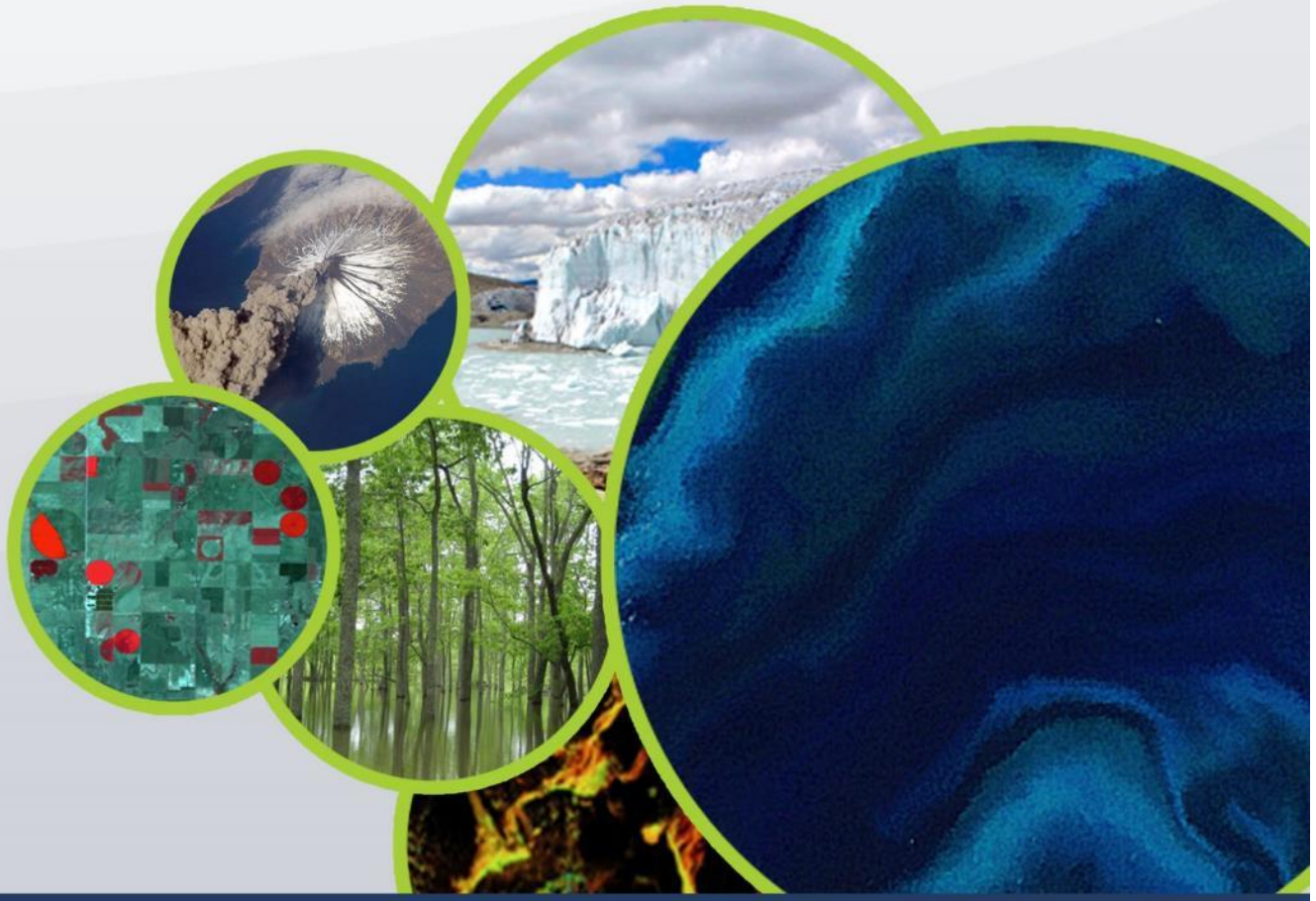
Committee on Earth Observation Satellites



CEOS Working Group on Capacity Building and Data Democracy (WGCapD)

10th Annual Meeting: *Building a Vision for the Next Decade*

1 to 4 March 2021, Virtual

Celebrating 10 years of…

WGCapD

Contents

Executive summary

The Committee on Earth Observation Satellites (CEOS) Working Group on Capacity Building and Data Democracy (WGCapD) held its 10th Annual Meeting virtually from 1-4 March 2021. More than 170 people from 30 countries participated over the course of four days, representing the largest annual meeting turnout in WGCapD's history. With a theme of *Building a vision for the next decade*, sessions centered on improving capacity building related to the application of Earth observations (EO), with the aim of supporting decision-making around global challenges.

The meeting featured two days of working sessions for CEOS members and associate members on WGCapD work planning and deliverables and two open days for a wider audience of EO practitioners representing meteorological services, academia, training providers and others. The open day sessions explored trends in the application of EO information and key priorities for the next decade, with time dedicated to flood resilience as a use case for increasing the impact and effectiveness of capacity building (CB) efforts. Four regional exchanges provided platforms for learning about existing needs and opportunities for collaboration and coordination across Africa, the Americas, Asia and Europe, again with an emphasis on capacity building around flooding.

WGCapD-10 agenda, presentations, and select session recordings are available at: http://ceos.org/meetings/wgcapd-10/

Key insights and recommendations

Panelists and participants shared a diversity of perspectives on priorities for EO capacity building, generally, and WGCapD's work, specifically. Key take-aways included:

- The core work of WGCapD for the next decade should be to redouble capacity building efforts related to fostering cooperation and collaboration; mobilizing resources; investing in EO literacy/education; and championing the value of EO applications among key audiences.
- To advance data democracy, a possible niche for WGCapD is to "curate" resources around specific development challenges to help decision-makers answer the question: "which tool, for what, when?" WGCapD could organize and make available relevant EO tools, guidance, training opportunities and materials, and other resources around priority development challenges. WGCapD could also be a resource in helping users understand and prepare for emerging technologies.
- As an example of this approach, discussions on flooding unearthed a strong interest in WGCapD, in coordination with other CEOS working groups and teams, piloting a flood dashboard. Its aim would be to guide users through existing datasets and decisions on how and when to use them.
- Participants expressed strong support for the Earth Observation Training, Education and Capacity Development Network (EOTEC Dev Net), a new body which aims to improve coordination among EO space-based asset providers and training providers. These include: CEOS WGCapD; the World Meteorological Organization (WMO)/Coordination Group for Meteorological Satellites Virtual Laboratory for Training and Education in Satellite Meteorology

(VLab); WMO's Education and Training Programme; the United Nations Office for Outer Space Affairs's Space-based Information for Disaster Management and Emergency Response platform (UN-SPIDER); the Group on Earth Observations (GEO); and others. They noted the importance of strengthening engagement across the capacity development network as part of EOTEC Dev Net's start-up.

