

New Space Cal/Val and Usability Assessment

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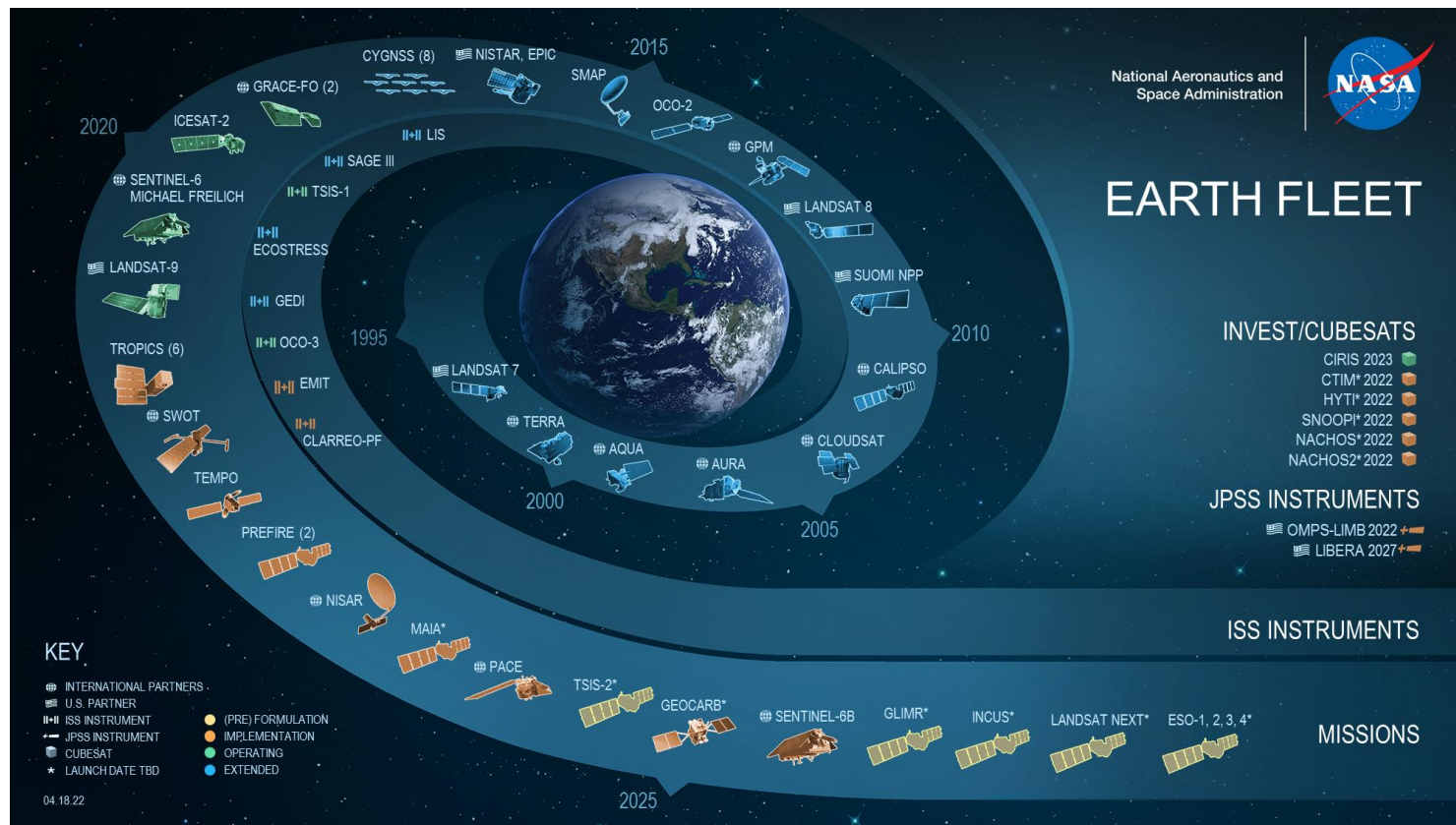
Living Planet Symposium 2022 - 24th May 2022



