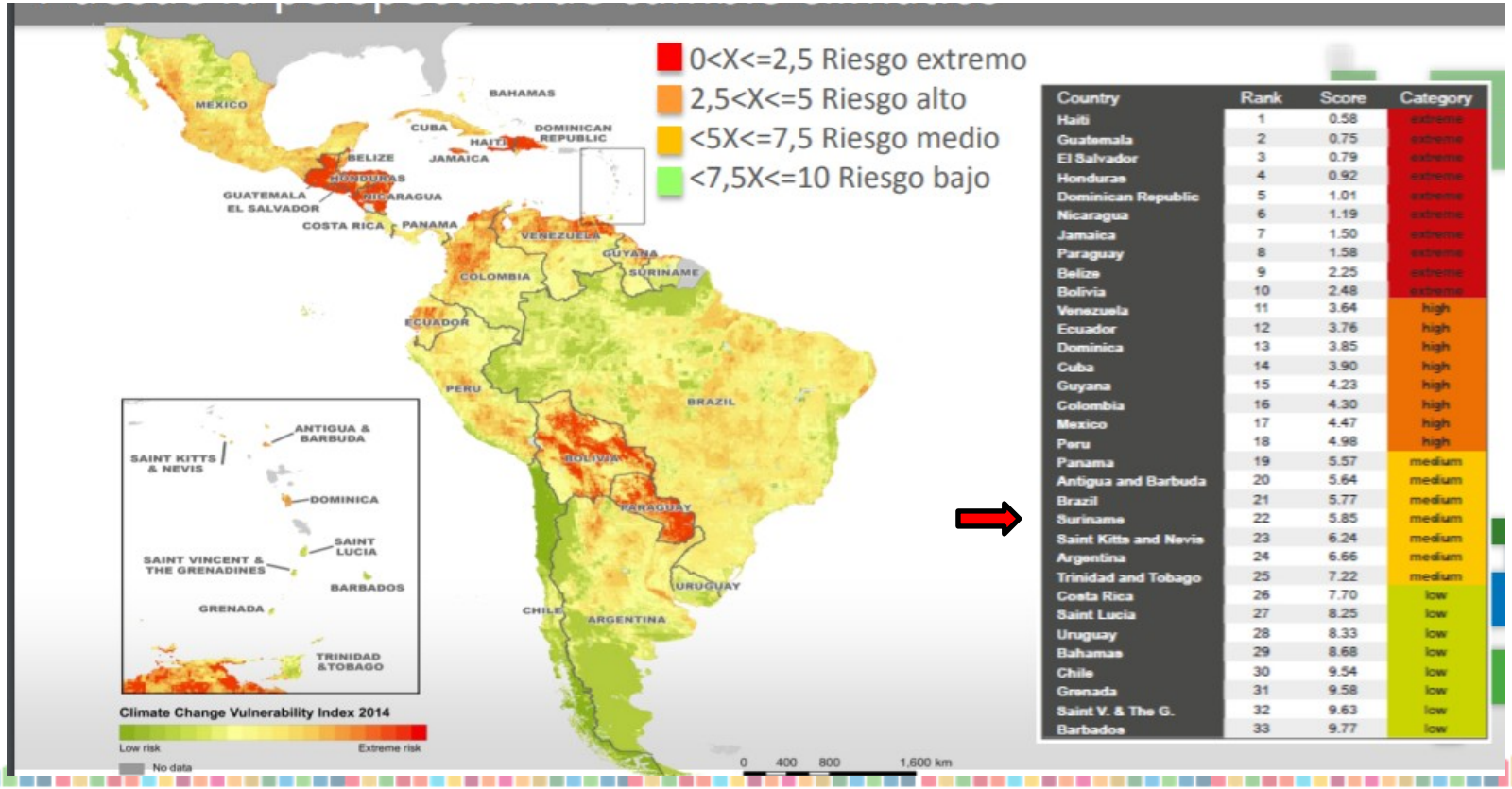


Source: Centre for Research on the Epidemiology of Disasters (CRED) Catholic University of Louvain. The International Disaster Database (EM-DAT) http://www.emdat.be//Catholic

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.



