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NEWSLETTER

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In Focus

Space-based information for post-2015 sustainable development

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

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.

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

Pedro Basabe, Senior Programme Officer, UN Office for Disaster Risk Reduction

Pedro Basabe, geologist and Dr. ès Sc. in hydrogeology, has vast expertise in applied geology, natural hazard identification, mapping, monitoring systems, research and project management. He joined the UN Office for Disaster Risk Reduction (UNISDR) in November 2001, where he is contributing to disaster risk reduction knowledge and capacity development, publications, partnership development, drought risk reduction practices and linkages with the humanitarian sector to promote holistic and integrated disaster risk management.

What role can Earth observation and space technologies play to help countries reduce disaster risks?

Earth observation plays a very strong role in contributing to the assessment of natural hazards, the exposure of vulnerable elements and to track changes in exposure over the years. These are essential elements when assessing the degree of disaster risk to which communities are exposed.

As stated in the Sendai framework for disaster risk reduction, which was launched during the recent World Conference on Disaster Risk Reduction, there is a need to assess and understand disaster risk and how it is created. Earth observation contributes to such an assessment. In addition, it contributes to enhance the effectiveness of multi-hazard early warning systems providing precise information on a timely basis.

The use of Earth observation has been explicitly stated in the Sendai framework as a way to gather data that is needed to elaborate information on hazard exposure, vulnerability and risk.

What are the current obstacles and challenges for countries using space-based information?

I can think of three main obstacles:

- Weak capacities in government institutions that inhibits them from taking advantage of the opportunities offered by the space community, including lack of skills of staff, inadequate hardware and software to process satellite imagery, as well as lack of access to high-resolution satellite imagery due to its high cost;

- Poor coordination among stakeholders at the national level to make use of Earth observations;

- Weak cooperation and coordination among international and regional organizations involved in Earth observation when it comes to assisting countries to make use of Earth observation in efforts focusing on disaster risk reduction.

How can OOSA and UNISDR jointly support countries in making better use of space-based information for disaster risk reduction?

To achieve this goal, it is essential that UNOOSA and UNISDR converge on ways to do it. One example is the Earth observation partnership that was launched in Sendai during the World Conference. The Sendai framework makes reference to the need to strengthen national platforms for disaster risk reduction through regional and international efforts. The Sendai Framework also makes explicit reference to the importance of international cooperation to promote the use of geospatial and space-based technologies and related services for a variety of purposes including developing and updating periodically location–based disaster risk information or to improve methods to assess risks as a way to develop and implement disaster risk reduction policies among others. The Framework reiterates the usefulness of the use and expansion of thematic platforms such as this Earth observation partnership as a way to share know-how, innovation and research to ensure access to technology and information in disaster risk reduction.

In a nutshell: Space-based information in the 2015 Sendai Framework fo

After extensive rounds of negotiations during several months, the 187 Member States that attended the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan launched in the evening of 18 March 2015 the Sendai Framework for Disaster Risk Reduction, valid for the period 2015 to 2030. The document (A/CONF.224/CRP.1) contains seven targets and four priorities for action. The Framework specifically mentions space-based and geospatial information in several paragraphs.

