



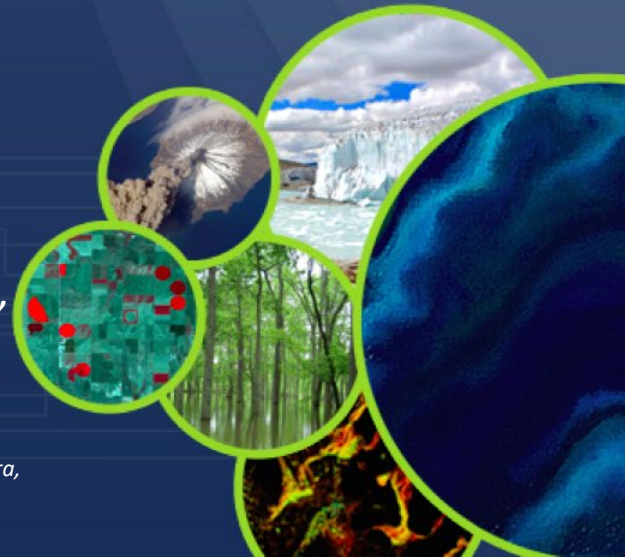
Committee on Earth Observation Satellites

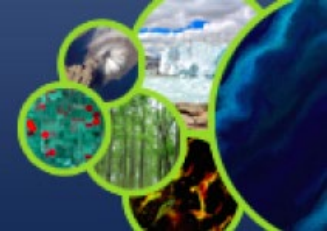
CEOS Analysis Ready Data for Land: Status and Outlook for Optical Data Products

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- **CEOS-ARD Framework Overview**
- **The Process: CEOS-ARD product evaluation**
 - Self-Assessment
 - Peer Review - WGCV role
- **Optical PFS Overview**
 - Aquatic Reflectance PFS (cont.)
- **PFS Status (Current)**
- **Other PFS Status (Being Developed)**
- **CEOS-ARD for Land (CARD4L) Updates**
- **CEOS-ARD Activities**
ceos.org/ard

(PFS = ‘product family specification’)

Preface: Analysis -ready data is important!



- Unlocking the billions of dollars of *potential* value of EO data
- Operational systems
- Allowing universal, and near-real time, access
- Leveraging the time-series
- Continental-scale processing

