Committee on Earth Observation Satellites

GEO Session Introduction

A. Siqueira/GA/SIT Chair Team & D. Cripe/GEOSEC

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #1

Virtual Meeting

Wednesday 16th September

GEO Session Objectives

Objectives

- To have an update on GEO priorities and directions.
- To understand which areas CEOS contributes to the GEO work programme.
- To have an overview of emerging requests for support from the CEOS community.
- To identify key messages that CEOS may wish to communicate to GEO.
- To understand future planned CEOS-GEO actions around global data flows.
- To understand and discuss GEO Knowledge Hub and the implications for CEOS.
- To work with GEO to understand and ensure requests to CEOS Plenary are clear and feasible.

GEO Session Agenda

1. Session introduction, context, welcome [3 min]
2. Update on GEO priorities and directions [10 min]
3. CEOS contributions to the GEO Work Programme [42 min]
4. Emerging requests for support from CEOS [10 min]
5. CEOS-GEO actions around global data flows [15 min].
6. GEO Knowledge Hub and its links to CEOS [10 min]
7. Discussion [20 min]

Additional Points

- Please use the chat window for any comments/suggestions/request the floor to intervene
- Please try to keep your presentation within the time allocation as we have a large number of presentations to get through

Committee on Earth Observation Satellites

Update on GEO priorities and directions

G. Camara/GEOSEC and D. Cripe/GEOSEC

CEOS SIT Technical Workshop 2020

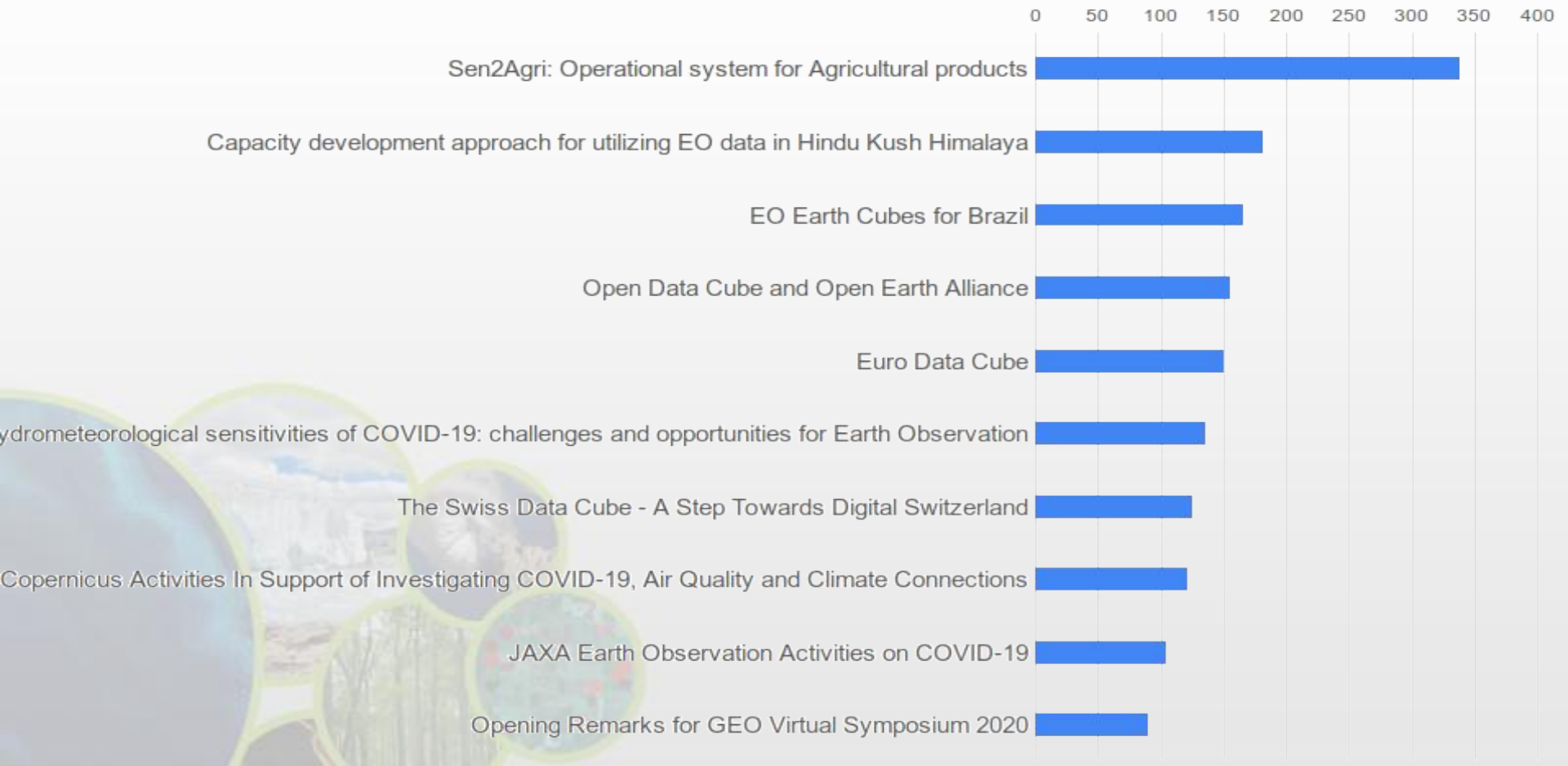
Session 5.1 Agenda Item #5.1.2

Virtual Meeting

Wednesday 16th September

GEO Symposium

Views of Recorded Presentations -- Top 10



GEO Symposium - select take home messages

- **AquaWatch: variety of sensors and platforms providing water quality information (Copernicus GLS, NOAA Ocean Color, TIGER WOIS, etc), data cubes.**
  - disparate data sources, different sensors, time-periods, product processing, degree of validation, open vs proprietary: *conflicting results from different products for same location/time period*
  - working with CEOS (WGISS, WGCV, LSI-VC) to develop aquatic ARD
    - "ARD no longer a desire of global users but becoming a requirement and expectation."
- **EVs: GCOS, GEO BON, MBON, GEO EVs CA**
  - Commitments to global policy -> demand for relevant and timely data
  - Spatial/temporal/taxonomic gaps still hamper progress -> ongoing dialogue with user community
  - Challenge is to adapt EVs for use with SDG monitoring frameworks
  - Need for harmonized multi-mission datasets for comprehensive time-series analysis
  - Need for continued cal/val based on expansion of in situ networks

