

## The Mexican Space Agency promotes data accessibility or space policies in emerging countries: an example of regional cooperation in Latin America towards the achievements of the SDGs

The efforts carried out by the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) concerning early warning systems, particularly to the project called Strengthening Early Warning Systems for Droughts (SEWS-D) project carried out by UN-SPIDER and nine international, regional and national partners from several countries of Central America.

The implementation of this project has allowed UN-SPIDER and the AEM to achieve the following results:

- Gathering of a set of suggestions to contribute to the institutionalization of the use of satellite information in the countries of the region, focusing on multi-hazard early warning systems;
- Development of the implementation of the SEWS-D project through the set of activities agreement achieved among all participants.
- Contribution to a better appreciation by the representatives of the region of the advances and technologies developed by the space community in order to support efforts on early warning systems.
- The project has contributed to the implementation of the Sendai Framework concerning action priorities 1 and 4: understanding disaster risk; and increasing disaster preparedness in order to give an effective response and to "rebuild and enhance" recovery, rehabilitation and reconstruction areas. Similarly, the Meeting has contributed to the goals of UN-SPIDER by acting as a bridge between representatives of the space community and representatives of the community, centering its efforts on management, risk reduction and as a means of access to satellite technologies developed to contribute thereto for risk reduction.
- The SEWS-D project contributes to UNOOSA's mission, from the point of view thereof, of promoting the use of space technologies for the benefit of humankind.

### GENERAL NOTIONS ON EARLY WARNING SYSTEMS

- According to the United Nations Office for Disaster Risk Reduction (UNISDR), an early warning system is "The set of capacities required to generate and spread prompt and meaningful alert information, in order to allow people, communities and organizations threatened by a hazard to prepare and take action in an appropriate and timely manner so as to reduce the possibility of loss or damage."



Figure 1: Components of an effective / people-centered early warning system. Source: UNISDR

### MULTI-HAZARD EARLY WARNING SYSTEMS IN THE INTERNATIONAL FIELD

- At an international scale, the Sendai Framework for Disaster Risk Reduction 2015-2030 reiterates the need to promote efforts regarding early warning systems, calling for their establishment with a multi-hazard early warning approach. In parallel, the Paris Agreement also recognizes the benefits of early warning systems and makes an appeal for its implementation as part of the efforts made by countries in terms of climate change adaptation.
- As a strategy to advance on the implementation of the Sendai Framework in regard of multi-hazard early warning systems, several institutions such as the World Meteorological Organization (WMO), the UN-SPIDER program of the United Nations Office for Outer Space Affairs (UNOOSA), the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO-IOC), the Food and Agriculture Organization of the United Nations (FAO), German Agency for Technical Cooperation (GIZ, German acronym), and other partners, have established the International Network for Multi-Hazard Early Warning Systems (IN-MHEWS) during its Third World Conference on Disaster Risk Reduction, which aims to facilitate the sharing of expertise and good practices on multi-hazard early warning systems as a way to contribute to increasing the resilience of communities exposed to natural hazards.
- Considering the three global agendas, the Sendai Framework for Disaster Risk Reduction, the Paris Climate Change Agreement and the launch of the Sustainable Development Goals, as well as the potential benefits of using space technologies in diverse areas of application, the United Nations Committee on the Peaceful Uses of Outer Space wishes to contribute to the improvement of resilience and support of Member States to achieve the global development agenda objectives through seven thematic priorities within the UNISPACE +50 process. Thematic priority 6, "International Cooperation Towards Low-emission and Resilient Societies", concerns the use of satellite technologies to contribute to the implementation of the three global agendas.

### USE OF SATELLITE TECHNOLOGY IN LATIN AMERICA AND THE CARIBBEAN: EXAMPLES

- The SEWS-D project facilitates the sharing of expertise and knowledge regarding the use of satellite technologies in early warning systems for various types of hazards. As in other regions in the world, satellite technologies in Latin America and the Caribbean can be applied to forecast tropical storms and hurricanes, droughts, forest fires and volcanic eruptions. In several cases, these technologies are used to monitor cross-border phenomena, such as hurricanes and volcanic ash clouds, as in the case of volcanoes in Chile, which are blown away by winds to Argentina.
- As expected, National Meteorological Services use data and information obtained from different satellites together with data collected from meteorological stations in the field in order to forecast events that may cause hydro-meteorological disasters.



