Space-based technologies in support of disaster management: UN-SPIDER

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www.unoosa.org

UNITED NATIONS
Office for Outer Space Affairs

UN and Outer Space: Early Years

- 1958: Resolution by the UN General Assembly 1348(XIII):
  - Outer space to be used for peaceful purposes only and to be exploited to the benefit of mankind
  - Established an ad-hoc Committee on the Peaceful Uses of Outer Space (COPUOS) as an appropriate body for international cooperation

- 1959: UN General Assembly resolution 1472 (XIV) reaffirmed the role of COPUOS and mandated the Committee to:
  - Review international co-operation
  - Study space-related activities that could be undertaken under United Nations auspices
  - Encourage and assist with national space research programmes
  - Study legal problems which may arise from the exploration of outer space

Towards UNISPACE+50 in 2018

- **2018** marks the 50th anniversary of the first UN Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), held in Vienna in 1968
- **Committee on the Peaceful Uses of Outer Space (COPOUS)** decided in June 2015 to use this milestone anniversary to renew and strengthen its mandate as **a unique platform for interrelationship between major space faring nations and emerging space nations, and industry**, supported by the Office for Outer Space Affairs (**UNOOSA**)

- **UNISPACE+50 will articulate a long-term vision for Space**: from a domain of States towards a domain of a commonly shared human experience

Background

- United Nations Office for Outer Space Affairs (UNOOSA) - established in 1962
- UNISPACE Conferences - 3 (1968, 1982, 1999)
- UNISPACE-3 in 1999 lead to the Creation of the International Charter on Space and Major Disasters (voluntary) and initiated discussions for establishing the UN-SPIDER programme in the framework of the UN General Assembly
- in 2006, all 193 UN Member States mandated OOSA to establish and implement UN-SPIDER

UNITED NATIONS
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UNOOSA

Space Applications Section

Committee Policy and Legal Affairs Section

Programme on Space Applications

UN-SPIDER

Mission statement

„Ensure that all countries have access to and develop the capacity to use all types of **space-based information** to support the **full disaster management cycle**.“

UN-SPIDER
... use all types of space-based information

- **Earth Observation**

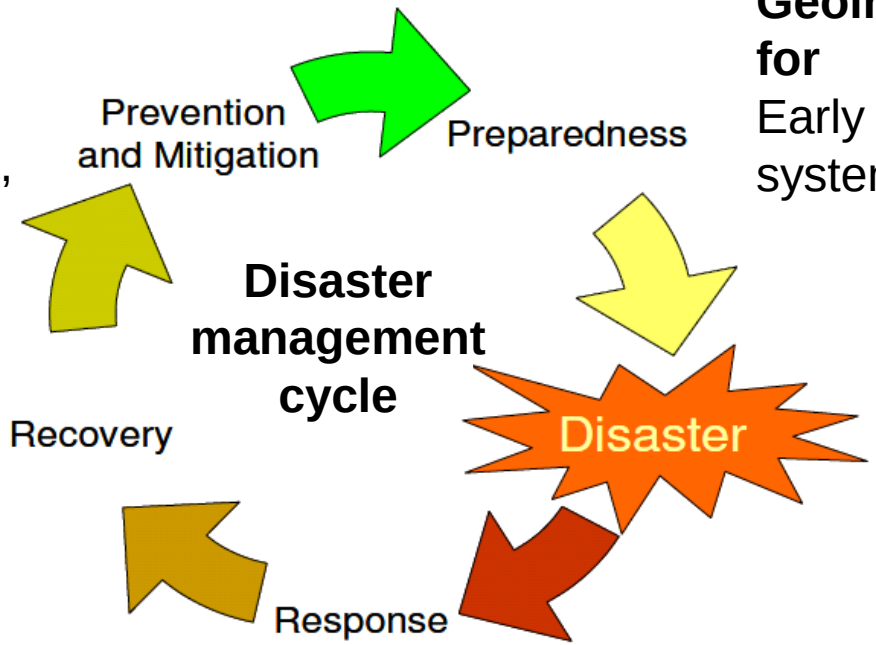
- **Satellite Communication**

- **Navigation and Positioning**

… to support the full disaster management cycle

Geoinformation for
Hazard, exposure, vulnerability, and risk assessment

Geoinformation for
Early Warning systems



Geoinformation for
Post Disaster Needs Assessment (PDNA)/ Damage and Loss Assessment (DaLA)

Geoinformation for
Rapid mapping: Extent and impact

Network of Regional Support Offices

UNITED NATIONS
Office for Outer Space Affairs

UN-SPIDER

Knowledge Portal

The UN-SPIDER Knowledge Portal is a web-based tool for information, communication and process support

Fostering Cooperation

UN-SPIDER fosters alliances and creates forums where both space and disaster management communities can meet

Capacity Building

UN-SPIDER facilitates capacity building and institutional strengthening, including the development of curricula and an e-learning platform (e-SPIDER)

