

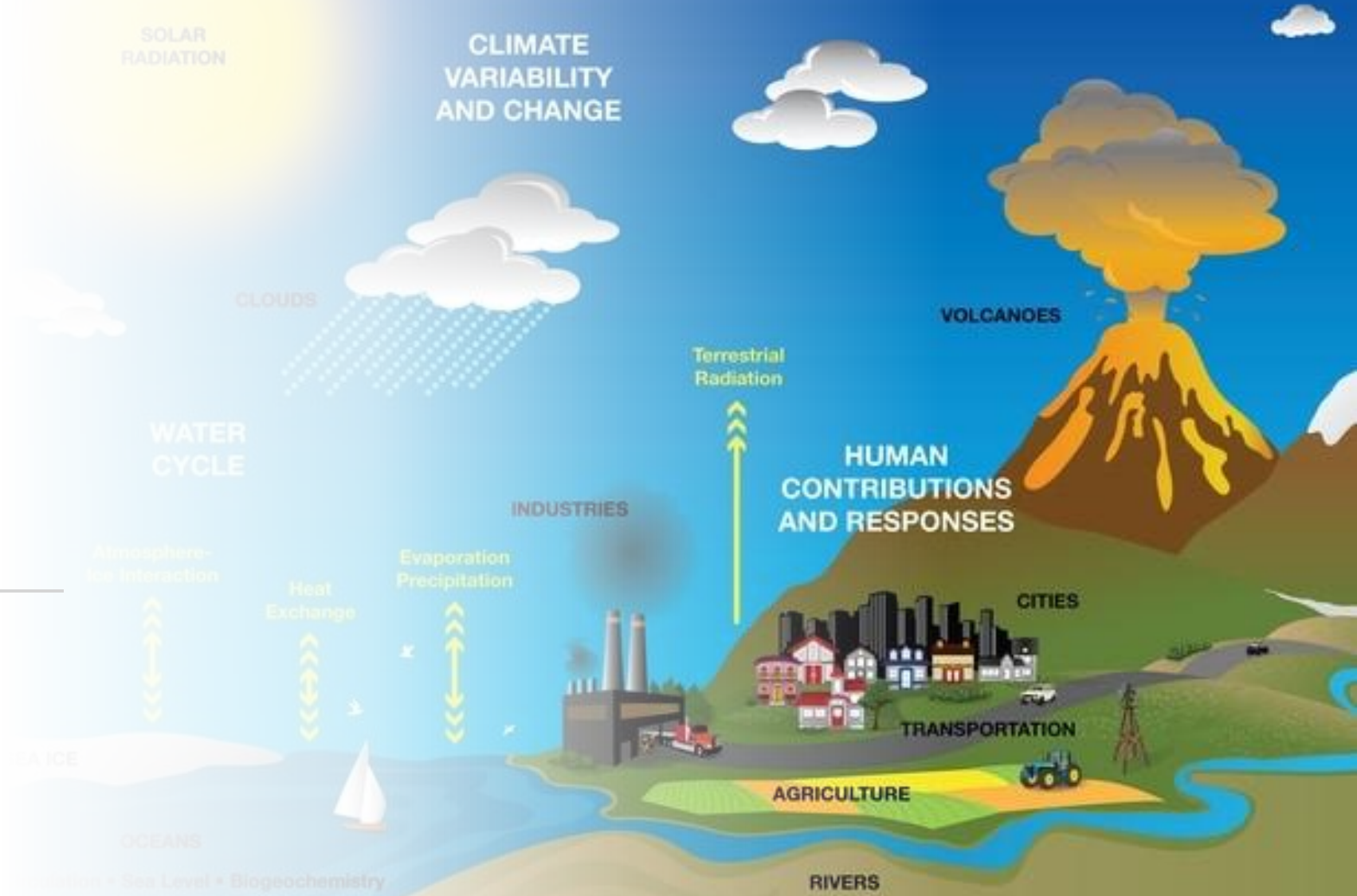
Earth as a Complex Interrelate

GHRC UWG Meeting

Stephen Berrick

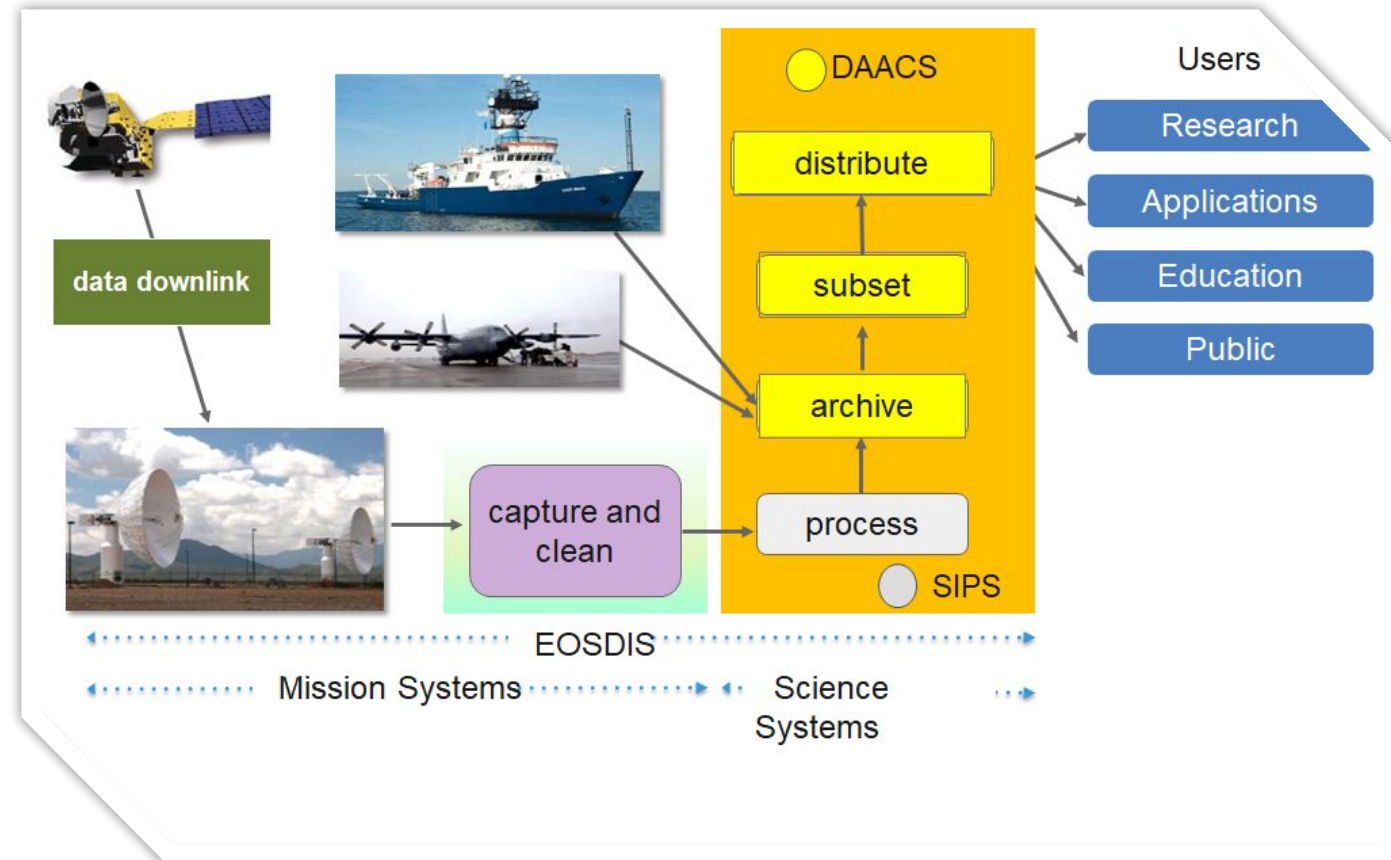
ESDIS Project

October 19, 2022



Earth Science Data and Information System (ESDIS)

- The ESDIS Project manages the science systems of the Earth Observing System Data and Information System (EOSDIS). EOSDIS is a comprehensive distributed Earth science data and information system designed to support NASA's Earth science missions.
- EOSDIS is designed to ingest, archive, distribute, visualize, all types of Earth Science data which include field campaign measurements, airborne data, *in situ* data, model data, ancillary products used for processing and other related datasets.
- The ESDIS Project provides and controls all aspects of the effort including but not limited to requirements, design, acquisition, development, operations, maintenance and decommission.

