

CERES Data Management

Working Group Report
CERES Science Team Meeting

Katie Dejewakh
Walter Miller
CERES DMT

MAY 14, 2024

Agenda

Background

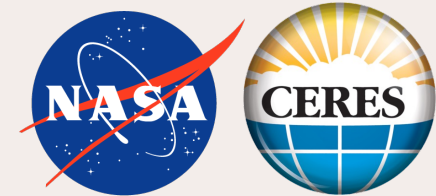
Team Highlights

Improvements:

- Edition 5
- Code Re-architecture
- Systems

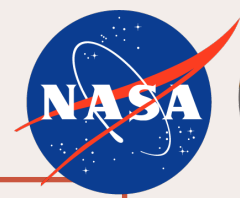
Conclusion





Background

Clouds



Sunny Sun-Mack

Walter Miller

Ricky Brown

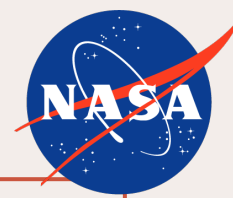
Rita Smith

Elizabeth Heckert

Yan Chen

Steven Kohler

Instrument

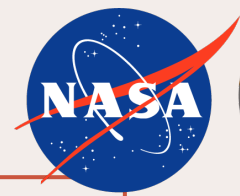


Denise Cooper
Thomas Grepiotis
Dianne Snyder
Hunter Winecoff

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

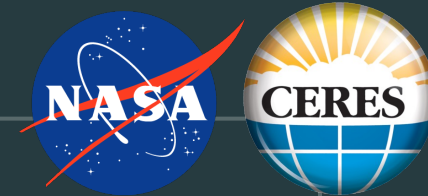
Visualization and Ordering Tool



Churngwei Chu
Pamela Mlynczak
Babak Samani

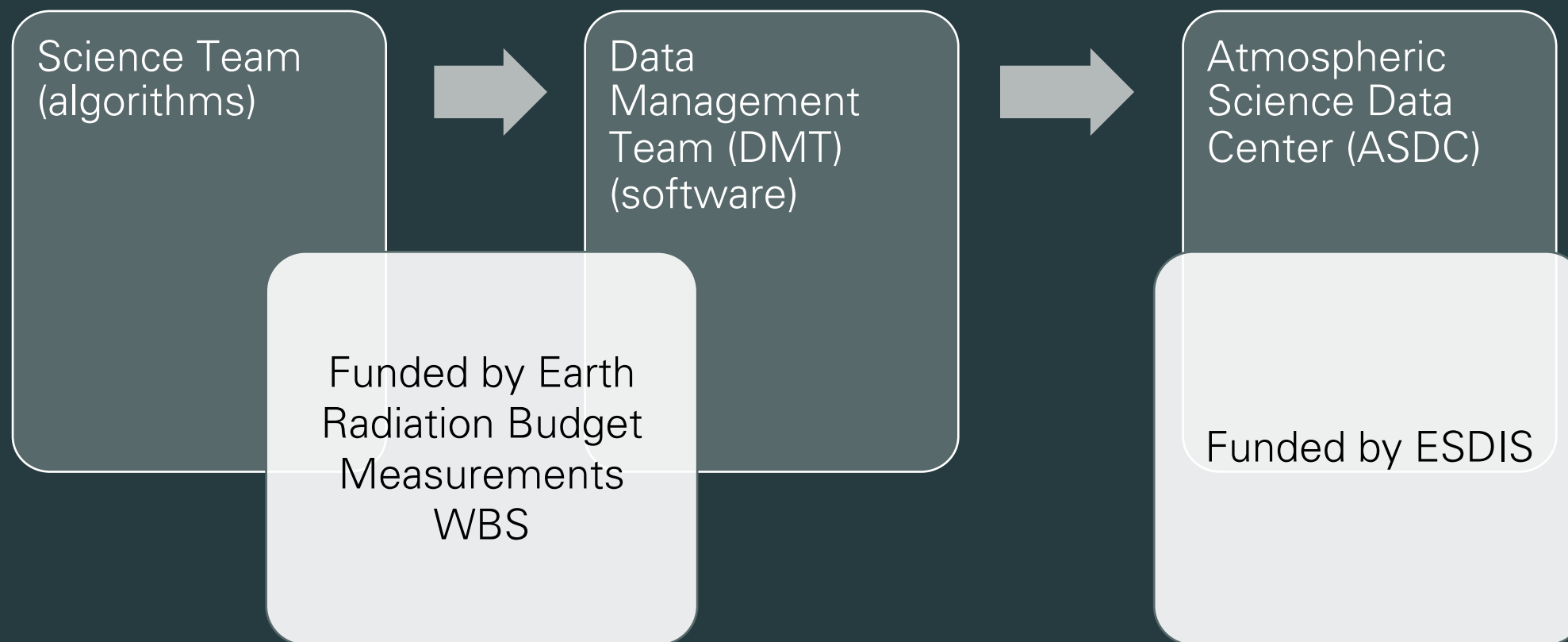
Atmospheric Science Data Center (ASDC) Support