Technical Advisory Support

UN-SPIDER provides support to countries in assessing national capacity and in evaluating disaster and risk reduction activities, policies and plans

and many more…

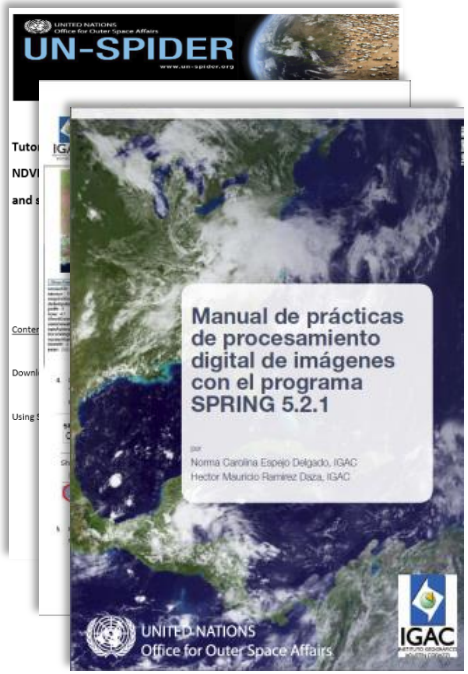
Knowledge Portal

Space Application Guides
including scientific papers, best practices and experience reports

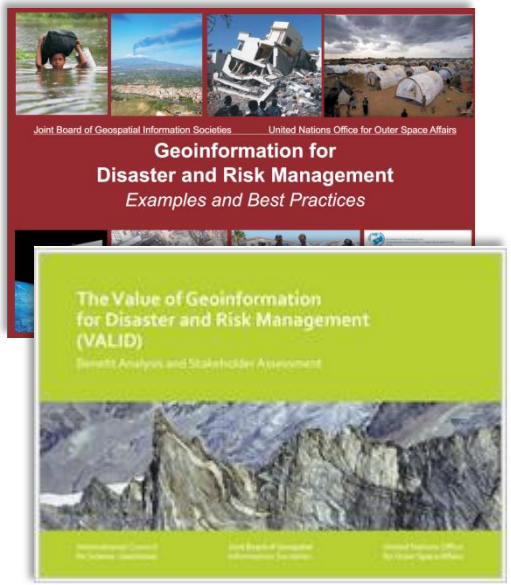
News and Events from the space and the disaster/risk management community

Guides on **Technologies, institutions** and **organizational mechanisms**

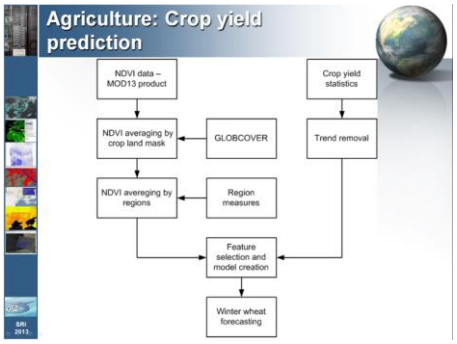
Knowledge Generation:



Training material, tutorials



Publications



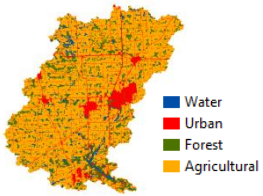
Recommended practices

Lessons learned

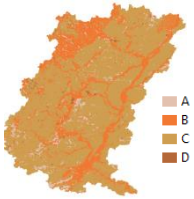
Recommended Practice Flood Hazard Mapping

How do land use changes affect runoff and potential inundation areas in my region?

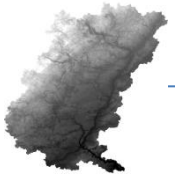
Recommended practices provide step-by-step instructions on how to apply the methodology.



Land Use



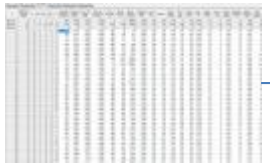
Soil



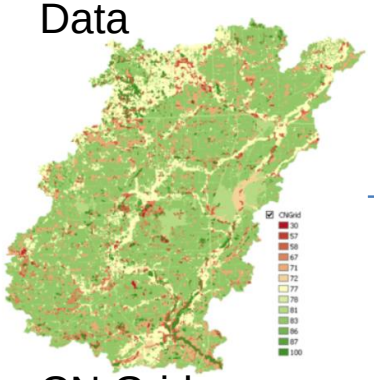
HydroDEM

LUValue	Description	A	B	C	D
1	Water	100	100	100	100
2	Medium Residential	57	72	81	86
3	Forest	30	58	71	78
4	Agricultural	67	77	83	87