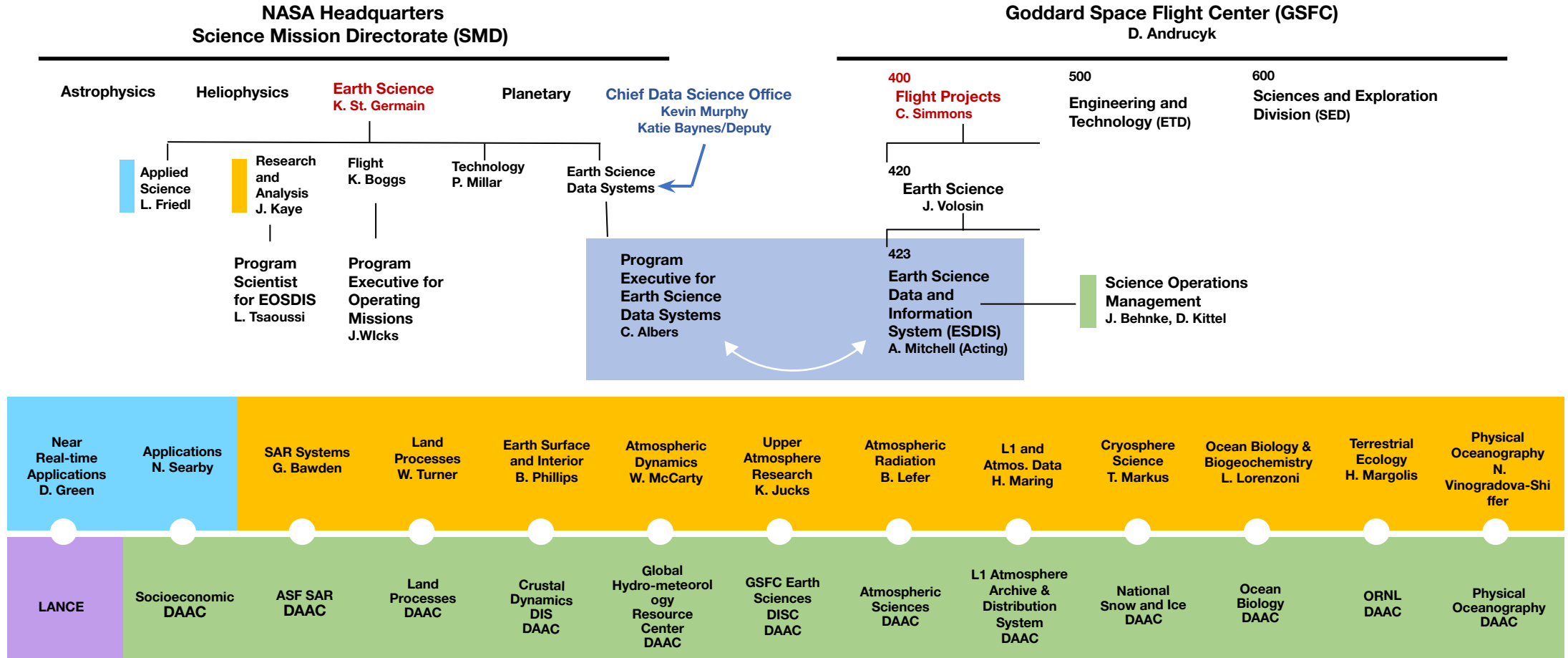


Operating since 1994, it has been evolving to keep pace with technology and users' requirements.

ESDIS Charge to the User Working Group Members

- UWGs have played a pivotal role in the development of the DAACs going back to their earliest days.
- Rather than providing 'direction' or 'advice', the UWG members are encouraged to share their insight SME, and recommendations pertinent to current practices and activities at the DAACs.
- In times when resources are constrained, how would you prioritize current activities? What is critical and what are 'nice to have' activities?
- Help enable ESDIS, GHRC, ESDS, ESD to look ahead and see the possible issues and possibilities of current actions. What are we getting right and where are we falling short?

