CERES Data Management

Working Group Report
CERES Spring Science Team Meeting

Kathleen Dejwakh[1], Walter Miller[2], Cheyenne Land[2]
and the CERES Data Management Team

May 12, 2026

[1]NASA Langley Research Center
[2]Adnet Systems, Inc.

Outline

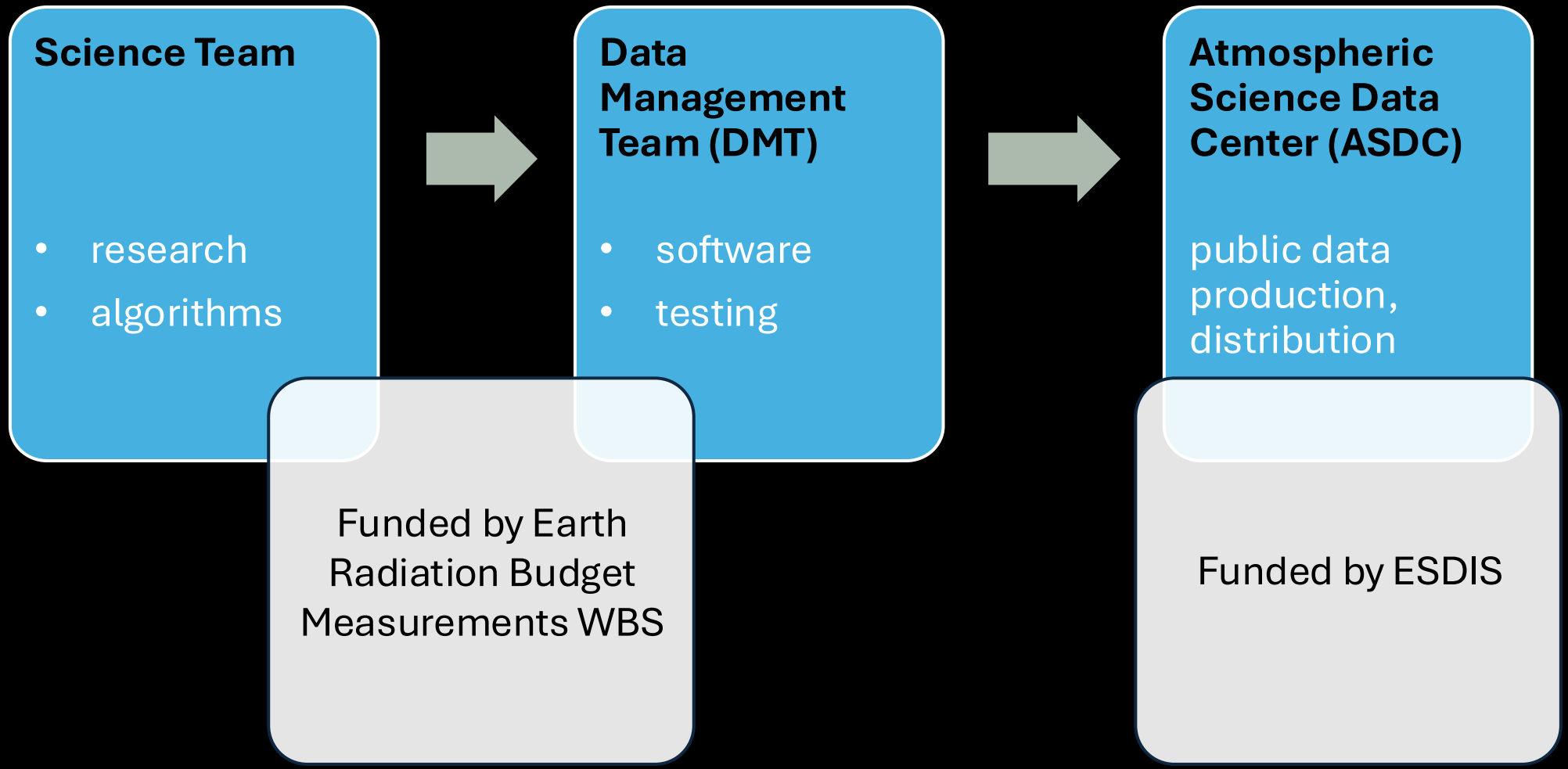
- Background
- Team Highlights
- Project Updates
- Systems & ASDC

Background

DMT Teams & Partners

Instrument & ERBE-like	Clouds	Inversion
Surface & Atmospheric Radiation Budget (SARB)	Temporal Interpolation & Spatial Averaging (TISA)	Fast Longwave & Shortwave Flux (FLASHFlux)
Configuration Management (CM) & Infrastructure	Production Request (PR) Tool	Atmospheric Science Data Center (ASDC) Support

Interfaces


Science Team
• research
• algorithms
Data Management Team (DMT)
• software
• testing
Atmospheric Science Data Center (ASDC)
public data production, distribution
Funded by Earth Radiation Budget Measurements WBS
Funded by ESDIS

Team Highlights

Software Delivery Highlights

CATALYST & Production Request (PR) Tool:
- Updates added to e-mail notifications on filesystem mounts
- Updates required to support system upgrade to RHEL9
- New PR Web interface release and related bug fixes

Instrument & ERBE-like:
- Monthly/bi-monthly gain adjustments
- Monthly/bi-monthly SRF adjustments

ERBE-like: Monthly/bi-monthly crosstrack ID files

Software Delivery Highlights

TISA: Updating multiple PGEs to fix a date-range cutoff of 2025

FLASHFlux: Delivering quarterly SCC files

Clouds: Compatibility with AMSR-2 NISE snow and ice files

Software Delivery Highlights

SARB: Fixing QC reporting error in SYNI for NOGEO Fu-Liou run

Various SORCE TSI, MATCH aerosol, and gridded GEO ancillary product updates

Product Availability

	Platform				
Product	**Terra**	**Aqua**	**S-NPP**	**NOAA-20**	**Remarks**
BDS	Feb. 2026	Feb. 2026	July 2024	Mar. 2026	Single Instrument
SSF	Feb. 2026	Feb. 2026	July 2024	Feb. 2026	Single Instrument
CRS	x	x			2018-2022, May-Aug. 2024
CRS1deg-Hour	x	x			2018-2022, May-Aug. 2024
SSF1deg-Hour	Jan. 2025	Feb. 2023	July 2024	Dec. 2025	Cross-track Only
SSF1deg-Day/-Month	Jan. 2025	Feb. 2023	July 2024	Dec. 2025	Cross-track Only
SYN1deg-1Hour/-MHour	Mar. 2022			Dec. 2025	Terra-Aqua-NOAA20
SYN1deg-Day/-Month	Mar. 2022			Dec. 2025	Terra-Aqua-NOAA20
CldTypHist	Terra+Aqua Feb. 2023			Terra+NOAA-20 July 2024	
FluxByCldTyp-Day/-Month	Feb. 2023			Feb. 2026	
EBAF	April 2022			Feb. 2026	Ed4.2.1
EBAF ToA	Mar. 2022			Dec. 2025	Ed4.2.1

Public Data Product Releases

- Released:
  - Edition 4A Terra-FM2 CRS – March 2026
  - Edition 1C NOAA-20 FluxByCldTyp-Day/-Month – March 2026

- Forthcoming:
  - Edition 1C NOAA-20 CLDPIX – June 2026
  - Edition 2B S-NPP SSF, SSF1deg – June 2026
  - Edition 5 Terra, Aqua BDS – July 2026

