



# *Supporting climate assessments and adaptation planning in Latin America and the Caribbean*

U.S. Department of the Interior  
U.S. Geological Survey

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Chief Scientist for Climate and Land Use Change

*Climate change is already affecting natural and human systems in Latin America and the Caribbean.*

## Summary findings of IPCC WGII Sixth Assessment Report for Central and South America (Chapter 12) focus on:

- High levels of **exposure and vulnerability** in human and natural systems
- Economic, ethnic and social **inequalities are exacerbated**
- Precipitation and extreme temperature impacts on **agricultural production**
- Impacts on **Amazon forest biodiversity and carbon** repositories
- Change in distribution of **terrestrial species** and vectors of **infectious disease**.
- Coastal impacts - **coral reefs, estuaries, wetlands and sandy beaches**
- **Glacial loss** - 30% - 50% decline in extent of Andes glaciers since 1980s
- Synergy among fire, land use change, and climate change, directly impacting **human health, ecosystem functioning, forest structure, food security and livelihoods**
- Sensitivity to **climatic-related migrations and displacements**

# IPCC (2022) assessed climate change impacts in 8 Regions of Central and South America

## Examples of observed change in Southwest South America (SWS):

↑ Glacier mass loss and glacial lake size

↑ Glacier lake outburst floods, avalanches, debris flows and lahars

↑ Temperatures, ↓ precipitation, and long-term drought affecting streamflow in rivers that supply megacities, e.g., Santiago

↓ Groundwater availability

↑ Number of fires and areas burned in Chile (1946- 2017)

### Geographical scope of Central and South America

Central America (CA)\*

Northwestern South America (NWS)

Northern South America (NSA)

South America Monsoon (SAM)

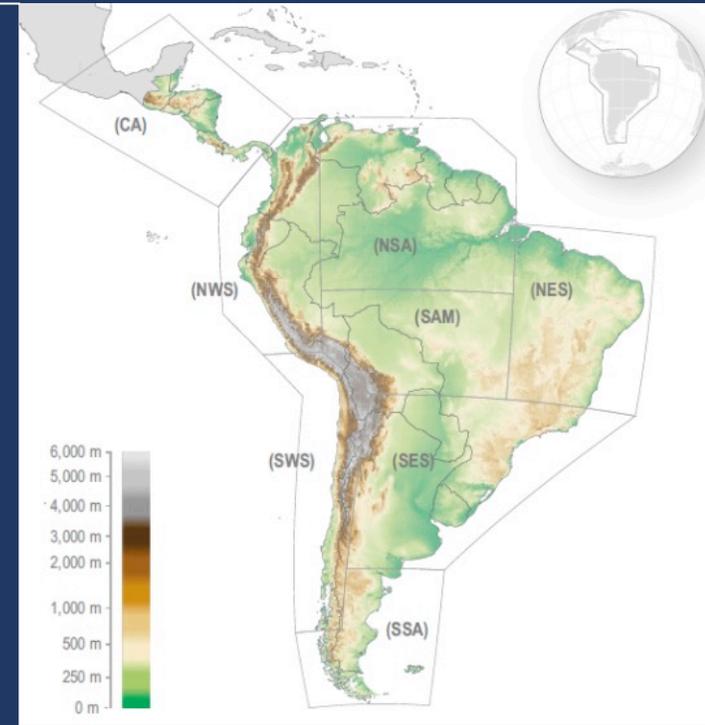
Northeastern South America (NES)

Southwestern South America (SWS)

Southeastern South America (SES)

Southern South America (SSA)

\* Different from the WGI South Central America (SCA) which includes the southern part of Mexico. Small Islands are covered in Ch. 15



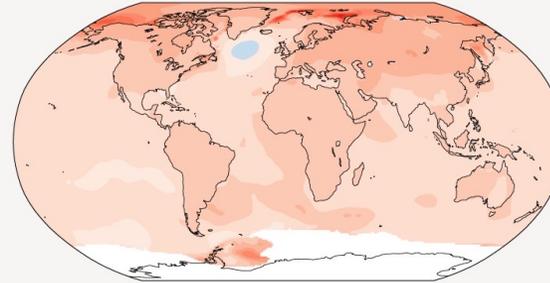
(Source: IPCC AR6, WGII Chapter 12, 2022)

# With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture

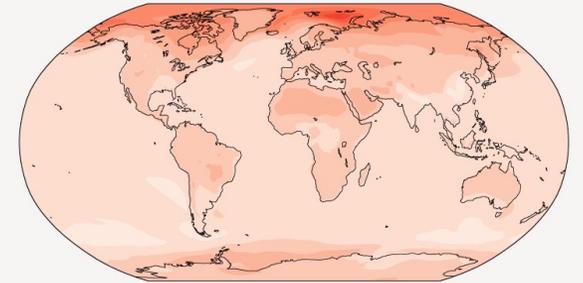
## a) Annual mean temperature change (°C) at 1 °C global warming

Warming at 1 °C affects all continents and is generally larger over land than over the oceans in both observations and models. Across most regions, observed and simulated patterns are consistent.