ESDIS organization

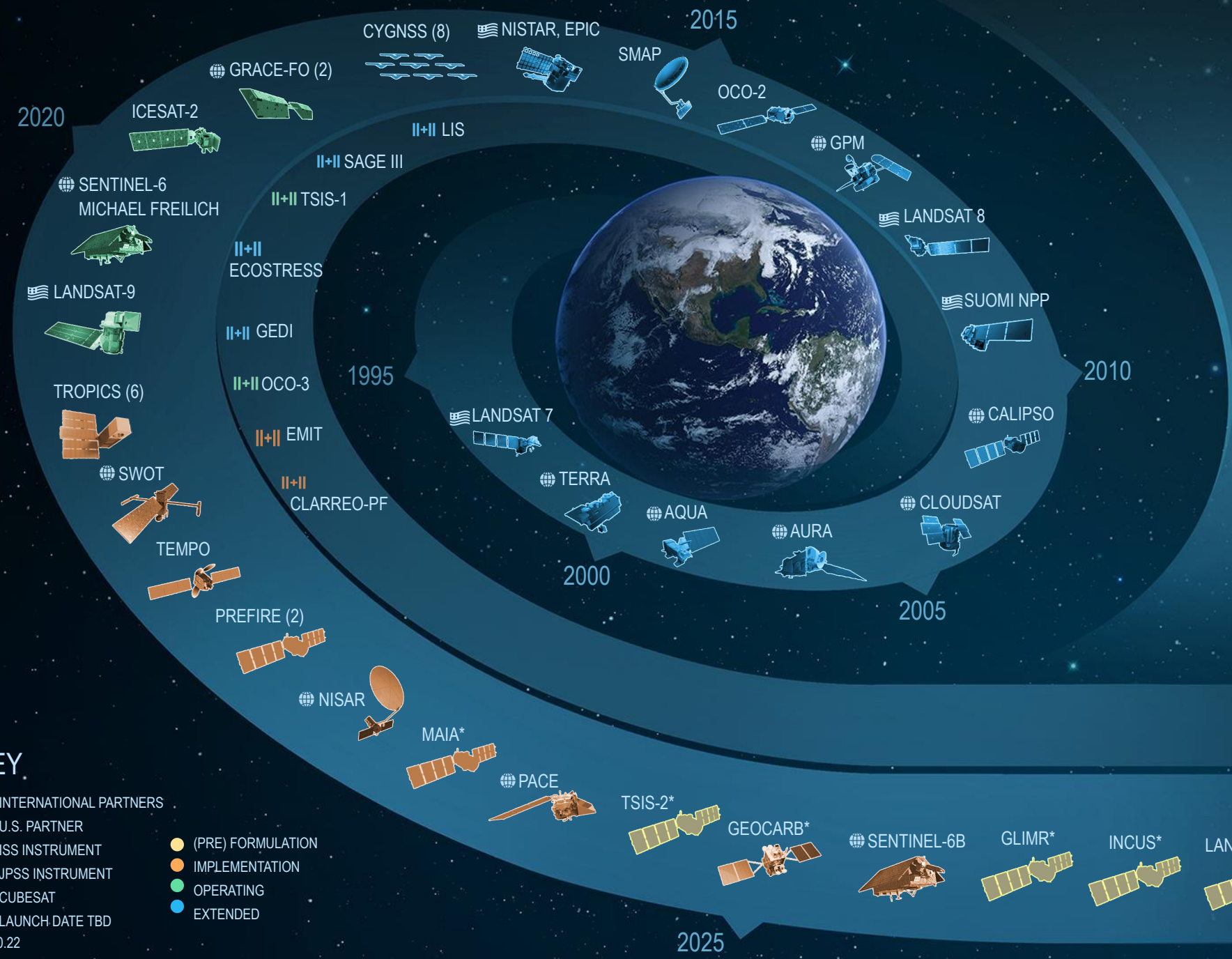


LEGEND





EARTH FLEET



INVEST/CUBESATS

- CSIM-FD 2023
- HARP 2022
- CIRIS 2023
- CTIM* 2022
- HYTI* 2022
- SNOOPI* 2022
- NACHOS* 2022
- NACHOS2* 2022

JPSS INSTRUMENTS

- OMPS-LIMB 2022
- LIBERA 2027

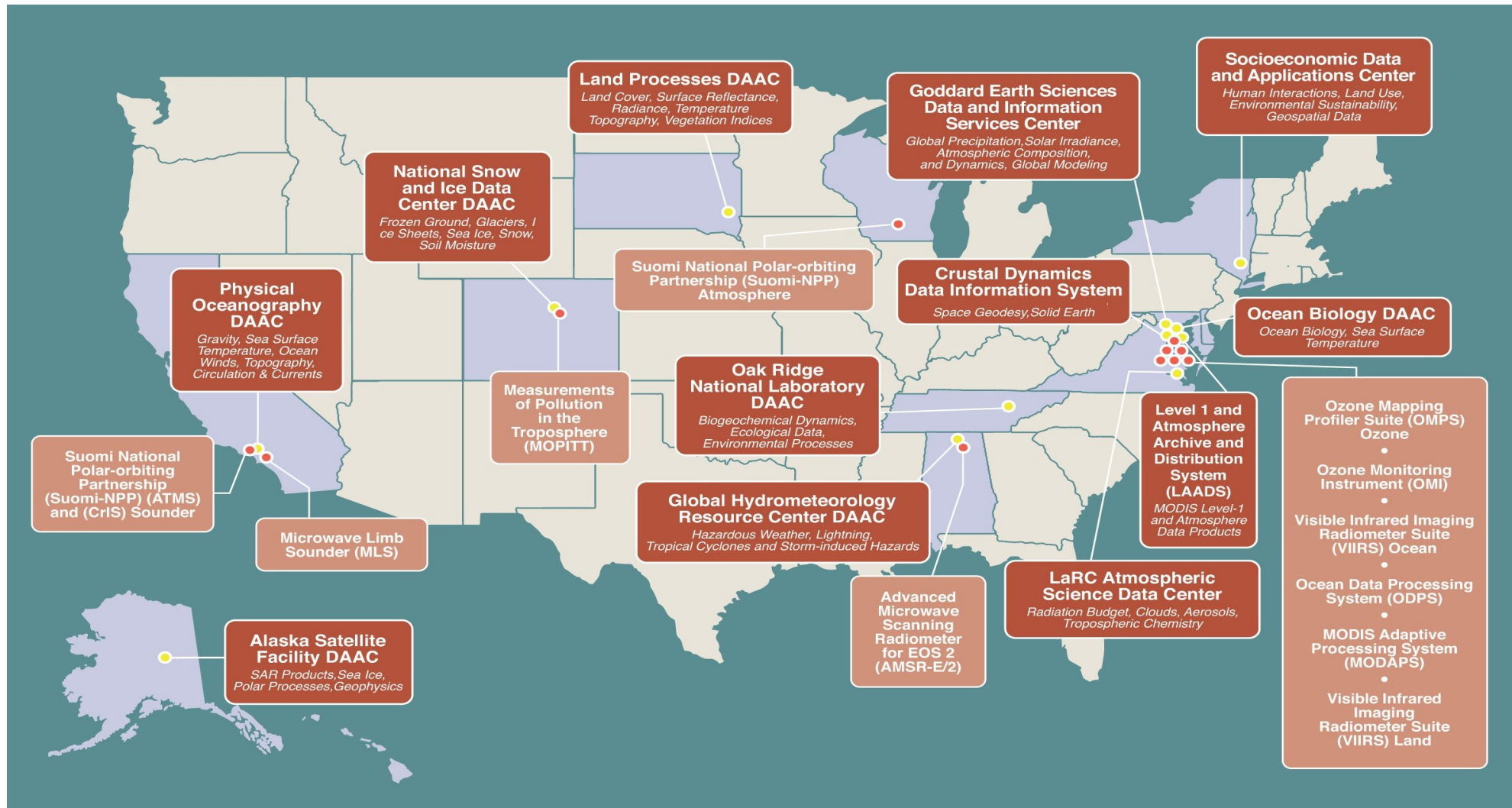
ISS INSTRUMENTS