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

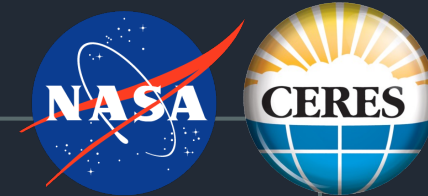
add new PR PGE Template for FLASHFlux TISA Average PGE, FLASH13-5.1P1
of FLASHFlux TISA Average

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)

5/14/2024

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



Software Deliveries (69)

TISA Gridding:

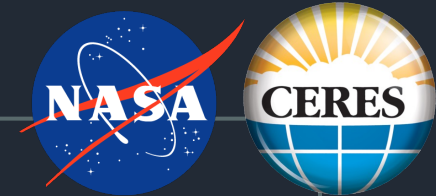
- Reconfiguration to support MERRA-2 reanalysis MOA input option
- Update to support Edition1C NOAA-20 processing
- Initial delivery of C++ PGE code to produce CRS1deg-Hour from CRS Level 2 data

Clouds:

Update Edition1B cloud retrieval to use either GEOS 5.4.1 or MERRA-2 MOA

Inversion:

Update Edition1B Inversion code to use either GEOS 5.4.1 or MERRA-2 MOA



Software Deliveries (69)

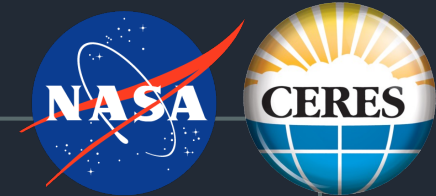
FLASHFlux:

- Clouds normalization files between Terra MODIS C6.1-C5 and NOAA-20 VIIRS V2-Aqua MODIS C5
- Spectral calibration coefficient files

Instrument and ERBE-like:

Several rounds of gains and spectral response function updates for instruments

TISA Averaging: Interpolation adjustment to support surface flux processing



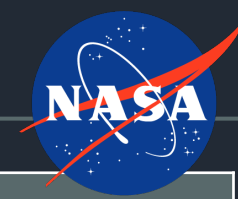
Software Deliveries (69)

CATALYST, PR Tool, and CERESlib:

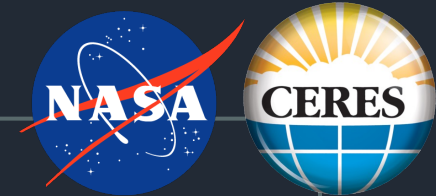
- MERRA-2 MOA input support
- NOAA-20 Deep Blue aerosol input support

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	February 2024
SSF	x	x	x	x	February 2024
CRS	x	x			2018-2022
CRS1deg-Hour	x	x			2018-2022
SSF1deg-Hour	x	x	x	x	February 2024
SSF1deg-Day/-Month	x	x	x	x	February 2024
SYN1deg-1Hour/-MHour	Terra+Aqua			Terra+NOAA-20	February 2024
SYN1deg-Day/-Month	Terra+Aqua			Terra+NOAA-20	February 2024
CldTypHist	Terra+Aqua			Terra+NOAA-20	February 2024
FluxByCldTyp-Day/-Month	Terra+Aqua			NOAA-20	February 2024
EBAF	Terra+Aqua			x	December 2023
EBAF ToA	Terra+Aqua			x	February 2024



New Production

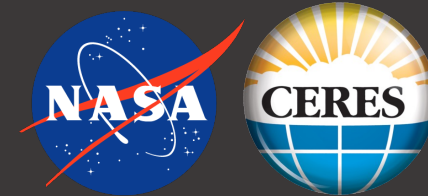
Released: Edition 4A CRS1deg-Hour

Upcoming: Edition 1C NOAA-20, featuring NOAA-20 Deep Blue data

Upcoming: Edition 4B SYN1deg (reprocessing):