NASA Commercial Smallsat Data Acquisition (CSDA) Programme and activities

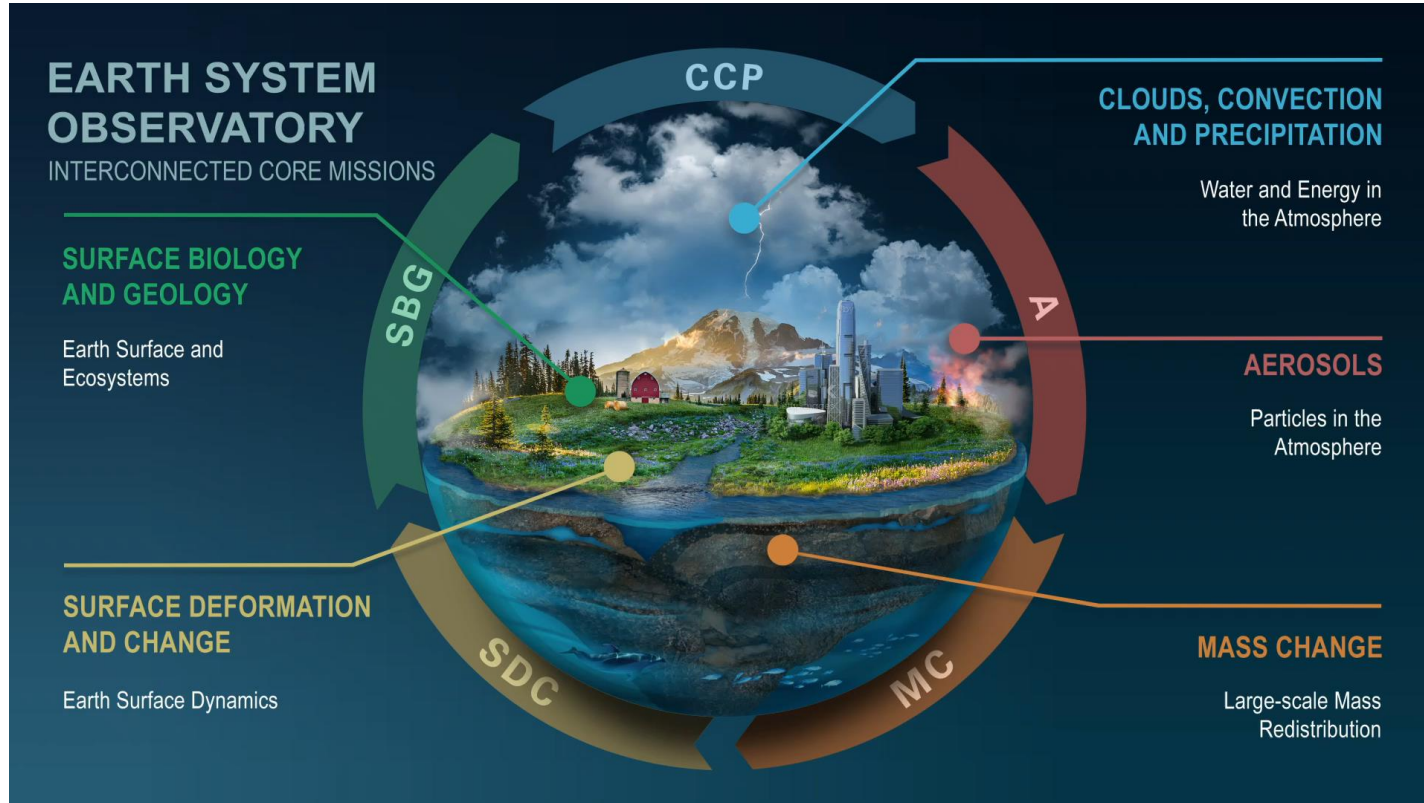


NASA's Fleet of Missions





Earth System Observatory





What is NASA CSDA?

- Pilot initiated in November 2017 to evaluate data from operating commercial small-satellite constellations for research and applied science activities
 - Augment and/or complement NASA observations
 - Cost effective means to advance/extend research and applications
- Blanket Purchase Agreements (BPAs) were awarded in September 2018 to Maxar (DigitalGlobe) Inc., Planet Labs Inc., and Spire Global.
- Pilot successfully ended early 2020 → sustained program - CSDA Program
 - On-ramp #2: BPAs awarded to Airbus US for Synthetic Aperture Radar (SAR) and BlackSky for optical imagery
 - On-ramp #3: Sole source synopsis posted for Capella Space, ICEYE US, Inc, GeoOptics, Inc, and GHGSat, Inc.
- The data evaluation is performed by a team of investigators selected from the research and applications communities to assess their utility in achieving the scientific objectives of ESD.