Country	Rank	Score	Category
Haiti	1	0.58	extreme
Guatemala	2	0.75	extreme
El Salvador	3	0.79	extreme
Honduras	4	0.92	extreme
Dominican Republic	5	1.01	extreme
Nicaragua	6	1.19	extreme
Jamaica	7	1.50	extreme
Paraguay	8	1.58	extreme
Belize	9	2.25	extreme
Bolivia	10	2.48	extreme
Venezuela	11	3.64	high
Ecuador	12	3.76	high
Dominica	13	3.85	high
Cuba	14	3.90	high
Guyana	15	4.23	high
Colombia	16	4.30	high
Mexico	17	4.47	high
Peru	18	4.98	high
Panama	19	5.57	medium
Antigua and Barbuda	20	5.64	medium
Brazil	21	5.77	medium
Suriname	22	5.85	medium
Saint Kitts and Nevis	23	6.24	medium
Argentina	24	6.66	medium
Trinidad and Tobago	25	7.22	medium
Costa Rica	26	7.70	low
Saint Lucia	27	8.25	low
Uruguay	28	8.33	low
Bahamas	29	8.68	low
Chile	30	9.54	low
Grenada	31	9.58	low
Saint V. & The G.	32	9.63	low
Barbados	33	9.77	low

The geospatial dimension of environment statistics

- 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.