- Another recommendation is for WGCapD to consider capitalizing on the huge, growing global community of users made possible by open data, by, for example:
    - Engaging more space agencies and other CEOS members and associate members in the work of WGCapD so that it can rely on a strong, immediate network.
    - Fostering EO literacy among various target audiences, recognizing that each have their own interests and information needs. Emerging young professionals and EO social media groups are key audiences, along with experts from economics, development finance and other disciplines, who are still learning why and how to use EO in policy and decision-making.
    - Expanding outreach to local, national and regional government officials, particularly in communicating the cost-benefit analysis of EO applications, to show them the value of integrating EO into policy and decision-making. Identifying appropriate approaches to engaging the private sector in EO capacity building, with particular attention to supporting start-ups.
    - Considering the potential for citizen science.
- The regional exchanges, which included participation of meteorological services, universities and other training providers, along with CEOS members, underscored the opportunity that exists for fostering collaboration and coordination through regional communities of practice. These could convene regularly to advance EO-centered capacity development activities. As a next step, another round of regional meetings will be held in June 2021.

Capacity building gaps, recommendations and ideas that WGCapD might consider in concert with other CEOS working teams

- Develop a guidance note on implications of cloud-based solutions, providing a road map for adoption and an overview of needs, options, costs, overhead, required human resources, etc.
- Convene a meeting to explore capacity development impact measurement tools and methods, including theories of change and other approaches to assessing impact.
- Create an "evidence toolkit," which would promote understanding with practical applications of EO data, to foster EO literacy.
- Expand urban flooding resources with components on how to integrate SAR data and high-resolution imagery, population data and digital elevation models (DEMs), and build skills to use them.
- To foster connections to WGCapD, inform the UN Office of Disaster Risk Reduction about EOTEC Dev Net and ask for a permanent booth and/or side event slot at its 2-yearly regional platforms.
- Facilitate a group on DEMs that would unite expertise from across CEOS and member agencies.

Next steps

- WGCapD to collaborate with CEOS Working Group on Disasters (WGDisasters) and others to explore creation of a flood dashboard.
- WGCapD chair to present EOTEC Dev Net to the CEOS Strategic Implementation Team (SIT) in late March. *(Note: the SIT approved plans to move forward with EOTEC Dev Net, with a 2-year pilot led by a new WGCapD EOTEC Dev Net Task Team.)*
- Next WGCapD global meeting planned for September 2021, possibly in Germany and/or virtually.
- Follow-on regional exchanges to be held virtually in June.
- Discussions to continue to prioritize the 28 deliverables in WGCapD's 2021 work plan, particularly given ongoing pandemic-related constraints.

WGCapD individual member's reflections on their vision for the decade ahead…

- WGCapD could prioritize advocacy around the use of EO and other geospatial technologies in the decision-making and work plans of all countries.
- WGCapD is at the forefront of capacity building efforts of space agencies in the use of satellite data, and aware of what is in pipeline. WGCapD understands the importance of addressing various needs of stakeholders. WGCapD could become a main source of guidance and curricula on the use of EO for floods and other hazards.
- The long-term vision for WGCapD could be reaching out to the people, supporting data democracy…it could be linked to the Sustainable Development Goals, for example: advising on what the types of data needed for various issues like stream water, sanitation, climate, disasters, etc.
- WGCapD could invest in creating a network in which all are included, with access to all online resources like EO College. Space agencies should be encouraged to participate in WGCapD and not see it as additional workload but as a place to share resources, ideas, connections and networks. WGCapD should also include the commercial world.
- As large volumes of EO are moved into the cloud, WGCapD could support users who lack supercomputers or the technological bandwidth to work with that large volume of data. WGCapD could be a bridge to ensure that those users do not lose access as the technology evolves.
- WGCapD could create more opportunities to be systematic in understanding needs and gaps, and track progress to address them. Is there an existing best practice among our space agencies or our training partners that we can harness?
- Users may have difficulty expressing their needs if they do not know what is feasible. There is an opportunity for WGCapD to help them understand what is available and how to frame their needs in a way that can be understood by satellite operators and data providers.
- WGCapD could also help in building capacity to use the work of the other CEOS working groups and virtual constellations.

WGCapD-10 in detail

Internal working sessions

The March 1 and 4 meetings of WGCapD-10 were used for internal work for CEOS members and associate members, though other meeting invitees were invited to join as observers. These sessions included: a leadership report from Chair Nancy Searby of NASA, an update on the draft webinar toolkit, and participant discussions of WGCapD's work plan and a vision for the next decade. Marking the 10th anniversary of the annual meeting, the opening session on March 1 included the participation of former working group chairs.

Former chairs pictured above, starting at top left: Hilcea Ferreira (2012-2013); Jacob Sutherlan (2014); Nancy Searby (2020-present); Eric Wood (2014); Jane Olwoch (2016-2017); Senthil Kumar (2018); Brent Smith (founding father); Dieter Hausamann (founding father); and Pham Mai Thy (Vice Chair, 2020-present). Missing but in attendance: Prakash Chauhan (2019).

Keynote

Barbara Ryan, Executive Director of the World Geospatial Industry Council, kicked off the first open day of WGCapD-10 with insights from her decades-long career in Earth observation. Setting the scene for conversations the rest of the meeting, she presented an inspiring enabling framework for building EO capacity centered on four principles:

- Availability of open data.
- Building on what's been done rather than starting from scratch.
- Relentless pursuit of integration and coordination (internally, as well as nationally, regionally and globally).
- "Hyper-partnering," meaning, partnerships as a leading strategic priority and commitment.