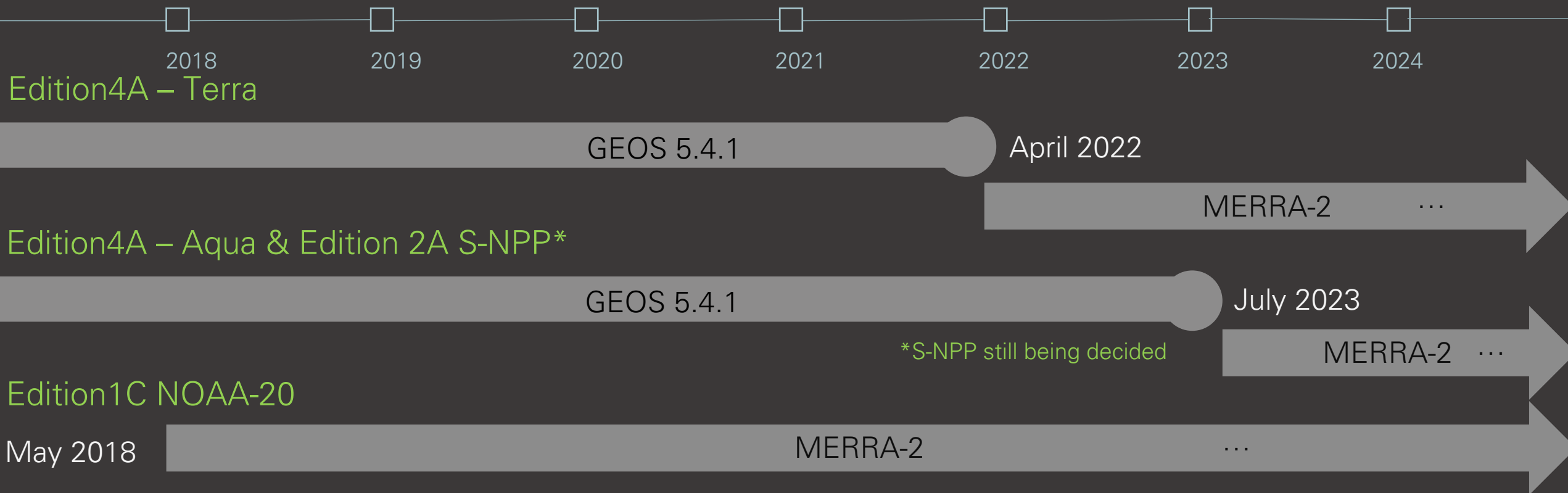
- Finishing GEO reprocessing: GOES-15 and GOES-17
- Twilight striping correction
- Updated interpolation scheme
- Reprocessing begun – projected finish: Summer 2024

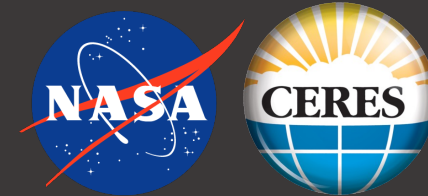
Upcoming: Edition 5 Machine-Learning Flux (MLF)



Switch to MERRA-2 Reanalysis

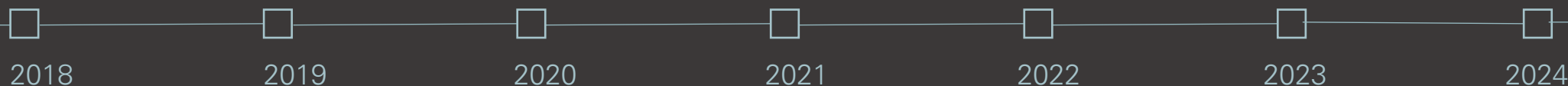
SSF (Level 2) & SSF1deg (Level 3)





