

64th International Astronautical Congress 2013

EARTH OBSERVATION SYMPOSIUM (B1)  
Towards Implementation of GEOSS (6)

Author: Mr. Jacob Sutherlun  
National Oceanic and Atmospheric Administration (NOAA), United States,  
jacob.sutherlun@noaa.gov

Ms. Tiffany Chow  
Secure World Foundation, United States, tchow@swfound.org

COLLABORATION IN THE CEOS WORKING GROUP ON CAPACITY BUILDING AND  
DATA  
DEMOCRACY: A CASE STUDY OF DIGITAL ELEVATION MODEL WORKSHOPS

Abstract

This past year at the IAC in Naples, Italy, a paper was presented that examined how an intergovernmental entity like the Committee on Earth Observation Satellites (CEOS) could cooperate with non-governmental organizations (NGOs) to build a more effective approach to capacity building in the area of space-borne Earth observations. That paper particularly explored the case study of collaboration between an NGO, Secure World Foundation (SWF), and the CEOS Working Group on Capacity Building and Data Democracy (WGCapD) on the WGCapD Digital Elevation Models (DEMs) Project. The WGCapD was just beginning its work last year, but it has now had an opportunity to begin the implementation of some of its activities, including the DEMs Project.

This paper will update on this case study and extrapolate wider lessons on the collaborative opportunities and advantages of NGO cooperation with intergovernmental bodies. As part of its DEMs Project, the WGCapD is hosting a series of workshops that focus on newly released 30 meter Shuttle Radar Topography Mission data applications for flash flood forecasting and urban planning. The first of these workshops was scheduled for May 2013 in Nairobi, Kenya. The WGCapD partnered with the Regional Centre for Mapping of Resources for Development (RCMRD), a Ministerial level organization of 18 member states in East and Southern Africa to host and run the workshop. SWF has been involved in this project from the outset through the WGCapD. This paper will provide a summary of the workshop itself and the lessons learned from that experience, specifically how collaboration improves efficiency and reduces redundancy in capacity building activities.

## I. INTRODUCTION

At the 2012 International Astronautical Congress (IAC) held in Naples, Italy, the authors presented a paper that examined how an intergovernmental entity like the Committee on Earth Observation Satellites (CEOS) could cooperate with non-governmental organizations (NGOs) to build a more effective approach to capacity building in the area of space-borne Earth observations. That paper particularly explored the case study of collaboration between an NGO, Secure World Foundation (SWF), and the CEOS Working Group on Capacity Building and Data Democracy (WGCapD) on the WGCapD Digital Elevation Models (DEMs) Project. The WGCapD was just beginning its work last year, but has now had an opportunity to implement some of its activities, including the DEMs Project.

This paper will serve as a follow-on to that presentation. It will review the progress of the DEMs Project and provide an overview of the first DEMs Project activity, the Nairobi Workshop, which was held in May 2013 at the Regional Centre for Mapping of Resources for Development (RCMRD) in Nairobi, Kenya. The paper will conclude by offering some lessons learned for both the DEMs Project and collaborative opportunities in satellite-based Earth Observation (EO) capacity building activities.

## II. BACKGROUND INFORMATION

Before examining the DEMs Project and Nairobi workshop in greater detail, this section will provide some background information on CEOS, WGCapD, and the precursor paper presented at the IAC in Naples, Italy.

CEOS, established in 1984 in response to a recommendation from a Panel of Experts on Remote Sensing from Space that was set up under the G7 Economic Summit of Industrialized Nations to organize global EO coordination efforts, provides a framework for international coordination of space-based EO missions. CEOS has 30 Member space agencies and 23 Associate organizations. The objectives of CEOS are to:

- Optimize benefits of space-borne Earth observations (EO) through cooperation of its Members in mission planning and in development of compatible data products, formats, services, applications and policies;
- To serve as a focal point for international coordination of space-related EO activities; and,
- To exchange policy and technical information to encourage complementarity and compatibility of observation and data exchange systems.

In 2013, CEOS is focusing coordination efforts on the following priority areas: “climate monitoring and research, carbon observations, including observations to sustainable management of the world’s forests, food security, disaster risk management, capacity building, and data availability and access.”<sup>1</sup> Within the capacity building and data availability and access priorities, CEOS is making great efforts to advocate the concept of Data Democracy, which is defined as ensuring timely access to key datasets and associated tools for the worldwide development of capacity in the use of EO from space.

