# Space and Disaster Management

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# Contents of the Presentation

- An Overview of the type of disasters that affect Latin America and the Caribbean.
- The need to change from a reactive approach to disaster management to a preventative approach
- The importance of space science and technology in providing information to decision-makers
- Space tools for solutions to flooding
- The need for capacity building and what is being done through coordination and cooperation

# Disasters in Latin America and the Caribbean

Inter-American Development Bank (2000)

- Between 1970 – 2000, an average of 32.4 disasters per year in LAC
  - 226,000 fatalities (or around 7,500 deaths a year)
  - Estimate annual average cost between $700M & $3.3 billion.
- Disasters result in negative short-term effects on GDP growth
- In some cases, longer-term economic consequences, (slower growth, higher indebtedness and higher regional and income inequality
- Environmental and social costs are also substantial.

# Disasters in Latin America and the Caribbean

Natural disasters: Temporary events triggered by natural hazards that overwhelm local response capacity and seriously affect social & economic development.

- Due to geographical conditions, LAC is prone to natural events of severe intensity.
- BUT - large economic and human cost is mainly due to extreme vulnerability.
  - Vulnerability due to the pattern of socioeconomic development
  - Inadequate risk management policies
    - In part due to insufficient timely information on risk areas

# Disasters in Latin America and the Caribbean

| Distribution of disasters in Latin America and the Caribbean by sub-regions (1970 – 1999) | | | | |
|---|---|---|---|---|
| **Subregion** | Occurrence (%) | Fatalities (%) | Affected (%) | Damages, $1998 (%) |
| **South America** | 50 | 65 | 75 | 53 |
| **Mexico & Central America** | 28 | 33 | 13 | 31 |
| **Caribbean** | 22 | 2 | 12 | 16 |
| **Total** | 100 | 100 | 100 | 100 |

# Disasters in Latin America and the Caribbean

| Disaster Exposure Indicators in Latin America and the Caribbean by Sub-region (1970 – 1999) | | | | |
|---|---|---|---|---|
| **Subregion** | Occurrence/ thousand km2 | Share of pop killed per million hab | Share of pop affected per thousand hab | Cumulative damages as share of 1998 GDP |
| **South America** | 0.3% | 431.1 | 322.9 | 3.9% |
| **Mexico & Central America** | 1.2% * | 555.1 ** | 147.7 | 7.1% *** |
| **Caribbean** | 10.1% | 3.8 | 486.4 | 43.3% |
| | * 30% without Mexico; | ** 1,467 without Mexico; | | *** 31.8% without Mexico. |

# Type of disasters in Latin America and the Caribbean

The nature of the risk is also different because the three sub-regions of LAC do not face the same type of disasters.

- Nearly half the disasters in South America have been caused by flooding. The two other important triggering events have been slides and earthquakes, while windstorms only caused 7% of disasters.
- In the Caribbean, more than half of disasters were due to wind storms, while flooding was the second major natural event causing disasters.
- Central America is the region that by far faces the biggest variety of disasters, with 31% caused by floods, 26% by wind storms, 19% by earthquakes and 8% by volcanoes

# Take away for Disasters in Latin America and the Caribbean

- 50% of the disasters in LAC occur in South America, 65% of the fatalities, 75% of the population affected & 53% of total damages.
- But, South America's effective exposure to risk is not as high as in Central America or the Caribbean.
- Occurrence per thousand km2 is only 0.3, compared with 10.1 for the Caribbean;
- Central America has a greater proportion of population killed than South America does (especially if Mexico is not counted)
- The Caribbean has a greater proportion of affected population than South America.
- In terms of damages, cumulative losses for 1970-99 represent only 3.9% of the combined GDP of South American countries, whereas they amount to 43.3% for the Caribbean.

# Outlook of the impact of disasters in Latin America and the Caribbean

Instead of a proactive approach towards risk management focused on risk reduction and preparedness, the region continues to rely upon:

- Costly reconstruction; and
- In some cases, on post-disaster international assistance.