Switch to MERRA-2 Reanalysis

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



Edition4A

GEOS 5.4.1

July 2024

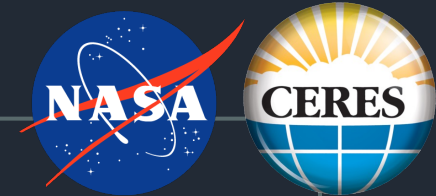
Edition4B

GEOS-IT

April 2022

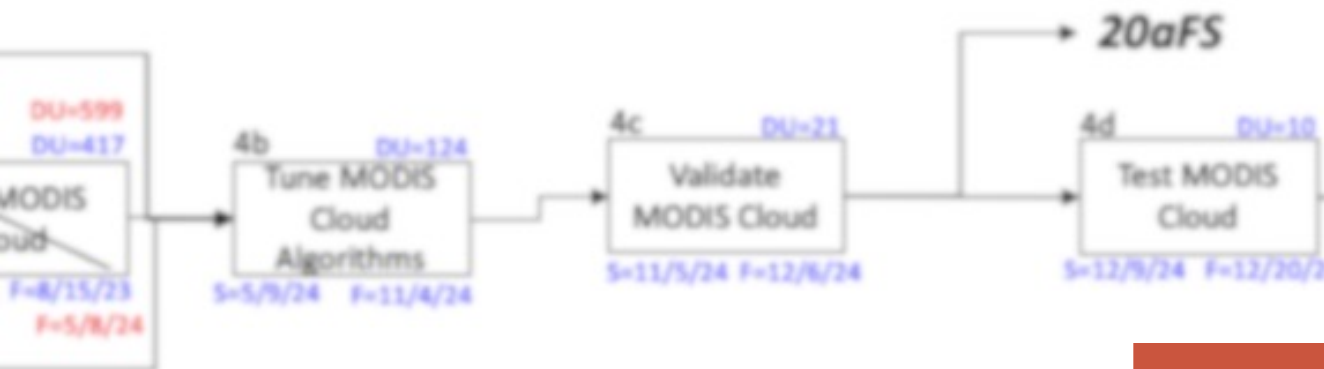
MERRA-2

...



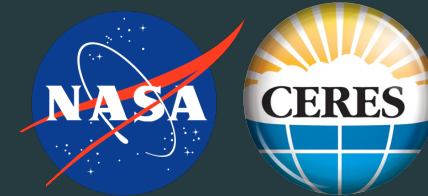
CERES Ordering Tool

- Clouds visualization back-end codebase merge
- Preparation for pre-production tool migration to virtual machines
- Support for new data service
 - Public product: CRS1deg-Hour
 - Internal testing: "Alpha1" Edition 5

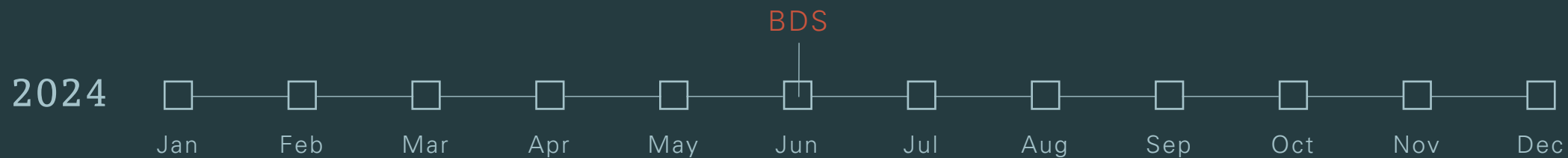
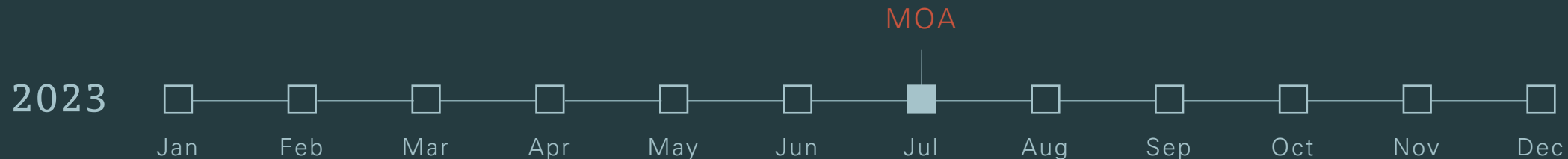


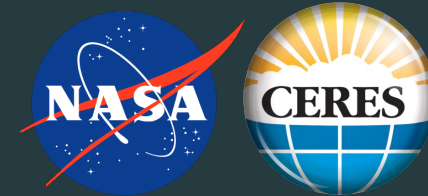
Improvements





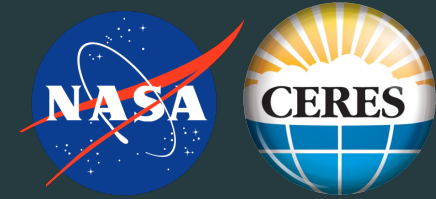
Edition 5 Progress





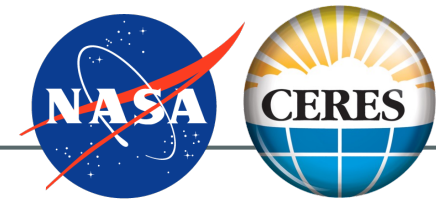
Edition 5 Progress

- 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 Alpha1 test in November 2023
- Alpha2 estimated June/July 2024