Session 2: EO capacity development in the decade ahead

Panelists (left to right):



Christof Aubrecht, Program Coordinator, Global Development Assistance, European Space Agency and ESA Partnership Senior Advisor, World Bank

Steven Ramage, Head of External Relations, Group on Earth Observations (GEO)

Sylvia Wilson, SilvaCarbon Steering Committee Co-chair/USGS

Suggested priorities and opportunities for advancing EO use in the next decade:

- Continue investing in and refining collaboration and coordination mechanisms, e.g.: expanding CEOS' role in catalyzing "hyper-partnering" regionally and nationally.
- Increase use of EO data for decision-making by engaging and supporting policymakers.
    - Articulating the value proposition of EO.
    - Collaborating on efforts to integrate EO and space applications into ongoing, existing processes, such as decision-making around land use.
    - Fostering fit-for-purpose solutions, with emphasis on increasing awareness, coordination and collaboration with end users in countries, so that they implement and sustain the solutions.
- Systematically assess barriers to use for developing countries, including: the costs of processing in the cloud, infrastructure limitations, internet limitations, sustaining local/national skills, etc.
- Promote diversity and inclusion, especially among emerging young professionals.
- Expand availability of tools and resources in languages other than English.
- Capitalize on the huge, growing global community of users made possible by open data.
    - Foster EO literacy, recognizing that various target audiences each have their own interests and information needs.
    - Continue building the community of practice, including EO-focused social media groups, emerging young professionals and private sector EO interests, especially start-ups.


NASA-WGCapD: Lauren Childs
NASA-WGCapD: Yasha Moz
Erin Martin
S P Aggarwal
WGCapD Chair: Searby, Nancy D. (HQ...
Daniel Matsapola
CEOS-SEO: Brian Killough
Svetlana Zolotūkova, National Centre fo...
Manoel (UFSM) - Brazil
Michael Bock (DLR)
Huard, Janin (ASC/CSA)
USGS/ KBR - Chris Barnes
UNOOSA: Jorge Del Rio Vera
NASA Disasters Program Ricardo Quiro...
Robert Eckardt
BAKO MAMANE
Vera

Flooding as a case study

A portion of WGCapD-10 was dedicated to exploring capacity building on flooding as a case study for how the working group might re-organize aspects of its approach to maximize impact. Among the sessions was a panel presentation followed by breakout groups with stock-taking and brainstorming on flood forecasting/early warning, flood response and flood risk management. The regional exchanges featured conversations on flooding specific to Africa, the Americas, Asia-Oceania and Europe. Overarching takeaways from Session 3 and the regional exchanges were:

- The importance and opportunity in leveraging the wealth of existing expertise within CEOS, with WGCapD continuing to play connecting/connector role with WGDisasters and other CEOS working groups and teams. For example, WGCapD could facilitate a group on DEMS for flooding.
- The continuing priority of simplifying rich data sets into usable tools. WGCapD can play a role in helping national/regional users determine which tool, for which geography, at which scale. A flood dashboard was proposed as a means to accomplishing this.
- To support disaster risk reduction, WGCapD can increase its advocacy efforts, promoting the use of EO applications in decision-making, particularly at regional and local scales.
- Partnership between CEOS with the regional GEOs could focus on the development of regionally calibrated operational flood services.
- Key data needs:
    - Better hydrologic mapping and storm surge mapping at regional and local level.
    - More timely data to support flood and disaster management; the time lag is still a barrier to response.
    - Tools to support flood management in urban areas.

Session 3: Addressing global challenges: opportunities to build flood resilience capacity

Panelists (left to right):

Juan Carlos Villagran de Leon, Head, UN Space-based Information for Disaster Management and Emergency Response (UN-SPIDER)

Prakash Chauhan, Director, Indian Institute of Remote Sensing, Indian Space Research Organisation

Guy Schumann, CEOS Working Group on Disasters, Flood Pilot Co-investigator

- *Prakash Chauhan*: The Uttarakhand flash floods and landslide in February 2021, which claimed several hundred lives and destroyed two hydropower plants and six bridges, highlighted several key needs related to flood emergencies:
    - Simpler, quicker threat assessment tools, along with skilled personnel to use them.
    - Early warning systems that integrate various datasets.
    - Increased investment in understanding and acting on the impact of climate change on floods.

- *Juan Carlos Villagran de Leon*: UN-SPIDER is mandated by the UN General Assembly to promote use of space-based information for disaster risk reduction. Its work is oriented toward both policymakers and technical experts, seeking to leverage ongoing decision-making and reporting through global development frameworks.
    - Technical advisory missions have helped identify strengths, weaknesses and needs. Sustained presence and/or connection is required to move processes forward.
    - CB recommendations on floods: Need to provide solutions for all aspects of disaster management cycle. Need to understand strengths of partners so resources and activities are sustainable. CB providers must be ready to repeat the process as staff in developing countries can change frequently. Cloud-based solutions are a good option, but they need to be available in languages other than English.
- *Guy Schumann*: WGDisasters' new flood pilot focuses on advancing flood risk monitoring and mapping with new datasets and evidence.
    - Five groups across the globe are collaborating on flood early warning and risk using EO and models. Each group is looking at a different region using different satellites.
    - Leveraging the WGISS interoperability lab: the pilot is bringing together all players using data sharing and running some algorithms on that platform. Could be replicated in a capacity building pilot.
    - For capacity building: part of a large European massive open online course (MOOC) project to show latest European tools with data on floods with from the Sentinel satellites.
    - The pilot is not focused directly on capacity building but on data sharing and making sure agencies can apply the datasets.

During the Session 3 breakout discussions, small groups used an online collaboration tool called Padlet to share their ideas. A summary of inputs from the breakout groups follows. The original padlets are available here.

TOPICS	G1: Flood forecasting/early warning (EW)	G2: Flood response	G3: Flood risk management
			