In order to promote Data Democracy within and outside of CEOS, CEOS maintains the

---

<sup>1</sup> CEOS 2013 Work Plan, [ceos.org/images/CEOS\\_2013\\_Work\\_Plan\\_FINAL.pdf](http://ceos.org/images/CEOS_2013_Work_Plan_FINAL.pdf)

WGCapD, which was reconstituted in 2011 to focus on Data Democracy. The idea of Data Democracy was introduced in 2008 during the CEOS Chairmanship of the South African Council for Scientific and Industrial Research (CSIR) and further advanced under the subsequent chairmanships of Thailand's GEO-Informatics and Space Technology Development Agency (GISTDA) in 2009 and Brazil's National Institute for Space Research (INPE) in 2010. The objective of the Data Democracy Initiative, as noted in the 2010 CEOS Rio Plenary Statement, is the "provision of timely access to key data sets free of charge to build capacity worldwide,...enhanced data dissemination capabilities, sharing of software tools, increased training, and technology transfer to end users."

While the majority of WGCapD members are CEOS Agencies, the Working Group has also partnered with many other institutions, such as Secure World Foundation (SWF), the Regional Centre for Mapping of Resources for Development (RCMRD), the Centro Regional de Enseñanza de Ciencia y Tecnología del Espacio para América Latina y el Caribe (CRECTEALC), the World Bank, and the Group on Earth Observations (GEO), in an effort to amplify the capacity building efforts of all parties involved.

The paper presented at the 2012 IAC in Naples, Italy, introduced the CEOS WGCapD and its objectives, discussed the advantages of cooperation in achieving those objectives, looked at the DEMs Project as an example of implementation activities, and suggested that this experience might inform other cooperation on satellite-based EO capacity building activities.

The paper asserted that several advantages exist in cooperating on Data Democracy initiatives and capacity building activities

and used the DEMs Project as a practical example of those advantages. The advantages obtained through cooperation on the DEMs Project included:

- Facilitating the use of EO data owned by a single nation for applications beyond its borders
- Enabling burden-sharing
- Leading to an outcome superior to unilateral action

While this list does not exhaust the advantages of cooperation on the DEMs Project, the authors focused on these as prime examples of benefits that might also be achieved in cooperating on other Data Democracy and capacity building efforts. Thus, the paper concluded by suggesting that these specific lessons learned might be extrapolated to inform similar activities.

This paper will later revisit these lessons learned in the context of the Nairobi Workshop, the inaugural DEMs Project activity.

### III. OVERVIEW OF DEMS PROJECT AND NAIROBI WORKSHOP

This section will provide an overview of the DEMs Project and its inaugural activity, the Nairobi Workshop.

The DEMs Project aims to deliver 30 meter elevation data gathered on the Shuttle Radar Topography Mission (SRTM) to underserved communities and train them on how to use the data in applications targeting their needs. Through this project, the CEOS WGCapD takes previously unavailable data, owned by a single nation, and delivers it to those who could benefit from it, thereby advancing Data Democracy through cooperation. The SRTM 30 meter data is the sovereign property of the nation who funded and fielded the EO mission, the United States. For a variety of reasons, the United

States, and specifically the National Geospatial Intelligence Agency (NGA) who owns the data, has not made the data freely and publicly available to all, but they recognized an opportunity to deliver the data to under-served communities in a controlled and purposeful way through its agencies, the National Oceanic and Atmospheric Administration (NOAA), the United States Geological Survey (USGS), and the National Aeronautics and Space Administration (NASA), in connection with their roles in the CEOS WGCapD.

Since the 30 meter data had been largely kept out of the public domain, with the exception of the data over the United States, releasing this data to individual countries fell into somewhat uncharted territory. Close, extracted coordination was required between all stakeholders to ensure that the data would be used for its intended purposes. Datasets for two countries, South Sudan and Somalia, were initially approved for release with talks ongoing about future releases of SRTM 30 meter data. These two datasets could be used to train workshop attendees with the hope that attendees from countries other than the two provided would receive data for their individual countries as some point in the future.

Despite difficulties in securing a complete release of the 30 meter elevation data, the WGCapD partners decided to move forward with the data received for South Sudan and Somalia and use it in the first activity in the DEMs Project, the Nairobi Workshop. CEOS WGCapD members teamed up with a local partner, RCMRD, and the co-located United States Agency for International Development (USAID) and NASA SERVIR hub to host a weeklong training workshop in Nairobi, Kenya, for East African participants. Additional workshop partners included CEOS member agencies INPE, the

South African National Space Agency (SANSA), USGS, and NOAA and CEOS WGCapD partner NGO, the Secure World Foundation. Participants from the following countries attended the workshop: Ethiopia, Kenya, Somalia, South Sudan, Uganda, and Zambia.