Observed change per 1 °C global warming



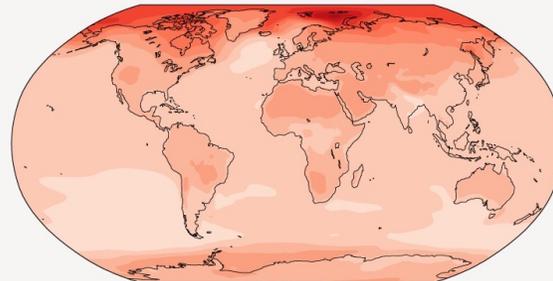
Simulated change at 1 °C global warming



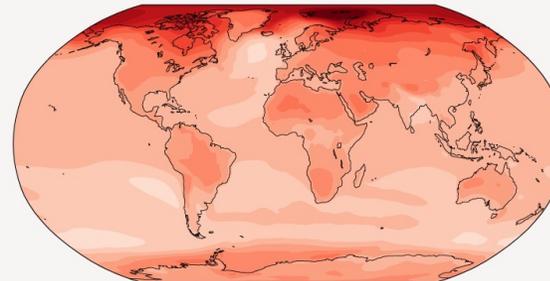
## b) Annual mean temperature change (°C) relative to 1850-1900

Across warming levels, land areas warm more than oceans, and the Arctic and Antarctica warm more than the tropics.

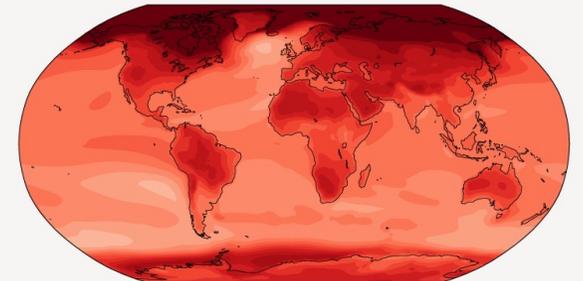
Simulated change at 1.5 °C global warming



Simulated change at 2 °C global warming



Simulated change at 4 °C global warming



# Observed and Projected Changes in Temperature

(Source: AR6 WG I, SPM, 2021)

# Projected impacts in South and Central America (AR6 WG II)

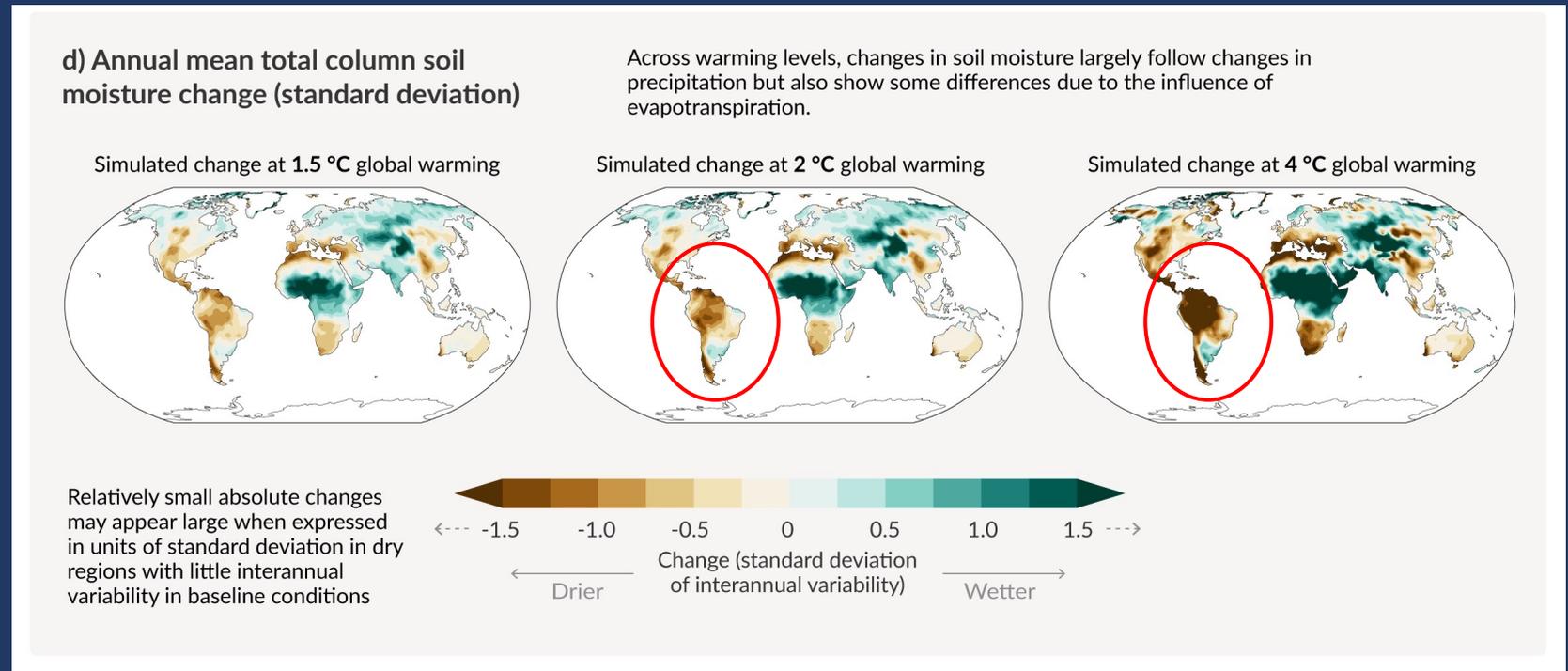
Climate change is projected to convert existing risks into 8 “severe key risks”:

1. Food insecurity due to droughts
2. Water insecurity -- declining snow cover, shrinking glaciers and rainfall variability
3. Risk to people and infrastructure -- floods & landslides
4. Increasing epidemics, especially vector-borne diseases
5. Cascading risks -- surpassing public service systems
6. Large-scale changes & biome shifts in the Amazon
7. Risks to coral reef ecosystems
8. Risks to coastal socio-ecological systems due to sea level rise, storm surges and coastal erosion

