



Committee on Earth Observation Satellites
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CEOS SIT-28 Meeting Report



Dr. Michael H. Freilich, CEOS Strategic Implementation Team Chair

The 28th CEOS Strategic Implementation Team (SIT-28) Meeting held on March 12-14, 2013 in Langley, Virginia, U.S.A., accomplished an ambitious agenda. We begin by thanking everyone who participated in person and virtually through web-conferencing. With your participation, much was accomplished at SIT-28, and in the months since the meeting, to prepare us for our Plenary in November 2013.

As a result of decisions taken at SIT-28, our seven Virtual Constellations (VCs) are working to harmonize their Terms of Reference and to incorporate knowledge gained from the development, establishment, and maturity of CEOS VCs into best practices with a comprehensive review and revision of the Virtual Constellation Process Paper. In an evolving CEOS, such holistic efforts refresh our understanding, guide our future activities, and remind us of both complexities and common elements that affect our coordination and implementation. These two initiatives, recommended at SIT-28, will also provide a platform for us to capture and articulate in a consolidated statement for stakeholders and the user community, the breadth and relevance of CEOS accomplishments and ongoing contributions for societal benefit.

In the area of Disasters, discussions at SIT-28 explored the *potential* establishment in 2014 of a new CEOS Working Group on Disasters. In the area of Climate, we examined and are acting upon a proposed partnership to work with the Coordination Group for Meteorological Satellites (CGMS) on a joint CEOS-CGMS Climate Working Group. In a broader context, SIT-28 was a forum to discuss CEOS's commitments to stakeholders, the

accomplishment of which require a sustainable and well-integrated CEOS. The Self-Study initiative, which further advanced at SIT-28, will soon be presenting at Plenary, strategic guidance documents for CEOS that represent a two-year body of work by our Agencies.

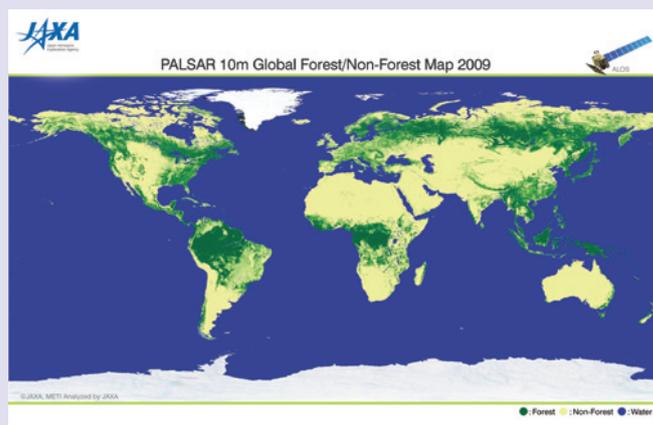
With the tenth anniversary of the Group on Earth Observations (GEO) coming into view, CEOS now supports approximately 40 percent of the Tasks and Components in the GEO 2012-2015 Work Plan. SIT-28 also focused on the strategic coordination and alignment of CEOS implementation activities in support of the Global Earth Observation System of Systems (GEOSS) and other elements of the GEO Work Plan. The meeting addressed a number of key GEO priorities including the Global Forest Observation Initiative (GFOI), the Blue Planet Task, the GEO Global Agricultural Monitoring (GEOGLAM) initiative, the development of the CEOS Carbon Strategy (in response to the GEO Carbon Strategy), and support for the GEO Disasters Societal Benefit Area. SIT-28 endorsed the

CEOS global satellite acquisition strategy in support of GFOI, and approved the development of a data services strategy in support of GFOI countries. It also endorsed the implementation of a Capacity Building Inventory by the CEOS Working Group on Capacity Building and Data Democracy (WGCapD), the continuation of the activities of the CEOS *ad hoc* working group on GEOGLAM, and a strengthened focus on data access and discovery for GEO through the CEOS Working Group on Information Systems and Services (WGISS).

The SIT Chair Team looks forward to discussions at the upcoming SIT Technical Workshop and side meetings on September 10-12, 2013 in Pasadena, California, USA. The Workshop will address a number of important topics for decision or endorsement at the CEOS Plenary in November, and it will move us closer to defining CEOS's participation in the GEO-X Plenary and the Ministerial Summit in January 2014. We hope you can join us and thank you for your continued support.

Global Forest/Non-Forest Map by PALSAR/ALOS

This figure is the Global Forest/Non-forest Map (2009,) using two colors to indicate forests in green and non-forest areas in yellow, where forest is defined as the radar backscatter greater than -14dB. The accuracy of the forest/non-forest demarcation by this image is confirmed to be 84% compared to the ground truth data.



Working Group on Calibration and Validation (WGCV)



Dr. Satish K. Srivastava,
CSA WGCV Chair

The 36th Working Group for Calibration and Validation (WGCV) plenary meeting was hosted by the Academy of Opto-Electronics, Chinese Academy of Science (CAS) in Shanghai, China from May 13 to 17, 2013 in collaboration with SECM, USTC and SITP of CAS. There were more than 55 participants representing 25 agencies/institutions internationally. Some participants joined the meeting virtually. In addition to usual plenary proceedings such as subgroup reports, agency/country reports, work plan, GEO actions etc., there were a number of Special Interest Presentations. As a follow up from SIT-28 meeting, one of the main objectives of this plenary was to engage with CEOS Virtual Constellations (VCs) and their activities that could lead to substantive collaboration between WGCV and VCs. Some VCs (SST, AC, LSI and PC) and CEO made presentations (virtually or in person) and potential collaboration was discussed. In fact the Infrared and Visible Optical Sensors (IVOS) subgroup of WGCV is already working

jointly with VC-SST proposing a campaign for post-launch calibration and validation of instrumentation used for brightness temperature measurements. The campaign should be useful to WG Climate and VC-AC also.

