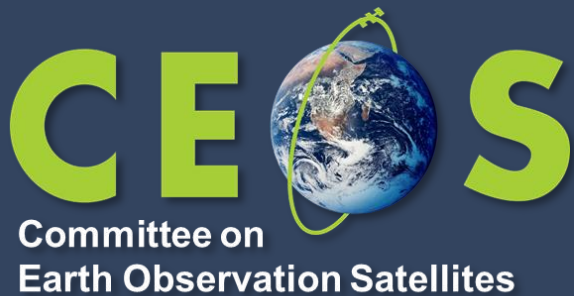
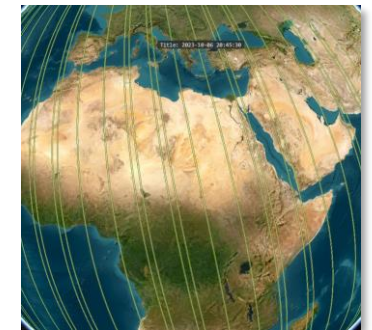


Systems Engineering Office Report

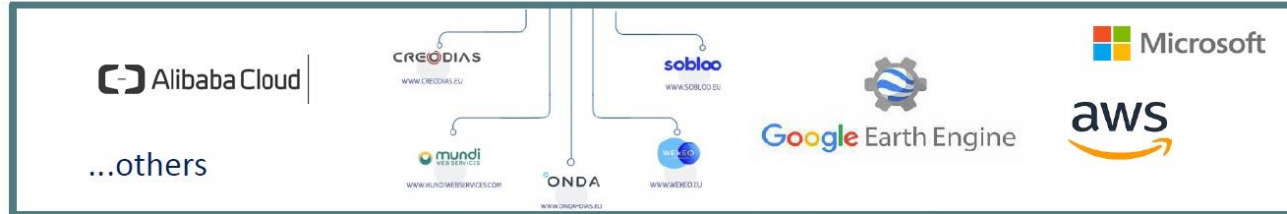


David Borges
CEOS SEO, NASA
Data Interoperability & Use
WGISS-56, Paris France
24 October 2023

- GEO Infrastructure Development Task Team (GIDTT)
 - Space-based data, Data Cubes, Cloud providers
- ODC Community Engagement
 - Digital Earth Africa
 - Digital Earth Pacific
- COVE
 - New commercial missions
 - STAC data access



EAG Option 2



Data Cubes

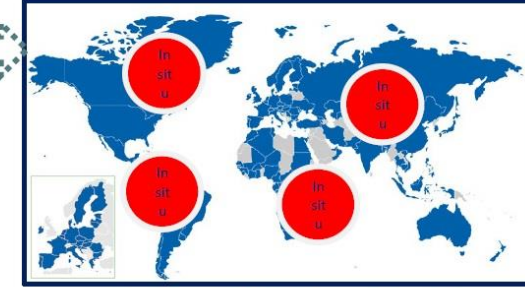


+ Commercial Companies (VHR)

EAG Option 3



EO Data, Products and Services



Regional /National In Situ



COVE Data Policy



COVE
Home Tools Help Contact Us Log In/Register

CEOS Data Policy

Introduction

Data Policy Table

About the Portal

The CEOS System Engineering Office (SEO) worked with the CEOS Working Group on Information Systems and Services (WGISS) to gather and organize key information on data policies, data access portals and interoperability protocols.

CEOS is currently operating and planning hundreds of Earth observation satellites. The information contained in this portal will improve the efficiency and effectiveness of gaining access to space-based Earth observation data to support many global initiatives with vast societal impact.

SEO Sponsor

David Borges
 CEOS Systems Engineering Office (SEO)
 Email: David.Borges@nasa.gov

Data Accessibility

Across the globe, 60 agencies from 32 countries have operated or supported Earth-observing satellites, spanning 824 mission/instrument combinations, of which 511 have open data policies. There are currently 359 active mission/instrument combinations supported by CEOS.

