



The HQ Perspective

LANCE UWG May 2022

Katie Baynes
Deputy Chief Science Data Officer
NASA Headquarters



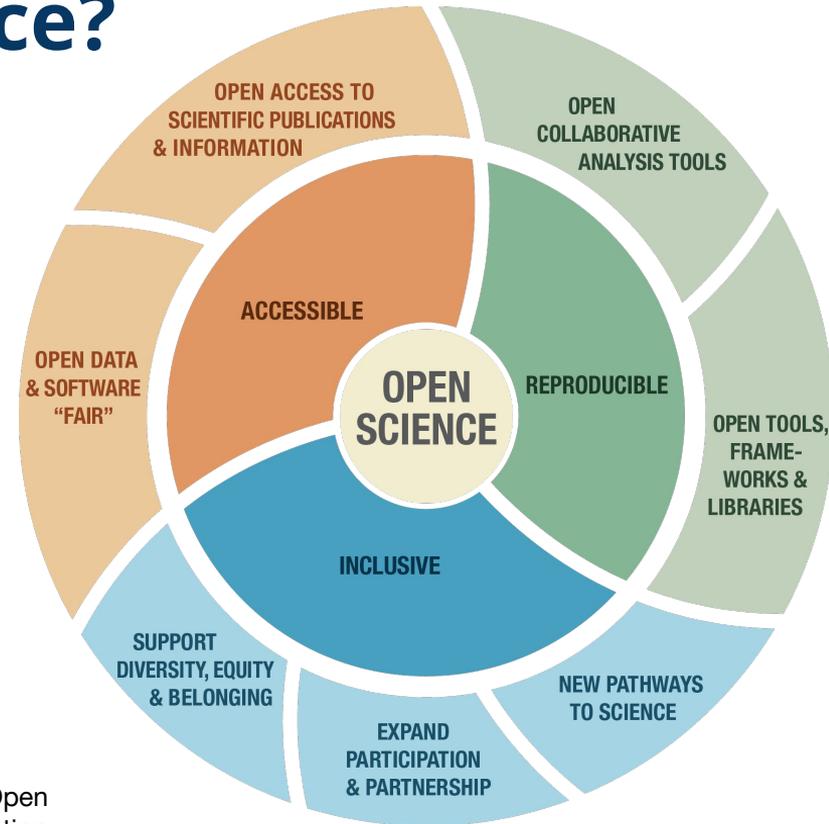


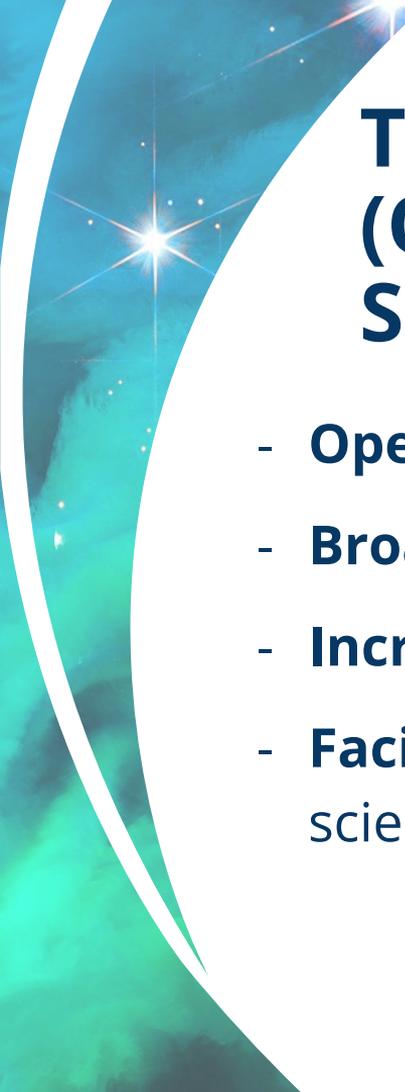
So many acronyms to talk about!

- NASA's Open Source Science Initiative (**OSSI**)
- Science Data Policy Updates (aka **SPD-41a**)
- Preparing for the next generation of NASA missions (**ESO**)
- The **TOPS** initiative
- NASA's commitment to Equity and Environmental Justice (**EEJ**)
- Updates on Commercial SmallSat Data Acquisition Program (**CSDA**)
- Thoughts on the future of LANCE (**LANCE!**)

What is Open Science?