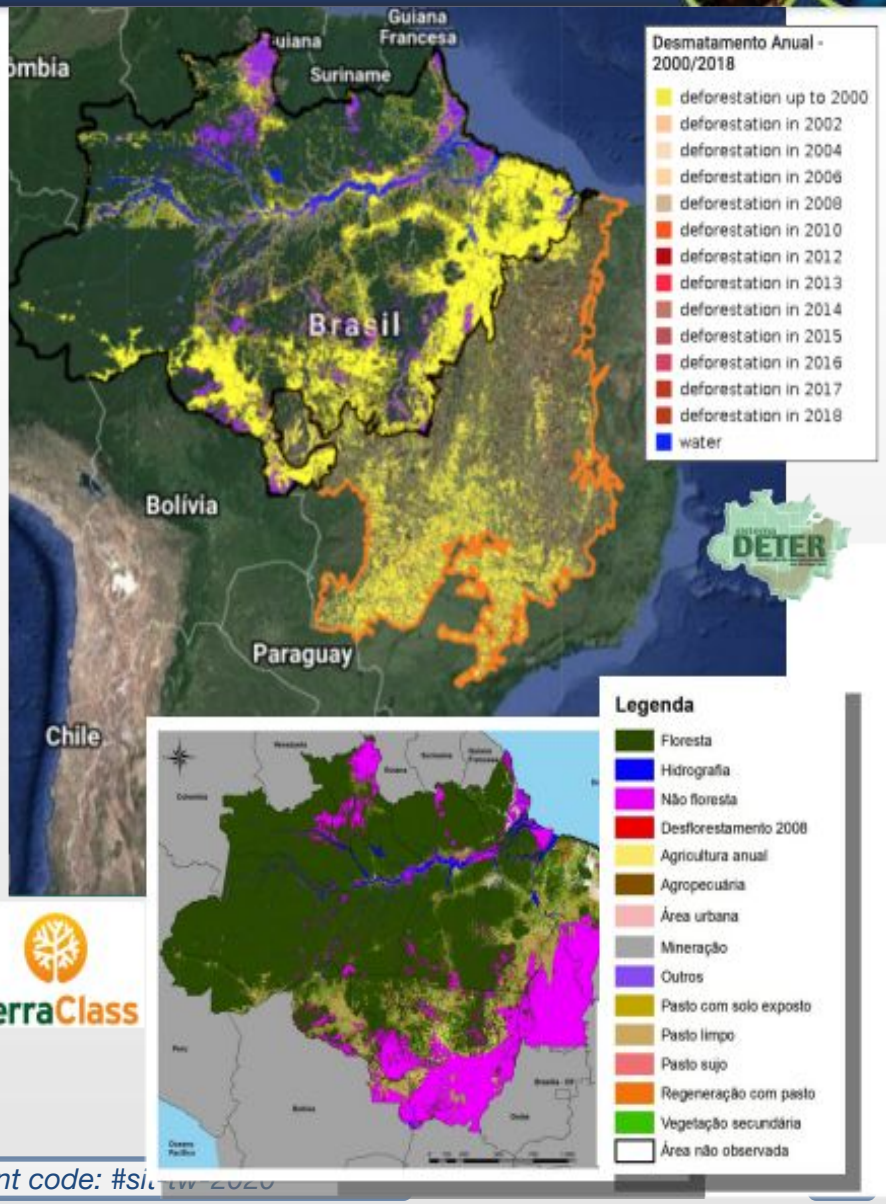
Brazil Data Cube

National Institute for Space Research (INPE), Brazil

Responsible for producing official land use and cover information in Brazil

Projects:

- ✓ **PRODES**: clear cut deforestation
- ✓ **DETER**: alerts of deforestation
- ✓ **TerraClass**: identify what the deforested areas detected by PRODES have become.
- ✓ ...



INPE
MINISTÉRIO DA CIÊNCIA E TECNOLOGIA
INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

Brazil Data Cube Project – Main Motivation

Responsible for producing official land use and cover information in Brazil

Projects: **PRODES, DETER** and **TerraClass**

Use a methodology mainly based on visual interpretation of remote sensing imagery.

Brazil Data Cube project

Produce technological innovation to improve this methodology.

Big data technologies, **time series analysis** and machine learning methods to store, process and analyze big Earth observation data sets mainly for land use and cover change detection.

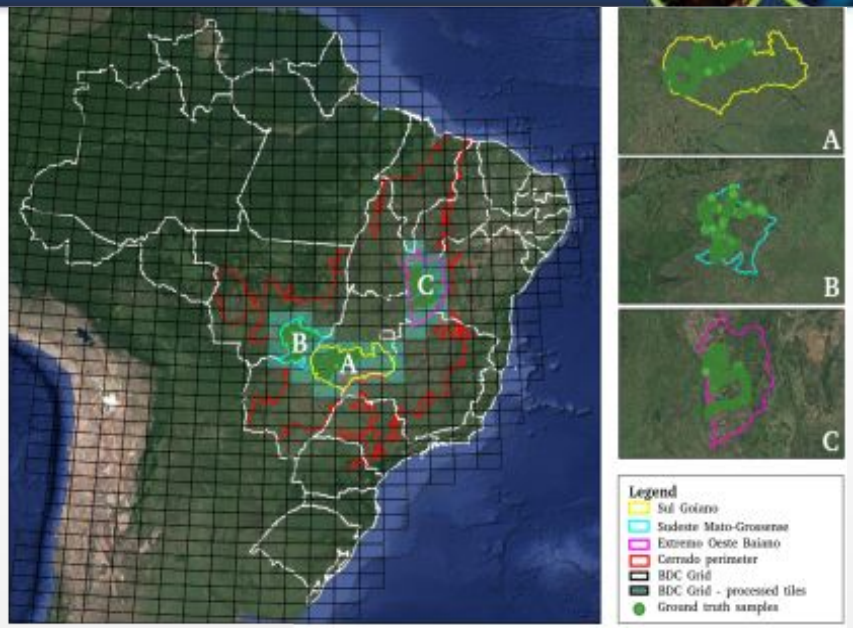
MINISTÉRIO DA CIÊNCIA E TECNOLOGIA
INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