## Soil moisture change

simulated at 1.5°, 2° and 4° C global warming

(Source: AR6 WG I, SPM, 2021)



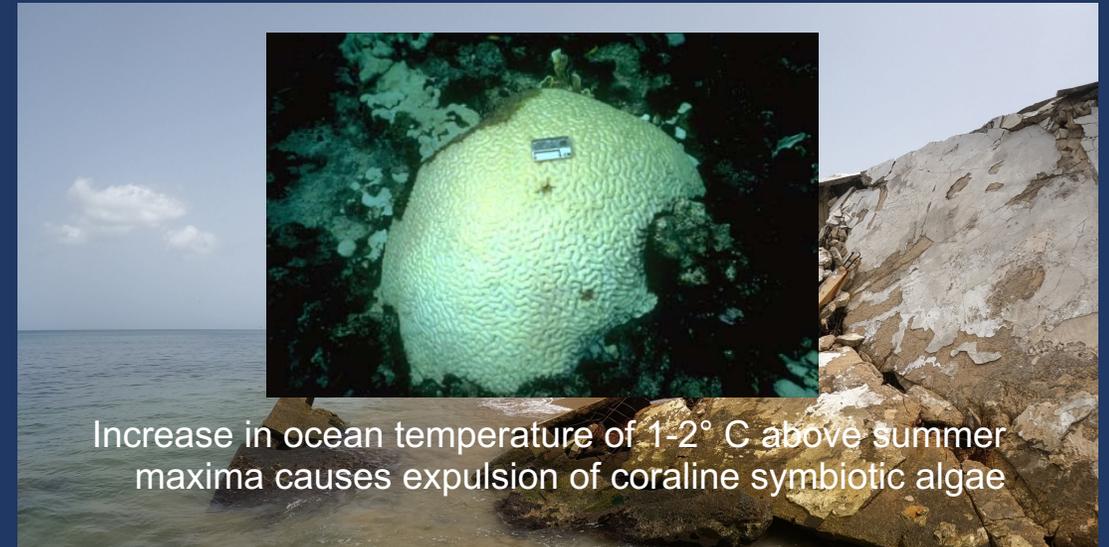
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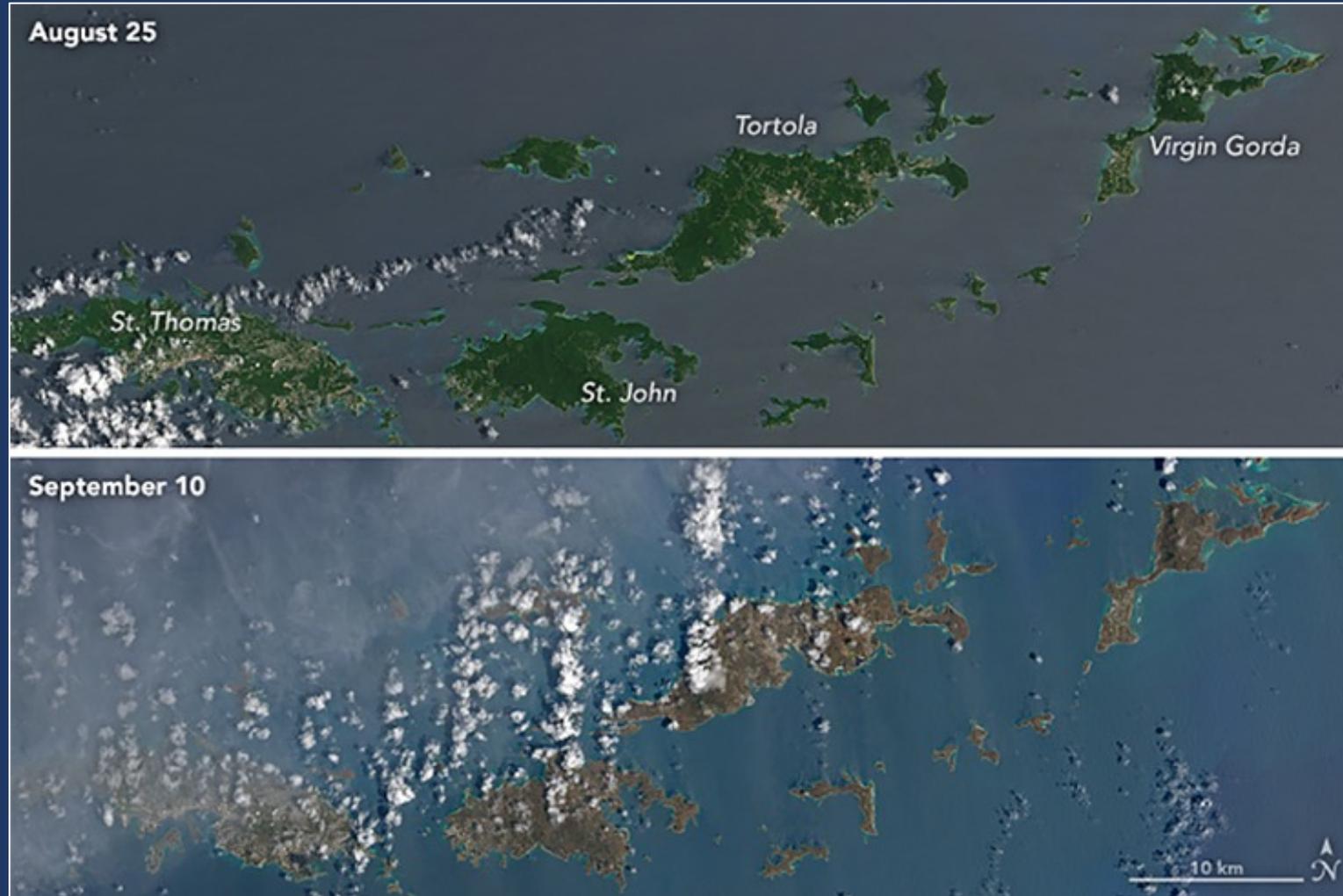