There was a Quality Assurance Framework for Earth Observation (QA4EO) side meeting during WGCV-36, and short- and long-term approaches were discussed. In the short term (months), the focus is on addressing specific examples with QA4EO, e.g., flooding and ozone. In the longer term (1-2 years), the approach is to extend these examples to showcases. The Terrain Mapping (TM) subgroup of WGCV proposed to produce a GEO showcase on tsunamis; it is presently under consideration by the CEOS Secretariat. At WGCV-36 there was a call for nominations for the 2014-2016 Vice Chair, to become Chair in

2016-2018.

The 37th WGCV plenary meeting will be hosted by ESA/ESRIN in Frascati, Italy from February 17-21, 2014. The Synthetic Aperture Radar (SAR) subgroup of the WGCV will hold its 20th CEOS SAR Calibration and Validation Workshop jointly with the 9th Advanced SAR (ASAR) Workshop organized by the Canadian Space Agency (CSA) from October 15-18, 2013 in St. Hubert, Canada (<http://sarvc.ceos.org/workshop2013>).



Participants of WGCV-36 plenary meeting in Shanghai

Working Group on Information Systems and Services (WGISS)



Satoko Horiyama MIURA,
JAXA

The Working Group on Information Systems and Services (WGISS) had its 35th meeting May 6-10 in São José dos Campos, kindly hosted by INPE. As the chair, I am very happy to report that the meeting was successful and very fruitful. The attendance was near 50 including those who attended virtually, thanks to the efforts of the WGISS Infrastructure Service Project.

During the meeting, we were able to have many fruitful discussions. Some highlights include, but are not limited to;

1. WGISS support for three recommendations adopted at the 28th SIT Meeting: dataset registration to IDN (International Directory Network), IDN information maintenance and better user navigation after data discovery.. The results include preparing tools and a best practice document which support those who are responsible for dataset registration and distribution within each agency.
2. WGISS Future Strategy discussion, including target and success measurement, required documents consistent with CEOS Self Study results/guidance and the need for discussion sessions focusing on new, emerging technologies. This discussion will continue at future meetings, under guidance of CEOS Self Study results.

3. Technical discussion on
 - a) CEOS Opensearch (as the follow-up of the last Plenary's action)
 - b) "Browse Guideline" document (prepared by Data Steward Interest Group)
 - c) Data discovery and access (including CEOS WGISS Integrated Catalogue-CWIC, the IDN and new technologies)
 - d) User authentication service (under Technology Exploration Interest Group)
 - e) Architecture for Disaster (under GEOSS Architecture for Disasters and Risk Assessments project)
 - f) Progress and future plan for the CEOS Water Portal.
4. The first VC IG session with presentations by VC lead representatives of the AC, PC and LSI VCs and a presentation on the CEOS/VC Portals initiative.

In addition to our regular meetings and activities, WGISS is closely communicating with the GEO Secretariat and GEO Infrastructure Implementation Board (IIB), in order to achieve one of our goals, "All of the "OPEN" CEOS Agencies' data can be discovered and

accessed from external clients (e.g., GEOSS Common Infrastructure)". We will continue this effort.

Recently, we received the very positive response from ROSCOSMOS on attending the WGISS-36 meeting this coming September and also hosting the WGISS meeting next year. This was great news and I'd like to stress again that WGISS is always open to any CEOS members or associates. My chair term will complete in the coming November. The next chair will be Mr. Richard Moreno, CNES. I would like to express my sincere appreciation for the support of CEOS, and would like to request your continuous and stronger support to us, in order to accomplish CEOS core business assigned to WGISS.



Working Group on Capacity Building and Data Democracy (WGCapD)

Hilcéa Ferreira, INPE and Jacob Sutherlun, NOAA

The 2nd Working Group on Capacity Building and Data Democracy (WGCapD) meeting was kindly hosted by the European Space Agency (ESA) in Frascati, Italy, from March 04-06, 2013. The presentations by individual agencies focused on what they have been doing in terms of capacity building and data democracy that could serve as a catalyst within WGCapD or work as a project in the scope of the group. We could see that there are a number of ongoing educational initiatives with different target audiences, including end users, universities, college educators, secondary school students and elementary school students. We were exposed to some very interesting educational and training resources made available through CEOS Agencies. With the Data Democracy principle in mind, WGCapD shall play a top-level role, stimulating, coordination and creating opportunities to help users find these very useful materials.

ESA and DLR presented on an important contribution to capacity building. They have been leading, the "Practical EO Education for Students and Teachers" Project, where the main goal is to disseminate the methodology of Earth Observation and remote sensing among secondary School students and teachers, enabling them to understand and use remote sensing in Earth sciences applications. This essential tool for increasing the awareness for the usefulness of Earth Observation data at school level has been included as one of WGCapD main activities.

A new project proposal, Inventory of Capacity Building Activities, was presented and very well received by all participants. The primary objective of this project is to compile all current capacity-building efforts on the

use of space-derived Earth observation (EO) data for societal benefits into an easily updateable format. So far, we have received feedback and engagement of more than 14 CEOS Members and Associates.

Regarding the internal coordination of WGCapD with other WGs, Ivan Petiteville (ESA), presented, on behalf of CEOS ad hoc Disaster Team, on possible support WGCapD could give to DRM (Disaster Risk Management) Capacity Building Activities. Growing political interest in DRM might be an opportunity for space agencies to play a major role in near future. Recent major international conferences, publications and declarations from decision-makers explicitly refer to the necessity to increase the means of observations including from satellites. A WGCapD person was invited to join the CEOS DRM team and to participate in all activities, serving as the liaison between the two groups.

