



Space and Disaster Management – Focus on Latin America and the Caribbean

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From Response to Resilience: Space and Disaster Risk 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 preventive approach
- The importance of space science and technology in providing accurate and timely information to decision-makers
- Why space tools for solutions to flooding in Mesoamerica
- The need for capacity building and success achieved through coordination and cooperation in a series of three workshops



From Response to Resilience: Space and Disaster Risk Management

Broad range of disasters being dealt with in various for a

- Space Debris
- Space Weather
- **Near-Earth Objects (IAWN, SMPAG: SWF success stories)**
- Impact of natural phenomena to vulnerable populations and infrastructure at risk



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 \$700 M & \$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 – the 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 accurate and 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 km ²	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.



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 in disaster management

The implementation of the recommendations of UNISPACE III led to 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).



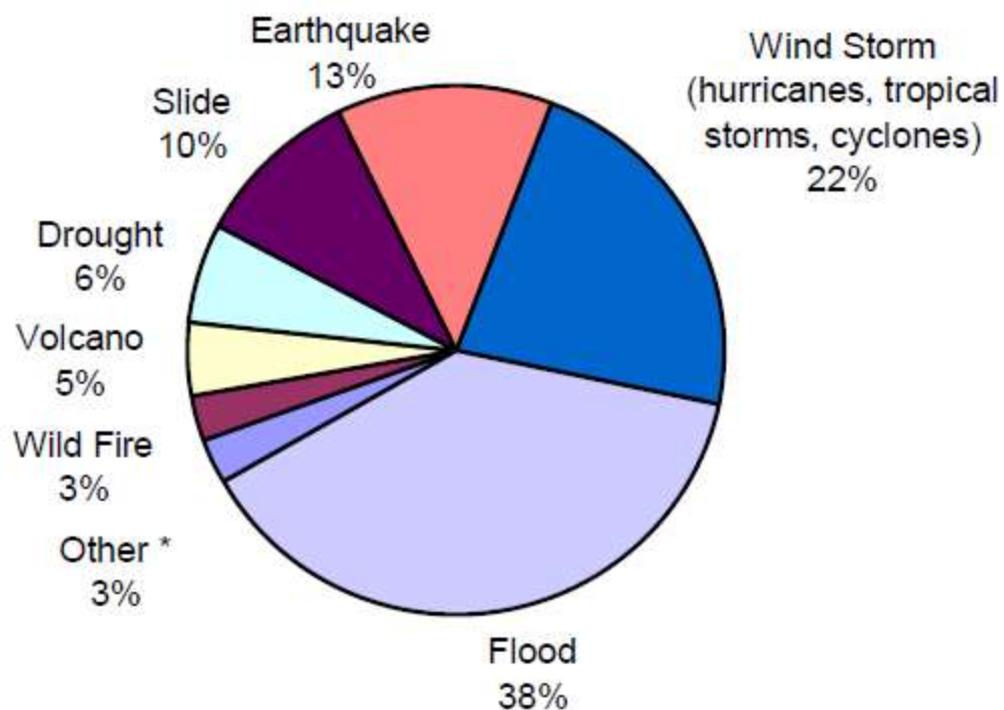
Space science and space applications in disaster management

The implementation of the recommendations of UNISPACE III led to cogent initiatives:

- Group on Earth Observation (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>)

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





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
- **Capacity building in needed to use the technology**



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
- There are several, national and international entities, carrying out Capacity Building activities.



Building capacity to use space tools – a success story

- Several governmental and non-governmental entities carrying out capacity building (CB) activities in the use of EO data coordinated and organized a series of three workshops .
 - WGCapD of CEOS – several space agencies participating
 - UN-SPIDER
 - SWF (Member of WGCapD; coop. w/UN-SPIDER, CRECTEALC)
 - CRECTEALC (Member WGCapD; EOPOWER, coop. w/UN-SPIDER)
 - GEO Secretariat
 - European Commission (through the EOPOWER Project)

Building capacity to use space tools

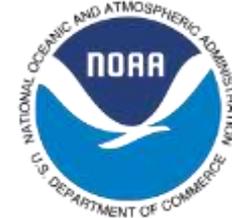
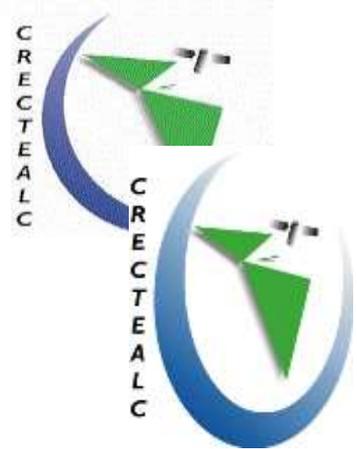


Workshop on the Use of Space Science and Technology for the Prevention of and Response to Disasters in Mesoamerica

19th – 22th November 2013, Tuxtla Gutiérrez, México

Objective: Demonstrate and build capacity in the use of Earth observation images from various satellites for disaster prevention and relief

Building capacity to use space tools



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

- **Objective: Hands-on training in the use of open-source software QGIS and TerraMA2 (model developed by INPE to estimate risk)**



Building capacity to use space tools



Higher Resolution SRTM Data & Flood Modelling Workshop

May 25th – 29th 2015, Tonantzintla and Puebla, México

Objective: Build capacity in the use of the DEM-30m derived from the SRTM-2 data in two open-source flood models, TerraHidro and CREST and make data available to LAC countries

Building capacity to use space tools



Dr. Sergio Rosim (INPE) explaining the use of TerraHidro



Impact of the series of workshops

1. Several participants indicated their intention to use TerraHydro and CREST in their work.
2. Some felt confident to provide similar training to other colleagues **SRTM DEM-30m data sets provided by NASA/USGS.**
3. A representative of INEGI proposed to establish a working group to exchange experiences in the use of DEM-30m in flood models and to arrange for further national and regional training. The proposal was supported by other participants.
4. It was agreed that to **establish the working group**, focal points would be identified. The focal points would coordinate to develop a work plan.



Proposed elements for the work plan

1. Replicate the course on use of the SRTM-30m DEM in CREST and TerraHidro at the national level; institutions from Mexico and Uruguay have indicated interest in organizing courses.
2. Cooperative development of additional modules for the TerraHidro model, coordinated by INPE. INAOE/CRECTEALC will participate.
3. Further training in TerraMA², coord. by Laboratório de Análise e Processamento de Imagens de Satelites (Brazil). This would focus on drought to prepare for use of data from the SMAP satellite.
4. Training course on data from the SMAP satellite for drought applications; (CRECTEALC/JPL/others). To be held the week prior to the Plenary and Ministerial Meetings of GEO (Mexico City, Nov. 2015) if funding can be raised in time. Otherwise a later date will be chosen.
5. Other proposal to be made by Working Group



THANK YOU

Secretariat

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