Panel takeaways	• Rather than selecting users, regions, training events/opportunities, decide on a strategy for global collaboration at CEOS and GEO level, join hydrological institutions working on forecasting/EW, e.g., River Basin Orgs, RIMES, ESCAP	• Limited bandwidth limits some countries from being able to download data themselves; this means that cloud platforms allow them access • We need to work more collaboratively on using EO for flooding solutions	• Engage emerging young professionals • Challenge to help users identify what tools and data sets are best for different decisions/ actions, and when • As we progress, don't leave others behind
Priority CB opportunities	• Menu of best EW tools/practices • Prioritize data, regions, targets for CB on EW warning: civil protections? Decision-makers? • Partner with regional remote sensing specialists (SELPER, EARSEL), UN agencies and development banks • Link to UN SPIDER tech. advisory missions • Integrate with existing national/local systems	• Identify specific recurring capacity building programs, courses. • Support SAR training, especially related to urban flooding • Draft guidance note on cloud solutions	• Help users know which tools work "best" in which situations • Engage local academia in hosting training • Ask UNDRR for a permanent place/booth at each regional platform • Haiti Observatory Project – lessons learned • Launch EO “showcases” for multi-disciplinary groups of policymakers
Information needs/gaps	• A flood disaster dashboard or a menu/inventory of tools/data • Information on user needs • Prioritization of level: regional, national, river basin • Improved hydrologic modeling • Cost-benefit analysis for decision-makers • UN ESCAP Toolkit identifies some gaps: https://www.unescap.org/sites/default/files/Flood_toolkit_HighRes.pdf	• Responder info needs? • Timely data after a flooding event - radar observations from space often limited and delayed • Accurate DEMs • Operational Flood Service • CB in more languages • Tools for urban flooding • Procedure on combined use of archived and up-to-date imagery and imagery in different resolutions • Flood curriculum for beginner, medium, advanced users	• Up-to-date and detailed population data • In South America: big gap at municipal level on flood info and vulnerability risk which needs to be in land planning/sustainable development plans. • Sendai Framework link: gap on the level of EO integration in national/ local disaster risk reduction strategies.
Priority collaboration opportunities	• Support creation and improvement of DEMs for hydrologic modeling (could build on Copernicus DEM)	• UN-SPIDER and WGCapD collaborations on trainings and use the UN-SPIDER convenings to build synergies	• Using social networks • ARSET Training, e.g. webinar on population grids • Citizen Science and platforms such as Facebook Data for Good • Collaboration between WGDisasters and UNOOSA • Collaboration with other CEOS teams
Suggested next steps	• Engage CEOS and GEO on dashboard • Identify niches for WGCapD • Identify steps where EO imagery, altimetry, etc. can help (e.g. validation of forecast against observation, geomorphology analysis, integration of GIS supporting decision support...) • Identify possible partnerships, e.g. WMO, hydrological experts, civil protections, UN SPIDER or other UN bodies	• Start new curriculum by compiling training material and lessons learned • Include future work plan deliverable on urban flooding • Develop a guidance note regarding needs and options for cloud-based solutions	• Identify data gaps on flood vulnerability and risk management • Strengthen CEOS-GEO links

Regional exchanges

The four WGCapD-10 regional exchanges, covering Africa, the Americas, Asia and Europe, convened CEOS members and associate members together with EO practitioners representing meteorological services, academia, training providers and others. Each 1-hour session was open to colleagues in the region as well as those based elsewhere who are working in the region. Each began with an introductory WGCapD presentation followed by a discussion on flood capacity building work in the region. They were conducted at times convenient to participants in the respective region.

AFRICA

AMERICAS

ASIA-OCEANIA

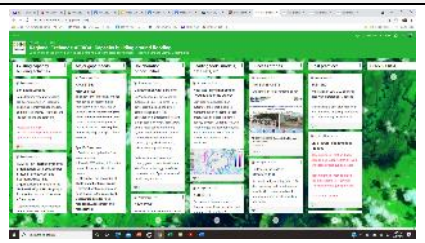
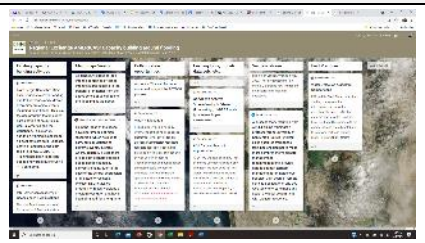
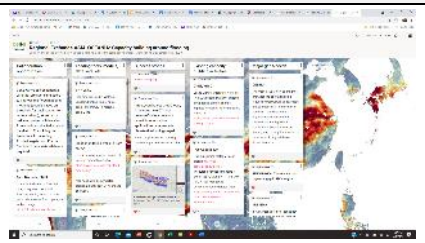
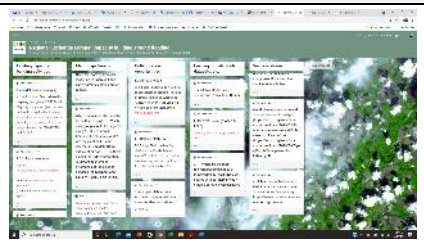
EUROPE

Final day

The final day of WGCapD-10 was devoted to discussions among members and associate members to synthesize and reflect on the prior days of the meeting. An important discussion centered on the vision for WGCapD in its next decade (see box on page 4.) The group also reviewed the current workplan with an eye to refining the current number of deliverables (28 listed for 2021) and expanding those planned for 2022 and 2023. Suggestions included:

- Removing deliverables undertaken and driven by individual agencies, rather than WGCapD (while ensuring relevant activities stay on the training calendar).
- Devoting a full day of the September 2021 meeting to discussing and revising the workplan. This would enable good discussion while better aligning work planning process with the overall work plan process led by the CEOS SIT.

Summary of inputs from the four regional exchanges. The original padlets are available here.