The focus of the inaugural DEMs Project workshop was developing capacity in the East African region for utilizing satellite-derived DEMs, specifically the newly-released SRTM 30 meter elevation data, in a variety of ways, but with a particular emphasis on hydrologic models. The WGCapD partners consulted with the local partner, RCMRD, to identify hydrology as an application of particular interest in the East African region, parts of which are severely affected by flash floods.

The agenda featured a mix of introductory presentations to a variety of tools, applications, and concepts, as well as several hands-on training sessions working with different tools and software, some of which were open source. The following organizations sent trainers and / or presented materials: Famine Early Warning Systems Network (FEWSNET), INPE, SANSA, SWF, RCMRD/SERVIR, and USGS.

The Nairobi Workshop was a successful inaugural activity for the CEOS WGCapD DEMs Project. The organizing partners collected feedback through an open discussion session at the end of the last day of the workshop and through a paper questionnaire filled out by all participants. That feedback has been incorporated into a final report, which can be found online<sup>2</sup>, and was also used to inform this paper and lessons learned. Overall, participants were

---

2

[http://www.ceos.org/images/WGCapD/DEMWorkshopReport\\_Web\\_Version.pdf](http://www.ceos.org/images/WGCapD/DEMWorkshopReport_Web_Version.pdf)

pleased with their experience and felt that material covered would be relevant in their daily jobs. The only source of dissatisfaction was that the SRTM 30 meter data was not yet available for all of the workshop participants, only for the South Sudanese and Somali.

#### IV. LESSONS LEARNED

The Nairobi Workshop was an invaluable experience and successful first DEMs Project activity for the WGCapD. It further confirmed those lessons learned about the advantages of cooperation reviewed in the paper presented at the 2012 IAC in Naples, Italy. There were also additional, unanticipated lessons learned from the Nairobi Workshop that can inform future DEMs Project activities, as well as future CEOS WGCapD projects and wider Data Democracy and satellite-based EO capacity building initiatives. This section will look at both expected and unexpected lessons learned from the Nairobi Workshop.

##### Review of Lessons Learned in IAC 2012 Paper

In the 2012 paper presented at the IAC in Naples, Italy, there were three major advantages to cooperating on Data Democracy and capacity building initiatives as evidenced through the DEMs Project in the CEOS WGCapD. As summarized earlier in this paper, those advantages were:

- Facilitating the use of EO data owned by a single nation for applications beyond its borders
- Enabling burden-sharing
- Leading to an outcome superior to unilateral action

In the case of the Nairobi Workshop, all of these advantages to cooperation were demonstrated.

First, the Nairobi Workshop demonstrated how satellite-derived EO data gathered and owned by one nation can serve useful purposes far beyond its own borders. The 30 meter elevation data gathered on the U.S. Space Shuttle mission was of great use to and highly desired by the East African participants at the Nairobi Workshop. In a region often affected by flash floods, the 30m elevation data can be used in hydrologic models that more accurately predict flooding, thereby preventing loss of life and economic damage. This is just one example of how the SRTM 2 data is useful for important applications in East Africa. There are additional potential applications there and even more to be discovered for other regions of the world.

Second, the Nairobi Workshop demonstrated how cooperation enables burden-sharing. This DEMs Project activity would not have been possible without partnership among CEOS WGCapD members, supporting NGOs, and a local host. Costs and logistical responsibilities were shared amongst six partner organizations. No single entity could have paid for, offered, or organized this workshop unilaterally. Some partners contributed funding to bring participants from East African countries; others contributed trainers and software; others contributed use of facilities and staff. By cooperating on this activity, and being flexible about the types of contributions from each partner, the Nairobi Workshop came together successfully. Resources, logistical support, and training came from a variety of sources, which also enhanced the quality of the workshop.

Third, the Nairobi Workshop showed how cooperation can in fact lead to a superior outcome than if an activity is carried out by one actor alone. As mentioned earlier, the

burden-sharing enabled by cooperation meant there was a diversity of training offered at the workshop. This provided participants with a range of tools, models, software, and applications from which they could choose instead of limiting them to work with only one platform or model. It was also very clear from this experience that partnering with a local host is critical to success. Cooperating with RCMRD not only improved the overall quality of the activity but also ensured that the workshop was tailored as much as possible to the participants' needs. Because RCMRD is located in the region and interacts regularly with actors there, they had a much better sense of what types of software, applications, tools, and models would be of greatest utility to the participants.

#### Other Lessons Learned

In addition to confirming the aforementioned advantages to cooperation, there were a number of other lessons learned from the Nairobi Workshop that can benefit future DEMs Workshops and WGCapD activities, as well as inform broader Data Democracy and capacity building activities in space-based EO.

