5th UNITED NATIONS INTERNATIONAL CONFERENCE ON SPACED-BASED TECHNOLOGIES FOR DISASTER MANAGEMENT

Brazilian Civil Defense: challenges for effective responses during emergencies.

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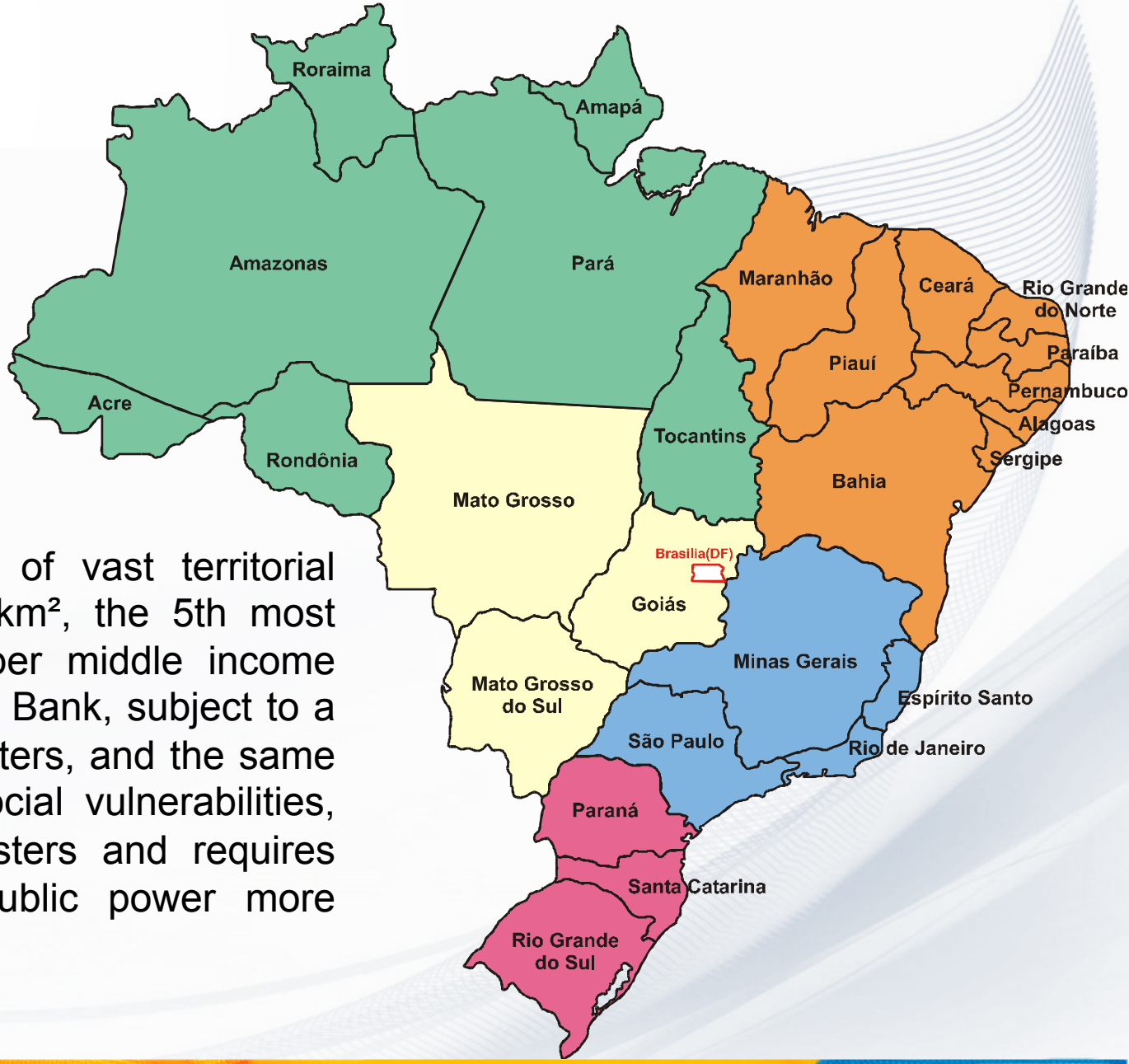
OBJECTIVES:

- To demonstrate how the protection of political and civil defense is organized in the country;
- To see how frequently disasters occur in various regions of the country;
- To check the gaps and flaws in risk areas of mapping activities, remote sensing technologies (weather stations, radar and satellites);
- Difficulties
- Challenges we have to implement an efficient response
- Examples of good practice and initiatives in alignment with the Priority 4 of Sendai Framework

OVERVIEW OF BRAZIL



BRAZIL is a country of vast territorial extension, 8.516.000 km², the 5th most populous country, upper middle income according to the World Bank, subject to a variety of natural disasters, and the same time with immense social vulnerabilities, which intensifies disasters and requires rescue teams and public power more efficient.