Panaglobo Consulting
on behalf of
Digital Earth Africa

Analysis Ready Data

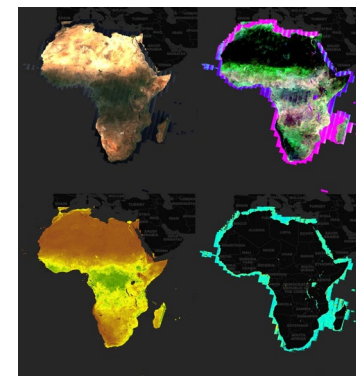
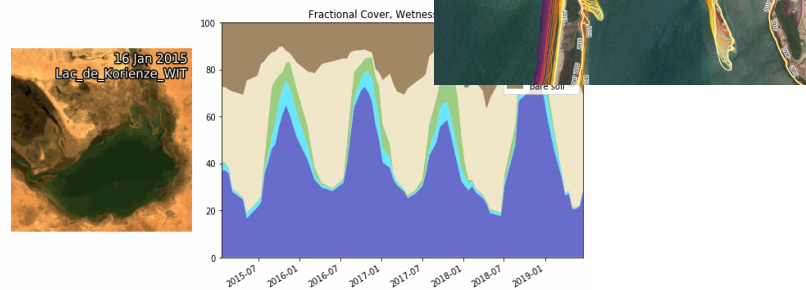
A smart way to use Earth Observation
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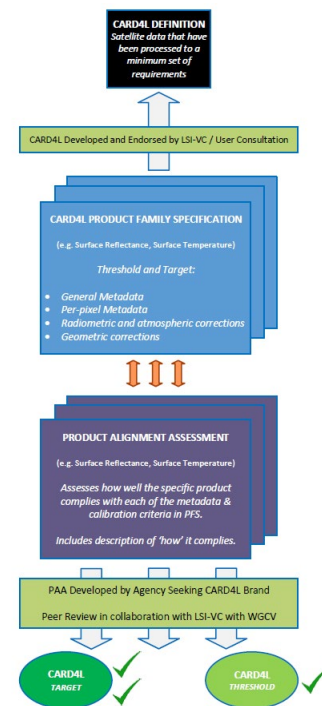
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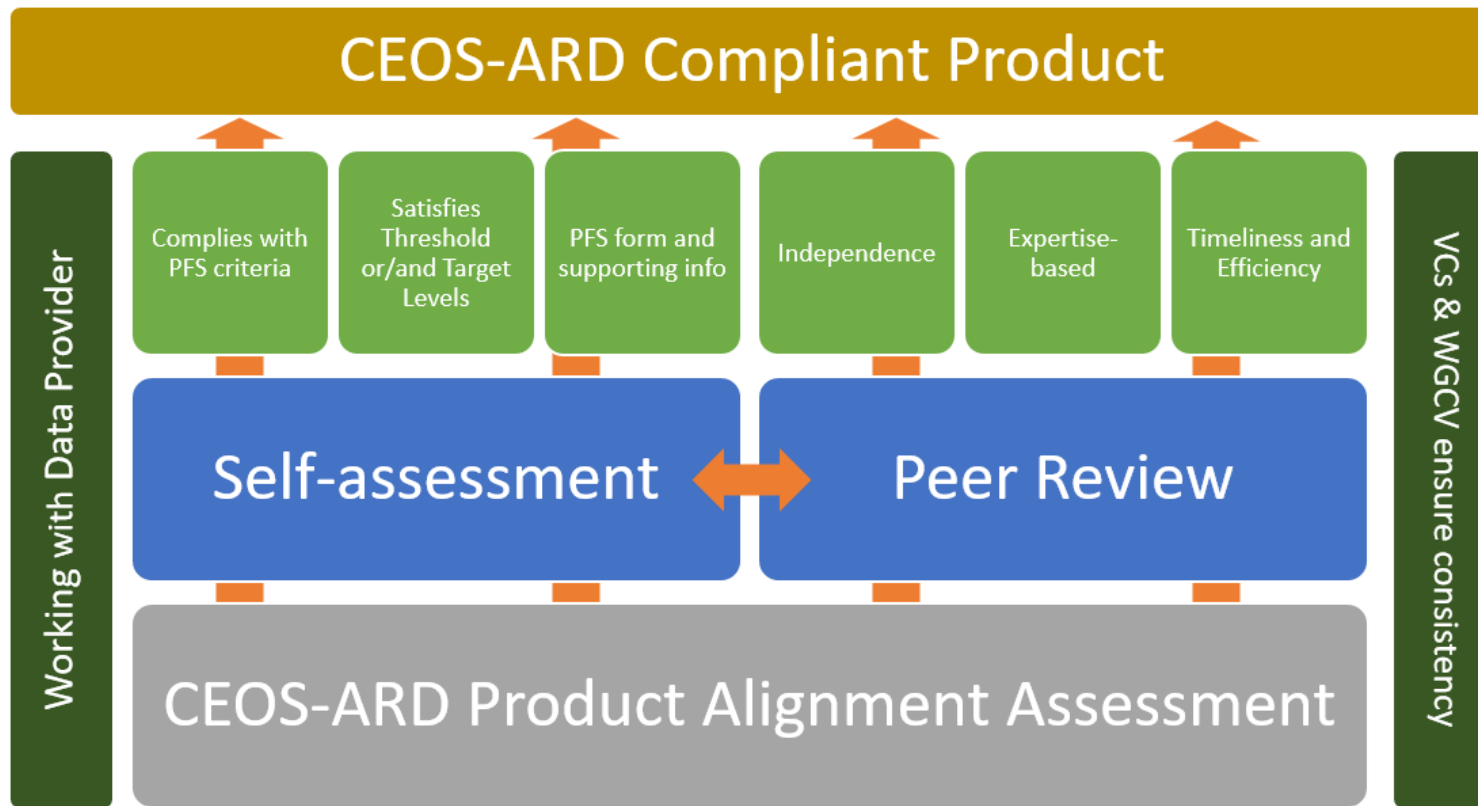


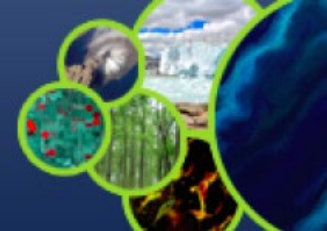


The CEOS ARD Framework covers:

- Generalised CEOS ARD definition
- The role of the Product Family Specifications (PFS)
- PFS core elements
- Development process for new PFS
- Self-assessments and CEOS roles in the process
- General process for peer review of self-assessments and approval of CEOS-ARD datasets
- Classification and promotion of CEOS ARD datasets
- The role of Advisory Notes in providing guidance on aspects like file formats, etc. which are not part of the core Framework.

