CERES Data Management

Working Group Report
CERES Science Team Meeting

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Walter Miller
CERES DMT

OCTOBER 1, 2024

Agenda

Background

Team Highlights

Improvements:

- Edition 5
- Code Re-architecture
- Systems

Summary

Background

Data Management Team (DMT)

Clouds

Sunny Sun-Mack

Walter Miller

Ricky Brown

Rita Smith

Elizabeth Heckert

Yan Chen

Steven Kohler

DMT

Instrument

Denise Cooper

Thomas Grepiotis

Dianne Snyder

Hunter Winecoff

ERBE-like

Dale Walikainen

Jeremie Lande

DMT

Inversion

Victor Sothcott

Surface and Atmospheric Radiation Budget (SARB)

Thomas Caldwell

DMT

Temporal Interpolation and Spatial Aver[illegible]ls

Beau Branch

Edward Kizer

Joshua Wilkins

FLASHFlux

Jay Garg

PC Sawaengphokhai

Hunter Winecoff

DMT

Configuration Management (CM) & Infra[illegible]re

Tammy Ayers

Willinda Evans

Nelson Hillyer

Dennis Keyes

Production Request (PR) Tool

Carla Grune

Elizabeth Heckert

Partner Teams

Visualization and Ordering Tool

Churngwei Chu

Pamela Mlynczak

Babak Samani

Atmospheric Science Data Center (ASDC) Support