OVERVIEW OF BRAZIL

Brazilian Atlas of Disaster – In the images below we can see a recent statistical study of disasters in Brazil between the year 1991 and the year 2010.

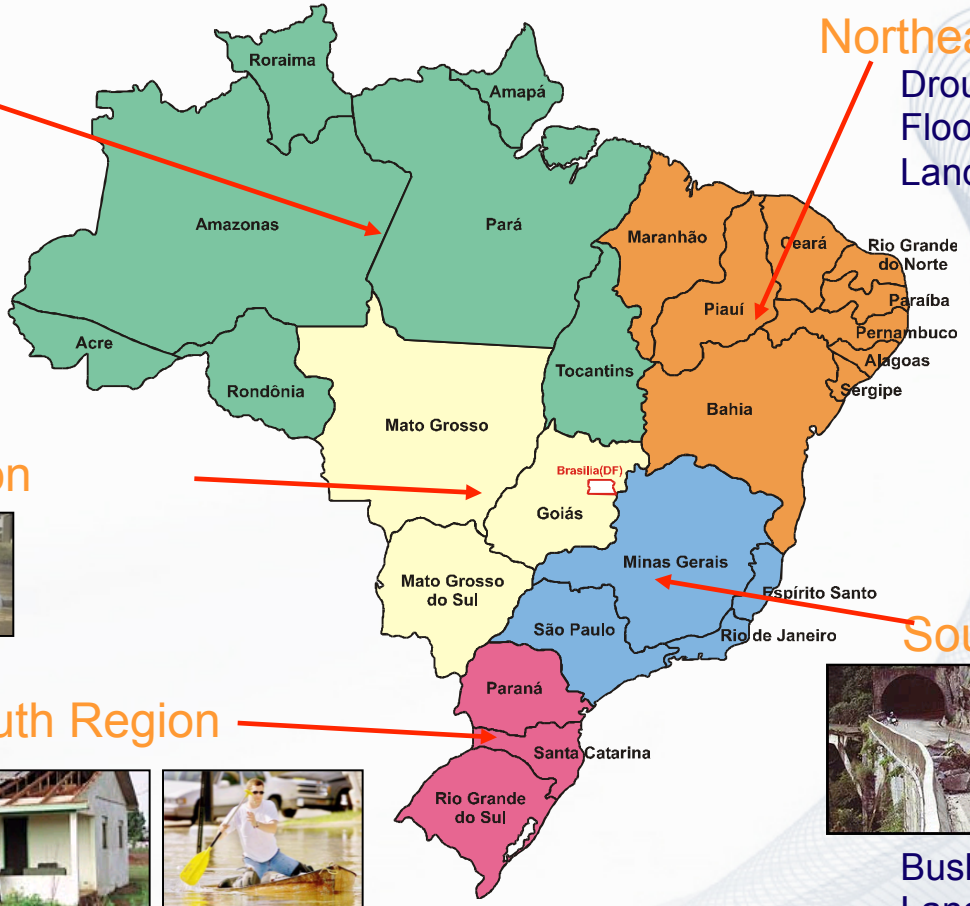
The most frequent natural disasters in Brazil