CERES Subsetting, Visualization & Ordering Tool

All computing environments upgraded to Red Hat Enterprise Linux (RHEL) 9

Continued development of Python subsetting code using JSON metadata for most products

Continued progress on merging of OTVis backend code, harmonizing Level 2 and Level 3 operations

Project Updates

Process Improvements

Mode: Differences
Left file: /var/lib/jenkins/workspace/1P6_Retrieval_MODIS_Aqua_Build_and_Unit_Test_Repo_Data/clouds/CER4.1-4.1P6/src/retrieval/unit_test/results/Clouds_unit_tst/MODIS_Aqua/legacy/Chunk_163/Day_1P6_outp
Right file: /var/lib/jenkins/workspace/1P6_Retrieval_MODIS_Aqua_Build_and_Unit_Test_Repo_Data/clouds/CER4.1-4.1P6/src/retrieval/unit_test/results/Clouds_unit_tst/MODIS_Aqua/new/Chunk_163/Day_1P6_outp

	1: moaSkinT	2: moaPW	3: result	4: clearCategory	5: cloudCategory	6: ABsummary	7: ADsummary	8: polarMask	9: polarSummary	10: version			1: moaSkinT	2: moaPW	3: result	4: clearCategory	5: cloudCa
20389	301.922	3.12085	1	8	0	9	9	7	9	61	<>	20389	301.922	3.12085	0	0	4
19195	302.672	2.68033	0	5	4	4	9	7	9	61	<>	19195	302.672	2.68033	1	8	2
8086	302.859	5.27654	1	8	2	4	9	7	9	61	<>	8086	302.859	5.27654	0	5	4
8781	302.922	5.03841	0	5	4	4	9	7	9	61	<>	8781	302.922	5.03841	1	8	2

- Cloud mask
- Verifying that floating point errors in refactored code are insignificant
- In comparing (see above):
  1. Set breakpoint, in desired IDE, to line number highlighted
  2. Step through algorithm to inspect inputs that caused differences

Process Improvements

E-mail Digest

Reports

Data “chunk” number

Highlights numbers of records processed, and differences encountered

FW: Successful - Test Log for: 1P6_Retrieval_MODIS_Aqua_Build_and_Unit_Test_Repo_Data testing Chunk 093 data from...

KS

Kohler, Steven C. (LARC-E302)[RSES] <steven.c.kohler@nasa.gov>

Today at 2:23 PM

To: Dejwakh, Kathleen (LARC-E302)

CER4.1-4.1P6_Day_... 3.6 KB | CER4.1-4.1P6_Day_... 47.5 KB | CER4.1-4.1P6_Day_... 4.2 KB | +7 more

Download All • Preview All

Build Name:	sck-CLOUDS-7-Unit-test-data_tst_Aqua_MODIS_1P6_2025_Sep25_#262
Build Cause:	MANUALTRIGGER
Build User ID:	sckohler
Build User:	Steven C. Kohler
User Email:	steven.c.kohler@nasa.gov
Build Status:	Successful
Jenkins Build Number:	262
Project Name:	1P6_Retrieval_MODIS_Aqua_Build_and_Unit_Test_Repo_Data
Data Repository Branch:	sck-CLOUDS-7-Unit-test-data
Test Data Chunk:	093
DAY difference rows: (of 501 total)	Non CloudPixel: 0 — CloudPixel: 0
NIGHT difference rows: (of 3409 total)	Non CloudPixel: 0 — CloudPixel: 0
TWILIGHT difference rows: (of 23209 total)	Non CloudPixel: 1 — CloudPixel: 0
Test Notes:	CloudPixel excerpt comparison report opens/loads much more quickly than full CloudPixel comparison report

Process Improvements

- Gridding:
  - Incorporated
    - average 9-Directional Model for flux
    - GEO pixel cloud properties
  - Improved GEO compositing code

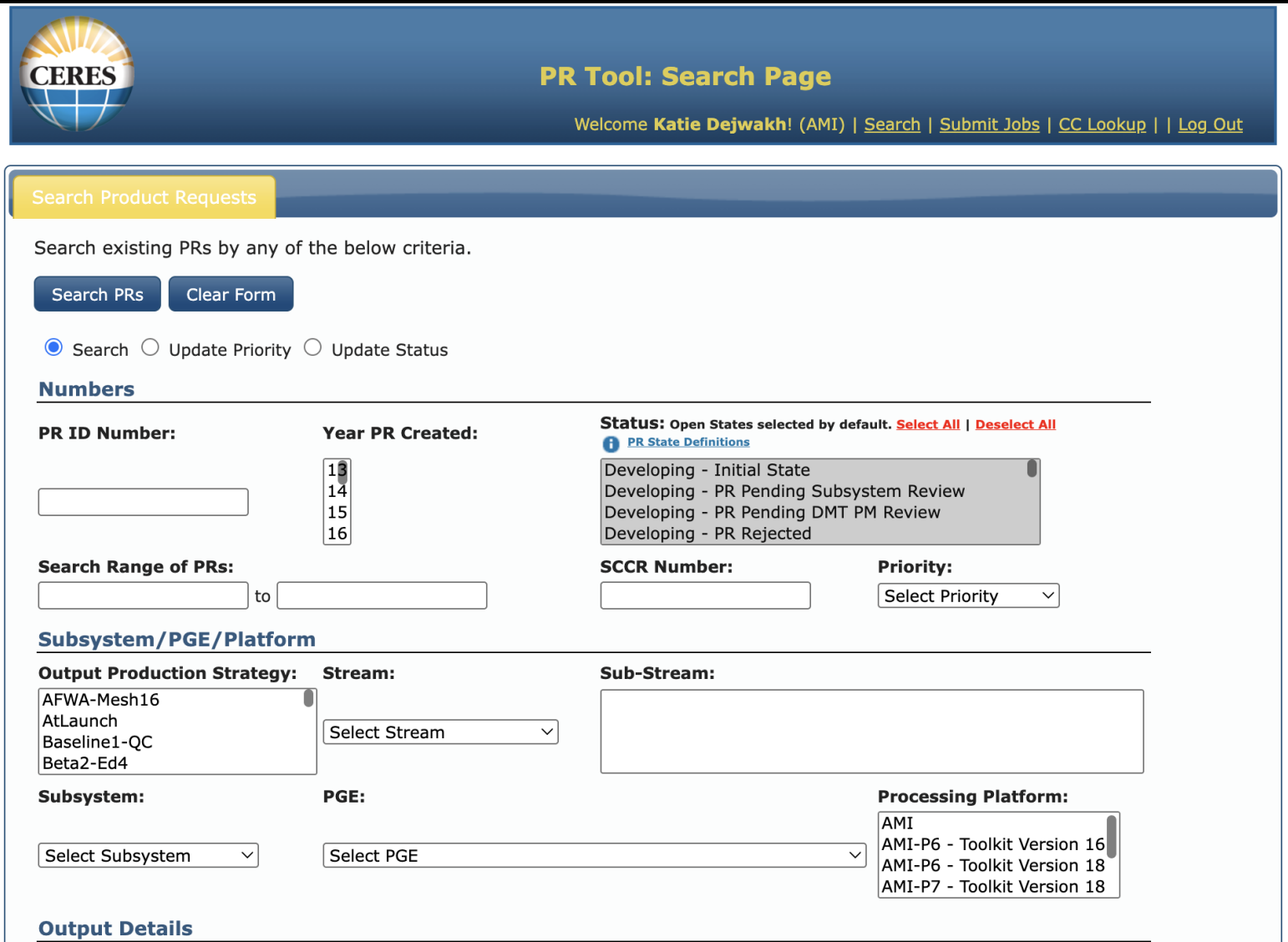
- TSIB:
  - Backwards compatibility for Edition 5 testing
  - Option of creating zonal nested or equal-angle files
  - Ensuring consistency with EBAF underlying processes
  - Running for “alpha” Edition 5 processing