Hurricane Mitch caused over 9,000 fatalities, 3 million people displaced, countrywide flooding, and 500,000 landslides in Honduras alone (USGS photo)

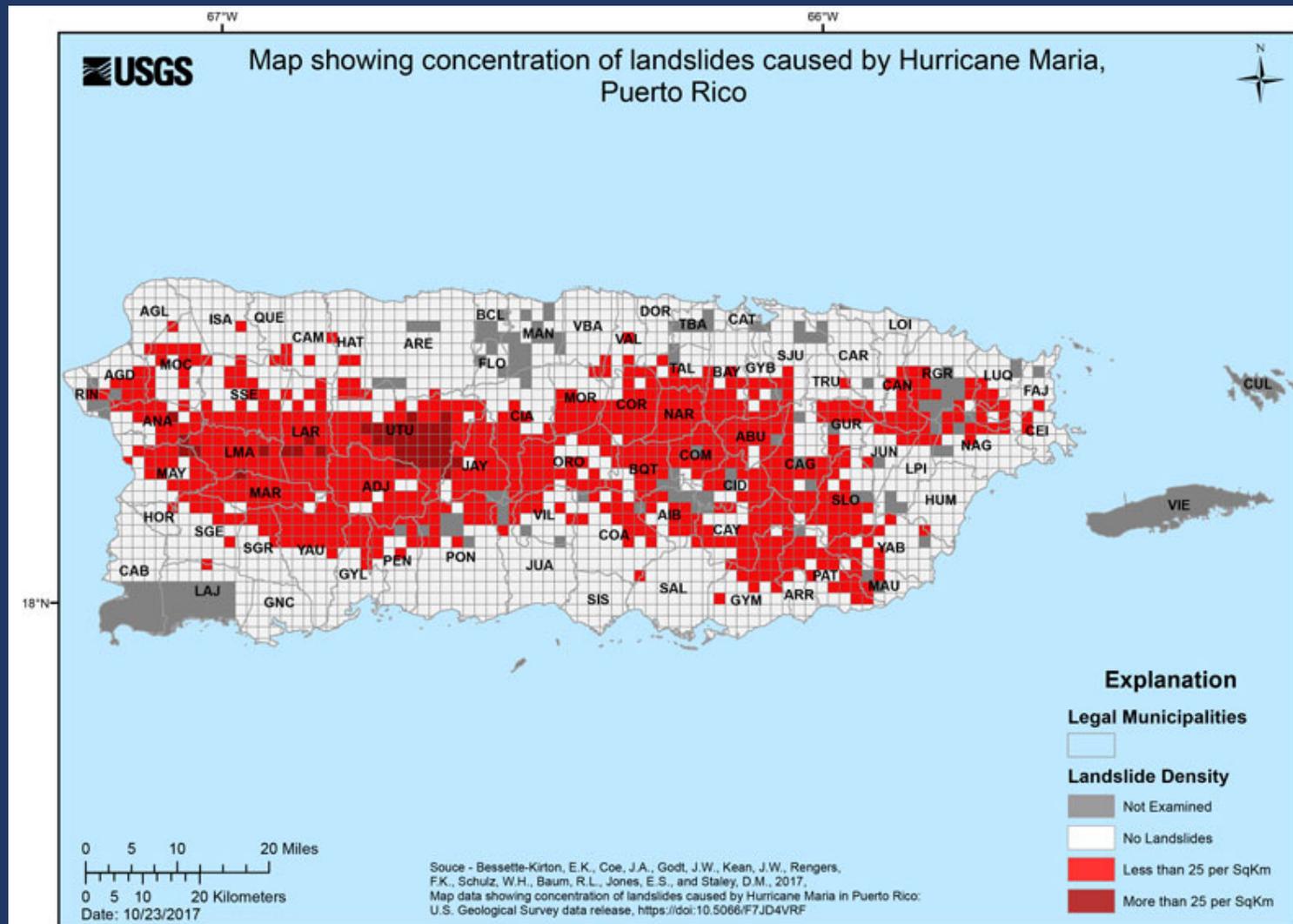


Buildings destroyed during Hurricane Maria in Rincón, Puerto Rico. USGS photo taken August 28, 2021, almost four years after the hurricane.