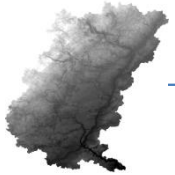
CN Look Up



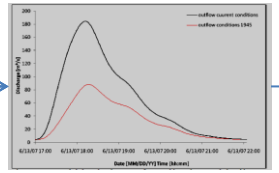
Meteo Data



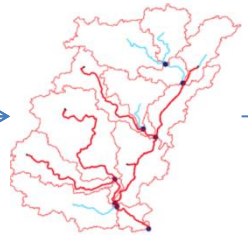
CN Grid



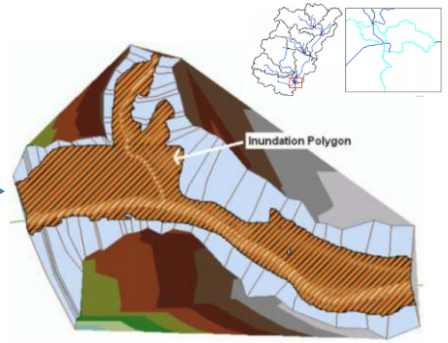
DEM



Hydrograph



Drainage Network



Inundation Polygon

PURDUE UNIVERSITY
LYLES SCHOOL OF CIVIL ENGINEERING

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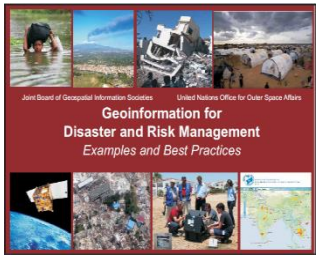
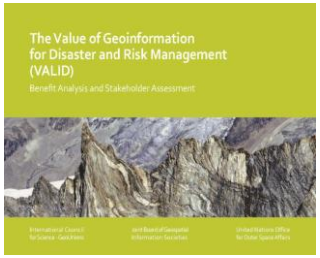
Publications





Optimizing Disaster- and Risk Management (DM/DRM) with geoinformation products and services is an increasing global trend and also challenge to the scientific community

- Best practice methodology and benefit valuation successfully addressed by two foregoing joint publications
- Continuation highly recommended by the participants at the VALID booklet launch and presentation in Vienna
- Third booklet planned: How geoinformation is utilized in the context of specific application cases

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NEWSLETTER

May 2015 Vol. 2/15

In Focus

Space-based information for post-2015 sustainable development

2015 is a milestone year for the United Nations. Not only is the organization celebrating its 70 years of existence, the year is also the starting point for major agreements and frameworks that will shape global sustainable development in the years to come. Nations worldwide will jointly embark on new paths to end poverty, promote prosperity and well-being for all, protect the environment, address climate change and reduce disaster risks. It is in this context that the United Nations Secretary-General Ban Ki-moon has launched the "2015: Time for Global Action" campaign.

Most notable among the processes to be kicked off in 2015 are these three:

The Sendai Framework for Disaster Risk Reduction (2015-2030); a new global agreement on climate change; and a new set of targets for economic, social and environmental development: the Sustainable Development Goals (SGDs) which are building on the Millennium Development Goals running out at the end of 2015.

Drought and shrinking water levels in the Jaguari Reservoir, Brazil observed by the Landsat 8 satellite in August 2014 (Image: NASA)

Satellite technologies can be key in ensuring the successful implementation of these three frameworks. The data that satellites can collect from space provide vital input to decision-making processes as well as to monitoring and evaluation efforts. With such inputs, nations and societies can stay on track in achieving these global goals and implement their national plans with regards to disaster risk reduction, climate change adaptation and mitigation and sustainable development in it various dimensions.

The United Nations Office for Outer Space Affairs (UNOOSA), through its UN-SPIDER programme among others, is working with governments and partners in promoting the use of reliable and objective data that satellite technologies provide - especially in developing countries. It does so through awareness raising, capacity building, technical advisory support and outreach events.

From 26 to 28 May 2015, UNOOSA/ UN-SPIDER, in cooperation with the German Aerospace Center (DLR) and the German Federal Ministry for Economic Affairs and Energy, is organising the United Nations/Germany International Conference for Earth Observation. 120 international experts will convene in Bonn, Germany, to discuss and share knowledge on the use of space technologies in the context of the post-2015 agreements on disaster risk reduction, on climate change adaptation and mitigation and on the Sustainable Development Goals.

In this issue

Interview with Pedro Basabe, UNISDR....2

The importance of space-based information in the 2015 Sendai Framework for Disaster Risk Reduction....3

How space-based information can support measures for climate change mitigation and climate change adaptation....4

The relevance of space-based information for achieving the Sustainable Development Goals....5

Editorial: After Sendai....6

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AUGUST 2015 UPDATES

UN-SPIDER at a glance

UN-SPIDER and IGAC conducted a Regional Expert Meeting in Colombia

UN-SPIDER and its Regional Support Office IGAC conducted a Regional Expert Meeting in Bogota, Colombia from 12 to 14 August within the International Geomatic Week carried out by the Geographic Institute Agustin Codazzi (IGAC). The meeting brought together around 20 participants from the Caribbean, Central America and South America. The Regional Expert Meeting benefitted from the participation of regional and international experts from the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean (CRECTEALC), the International Research Centre on El Niño Phenomena (CIIFEN), the Federal University of Santa Maria in Brazil (UFSM) and the Central American Agriculture and Livestock Committee (CAC).