A collaborative culture enabled by **technology** that empowers the **open sharing of data, information, and knowledge** within the **scientific community and the wider public** to accelerate scientific research and understanding.

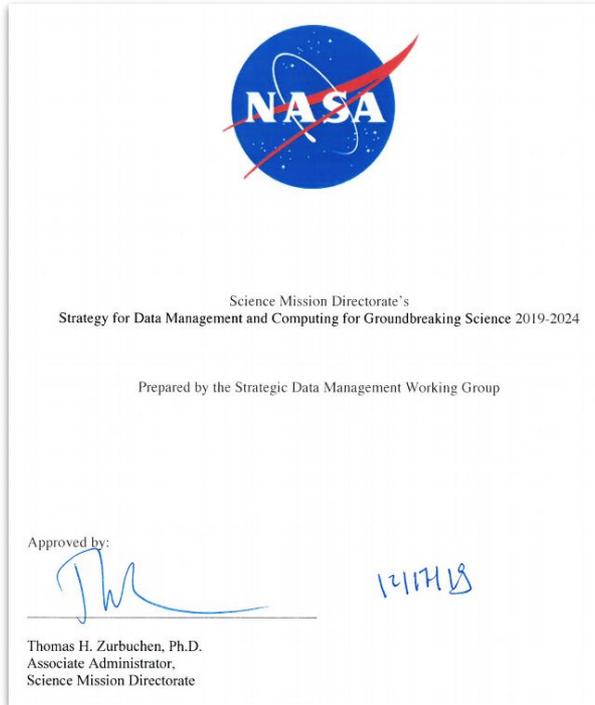




The Open-Source Science Initiative (OSSI) is NASA's method to put Open Science into practice.

- **Open** the entirety of the scientific process, *from start to finish*
- **Broaden** community involvement in the scientific process
- **Increase** accessibility of data, software, & publications
- **Facilitate** inclusion, transparency, and reproducibility of science

What is the SMD Strategy for Data and Computing?



An SMD-approved strategy to enable transformational open science through continuous evolution of SMD's science data and computing systems.

Goal 1: Develop and Implement Capabilities to Enable Open Science

Goal 2: Continuous Evolution of Data and Computing Systems

Goal 3: Harness the Community and Strategic Partnerships for Innovation

What is the Scientific Information Policy (SPD-41)?

SPD-41 brings together existing NASA and Federal guidance on open data, software, and publications.

SPD-41 applies to all new SMD-funded activities related to producing scientific information. (start date September 2021 and later)

[SPD-41: The Science Information Policy](#)

“As open as possible, as closed as necessary.”

What is “NASA Scientific Information”?

Publications

Scientific & technical documents, including information produced during public meetings, released through print, electronic, or alternative media.

Data

Scientific information that can be stored digitally and accessed electronically.

Software

Computer programs in source and object code that provide users some degree of scientific utility or produce a scientific result or service.

SPD-41a Policy (**updates** to SPD-41 under consideration)

Data

Scientific data **should be FAIR** and shall be made publicly available with a clear, open, and accessible data license no later than the publication of the research, **and be citable**.

Mission data shall be openly available with no period of exclusive access.

Software

Research software **shall** be publicly available no later than the publication of the research, assigned a permissive software license, **and be citable**.

Mission software shall additionally be developed openly in a publicly accessible, version-controlled platform that allows for contributions and engagement from the community.

Publications

Manuscripts versions of as-accepted manuscripts shall be deposited in a NASA repository and made publicly available within 12-months. **Publishing as open access is supported and posting preprints is encouraged**.

Mission publications shall additionally be made publicly available at the time of their publication.

Science workshops and meetings shall be open to broad participation and documented in public repositories.

Open science activities will be considered in reviews of proposals.