Process Improvements

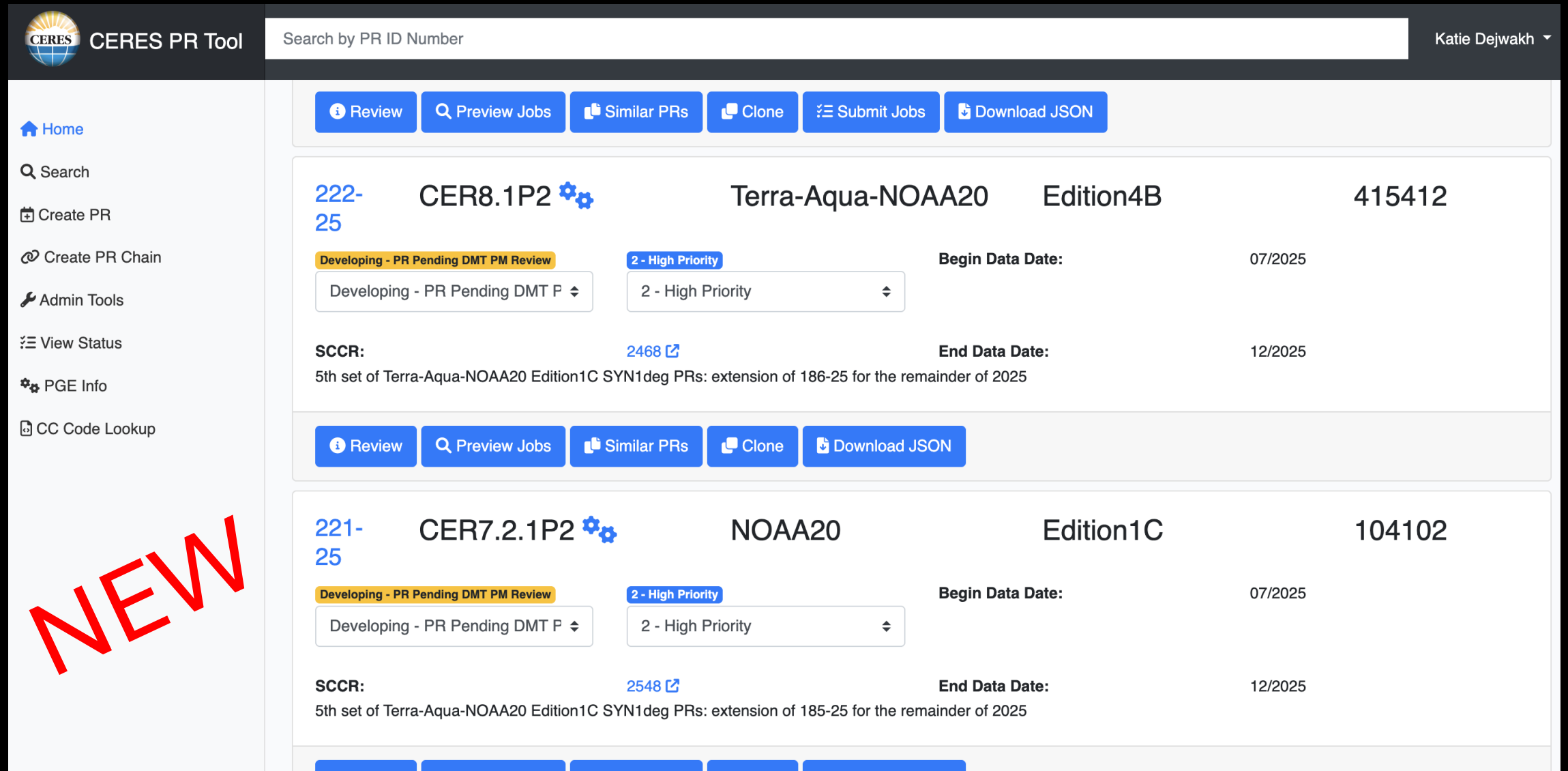
- SYN1deg:
  - Continued work harmonizing code for LEO and GEO cloud property processing
  - Accommodating 3 x 3 (optical depth x pressure) cloud properties

Process Improvements - New PR Tool

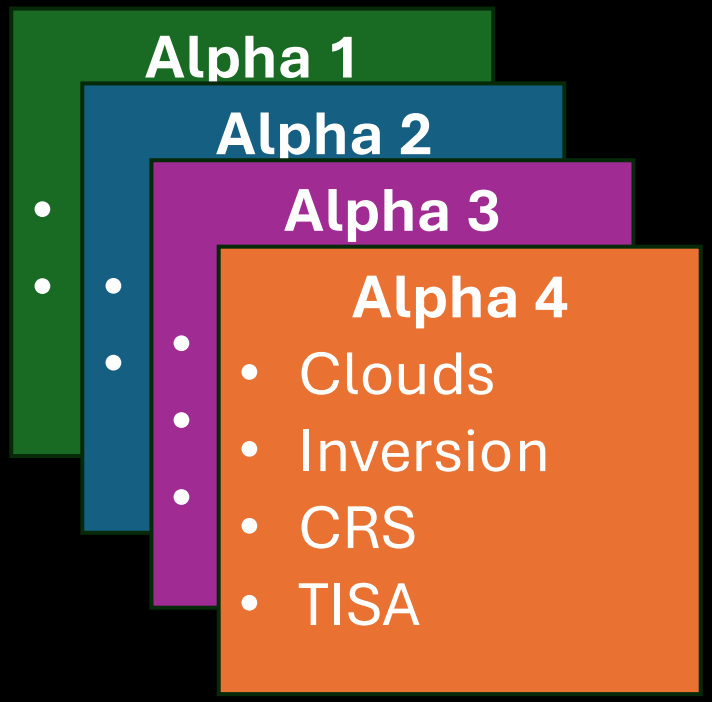
OLD



Process Improvements - New PR Tool



Alpha Runs of Edition 5



Alpha 4:

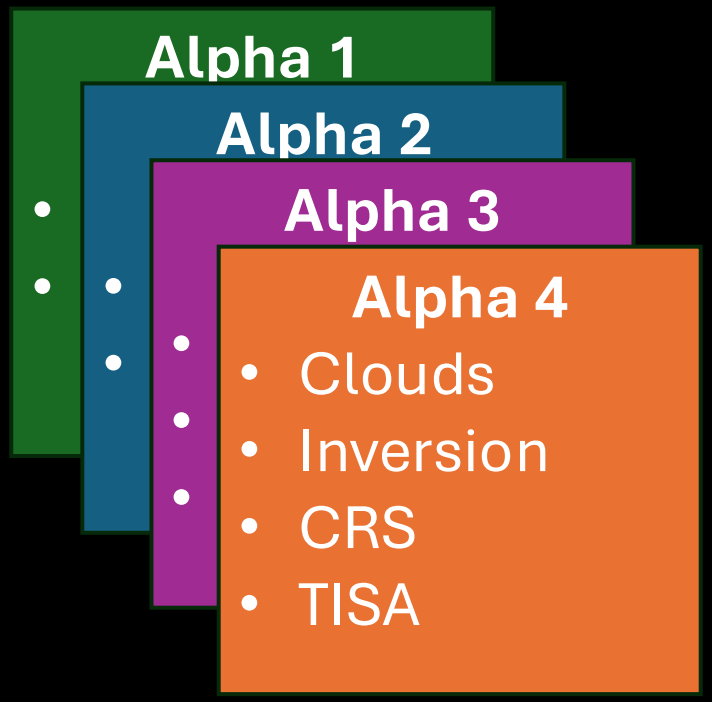
Clouds – ERA5 incorporation

- MOA
- Cloud mask
  - Polar night updated to detect more clouds
  - Further tuned
- Clear-sky neural net