All Missions

Mission/Instrument Combinations by Access Category

Access Category	Number
Open	511
Restricted	267
Unknown Access	46

Active Missions

Mission/Instrument Combinations by Access Category

Access Category	Number
Open	251
Restricted	95
Unknown Access	13

Introduction

Data Policy Table

Show entries:

Export options: 10 items selected

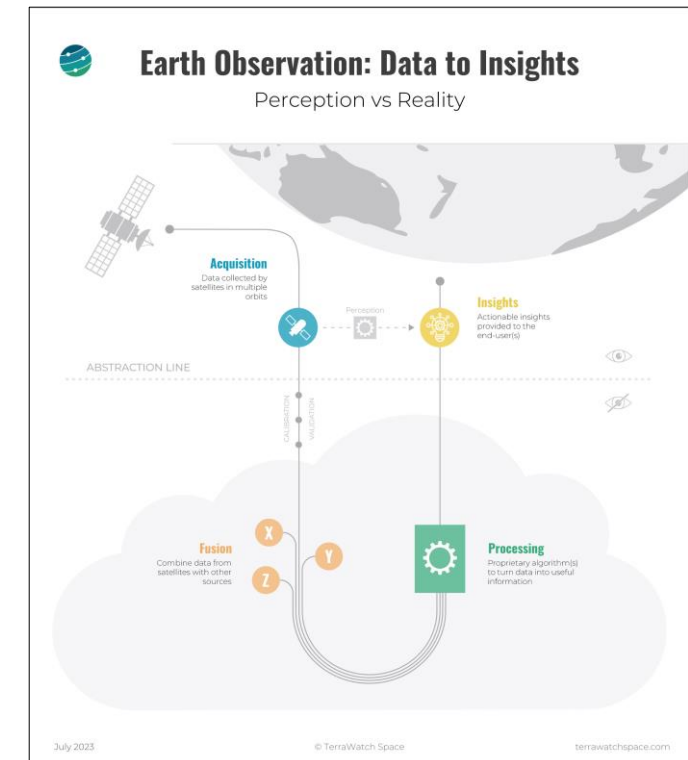
Show/Hide Columns:

Search:

Mission	Mission Agency	Launch Date	Mission Status	Instrument	Instrument Agencies	Access	IDN	Client Portal	Access Comments
ACRIMSAT	NASA	1999-12-20	Decomissioned	ACRIM III	NASA	Open	Link	cwic / dataCORE / Reverb	
ADEOS	JAXA, MITI, MOE (Japan), NASA, CNES	1996-08-17	Decomissioned	AVNIR	JAXA	Restricted	Link	G-Portal	Data available through G-Portal, but access is restricted to PI and other specified users
ADEOS	JAXA, MITI, MOE (Japan), NASA, CNES	1996-08-17	Decomissioned	ILAS	JAXA, MOE (Japan)	Restricted		G-Portal	Data available through G-Portal, but access is restricted to PI and other specified users
ADEOS	JAXA, MITI, MOE (Japan), NASA, CNES	1996-08-17	Decomissioned	IMG	JAXA, MITI	Restricted		G-Portal	Data available through G-Portal, but access is restricted to PI and other specified users

Slide 4

- CEOS ARD
 - Standards / Community Engagement
 - Nighttime Lights Occlusion Analysis
- AI/ML
 - Generative Pre-trained Transformer (GPT)
 - WGISS Tech Exploration White Paper
- New Space Task Team
 - Commercial data ODC integration
 - Interoperability with CEOS datasets




Earth Analytics Interoperability Lab (EAIL)



- Initiated in April 2020 as a CEOS WGISS / SEO initiative, **EAIL** was a data and analytics platform that used AWS Cloud and Open Data Cube. Its advantages included Jupyter Hub, Dask scaling, customized ARD pipelines and GPU processing.



Chile



Working Group on Information Systems and Services

CEOS Earth Analytics Interoperability Lab

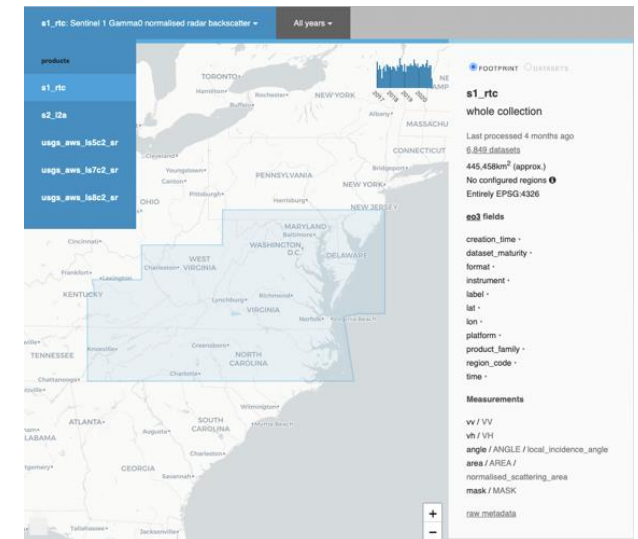
Working Group on Information Systems and Services and Systems Engineering Office