# Hurricanes and sea level rise pose existential threats to many Caribbean nations



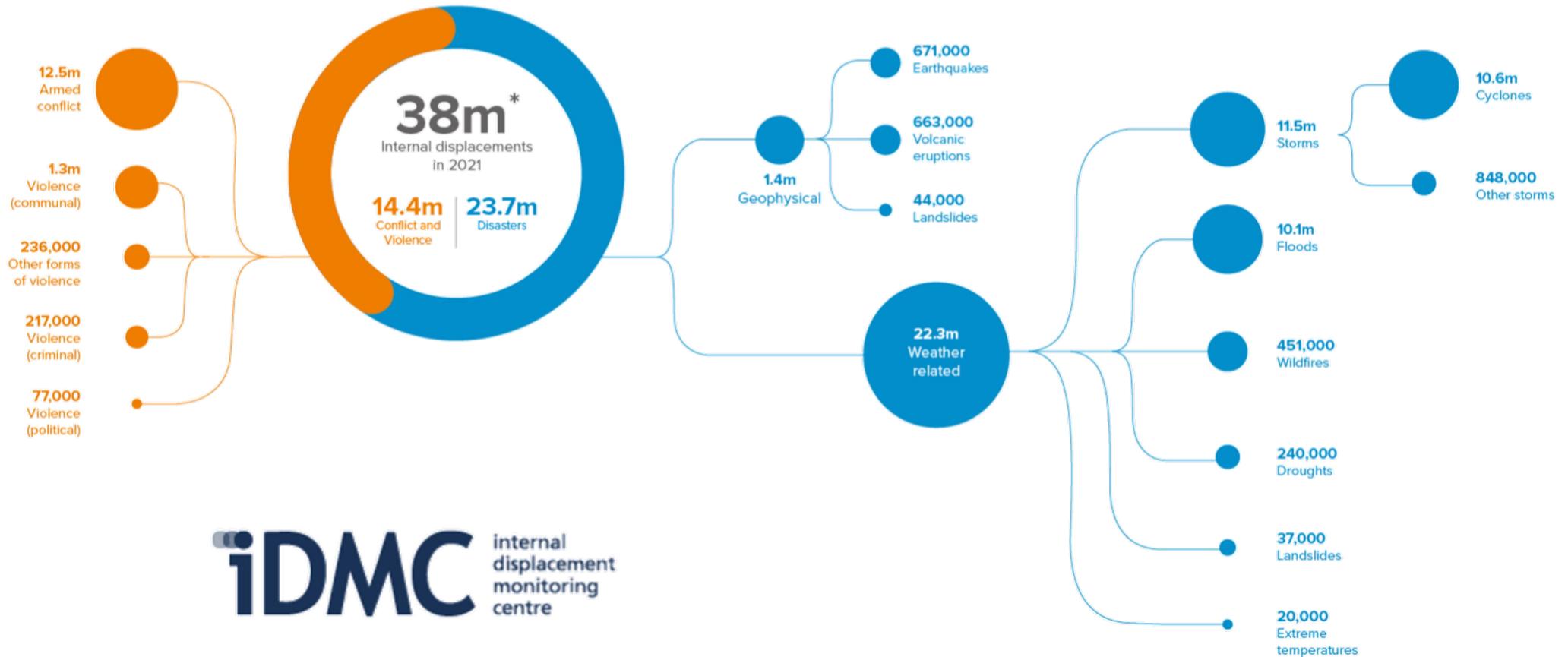
Caribbean Islands before and after Hurricane Irma, 2017



## Hurricane Maria made landfall in Puerto Rico as a Cat 4 hurricane, Sept. 20, 2017

- Estimated 2 - 3,000 dead and **net out-migration of over 200,000 people**
- Entire electric grid failed; water and communication systems inoperable
- One of largest US disaster housing missions (166,000 homes destroyed)

# Internal displacements breakdown by conflict, violence and disasters in 2021



# The Americas

## Internal displacements in 2021



**Conflict and violence**

381,000

**Disasters**

1,659,000

5.4% of the global total

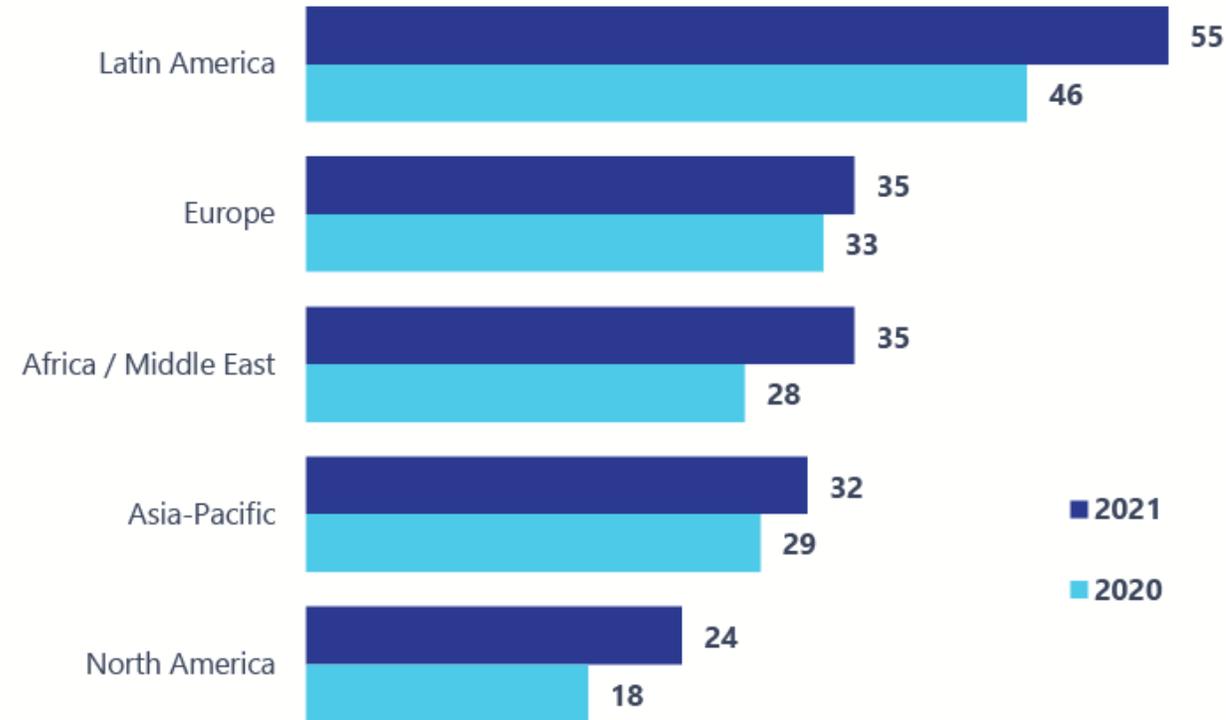


<b>1</b>	United States	<b>2</b>	Brazil	<b>3</b>	Haiti
	573,000		21,000 449,000		20,000 220,000
		<b>4</b>	Cuba	<b>5</b>	El Salvador
			194,000		175,000 550