The first semester of 2013 was very productive for accomplishing progress in enhanced data sharing and capacity building. Two main activities of the WGCapD have been successfully delivered:

- ✓ The inaugural Digital Elevation Model (DEM) Workshop took place at RCMRD in Nairobi, Kenya, on 6-10 May 2013. The purpose of the DEM Workshop was to build capacity in the East African region for utilizing satellite-derived digital elevation data, specifically newly released 30m elevation data gathered on the Shuttle Radar Topography Mission (SRTM), in a variety of ways, but with an emphasis on hydrological models. The workshop included 11 participants from Ethiopia, Kenya, Somalia, South

Sudan, Uganda and Zambia. Presenters and trainers were sent from FEWSNET, INPE, SANSa, SWF, RCMRD/SERVIR and USGS.

- ✓ The Remote Sensing E-Learning Course finished in the end of June and we are now in the process of finalizing Students' grades. The certificates shall be issued in August. This has been a rewarding experience and we have learned a lot. In the next months, we intend to work on a Best Practices Evaluation Report.

We are very glad that SANSa stepped in to be the next WGCapD Vice-Chair, for the 2014 and 2015 term. We also would like to thank ISRO for kindly offering to host the 3rd WGCapD meeting, which will be held in Dehradun, India, in February/March of 2014.

WGCapD is open to new CEOS members. Join us and let's keep up the good work!



WGCapD – 2, Frascati, Italy (March 2013)

First WGCapD Digital Elevation Models Workshop A Success!

Jacob Sutherlun, NOAA



When the Working Group on Capacity Building and Data Democracy (WGCapD) was reconstituted in 2011, emphasis was placed on not only doing traditional capacity building and training but also on providing new data, providing new software tools, and improving dissemination methods. By pursuing these four aspects of Data Democracy, the WGCapD is seeking to build capacity for the effective use of Earth observation data for informed decision making worldwide. It is with this goal in mind that the WGCapD pursued the activity of a holding a series of Digital Elevation Model Workshops.

The opportunity arose for the WG to facilitate the release of the 30 meter data from the Shuttle Radar Topography Mission (SRTM). In line with the goals of the WGCapD, the WG chose to not only provide access to new data but to also provide instruction

on the software tools needed to create products for sound decision making. The WGCapD, in cooperation with the Regional Center of Mapping of Resources for Development (RCMRD), hosted a weeklong workshop during the week of May 6-10. The workshop brought together 12 participants from East African countries to discuss digital elevation models (DEMs), train on a wide range of hydrological modeling software, most of which were open source, and deliver the newly-released 30 meter data from the Shuttle Radar Topography Mission (SRTM). The countries represented were Ethiopia, Uganda, Kenya, South Sudan, Somalia, and Zambia. Planning, funding, and instruction at the workshop were carried out by RCMRD, Secure World Foundation (SWF), NOAA, USGS, INPE, SANSa, and NASA and USAID's SERVIR program.

In order to ensure a coherent workshop with seamless transitions from one instructor or software tool to another, the instructors agreed to focus on one flooding event in Somalia. This presented a common thread so that the workshop participants could see how the different models and software could be applied to this event. This collaborative effort was executed well, and participants, hosts, and trainers all gave positive feedback. It was a very tangible expression of the principles of Data Democracy and the CEOS WGCapD goals.

The CEOS WGCapD was able to deliver the SRTM 30m data

to participants from South Sudan and Somalia, and the WGCapD is optimistic that data will be provided to the other participants in the workshop in the coming months. The WGCapD is also optimistic that access will be granted to more data so that similar workshops can be held in other regions of the world. Preliminary discussions have been held with the International Centre for Integrated Mountain Development (ICIMOD) in Nepal for a late 2013 DEM workshop in cooperation with WGCapD.

The WGCapD is off to a good start in pursuing the goals that were laid out in 2011. This initiative could not have happened without the support of CEOS as an organization and the individual agencies and partners committing their time and resources. This was a truly collaborative effort that required the time and talents of many individuals. Thanks is extended to all those that were directly and indirectly involved.



Working Group on Climate (WGClimate)

Mark Dowell, EC-JRC and John Bates, NOAA

From the 18th to the 22nd of February a series of co-located meetings were held in Geneva in what was labeled the "Climate from Space week". The consolidation of a number of meetings, which was largely encouraged through the activities of the CEOS Working Group on Climate, aimed at combining discussions of a number of organizations and entities involved in the coordination of space observations for climate. The meeting was gratefully hosted by the WMO at their premises in Geneva.

Specifically the meetings included:

- 1] the 3rd meeting of the CEOS-CGMS-WMO ad hoc group on an Architecture for Climate Monitoring from Space-based observations
- 2] the 3rd meeting of the CEOS Working Group on Climate
- 3] and, the 8th meeting of the SCOPE-CM Executive Panel

There was additional collaboration with the World Climate Research Programme Data Advisory Council (WCRP-DAC) and the CEOS Virtual Constellations (for SST, OCR and ACC) as well as representatives of the international science groups associated to the VCs (i.e. IOCCG and GHRST). Finally, the meeting benefited from the contributions from programmes and projects located in the WMO building i.e. GCOS, GEO, WCRP and the WMO Space

Programme. The detailed agenda and links to the presentations can be found on the CEOS WGClimate web page: (http://www.ceos.org/index.php?option=com_content&view=category&layout=blog&id=179&Itemid=285)

The Architecture for Climate Monitoring and the ECV Inventory:

The final version of the Architecture strategy report is available at: (http://www.ceos.org/images/strategy_towards_architecture_high_res_V10_high_res.pdf). Efforts on establishing an initial physical representation of this Architecture through an ECV Inventory were discussed and specific analysis on the initial data provided by Space Agencies was decided on. There was also discussion with WCRP on the interest of expanding the ECV Inventory to include in-situ datasets. The Architecture activity, in general, is seen as an important foundation for the development of the Observation and Monitoring pillar of the Global Framework for Climate Services.

