

# CERES Data Management

Working Group Report  
CERES Science Team Meeting

Katie Deiwakh  
Walter Miller  
CERES DMT

OCTOBER 1, 2024

## Agenda

Background

Team Highlights

Improvements:

- Edition 5
- Code Re-architecture
- Systems

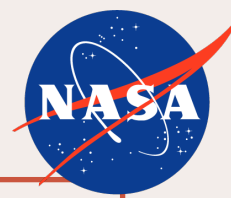
Summary





# Background

Clouds



Sunny Sun-Mack

Walter Miller

Ricky Brown

Rita Smith

Elizabeth Heckert

Yan Chen

Steven Kohler



Instrument

Denise Cooper  
Thomas Grepiotis  
Dianne Snyder  
Hunter Winecoff

ERBE-like

Dale Walikainen  
Jeremie Lande

Inversion



Victor Sothcott

Surface and Atmospheric Radiation Budget (SARB)

Thomas Caldwell

Temporal Interpolation and Spatial Averaging



Beau Branch  
Edward Kizer  
Joshua Wilkins

FLASHFlux

Jay Garg  
PC Sawaengphokhai  
Hunter Winecoff

Configuration Management (CM) & Infrastructure



Tammy Ayers  
Willinda Evans  
Nelson Hillyer  
Dennis Keyes

Production Request (PR) Tool

Carla Grune  
Elizabeth Heckert



## Visualization and Ordering Tool



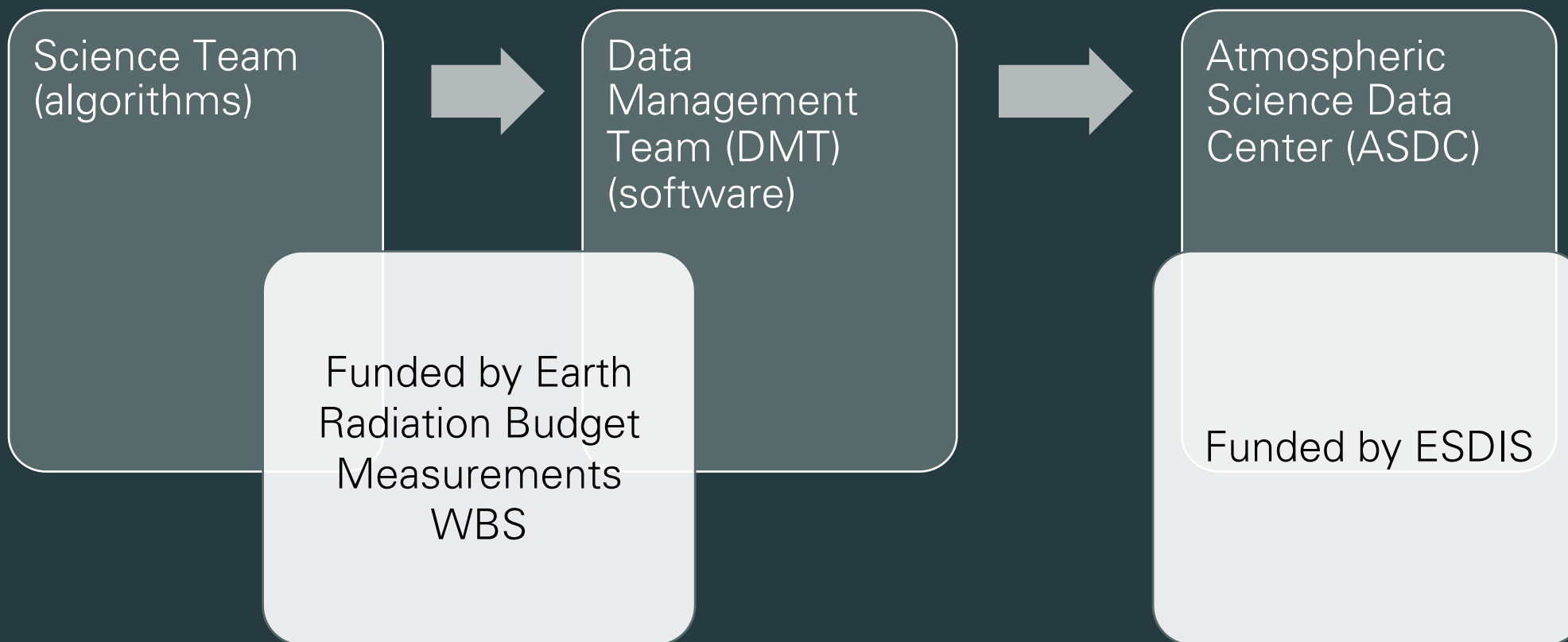
Churngwei Chu  
Pamela Mlynczak  
Babak Samani