**iDMC** internal displacement monitoring centre

## People Feel Increasingly Affected by Climate Change

"Greatly Affected," by Region, 2020–2021



Around the world, more people feel "greatly affected" by climate change than a year ago.

This sentiment has increased across all regions and is highest in Latin America, where a majority now feel greatly affected by climate change. While this is lower in North America, there is still a significant increase in the number of people who feel climate change is greatly affecting them.

This figure will likely continue to grow as temperatures rise and extreme weather events intensify, leading to increasing public pressure for strong action on climate change.

Source: GlobeScan Radar Report 2021 (survey of 30,000 people in the general public in July 2021)

# AmeriGEO convened in virtual Plenary Session in 2021

- Ministerial roundtable – every country represented addressed climate change and the need for data and tools to help Nations in the Americas adapt.
- Americas Caucus adopted climate change as a cross cutting theme of the work of AmeriGEO.
- Theme of AmeriGEO Week 2022: “Human Migration in Focus” - 804 participants

*Consensus - A foundational understanding of climate change and consequences is essential for successful adaptation. Data, expertise and assessment needs vary among countries; capacity is strong but uneven.*



# AmeriGEO

**20 member countries  
of the Group on Earth  
Observations (GEO)**

**Leverages National  
GEOs and networks  
to facilitate  
engagement among  
communities and  
stakeholders**



**Integrated approach to  
regional initiatives and  
capacity development**

**Empowering local and  
indigenous  
communities**

**Build capacity in GEO-  
member countries by  
leveraging existing  
expertise, technology,  
and efforts in-country  
and across the region**

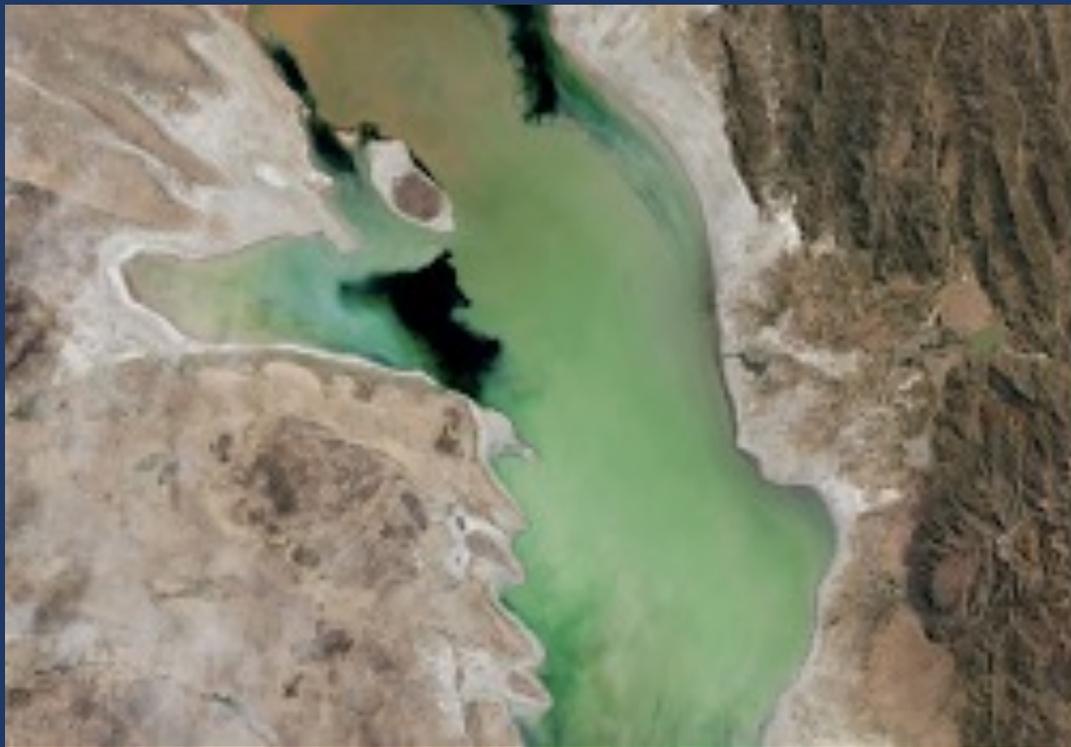
# Earth observations

Earth observations (EO) are data and information collected about our planet, whether relating to the atmosphere, oceans or land.

This includes satellite imagery, space-based or remotely-sensed data, as well as ground-based or in situ data - sensors in, on or around the Earth.

EO is foundational to climate impact and adaptation science – enables “scaling up” across time and space.