Inversion:

- Proto-Edition 5 spectral correction coefficients
- Change in unfiltering process from Alpha 3

Alpha Runs of Edition 5



Alpha 4:

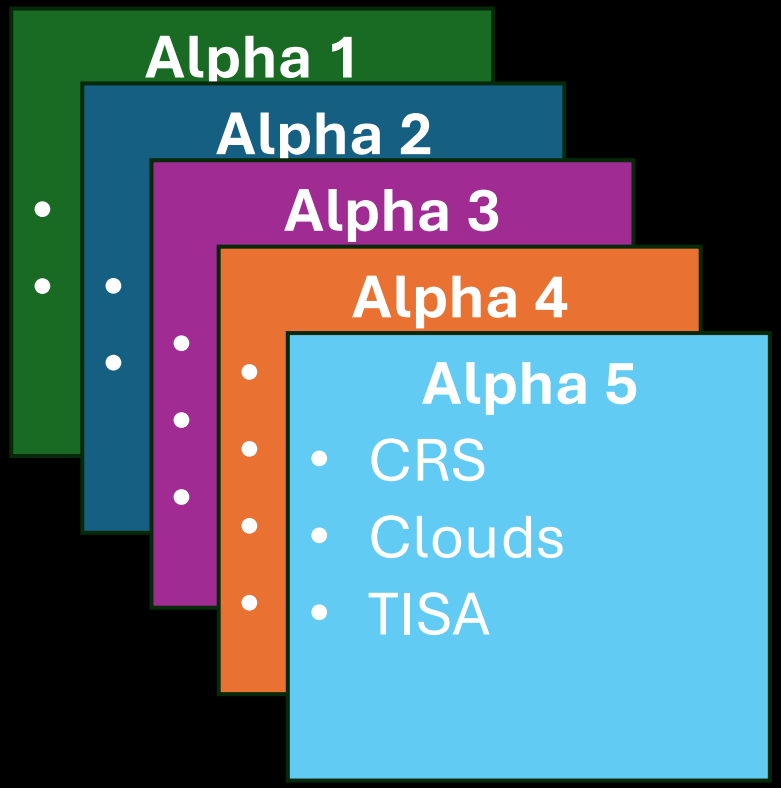
CRS

- Edition 5 Fu-Liou algorithm changes

TISA

- Edition 5 unfiltering
- Alpha4-Edition5 sea ice brightness index (SiBi) maps and three-channel GEO clouds

Alpha Runs of Edition 5



Alpha 5:

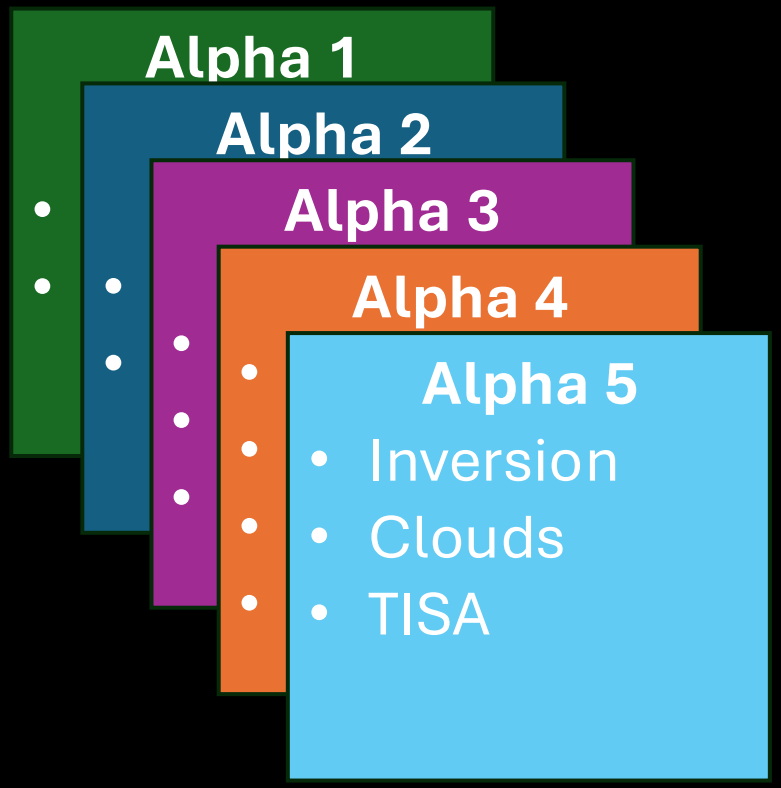
CRS

- Completed Fu-Liou algorithm changes

Clouds

- Mask:
  - Reduced false thin cirrus
  - Increased detection – nighttime Arctic
  - Other corrections
- Retrieval:
  - Neural net cloud heights and nighttime tau
  - Imager-derived land emissivity maps
- VIIRS C7 scaling factors