- Similarly, efforts are being made in Mexico and other countries, supported by the Group on Earth Observations (GEO) to implement and operationalize GEONETCAST-type satellite antennas and receivers ([link: https://www.earthobservations.org/geonetcast.php](https://www.earthobservations.org/geonetcast.php))
- In Central America and the Caribbean, the existence of more intense and frequent droughts is leading to the implementation of early warning systems for droughts, such as UN-SPIDER and nine international, regional and national partners' project that aims to Strengthen Early Warning Systems for Droughts (SEWS-D)

### INSTITUTIONAL ISSUES

- This section comprehends information on the efforts carried out by countries, such as El Salvador, Guatemala, Honduras and the Dominican Republic to institutionalize the use of satellite information in applications regarding management for disaster risk reduction and response thereof.

#### a. Dominican Republic

In March 2013, the Inter-Institutional Geo-Spatial Information Team (EIGEO) was established in the Dominican Republic, with 14 State institutions and institutes of the National Autonomous University of Santo Domingo. As in the case of Guatemala and other countries, the goal of EIGEO is to generate useful information for decision making. The EIGEO currently has 22 member institutions and has developed various products, including the drought map for the Dominican Republic. The operational structure of the EIGEO consists of a coordinator, a permanent technical team, a disaster response team, a group of external advisors, and it operates as an advisory team of the National Emergency Commission.

### THE ACADEMY AND SATELLITE TECHNOLOGIES

- The Regional Meeting incorporated a session in which experts from various universities and regional centers presented their efforts regarding satellite technologies.

#### a. Regional Centre for Space Science and Technology Education for Latin America and the Caribbean

- The Regional Centre for Space Science and Technology Education for Latin America and the Caribbean (CRETEALC) was established by Brazil and Mexico under the auspices of the Programme on Space Applications of the UNOOSA with the following objectives, among others:
  - To expand knowledge of member states in the different disciplines of space science and technology (regionally and internationally) and thus increase their scientific, economic and social development.
  - To organize teaching, research and development programs of practical applications initially oriented towards remote sensing, satellite telecommunication and space information systems.
- CRETEALC provides eleven and nine-month courses on different subjects, including remote sensing, satellite telecommunication and space information systems, in which students carry out research projects focusing on various topics.

#### b. The Federal University of Santa Maria in the State Rio do Sul, Brazil

- In Brazil, where the most extreme droughts of the continent have arisen in the 70s, the Federal University of Santa Maria (UFSM) conducts drought monitoring in the southern region of Brazil using the Standard Vegetation Index (SVI) in conjunction with the CRS / INPE (National Institute for Space Research).
- UFSM experts aim to promptly map the last 10 years with satellite images. Figure 10 shows a series of maps for the period between 2001 and 2009.