Some of the major strengths of the Nairobi Workshop were:

- having a WGCapD representative in attendance,
- inviting technically-proficient participants,
- selecting one case study,
- preparing and providing step-by-step instructions and take-home materials for the participants,
- and collecting feedback from participants immediately and in-person.

First, having a WGCapD representative in attendance was beneficial because this

individual could facilitate the process, present on behalf of CEOS WGCapD, help couch the workshop in the larger GEO and CEOS context, and report back to the other organizers and CEOS WGCapD.

Second, all of the participants present at the Nairobi Workshop were previously trained in some technical field relevant to the workshop content. This was a major benefit as it elevated the discussions and allowed trainers to delve deeper into the applications and tools.

Third, one case study was used in all training modules. In advance of the workshop, organizers settled on a site in Somalia that had experienced a major flood event several months prior. This site was used throughout the workshop, effectively unifying the materials and showcasing the diversity of tools and software presented.

Fourth, many of the trainers wrote out step-by-step instructions and prepared packets that the participants could take back to their daily jobs. This ensured that participants could follow along at their own pace and could refer to exercises later should they need help recalling certain models or applications.

Finally, it was very beneficial to schedule an immediate feedback discussion and have participants fill out a written questionnaire evaluating their experience in the workshop. This guaranteed that all participants provided feedback and, in particular, feedback that was fresh in their minds. This feedback has proven essential in extracting as much value from the workshop as possible. The value derived has extended far beyond the weeklong workshop because of this feedback. It has helped CEOS WGCapD evaluate what did and did not work in the workshop, how the model can be improved

for future workshops in the DEMs Project, and will hopefully inform other EO Data Democracy and capacity building activities.

Some of the areas for improvement at the Nairobi Workshop were:

- the need for a defined facilitator,
- greater clarity among participants about the workshop's objective,
- more adequate preparation,
- a more logical flow to the agenda,
- and more hands-on exercises.

First, it was unclear who among the many partner organizers would be in charge of facilitating the workshop from beginning to end. This is an unsurprising consequence of cooperation and can be easily resolved by pre-designating someone to facilitate the activity.

Second, there could have been greater clarification of workshop objectives for the participants. While it was clear to the organizers involved how the workshop fit into the overarching context of CEOS WGCapD and GEO, this was not obvious to the workshop participants. This could easily be improved through clearer communication leading up to the workshop, likely in invitation materials, and during the workshop through presentations and discussion.

Third, minor technical difficulties slowed down the progress of the workshop. These could have been avoided with more adequate preparation such as installing and running software in advance of the workshop.

Fourth, the participants felt that some of the presentations that came later in the week would have fit more logically on the first or second days, thus laying a stronger

foundation for other modules and presentations.

Finally, while there were many hands-on exercises incorporated into the agenda, the participants were eager for even more. Both of these suggestions can be easily achieved in future workshops with some shuffling of the agenda.

Most of these deficiencies were minor weaknesses; the single greatest area of constructive criticism was the desire for 30 meter data for all of the participating countries. It was explained at the workshop that data was expected eventually and would be delivered to participants as soon as possible, but that the release was being delayed by complicated negotiations within the U.S. Government. This explanation was generally accepted, but it does not resolve the issue that much of the training provided is lost if not put to use immediately. Without the datasets, much of the Nairobi Workshop value will diminish for all participants except those from South Sudan and Somalia, who were able to take the SRTM 2 data home with them.

How can these seemingly specific lessons learned apply to other EO Data Democracy and capacity building activities? Overall, they demonstrate the value of preparation, especially in tailoring the offerings to participants, and clarification of roles and intentions. The more that an activity's organizers know their audience in advance, the more relevant and useful the activity can be. It will help the organizers structure the agenda more effectively, offer as many or as little hands-on exercises as desired, and prepare appropriate instructions and take-home materials. Additionally, clarification is key for the smooth running of such an activity, not just among the organizing parties, but also with the participants.

Clearly designating roles ensures that the workshop flows smoothly and seamlessly. Clearly communicating the objectives of the workshop helps participants derive as much value as possible from their experience.

## V. CONCLUSION

In the realm of Data Democracy and capacity building activities for space-based Earth observations, cooperation is key to success. The advantages of cooperating on such initiatives proliferates the benefits to be gained from space-derived EO, enables burden-sharing thereby making possible activities that would not be otherwise, and almost always produces a better outcome than if these efforts were carried out unilaterally. Together with the paper presented at the 2012 IAC in Naples, Italy, this paper has demonstrated these advantages to cooperation through the CEOS WGCapD experience, specifically in its DEMs Project and Nairobi Workshop, and suggests that these lessons learned might benefit other activities targeting capacity development in a more effective use of space-based EO in daily decision making around the world.