System metrics of ECV maturity

A basis for developing a systematic approach to maturity of ECV products was discussed, with a starting point being the proposed approach by NOAA (<http://onlinelibrary.wiley.com/doi/10.1029/2012EO440006/abstract>). Additional agencies presented their efforts in trying to apply, and eventually modify, this

approach so that it is compatible with their own internal programmatic requirements. These activities will continue and we will strive to look for a common approach, which can be applied systematically across space agencies. There was also a separate discussion of how to ensure a scientific assessment of ECVs. The defined best practices should be applied by domain specific experts (e.g. where relevant possibly through a combination of CEOS VCs and international science groups) and that CEOS WGClimate should ensure through member agencies that the activities are adequately resourced.



Group photo: Climate from Space Week

The Coordination Group for Meteorological Satellites (CGMS) is held its 41st plenary session on 8-12 July 2013 in Tsukuba, Japan.

Paul Counet, EUMETSAT

The focus of this year's plenary session was on user preparedness for future generation satellites, including data dissemination and regional retransmission services in 2020 and beyond. In this timeframe, Europe, the United States, China, India and South Korea will fly a new generation of geostationary satellites. Europe, the United States and China also have plans for new generations of polar-orbiting satellites.

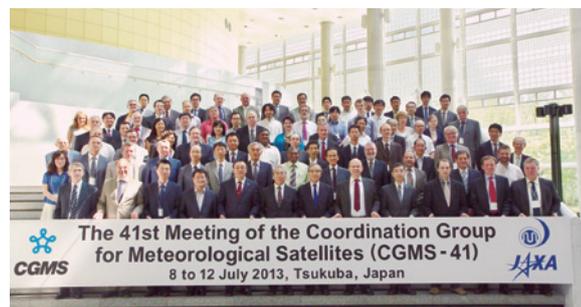
CGMS-41 also discussed how best to coordinate polar orbits in response to the Vision of the World Meteorological Organization (WMO) Global Observing System for 2025. Since CGMS-40, held in Lugano, Switzerland, in November 2012, studies have been undertaken in Europe, the United States, Japan,

South Korea and China which have shown the benefits

of having satellites on three orbital planes: in the early morning, morning and afternoon timeframe. CGMS members discussed if this could be achieved by moving a China Meteorological Administration (CMA) FY-3 low Earth orbiting satellite to the early morning orbit, complementing the European Metop satellites in the morning orbit and the US Suomi-NPP and JPSS satellites in the afternoon orbit. Such a constellation would have a positive impact on Numerical Weather Prediction models, creating benefits for users.

In addition, CGMS-41 further explored cooperation on climate activities. The CGMS plenary endorsed the terms of reference of a joint Climate Working Group between CGMS and the Committee on Earth Observation Satellites (CEOS). This initiative, promoted by EUMETSAT as

the CGMS Secretariat and the next Chair of CEOS, will enable the production of a coordinated contribution from all space agencies to the global architecture for climate monitoring from space - the space agency contribution to the observation and monitoring pillar of the Global Framework for Climate Services (GFCS).



As part of its upcoming 2014 CEOS Chairmanship, EUMETSAT is pleased to release the first announcement for "The Symposium on Climate Research and Earth Observations from Space: Climate Information for Decision Making" which will

take place in Darmstadt, Germany from 13-17 October 2014.

The main goal of the symposium is to provide a forum for discussing the current state of climate science and climate observations in order to evaluate recent achievements, ascertain critical objectives to be achieved with satellite-based climate information, and identify gaps in the current space-based climate observing system. A major topic that will be discussed is the proposed Architecture for sustained Climate Monitoring from Space that has

been developed under the auspices of the Committee on Earth Observation Satellites (CEOS), the Coordination Group of Meteorological Satellites (CGMS) and WMO. Beyond the monitoring of the current state of the Climate System, the conference will also consider how Earth observation contributes to future developments in climate prediction and climate change projection.

The symposium is jointly organised by EUMETSAT and WCRP with support from the European Commission. To find out more please visit the Climate Symposium website (<http://www.theclimatesymposium2014.com>).

CEOS Atmospheric Composition Constellation: Recent Activities and Path Forward

The CEOS Atmospheric Composition Constellation (ACC) held its 9th workshop at EUMETSAT in Darmstadt, Germany, on 18-19 April 2013. The Atmospheric Composition Constellation (ACC) is one of the seven virtual constellations that support the overall goals of the Group on Earth Observations (GEO) and provide prototype systems supporting the implementation of the Global Earth Observing System of Systems (GEOSS). The ACC's key objectives are to collect and deliver data to improve predictive capabilities for coupled changes in the ozone layer, air quality, and climate forecasting and to meet participating agency priorities that are aligned to the GEO societal benefit areas (e.g., health, climate, energy, ecosystems). ACC works to facilitate international collaboration among space agencies and establish a framework for long term coordination of CEOS's goals.

Researchers from participating CEOS agencies, related universities, and supporting organizations participated at the workshop in person or by WebEx. These agencies included the Aristotle University of Thessaloniki, Belgian Institute for Space Aeronomy, China Meteorological Administration/National Satellite Meteorological Center, CNRS, DLR, Environment Canada, ESA, Euro-Mediterranean Center on Climate Change (CMCC), EUMETSAT, Finnish Meteorological Institute, Forschungszentrum Jülich, Harvard University, Karlsruhe Institut für Technologie (KIT), KNMI, LATMOS, NASA, National Center for Atmospheric Research, NOAA, SSAI, University of Bremen, and Yonsei University.

The Workshop addressed four principal topics: 1) Long-Term Total Ozone Data Set

Harmonization, (2) Volcanic Ash Monitoring from Space, (3) ACC Air Quality Constellation, and (4) Greenhouse Gas (GHG) Essential Climate Variable (ECV) generation. The workshop minutes and associated presentations can be found at <http://www.ceos.org/acc>.

Key outcomes from the workshop are presented by topical area.

1. Total Ozone Measurement Coordination

The setting up of a common validation protocol for the ACC-9 total

ozone workshop (using the same reference data for validation with availability of all data at an open ftp server) was seen as a positive step forward and this protocol should be further extended to include more detailed information on the selection criteria for ground-based data and details on how zonal means are being calculated.