Brazil Data Cube

BDC Project – Status and Future

Status:

- ✓ CBERS 4, Sentinel 2 and Landsat 8 - ARD images and data cubes from 2016 to 2020 and land use and cover maps:
  - ✓ Today: three areas in Brazil (A, B and C).
  - ✓ December 2020: Cerrado biome.



Future:

- ✓ Create data cubes harmonazing/mixing Sentinel 2 and Landsat 8 satellite images
- ✓ Create data cubes using Sentinel 1 images
- ✓ Promote the use of data cubes and time series analysis to extract different kinds of information from Earth observation satellite images in Brazil
- ✓ **Data cube will be made available to the public for full and open utilization.**

India Data Cube

- **Indian Institute for Human Settlements (IIHS): *Integrating EO Data with Census and Sample Surveys to estimate Development Indicators for India.***
- **Decided to adopt data cube approach.**
- **Training a convolutional neural network (CNN) model to identify built-up cells using Landsat 5TM data**
  - training and validation done using India Urban Atlas dataset prepared through manual classification methods
  - model generated new training and validation data for Bengaluru using building footprints obtained from the local planning authority
  - major challenge is to identify residential areas correctly
    - Bayesian hierarchical model developed to disaggregate the population (from the 2011 Census) to 30mx30m cells, inputs to this model include land cover classification, building heights and street density data **generated from Cartosat 1 data** using an open source algorithm.
- **future: integration of data from various sources such as Census of India, National Sample Survey, and National Family Health Survey with data cube**

Swiss Data Cube

SWISS DATA CUBE *in Numbers*

Updated every week!

A unique Analysis Ready Data Archive

36 years
FROM 1984 to 2020

7 sensors
LANDSAT 5/7/8;
SENTINEL-1/2 A-B

10-30-90m
PIXEL RESOLUTION

>450 million
PIXELS

>1000 billion
OBSERVATIONS

~12500 images
INGESTED

~5 TB
ANALYSIS READY DATA

~10 millions CHF
COST OF DATA WITHOUT OPEN DATA ACCESS POLICY

GRID Geneva · UNIVERSITÉ DE GENÈVE · University of Zurich · WSL

Giuliani G., Chatenoux B., De Bono A., Rodila D., Richard J.-P., Allenbach K., Dao H., Peduzzi P. (2017) Building an Earth Observations Data Cube: lessons learned from the Swiss Data Cube (SDC) on generating Analysis Ready Data (ARD). *Big Earth Data 1(1):1-18*

Data Cube on Demand

Data Cube on Demand (DCoD)

Aims at **facilitating the generation and use of an ODC instance virtually anywhere in the World**.

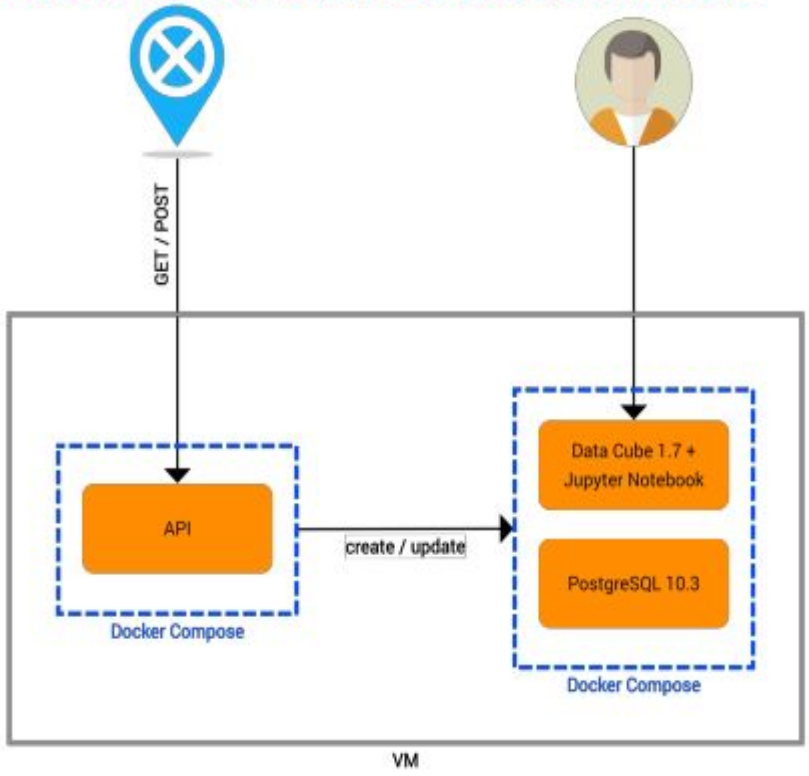
Users are only required to specify:

- an area of interest on a web-based mapping application;
- types of sensors between Landsat 5-7-8 and Sentinel-2;
- desired temporal frame;

Then automatically an empty ODC instance is instantiated and desired data are ingested.

On going discussions to use DCoD with:

- eLETR
- UNEP World Env. Situation Room



Giuliani G., Chatenoux B., Piller T., Moser F., Lacroix P. (2020) Data Cube on Demand (DCoD): Generating Earth Observation Data Cube anywhere, International Journal of Applied Earth Observation and Geoinformation 87:102035
https://doi.org/10.1016/j.jag.2019.102035

Messages for CEOS

- **Needs of community - many want to make use of ARD on the cloud.**
  - More documented ARD please, with SpatioTemporal Asset Catalog (STAC) indexing to facilitate discovery and access.