The ArcGIS Book: 10 Big Ideas about Applying Geography to Your World

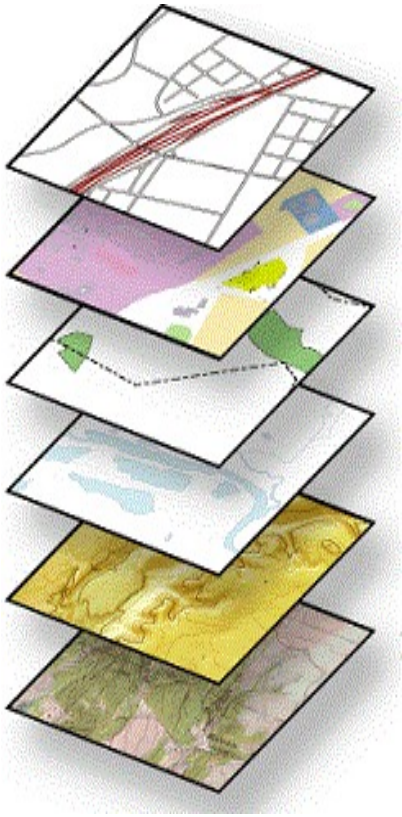
Georeferencing

- *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*

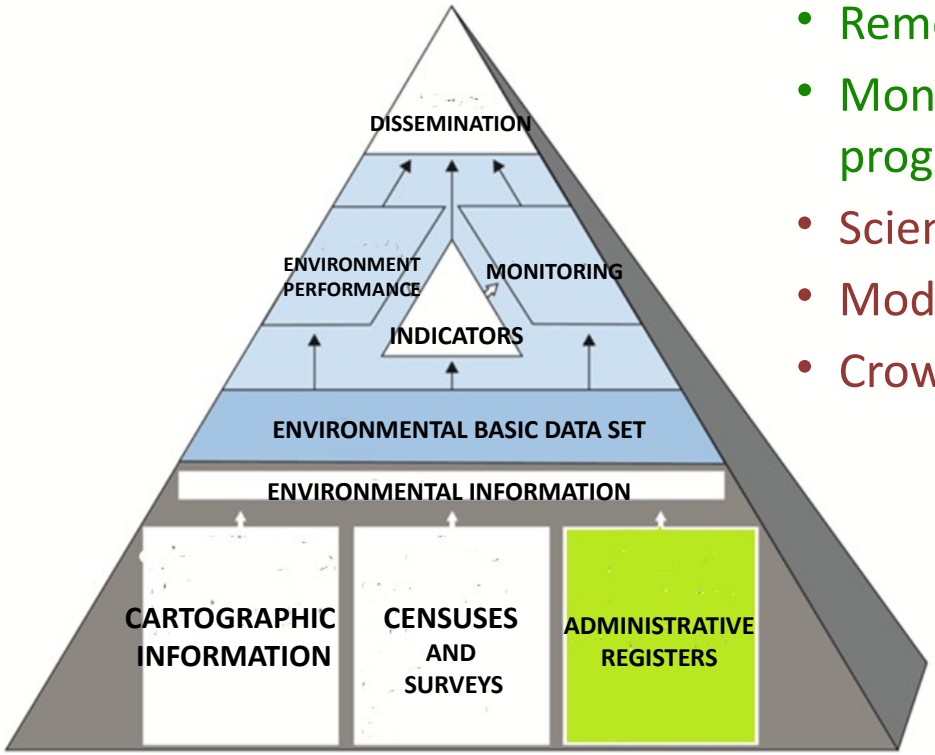
Georeferencing

- 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

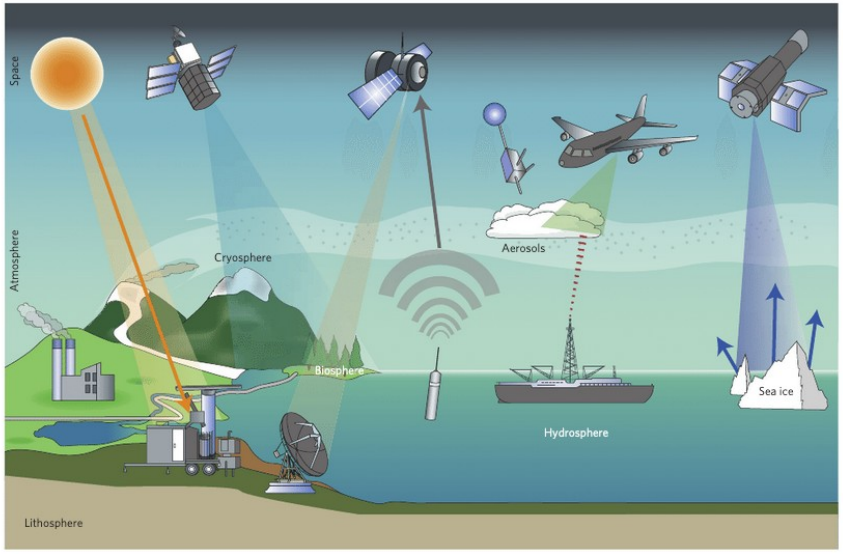
Based on Walter Radermacher, *Green Economy and Official Statistics,* Seoul, July 2011.

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.