Read more: Knowledge Portal

Agreement between UNOOSA and the Swiss Government

The United Nations Office for Outer Space Affairs (UNOOSA) is pleased to announce an agreement with the Swiss Government to support the development of new initiatives to advance the use of space-based tools and technology in the various areas of work of Geneva-based United Nations entities, international organisations or non-governmental organisations. Funded by the Federal Department of Foreign Affairs and the Federal Department of Environment, Transport, Energy and Communications, the agreement aims at increasing awareness of the benefits of space-based tools and technology for environment and natural resource management, humanitarian affairs, peace building and security. Switzerland, a Member State of the Committee on the Peaceful Uses of Outer Space (COPUOS), hopes through this collaboration to strengthen the capabilities of Geneva-based entities in using space-based data, information, products and services.

Read more: Knowledge Portal

UN-SPIDER and UNDP Bhutan office support efforts to manage landslide risk in Bhutan

The UN-SPIDER, the UNDP and the Department of Disaster Management (DDM) (Ministry of Home and Cultural Affairs) conducted follow up activities and training workshop as a next step after the UN-SPIDER Technical Advisory Mission (TAM) to Bhutan, offered in June 2014. The activities were executed from 17 to 21 August, 2015.

Soon after the TAM was conducted, the UN Resident Coordinator secured funding to implement the recommendations of the TAM through the UN joint project titled "Recovery Preparedness and Resilience-building in Bhutan". Through this funding, 19 officials from Bhutan visited the UN Affiliated Centre for Space Science Technology Education in Asia and the Pacific in India to attend one week training programme titled "Response and recovery preparedness" in April 2015. This training provided general understanding on the role of space based information in managing various hazards in Bhutan.

Read more: Knowledge Portal

UN-SPIDER issues the Role of World Natural Heritage and Sites in Disaster Risk Reduction in a workshop in India

The International Workshop on the Role of World Natural Heritage (WHS) Sites in Disaster Risk Reduction (DRR) was organised by UNESCO Category 2 Centre (C2C) World Natural Heritage Management and Training for Asia and the Pacific Region based at Wildlife Institute of India. The event was performed in Dehradun city on 24 and 25 August.

Read more: Knowledge Portal

UN-SPIDER meets students of 20th Post Graduate Diploma in Remote Sensing and GIS

The head of the UN-SPIDER Beijing Office, Shirish Ravan, visited the UN Affiliated Centre for Space Science Technology Education in Asia and the Pacific (CSSTEAP), in Dehradun, India, on 25 August 2015; to interact with 24 international

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UN-SPIDER REGIONAL SUPPORT OFFICES

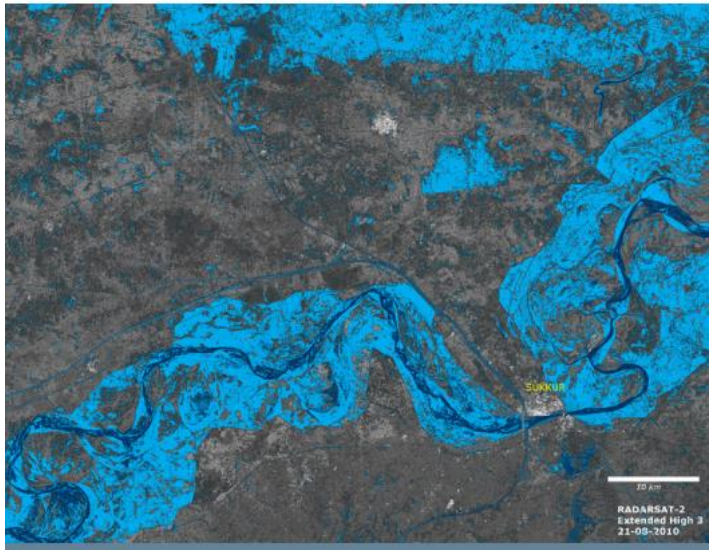
Effective use of Space-based information to monitor disasters and its impacts