North Region


Floods
Droughts
Bushfires

Northeast Region

Droughts
Floods
Landslides

Midwest Region


Bushfires
Floods
Erosion

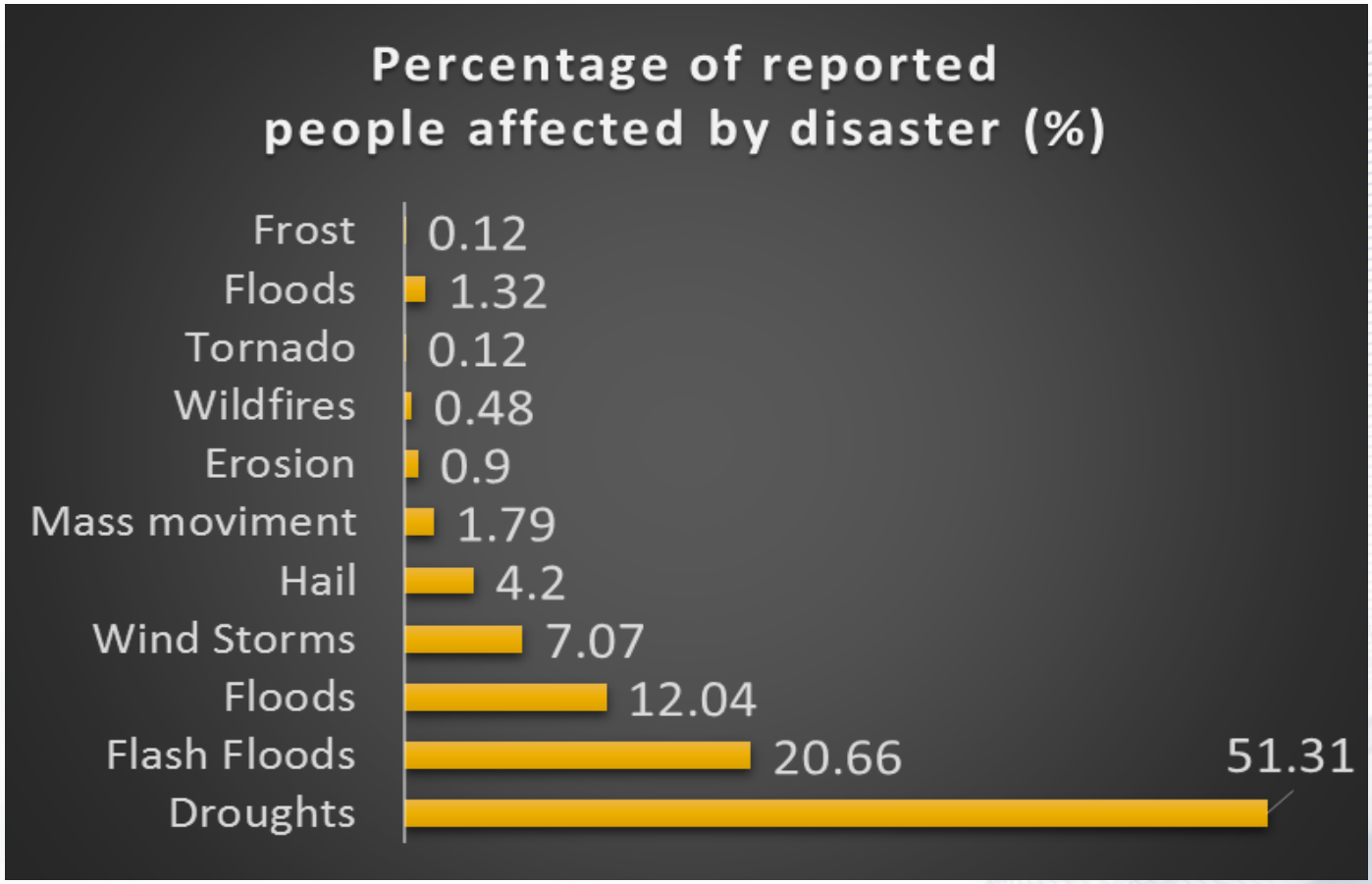
South Region

Floods
Windstorms and hales
Droughts

Southeast Region

Bushfires
Landslides
Floods

NATURAL DISASTERS IN BRAZIL

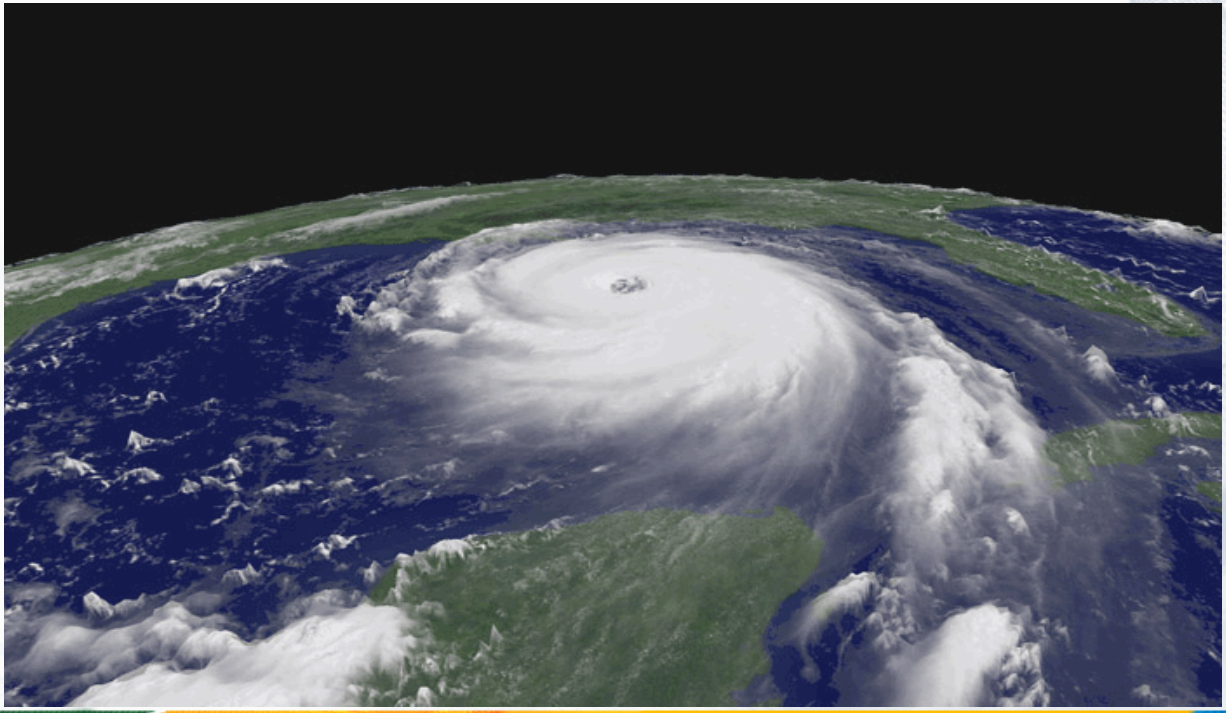


As you can see according to the images, floods and landslides are the largest number of fatalities.

Remote sensing
Members of National Organizations-

Created in 1961, the National Institute for Space Research (INPE) operates in the areas of Meteorology and Climate Change, Earth Observation, Space Science and Atmospheric and Space Engineering. Provides operational services and unique weather forecasting and climate monitoring deforestation in the Legal Amazon, satellite tracking and control, burned measures, lightenings and air pollution and also conducts tests and high quality industrial testing.