Information exchange among the European and American ozone satellite providers and retrieval researchers should continue as all can learn from each other especially on the error characterization of the different data sets.

The separate long term American and European total ozone data sets (with clear error characterization) as already provided are valuable for the user community (both to climate modelers and researchers). As users have different requirements, a combined American/European long term data set should be provided by the experts on the satellite instruments and the retrieval algorithms. For the American data sets, the focus should be on the usage of the SBUV data as they provide a reference data set. Other satellite data sets (e.g. Chinese missions and infrared missions like IAS) should be included in this data intercomparison process and possible merging activities. And, if resources allow, these activities should be extended to nadir ozone profiles covering the time period of the last 15 years.

2. Volcanic Ash Monitoring From Space

Activities in Europe and North America to use space-based observations to monitor volcanic ash, enhance forecasts, and provide products to decision makers and industry were discussed. With the successful conclusion of a workshop held in Dublin in March 2013, ACC meeting participants welcomed enhanced collaboration between the North American and European communities on this topic.

3. Air Quality (AQ) Constellation Coordination

It was noted that substantial progress has been on two of the three near-term actions of the community white paper, endorsed at the CEOS Strategic Implementation Team (SIT-26) meeting. Points of contact from each region have been named to participate on mutual mission science or advisory teams with a focus on common science and collaborative data products.

Richard Eckman,

NASA



Claus Zehner,

ESA



The CEOS/MACC-II International OSSE Workshop was held 22-24 October 2012 at ECMWF

(<http://www.ecmwf.int/newsevents/meetings/workshops/2012/OSSE/>) and shared expertise, discussed common approaches and experiments, and defined initial collaboration to share high resolution global chemistry/aerosol nature runs. An action to coordinate a societal benefit assessment of satellite air quality observations, leveraging recent GCOSS and GEO health community of practice efforts, will require further interaction with economists and health effects communities.

Following discussion of the status of the upcoming missions (Sentinel-4, GEMS, and TEMPO), there was consensus on these draft recommendations to advance the AQ constellation coordination activities:

- Convene (virtually or otherwise) an expert group to develop best-practices recommendations for UV-Vis spectrometer pre-launch instrument characterization.
- Agree that common absolute radiance calibration is a secondary rather than primary need for these instruments; better to instead invest funds in characterizing each instrument as completely as possible.
- Share pre-launch calibration plans (to the extent allowed by possible proprietary restrictions) and invite cross participation in reviews that cover calibration.
- Share instrument characterization/calibration databases and Level 1-b data, in a common format, to allow application of common algorithms to all datasets.
- Develop a list of desired constellation data products (which may

(to be continued on page 6)

VC-OCR Report

The first International Ocean Colour Science meeting was held on 6-8 May 2013 in Darmstadt, Germany. It was convened by the International Ocean Colour Coordinating Group (IOCCG) in partnership with EUMETSAT and NASA. Sponsorship for the meeting was received from EUMETSAT, NASA, ESA and CNES, which is gratefully acknowledged. The meeting programme included eight presentations from space agency representatives, five invited keynote talks, 12 breakout splinter sessions, two poster sessions (114 posters) and open floor discussions. The overarching theme of the IOCCG meeting was "Building of Ocean Colour Climate Data Records". Eleven splinter sessions have recently submitted reports and recommendations:

* Splinter Session 2: Advances in Atmospheric Correction of Satellite Ocean Color Imagery

<<http://iocs.ioccg.org/wp-content/uploads/splinter2-frouin-atm-corr.pdf>>

* Splinter Session 3: Geostationary Ocean Colour Radiometry

<<http://iocs.ioccg.org/wp-content/uploads/splinter3-mannino-geostationary.pdf>>

* Splinter Session 4: Multi agency data sharing (satellite and in situ data)

<<http://iocs.ioccg.org/wp-content/uploads/splinter4-laur-data-sharing.pdf>>

* Splinter Session 5: Operational Ocean Colour Data in Support of Research, Applications and Services

<<http://iocs.ioccg.org/wp-content/uploads/splinter5-kwiatkowska-operational.pdf>>

* Splinter Session 6: In situ Measurement Protocol Revision for Cal/Val

<<http://iocs.ioccg.org/wp-content/uploads/splinter6-fargion-protocols.pdf>>

* Splinter Session 7: International Training and Outreach

<<http://iocs.ioccg.org/wp-content/uploads/splinter7-higgins-training.pdf>>

* Splinter Session 8: System Vicarious Calibration

<<http://iocs.ioccg.org/wp-content/uploads/splinter8-zibordi-vicarious-calibration.pdf>>

Paula Bontempi, NASA

* Splinter Session 9: Climate Variables and Long Term Trends

<<http://iocs.ioccg.org/wp-content/uploads/splinter9-climate-variables-yoder.pdf>>

* Splinter Session 10: Phytoplankton Community Structure from Ocean Colour: Methods, Validation, Intercomparisons and Applications

<<http://iocs.ioccg.org/wp-content/uploads/splinter10-bracher-pfts.pdf>>

* Splinter Session 11: Satellite Data File Formats and Tools for Easy Science Exploitation

<<http://iocs.ioccg.org/wp-content/uploads/splinter11-brockman-data-format.pdf>>

* Splinter Session 12: Satellite Instrument Pre and Post Launch Calibration

<<http://iocs.ioccg.org/wp-content/uploads/splinter12-meister-instrument-cal.pdf>>

The OCR-VC, IOCCG, and planning committee are working on the final recommendations and next steps.