	Africa	Americas	Asia-Oceania	Europe
TOPICS				
Existing CB activities	• Esri learning resources • ARCSSTE-E: 9- and 18-month programmes in Sat-Communications; GIS/RS; Sat-Meteorology, Global Navigation Satellite Systems, and Basic Space and Atmospheric Science. Current lead of the EUC-AUC GMES, Africa support project to implement the Multi-scale Flood Monitoring and Assessment Services for West Africa. • RCMRD: working on Community-Based Flood Early Warning System (CBFEWS) in 8 selected flood/disaster prone districts of Malawi. Involves installation of 33 sensors and CB for key agencies. • Copernicus Emergency Mapping Service • SERVIR: mapping flows at regional, basin level for riverine flooding. Contributing socioeconomic to assess vulnerability to flash flooding. • EU global flood forecast available to everyone. • Example of recent UN-SPIDER online training on flood mapping • Copernicus RUS portal with tutorial on flood mapping here under risk monitoring. Related videos	• The Inter-American Academy of Geosciences & Applications working to provide EO-related CB • Mexico supporting micro basin studies to cover flooding due to hurricanes, flash floods and other extreme events. Includes Central America and the Caribbean. Focus on CB hands-on training on how to access no-cost satellite data (Landsat, Sentinel) and use of no-cost tools (e. g. QGIS, SNAP). • UN-SPIDER Regional Support Offices and other Centres of Excellence mapping tools and resources • CSIRO data cubes workshops for the Americas in April to Aug 2021 in Spanish. • WMO VLAB has active online webinar series. Calendar here. Also coordinating on regional Initiatives including a monthly climate and weather discussion • Copernicus RUS portal with tutorial on flood mapping here under risk monitoring. Related videos	• CESBIO: Ongoing monitoring across South Asia, including floods. CB on SAR data and open access software (SNAP, OTB) and Sentinel-1 data for applications including flood monitoring. Next session on flood CB is in October 2021. • SERVIR-HKH: Recent HydroSAR training. Downloadable lectures here. • CEOS flood pilot underway through WG Disasters. Goal is to integrate optical and SAR imagery for different case studies • DLR: The FloodAdaptVN project is starting a webinar series on EO analysis and geospatial analysis. Partnership with CSSTEAP on courses for Asia • CNES: VSEO (Vietnam School of Earth Observation) annual summer school on remote sensing. • CNES/VNSC: Space Climate Observatory Project (VietSCO) • Copernicus RUS portal with tutorial on flood mapping here under risk monitoring. Related videos	• Activation-based flood delineation mapping through the CEMS Rapid Mapping component including a pre-tasking of satellite images through the CEMS EFAS and GloFAS • Charter is less active in Europe than Copernicus EMS and limited to the immediate response phase. EMS might be more relevant here. • EO College: Introduction to Flood monitoring video. Tutorial on Flood mapping with Sentinel-1 in Echoes in Space MOOC • Risk maps (floods, tsunami) for specific regions upon request through the CEMS Risk and Recovery Mapping component • Open data: climatology of river discharge, soil moisture and snow water equivalent for Europe and global for more than 30/40 years (accessible from the C3S Climate Data Store) • New EMS service: global satellite-based flood monitoring with global water body mapping and flood delineation mapping. • European and Global probabilistic flood forecasting. See EFAS and GloFAS) • Hydrology TEP: hydrology data, mapping water level time series, etc • Copernicus RUS portal.

	Africa	Americas	Asia-Oceania	Europe
Major gaps/needs	• Inadequate ground-based observed data for flood model calibration and validation. • Skills transfer and CB building for mandated agencies still required. • Urban flood mapping • Tools and methods for DSM/DEM to map flood risk at catchment level, as well as training people to use them. • 30m DEM available here. • Big gap in uptake of information for local risk adaptation and mitigation measures.	• Need high resolution LIDAR imagery, e.g., updated LIDAR DTMs needed for urban watersheds in Chiapas, Mexico. • Flood mapping methodologies to support risk mapping and land planning by municipalities. • More affordable DEMS • High rotation of GIS experts > skills gap • Updated land cover / land use datasets needed for flood modelling. Need data for flash flood maps. • SAR CB needed for monitoring agricultural land and crop productivity. • Systematic needs assessment is lacking. • CB materials required in languages other than English. • Need a regionally calibrated flood detection system with near-real-time products linked to vulnerability factors. • Need an application that showcases use of satellite imagery at different resolutions in flood management. • Study needed on floods and spread of volcanic material to flood plains.	• Main issue: applying and integrating knowledge to operations. Requires infrastructure to download and process NRT time series of Sentinel-1, and links to the organisations mandated for Disaster Monitoring. Should combine basic knowledge training with training for operational services, including validation, dissemination etc. • Serious capacity gap in HKH region • Sustainable uptake of the data/information derived from EO and geospatial modelling by local authorities and decision-makers. • In Asia-Oceania region, technology needed to address 4 major flood types: flash floods, basin scale floods, cyclone-driven floods, GLOF/snowmelt floods.	• Need for more hydrological modeling to improve flood early warning, coming out of GloFAS. • Copernicus: more awareness needed. • Need more emphasis in helping users develop fit for purpose applications. • Need to expand provision of info in languages other than English. • More and homogenic exposure data for flood impact modelling. • Opportunity to provide training to users adapting models to their regions.

	Africa	Americas	Asia-Oceania	Europe
Collaboration opportunities	• SarVision • ARCSSTE-E • HumMingBird project (GMV NSL & partners) • RCMRD • Africa GeoPortal • Red Cross collaboration • ONDA 4 Education: paid service facilitating access to Copernicus.	• Autonomous University of Chiapas can partner with others on temporal and territorial prospective studies. • AmeriGEO looking for training partners via Inter-American Academy. Contact: america.alvarez13@outlook.com • NASA-SICA Joint Statement sets up a framework for collaboration in Central America + Dominican Republic. • Copernicus is funding outreach activities in Central America. • SICA's disasters + hydro-met secretariats, CEPREDENAC and CRRH • SERVIR-Amazonia: opportunities for synergies. • ONDA 4 Education	• CESBIO: can collaborate with tool providers and users to improve the flood mapping methods. • VNSC and NESDIS collaborating on flood mapping. • DLR: flood risk reduction project in Central Vietnam open to cooperation and exchange. • SERVIR-HKH: open to collaborating on CB using EO/GIT in HKH countries. • ONDA 4 Education	• Esri: interested in collaborations linking Europe-Africa. Email: mgould@esri.com • EO College Platform could host teaching material. Has an intro to flood monitoring. • More MOOCs: Need for course with basic onboarding on EO flood info/approaches; applications of early warning; rapid flood mapping. UNSPIDER's existing resources could be a starting point. • CB and training about reuse and exploitation of LISFLOOD model. • Copernicus / RUS: offers use of virtual machines with OS SW for training (up to 20 students) to European trainers. More info: training@rus-copernicus.eu.
Leading models, tools, data sets, tools,	• SarVision: automated tool able to monitor flooding in open areas and under the dense canopy of trees. • ARCSSTE-E: framework for regional-scale flood modeling integrating GIS and two hydrological models. • GLoFAS: Global Flood Awareness Syst. • EF5: Ensembles Framework for Flash Flood Forecasting. • MifMASS • GeoCollaborate • ASU's Decision Theater • DLR-WB on disaster and risk topics. Uses World Settlement Footprint. • ASAP: decision support for early warning on ag. production hotspots	• Need high resolution satellite images for the flood zone of the lower part of the Grijalva Usumacinta river Mexico. • GEOGloWS ECMWF Streamflow HydroViewer (forecasting), HYDRA Floods (post-event impact assessment). • ESPOL: soon to launch a BOT for searching CB opportunities in any language.	• NOAA flood monitoring website. • SERVIR-HKH: Working with partner HydroSAR. • SERVIR-Mekong: Mekong Drought and Crop Watch for the Lower Mekong. Also HYDRAFloods system, under development. Will provide near daily water maps. • DEM: Copernicus DEM. • Population distribution: World Settlement Footprint.	• GloFAS: open source and available at Github. • LISFLOOD model (GloFAS & EFAS).