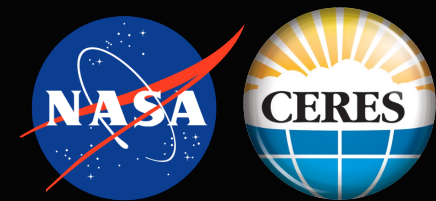
Edition 5 Anticipated Data Product Availability

Product	Terra and Aqua	S-NPP and/or NOAA-20
BDS	MAR 2025	DEC 2025
SSF	OCT 2026	JUL 2027
CRS	OCT 2026	JUL 2027
SSF1deg-Hour	FEB 2026	JUL 2027
SSF1deg-Day/Month	MAR 2026	AUG 2027
SYN1deg-1Hour/Mhour/Day/Month	OCT 2027	NOV 2027
CldTypHist	OCT 2027	NOV 2027
FluxByCldTyp	MAR 2027	SEP 2027
EBAF-TOA	DEC 2027	JAN 2028
EBAF	FEB 2028	MAR 2028



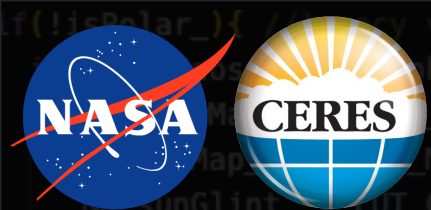
TISA Code Re-Architecture

- Running Hybrid Edition4A/Edition 5 codebase to enable intercomparisons
 - Creating binary zonal files (old style) from new, netCDF4 files
 - Refining creation of XGLB coefficients for production runs
 - NB2BB handoff to gridding still under development
- Maturing C++ gridding codebase
 - Testing on new product, Edition 4A CRS1deg-Hour
 - Gridding LW fluxes (SW fluxes in development)
 - Developing associated C++ library for general use
- Increasing use of JSON files to configure code and reduce complexity



Clouds Code Re-Architecture

- Running validation test cases against new, C++ codebase
- AWS PGE run prototyping
- Writing documentation for current, best setup
- Setup:
 - ECS container orchestration
 - Tested Fargate vs. EC2 for scaling
 - EC2 more flexible
 - Enables FSX (filesystem) usage
 - Largely as performant as on premises runtime
 - Most significant gains potentially algorithm, software design