**This reactive stance is costly in terms of lives & destroyed assets and appears unsustainable**

- worldwide international assistance decreases
- natural disaster proneness increases everywhere

Improvement of risk management is essential for economic and social development in the region.

# Space science and space applications

UNISPACE III recognized the importance of space for improving our fundamental knowledge of the universe and for improving the daily lives of people worldwide through:

- Environmental monitoring,
- Management of natural resources,
- Early warning systems to help mitigate potential disasters and support disaster management,
- Meteorological forecasting,
- Climate modelling
- Satellite navigation and communications

# Space science and space applications in disaster management

The implementation of the recommendations of UNISPACE III and other cogent initiatives:

- United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER);
  - Partnerships with more than 20 UN entities, international organizations and governments to promote use of space-based tools in global and regional initiatives
    - Third World Conference on Disaster Risk Reduction, (Japan, March 2015) – Sendai Framework for DRR (2015 – 2030)
    - The UN-SPIDER knowledge portal (www.un-spider.org)
    - 17 Regional Support Offices (incl. Argentina, Colombia).

# Space science and space applications in disaster management

The implementation of the recommendations of UNISPACE III and other cogent initiatives:

- Group on Earth Observation Satellites (GEO; 97 Members & 87 participating organizations, including OOSA and SWF);
  - Developing Global Earth Observation System of Systems (GEOSS)
  - Nine SBAs, including Disasters
  - Dedicated Secretariat

  (http://earthobservations.org)

# Space science and space applications in disaster management

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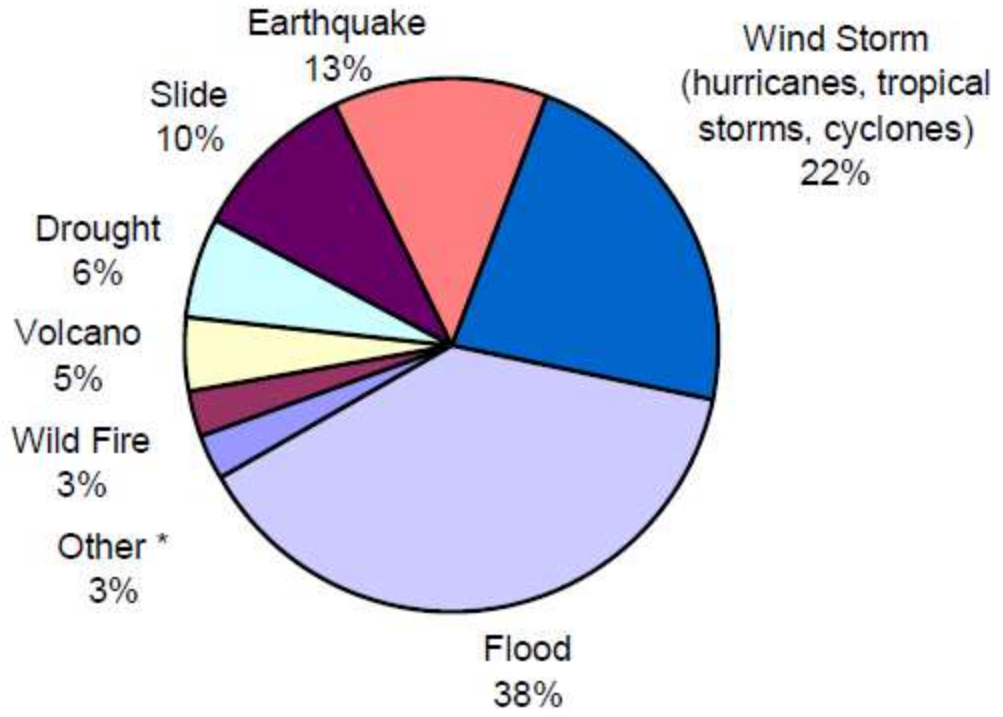
# Distribution by Disaster Type (Latin America and the Caribbean, 1970-99)




Source: Data from CRED (1999).