EARTH SYSTEM OBSERVATORY

OBSERVATORY

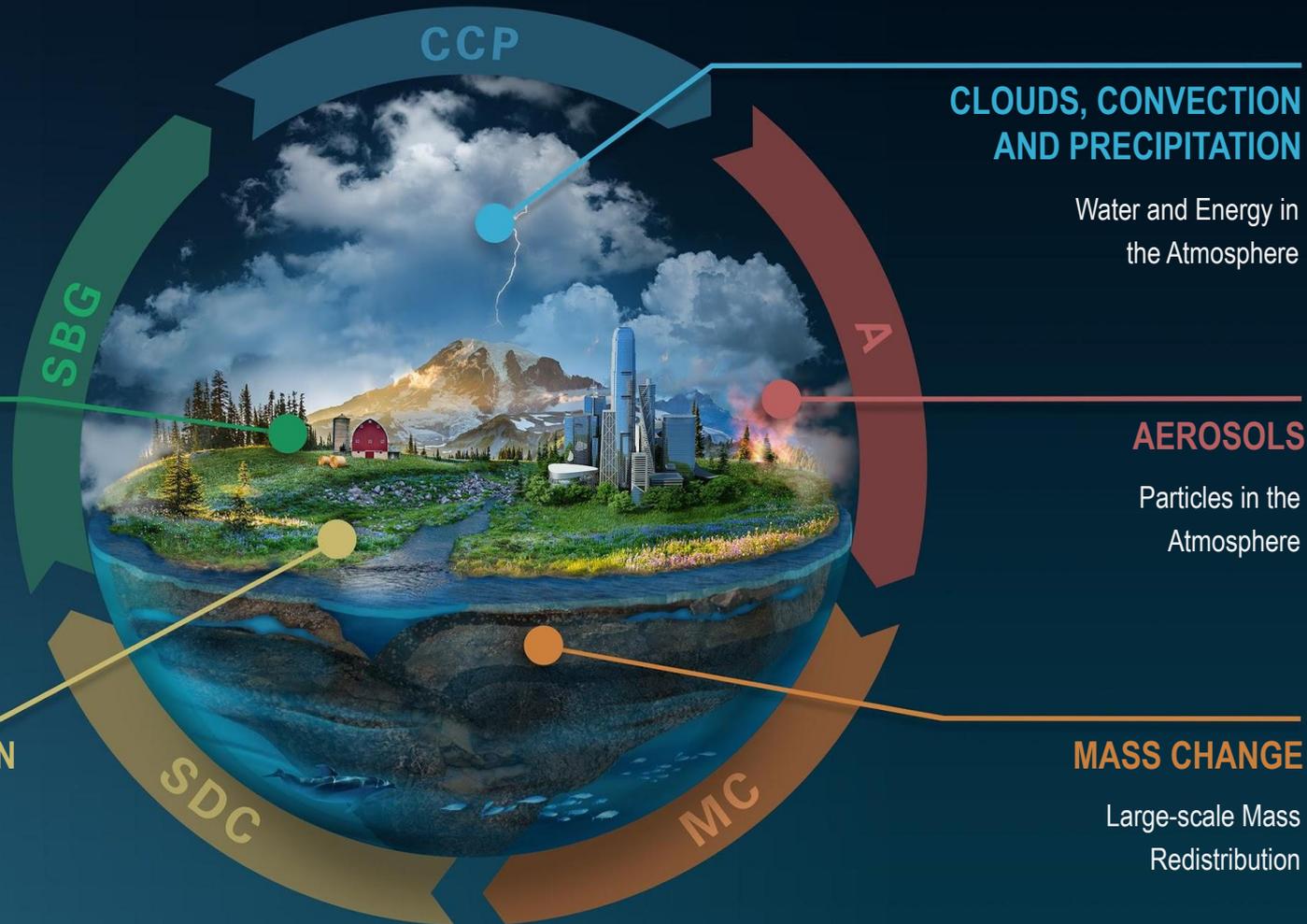
INTERCONNECTED
CORE MISSIONS

SURFACE BIOLOGY AND GEOLOGY

Earth Surface &
Ecosystems

SURFACE DEFORMATION AND CHANGE

Earth Surface Dynamics



Exemplar: Open-Source Science Policy for Earth System Observatory

- A. **All mission data, metadata, software, databases, publications, and documentation shall be available on a full, free, open, and unrestricted basis starting in Phase B** with no period of exclusive access.
- B. **Science workshops and meetings** shall be **open** to broad participation and documented in public repositories.