**Commercial SmallSat Data Acquisition
Program Pilot
Evaluation Report**

NASA Earth Science Division
April 2020



Program Objectives



- Establish a continuous and repeatable process to onramp new commercial data vendors.
- Enable sustained use of purchased data for broader use and dissemination by NASA scientific community.
- Ensure long-term data preservation, access and distribution of purchased data and long-term access for scientific reproducibility.
- Coordinate with other US Government agencies and international partners on the evaluation and scientific use of commercial data.



Evaluation Criteria

The goal of each project's evaluation is to address:

1. **Accessibility of vendor supplied imagery and data**
The ease and efficiency with which data can be searched, discovered, and downloaded from vendor systems.
2. **Accuracy and completeness of metadata**
The accuracy and completeness of metadata that accompanies the data provided by the vendor.
3. **Quality of User Support Services**
The availability, responsiveness, and technical expertise required to answer PI inquiries.
4. **Usefulness of data for advancing Earth system science research and applications**
The ability of vendor-provided data to support Earth system science research and applications activities.
5. **Quality of vendor supplied imagery and/or data**
Data attributes such as geolocation accuracy, radiometric calibration, and platform intercalibration. Data quality criteria will target the ESA-NASA Evaluation Guidelines drafted for data.



ESA-NASA SAR Evaluation Guidelines

This assessment is designed for instrument performance and not for data utility.
It consists of the following:

Documentation Review

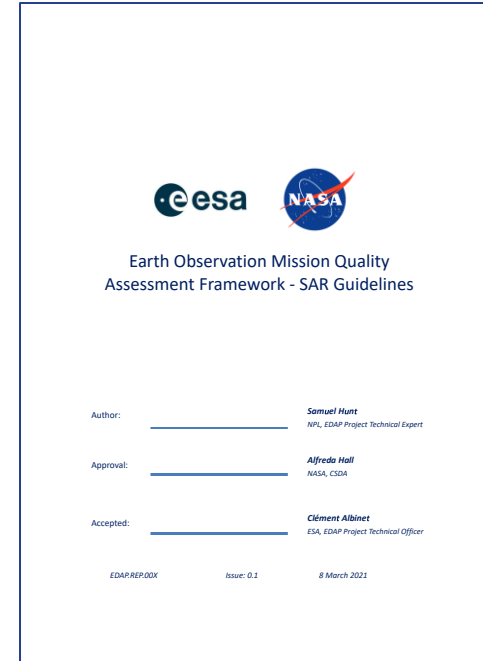
- Product Information (Metadata...)
- Metrology (Sensor Calibration...)
- Product Generation (Algorithms...)

Measurement Validation

- Absolute Radiometric accuracy validation
- Radiometric Stability validation
- Sensitivity validation
- Polarimetric accuracy
- Interferometric quality validation