CEOS & GEO Cooperation - GEO WP Symposium and Preparing GEO Summit

CEOS, widely recognized as the "Space Arm of GEO", is a key partner of GEO among its 67 (and steadily increasing) Participating Organizations. GEO's high profile "special initiatives", the Global Forest Observation Initiative (GFOI) and the GEO Global Agricultural Monitoring initiative (GEOGLAM) rely strongly on data provided by CEOS after coordinated acquisitions. However, CEOS contributes in many other ways to GEO and GEOSS, as can be illustrated by the two main annual GEO events: the Work Plan Symposium and the Plenary which this year will be followed by a Ministerial Summit.

The 2013 edition of the GEO Work Plan Symposium took place 4-6 June in Geneva with about 120 participants from 40 GEO Members and Participating Organizations. The Symposium offered an opportunity to highlight progress, exchange information, and foster coordination across the whole Work Plan. The main focus was on improving the GEOSS Common Infrastructure, engaging users from developing countries, and developing cross-cutting demonstrators and showcases for the GEO Ministerial Summit and GEO-X Plenary (13-17 January 2014 in Geneva). The GEO Implementation Boards met during the same week both before the Symposium to prepare, and after to analyze the results and take needed actions. The Boards also discussed other issues, including this year's assessment of the progress towards achieving the GEO strategic targets.

CEOS was highly visible during the Symposium and contributed to its success by masterfully chairing one of the main sessions as well as the meeting of the Societal Benefits Implementation Board (Kerry Sawyer, CEO), making excellent presentations of CEOS-led Tasks (Brian Killough for Earth Observations Systems and Ivan Petiteville for Disasters), and taking part in discussions in the Symposium sessions and Board meetings (Satoko Miura and Guy Seguin in addition to Kerry, Brian and Ivan).

The Ministerial Summit 17 January 2014 is a major milestone for GEO, as it is expected that Ministers will decide to extend its mandate by another ten years and give some directions for "GEO 2025". This obviously requires a lot of preparatory work and two working groups were established to address this with the support of the GEO Secretariat. The Post-2015 Working Group has produced a set of recommendations relating to strategic objectives, societal challenges to address and how to structure GEO around them (evolution of the GEO Societal Benefits Areas), GEO core functions, governance, engagement with developing countries and with the private sector, and resourcing. A document with these recommendations preceded by a stock-taking of GEO achievements to make the case for GEO, was shared with all GEO Principals and a new version will take into account the comments received. In the meantime, three scenarios with different ambition levels have been developed for the GEOSS implementation based upon the recommendations. The

Barbara Ryan,
GEO Secretariat Director



Espen Volden,
GEO Secretariat



Ministerial Working Group has defined the overall approach to the GEO Summit 2014 as well as to the organization of the "GEO Week", of which the Summit is the conclusion. They are preparing a package of coherent documents for the Ministers including a GEO Vision for 2025 building upon the Post-2015 document, a Pathways for 2025 document building upon the scenarios, and the Summit Declaration which needs to be negotiated with the Ministries in advance. Brent Smith is representing CEOS on both working groups and is bringing in his huge experience and reflecting CEOS views as discussed in particular at CEOS Plenary and SIT meetings. The GEO Week with the Summit will be an excellent opportunity for CEOS to promote its activities and achievements and to highlight its views and concerns.

Message from the CEOS Executive Officer

As you can see from the wonderful articles in this 41st CEOS Newsletter, CEOS has been very busy accomplishing the activities in support of key initiatives for 2013. These initiatives, decided at the 2012 CEOS Plenary meeting, include: enhancing cooperation to support more effective societal decision-making in the areas of climate monitoring and research; carbon observations, including observations to support the effective monitoring and management of the world's forested regions; food security; disaster risk management; capacity building; and data availability and access. These initiatives, and their expected outcomes for 2013, reflect the ongoing and emerging priorities of CEOS, as reflected in our internal decision-making and our commitments to our external stakeholders. They are intended to enable the development of the Global Earth Observation System of Systems (GEOSS), with a particular focus on improved Earth observation (EO) systems coordination and enhanced data access for key global programs and initiatives. CEOS is accomplishing these activities all the while undergoing a very intensive two-year Self-Study to assess the strengths and identify some of the areas for improvement for the organization as we enter our fourth decade in 2014.

The ability of CEOS to successfully execute the activities in support of these initiatives depends heavily on the time, expertise, and commitment of all CEOS Member and Associate Agencies, and those that have selflessly committed to leading the Working Groups, Virtual Constellations, and ad hoc activities.

I would be remiss if I didn't take this opportunity to thank some of those who have contributed greatly to CEOS but because of other commitments, have moved on to other endeavors. John Faundeen, USGS, has been a key contributor and confidante over the past few years as co-Lead of the Land Surface Imaging Virtual Constellation and co-Lead of the ad hoc Space Data Coordination Group for Global Forest Observation Initiative. We wish John the best of luck in his new responsibilities. I would also like to thank Osamu Ochiai, JAXA, for his exceptional commitment to



Osamu Ochiai,
GEO Secretariat

Kerry Ann Sawyer,
CEOS Executive Officer



CEOS as a key member of the Secretariat and as the CEOS Water Societal Benefit Area Coordinator. Osamu has accepted a position with the GEO Secretariat so we look forward to continuing to work with Osamu in his new role in Geneva.

Kerry Ann Sawyer, CEOS Executive Officer
kerry.sawyer@noaa.gov



3rd Meeting of the Space Data Coordination Group
John Faundeen is third from the right on the back row.

(continued from page 5)

- or may not differ from each mission's standard products).
- Strive for consistency in retrieval algorithms.
- Facilitate cross participation in Algorithm Theoretical Basis Document (ATBD) reviews.
- Jointly improve retrieval algorithms by conducting inter-comparisons on common radiances.
- Develop longer term recommendations for possible common post-launch calibration/validation strategies (e.g., supersite instrumentation round-robins, joint airborne campaigns)

4. Greenhouse Gas (GHG) Essential Climate Variable (ECV) Generation

There are many activities in progress across multiple space agencies (e.g. JAXA/NIES, JPL, ESA-CCI, and EU projects) to further explore SCIAMACHY and GOSAT CH₄ and CO₂ measurements and to demonstrate their usefulness for retrieving information about regional sources and sinks. Data from other satellite measurements that cannot measure down to the Earth's surface (e.g. AIRS, IASI) are also being studied and used to constrain GHG inversion methods. It was also noted that there are several

new GHG satellite missions already planned (e.g., OCO-2, GOSAT-2, TanSat, Merlin) and in the proposal phase (e.g. Carbonsat).