1

Software shall be developed openly in a publicly accessible, version-controlled platform using a **permissive software license allowing for community use and contributions**.

2

Manuscripts shall be published with open access licenses; versions of as-accepted manuscripts shall be made available as open preprints and deposited in a NASA or [Partner] **repository upon publication**.

3

All mission **data, calibration information, and simulated products supporting development and validation of algorithms shall be made available without any conditions to use**.

4

Scientific data, metadata, software, publications and documentation **shall be archived and made available by NASA and/or [Partner] starting in Phase B**.

5

NASA and [Partner] software, documentation and data shall be properly marked, cited, and/or attributed. Metrics to measure and acknowledge open-source science contributions will be developed.

6

NASA and [Partner] will mutually develop an Open-Source Science Plan that specifies details of collaboration.



A NASA OPEN-SOURCE SCIENCE INITIATIVE: **TOPS**: TRANSFORM TO OPEN SCIENCE

<https://github.com/nasa/Transform-to-Open-Science>

2023 is NASA's Year of Open Science



TOPS will be energizing and uplifting open science across the scientific community through:



Visibility

Publishing articles, appearing on podcasts, developing targeted communication that expands footprint

Integrating Open Science into themes at large-scale events and conferences



Capacity Sharing

Producing online, free, Open Science curriculum on Open edX

Hosting workshops, events, cohorts, science team meetings, hackathons

Constructing multiple pathways to Open Science Badge



Incentives

Developing Open Science Badge/Certification

Sponsoring high profile prizes and challenges

Establishing high profile awards in support of open science research



Moving toward Openness

Recognizing open science practices

Holding open meetings

Sharing hidden knowledge

Inclusive collaboration



Connecting NASA Data to Equity and Environmental Justice



NASA ESD's Commitment

Diversify Earth science research and applications communities with representation from all backgrounds.

Support **Environmental Justice communities** by expanding awareness, accessibility, and use of **Earth science data** and enabling contributions to **Earth science research and applications** from a broad array of users.

Defining EEJ for NASA

Environmental Justice:

“The use of **NASA data, products, and personnel** can and should inform the **just treatment and meaningful involvement of all people** – regardless of race, color, national origin, income, or ability – with respect to development, implementation, and evaluation of programs, practices, and activities that affect human health and the environment.”



Climate Justice:

Climate change disproportionately influences environmental exposures and vulnerabilities of the world’s poorest and marginalized communities.

EJ Communities:

“**Geographic locations within the U.S. and its territories** with significant representation of persons of color, low-income persons, indigenous persons or members of Tribal nations, where such individuals experience, or are at risk of experiencing, higher or more adverse human health or environmental outcomes.”

Current EEJ Activities

ESD Equity and Environmental Justice webpage

EJ Data Backgrounder - Learn how NASA data are being used to support environmental and climate justice efforts

Earth Science Data Systems discovery for Environmental Justice
– Student Intern Project

SCAN TO LEARN MORE:



ESD's Equity and EJ Page



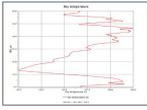
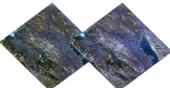
EJ Data Backgrounder

Commercial Smallsat Data Acquisition (CSDA) Program

- 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
 - *Restrictive nature of the EULAs made standard scientific collaboration difficult and must be addressed in future data purchases.*



CSDA Data Holdings

Vendor	Constellations/ Products	Availability Dates	Orbit Characteristics	Spatial Resolution	Spectral Characteristics	Sample
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.	DESIS L1B, L1C, and L2A	11/21/2018 - Present	Non Sun Synchronous 52° N - 55° S (ISS)	30 meters	235 channels, 2.5nm from 402 to 1000 nm	
EarthDEM	individual strips and mosaics	2009 - Present		2 meters		