## Atmospheric Science Data Center (ASDC) Support

Karen Brown  
Sharon Dukes-Allen  
Christopher Harris

## Background

CERES/RBSP – not a true Science-Investigator Processing System, or “SIPS”





# Team Highlights

add new PR PGE Template for FLASHFlux TISA Grid PGE, FLASH13-9.2P3  
to the CATALYST server to adjust job execution priority and limits for the number of high I/O jobs running at any one time.  
map 401 to MERRADStream for CER12.1P3

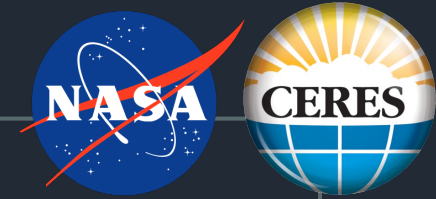
add new PR PGE Template for FLASHFlux TISA Average PGE, FLASH13-5.1P1  
of FLASHFlux TISA Average  
deactivate FLASH13-3.2P2 PGE, PRs and CATALYST status flags

Perf\_Lib module being added in SCCR 1951 to fix the issue with mails not being able to send out emails from the  
to library to handle sending email messages on AMI or AMI-p interactive or grid engine execution hosts.

Labels	Description
1865	Initial delivery of FLASHFlux Inversion subsystem (13-3.0P6, 13-3.1P6)
1865	Create CERES Archiver Profiles for FLASH Inversion PGEs.
1865	Create CATALYST PGE modules for FLASH Inversion PGEs.
1939	Initial delivery of FLASHFlux TISA Grid Subsystem (13-9)

10/1/2024

QC specific CERES Archiver profiles for Baseline1-QC processing for PGEs CER1.1P10, CER2.2P1, and CER2.2P2.



## Software Deliveries (50) – Highlights

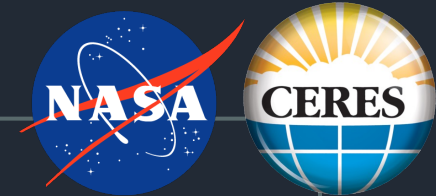
**TISA Gridding:** CldTypHist support for MERRA-2 reanalysis MOA input

**TISA Averaging:** Accommodating MERRA-2 input for top-of-atmosphere and surface radiation budget monthly and regional averaging

**Clouds:** Updating Edition 2A NPP cloud retrieval to use either GEOS 5.4.1 or MERRA-2 MOA

### **CATALYST:**

- Database simplification
- Stricter enforcement of string handling



## Software Deliveries (50) – Highlights

### PR Tool:

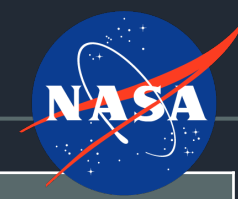
- NEW PR Tool user interface
- PHP upgrades for security compliance

### Instrument and ERBE-like:

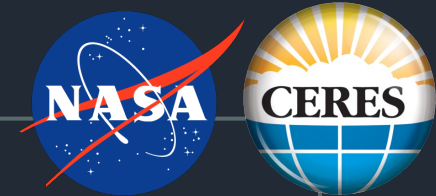
Various gains and spectral response function updates for instruments

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

# Product Availability



Product	Platform				Availability Thru
	Terra	Aqua	S-NPP	NOAA-20	
BDS	x	x	x	x	June 2024
SSF	x	x	x	x	June 2024
CRS	x	x			2018-2022
CRS1deg-Hour	x	x			2018-2022
SSF1deg-Hour	x	x	x	x	June 2024
SSF1deg-Day/-Month	x	x	x	x	June 2024
SYN1deg-1Hour/-MHour	Terra+Aqua			Terra+NOAA-20	June 2024
SYN1deg-Day/-Month	Terra+Aqua			Terra+NOAA-20	June 2024
CldTypHist	Terra+Aqua			Terra+NOAA-20	February 2024
FluxByCldTyp-Day/-Month	Terra+Aqua			NOAA-20	July 2024
EBAF	Terra+Aqua			x	May 2024
EBAF ToA	Terra+Aqua			x	June 2024



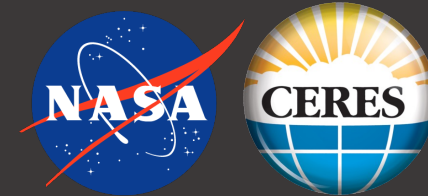
## New Production

Edition1C NOAA-20, featuring NOAA-20 Deep Blue data

Upcoming: Edition 4B SYN1deg (reprocessing):