- **Plethora of DC projects on the landscape**
  - Does CEOS see the Open Earth Alliance (OEA) Community Activity ***the*** coordination mechanism?

- **Full support of GEO Secretariat for further development of sandbox approach (Digital EA; SDGs on AWS, Google).**

- **GEO Secretariat appreciates work of the SDG and CEOS-COAST AHTs, and Biomass protocol, AFOLU, and would like to continue engaging with CEOS for translation of needs from user communities into satellite observation requirements.**

Committee on Earth Observation Satellites

CEOS and the GEO Working Groups

K. Sawyer/NOAA/CEOS CEO

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

Virtual Meeting

Wednesday 16th September

GEO Foundational Task Working Groups

- **Working Groups were one of the mechanisms used to implement the Foundational Tasks in the 2017-2019 GWP.**
  - Included Capacity Building WG and Data Sharing WG.
- **For the 2020-2022 GWP, the Secretariat proposed a realignment of the Foundational Tasks, simplifying the structure from 10 FTs to 5.**
- **2020-2022 Working Groups:**
  - Capacity Development (revised from the previous CB-WG)
  - Data (revised from the previous DSWG)
    - Includes a subgroup on In Situ Data
  - Climate Change (expanded from the PB Paris Agreement Subgroup)
  - Disaster Risk Reduction (expanded from the PB DRR Subgroup)
- **All GEO Principals could nominate members to WGs.**

Working Group Nominations

- **Call for nominations issued 24 March with deadline of 30 April (later extended to 15 May).**
- **Total of 338 individuals were nominated or expressed interest.**
- **Current number of members (subject to change):**
  - Capacity Development 55
  - Climate Change 96
  - Disaster Risk Reduction 89
  - Data 67

Committee on Earth Observation Satellites

GEO Capacity Development Working Group (CD WG)

N. Searby/NASA

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

Virtual Meeting

Wednesday 16th September

GEO Capacity Development Working Group (CD WG)

Members and Subgroups

The WG has currently 54+ members (21 females, 32 male, 1 not determined)

The Working Group established 3 subgroups to assist in fulfilling its duties.

Subgroup 1: GEO mapping and needs assessment (lead Hanna Albrecht/GIZ)

Subgroup 2: Collecting, sharing and developing CD tools (lead Allison Craddock/IAG)

Subgroup 3: Organizing dissemination events, M&E and impact assessment (lead Nancy Searby/CEOS WGCapD)

GEO Sec: Joost Van Teuben

	CapDev
GEO Member	37
GEO Participating Organization	13
GEO Associate	4
GEO Programme Board	4
Total	58

PB members: Allison Craddock, Charles Mwangi, Amos Kabo-Bah, Bente Bye, and Imran Khan
CEOS WGCapD members: Pham Thi Mai Thy, Nancy Searby

	CapDev
Africa	12
Americas	18
Asia-Oceania	9
Commonwealth of Independent States	0
Europe	15
Total	54

CD WG Plan from Terms of Reference

- **Purpose -** The WG-CD is convened to facilitate GEO's efforts on CD and will support the translation of the Canberra Declaration into concrete actions within the GEO Work Programme.
- **Duties**
  - Support GEO Flagships, Initiatives and Regional GEOs
  - Develop CD tools and methodologies
  - Collect & share good practices
  - Organize seminars, teleconferences, side-events
  - Implement impact assessments
- **Initial Plans**
  - Stocktake of capacity development activities and needs within GEO flagships, initiatives, community activities, and regional GEO's
    - Needs, tools & methodologies, good practices
    - Monitoring, evaluation, & learning (MEL), impact assessments
  - Organize dissemination events (WGCapD potential synergy)

Committee on Earth Observation Satellites

GEO Disasters Risk Reduction Working Group

David Green, NASA, WGDisasters Chair

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

Virtual Meeting

7-11 and 14-18 September 2020

DRR WG Progress

- Co-Chairs elected through online voting to lead three Subgroups
- Three Subgroups established
  - SG1: Coordination across the GEO Work Programme
  - SG2: UNDRR Coordination (Sendai Framework Monitoring & Global Assessments)
  - SG3: Climate Change, SDG, and Urban Activities Coordination
- DRR WG Kickoff meeting held in June, led by Steven Ramage
- Co-Chairs meeting and Deputy Chair meetings held in July
- Draft SG Work Plans developed, to be completed and combined early September
- DRR WG Meeting #2 to be scheduled 23 or 24 September, based on poll results

GEO Disasters
Space Element of GEO

Governance

Subgroup 1: Coordination across the GEO Work Programme

Co-Chair: Dave Borges (NASA, United States)

Deputy Chairs: Godstime James (Africa), Fernando Belda (Spain), Tatiya Chuentragun (Thailand)

Subgroup 2: UNDRR Coordination (Sendai Framework Monitoring & Global Assessments)

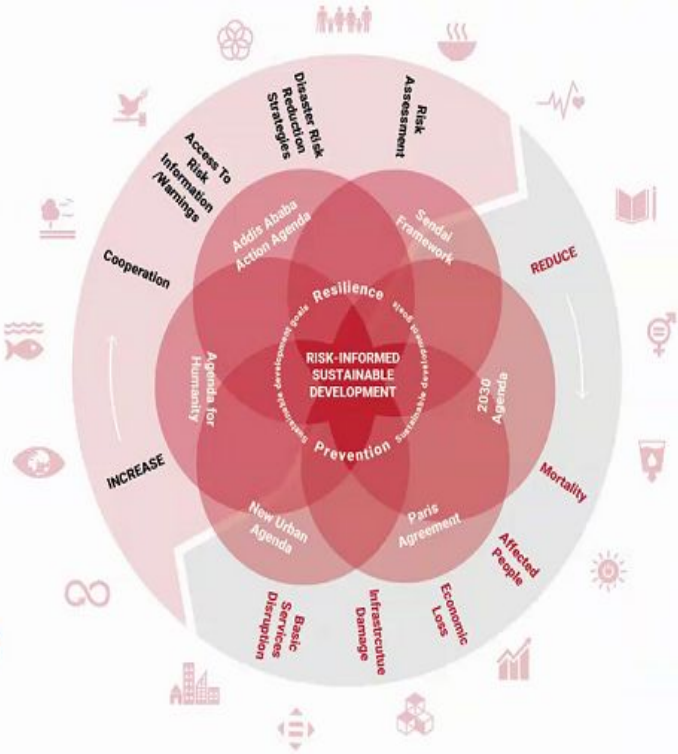
Co-Chair: Janet Edwards (MSB, Sweden)