20 April 2020

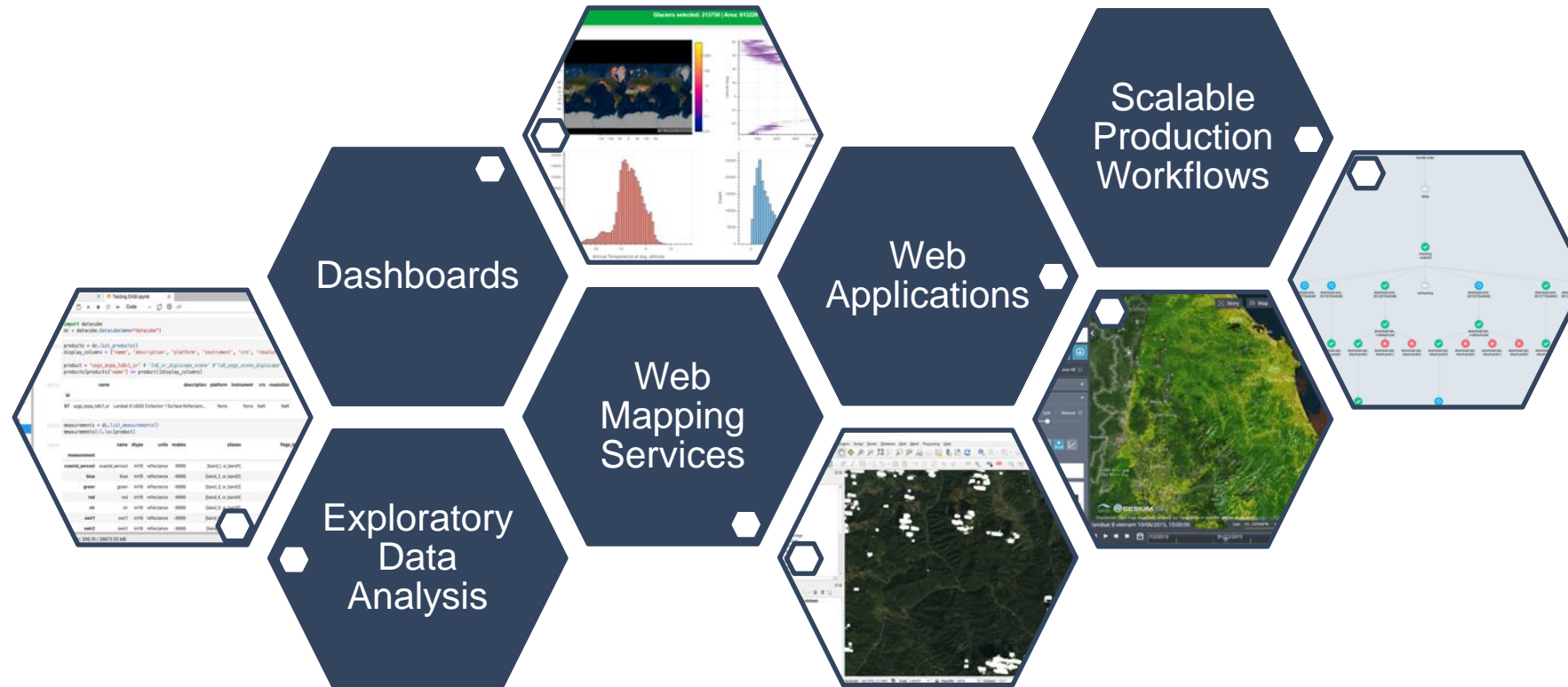
Robert Woodcock, CSIRO, WGISS Chair
Brian Killough, NASA, SEO Director

Situation

A significant number of CEOS activities are now engaged in the CEOS ARD and FDA strategies and in Integrated Earth observation data analysis (COAST, SDG, WGClimate, LSI-VC, WGDisasters, GEO Aquawatch and GEOGLAM). There is strong collaboration between groups with both WGISS and SEO being sought for technical advice and coordination on issues related to interoperability of all kinds including data standards, formats, analytics and discovery services.