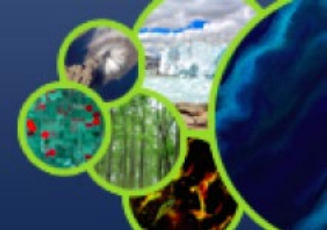






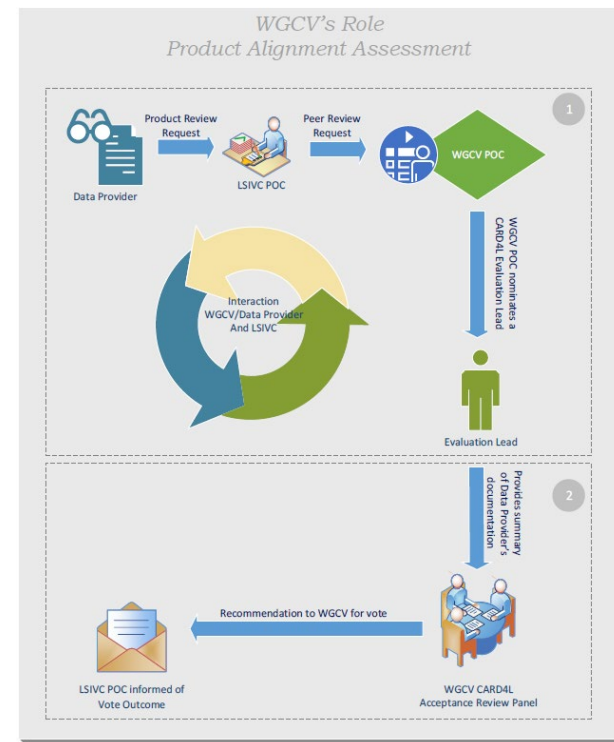
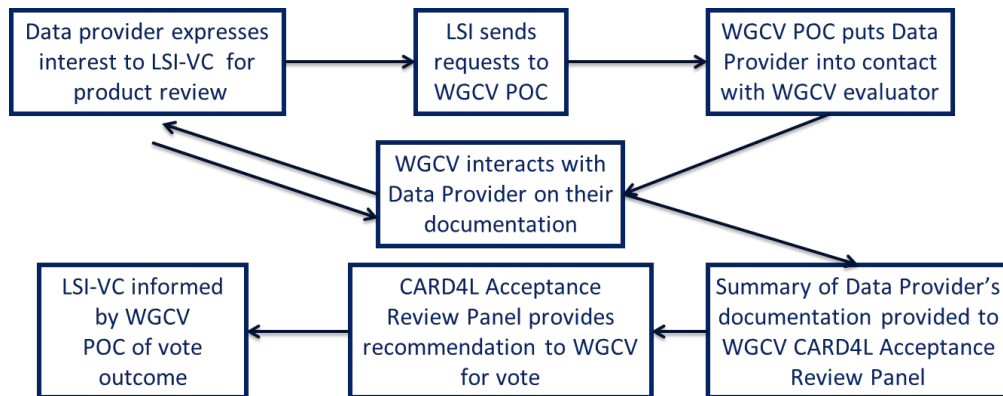
CEOS-ARD self-assessment process enables data providers to assess whether their product satisfies either the **'Threshold'**, **'Target'**, or both of the requirements.

- The columns of the Product Family Specification form help the data provider to assess how well the specific product complies with each of the criteria in the Product Family Specification.
- Data providers complete the self-assessment columns of the PFS form and compile necessary supporting information.
- Data providers use self-assessments to put forward their product as compliant with CEOS ARD Specifications.



A peer review is undertaken to independently confirm that the specification is met (CEOS WGCV). Key principles of the peer review are:

- 1) Independence - data provider is not involved in the review;
- 2) Expertise-based - experts in the data products are used in the peer review;
- 3) Timeliness and efficiency - workload is manageable and that data providers receive feedback in a reasonable period of time.
- 4) Lightweight review for 'Threshold level only' submissions, a full WGCV Review Panel assessment for 'Target' level submissions



Surface Reflectance & Surface Temperature

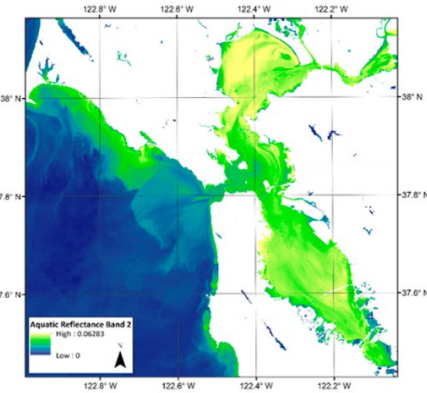
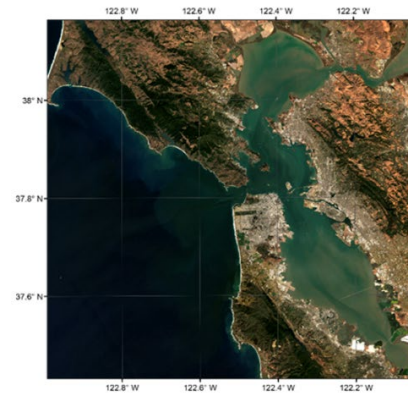
- First endorsed in 2019
- Current version: 5.0
- Data collected with multispectral sensors operating in the VIS/NIR/SWIR wavelengths.
- These typically operate with ground sample distance and resolution in the order of 10-100m (but not limited to this resolution).