Deputy Chairs: John LaBrecque (United States), Aliyu Abdullahi (Africa)

Subgroup 3: Climate Change, SDG, Urban Activities Coordination

Co-Chair: Kene Onukwube (DEAR, Africa)

Deputy Chairs: Cheila Cullen (United States), Ramesh Singh (United States), Chulam Rhasul (Nepal)



DRR WG Subgroup 1 Work Plan Highlights

- Purpose
  - Develop and implement a coherent and crosscutting approach within GEO to advance the use of Earth observations in support of countries' disaster risk reduction and resilience efforts.
- Highlight aspects of the Work Programme that are DRR related, and describe key elements and locations of each activity.
- Promote, including through good practices and impact, sharing of data and knowledge to improve DRR.
- Work with SG2 and SG3 to understand real requirements at national levels and communicate these requirements to relevant activities within GEO WP.
- Promote awareness of relevant global policy frameworks across the WP, such as *UN-GGIM WG-Disasters Strategic Framework on Geospatial Information and Services*.

DRR WG Subgroup 2 Work Plan Highlights

- Purpose
  - Leverage SG1 efforts and use combined resources of SG2 to promote the dissemination and use of Earth observations to strengthen capabilities to reduce disaster risk according to the needs of countries as identified by UNDRR.
- Serve as primary GEO liaison to UNDRR
- Increase the use of Earth observation data for achieving the Sendai Framework's Global Target E, that is to substantially increase number of countries with national and local disaster risk reduction strategies.
- Showcase how Earth observation data can complement data governments already have to assess risk and risk trends over time.
- Showcase how Earth observations can be used to describe and visualize vulnerability and exposure.

UNDRR
UN Office for Disaster Risk Reduction

DRR WG Subgroup 3 Work Plan Highlights

- Purpose
  - Leverage SG1 efforts to provide an overview of links, and actionable opportunities, between disaster risk reduction, climate change, SDGs and urban activities.
- Serve as primary link to CC-WG, SDG and Urban related activities.
- Document an end-to-end approach of the impacts and linkages of climate change on disaster risk reduction and the SDGs.

Committee on Earth Observation Satellites

GEO Working Group - Climate Change

J. Schulz, EUMETSAT, WGClimate Chair

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

Virtual Meeting

Wednesday 16th September

GEO Climate Change Working Group

Subgroup 1: Coordination of climate issues across the GEO Work Programme & Synergies with key partners (including WMO)

Co-chair: Virginia BURKETT (USGS - United States)

WGClimate: Jörg Schulz (EUMETSAT)

Subgroup 2: Engagement with UNFCCC and IPCC

Co-chair: **Mark DOWELL (JRC - European Commission)**

WGClimate: Wenying SU (NASA)

Subgroup 3: Enhancing the use of EO for Mitigation

Co-chair: Lucia PERUGINI (CMCC – Italy)

WGClimate: Wenying SU (NASA)

Subgroup 4: Enhancing the use of EO for Adaptation and Loss & Damage

Co-chair: Angel VALDIVIEZO AJILA (National Service for Disaster Risk Reduction and Emergencies – Ecuador)

WGClimate: Jörg Schulz (EUMETSAT)

- Await Co-chairs to finalise and present roadmap and work plans to CC-WG
- Probably needs review by subgroups before being accepted
- Guess work plans come without resource estimates, thus need to apply a realism check. CEOS contributions need to be existing or feasible in near future CEOS work plan.

Credit graphic: Sara Venturini (GEO SEC)

WGClimate member not assigned yet: Susanne Mecklenburg (ESA)

Early Observations

- Observe overlaps between Subgroup-2 and WGClimate GHG Task Team, need to coordinate that several items are contributions by CEOS-CGMS to GEO
- Need to ensure that CEOS outputs are used in CC-WG activity “Preparation of GEO’s response on EO gaps identified by IPCC Special Reports / AR6” involving all CC-WG subgroups
- Same applies to CC-WG activity “Definition of application specific EO requirement addressing all aspects of the UNFCCC, including through a stakeholder workshop”, planned for Q3/4 2021 - Q2/Q3 2022 – Here it would be important that this is coordinated with the GCOS IP and that it is compatible with CEOS needs, e.g., for the ECV Inventory
- CC-WG activity “Organisation of joint GEO-IPCC Expert meeting on the topics of land representation, the role of remote sensing and field measurements, and uncertainty” – Remote sensing part should be covered by CEOS (mix of WGClimate and LSI VC)
- Several other CC-WG activities need to be analysed on overlap/contribution when work plans are available

Committee on Earth Observation Satellites

GEO Data Working Group Report

Brian Killough, PhD

NASA Langley Research Center

CEOS Systems Engineering Office (SEO)