Lessons Learnt from Drought in Iran

prepared by Iranian Space Agency

UN-SPIDER REGIONAL SUPPORT OFFICES

SUPARCO

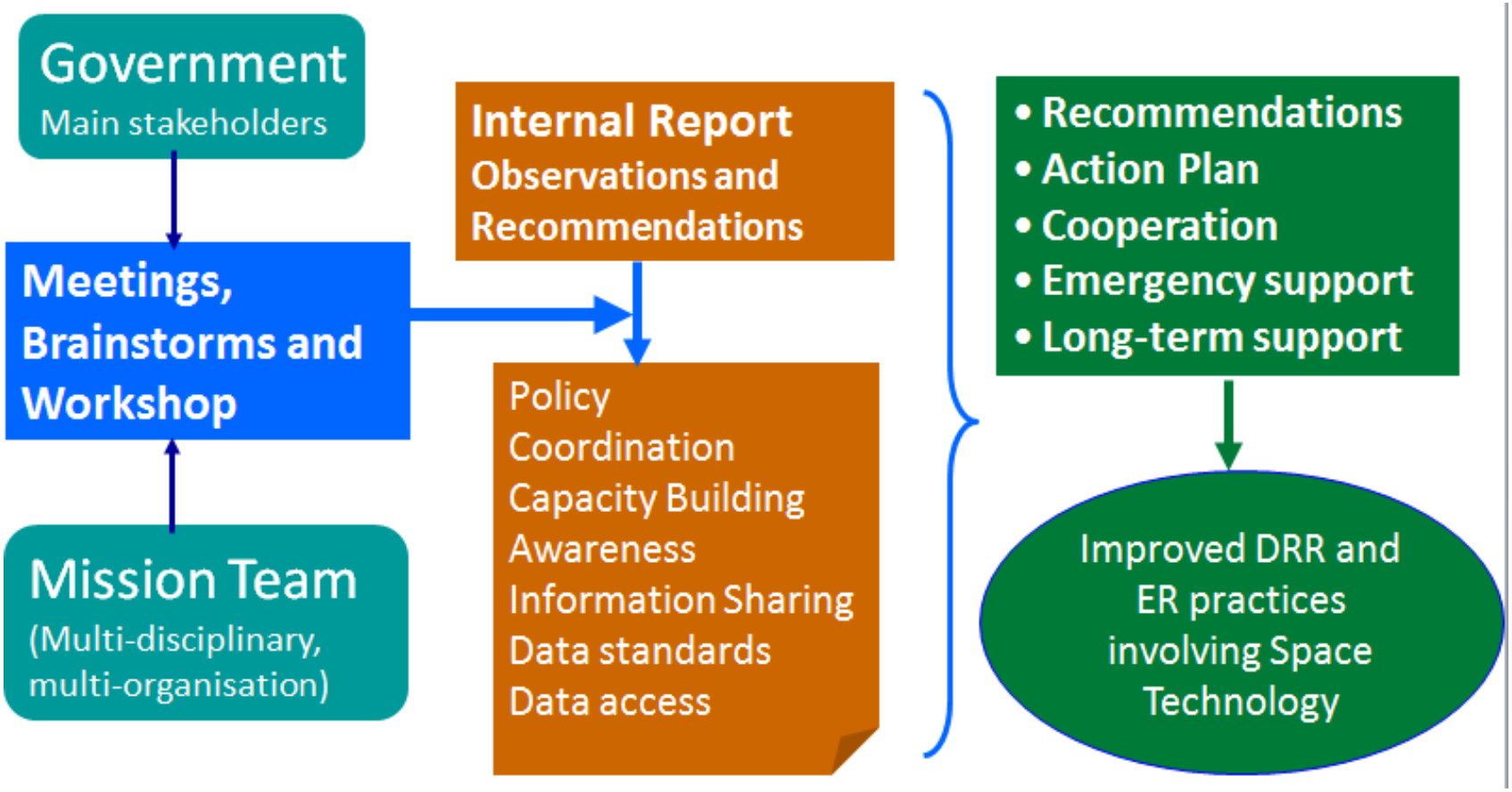


Effective use of Space-based information to monitor disasters and its impacts

Lessons Learnt from Floods in Pakistan

prepared by SUPARCO, Pakistan

Technical Advisory Missions



Technical Advisory Missions (2008 - 2016)

Pending in Africa: Benin, Niger, Rwanda, Uganda, Zimbabwe

Classes of recommendations from Advisory Missions

- **Policy and Coordination**
- **Awareness Raising**
- **Capacity Building and Institutional Strengthening**
- **Accessing and Processing of Data**
- **Information Flow and Management**
- **Strengthening International Cooperation**
- **Specific recommendations to address various stages of disaster management (risk reduction, early warning, emergency response etc.)**

Related Activities in 2013

Technical Advisory Mission

- **Vietnam**
- **Ghana**
- **Malawi**

Training

- **Bangladesh**
- **Sudan**
- **Dominican Republic**
- **Mozambique**
- **Indonesia**

Workshops/conferences

- United Nations/**Germany** Early Warning Expert Meeting, Bonn
- SPIDER/NDRCC training, Beijing, **China**
- UN/China International Conference, Beijing, **China**
- Beijing Training: Flood Risk Mapping, Modeling and Assessment using Space technology, Beijing, **China**

Related Activities in 2014

Technical Advisory Mission

- **Kenya**, 3-7 March 2014
- **El Salvador**, 2-4 April 2014
- **Zambia**, 26-30 May2014
- **Bhutan**, 2-6 June 2014
- **Mongolia**, 11-15 August 2014