MISSIONS

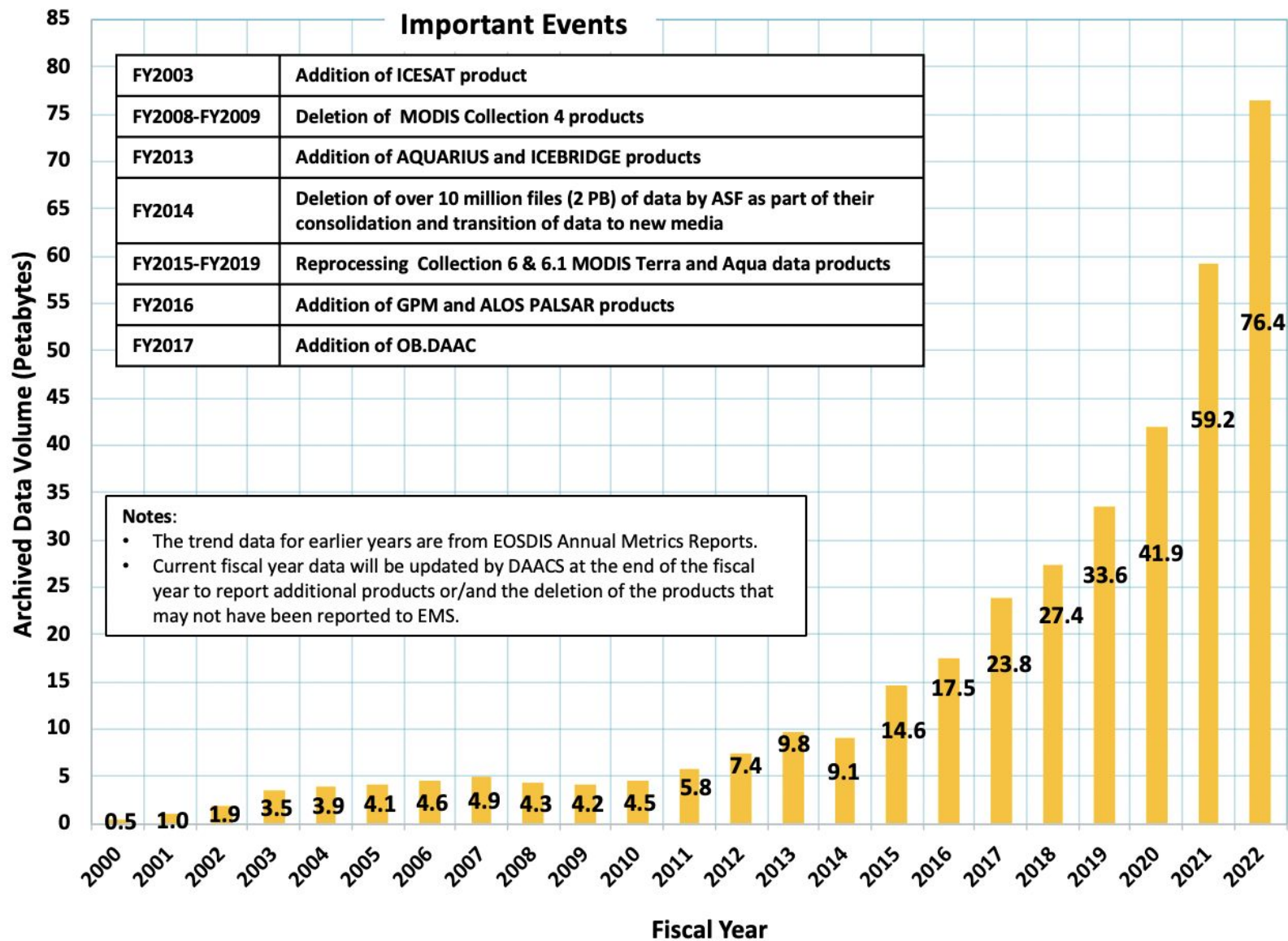
KEY

- INTERNATIONAL PARTNERS
- U.S. PARTNER
- ISS INSTRUMENT
- JPSS INSTRUMENT
- CUBESAT
- LAUNCH DATE TBD
- (PRE) FORMULATION
- IMPLEMENTATION
- OPERATING
- EXTENDED

EOSDIS Distributed Active Archive Center (DAACs) and Science Investigator-led Processing Systems (SIPS)