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

7-11 and 14-18 September 2020

GEO Data WG Status

- **Data Working Group (DWG) Members:** 58 members from government, academia, UN agencies, IGOs, NGOs.
- **Meetings**: Kickoff on June 9, 2nd Data Working Group (DWG) All-Hands on July 6, 3rd All-Hands Meeting planned for September 18.
- Four **Co-Chairs elected** to lead the DWG: Alena Rybkina (CODATA), Anastasia Wahome (RCMRD), Robert Downs (WDS), Richard Moreno (CNES). They have had two meetings in July and August.
- **Purpose of DWG**: Address data policy, data ethics and data governance issues impacting the use of EO and improving its uptake. Also, support the translation of the GEO Canberra Declaration which noted the benefits and impact of EO.
- **Duties of DWG**: Monitor trends in open data and data management practices to revise and promote the GEOSS Data Sharing Principles and the GEOSS Data Management Principles, advance discussions about data with stakeholder communities, recommend ways for GEO to advance EO interoperability, and identify, analyze and describe best practices for EO data sharing and management.
- **Proposed Sub-Groups**: (a) In-Situ, (b) Data Sharing and Data Management Principles, (c) Data Rights, Ethics, Legal, and Privacy.
- **Future Engagement Plans**: GEOSS Infrastructure Development Task Team (GIDTT), WMO Data Conference, CEOS WGISS Meeting, Research Data Alliance (RDA), GEO Week 2020

Committee on Earth Observation Satellites

CEOS and thematically focussed GEO Work Programme activities

K. Sawyer/NOAA/CEOS CEO

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

Virtual Meeting

Wednesday 16th September

CEOS and thematically focussed GEO Work Programme activities

Presentation:

https://drive.google.com/file/d/1gyz_kAHHuO4yURus6MoCA86zyjd3ef6e/view?usp=sharing

Committee on Earth Observation Satellites

Panel

I. Petiteville/ESA, O. Ochiai/JAXA and I. Jarvis/GEOGLAM

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

Virtual Meeting

Wednesday 16th September

Panel [20min]

Panellists:

- CEOS support for GEO-DARMA [I. Petiteville/ESA] - 4min
- CEOS support for GFOI [O. Ochiai/JAXA] - 4min
- CEOS support for GEOGLAM [I. Jarvis/GEOGLAM] - 4min

Panellist Insights on:

- CEOS contributions to GEO flagships and initiatives focusing on linkages for GEO's engagement priorities
- What CEOS gets out of those contributions.
- Where panellists see CEOS's contributions going in the future.

Committee on Earth Observation Satellites

CEOS support for GEO-DARMA

I. Petiteville/ESA/Chair, GEO-DARMA SC

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

Virtual Meeting

Wednesday 16th September

CEOS support for GEO-DARMA

Presentation:

https://docs.google.com/presentation/d/1Z2zh0HeNpIKqB-9-6ClaAPojmCQ5_eiDyicP7Zz70DM/edit?usp=sharing

Committee on Earth Observation Satellites

CEOS support for GFOI

O. Ochiai/JAXA

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

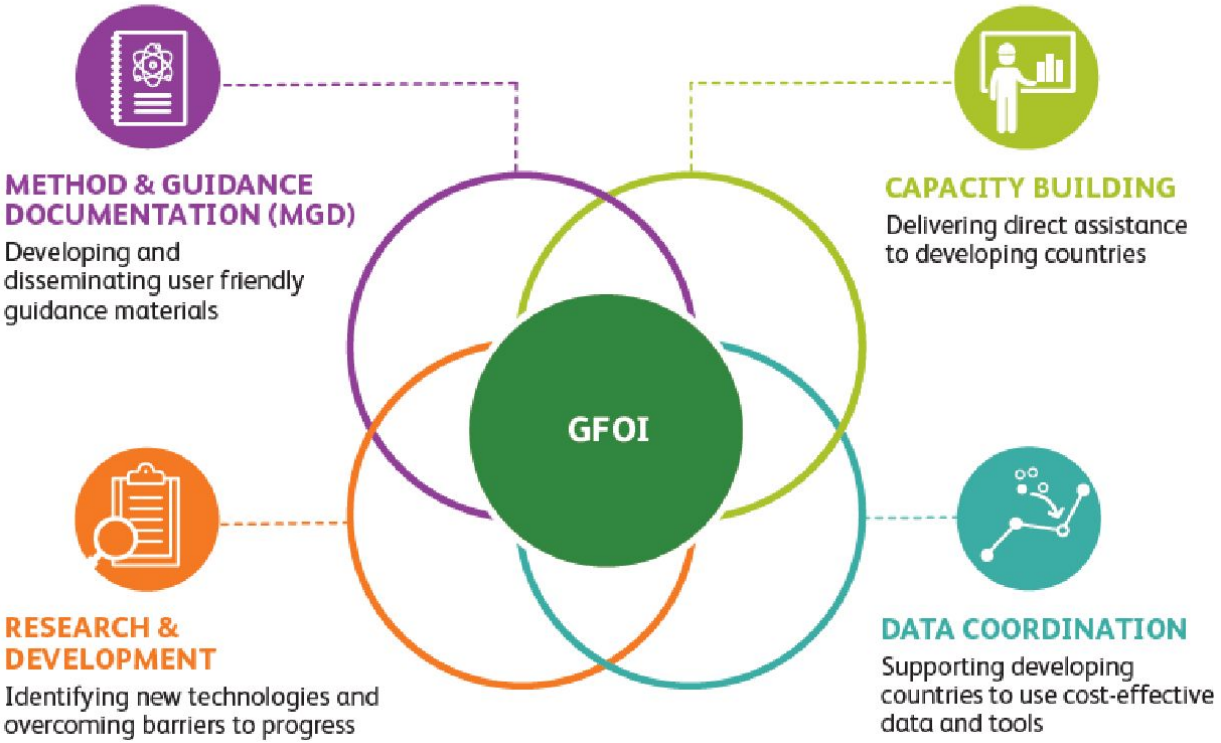
Virtual Meeting

Wednesday 16th September

Earth Observations for Global Forest Monitoring

GFOI, founded under Group on Earth Observations (GEO) in 2011, coordinates international support on forest monitoring and GHG accounting for REDD+ and related forums