Alpha Runs of Edition 5

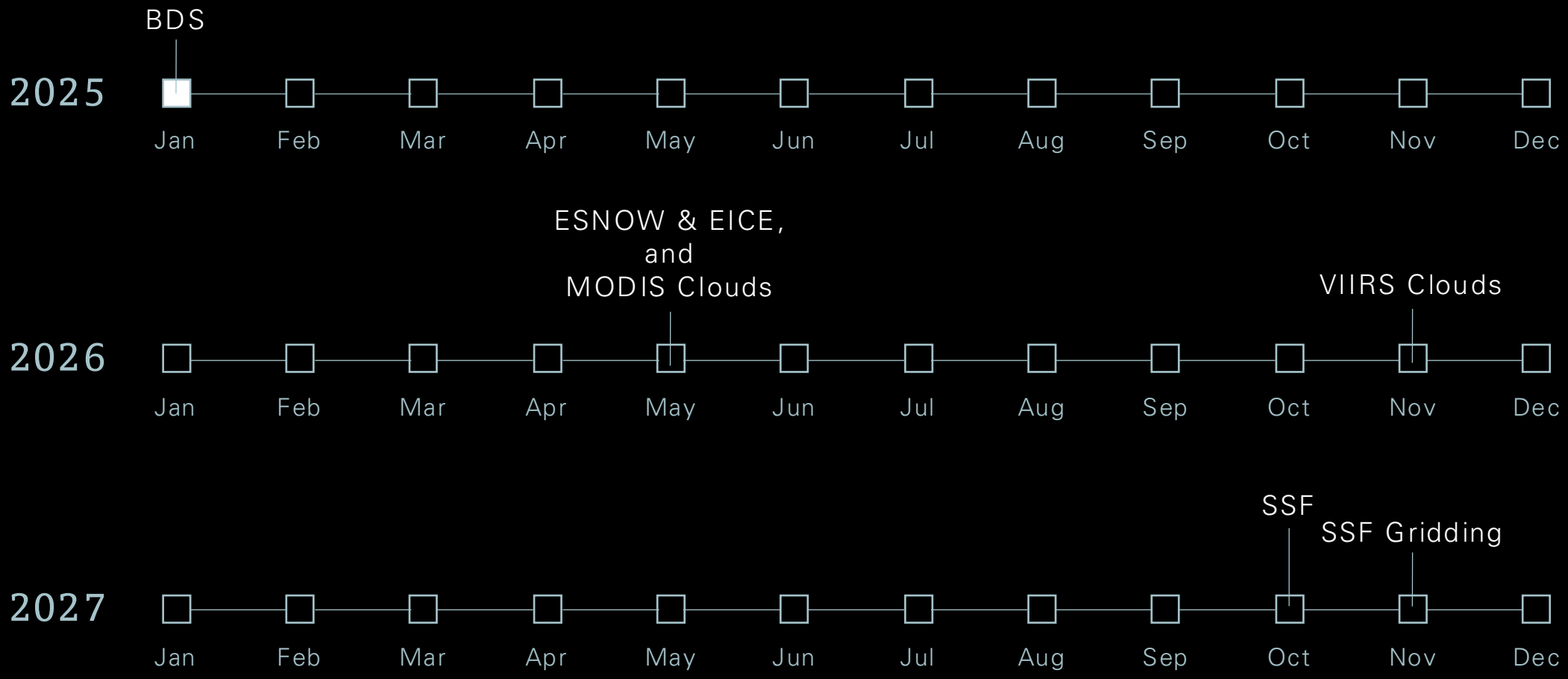


Alpha 5:

TISA

- SYN1deg 3x3 cloud properties
- Improved GEO two-channel satellite code

Edition 5 Code Delivery Progress



Edition 5 Anticipated Product Availability

Product	Terra and Aqua	S-NPP and/or NOAA-20
BDS	JULY 2026	NOV 2026
SSF	SEPT 2027	APR 2028
SSF1deg-Hour	OCT 2027	MAY 2028
SSF1deg-Day/Month	NOV 2027	JUNE 2028
SYN1deg-1Hour/Mhour/Day/Month	JULY 2028	SEPT 2028
CldTypHist	DEC 2027	MAR 2028
FluxByCldTyp	NOV 2027	JULY 2028
EBAF-TOA	DEC 2028	DEC 2028
EBAF	DEC 2028	DEC 2028

Terra, Aqua and Suomi-NPP Preservation

- Captured code change history for Terra and Aqua Edition4 and NPP Edition2
- Updated Processing History configuration code (CC) change and Impact
- Provided initial spreadsheets with requested information

Libera Data Management Working Group

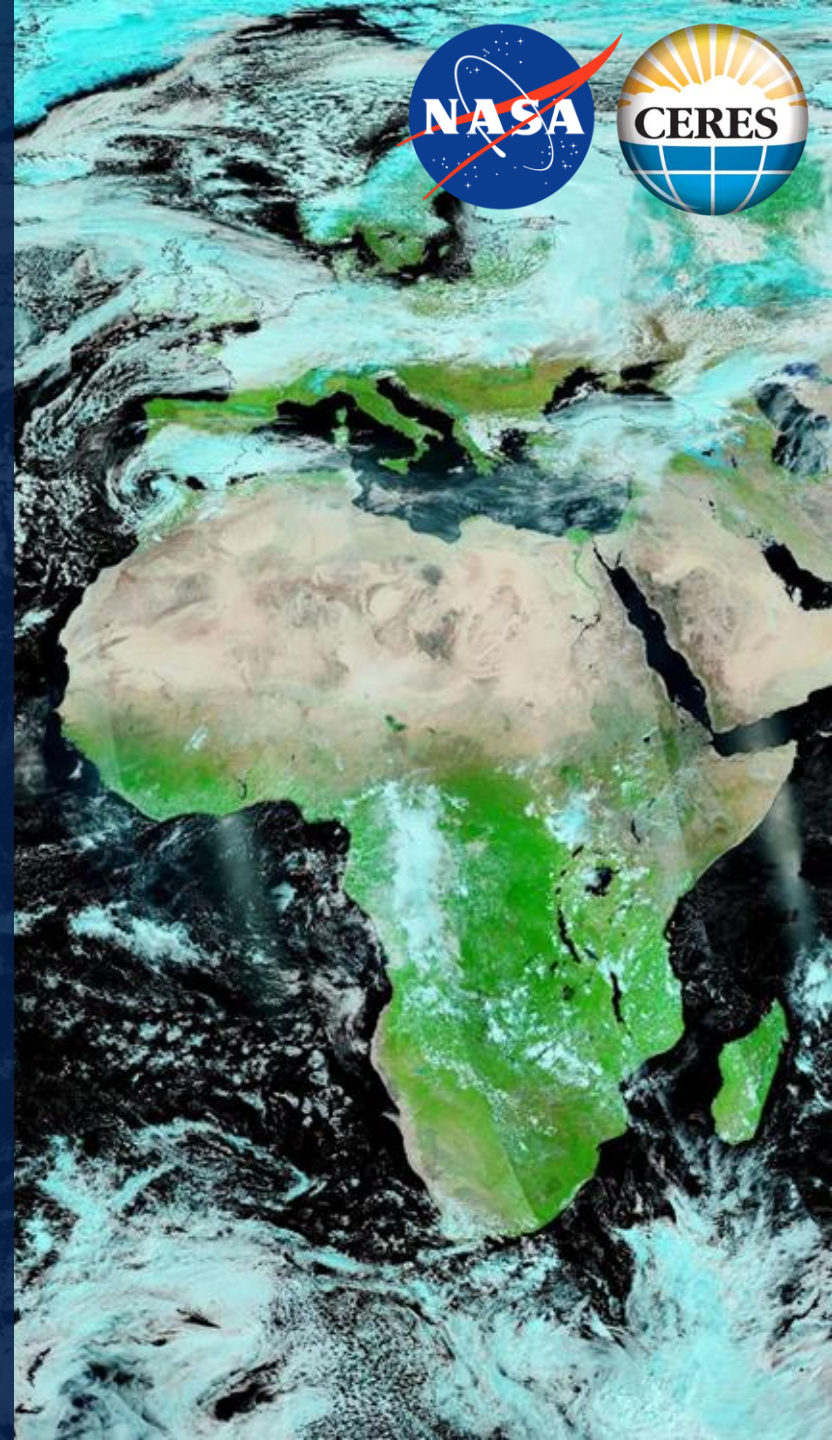
- Finalizing first release of Data Exchange Agreement (DXA)
  - Anticipated data product exchanges (public and non-public)
  - Contact information
- Finalized YAML definition of Libera Level-1B data product contents
- Coordinated first transfer of test Level-0 data between EDOS and ASDC

Systems & ASDC

Systems

- ASDC archive hardware moved to Computational Research Facility
- Deployed new production compute hardware
  - RHEL9
  - most PGEs had ~2x runtime speedup
  - science computing hardware to be deployed
- Expanding both science computing and production data storage