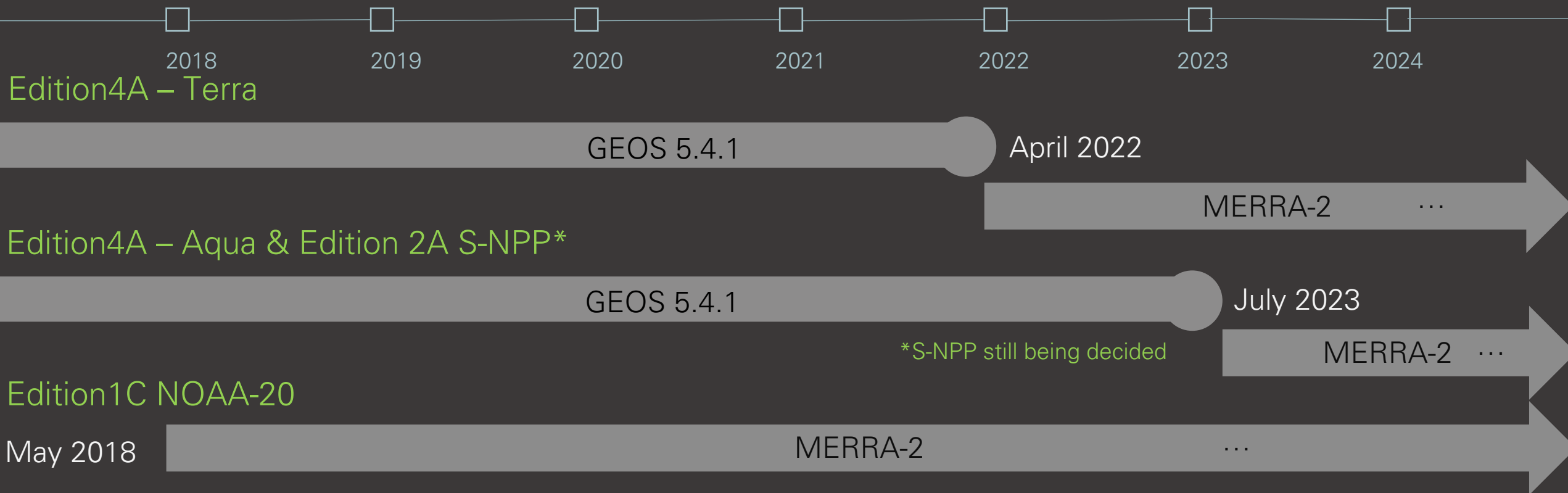
- Finishing GEO reprocessing: Validating new GGEOs with MERRA-2 clouds
- Twilight striping correction
- Updated interpolation scheme
- Reprocessing completed –  
Terra and Terra-Aqua periods (March 2000 to March 2022)
- Projected availability: Fall 2024

Upcoming: EBAF ToA Edition 4.2.1

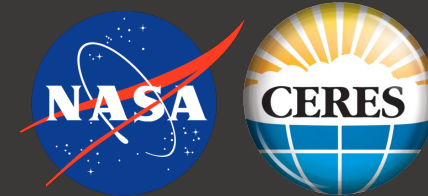


# Switch to MERRA-2 Reanalysis

SSF (Level 2) & SSF1deg (Level 3)