FOUR GFOI COMPONENTS



- Lead partners: Australia, CEOS, ESA, FAO, Germany, Norway, UK, USA, & the World Bank.
- Many other contributor including Countries, UNFCCC, IPCC, universities, technical and policy experts
- Open to new partners

Earth Observations for Global Forest Monitoring

GEO GROUP ON EARTH OBSERVATIONS

GFOI

- Provide REDD+ countries with a **larger and more targeted package of support**
- Ensure support is **targeted at country needs** to help accelerate progress towards reporting and action
- Foster a **network of experts** to help address challenges and bottlenecks to progress
- Facilitate **exchanges resources, comparative advantages**, **south-south collaboration** and enable learning between partners
- **Avoid overlaps and duplication** of effort by developing countries and international partners

Earth Observation Satellite Data and Tools

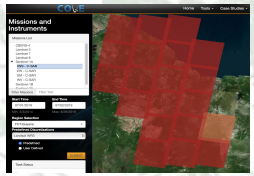
CEOS Committee on Earth Observation Satellites

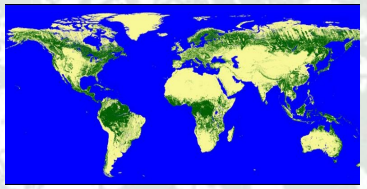
SEPAL SYSTEM FOR EARTH OBSERVATION DATA ACCESS, PROCESSING & ANALYSIS FOR LAND MONITORING

OPEN DATA CUBE

Google Earth Engine

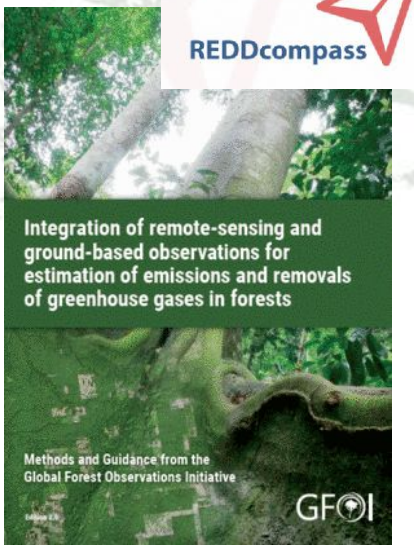
COVE





Method and Guidance

REDDcompass



Research & Development

GOFC-GOLD Global Observations of Forest Cover and Land Use Dynamics

esa

Capacity Building

@GFOI_FOREST

GFOI.ORG

GFOI1

Data Component and more

- Data and Tools - Support GFOI components and partners to make best use for forest monitoring and MRV
- Annual wall-to-wall coverage of all the world's forested regions with remote sensing data
- Ground data, including integration with remote sensing datasets - Support countries to assess and communicate their needs
- Delivery of ARD products, considering issues such as the volumes of free and open data, infrastructure and countries' internet connectivity

GST is a new activity in GFOI across entire components

Committee on Earth Observation Satellites

CEOS Contribution to the GEOGLAM Flagship

I. Jarvis/GEOGLAM

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.3

Virtual Meeting

Wednesday 16th September

CEOS Contribution to the GEOGLAM Flagship

- GEOGLAM has liaised with CEOS from 2012-2019 through an ad hoc Working Group, and since 2019 through an LSI VC Sub-group
- Since 2013 GEOGLAM has provided near real time crop conditions to support markets, and since 2016 for early warning in support of food security response
- The most recent update of GEOGLAM requirements was completed in 2019
- Since 2012 much of the incremental CEOS support was focused on research
- During 2020 GEOGLAM has been working towards the definition of Essential Agricultural Variables (EAV's) to support shared CEOS-GEOGLAM priorities (climate, SDG's and disaster response)
- While we look towards 2021, we anticipate the EAV's will transform the CEOS-GEOGLAM relationship as together we strive to harmonize the CEOS data and service requirements with GEOGLAM's EAV driven user needs

We look forward to continue working with CEOS to bring even greater relevance to Earth Observations in support of global food security

Committee on Earth Observation Satellites

Emerging requests from Cloud Service Providers for support from CEOS

D. Cripe/GEOSEC

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.4

Virtual Meeting

Wednesday 16th September

Requests from Cloud Service Providers

- **AWS: request for harmonized index for data on the cloud that could be leveraged by anyone trying to build/access a data cube.**

- **GEE: use of commercial cloud to scale and operationalise projects and activities. Set of best practices for reference would be very useful (WGCapD?).**

- **Microsoft:**
  - Disparate conversion approaches for hosting data cloud-optimized formats (e.g. COG) because few (no?) public-sector providers are providing data in cloud-optimized formats - can CEOS help?
  - AI for Earth program interested in not only hosting public-sector data on Azure (http://aka.ms/ai4edata), but also in working closely with the sustainability community to develop specific conservation projects that use remote sensing data on Azure, leveraging AI for Earth funding and in some cases Microsoft data science expertise.

Committee on Earth Observation Satellites

CEOS-GEO actions around global data flow

G. Camara/GEOSEC

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.5

Virtual Meeting

Wednesday 16th September

Presentation:

Committee on Earth Observation Satellites

GEO Knowledge Hub and its links to CEOS

P. De Salvo/GEOSEC and F. Franziskakis/GEOSEC

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.6

Virtual Meeting

Wednesday 16th September

The GEO Knowledge Hub and its links to CEOS

1. Context

Results-oriented strategy for GEO

Digital library of Earth Observation applications

Curated and linked resources into “Knowledge Packages”

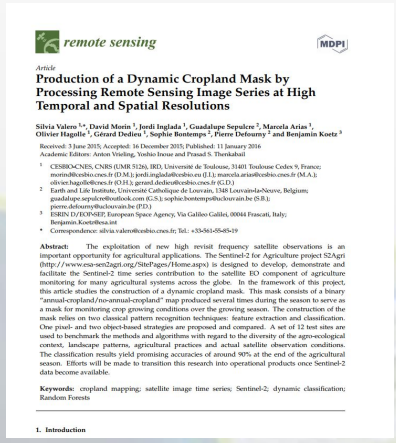
2. Digital library design

- Based on InvenioRDM
- Turn-key design
- Flexible, scalable and customizable
- Open-source, stable solution
- Vendor independent
- Supported by many institutions