- ❖ Built using the Open Data Cube software and CSIRO's Earth Analytics, Science and Innovation platform



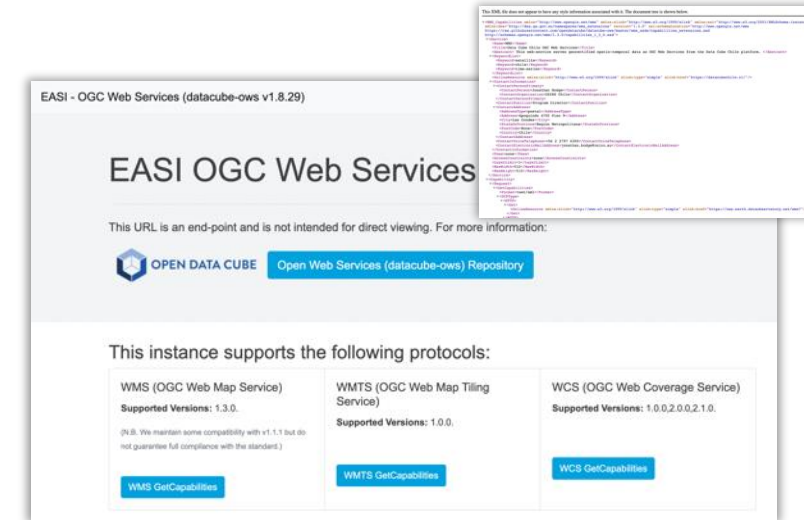
Powered by Open Data Cube and the Python data science ecosystem

Additional capabilities



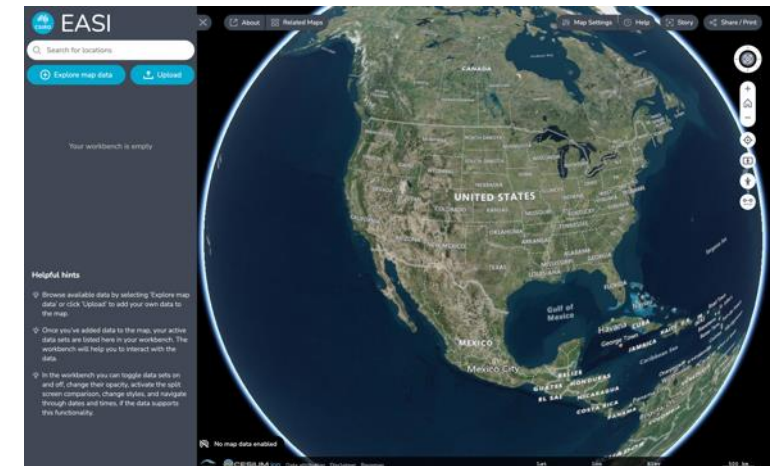
❖ OWS service layer ready for implementation

- WMS, WMTS and WCS services
- Exposes data cube layers to the outside world
- Supports multiple styling options, band combinations and index generation



❖ Terriamap web visualization tool

- Connects directly to WMS services above
- Supports over 30 data and services type including time-series data and processing services (WPS)



New & potential analytics capabilities



❖ GPU processing with AWS GPU nodes



❖ Additional scientific programming options with R



❖ New machine learning capabilities



CEOS Analytics Lab

Empowering exploration and scalable analysis of Earth observation data

The CEOS Analytics Lab is a multiuser gateway for spatial data science powered by EASI. Every user is provided a customized JupyterLab environment to easily load EO data products and seamlessly scale to additional computational nodes through the Dask Gateway.

Login [↗](#)

Support

We are here to help the CEOS community succeed. If you have a potential application or need a platform for EO data analysis we would like to hear from you. Please be aware that the CEOS Analytics Lab is still undergoing changes and we are interested in gathering your feedback.