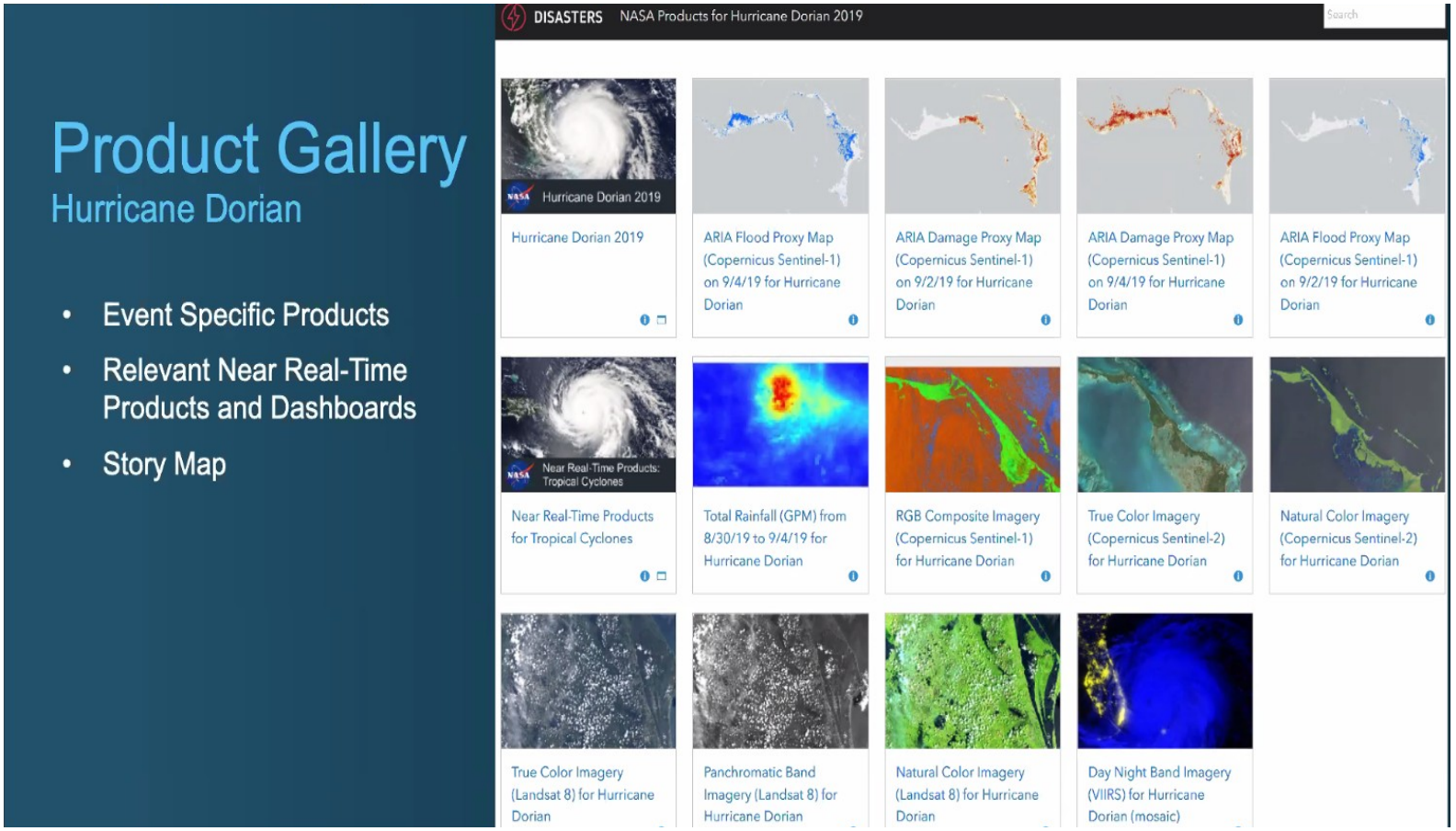
- Data is obtained in digital format from instruments that measure the electromagnetic response of the different elements over the earth's surface.

- These data are subject to be processed applying classification techniques supported by field validations