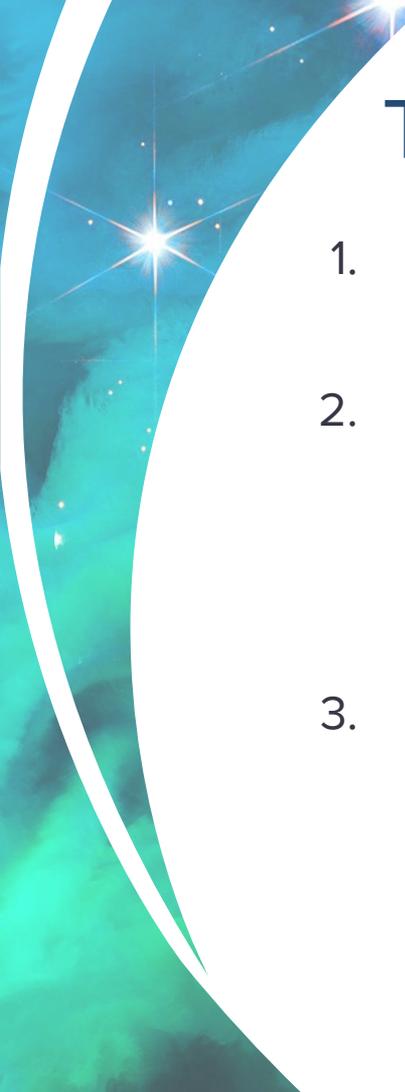
CSDA Program High Level Summary

- Commercial Smallsat Data Acquisition Program is a sustained program.
- All data purchased by NASA as well as DESIS are available to funded researchers in accordance with the vendor's scientific use license.
- Onramp procurements for the new vendors are underway.
- FY22 CSDA data holdings will be coming available via Earthdata Search.

Accessing and Requesting Commercial Smallsat Data FAQ:

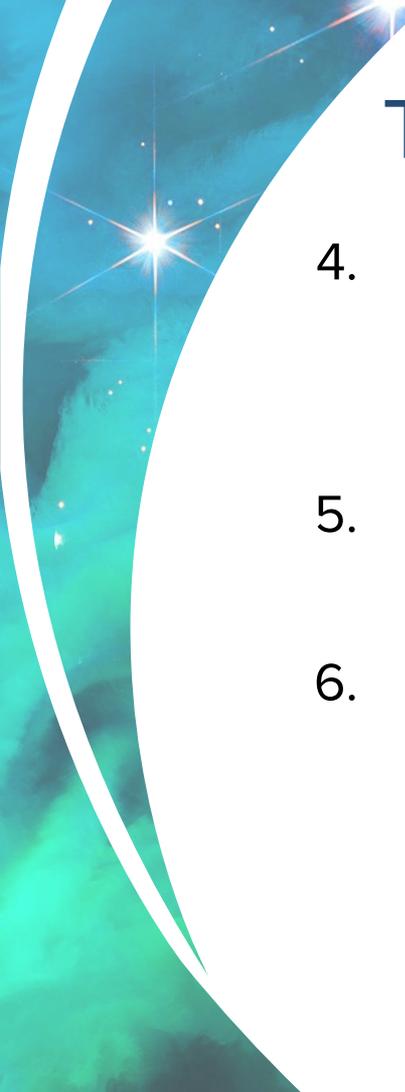
<https://earthdata.nasa.gov/esds/small-satellite-data-buy-program/faq-commercial-data>





Thoughts on the Future of LANCE

1. NASA ESD needs a near-real-time solution for mission and data products going forward.
2. The term and acronym LANCE should not preclude the usage of instruments/data products that are not part of the EOS system. There should not be any strict guidelines on what data sources should be included under the LANCE moniker.
3. LANCE should be seen as a partner early in the ESO mission lifecycle. The LANCE group should also reach out to each ESO mission's Program Application Leads (PALs) to ensure that throughout the mission lifecycle potential low latency product needs are captured.



Thoughts on the Future of LANCE

4. We need to introduce the concept of “experimental” or “developmental” products that have less stringent expectations.
5. There needs to be a process for transitioning an experimental product into the operational product category.
6. LANCE should maintain a list of potential operational and experimental/development products and high-level information about each. This list should be periodically reviewed for prioritization for new processing candidates.



Thoughts on the Future of LANCE

7. LANCE should maintain a “one stop shopping” approach where users can come to find the products they need in one location.
8. LANCE should clearly distinguish NRT data from the other latency categories as “operational” users require data within 3 hours of observation.



Questions?