Workshop attendees decided that it would be beneficial (especially to support future planned GHG satellite missions) to follow the example of the ACC Air Quality Constellation to write a white paper describing a similar Constellation for GHG missions with an emphasis on algorithm improvements and uncertainty quantification. A formal timeframe for this activity will be agreed in the near future.

Update on the Global Forest Observations Initiative (GFOI)

Stephen Ward and George Dyke, SDCG Secretariat

Australia's Department of Climate Change and Energy Efficiency (DCCEE), as the national lead on GFOI, was delighted to be able to propose and host the 1st GFOI Plenary meeting in Sydney in February 2013. The Plenary brought together all of the components of the GFOI Work Plan, including:

- the R&D community, which held their Science and Data Summit meeting;
- the Methods and Guidance Documentation experts, who met to progress their texts under the chairmanship of Jim Penman (IPCC);
- the Space Data supply stakeholders, in the form of CEOS's Space Data Coordination Group (SDCG) for GFOI;
- the Capacity Building team, led by USGS; and
- the GFOI Office – with the newly appointed lead, Simon Eggleston (previously at the IPCC Inventories Bureau), in attendance.

More than 70 participants contributed to the different meetings. The cross-fertilization of ideas and information between the different groups proved to be extremely helpful and inspired great discussion on the future of GFOI. The concept of a GFOI Plenary, to be held periodically to facilitate exactly such an exchange of ideas, was

widely regarded as being a success.

Of particular interest to CEOS is the Space Data component of GFOI – being stewarded by the SDCG (led by USGS, ESA, Norway, and with the Secretariat provided by Australia). The SDCG-3 meeting in Sydney was highly productive and the participants worked hard to conclude the first deliverable to CEOS from the group – the Baseline Global Data Acquisition Strategy for GFOI. This Strategy aims to provide the minimum space data information required by any country, at any time, to facilitate their participation in measures to reduce carbon emissions through deforestation. The Strategy pioneers a new level of specificity in the coordination of CEOS agency missions, representing a significant amount of work by the SDCG Executive. Its endorsement by CEOS SIT in March was an important signal to the policy community that CEOS agencies have the will and

the capacity to support an operational GFOI.

SDCG-3 also charted the next steps for the group, including the definition of the space data services required by individual countries in participating in GFOI. The GFOI Space Data Services will be piloted with a small number of countries in order to ensure that they are fit for purpose and consistent with the actual needs of countries seeking to engage in GFOI. SDCG-4 will be held in Pasadena on 4-6 September, and all agencies willing to contribute to GFOI's space data needs are encouraged to attend.



Space Agencies and Disaster Risk Reduction

Ivan Petiteville, ESA

In 2010, disaster events caused the death of almost 300,000 people, affected another 220 million and resulted in more than \$120 billion in economic damages. Impacts of disaster events on economy and human lives are increasing every year due to growing urbanization and an increase in the number and severity of weather-extreme events; by 2050, the number of people exposed to storms and earthquakes in large cities could double and by 2100, damages from weather-related hazards may triple.

Until recently, stakeholders involved in disaster risk management (DRM), including CEOS Agencies, have focused their efforts mainly on the response phase, immediately after the crisis. The International Charter is one of the most successful initiatives resulting from the coordination between space agencies but it is restricted to the response phase. Independent studies from organisations including the World Bank have indicated that the return on investments in disaster prevention is between 400% and 700%. In the last ten years, decision-makers and major stakeholders have shown an increasing interest in mitigation activities. For instance, the UN International Strategy for Disaster Risk Reduction (UNISDR - UN office for disaster risk reduction) was established in 2000; WMO started a Disaster Risk Reduction program in 2003; the European Commission included "disaster prevention" in the Lisbon Treaty (2007) and allocated a 455 million-budget for civil protection and future European Emergency Response Capacity for the period 2014-2020. There is an opportunity (an obligation ?) for space agencies to improve their contribution to the various DRM phases, in response to the growing request from the community of users

(e.g. decision-makers, scientists, practitioners, local authorities ..). In 2008, CEOS developed flood pilots for the Caribbean and Africa to support the full cycle of disaster management and in 2011, CEOS created the ad hoc Working Group on DRM to develop a more comprehensive strategy for DRM to go beyond the flood pilots. CEOS Agencies have initiated a series of actions aiming at fostering the use of Earth observation (EO) in support of DRM and at raising the awareness of politicians, decision-makers and major stakeholders of the benefits of using satellite EO in all phases of DRM. Thirty-five staff from ten CEOS Agencies and twenty-six experts from non-CEOS organisations representing the user community at local/national or regional levels (e.g. academia, civil protection, UN agencies, operational resources management agencies, ..) are coordinating their efforts to develop three pilots on floods, volcanoes and seismic risks to demonstrate that EO satellite data will bring an added value to disaster risk reduction activities, by filling identified gaps in response to real user needs. Concrete and significant results will be demonstrated at the 2015 World Conference for Disaster Risk Reduction (Sendai, Japan) with the objective of enhancing the position of EO satellite data in the next Hyogo Framework for Actions (HFA2) that will define a plan of actions for all DRM actors for the period 2015-2025. The pilots require strong user involvement to be successful. This promising CEOS initiative has been

introduced by the GEO Secretariat Director in her speech at the Plenary meeting of the 2013 Global Platform on Disaster Risk Reduction (UN ISDR, Geneva, 19-23 May) chaired by Margareta Wahlström (Special Representative of the UN Secretary-General for Disaster Risk Reduction) - the last major event before the 2015 World Conference on DRR, attended by 3,160 participants including 778 governmental delegates from 173 governments.