INPE's researchers are also members of GEO and CEOS.



EARTH OBSERVATION SYSTEM

Remote sensing

Members of National Organizations -

CEMADEN -> National Center for Monitoring and Alerts Natural Disasters created in 2011

The main objective of the institution is to monitor natural disasters and issue alerts to safeguard lives and reduce the environmental and social economic vulnerability arising from those events.

Remote sensing
Members of National Organizations-

Currently the CEMADEN - National Center for Monitoring and Alerts Natural Disaster monitors 957 cities out of 5570 cities in Brazil. This monitoring and research consists of weather radar, automatic rain gauges, rain sensors and soil moisture, in addition to hydrological, robotic, geotechnical and meteorological stations.

EARTH OBSERVATION SYSTEM

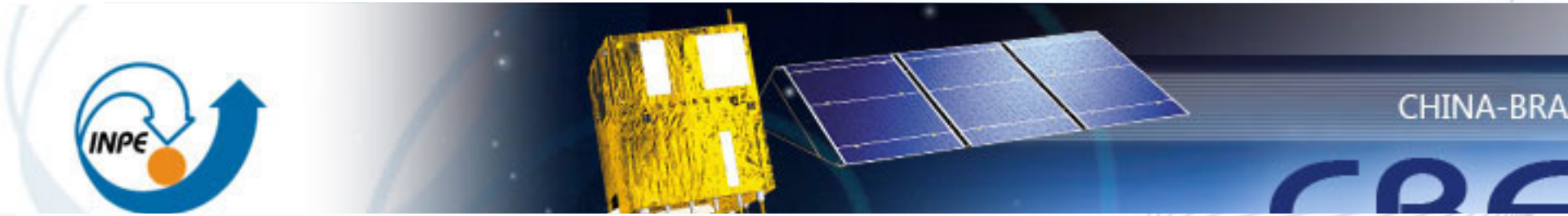
Remote sensing

Members of National Organizations-

CENAD - Brazilian National Risk and Disaster Management Center (established in 2005).