	Africa	Americas	Asia-Oceania	Europe
Success stories and best practices	• ARCSSTEE-CSSTE update on training • ESRI learning resources • *Best practices:* • Integration of LEO, GEO and SAR data with hydrological Modeling • Showcasing a pilot study for Near real time flood mapping, monitoring and rapid damage assessment • Radar-based Flood Mapping and Flood Hazard Mapping, UN-SPIDER Knowledge Portal • GitHub • Recommended practice on flood mapping using Sentinel 1 in Google Earth Engine here. • Or with SNAP • Disaster preparedness mapping with GLOFAS here.	• University collaboration with national agencies and municipalities on Mapathons. First steps to GEO-Labs? • Paraguay: creating a GEO lab in Paraguayan Space Agency • Guatemala and Costa Rica: multi-hazard assessment for support development plans and simplified environmental licensing. Cooperation between national and regional agencies. • SERVIR: GEOGloWS Hydroviewer and HYDRA Floods platforms used by CEPREDENAC and CRRH to prepare for Hurricanes Eta and Iota in 2020. • Mexico: Building 3 EWS for floods, at different levels • ARSET: Good case on Bolivia professor's application of online training skills	• IIRS/ISRO: MOOC on Disaster Risk Management: More than 12000 participants benefitted from 102 countries. Organized with CSSTEAP and UNOOSA. Phase 2 coming soon. • SERIVR-Mekong: World Food Programme use of HYDRAFloods maps in Cambodia and Myanmar for flood response and CB. More info. • HIWAT Application for reducing disaster impact video and article	• Success stories that can be shared from EMS, EFAS, UN-SPIDER, Charter on applications of existing flood services and related CB. • Flood Management in Ireland: socioeconomic analysis • Copernicus EMS collaboration in the framework of the Space Climate Observatory

Annex 1: Meeting agenda

CEOS Working Group on Capacity Building and Data Democracy (WGCapD) 10th Annual Meeting

Building a Vision for the Next Decade

1 to 4 March 2021

Celebrating 10 years of WGCapD

VIRTUAL MEETING: www.gotomeet.me/WGCapD/ceos-wgcapd-10-annual-meeting

(Telephone dial-in information at the end)

GUIDANCE ON MEETING PLATFORMS HERE

AGENDA

Pre-meetings

Internal working session: Monday, March 1

Participation: CEOS members and associate members

Session A 13:00-14:00 UTC 08:00-09:00 EST *60 minutes*	**Welcome** *In one word, how do you describe WGCapD?* **Scene-setter and discussion** • *Leadership perspectives on recent milestones and future outlook* • *Voices of experience: Insights from previous WGCapD chairs* • *Preliminary thinking: group discussion on WGCapD vision for the next decade*	*Participants will be asked to provide one word describing WGCapD.* *Share your thoughts here: https://www.menti.com/tv4udm52za*
Session B 14:00-14:45 UTC 09:00-09:45 EST *45 minutes*	**Member update video exchange** Drawing on pre-recorded updates provided by CEOS members and associate members, this session will create informal spaces for participants to engage on cross-cutting topics.	*Participants are asked to watch recordings prior to the meeting. Available on the CEOS WGCapD YouTube playlist.* *Connect via Wonder: www.wonder.me/r?id=a463bc20-edef-4263-9cb5-4ef6ec929410*
14:45-15:00 09:45-10:00 *15 minutes*	**LEG STRETCH**	

Session C 15:00-16:00 UTC 10:00-11:00 EST *60 minutes*	**Implementing the webinar toolkit** This session begins with an overview of the CEOS Webinar Toolkit, developed by WGCapD as a resource to enhance webinars highlighting CEOS contributions to users while also increasing awareness, access, and ability to use satellite data and other datasets to serve society. The presentation will be followed by a group discussion to brainstorm implementation, promotion and ongoing support to maintain the toolkit's relevance and value. *Presenter:* Lauren Childs-Gleason, WGCapD secretariat

Annual meeting

Day 1: Tuesday, March 2 — **The role of EO capacity development in meeting global challenges**

Participation: Open

	Question of the day: visit www.menti.com/owm513hdag
Session 1 13:00-13:30 UTC 08:00-08:30 EST *30 minutes*	**Welcome** *Speaker:* Nancy Searby, WGCapD-10 Chair, National Aeronautics and Space Administration **Keynote address** Supporting decision-makers: challenges and opportunities in strengthening skills in EO data management, analysis and application around the world. *Speaker*: Barbara Ryan, Executive Director, World Geospatial Industry Council
Session 2 13:30-14:30 UTC 08:30-09:30 EST *60 minutes*	**EO capacity development in the decade ahead** Panel: As WGCapD looks at its next 10 years, this panel will explore emerging EO capacity development needs together with strategies for streamlining cooperation. Through an interview format, leaders in capacity development from outside CEOS will be asked to share their approaches, successes and challenges, as well as perspectives on critical gaps and new opportunities. *Panelists*: • Steven Ramage, Head of External Relations, Group on Earth Observations (GEO) • Christof Aubrecht, Program Coordinator, Global Development Assistance, European Space Agency and ESA Partnership Senior Advisor, World Bank • Sylvia Wilson, SilvaCarbon Steering Committee Co-chair/USGS *Moderator:* Erin Martin
14:30-15:00 09:30-10:00 *30 minutes*	**LEG STRETCH/SOCIALIZING** Participants welcome to a virtual coffee anytime during the break at: www.wonder.me/r?id=a463bc20-edef-4263-9cb5-4ef6ec929410
Session 3 15:00-16:30 UTC 10:00-11:30 EST *90 minutes:*	**Addressing global challenges: opportunities to build flood resilience capacity** Panel: A panel of CEOS members will present on WGCapD engagement in capacity building around flood resilience. Presentations will emphasize: current capacity development activities related to flooding; gaps in approaches, models and tools; strategies for addressing needs assessment; and opportunities to improve cooperation and coordination. *Panelists*