Beyond the three pilots developed by the three Thematic Teams of the Ad Hoc DRM Working Group, the long term strategic vision is to foster progressively but significantly the use of EO satellite data for all types of disasters, at global, regional and local level thanks to a better coordination of the resources available. This long term goal will be reached only with the full cooperation of all CEOS agencies at all levels from the experts up to the managers.

"Five of the ten costliest disasters in terms of money were in the past four years"

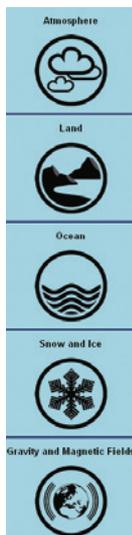


"Counting the cost of calamities", The Economist, article dated 14 Jan 2013, © The Economist

CEOS Missions, Instruments and Measurements Database 2013 Update Survey and Planned Enhancements

George Dyke and Ivan Petiteville, MIM team/ESA

The MIM team has been busy behind the scenes! The 2013 update of the ESA-maintained CEOS Missions, Instruments and Measurements (MIM) database is currently underway, with inputs being gathered from more than 35 CEOS agencies. The database contains extensive information on satellite and instrument capabilities, and was established to support planning and optimization of future observing systems, and to help demonstrate the extent to which space system capabilities meet user requirements for observations.



The mission and instrument details provided by CEOS agencies are invaluable in providing the most up to date information for the MIM user community. This includes thousands of website users, capability and gap analysis teams, e.g. in WMO and CEOS SEO, who use information for a number of activities, including support to CEOS Virtual Constellations, and other CEOS initiatives. In addition, the database was used last year in the production of the Rio+20 special print edition of The Earth Observation Handbook.

Thanks to all agencies for your on going support.

Enhanced Capabilities: Links to the ECV Inventory

In parallel with the 2013 Update Survey, the MIM team is also working on enhancements to the MIM online, to be released prior to the CEOS Plenary in November.

These will include the incorporation of information from the ECV Inventory, currently being lead by WGClimat and executed by the CEOS Systems Engineering Office (SEO). This represents a significant collaboration effort within CEOS, and it is hoped that a new community resource will result. Search and browse of the ECV Inventory and data set timelines will be enabled, and the links between ECV data records and related CEOS missions and instruments will be exposed.

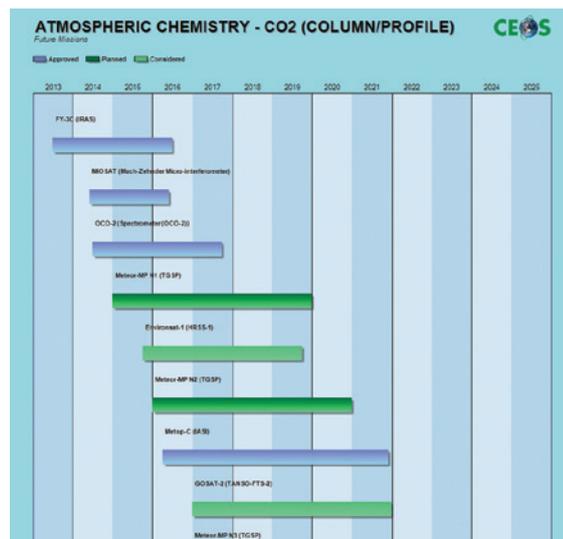
A number of possible future enhancements are also being considered.

- Potential links between the ECV Inventory and CEOS Response to the GCOS IP;
- Leverage of WGISS's CWIC and OpenSearch initiatives;
- Potential links to WMO's OSCAR/Requirements

database;

- Possible addition of a MIM API (Application Programming Interface); and
- Further additions to the online interface to expose the rich information contained in the MIM.

The MIM online can be accessed at database.eohandbook.com.



Meeting Calendar

As of August 2013

Activities	2013						2014				
	June	July	August	September	October	November	December	January	February	March	April
CEOS Plenary						▲4-6 27th Plenary and Side Meetings Montreal, Canada					
CEOS SIT (Strategic Implementation Team)				▲10-12 SIT Technical Workshop and Side Meetings Pasadena, California, USA							△7-11 SIT-29 and Side Meetings Toulouse, France
CEOS VCs and CEOS TFs (Virtual Constellations and Task Forces)		▲17-21 SST Constellation Meeting #2 Woods Hole, Massachusetts, USA		▲4-6 SDCG-4 Pasadena, California, USA							
CEOS WGs				▲16-19 WGISS-36 Frascati, Italy					△17-21 WGCV-37 Frascati, Italy		
GEO related Activities (Group on Earth Observations)	▲4-6 2013 GEO Workplan Symposium Geneva, Switzerland				▲1-4 GEOCARBON Conference and CL-02 Meeting Geneva, Switzerland			▲13-17 GEO-X Plenary Session & Ministerial Summit Geneva, Switzerland			
Others		▲8-12 CGMS-41 Tsukuba, Japan ▲21-26 IGARSS 2013 Melbourne, Australia ▲24-26 Third Session of UN Committee of Experts on Global Geospatial Info Mgmt Cambridge, UK		△9-13 ESA Living Planet Symposium Edinburgh, UK △16-20 Joint EUMETSAT Met Sat & 19th AMS SMOC Conference Vienna, Austria ▲23-27 64th International Astronautical Congress (IAC) 2013 Beijing, China	△9-11 4th Asia-Oceania Meteorological Satellite Users Conference (AOMSUC) Melbourne, Australia	△4-7 WCRP International Conference on Regional Climate - CORDEX 2013 Brussels, Belgium ▲11-22 UNFCCC COP-19 Warsaw, Poland					

▲: determined △: to be determined (Date, Host organization/Location) CEOS-related meetings are open only to designated participants.

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