The operating dynamics of CENAD consists in receiving information from various federal agencies which are responsible for weather prediction and temperature; assessment of geological conditions of risk areas; monitoring the movement of tectonic plates; monitoring of river basins; controls fires and bushfires. As products are assessed and processed by CENAD experts, data are sent to the Protection Civil Defense Organizations of states and cities.

EARTH OBSERVATION WITH SATELLITES



In the year 1988, the CBERS Program was born from a partnership between Brazil and China in the space technical scientific segment. Consequently, Brazil joined a select group of countries with remote sensing technology.

Images generated by CBERS satellites are used in important areas, as deforestation control and environmental monitoring in the Amazon Region, water resources monitoring, urban growth, soil occupation, education and several other applications.

Disaster Charter
The objective:

- To supply during periods of crisis, to States or communities whose population, activities or property are exposed to an imminent risk, or are already victims, of natural or technological disasters, data providing a basis for critical information for the anticipation and management of potential crises;

Disaster Charter

Total is 470 activations, but Brazil only activates the Charter in 8 situations described below:

2008 - Santa Catarina State
2011 - Rio de Janeiro State
2012 - Minas Gerais State
2014 - Rondônia, Paraná e Rio Grande do Sul State,
2015 - Acre e Amazonas State

REMOTE SENSING – How do we handle it?

Disaster Charter

BRAZIL JOINS THE INTERNATIONAL CHARTER 'SPACE AND MAJOR DISASTERS'

Signing ceremony

10 November 2011 In the year that severe flooding and landslides claimed over 800 lives in Brazil's Rio de Janeiro state, Brazil has joined the international space organisation that makes timely satellite data available to rescue authorities during disasters.

Brazil's National Institute for Space Research – INPE – formally became the newest member of the International Charter 'Space and Major Disasters' on 8 November.

Founded by ESA and the French and Canadian space agencies, the Charter is an international collaboration between the owners and operators of Earth observation missions to provide rapid access to satellite data to help disaster management authorities in the event of a natural or man-made disaster.

Charter Requestor: Brazilian Disaster and Risk Management National Centre (CENAD)

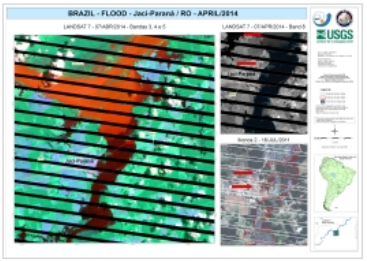
Project Management: INPE

Description of the event

Heavy rain in the northern regions of Brazil have resulted in flooding along the Madeira River since February 2014. Thousands of people have been evacuated, and the flooding is gradually growing worse as the water levels rise.

The Madeira River is a tributary of the Amazon River and the flooding is located in Rondonia, a state in northern Brazil on the border with Bolivia (which is also suffering from flooding). Water levels have risen to record levels as of 19 March, reaching 19 metres above the normal level, and it is forecast that it will continue to rise until the end of the month.

A state of emergency was declared in February and 22,000 homes have been evacuated in the area. Many villages along the river were flooded and roads inundated by the flood waters. It is estimated that the affected areas stretch from Porto Velho to Mutum-Parana. No casualties have been reported and this has been attributed to the quick evacuation of the area.



Flood map covering the town of Jaci Paraná, Rondônia District

Source: Ikonos 2 / Landsat-7
Acquired: Ikonos 2: 16/07/2011
Landsat-7: 07/04/2014

Copyright: Ikonos 2: Copyright © 2001-2013 DigitalGlobe
Landsat-7 data and products © USGS (2014) - All rights reserved
Map produced by INPE

Higher resolution version

Flood map covering Porto Velho, Rondônia District

Source: Landsat-8
Acquired: Pre-disaster: 27/08/2013
Post-disaster: 08/04/2014

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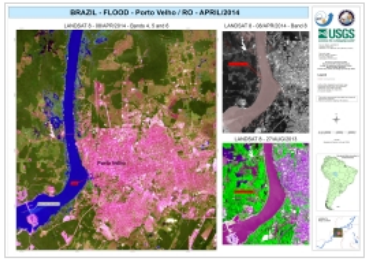
Map produced by INPE