Training

- **Vietnam**, 3rd week September 2014
- **Sri Lanka**, 1st week November 2014

Workshops/conferences

- Regional Expert Meeting/CEPREDENAC to Central America, **El Salvador**, 31 March and 1 April
- Regional workshop ASEAN region (Partners – LAPAN, AHA), **Indonesia**, 15-17 April
- International training with ICIMOD on flood forecast and hazard mapping, **Nepal**, 9-13 June May
- United Nations/**Germany** Expert Meeting on Space Technologies for flood and drought risk reduction, 5-6 June
- UN/**China** International Conference on Space-based Technologies for Disaster, 15-17 September
- Course in space-based applications for Disaster Risk Reduction, **China**, 18-23 September

UN-SPIDER capacity building efforts

UN-SPIDER
Technical Advisory Missions

Follow up actions
(Capacity Building):
- Institutional Strengthening
- Technical Training Workshops

Myanmar

Mexico

Cameroon

UN-SPIDER activities in Namibia 2008 - 2010

2nd UN-SPIDER Bonn WS

Technical Expert Meeting Bonn

Regional Meeting Namibia

1st Charter activation

1st Technical Advisory Mission

3rd Charter call

2nd Charter call

3rd UN-SPIDER Bonn WS

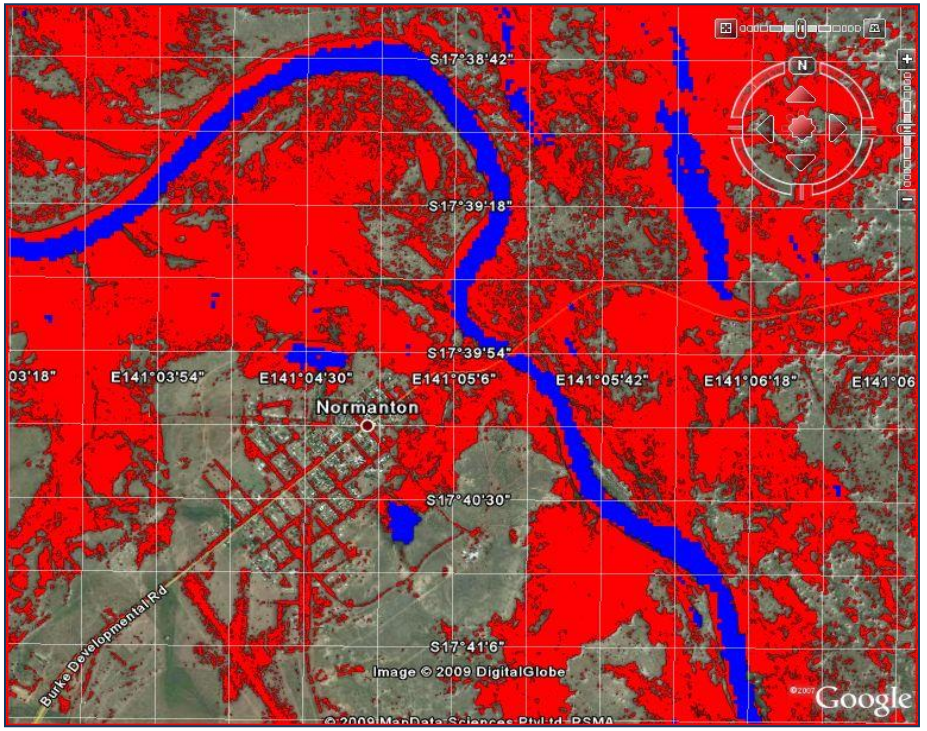
Mar Oct Feb Mar Aug Oct Jan time

2008 2009 2010

Technical Advisory Support

Example Namibia: Pilot project on integrated flood management and water related vector borne disease modelling

- UN-SPIDER co-leading efforts with NASA's GSFC and NOAA's CREST (Sensor Web Initiatives) together with DLR
- Derivation of flood forecasting models based on weekly EO-1, Formosat and QB collections
- Useful for next flooding season
- Technical experts meeting hosted in Bonn in October 2009 followed by field visits
- Regional Project Proposal developed



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UN-SPIDER Technical Advisory Mission, Sri Lanka

17 – 21 October 2011

Survey: Spatial Data for Disaster Management and Country Profile (Prof. R. Premalal De Silva)

1. *Ministry of Disaster Management (MDM)*
2. *Ministry of Technology and Research*
3. *Ministry of ICT and Telecommunication (ICTA)*
4. *National Building Research Organisation (NBRO)*
5. *International Water Management Institute (IWMI)*
6. *UN Country Team Information Management Group (UNCT IM):*
7. *Department of Meteorology*
8. *Coast Conservation Department*
9. *Telecommunication Regulatory Commission*
10. *Department of Survey and Mapping*
11. *Ministry of Public Administration and Home Affairs*

Cameroon Capacity Building 2012

- Follow-up of Technical Advisory Mission in 2011
- Requested after similar successful training in Burkina Faso
- 35-40 local participants (Civil Protection, UNDP, University, Meteo services staff)
- 5 international participants also (Civil Protection staff from Gabon, Burundi, Congo, DR Congo)
- Customized for French language as requested