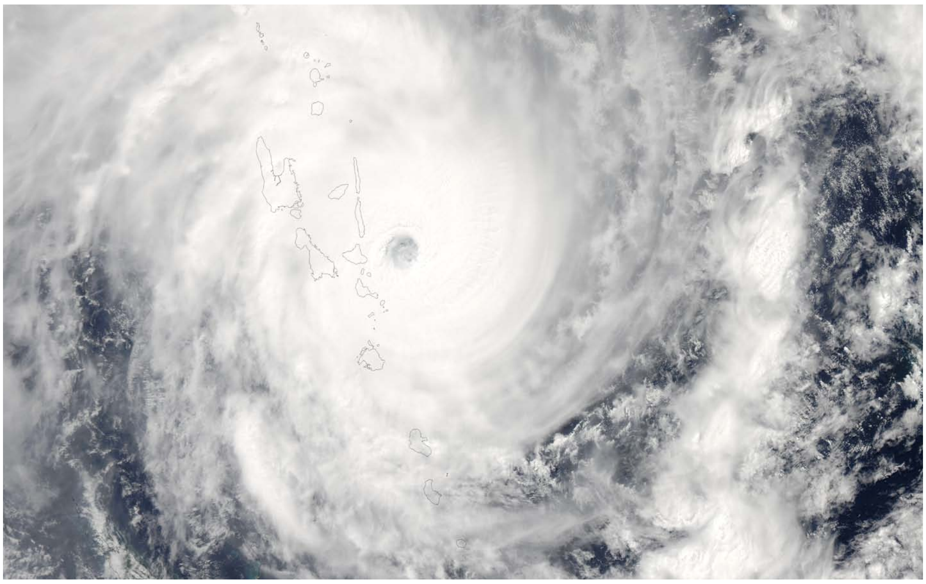
Under priority area 1: Understanding disaster risk, paragraphs 24 (c) and 24 (f) highlight the importance to "develop, update periodically and disseminate, as appropriate, location-based disaster risk information, including risk maps, to decision makers, the general public and communities at risk to disaster in an appropriate format by using, as applicable, geospatial information technology" and the importance to "promote real-time access to reliable data, make use of space and in situ information, including geographic

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

On 18 March 2015, world leaders decided on the 2015 Sendai Framework for Disaster Risk Reduction.

The implementation of reliable monitoring mechanisms from space can support the assessment of global progress in achieving the outcomes and goals of the Sendai Framework, especially by providing baseline information relevant to five of the seven global targets. Furthermore, space-based information can contribute directly to priority of action 1 "Understanding disaster risk" and to priority of action 4 "Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction".

In the case of priority 1, understanding disaster risk in all its dimensions of vulnerability, capacity, exposure of people and assets, hazard characteristics and the environment is necessary. Space technology provides reliable and consistent information on the global, regional, national and local scale, especially in the field of Earth observation, leading to a better understanding of disaster risks. Satellite-based information offers continuous monitoring and evaluation of exposure, multi-hazard characteristics and the environment through objective measuring systems. This allows policy makers to understand the alteration of underlying risk factors and their contribution to the overall disaster risk situation at different spatial and temporal scales.



Satellite technologies can help improve disaster early warning, such as in the case of Cyclone Pam that struck Vanuatu in March 2015 (Image: NASA)

In the case of priority 4, space research and technology will enhance disaster preparedness mainly in strengthening people-centred, multi-hazard, multi-sectoral forecasting and early warning systems, disaster risk and emergency communications mechanisms, social technologies and hazard-monitoring telecommunications systems. Space technology is an indispensable component to monitor fast and slow on-set hazards as well as the modification of hazards over time and in different places. By combining different datasets in a timely way, forecasting becomes more reliable, improving early warning decision making.

UN-SPIDER is ideally placed to support the Sendai Framework components "role of stakeholders" and "international cooperation and global partnership" as both aspects are at the core the programme's mandate. Together with key partners, UN-SPIDER co-initiated two efforts: an International Network for Multi-Hazard Early Warning and a global partnership focusing on Earth observations. The global partnership shall facilitate the use of Earth observation and related satellite-based technology through a variety of efforts including the provision of technical advisory support. Currently, the members of this partnership are discussing their terms of reference on how the space community can best support the implementation of the Sendai Framework.

or Disaster Risk Reduction

information systems (GIS)" at local and national levels.

In paragraph 25 (c), the Sendai Framework calls on global and regional organizations to "promote and enhance, through international cooperation, including technology transfer, access to and the sharing and use of non-sensitive data, information, as appropriate, communications and geospatial and space-based technologies and related services. Maintain and strengthen in situ and remotelysensed earth and climate observations. Strengthen the utilization of media, including social media, traditional media, big data and mobile phone networks to support national measures for successful disaster risk communication, as appropriate and in accordance with national laws". In paragraph 25(g) the Framework stresses the importance to "disseminate risk information with the best use of geospatial information technology."