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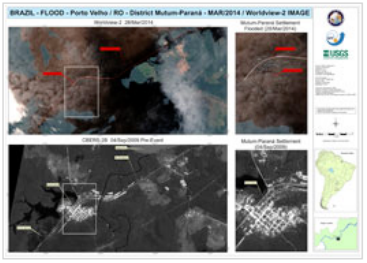

Flood in Porto Velho, Mutum-Paraná district

Source: WorldView-2 / CBERS-2B
Acquired: WorldView-2: 28/03/2014
CBERS-2B: 04/09/2009

Copyright: WorldView-2 © DigitalGlobe 2014
CBERS-2B © INPE
Map produced by INPE

Flood map covering Porto Velho, Rondônia District

Source: TerraSAR-X / Pleiades
Acquired: TerraSAR-X: 24/03/2014
Pleiades: 29/03/2014

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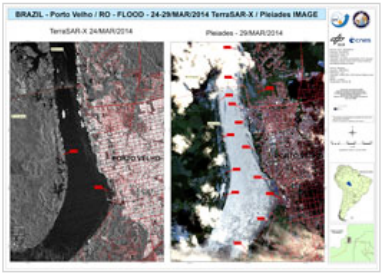
Map produced by INPE



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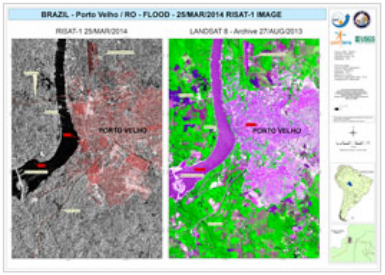

Flood map covering Madeira River at Porto Velho, Rondônia District

Source: RISAT-1 / Landsat-8
Acquired: RISAT-1: 25/03/2014
Landsat-8: 27/08/2013

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Landsat-8 data and products © USGS (2013) - All rights reserved
Map produced by INPE

Higher resolution version

Flood map covering the town of Jaci Paraná, Rondônia District

Source: Ikonos 2 / RADARSAT-2
Acquired: Ikonos 2: 16/07/2011
RADARSAT-2: 25/03/2014

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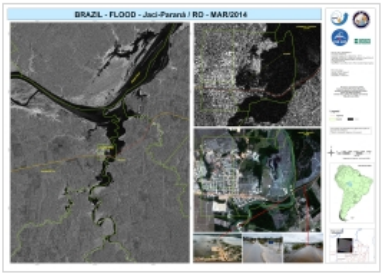
Map produced by INPE



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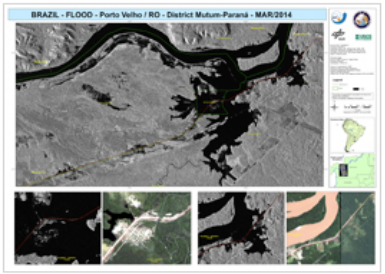

Flood map covering the town of Porto Velho, Mutum-Parana District

Source: Ikonos 2 / TerraSAR-X
Acquired: Ikonos 2: 25/05/2011
TerraSAR-X: 23/03/2014