Web Unification



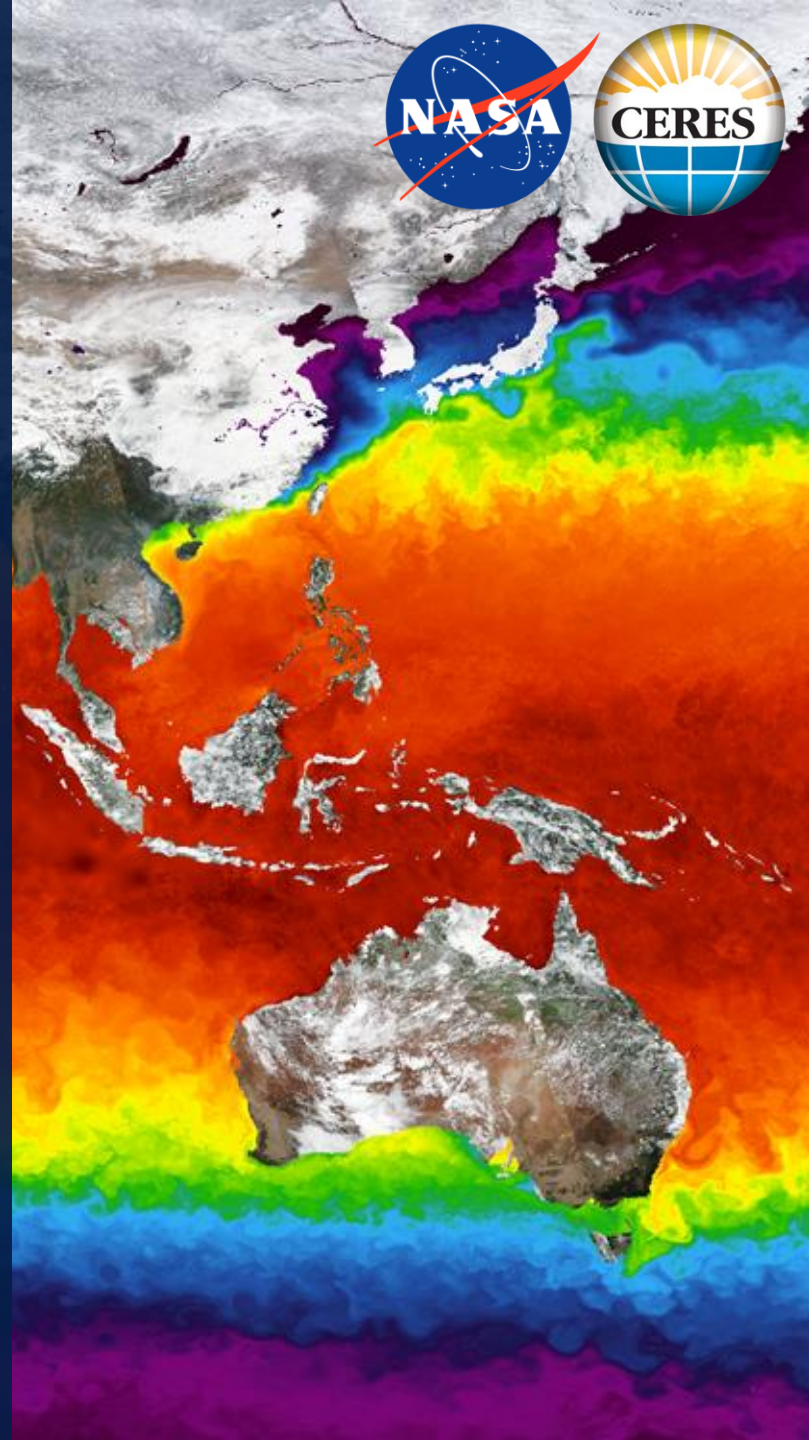
Achieving Earth Science to Action

Evolving Our Systems and Platforms

- Improve User Experience and accessibility through the Web Unification project
- Maximize efficiency and reduce friction by scaling and deploying *enterprise-level tools and services*

Evolving Our Data Stewardship

Enable better multi-mission and interdisciplinary activity support through the *migration of Earth data to the cloud* while maintaining world-class user support and documentation



WEB UNIFICATION

Earth Science Data Systems Program

- U.S. 21st Century Integrated Digital Experience Act (IDEA)
- all ESDS-funded public-facing web properties
- **By October 2026**. (ASDC: Spring 2026)

- improve discoverability and findability
- consistent identity across platforms
- build efficient pathways for users to access data and information
  - optimizing for all users
    - continue supporting experienced power users
    - onboard new users
- reduce vulnerabilities
- manage website usability, eliminate redundancy
- maximize effectiveness of communication

What Does NASA Earthdata Offer?

Access to science quality and near real-time datasets, services and tools for Earth's whole system

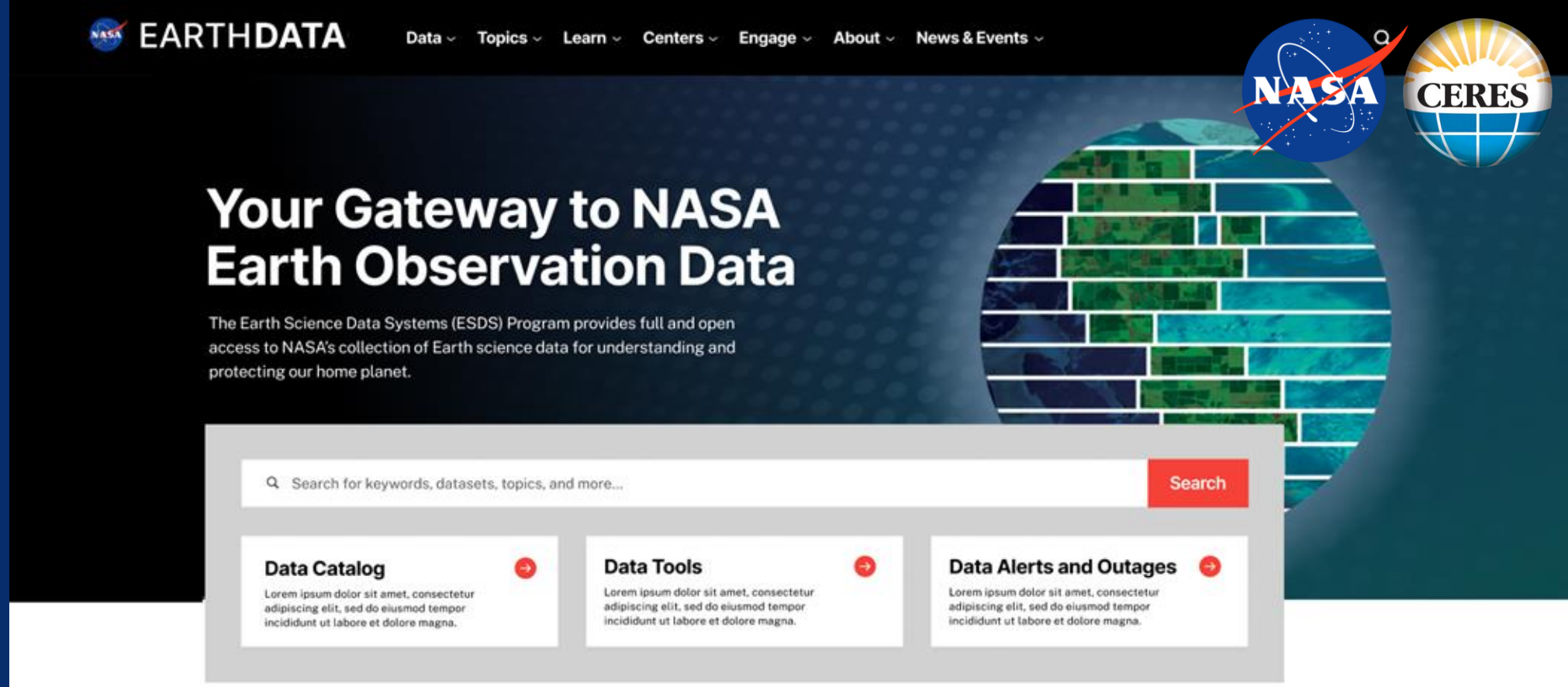
Links to learning resources: data recipes, tutorials, data discovery and data access webinars, GIS and cloud computing resources

Examples of how the data are being used in research and applications (e.g., Data User Profiles and Data Chats)

Opportunities for research and competitive programs, interagency initiatives, collaboration, and community engagement.