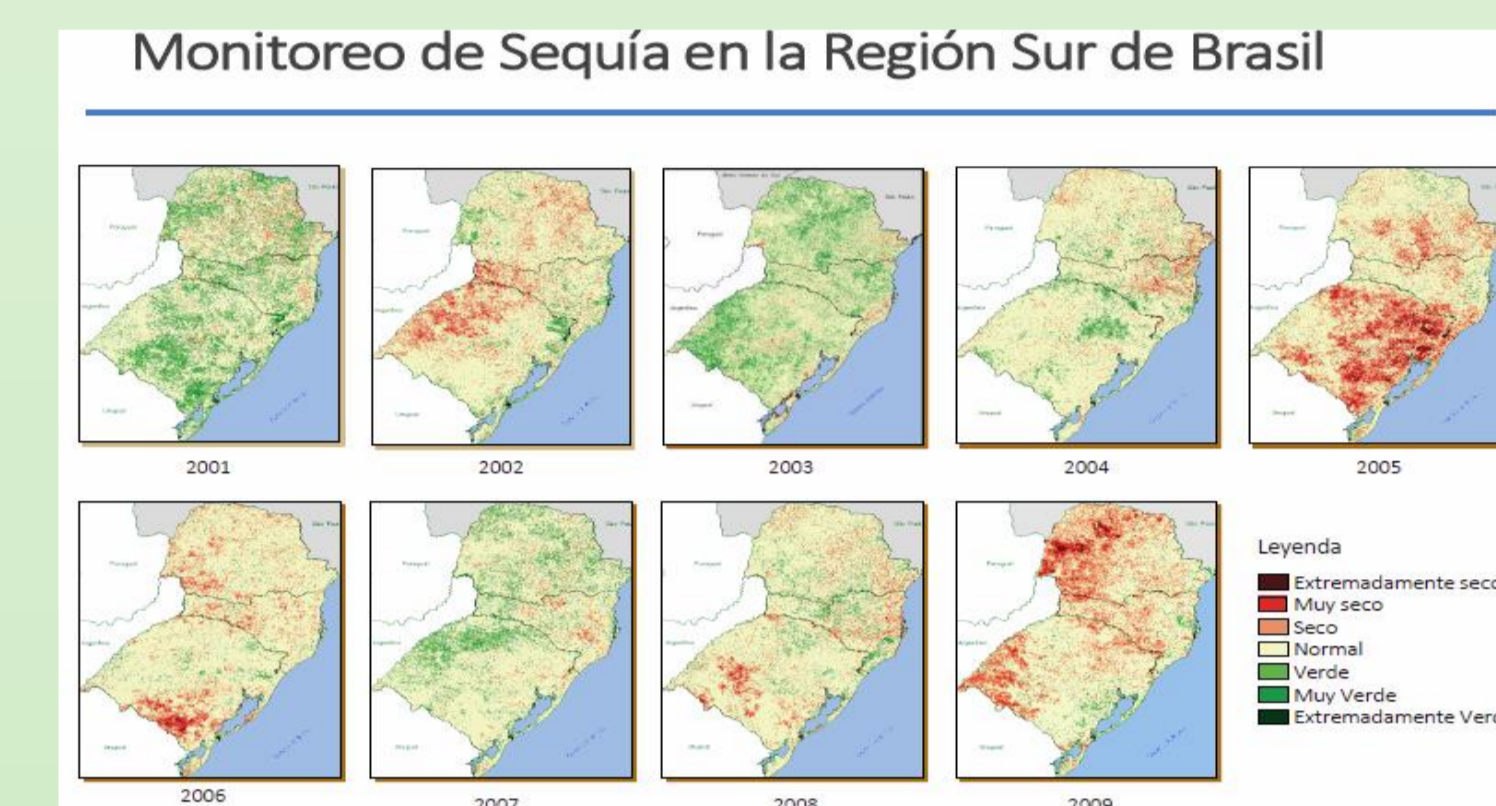


Figure 10: Vegetation Anomaly Map (SVI) in Southern region of Brazil summers.

Experts from the Federal University of Santa Maria contribute to the UN-SPIDER program for the implementation of the SEWS-D project and they have developed one of the two recommended practices focusing on the development of maps of the Standard Vegetation Index (SVI).

### GEOSPATIAL INFORMATION MANAGEMENT

- During the Regional Meeting, there was a session dedicated to the geospatial information management issue, in which CENAPRED (National Center for Disaster Prevention) and two private companies gave presentations.

#### a. CENAPRED National Risk Atlas

- Mexico's National Atlas of Risks was created by CENAPRED as part of its efforts to contribute mainly with spreading knowledge on dangers and identifying disaster risks in the country derived from geological, hydrometeorological, chemical, sanitary and socio-organizational phenomena.
- This objective also appears in Mexican legislation through the General Law of Civil Protection, which has an article defining the National Risk Atlas as a complete information system on disturbing agents and expected damages. This is a result of spatial and temporal analysis of the interaction between hazards, vulnerability and the degree of exposure of the agents that can be affected.
- The design of the Atlas began in 2000 by defining methodologically the concept of risk. In 2003, the Comprehensive Disaster Risk Information System was implemented. In 2004, the first website of the Atlas was created. In January 2010, the Analysis and Visualization System of Risk Scenarios (SAVER) was incorporated.

#### b. Geographic Institute Agustín Codazz (IGAC) of Colombia: Geospatial information management in disaster situations in Colombia

- The Geographic Institute Agustín Codazz made a presentation about its CIAF (Research and Development Centre of Geographic Information) office, which focuses on geomatic research and knowledge transfer. The CIAF Office has four groups:
  - The geo-science group,
  - The remote sensing group
  - The geographic information systems group
  - The space data infrastructure group of Colombia
- The IGAC is one of the State institutions that are part of the National Disaster Risk Management System headed by the President of the Republic of Colombia. In its role as a national cartographic and geomatic entity, the CIAF Office represents IGAC in the National Committee for Risk Awareness, which is one of the instances of guidance and coordination of the system. Figure 13 shows the structure of the Committee.



Figure 13: The National Disaster Risk Management System and the National Committee for Risk Awareness.

### RESULTS AND GENERAL CONCLUSIONS

- To gather information on the efforts made by institutions in Latin America and the Caribbean in regard to the use of satellite information in early warning systems for one and multiple hazards;
- To continue the efforts carried out by UN-SPIDER and its partners in the SEWS-D project.
- To explore ways of enhancing the use of this type of information in an early warning system for one or multiple hazards, particularly through the development and promotion of UN-SPIDER Recommended Practices in this area, in addition to increasing synergies among project participants;
- To generate an approach between space and early warning communities, particularly focusing on Latin America and the Caribbean;
- To explore the greater use of satellite system networks;
- To contribute to the implementation of the Sendai Framework for Disaster Risk Reduction and the Paris Agreement on Climate Change.