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

Climate change represents a global threat to the economic, social and environmental dimensions of sustainable development. In December 2015, world leaders will convene in Paris, France, to agree on a universal agreement on climate change. This new agreement will address climate change mitigation, mainly through the reduction of greenhouse gas emissions, as well as the capability of countries and societies to adapt to the realities of climate change, such as extreme weather events. It will also address how to cope with climate change related losses and damages.

Satellites offer a unique way of gathering data on essential climate variables at the global level which may be too difficult, too costly or impossible to gather using in-situ approaches. Such variables include atmospheric, terrestrial, and oceanic aspects, inter alia: sea-level rise, deforestation trends, carbon emissions, and the melting of polar ice caps and glaciers.

For example, innovative technologies such as NASA's OCO-2 mission or the French-German MERLIN satellite are able to probe the atmosphere for concentrations of methane or carbon dioxide, the two main contributors to the greenhouse effect.

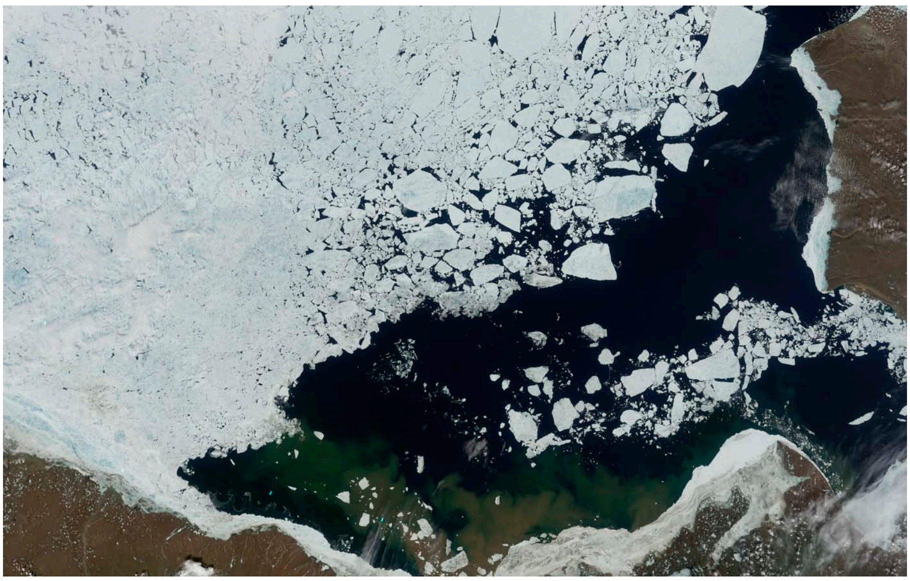
Another example of space technologies for climate change mitigation is the monitoring of deforestation and the health of our ecosystems. Forests as well as healthy wetlands and other types of natural land covers play a decisive role on climates, because they are important factors in carbon sequestration acting as effective carbon sinks. However, monitoring large forest areas or other ecosystems from the ground requires a lot of time and resources. Satellites on the other hand can monitor such areas continuously over long periods of time. They can measure greenhouse gas emissions, provide data for forest inventories (for example through classification by age, vegetation and health of vegetation), assess changes in the extent of forests, and estimate anthropogenic emissions by sources. Thus, satellites can greatly support efforts such as the UN's REDD+ mechanism to reduce emissions from deforestation and forest degradation in developing countries.

Satellites can also monitor variables that help societies better adapt to the realities of climate change. For example, through monitoring sea level rise due to increases in the subsurface ocean temperature. Climate change-related phenomena such as melting mountain glaciers and polar ice caps further contribute to the phenomenon. Sea level rise is by no means evenly spreading on the globe; the levels can vary greatly. For instance, Small Island Developing States in the Pacific seem to be more affected than the Pacific coast states in North and South America. Satellites can observe sea level developments through radar altimetry measurements and sea surface temperature assessments, which are then combined with in situ observations.

Floods, droughts and storms are closely linked to climate stimuli such as changes in temperature and precipitation, including rain, hail or snow which can be continuously monitored by satellites. This data can then be used to assess long term trends and support early warning systems.

Satellites can also measure water levels for freshwater bodies as well as assess the saturation of soils which are important indications related to droughts. Droughts and high temperatures resulting in part from climate change impacts can lead to devastating wild fires. Sensors such as the Moderate Resolution Imaging Spectroradiometer (MODIS) are able to detect fire locations by identifying hot spots.