Total EOSDIS Accumulated Data Archive Volume (Petabytes) Trend: FY2000-FY2022 (at the end of September 2022)



EOSDIS Metrics

In FY21, EOSDIS distributed more than **2 BILLION** data products to over **1.7 MILLION** distinct data users around the world



There were more than **72 PETABYTES** of Earth science data in the EOSDIS archive



24 PB of data (~62 million files) in Earthdata Cloud



3.4 Million files added to the cloud since April

Our Land, Atmosphere Near real-time Capability for Earth Observing System (LANCE) had

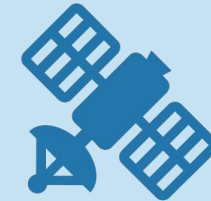
OVER 820

unique datasets, distributed more than

125 MILLION FILES

and produced 2.57 Petabytes of data

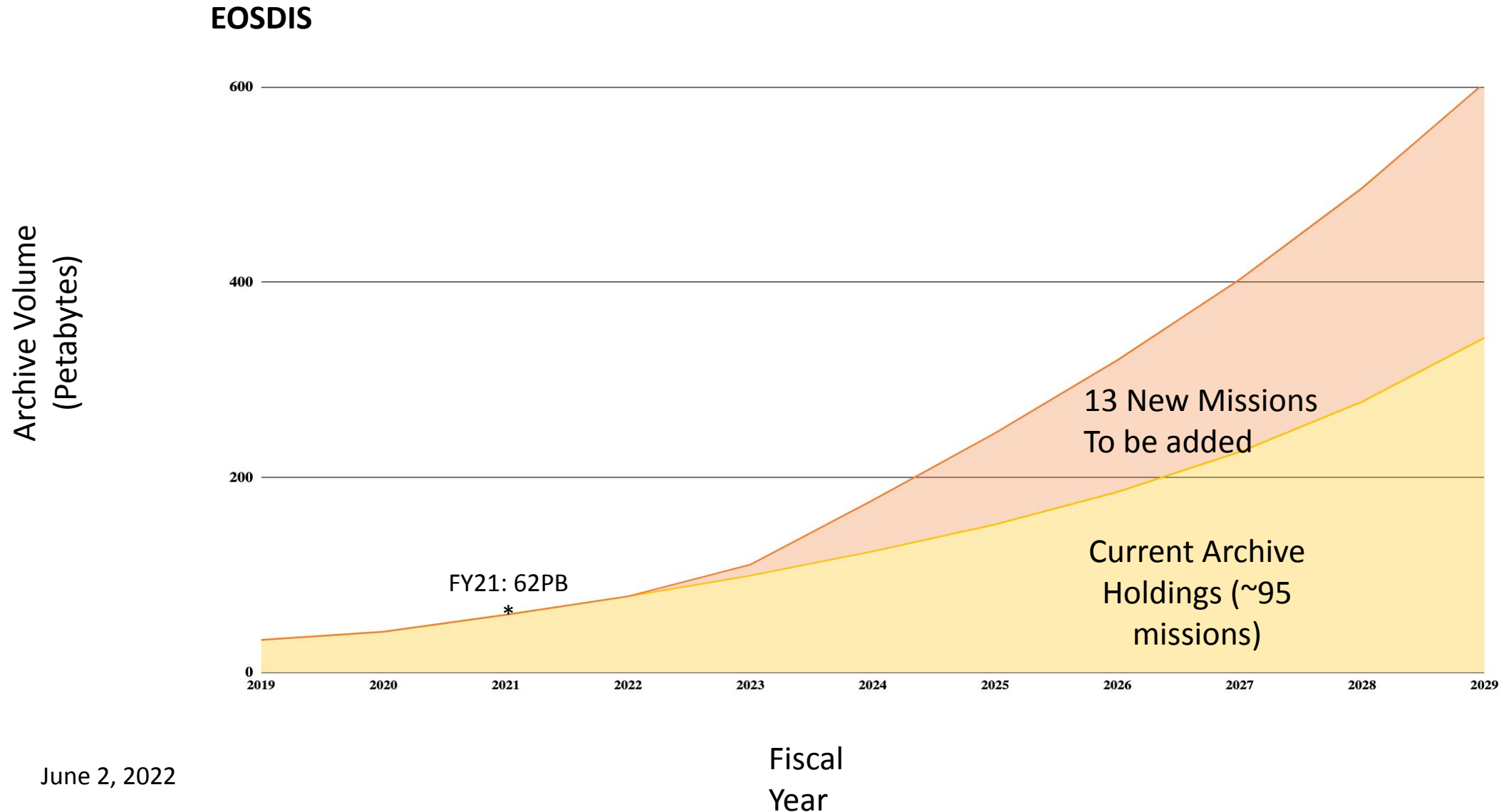
WITHIN 3 HOURS OF A SATELLITE OBSERVATION