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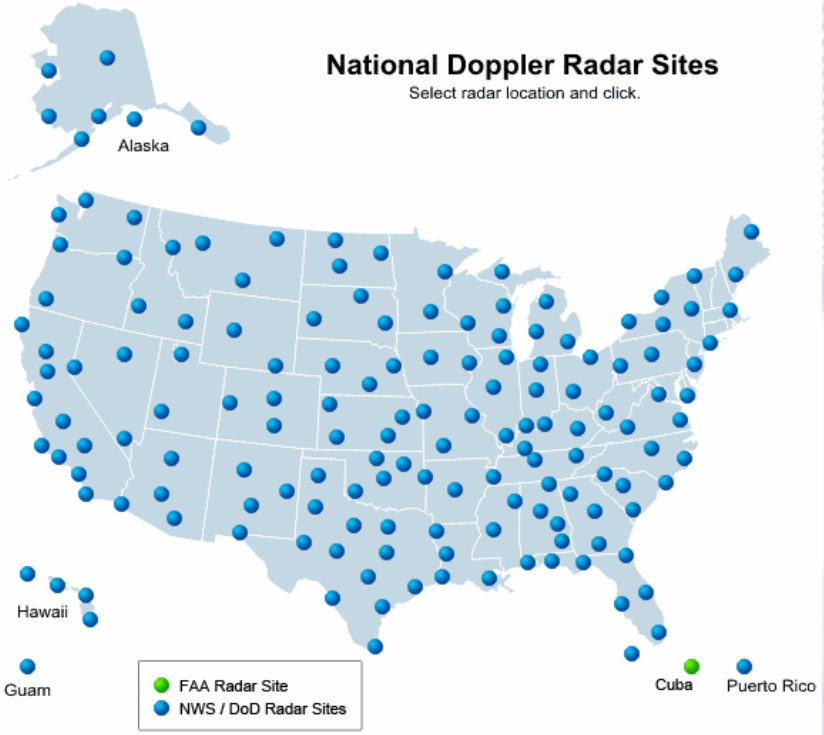
TerraSAR-X: © German Aerospace Center (DLR), 2014 Airbus Defence and Space / Infoterra GmbH
Map produced by INPE

Difficulties

- Weather radar - Currently the country has 35 weather radars, however only 9 belong to the National Center, while the others are owned by universities and states of the federation.



- Rain Gauges – approximately 4000 units installed in Brazil.
- Extension of the territory:
- High financial costs of weather radar

Earth observation - Preparedness and Response

Nowadays the preparedness and rescue teams use the free software Google Earth to observe mapping risk areas and draw polygons that we call warning or attention areas. The attention areas are demarcated based on statistical data of past occurrences.

Based on the attention area which is already mapped, we conducted field work, for example raising the number of people residing in a particular area, (street, block, neighborhood). With this information collected, we managed to draw contingency plans in cities in order to allocate resources and define responsibilities to those members of the Protection and Civil Defense system.

Brazilian Challenges

- To improve and increase the amount of weather radars in Brazil, to cover areas that do not have monitoring. Brazil still does not have doppler radar, as the developed countries for example. In past decades the records of tornadoes hardly existed, however currently, due to the drastic climate changes, it is now already part of our reality.
- To improve warning systems and alarm
- Create Action Protocols, after receiving alerts. What to do, how and when to act?
- To achieve images of high-resolution data for lower values and affordable costs;

To pursue the objectives and overcome challenges:

Just to remember:
Priority 4 – Sendai Framework
National level: (b) To invest in, develop, maintain and strengthen people-centred multi-hazard, multi-sectoral forecasting and early warning systems, disaster risk and emergency communications mechanisms, social technologies and hazard-monitoring telecommunications systems ....
Global level:... (a) To develop and strengthen, as appropriate, coordinated regional approaches and operational mechanisms to prepare for and ensure rapid and effective disaster response in situations that exceed national coping capacities;

Actions in alignment with Hyogo and Sendai Framework

Sasakawa Award - Brazilian project prepared by the city of Belo Horizonte / Minas Gerais (Pop 2,375,171.) on the prevention of natural disasters, geological risk mapping and flooding that won first place in the Risk and Disaster Reduction Award - Sasakawa 2013 of the United Nations (UN).