Additionally to observing (hydro-) meteorological variables, satellites can also track social trends relevant to climate change, such as the increasing exposure of vulnerable communities to the adverse effects of a changing climate and help build more resilient cities and societies. For example, satellite data can help in urban planning by identifying settlement areas and assessing whether those areas are particularly exposed to sea level rise, flooding or drought.



Unusually rapid sea ice retreat at Beaufort Sea, Alaska in June 2012 captured by the MODIS sensor on NASA's Terra satellite (Image: NASA)

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

From 25 to 27 September 2015, world leaders will gather in New York to jointly shape the post-2015 development agenda. The outcome will be an agreement on Sustainable Development Goals, succeeding the Millennium Development Goals. These Goals will place great emphasis on the joint responsibility of all countries to achieve a sustainable future for all. The preliminary list elaborated by the UN General Assembly's Open Working Group on Sustainable Development Goals in 2014 includes 17 goals and 169 targets. They cover an array of relevant topics including poverty, hunger, health and water, education, gender equality and natural resource management.

The goals will only be reached if countries and multilateral actors have access to reliable information in order to plan adequately. Goal 17, for example, stresses the importance to "increase significantly the availability of high-quality, timely and reliable data disaggregated by (…) geographic location". Satellite-derived data and information can be a key element in this process on two levels: first, they can provide a good knowledge base on the status quo, the needs and challenges allowing decision-makers to shape effective policies and allocate resources appropriately; second, satellite data can serve to continuously monitor the progresses or setbacks in implementing such measures, thus helping countries to stay on track. The following presents a few examples.

Goal 2 aims at ending hunger and promoting sustainable agriculture. Satellite information can play an important role in addressing agricultural production challenges. Satellite navigation, satellite communication and Earth observation can support precision farming methods. These help farmers manage their resources and plan their seeding and harvesting periods more effectively as well as sell their produce according to up-to-date information on current prices and needs.

The application of space technologies to the 17 Sustainable Development Goals

Goal 3 aims at ensuring health and well-being at all ages. Access to proper health care is not always a given in developing countries, especially in remote areas. Satellite-based tele-health services and tele-epidemiology can facilitate specialist treatments where they would otherwise not be available.

Goal 6 aims for universal and equitable access to drinking water and sanitation services. Satellites can effectively monitor water resources (such as lakes or reservoirs) and relevant water ecosystems such as mountains or wetlands from space thus supporting early warning systems when water supply runs low. They can also support processes such as urban water management at a large scale and support appropriate decision-making.

Goal 11 aims for inclusive, safe, resilient and sustainable cities and human settlements. Satellite-based Earth observation, such as the Global Urban Footprint project by the German Aerospace Center, can greatly contribute to track urban development and guide urban planning and climate change resilience, for example by identifying appropriate building areas and potential risk areas.

Goal 14 aims for sustainable monitoring and management of ocean resources. Since the health and status of oceans and other questions regarding maritime resources can be very difficult and costly to monitor on the ground, satellite data is an effective alternative. For example, sea ice, icebergs or oil spills on the sea surface can be detected; vessels can be identified and tracked to avoid illegal fishing activities. New innovative sensors, such as the Soil Moisture and Ocean Salinity (SMOS) satellite of the European Space Agency can be used to measure ocean acidification.

A remaining major challenge in this context is a lack of awareness among decision-makers and representatives of the research and academic community with respect to space technology applications for addressing social and economic development, primarily in developing countries, as well as a lack of resources and technical capacities. UNOOSA – through its UN-SPIDER programme and other activities – is addressing these challenges by raising awareness among the relevant stakeholders, by promoting low-cost space-related technologies and information resources, and by building capacities at country level.

After Sendai: The way forward

by Simonetta Di Pippo, Director of the United Nations Office for Outer Space Affairs (UNOOSA) and Luc St-Pierre, Senior Programme Officer of UNOOSA and Coordinator of UN-SPIDER

UNOOSA Director Simonetta Di Pippo speaking at WCDRR

In the last edition of the UN-SPIDER Newsletter we already spoke about the future key role of Earth Observation (EO) in disaster risk reduction. In March 2015, UNOOSA/UN-SPIDER was present on various platforms at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan.