with over **3.56 BILLION** files in the EOSDIS archive



Earth Science Data Archive Growth Projection



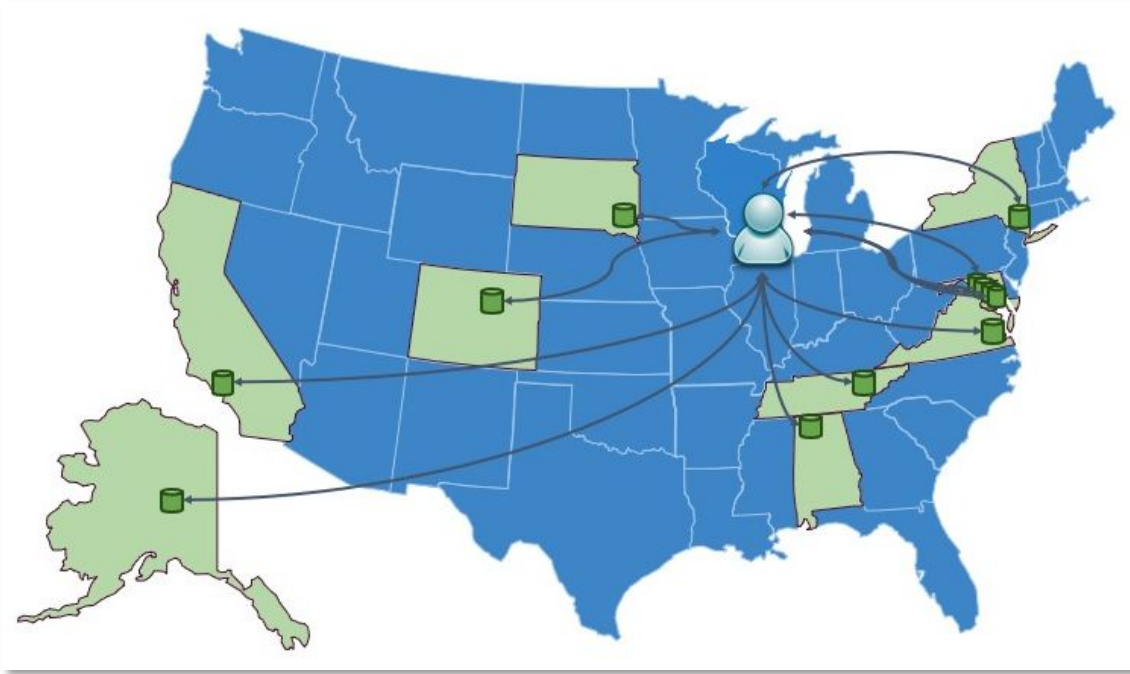
New Missions Information

Future Missions (LRD after Jan 2022)	Future Instrument	DAAC
CLARREO-PF on ISS	CLARREO-PF on ISS	ASDC DAAC
EMIT (ISS)	EMIT (ISS)	LPDAAC
GeoCARB (EVM-2)	GeoCARB (EVM-2)	GES DISC
JPSS-2	Sounder & OMPS	GES DISC
	VIIRS Ocean	OB DAAC
	VIIRS Land	LP DAAC
	VIIRS Cryo	NSIDC DAAC
	VIIRS Atmosphere	LAADS DAAC
Libera/JPSS-3	Libera/JPSS-3	ASDC
JPSS-3	Sounder & OMPS	GES DISC
	VIIRS Ocean	OB DAAC
	VIIRS Land	LP DAAC
	VIIRS Cryo	NSIDC DAAC
	VIIRS Atmosphere	LAADS DAAC
MAIA (EVI-3)	MAIA (EVI-3)	ASDC DAAC
NISAR	NISAR	ASF DAAC
PACE	PACE	OB. DAAC
PREFIRE (2 cubesats)	PREFIRE (2 cubesats)	ASDC DAAC
SWOT	SWOT	PO.DAAC
TEMPO (EVI-1)	TEMPO (EVI-1)	ASDC DAAC
TROPICS (EVI-3)	TROPICS (EVI-3)	GES DISC
TSIS-2	TSIS-2	GES DISC

- The new missions' Interface Control Documents provide initial volume estimates and growth rate
- Start the volume estimates 6 months after launch (for IOC)
- Only on-orbit missions provided here; airborne and field campaign volumes are provided in the current archive holdings estimate