- Trainers from the Regional Centre for Training in Aerospace Survey (RECTAS) and UNU-EHS
- Geographic Information System & Remote Sensing analysis software donated by Esri (ArcGIS 10, French); ILWIS Academic version also used
- Sample imagery provided by RECTAS for the training modules
- Digital Globe Inc. provided recent very high resolution sample images of hotspots in Cameroon, as tasked; direct download and processing during training
- The training covered basic elements of remote sensing, GIS, simple data extraction and geo-referencing

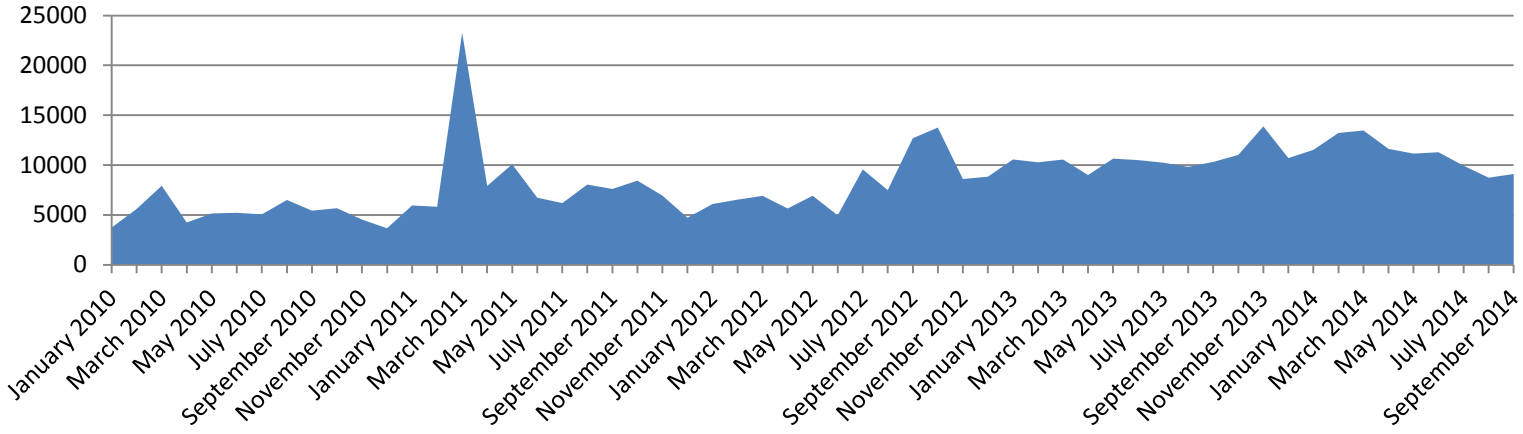
UN-SPIDER Technical Advisory Support

Some Lessons learned

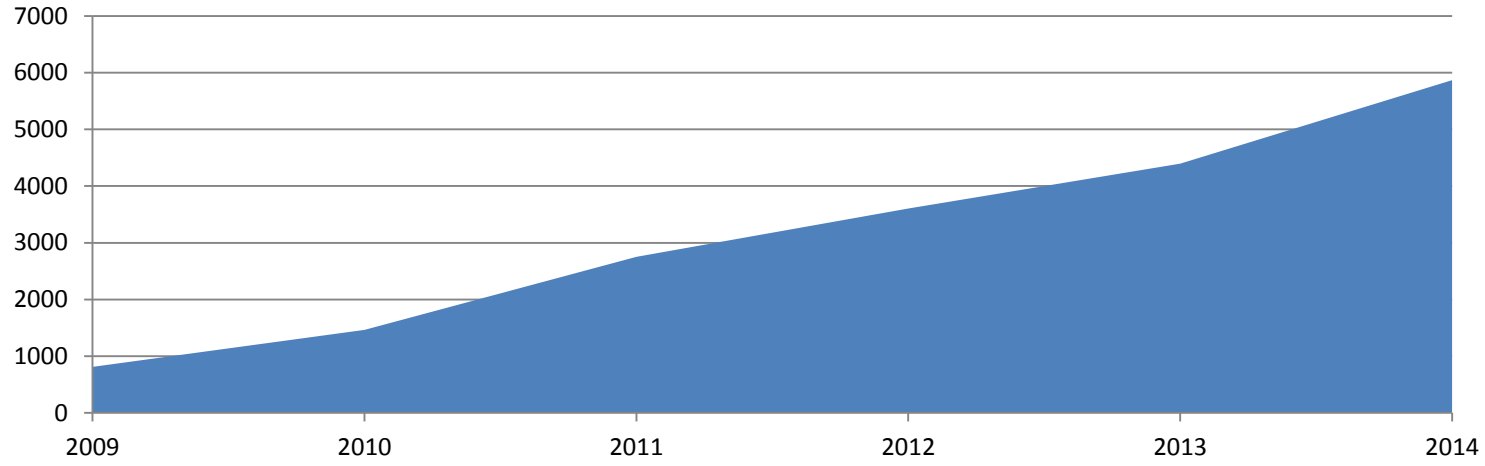
- Satellite meteorology does contributes to early warning, although challenges remain
- Contribution of higher-resolution satellite imagery, while wider used in emergency response, is still in incubation stage in risk management and less used in other DM phases
- Rapid mapping products remain as reference information during emergency response in many cases, not reaching responders on the ground fast enough; faster access to data, better data sharing protocols and licensing arrangements needed
- Emergency satellite communications is still a less explored domain, though highly relevant
- Quick implementation of TAM recommendations and addressing specific agreed actions is highly dependent on resource availability to the Programme and target countries as well