We wish to use this opportunity to set out a short list of our actions and results in Sendai and of the commitments we are taking in the coming year, not only for the “Sendai Framework for Disaster Risk Reduction 2015-2030”, but also for the broader global sustainable development agenda.

UNOOSA/UN-SPIDER co-organised two working sessions and two public fora. At the “Earth observations and high technology to reduce risks” working session, the Director of UNOOSA presented the White Paper “A global partnership for Earth observation to support nations in their disaster risk reduction efforts”. This innovative partnership of UNOOSA and of about 20 international, regional and national entities will be the basis of the concerted coordination to support the Sendai Framework. We also participated in the “Early Warning” working session where partners submitted the White Paper entitled “International network for multi-hazard early warning systems (IN-MHEWS): a multi-stakeholder partnership for promoting a holistic and integrated approach to early warning systems and services for disaster risk reduction and resilience”. We also participated in the public forum “New global framework for sharing of space technology and data standards to serve nations’ disaster management needs” organised by CANEUS and to present on “Small satellite development: contributing to socio-economic benefits from space technology”. Finally, UN-SPIDER was presented and discussed at the public forum “Enhancing disaster resilience by fusion of simulation, sensing and geospatial information”.

Sendai was for us much more than these targeted interventions; it was a final milestone after eight months of work with key partners such as GEO, CEOS, UNITAR/UNOSAT, ESCAP and various governments, to prepare, coordinate, strategize and lobby for space-based tools and applications to be predominantly present in the outcome document of Sendai. We are very proud of the inputs we made which helped to frame “Priority 1: Understanding Risk” (see pages 2-3).

Still, there remains a long and challenging road to bring EO commitments onto the operational agenda of countries. Recognition of EO as a valuable, affordable and timely instrument still needs work in many government entities. The large number of actors in the acquisition, provision, analysis and dissemination of EO products requires effective coordination in order to ensure that countries know what to request, what to expect and how to benefit from the information.

Making the white papers of Sendai living and dynamic references, not only for EO actors, but for end-users, will be essential over the next few years and UNOOSA/UN-SPIDER is committed to facilitating that effort. The model partnerships set for Sendai must continue to communicate how space-based tools and applications and their related technologies can also support countries in reaching their Sustainable Development Goals and their commitments to tackle climate change. We are thus preparing for other key global events this year to structure our joint message, including the SDG Summit in New York in September and the COP-21 of UNFCCC in December. Creating bridges from Sendai to New York and Paris, UNOOSA/UN-SPIDER is co-organising two conferences with the Governments of Germany and China, respectively. The United Nations/ Germany International Conference on Earth Observation: Global solutions for the challenges of sustainable development in societies at risk in Bonn, Germany, 26 to 28 May 2015 and the United Nations/China International Conference on Space-based Technologies for Disaster Management: A consolidating role in the implementation of the Sendai Framework on Disaster Risk Reduction 2015-2030 in Beijing, China, 14 to 16 September 2015. Building innovative partnerships with open communication lines and clear objectives is and will continue to be the modus operandi of UNOOSA/UN-SPIDER, with the overarching goal of serving humanity for a better life on Earth.

UNITED NATIONS

The United Nations Office for Outer Space Affairs (OOSA) implements the decisions of the General Assembly and of the Committee on the Peaceful Uses of Outer Space and its two Subcommittees, the Scientific and Technical Subcommittee and the Legal Subcommittee. The Office is responsible for promoting international cooperation in the peaceful uses of outer space, and assisting developing countries in using space science and technology. In resolution 61/110 of 14 December 2006 the United Nations General Assembly agreed to establish the “United Nations Platform for Space-based Information for Disaster Management and Emergency Response - UN-SPIDER” as a new United Nations programme to be implemented by OOSA. UN-SPIDER is the first programme of its kind to focus on the need to ensure access to and use of space-based solutions during all phases of the disaster management cycle, including the risk reduction phase which will significantly contribute to the reduction in the loss of lives and property.