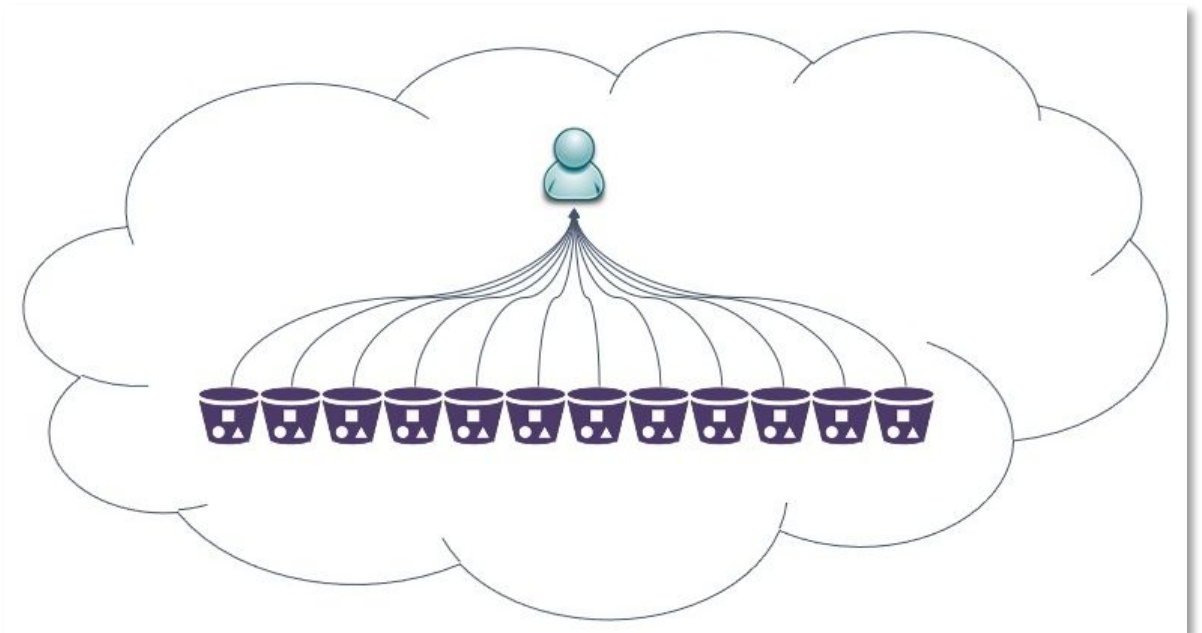
June 2, 2022

EOSDIS Transition: DAACs moving data into Earthdata Cloud



Today users seeking NASA's data may have to visit several DAACs to fulfill their needs. Moving between data centers and interfaces can be less efficient and time consuming.

As more EOSDIS data is moved into NASA's Earthdata Cloud, users will **be increasingly** able to (seamlessly) use data across traditional discipline silos - making the near future look a lot like a 'Data Lake'.

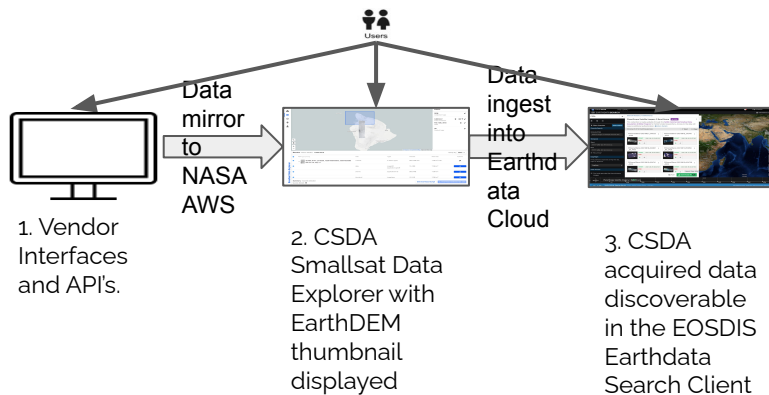


Commercial Satellite Data Acquisition Program



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.



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.	DESIIS 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		

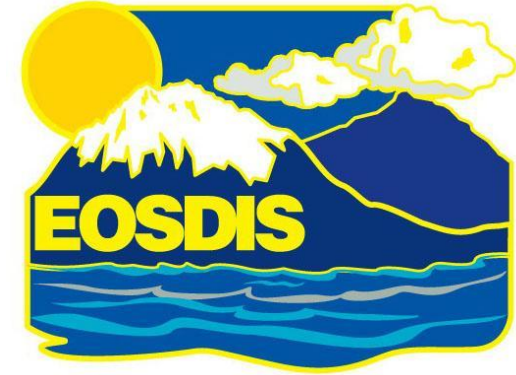
Understanding our Acronyms

- ESDS – Earth Science Data Systems is the name of the NASA Headquarters Program Office that funds the ESDIS Project.
- ESDIS – is the acronym name for the Project at GSFC that currently manages earth science data systems for EOS and other assigned missions.
- EOSDIS – is the acronym name for the System that was developed to manage NASA’s Earth Observing System missions. It has evolved over the years.
- Earthdata – is the name of the website that describes the ESDIS Project, the EOSDIS system, and HQ’s Earth Data Systems program.



ESDIS Project

Earth Science Data and Information Systems Project



- Formed in the late 1980s-early 1990s to develop and build an earth observation system consisting of a fleet of spacecraft and pre-existing earth science data
 - System was known as the Earth Observation System (EOS)
 - Part of the Mission to Planet Earth program
- System was assigned to Goddard Space Flight Center – the ESDIS Project – Code 423
 - Build, launch, operate EOS spacecraft
 - Build and operate data systems that acquire, process and distribute data
 - Tropical Rainfall Measurement Mission, the first EOS mission, launched in 1997. Followed by Terra, in 1999.
 - The EOS Data and Information System (EOSDIS) was developed and made operational for use by all EOS missions and has continued operations under the ESDIS Project