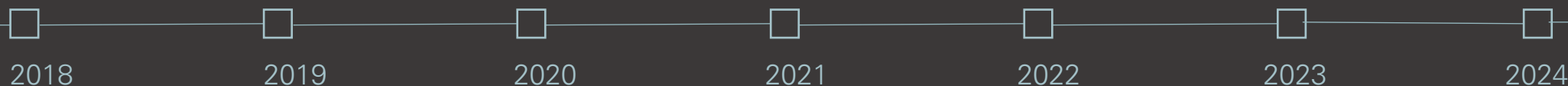






# Switch to MERRA-2 Reanalysis

SYN1deg (Level 3) Terra+Aqua / Terra+NOAA-20



Edition4A

GEOS 5.4.1

July 2024

Edition4B

GEOS 5.4.1

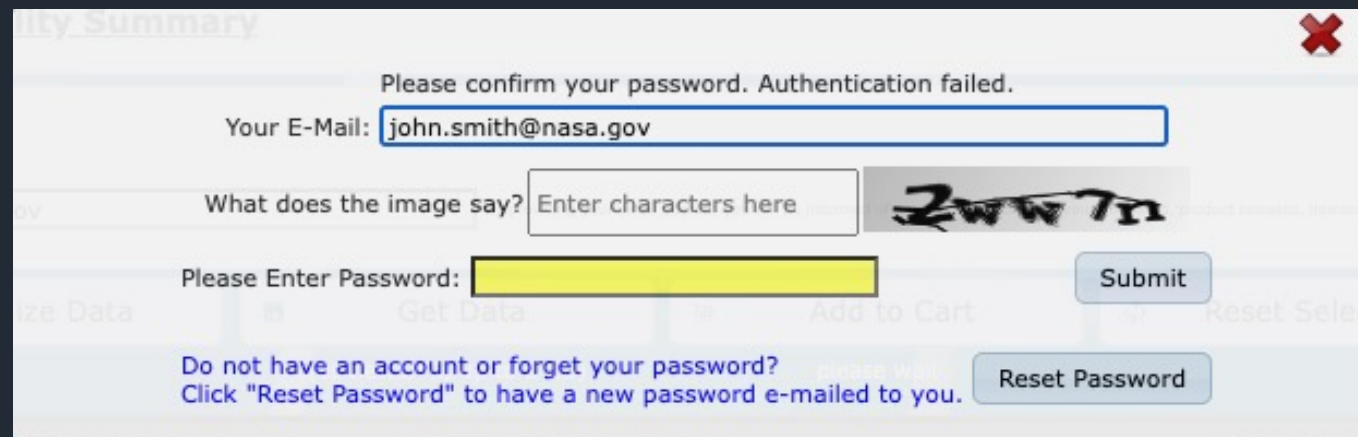
April 2022

MERRA-2

...

## CERES Ordering Tool

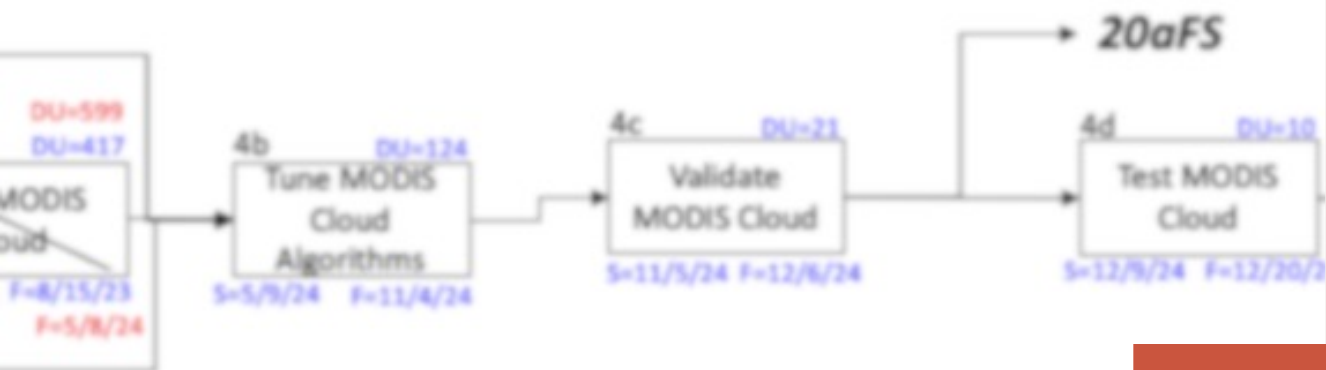
- Cybersecurity improvements, e.g. CAPTCHA:



The screenshot shows a web form titled "Identity Summary" with a red 'X' icon in the top right corner. The form contains the following elements:

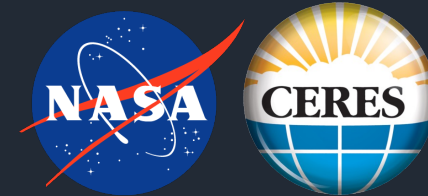
- A message: "Please confirm your password. Authentication failed."
- A text input field for "Your E-Mail:" containing the value "john.smith@nasa.gov".
- A CAPTCHA challenge: "What does the image say?" with a text input field containing "Enter characters here" and a small image of the text "2ww7n".
- A text input field for "Please Enter Password:" which is highlighted in yellow.
- A "Submit" button.
- A link: "Do not have an account or forget your password? Click 'Reset Password' to have a new password e-mailed to you." with a "Reset Password" button.