45-minute panel and 45-minute moderated small groups	• Prakash Chauhan, Director, Indian Institute of Remote Sensing, Indian Space Research Organisation • Juan Carlos Villagran de Leon, Head, UN Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) • Guy Schumann, CEOS Working Group on Disasters, Flood Pilot Co-investigator Breakout groups: Participants will brainstorm and identify practical next steps for WGCapD's engagement on flood-specific capacity development, with discussion of key activities and approaches, needs assessment and new collaboration models such EOTEC.	
	Breakout 1: Flood forecasting/early warning • *Moderator*: Francesco Sarti, European Space Agency • *Connection*: https://global.gotomeeting.com/join/633678197 • *Padlet*: https://padlet.com/Erin_M/qc3nvbfwvb0iz3f0	
	Breakout 2: Flood response • *Moderator*: Sergio Camacho, Instituto Nacional Astrofísica, Óptica y Electrónica • *Connection:* https://global.gotomeeting.com/join/543016269 • *Padlet*: https://padlet.com/Erin_M/gkvzbbowtb26hhaz	
	Breakout 3: Flood risk management • *Moderator:* Chris Barnes, US Geological Survey • *Connection:* https://global.gotomeeting.com/join/331106637 • *Padlet:* https://padlet.com/Erin_M/9eg7nesuj2nax5ts	
Session 4 16:30-17:00 UTC 11:30-12:00 EST *30 minutes*	**What did we learn?** Participants return from breakout groups to the plenary session to share their takeaways from the day and implications for future WGCapD activities.	
Day 2: Wednesday, March 3 **Participation: Open**		**Opportunities for impact**
Session 5 13:00-14:00 UTC 08:00-09:00 EST *60 minutes*	**Regional exchange: AFRICA** This consultative session opens with a short WGCapD update on key priorities (such as EOTEC) followed by an exchange with participants on a specific case: capacity development in EO-informed flood management, early warning and response. Select participants from the region present briefly on local needs and opportunities as a means to kickstarting discussion of barriers to use, needs assessment	*To foster collaboration, we will use this tool: https://padlet.com/Erin_M/bcignj8bb6u7a78j* *Contributions are welcome prior to the meeting!*

	approaches and other topics. The aim is to identify and advance practical ideas to shape WGCapD's evolving work in this area. *Moderator*: Dan Matsapola, South African National Space Agency	
14:00-14:15 09:00-09:15 *15 minutes*	**LEG STRETCH**	
Session 6 14:15-15:15 UTC 09:15-10:15 EST *60 minutes*	**Regional exchange: EUROPE** This consultative session opens with a short WGCapD update on key priorities (such as EOTEC) followed by an exchange with participants on a specific case: capacity development in EO-informed flood management, early warning and response. Select participants from the region present briefly on local needs and opportunities as a means to kickstarting discussion of barriers to use, needs assessment approaches and other topics. The aim is to identify and advance practical ideas to shape WGCapD's evolving work in this area. *Moderator*: Francesco Sarti, European Space Agency	*To foster collaboration, we will be using this tool: https://padlet.com/Erin_M/ckhxgkge6ux6pupj* *Contributions are welcome prior to the meeting!*
15:15-15:30 10:15-10:30 *15 minutes*	**LEG STRETCH**	
Session 7 15:30-16:30 UTC 10:30-11:30 EST *60 minutes*	**Regional exchange: AMERICAS** This consultative session opens with a short WGCapD update on key priorities (such as EOTEC) followed by an exchange with participants on a specific case: capacity development in EO-informed flood management, early warning and response. Select participants from the region present briefly on local needs and opportunities as a means to kickstarting discussion of barriers to use, needs assessment	*To foster collaboration, we will be using this tool: https://padlet.com/Erin_M/sdymdfap3djgtt0l* *Contributions are welcome prior to the meeting!*

	approaches and other topics. The aim is to identify and advance practical ideas to shape WGCapD's evolving work in this area. *Moderator*: Albert DeGarmo, National Oceanic and Atmospheric Administration	
SESSION BREAK – meeting reconvenes 11.5 hours later		
Note: In Asia-Oceania, Europe and Africa, the next session takes place Thursday, March 4		
Session 8 04:00-05:00 UTC 23:00-24:00 EST *60 minutes*	**Regional exchange: ASIA-OCEANIA** This consultative session opens with a short WGCapD update on key priorities (such as EOTEC) followed by an exchange with participants on a specific case: capacity development in EO-informed flood management, early warning and response. Select participants from the region present briefly on local needs and opportunities as a means to kickstarting discussion of barriers to use, needs assessment approaches and other topics. The aim is to identify and advance practical ideas to shape WGCapD's evolving work in this area. *Moderator*: Pham Thi Mai Thy, Vietnam National Space Center	*To foster collaboration, we will be using this tool: https://padlet.com/Erin_M/21u0f1rc83171dcm* *Contributions are welcome prior to the meeting!*
Day 3: Thursday, March 4 **Internal working sessions: CEOS members and associate members**		**Integrating our work**
Session D 13:00-14:15 UTC 08:00-09:15 EST *75 minutes*	**Synthesis, learning and reflection** Drawing on the week's sessions, particularly regional exchanges and breakout groups, this session will provide a forum for recapping, making recommendations and reflecting on areas of interest for the next decade of WGCapD. Starts off with a presentation from the WGCapD Secretariat recapping key takeaways from the week.	
14:15-14:45 09:15-09:45 *30 minutes*	**LEG STRETCH/SOCIALIZING** Participants welcome to a virtual coffee anytime during the break at: https://www.wonder.me/r?id=a463bc20-edef-4263-9cb5-4ef6ec929410	

Session E 14:45-15:45 UTC 09:45-10:45 EST *60 minutes*	**Identifying work plan priorities: 2022-2023** Moving from the next decade to a focus on the next two years, this session will engage participants in a conversation about how to deliver results in key areas, including EOTEC. Participants may break into small groups as needed.	
Session F 15:45-16:00 UTC 10:45-11:00 EST *15 minutes*	**WRAP-UP AND CLOSING** Speaker**:** Nancy Searby, NASA	

Annex 2: Participants (registered and attending)