Clouds Code Re-Architecture – AWS

→ 1. ECS Service starts instance from AMI

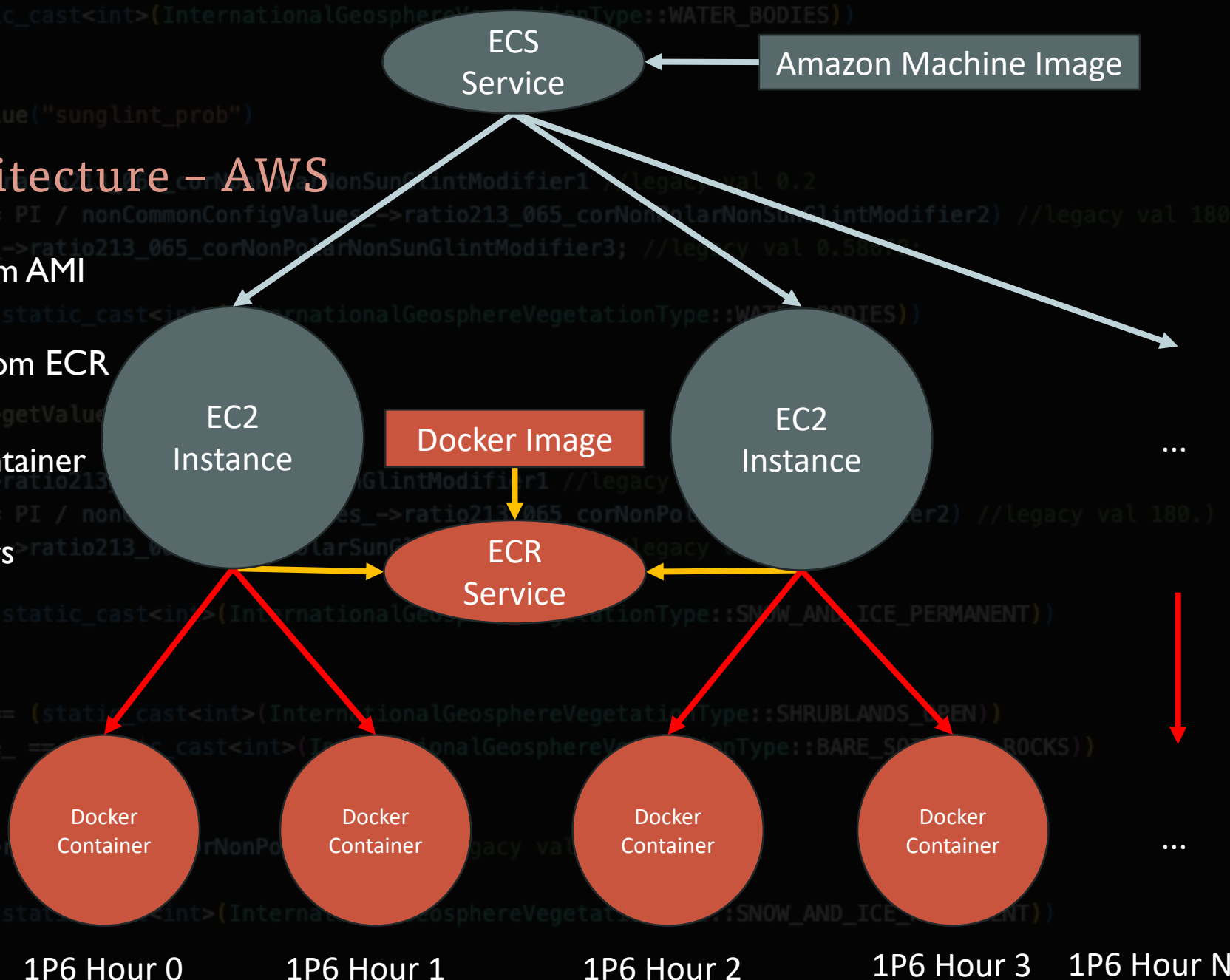
→ 2. Instance Pulls Docker Image from ECR

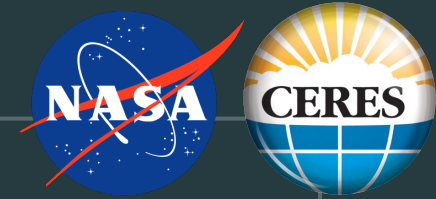
→ 3. Instance Launches Docker Container

4. Clouds PGE Runs in Containers

Elastic Container Service (ECS) / Elastic Cloud Compute (EC2)

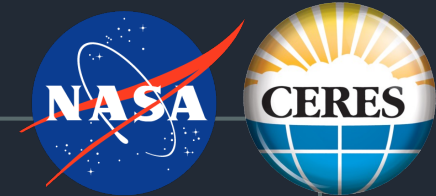
Elastic Container Registry (ECR) / Docker





Open Science

- Team members attending NASA Software for the SMD Workshop, May 7-9, 2024 at NASA Headquarters
 - Presenting TISA:
 - Level 3 framework improvements
 - Developer-scientist collaborative technique
- Metadata and variable improvements aligning with OSSI/TOPS data best practices



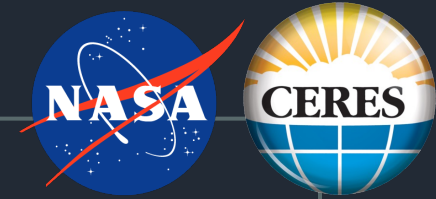
Libera Data Management Working Group

- LASP-RBSP meeting every other week
 - Level 1B data requirements
 - Data transfer interfaces and testing strategy
 - LASP→ASDC
 - ASDC→LASP
- LASP-ASDC: finished interface control document (ICD)



Systems

- Data migration to new archive underway
- Renewed Red Hat Linux subscriptions
- Dell/EMC Isilon → Dell PowerScale storage refresh



ASDC & SCF Support

- Refining collection-level metadata for ancillary geostationary imager data
- Receiving continued support for processing and storage infrastructure
 - Quickly resolving IT security vulnerabilities
 - Migrating systems to RHEL8 from RHEL7



5/14/2024

Conclusion

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

Questions?