Aquatic Reflectance

- Endorsed in 2022 (youngest!!)
- Current version: 1.0
- Specifically targeted to inland and coastal waters, was derived from CEOS land surface ARD with certain modifications and additions, by GEO-AquaWatch, Water-ForCE, and other subject matter experts.
- Typically operate with ground sample distance and resolution in the order of 10-1000 m; however, the specification is not inherently limited to this resolution

Aquatic Reflectance (AR) PFS facilitates:

- Operationalisation of AR EO information
- Comparisons of provider's ARD outputs
- Increased professionalism of provider and trust in products for end users
- Identifications of optimal areas of R&D



Current Product Family Specifications

PFS	Type	Version	Download	Metadata Spec	Last Updated
Surface Reflectance	Optical	5.0	PDF Word	-	8 June 2020
Surface Temperature	Optical	5.0	PDF Word	-	8 June 2020
Normalised Radar Backscatter	Radar	5.5	PDF Word	XLSX	2 December 2021
Polarimetric Radar	Radar	3.5	PDF Word	XLSX	2 December 2021
Aquatic Reflectance	Optical	1.0	PDF Word	-	23 February 2022

In-progress Product Family Specifications

PFS	Type
Nighttime Lights Surface Radiance	Optical
Geocoded Single-Look Complex (GSLC)	Radar
Interferometric Radar (INSAR)	Radar
LiDAR Terrain and Canopy Top Height	Optical

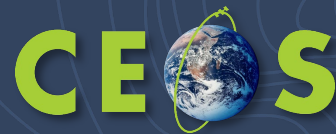
- New CARD4L Datasets:
 - ESA Sentinel-2 Level-2A
 - DLR EnMAP Surface Reflectance
 - Element84 Sentinel-2 Level-2A
 - Sentinel-1 NRB (Sinergise & Digital Earth Africa)
 - Landsat Collection 2 U.S. ARD (SR & ST))
- Various other self-assessments are underway (next slide).
- See the [website](#) for more details.



Under Development / Assessment

Product	CEOS ARD Type	PFS Version	Agency	Mission(s)	Access (DOI)	Info	Self Assessment	Peer Review	Sample Products
ALOS-2 PALSAR-2 Global Mosaics (RTC)	Normalised Radar Backscatter	v5.5	JAXA	ALOS-2 PALSAR-2	TBA	Link	Ongoing	TBA	TBA
Sentinel-1 NRB	Normalised Radar Backscatter	v5.5	ESA	Sentinel-1 (A, B)	TBA	Link	TBA	TBA	TBA
NovaSAR-1 RTC	Normalised Radar Backscatter	v5.5	CSIRO	NovaSAR-1	TBA	Link	Ongoing	TBA	TBA
Harmonised S-2 & L-8/9 (Level-2H)	Surface Reflectance	v5.0	ESA	Sentinel-2A, 2B; Landsat 8, 9	TBA	TBA	TBA	TBA	TBA
Fused S-2 & L-8/9 (Level-2F)	Surface Reflectance	v5.0	ESA	Sentinel-2A, 2B; Landsat 8, 9	TBA	TBA	TBA	TBA	TBA

More Information: ceos.org/ard/



CEOS ANALYSIS READY DATA

CEOS Analysis Ready Data (CEOS-ARD) are satellite data that have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort and interoperability both through time and with other datasets.

Information for:



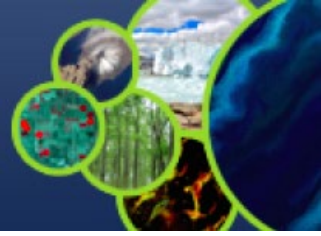
Data Producers



Data Distributors



Data Users



Through the CEOS-ARD Oversight Group the following activities are envisaged:

- CEOS coordination on ARD
- Maintenance of the CEOS-ARD Strategy and CEOS-ARD Governance Framework
- Guidance to data providers
- Coordination of CEOS-ARD Product Family Specifications (PFS)
- Template PFS
- Technical topics related to CEOS-ARD: accessibility and utilisation, data discovery mechanisms, data and metadata formats, STAC, pilots, etc.
- CEOS-ARD representation to broader community
- Coordination of outreach activities: webinars, conference representation, promotion and information resources (CEOS-ARD website, presentations, flyers/brochures, etc.)
- Championing the ARD concept and providing guidance for the community
- Primary external focal point for CEOS on matters related to ARD
- Represent CEOS on matters related to the further standardisation of ARD in the wider community

Thank you!

Questions?