## Lake drought in Bolivia

Earth observations were essential  
in assessing timing and extent of  
drought and its impacts on water  
availability

September 1984 - September 2016

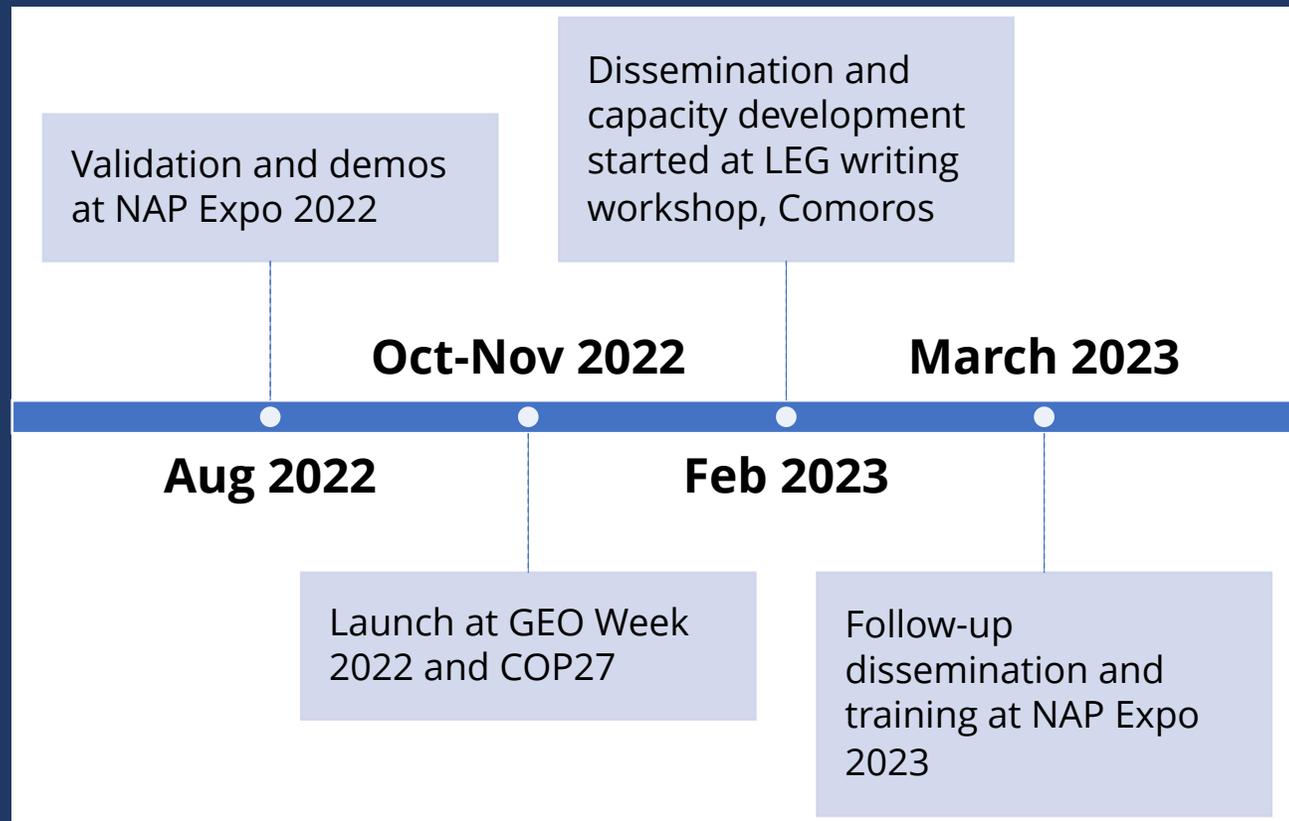


(Source: NASA Images of Change, 2021)

## GEO Supplement to integrate Earth observations into NAPs



**Key steps to establish a National Agriculture Monitoring System and support the implementation of NAPs with timely and accurate EO-based information for food security programmes and policies**



**Countries can access technical assistance and capacity development for project proposals generation**

# AmeriGEOSS Platform Transforming Data for Decision Making

# Regional GEOs - designed by GEO-member nations and their partners to meet specific regional needs

## SEARCH DATA

Use keyword searches to find and quickly display content, e.g., water or agua

645.4k

DATASETS

54

ORGANIZATIONS

58

GROUPS

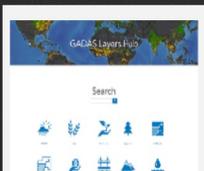
## FEATURED MAPS, TOOLS, AND APPLICATIONS



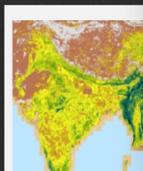
USA Soil Survey (Mature Sup...



EcoExplorer



Global Agriculture Disaster A...



Sentinel-2 Imagery: map



English

Spanish



1 UPCOMING TRAININGS

Register

435 ON-DEMAND WEBINARS

Watch

6 PAST SESSIONS

Watch

48 SELF-PACED COURSES

Enroll

30 REGISTERED PARTNERS

Visit

## Welcome to the Inter-American Academy of Geosciences & Applications

Partners in the Inter-American community are working to build capacity to advance the use of Statistical, Earth Observation, Geospatial and other Data to improve understanding and promote data-driven decision-making.



AmeriGEO is proud to host the Inter-American Academy of Geosciences & Applications on behalf of a growing network of public and private institutions, academia, and commercial partners.

Our Partners



**Capacity building effort with over 600 participants annually**

**Virtual event organized by CONIDA and other ministries and organizations.**

**Engages participants from across regions, sectors, and backgrounds**

A satellite in space is the central visual element. The satellite is gold-colored with a blue solar panel array extending from its side. The background is a view of Earth from space, showing green landmasses and blue oceans. The satellite is positioned in the upper right quadrant of the image, with its solar panel array pointing towards the bottom right. The text "Peru Mapathon" is overlaid on the satellite and the Earth background.