The GEO Knowledge Hub and its links to CEOS

3. Practical example: Sen2-Agri

Publications



remote sensing

MDPI

Article

Production of a Dynamic Cropland Mask by Processing Remote Sensing Image Series at High Temporal and Spatial Resolutions

Silvia Valero [1,*], David Morin [1], Jordi Inglada [1], Guadalupe Sepulcre [2], Marcela Arias [1], Olivier Hagolle [1], Gérard Dedieu [1], Sophie Bontemps [2], Pierre Defourny [2] and Benjamin Koetz [3]

Received: 3 June 2015; Accepted: 16 December 2015; Published: 11 January 2016

Academic Editors: Anton Vrieling, Yoshio Inoue and Prasad S. Thenkabail

[1] CESBIO-CNES, CNRS (UMR 5126), IRD, Université de Toulouse, 31401 Toulouse Cedex 9, France; morin@cesbio.cnes.fr (D.M.); jordi.inglada@cesbio.cnes.fr (J.I.); marcela.arias@cesbio.cnes.fr (M.A.); olivier.hagolle@cnes.fr (O.H.); gerard.dedieu@cesbio.cnes.fr (G.D.)

[2] Earth and Life Institute, Université Catholique de Louvain, 1348 Louvain-la-Neuve, Belgium; guadalupe.sepulcre@outlook.com (G.S.); sophie.bontemps@uclouvain.be (S.B.); pierre.defourny@uclouvain.be (P.D.)

[3] ESRIN D/EOPS-SEP, European Space Agency, Via Galileo Galilei, 00044 Frascati, Italy; Benjamin.Koetz@esa.int

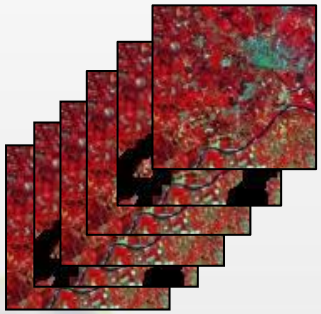
* Correspondence: silvia.valero@cesbio.cnes.fr; Tel.: +33-561-55-85-19

Abstract: The exploitation of new high revisit frequency satellite observations is an important opportunity for agricultural applications. The Sentinel-2 for Agriculture project S2Agri (http://www.esa-sen2agri.org/SitePages/Home.aspx) is designed to develop, demonstrate and facilitate the Sentinel-2 time series contribution to the satellite EO component of agriculture monitoring for many agricultural systems across the globe. In the framework of this project, this article studies the construction of a dynamic cropland mask. This mask consists of a binary "annual-cropland/no-annual-cropland" map produced several times during the season to serve as a mask for monitoring crop growing conditions over the growing season. The construction of the mask relies on two classical pattern recognition techniques: feature extraction and classification. One pixel- and two object-based strategies are proposed and compared. A set of 12 test sites are used to benchmark the methods and algorithms with regard to the diversity of the agro-ecological context, landscape patterns, agricultural practices and actual satellite observation conditions. The classification results yield promising accuracies of around 90% at the end of the agricultural season. Efforts will be made to transition this research into operational products once Sentinel-2 data become available.

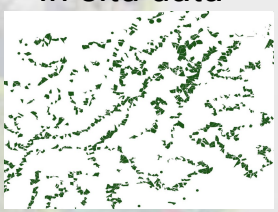
Keywords: cropland mapping; satellite image time series; Sentinel-2; dynamic classification; Random Forests

1. Introduction

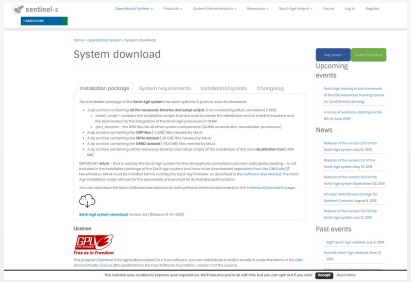
Satellite imagery



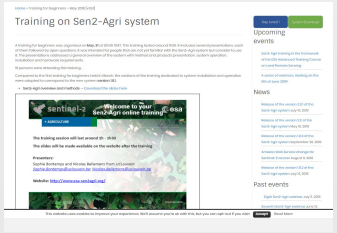
In-situ data



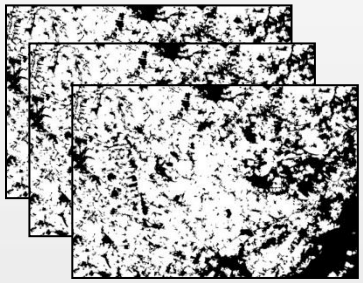
Open source software



Documentation



Results



Cloud environments

The GEO Knowledge Hub and its links to CEOS

4. Implementation schedule: July 2020 to June 2021

1.	First version of the digital library	**September 2020**
2.	Linkages with the GEOSS Infrastructure	**June 2021**
3.	Identifying EO applications to be featured	**June 2021**
4.	Showcasing reusability of EO applications	**June 2021**
5.	Improvement to the digital library (co-design with feedback from all other tasks)	**June 2021**

The GEO Knowledge Hub and its links to CEOS

5. Involving the community

Co-design process

Engagement of the GEO community

Advance the effective sharing of data and move towards open science

Higher impact of GEO

The GEO Knowledge Hub and its links to CEOS

5. Links to CEOS ?

EO solutions are easier to develop and then work best with facilitated access to ARD

Users looking for a solution need algorithms and guidelines on how to process satellite imagery

Use of the GKH by Space Agencies, to share their applications for others to reuse

Committee on Earth Observation Satellites

Discussion

CEOS SIT Technical Workshop 2020

Session 5.1 Agenda Item #5.1.7

Virtual Meeting

Wednesday 16th September