*Famine, insect infestation, wave/surge and extreme temperature.

# Space science and space applications in disaster management

The implementation of the recommendations of UNISPACE III and other cogent initiatives:

- International Charter on Space and Major Disasters (U-III, 2000); collaboration among 15 space agencies to provide satellite-derived info & products to support disaster response efforts.
- Famine Early Warning Systems Network (FEWS) and the Regional Visualization and Monitoring System (SERVIR) - USA
- DLR Center for Satellite-based Crisis Information (ZKI) – Germany, operational mapping and analysis tasks for disaster events worldwide
- Sentinel Asia (like the Charter; for Asia)
- Others

# Flooding and hydrological Disasters in Latin America and the Caribbean

Weather is of interest to people, as it affects agriculture, industry, transportation and many of our daily life activities.

However, it sometimes threatens our safety and even our lives when extreme weather events such as hurricanes, typhoons, ice storms, tornados, tropical and winter storms come upon us with little warning. Extreme weather events can cause floods, coastal storm surges and landslides.

There are also weather events that are longer time in the making. In this case, flooding and drought are “creeping” disasters due to periodic phenomena like El Niño or La Niña or due to weather patterns that may be caused by climate change.

# Space solutions for flooding & hydrological Disasters

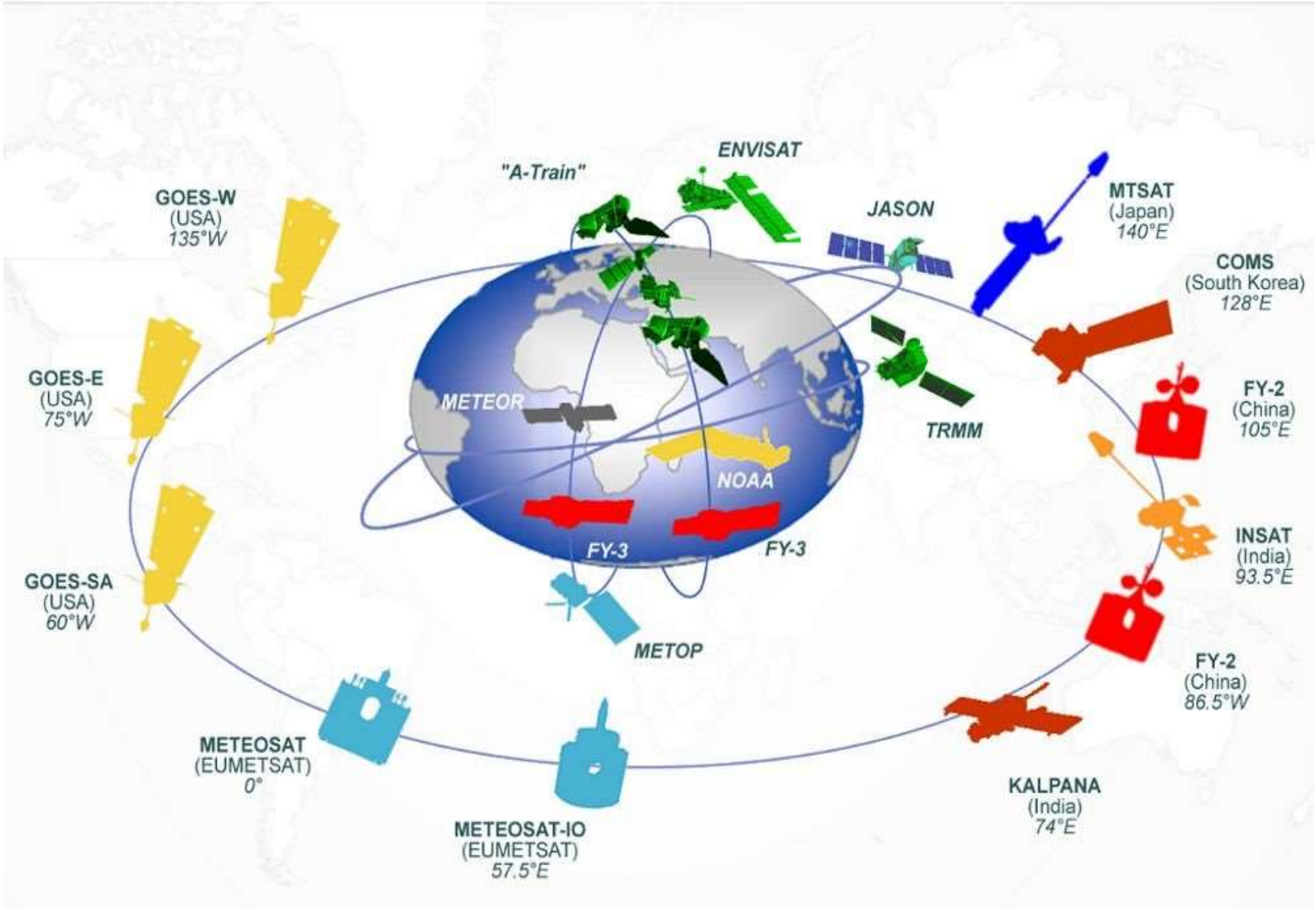
Earth Observation data from geostationary and low-Earth orbiting satellites to:

- Mitigate the impacts of extreme weather events; and
- Facilitate civil protection activities following flooding events

The Global Observing System (GOS) provides observations of the state of the atmosphere and ocean surface for preparation of:

- Weather analyses,
- Weather forecasts, advisories and warnings,
- Climate monitoring and environmental activities.

# The Global Observing System
## (representation not up to date)



# Space providing accurate and timely information for decision-makers

- Space science and technology can provide accurate and timely information for decision-makers
- Use of that information makes a major contribution to the well-being of humanity and, specifically, to achieving economic, social and cultural development
- Hence, the long-term sustainability of space activities is a matter of interest and importance not only for current and aspiring participants in space activities, but also for the international community as a whole.

# Building capacity to use space tools

- Broad international agreement that within existing data policies, in situ and space-acquired EO data should be made available at no cost or at affordable prices to the user communities.
- Broad international agreement that there is a need to disseminate awareness of the existence of the data, where and how it can be accessed and that there are several, national and international entities, carrying out Capacity Building activities.

# Building capacity to use space tools

- Several governmental and non-governmental entities carrying out capacity building (CB) activities in the use of EO data. One example:
  - CEOS (WGCapD) – several space agencies participating
  - GEO Secretariat
  - European Commission (through the 2-year EOPOWER Project)
    - EOPOWER is a follow-up to IASON and GEONETCAB
    - Has 13 partners from Europe, Africa, Asia and LAC (CRECTEALC)
    - Promoting the use of EO for development
    - Populating the GeoCab Portal
- Activities carried out are coordinated; they are either complementary or carried out jointly

# Building capacity to use space tools

- **Objectives: Were to find & Access EO images and open-souce software;**

***Workshop on the use of Space Science and Technology in the Prevention of and response to Disasters in Mesoamerica***

***19 – 22 November 2013, Tuxtla Gutiérrez, Chiapas, Mexico***

# Building capacity to use space tools

- Objective: Hands-on training on QGIS and TerraMA2

***Workshop on the use of Open-Source Software and Satellite Data in the Prevention of, and Response to, Disasters in Mesoamerica***

***19 – 23 May 2014, Tonantzintla, Puebla, México***

# Building capacity to use space tools

- **Objective: To make 30m Shuttle Radar Topography Mission 2 (SRTM-2) data available to countries in LAC**

***Higher Resolution SRTM Data & Flood Modelling Workshop***
***25 – 29 May 2015, Tonantzintla and Puebla, Puebla, México***

# THANK YOU

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