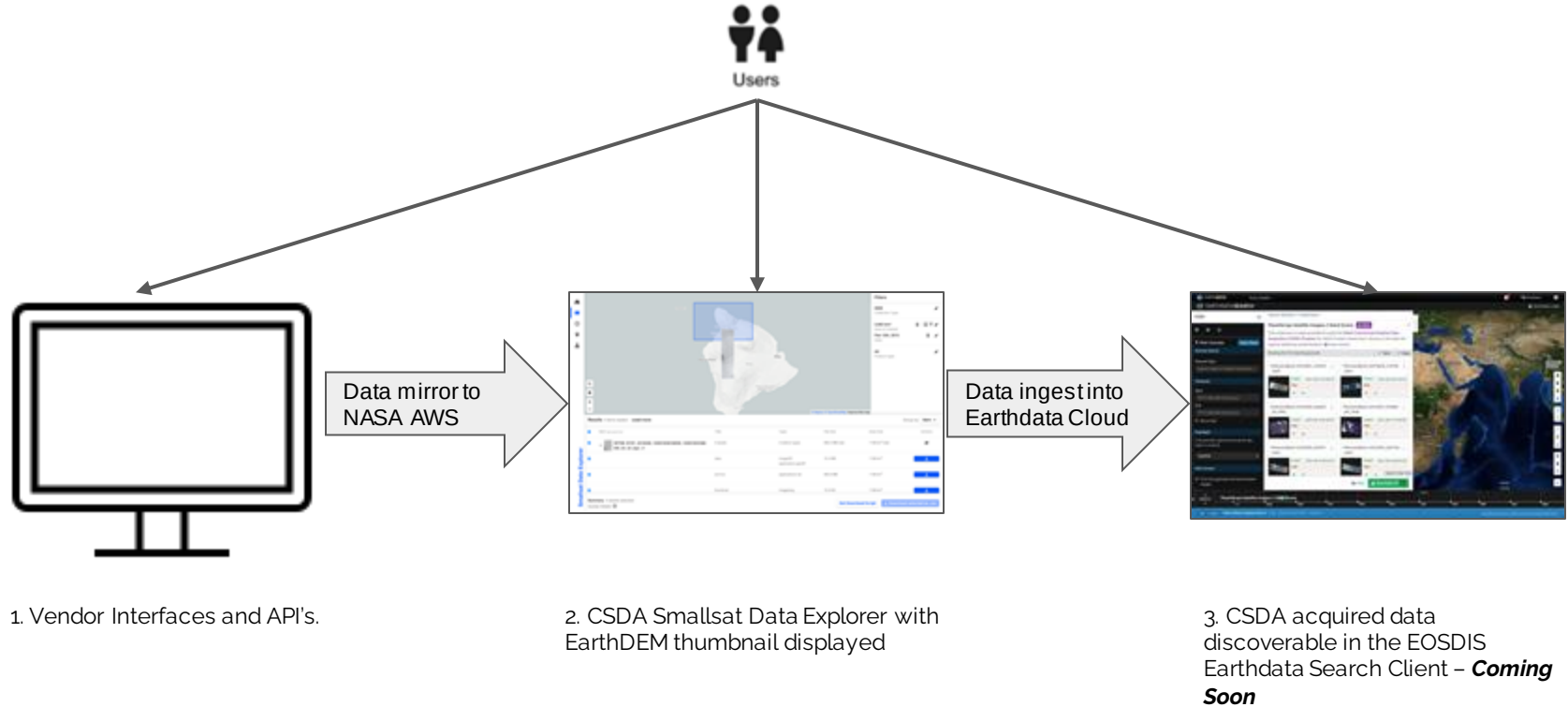
Geometric Validation

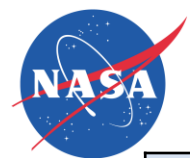
- Impulse Response Function validation
- Geocoding accuracy validation
- Channel to channel co-registration validation (for multi-polarization data)





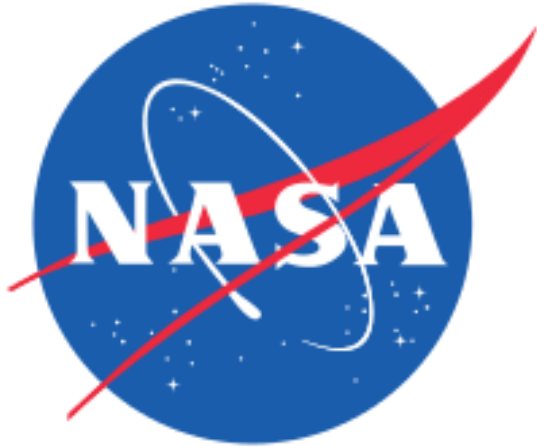
How Users Get Data?





Data Holdings

Vendor	Constellations/ Products	Availability Dates	Orbit Characteristics	Spatial Resolution	Spectral Characteristics
Planet	PlanetScope, RapidEye	12/31/2005 - Present	Sun Synchronous	3 - 6.5 meters	RGB, NIR (440-860 nm), Panchromatic
	SkySat	3/10/2015 - 12/12/2019		< 1 meter	RGB, NIR (450-900 nm), Panchromatic
Spire Global, Inc	GNSS Radio Occultation, GNSS Grazing Angle Reflectometry, Satellite Precise Orbit Determination (POD) and Satellite Attitude, Total Electron Content, Ionospheric Profiles, Scintillation Magnetometer, Raw IF	9/24/2018 - 4/18/2019 (partial) 11/1/2019 - Present (all)	GNSS-R and GNSS-RO receivers satellites: 37° and Sun Synchronous		
Maxar Technologies	Worldview 1-4, GeoEye-1, QuickBird, IKONOS	10/24/1999 - Present	Sun Synchronous	0.31 - 4.0 meters	Multispectral and Panchromatic (400 - 2245 nm)
Teledyne Brown Engineering, Inc.	DESI L1B, L1C, and L2A	11/21/2018 - Present	Non Sun Synchronous 52° N to 55° S (ISS)	30 meters	235 channels, 2.5nm from 402 to 1000 nm
Polar Geospatial Center EarthDEM product	individual strips and mosaic Digital Elevation Model	2009 - Present		2 meters	



Commercial Smallsat Data Acquisition (CSDA) Program

<https://earthdata.nasa.gov/csdap>