# Peru Mapathon

**Breaks barriers to access to opportunities**

**Empowering local and indigenous communities**

**Provide solutions issues related to natural disasters while simultaneously building capacity through workshops and trainings**

**23 Participating members from across the region**

**Builds networks and relationships between students and early-career professionals and national organizations**

**Student project development for University internship credits under AmeriGEO Sponsorship**

The background of the entire page is a photograph of several laptops on a dark table. In the foreground, a person's hands are visible, typing on a silver laptop. The image is slightly blurred, creating a sense of activity and focus on technology.

# GEOPathways Americas

**Student-led courses and workshops in GIS and imagery analysis**

**Student-led projects including technologies, tools, mapathons and other events**

**Collaboration with national GEOs to build tools and leverage citizen science**



# Other Regional Initiatives

## SERVIR Amazonia/GEOGLoWS

**GEOGLoWS-ECMWF** forecast service adopted as authoritative data by hydromet services in Ecuador, Colombia, Peru, Brazil, and the Dominican Republic

Responds to the priorities related to development and transfer of technology to strengthen early warning systems

## National GEOs

Helping establish and coordinate efforts among National GEOs

## COSTA

Coordinated effort between NOAA and AmeriGEO to build regional capacity for oil spill surveillance

Peru, Mexico, Trinidad and Tobago have implemented operational 24/7 monitoring programs





- Subcommittees of the US White House Committee on the Environment, each has legislative authority and structure for international collaboration
- USGEO has authority for US engagement in GEO and AmeriGEO
- USGCRP is the lead for US national climate assessments, federal climate change science, and US contributions to IPCC
- USGCRP international partners include InterAmerican Institute for Global Change Research, WCRP, Future Earth and START



NCA4  
(2017, 2018)

# LACI

Mejorar la Capacidad de Evaluación de Riesgos Climáticos y Catalizar Alianzas para Informar Decisiones en América Latina y el Caribe

Enhancing Capacity for Climate Risk Assessment and Catalyzing Partnerships to Inform Decisions in Latin America and the Caribbean



# LACI Vision

To provide opportunities for partnerships between Caribbean, Latin American, and North American countries to enhance capacity for climate risk and vulnerability assessments that would support local and regional decision-making in response to climate change impacts.

# LACI design

**Collaborative Effort**, grounded in **co-design**  
USGCRP, USGEO, AmeriGEO, IAI, & others

## **Phase 1 (Scoping):**

Argentina, Brazil, Canada, Chile, Colombia,  
Ecuador, El Salvador, Jamaica, Mexico,  
Panama, Paraguay, Peru, Uruguay, & USA

# Progress to Date

## Phase 1: Scoping

Partnership Building  
Landscape Mapping

2 Workshops

2 Surveys

In-depth NAPs Analysis

## Phase 2: Pilot Co-Development

9 original Pilot concepts from 10 countries submitted

Concepts stock take

4 Pilot clusters formed

4 Task Teams stood up

Continuous regional engagement

Pilot activities  
co-design

Nov  
2021

Aug  
2022

Sept  
2022

Oct  
2022

Nov  
2022

Dec  
2022

Jan  
2023

Feb  
2023

Mar—Jun 2023

# Common themes of the 9 Initial concept notes:

- 1) data access, usability and interoperability;
- 2) enhancing cross-stakeholder communication to advance climate risk and vulnerability assessment;
- 3) assessing cascading climate risks (e.g., climate-induced disasters, climate impacts on water resource, human habitat, biodiversity)

# Stock take: guiding considerations

- Alignment with the LACI vision
- Concise statement of knowledge challenge/gap, and how this activity would address the gap
- Strong DEI component
- **Scalability** and relevance
- Endorsement by or affiliation with the UNFCCC focal point
- Availability of applicable data/information/tools/methods/resources

# LACI 2023-2024

4 Task Teams formed to co-design  
Pilot activities

## **SRI 2023** - Pilots Announcement

Panama City, Panama, June 26-30

## **AmeriGEO Week**

San Jose, Costa Rica, Aug 7-11

## **UNFCCC COP28**

Dubai, United Arab Emirates, Nov 30-Dec 12, 2023



## Near Term Opportunities

GEO NAP guidance and dissemination, finance proposal generation (GEO GLAM assistance, national framework for crop monitoring based on EO) training tomorrow at 4 pm

LACI – open to additional collaborators in the design of pilots

Future Earth - PEGASuS 6 Call for proposals on Risk, Response, and Responsibility

IAI – Belmont Forum call for Collaborative Research Action on the Amazon and tropical forests

USAID funding opportunities - Climate Smart and Disaster Ready, PREPARE

# NAP EXPO 2023

## Sessions on Earth observations for NAPs

### SCALING UP ADAPTATION

#### Day 1

- 1.3.2 Preparing for adaptation with Earth observations in the LAC region (GEO, AmeriGEO)

#### Day 2

- 2.2.1 Towards new guidance to develop and implement coastal adaptation integrating climate science (GEO, GERICS, WMO, CSIRO, GEO Blue Planet)
- 2.4.4 Supporting the implementation of NAPs with Earth observations solutions (GEO, GEOGLAM, Digital Earth Africa, WMO)

#### Day 3

- 3.3.2 Measuring adaptation with remotely sensed data products (GEO)



**To learn more about LACI & get engaged:**

[www.globalchange.gov/laci](http://www.globalchange.gov/laci)

**Thank you!**