- Pre-production tool migration to virtual machines – no bare metal hosts remain!
- Save-as-ASCII – reducing backend requests, thus improving response
- RHEL8 testing underway



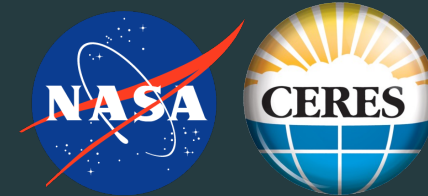
# Improvements





# Edition 5 Progress





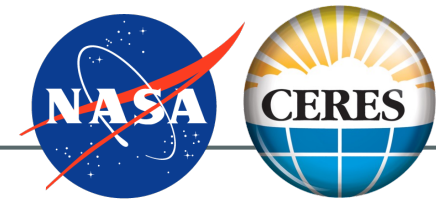
## Edition 5 Progress

- Tests with new ancillary input products
  - GEOS-IT
  - Collection 7 MODIS radiances
  - IGBP maps (from MODIS)
  - Emissivity maps (from IASI – Zhou and Huang)
  - NOAA CDR snow/ice
- Tests with new software/algorithms
  - Unfiltering algorithm for Inversion
  - High-resolution (0.5 x 0.5 degree lat/long) MOA code
  - New C++ gridding codebase
- Ran Alpha2 test in June 2024
- Alpha3 estimated: November 2024



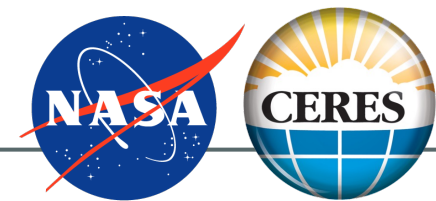
# Edition 5 Anticipated Data Product Availability

Product	Terra and Aqua	S-NPP and/or NOAA-20
BDS	DEC 2024	DEC 2025
SSF	APR 2027	DEC 2027
CRS	APR 2027	DEC 2027
SSF1deg-Hour	JUN 2027	JAN 2028
SSF1deg-Day/Month	JUL 2027	JAN 2028
SYN1deg-1 Hour/Mhour/Day/Month	MAR 2028	MAY 2028
CldTypHist	AUG 2027	MAY 2028
FluxByCldTyp	JUL 2027	MAR 2028
EBAF-TOA	SEP 2028	SEP 2028
EBAF	SEP 2028	SEP 2028



## Clouds Re-Architecture

- Finished “magic number” refactoring of clouds mask
- Created configuration file for unit test cases
- Refining testing framework in CI/CD pipeline
  - Isolated to clouds mask processing
  - More automated
  - Sparse Git checkouts enabled to minimize data overhead
  - BeyondCompare integrated for easier debugging



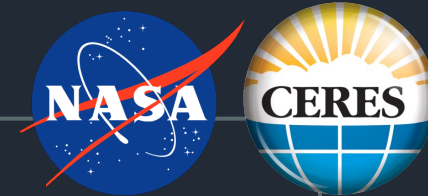
## TISA Code Re-Architecture

- Continuing to run Hybrid Edition4A/Edition 5 codebase to enable intercomparisons
  - Creating binary zonal files (old style) from new, netCDF4 files
  - NB2BB-to-gridding interface testing underway with GEOscan data
- Exercising more of new pipeline for Edition 5:
  - Aggregating gridded Alpha2 data more efficiently:
    - Writing out by the hour – more efficient writes
    - Saving a month's worth of hourly data – more efficient monthly reads
  - Testing new interpolation code on Alpha2 gridded input
  - Improved diagnostic execution setting for testing



# Libera Data Management Working Group (DMWG)





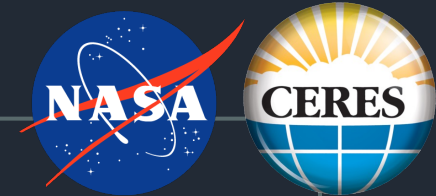
## Libera Data Management Working Group (DMWG)

- Technical Interchange Meeting at Laboratory for Atmospheric and Space Physics (LASP) – September 18-19, 2024
  - Refined data and data format needs
  - Identified necessary tests
    - LASP will examine upcoming CERES Edition 5 BDS
    - RBSP will test with Libera Level 1B format (synthetic data)
  - ASDC presented its project processes
- Working on best location(s) to document actions within LASP-RBSP DMWG



## Systems

- Data migration to new archive underway
- RHEL8 upgrades underway
- Potentially testing RHEL9



## ASDC & SCF Support

- Updating URLs and publications referenced in metadata
- All ASDC data to Earthdata Cloud by 2026
  - Tested CERES SSF most recently
  - Most CERES collections pushed to Earthdata Cloud by end of 2024



## Summary

- Continuing to develop Edition 5 algorithms and code
- Fall 2024 transition to Edition 4B for SYN1deg products
- Code re-architecture ongoing
- Working with ASDC to upkeep infrastructure & metadata

Questions?