EARTHDATA

Updated Earthdata Website



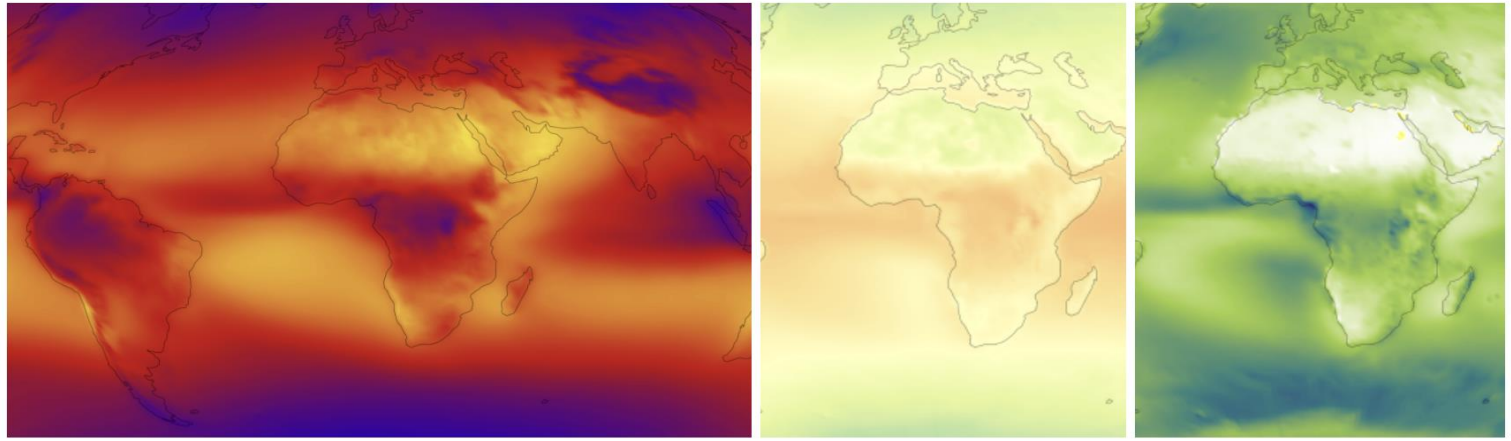
Browse Data by Topic

Connect to data through specific topics curated to support a wide range of scientific investigations.

- Atmosphere
- Biosphere
- Climate Indicators
- Cryosphere
- Human Dimensions
- Land Surface
- Ocean
- Solid Earth
- Sun-Earth Interactions
- Terrestrial Hydrosphere

Trending Subtopics

- Air Mass Density
- Wildfire
- Hurricane
- Ocean Waves
- Sea Surface Temperature



CERES

Clouds and the Earth's Radiant Energy System

Overview and Objectives

The Clouds and the Earth's Radiant Energy System (CERES) experiment is one of the highest-priority scientific satellite instruments developed for NASA's Earth Observing System (EOS) and continues through the Joint Polar Satellite System (JPSS). CERES is a key component of the Earth Observing System (EOS) program and serves as a follow-on to the successful Earth Radiation Budget Experiment (ERBE) mission.

DATA CENTERS

ASDC

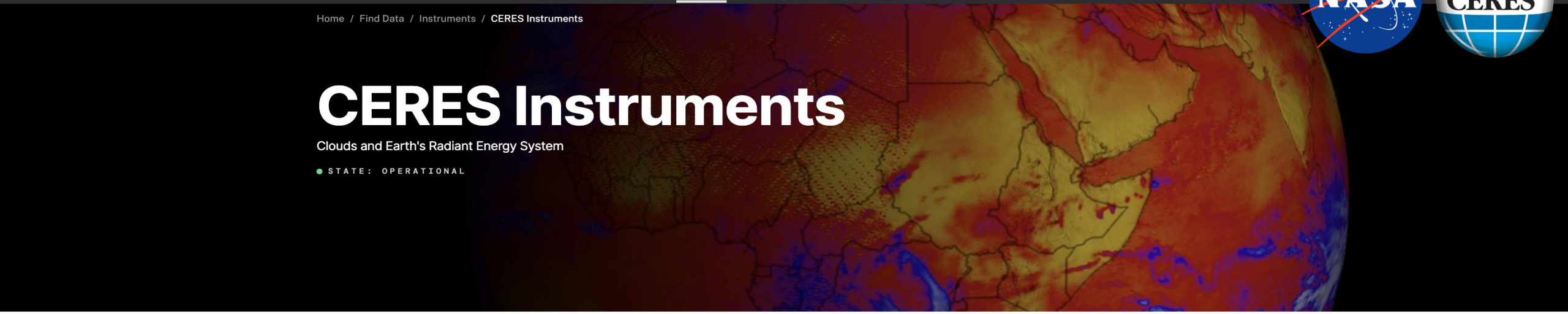
PARTNERS

CERES Science Page

Products and Data Analysis

CERES products include both solar-reflected and Earth-emitted radiation from the top of the atmosphere to the Earth's surface. The CERES instruments provide radiometric measurements of the Earth's atmosphere from three broadband channels. Cloud properties are determined using simultaneous measurements by other co-

CERES Earthdata Project Page



CERES Instruments

Clouds and Earth's Radiant Energy System

STATE: OPERATIONAL

The Clouds and the Earth's Radiant Energy System (CERES) experiment is one of the highest-priority scientific satellite instruments developed for NASA's Earth Observing System (EOS) and continues through the Joint Polar Satellite System (JPSS). CERES is a key component of the Earth Observing System (EOS) program and serves as a follow-on to the successful Earth Radiation Budget Experiment (ERBE) mission.