- Currently GPU enabled machine learning instances are not available by default. These can easily be enabled by request. Please get in touch if your analysis requires machine learning.
- Support Requests: If you need to submit a support request you can find the form in the Services menu at the top right of the page.
- Account Creation: Accounts can be created by filing a service request to access our platform and its features.
- Collaboration with CEOS Working Groups: We are open to collaborating with CEOS working groups to address specific requirements and ensure seamless integration.
- Training Opportunities: Take advantage of our training sessions designed to help you make the most of our platform and its capabilities.
- Scalability Options: Requests for larger instances will be accommodated to meet your evolving needs. Submit a service request for additional resources if you are reaching the limits of the provided options.

ceos.org/cal

New Space TT: SEO Task



- **Goal:** Conduct an ARD interoperability test using the CEOS Analytics Lab (CAL) as a contribution to the CEOS “New Space” initiative
- **ARD Interoperability:** Evaluate how ARD datasets from CEOS can be used interoperably with datasets from the commercial space providers.
 - What are the issues using these datasets together?
 - Can CEOS provide any tools or utilities that would improve the interoperability?
 - Can CEOS make any recommendations to the commercial space providers that would improve the use of their data and its marketability?
- **CEOS Analytics Lab (CAL):** Use the cloud-based CAL tool to conduct the test. This will enable participation across SEO-funded partners and take advantage of the CSIRO Jupyter Python environment and Open Data Cube (ODC) utilities.
- **CEOS New Space** initiative: The CEOS organization is searching for tangible tasks that can demonstrate improved connections between CEOS data and commercial data.

Resource Usage Allocation

Select the project allocation for this session's resources:

COAST CEOS COAST	CSIRO CSIRO team	EETT CEOS Ecosystem Extent Task Team	UNALLOCATED Default user allocation
CEOS-SEO CEOS SEO team	FLOOD PILOT CEOS Flood Pilot		

Resource requests

Costs shown below are indicative only and users are not being directly charged.
The costs are provided to help you make a decision about which node is best for you and are covered by CAL partners. Please choose the node that is best for your work.


Select the resources you want to use for this session:



DEFAULT 8 CPU 32GB GPU: None US\$0.40/hr

The Default Jupyter user node with 8 cores and 32GB of available RAM.

Jupyter profile

Choose the Jupyter environment you wish to launch.

Default Jupyter Python environment without ML (master.latest)
The EASI Open Data Cube with CSIRO EAIL Python packages. ODC 1.8.x.
Does not have machine learning libraries such as pytorch and tensorflow. 

DEVELOPMENT Python and R environment without ML (develop.latest)
The EASI Open Data Cube with CSIRO EAIL Python and R packages. ODC 1.8.x. Does not have machine learning libraries such as pytorch and tensorflow.  

<https://hub.cal.ceos.org>

The proposed analysis plan



- **Test Case #1: Optical Data Comparison**
 - **Area of Interest:** Hampton, Virginia and the Chesapeake Bay
 - **CEOS Datasets:** Landsat 8/9, Sentinel-2A/2B, Sentinel-1A
 - **Commercial Datasets:** Planet Lab, Maxar *(from NASA CSDA contract)*
- **Test Case #2: Radar Data Comparison**
 - **Area of Interest:** Southeast Asia (small rice fields – Mekong or Malaysia ???)
 - **CEOS Datasets:** Sentinel-1A, ALOS-2 ScanSAR, SAOCOM-1A/1B
 - **Commercial Datasets:** Umbra ???, ICEYE and Capella *(from NASA CSDA contract)*
- **Interoperability questions**
 - CEOS ARD compliance? Dataset formats and metadata parameters.
 - Georectification consistency .. What are alignment errors?
 - Spectral/Radiometric consistency ... What are the differences?
- **WGCV and WGISS collaboration** ... Can we work with other CEOS groups define the tasks?

- **LSI-VC-14-23:** *SEO to work with WGISS and WGCV to define plans for a “New Space” ARD interoperability project using the CEOS Analytics Lab, based on Interoperability Factors.*
- How should we jointly frame the New Space task to support Interoperability Framework? Demo?
- Can/should CEOS COVE Data Policy Portal be refreshed in coordination with WGISS to support Interoperability Framework?
- CEOS ARD OG working with Radiant Earth / Cloud Native Geospatial Foundation addressing CEOS-ARD STAC extension/repo updates based on PFS / OGC ARD SWG progress.
- Can Interoperability Framework integrate these and other efforts in context of persistent questions:
 - Commercial cloud provider vendor lock in? Addressing egress costs?
 - Authoritative traceability across multiple cloud environments?