Data/information sources

NASA products

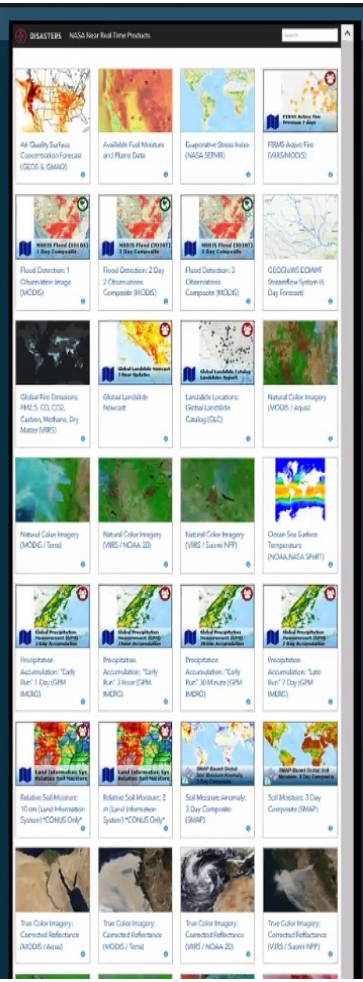


Data/information sources

NASA products

Near Real-Time Products

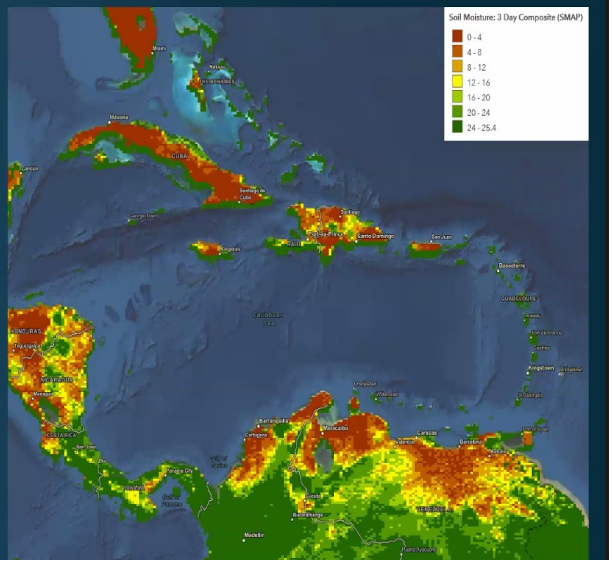
- Global unless noted otherwise
- Coarser resolution
- Automatically updated every few hours to daily or weekly
- Many products for the Caribbean
  - Black Marble Nighttime Blue/Yellow Composite
  - FIRMS Active Fire Points (MODIS, VIIRS)
  - Global Landslide Nowcast
  - Flood Detection – 2, 3 Observations (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

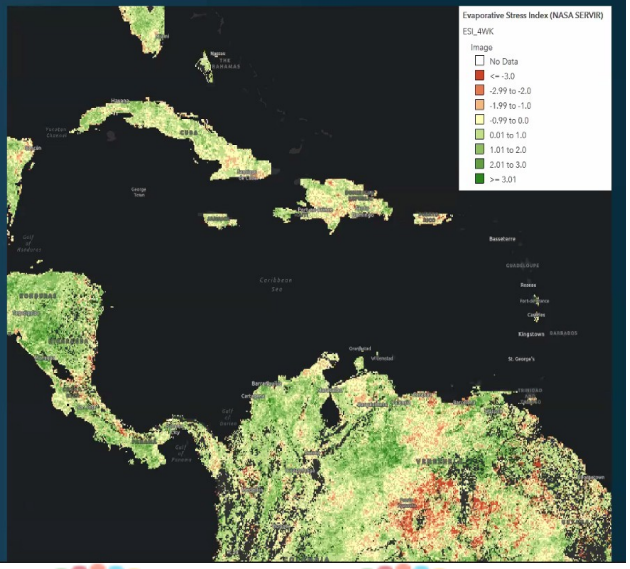
Soil Moisture

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



Evaporative Stress Index

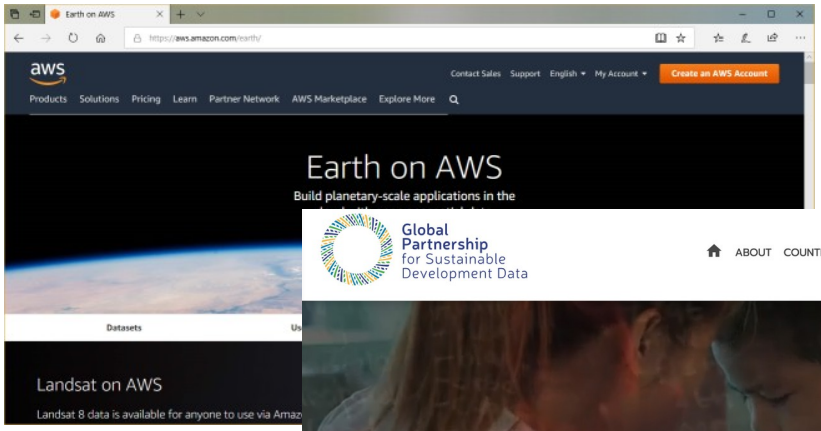
- Weekly product
- Yellow to Red = Dry, stressed vegetation
- Latency = ~2 weeks
- Resolution: 5km