INSTRUMENT TYPE

Spectrometers/ Radiometers

INSTRUMENT SUBTYPE

Radiometers

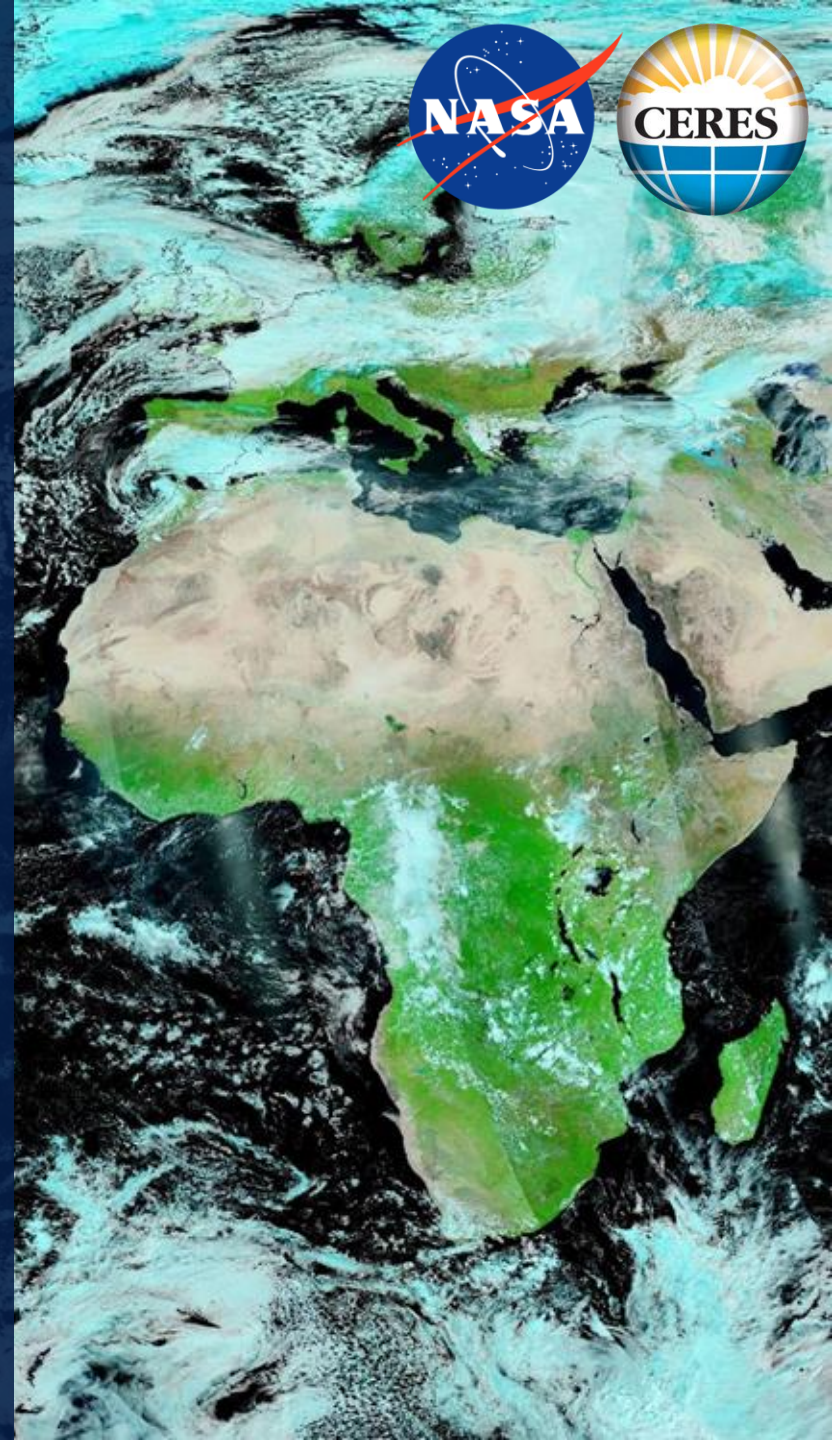
CERES Instruments and Satellites **Technical Specifications and Operations**

There have been seven operational CERES instruments:

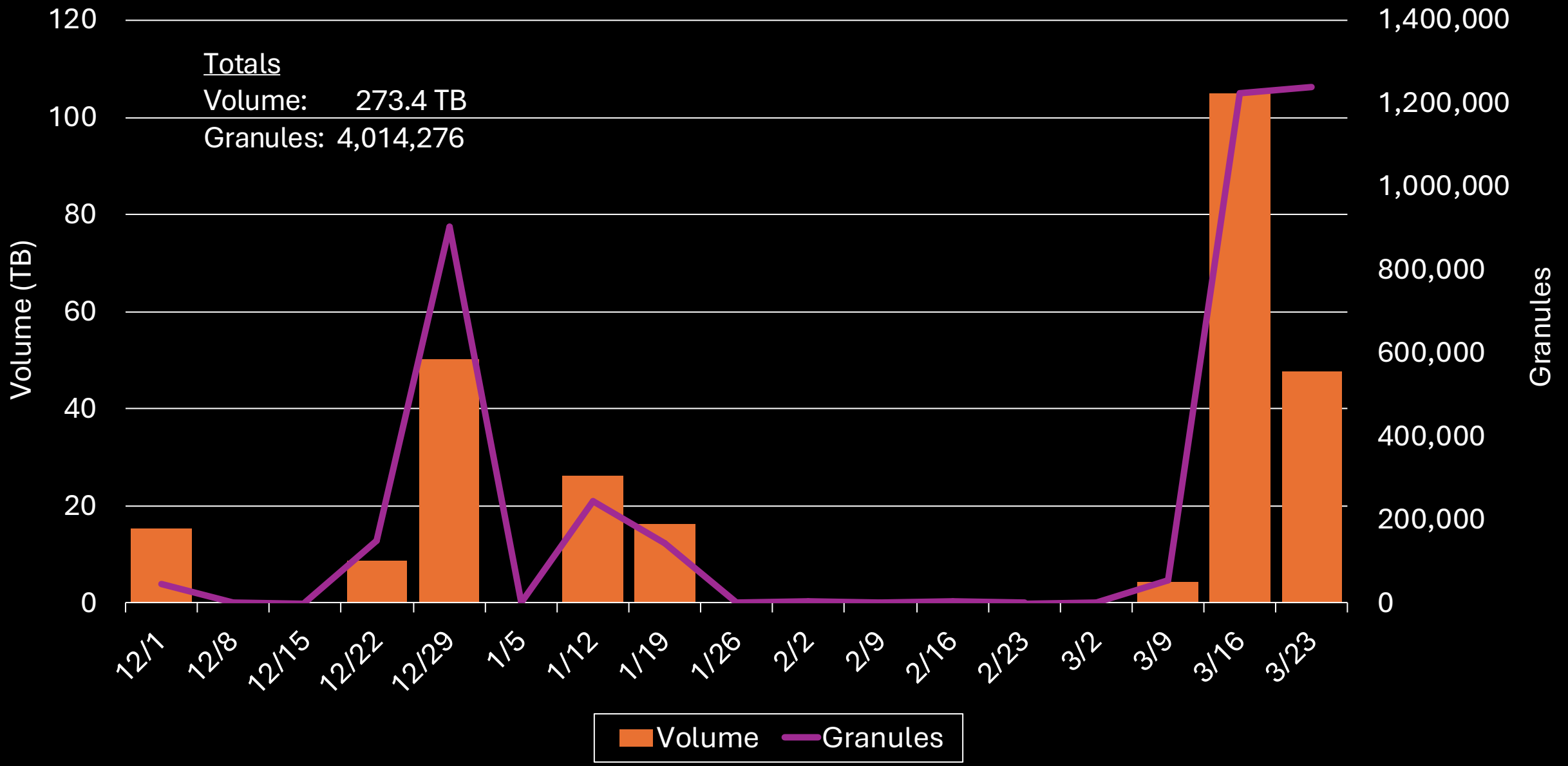
- The first CERES instrument, Proto-Flight Model (PFM) was launched on November 27, 1997 as part of the completed Tropical Rainfall Measuring Mission (TRMM).
- Two CERES instruments, Flight Models 1 and 2 (FM1 and FM2) were launched into polar orbit on board the EOS flagship Terra on December 18, 1999. FM2 ceased operations on January 10, 2025.
- Two additional CERES instruments, FM3 and FM4, were launched on board EOS Aqua on May 4, 2002

CERES Earthdata Instrument Page

Cloud Migration



Weekly Total Progress - CERES Data Cloud Ingest



Summary

- Anticipating several imminent Edition 5 software deliveries and processing
- Complying with data and web presence consolidation efforts
- State-of-the-art hardware in place to continue production reliably