Knowledge Portal

Sessions on Knowledge Portal



Number of content items published



Digital Outreach

10,000 visits per month

17,000 subscriptions

8,000 Social Media followers

How fire-detecting satellites could prevent wildfires

WED NOV 6 2013

A fire-detecting satellite has been designed by scientists from University of California, Berkeley with the goal of preventing hot spots from growing to out of control fires in the future. Through the use of state-of-the-art sensors and an analysis software to snap pictures of the ground every few seconds, the satellite called the Fire Urgency Estimator in Geosynchronous Orbit (FUEGO), would...

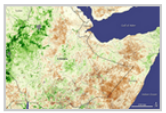
read more

Official launch of AfriGEOSS at AfricaGIS2013/GSDI14

WED NOV 6 2013

During the AfricaGIS2013/GSDI14, held this week in Addis Abeba, AfriGEOSS was launched on 5 November 2013. AfriGEOSS is an initiative by the intergovernmental Group on Earth Observations (GEO) aimed at building infrastructural capacities in Africa to benefit from geospatial data for sustainable development. GEO states: "The intergovernmental Group on Earth Observations (GEO) is playing a key...

read more

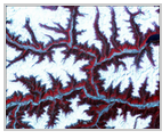


AfricaGIS 2013 and GSDI World Conference inaugurated in Ethiopia

TUE NOV 5 2013

The combined AfricaGIS 2013 and GSDI World Conference was inaugurated in Addis Ababa on 4 November 2013. The conference is jointly by EIS-Africa, the GSDI Association, the International Geospatial Society, the United Nations Economic Commission for Africa (UNECA) and Addis Ababa University and takes place from 4 to 8 November 2013. AfricaGIS is the largest regularly occurring GIS conference in...

read more



ICIMOD: Grants Programme for utilizing geospatial Tools and Services

MON NOV 4 2013

UN-SPIDER's Regional Support Office located in Nepal, the International Centre for Integrated Mountain Development (ICIMOD), has announced a Request for Proposals for the SERVIR-Himalaya Small Grants Program. The goal of the programme is to help growing the network of organizations, universities and institutions within the Hindu Kush-Himalaya region that utilize geospatial tools and services...

read more

UN-SPIDER - 10 years

- Supported over the years by some 25 UN staff, junior professionals and seconded experts from Member States, as well as by over 80 non-paid interns
- 21 Regional Support Offices (voluntary contributions)
- Modest financial support provided by Germany, China, Austria, Switzerland, Croatia, Indonesia; other various in-kind support (staff time, event hosting)
- Technical Advisory Missions in 35 of the most-vulnerable , disaster-prone countries – over 150 actions and recommendations identified, awaiting implementation
- Advisory support and capacity building in space technologies for over 45 countries
- Tens of thousands of Portal visits searching for space-based data and information during disaster events
- Specific booklets, best practices developed for knowledge sharing

Sendai Framework for Disaster Risk Reduction (2015-2030)

Priority 1: Understanding disaster risk

National and local levels

22(f) Promote real-time access to reliable data**, make use of space and in situ information, including GIS**, and use information and communications technology innovations to enhance measurement tools, collection, analysis and dissemination of data;

Global and regional levels

23(c) Promote and enhance, through international cooperation and technology transfer […] access to, and the sharing and use of, […] data, information, […] communication and **geospatial and space-based technologies and related services. Maintain and strengthen in situ and remotely-sensed earth and climate observations. […];**

→ Preparedness, Mitigation requirements - SDI

Agreements with VHR Imagery Providers

(free data for disasters, emergencies, full cycle - facilities in other applications)

- MoU with DigitalGlobe – completed
- MoU with China National Space Agency (5-7 sensors) – completed

- MoU with UAE Space Agency (DubaiSat) – in preparation
- MoU with Kazakhstan (KazSat) – in preparation
- MoU with Israel Space Agency (EROS) – in preparation
- MoU with Italian Space Agency (Cosmo-Skymed) – in preparation
- MoU with Planet (and Terra Bella) – under discussion
- MoU with Airbus – under discussion
- MoU with BlackSky – under discussion

Informal agreements also with Thailand, Venezuela, India and others on free access