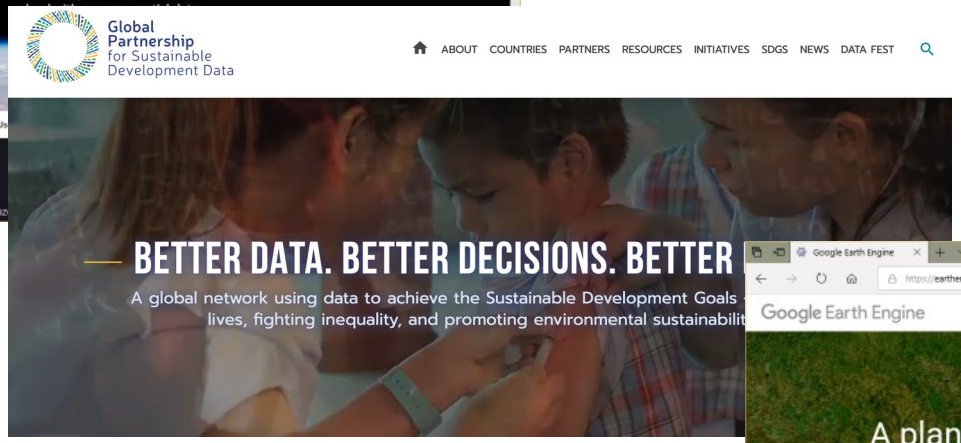


Data/information sources

Data availability through other platforms

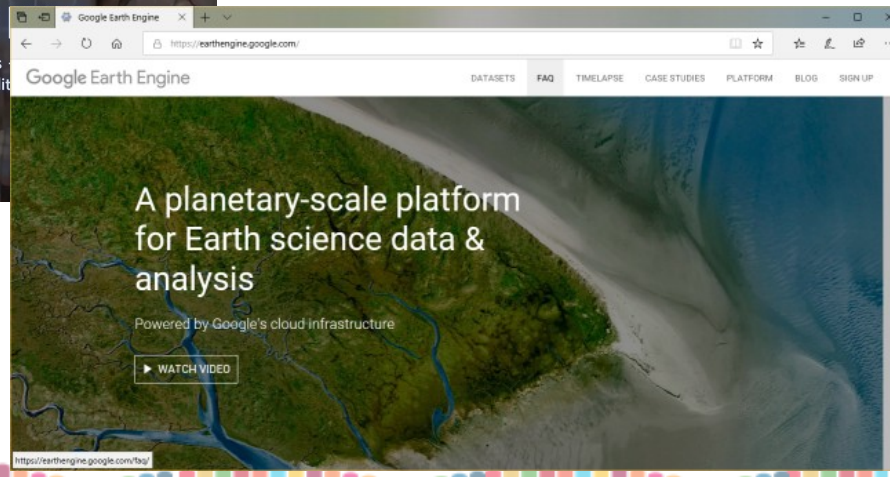
Amazon Web Services:
https://aws.amazon.com/earth/





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.

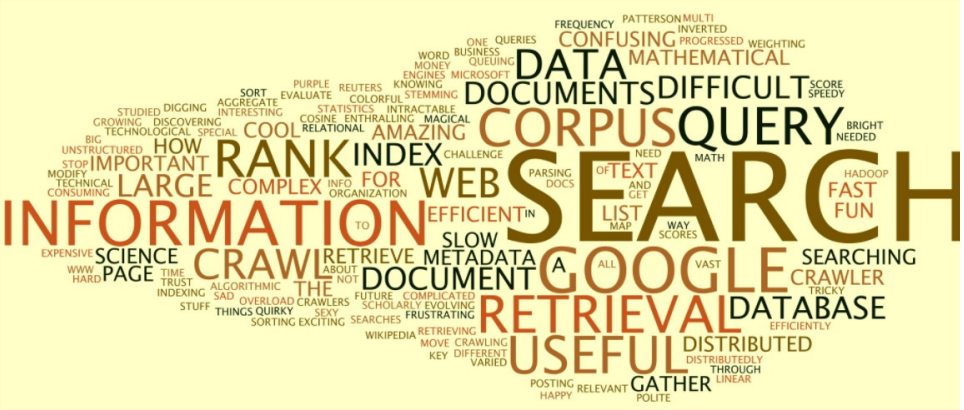
This is possible through a combination of local data and advanced geospatial tools, together with training for everyone working on geospatial challenges across the region.

Conclusion

The web is a source of vast amounts of data, and spatial analysis offers the means to transform it into valuable data for decision-making.

As spatial data and analysis value gain popularity, more methods and models emerge to facilitate the analysis.

GIS analysis helps you to make informed decisions, but it doesn't make the decisions for you. Doing that requires your expertise.



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Thank you for your attention!

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

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