Actions in alignment with Hyogo and Sendai Framework

PARANÁ
GOVERNO DO ESTADO

Paraná State Government - Brazil

State Coordination of Protection and Civil Defense

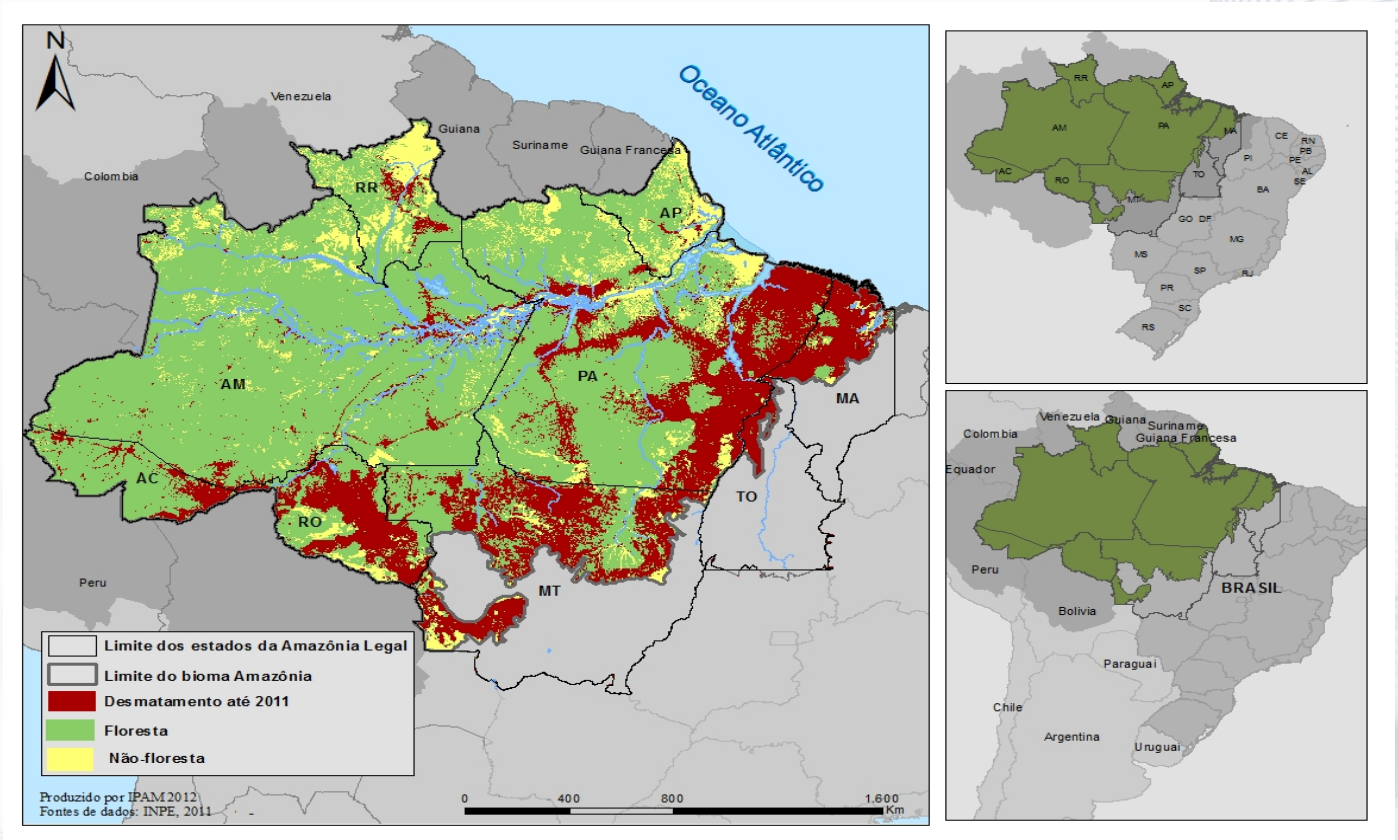
A Computer-based management tool for DRR in Brazil

Civil Defense of Parana State (pop. 11.1 mi) received the Award of the International Strategy Office for Disaster Reduction (UNISDR), the UN. It is the only Brazilian project awarded in the global campaign "Making Cities Resilient: My city is getting ready", having won the first place in the category "Information Systems Applications for internal use".

The computerized system of protection and developed for support to cities in disaster management.

Actions in alignment with Hyogo and Sendai Framework

Regarding the Earth Observation area, there is PRODES - Monitoring of the Brazilian Amazon Forest Satellite. With over 25 years of history, PRODES is considered the world's largest forest monitoring program, covering 4 million square kilometers of forest areas and its annual frequency.



TERRAMA 2

TERRAMA2, was created by INPE and is a computational platform open to any user interested in developing its own operating system of environmental risks. You can follow it from forest fires, landslides, floods and droughts, to network interruptions of energy from lightning and tidal movements in port regions, among other hazardous conditions.
Data can be used from weather satellites and radars or models of numerical predictions.

INPE launches new service forecast rays

The National Institute for Space Research (INPE), this month launched the new service forecast lightenings for the country. With it, it is possible to predict the incidence of lightenings with 24 hours notice. The system will be available next summer for the use by nationwide media outlets.

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Thank you for all the representatives of UN SPIDER, UNISDR and government of the People's Republic of China for their support and the valuable opportunity. Together we are strong!

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