Joe Abakunda, Rwanda Space Agency
Eric Abbam, U. of Energy and Natural Resources
Shiv Prasad Aggarwal, Indian Space Research Organisation
Rustem Arif Albayrak, NASA
Suchith Anand, Global Open Data for Agriculture and Nutrition
Guy Aube, Canadian Space Agency
Christoph Aubrecht, European Space Agency
Krystal Azelton, Secure World Foundation
Felix Bachofer, German Aerospace Center (DLR)
Ahmed Balogun, Fed. Univ. of Tech, Akure
Christopher Barnes,USGS/KBR
Paul Bartel, SERVIR West Africa
Oscar Daniel Beltrán Rodriguez, Institute of Hydrology, Meteorology and Environmental Studies - Ideam Amerigeo
Einar Bjørgo, UNITAR-UNOSAT
Brock Blevins, NASA Applied Remote Sensing Training Program (ARSET)
Michael Bock, DLR AR-AO
Ana Bonilla, Universidad Autónoma de Chiapas
Mercy Borbor-Cordova, Escuela Superior Politecnica del Litoral
Dave Borges, NASA
Assoumana Boubacar Toukal, AGRHYMET
Coen Bussink, UN Office for Outer Space Affairs
Sergio Camacho, Instituto Natl. Astrofísica, Óptica, Electrónica
Amalia Castro Gomez, RSAC c/o ESA/ESRIN
Jamilatou Chaibou Begou, SERVIR West Africa
Prakash Chauhan, ISRO
Emil Cherrington, NASA/SERVIR
Lauren Childs-Gleason, NASA
Amanda Clayton, NASA DEVELOP
Jose Carlos Coello Fababa, CONIDA
Bernadette Connell, CIRA
Allison Craddock, NASA JPL/International Association of Geodesy
Jens Danzeglocke, DLR
Marc Dawson, SERVIR West Africa
Manoel de Araujo Souza, USFM, Brazil
Omar Antonio de la Cruz Courtois, Universidad Autónoma de Chiapas
Albert DeGarmo, NOAA
Maria del Pilar Cornejo
Jorge Del Rio Vera, United Nations Office for Outer Space Affairs
Luca DellOro, UNITAR-UNOSAT
Rishiraj Dutta, Asian Disaster Preparedness Center
Robert Eckardt, EO College
Glory Enaruvbe, AFRIGIST
Hilcea Ferreira, former WGCapD chair
Federico Fierli, Eumetsat
Africa Flores, NASA/SERVIR
Beatriz Flores, CRECTEALC
Attilio Gambardella, European Commission
Mark Gaved, The Open University, UK
Yana Gevorgyan, NOAA
Margaret Glasscoe, UAH/MSFC
Sergio Gonzalez, UNACH
Michael Gould, Esri Inc.
David Green, NASA
Marie-Claire Greening, CEOS
Tao Guo, PIESAT Information Technology Co.,Ltd.
Angelica Gutierrez, NOAA/AmeriGEO
Cynthia Hall, NASA Earth Science Data Systems
Yves Hategekimana, Rwanda Space Agency
Ella Haugen, NASA
Brady Helms, NASA
Betzy Hernandez, NASA
Kelsey Herndon, University of Alabama at Huntsville
Mark Higgins, EUMETSAT
Kathrin Hoben, Federal Office of Civil Protection and Disaster Assistance
Kim Holloway, NASA / CEOS SEO
Janin Huard, Canadian Space Agency
Monica Jeada, USGS
Gensuo Jia, Chinese Academy of Sciences / START
Shilpa Kannan, NASA
Georgia Karadimou, RUS Copernicus / SERCO
Tomás Kasusky Pech, INAOE
Argie Kavvada, NASA
Tony Kim, NASA/MSFC/SERVIR
Astrid Christina Koch, European Commission - DG DEFIS
Tèhrrie König, National Institute for Space Research - INPE
Rui Kotani, JAXA
Laila Kühle, Federal Office of Civil Protection and Disaster Assistance
Senthil Kumar, ISRO (retired)
Harsha Madiraju, World Geospatial Industry Council
Mansour Mahamane, SERVIR West Africa
Erin Martin, Facilitator
Christine Mataya, NASA
Daniel Matsapola, South African National Space Agency
Tim Mayer, University of Alabama at Huntsville/NASA SERVIR
Heather McNairn, Agriculture and Agri-Food Canada
Nestor Gabriel Mendez, Hidrotec
Monica Miguel-Lago, EARSC
Albert Momo, Trimble
Antonios Mouratidis, Aristotle University of Thessaloniki
Yasha Moz, NASA
Rebekke Muench, NASA/SERVIR
Robinson Mugo, RCMRD
Jules Maurice Mupenzi Karasira, Rwanda Space Agency
Charles Mwangi, Kenya Space Agency
Monica Namo, NASA Langley Research Center
Merrie Neely, NOAA - CEOS COAST
Tessa Owens, Minerva Schools at KGI
Jon Padgham, START International
Jennifer Paris, NASA
Jose Pasapera, CONIDA Peru
Thy Pham, VNSC

Hoa Phan, CESBIO
Maximiliano Pisano, CONAE
Ana Prados, ARSET
John Pring, Geoscience Australia
Jesus Quintana, CONIDA
Ricardo Quiroga, NASA
Barri' Ralgand-English, NASA Langley Research Center
Steven Ramage, Group on Earth Observations
Shirish Ravan, UN Office for Outer Space Affairs
Alejandro Roman, Paraguayan Space Agency
Samantha Georgina Roman Vara, Universidad Autonoma de Chiapas
Kent Ross, NASA/DEVELOP Program
Natalia Rudorff, INPE
Michael Ruiz, NASA
Barbara Ryan, World Geospatial Industry Council
Peter Salamon, European Commission, DG Joint Research Center
Mariana Sanchez, Universidad Autonóma de Chiapas
Luisa Santoro, Italian Space Agency
Francesco Sarti, ESA
Seraphine Scherer
Gunter Schreier, DLR - German Aerospace Center
Guy Schumann, NASA/RSS
Nancy D. Searby, NASA HQ Earth Science Division
Rashmi Sharma, ISRO
Moisés Silva Cervantes, Autonomous University of Chiapas
D. Brent Smith, NOAA (retired)
Crista Straub, United States Geological Survey
Adrian Strauch, University of Bonn
Miguel Angel Suarez, Universidad Autonóma de Chiapas
Joost Teuben, University of Twente / ITC/GEO
Rajesh Thapa, ICIMOD
Vera Thiemig, Joint Research Centre
Linda Tomasini, CNES
Vardis Tsontos, NASA/JPL
Alexia Tsouni, NOAA
Juan Carlos Villagran de Leon,UNOOSA / UN-SPIDER
Carmen Villon, CONIDA
Sylvia Wilson, USGS
Herve Yesou
Svetlana Zolotikova, National Centre for Earth Observation UK