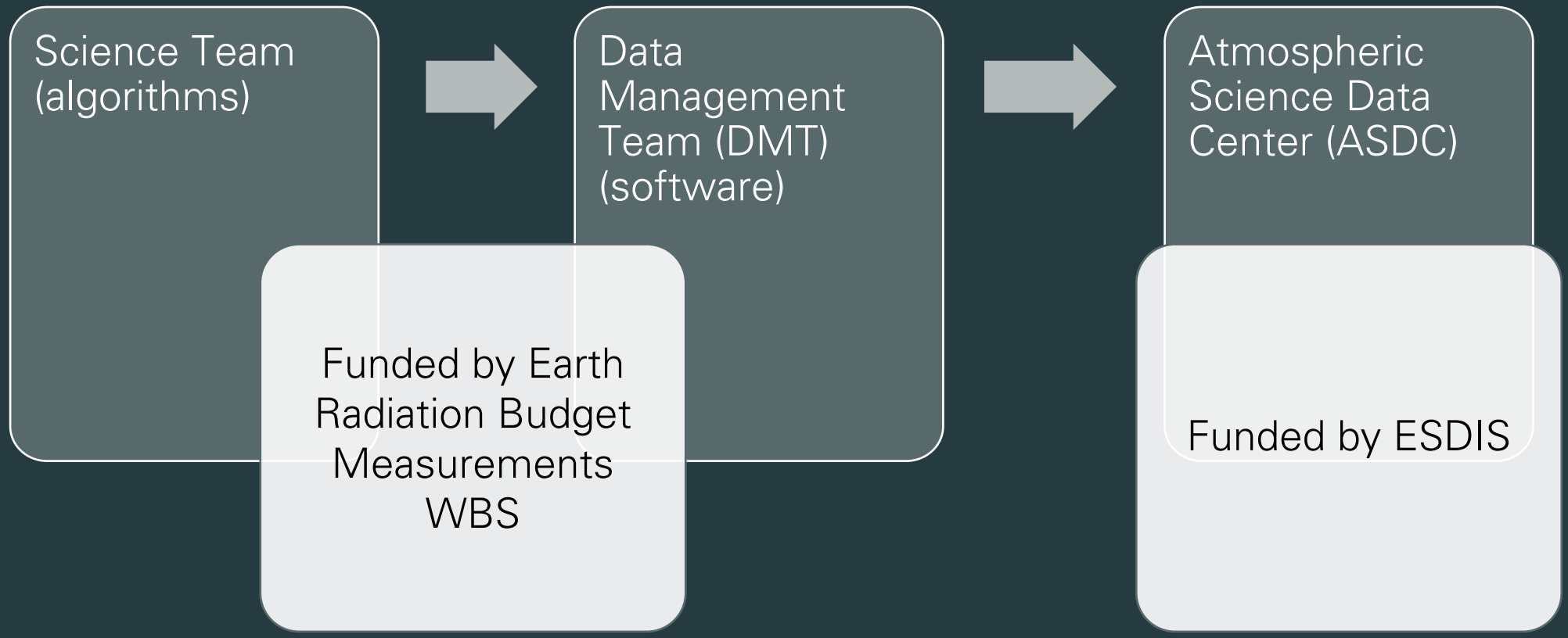
Karen Brown

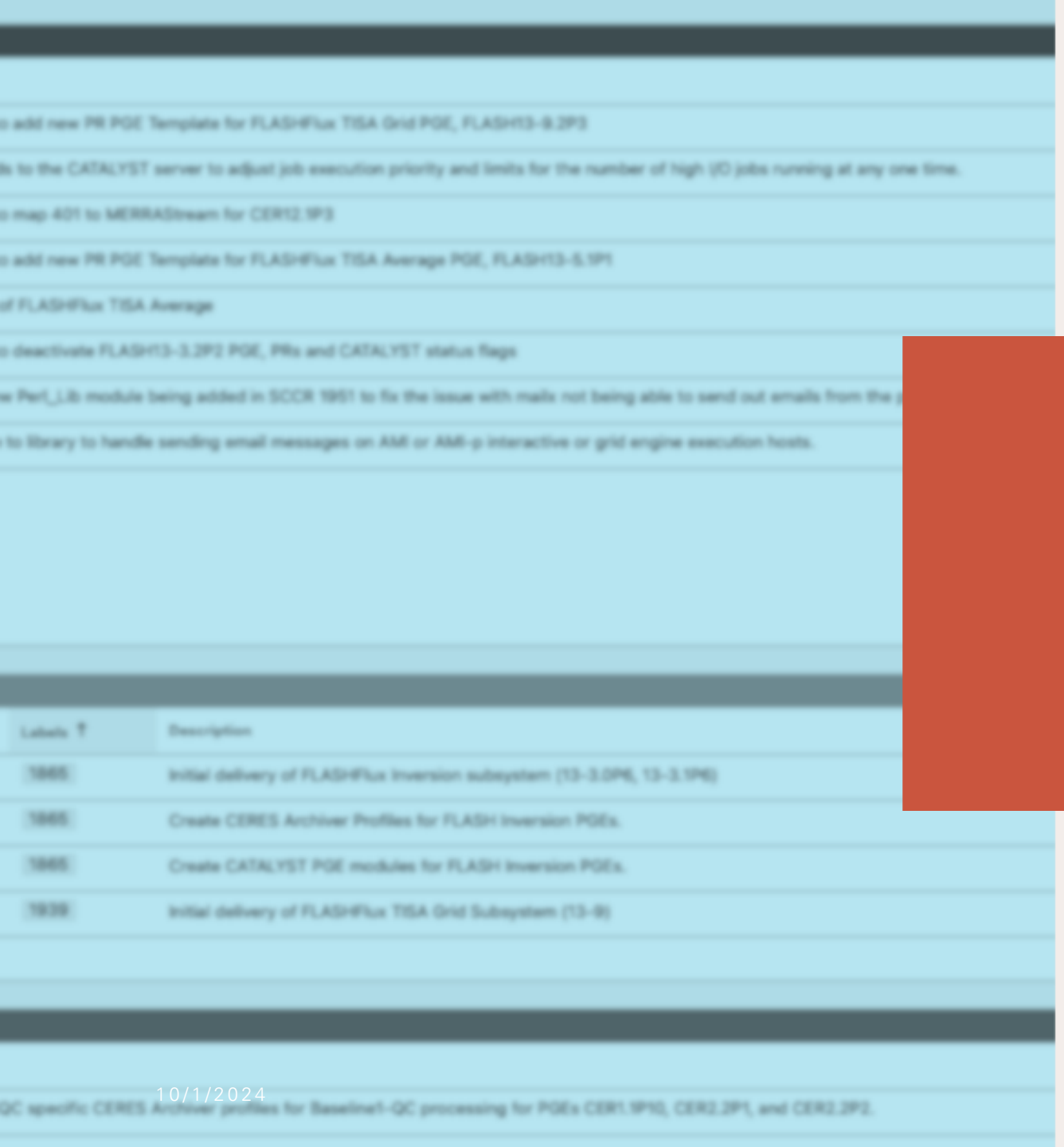
Sharon Dukes-Allen

Christopher Harris

Background

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





Team Highlights

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

	Platform				
Product	Terra	Aqua	S-NPP	NOAA-20	Availability Thru
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

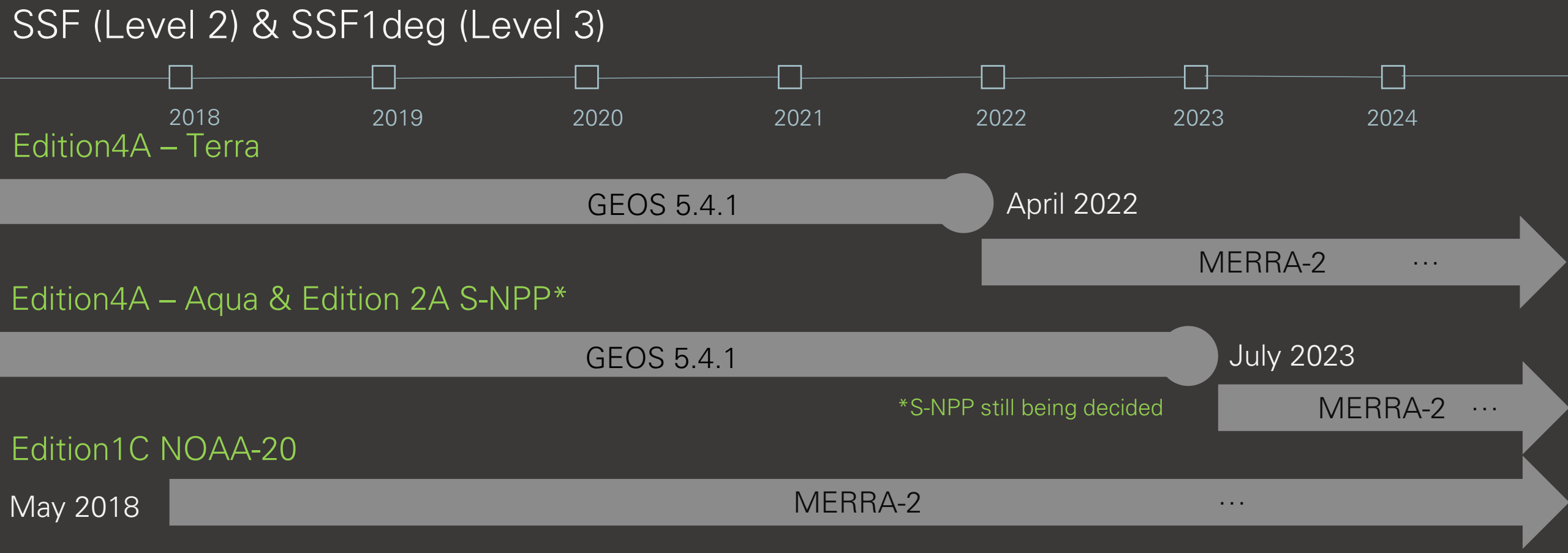
Edition1C NOAA-20, featuring NOAA-20 Deep Blue data

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

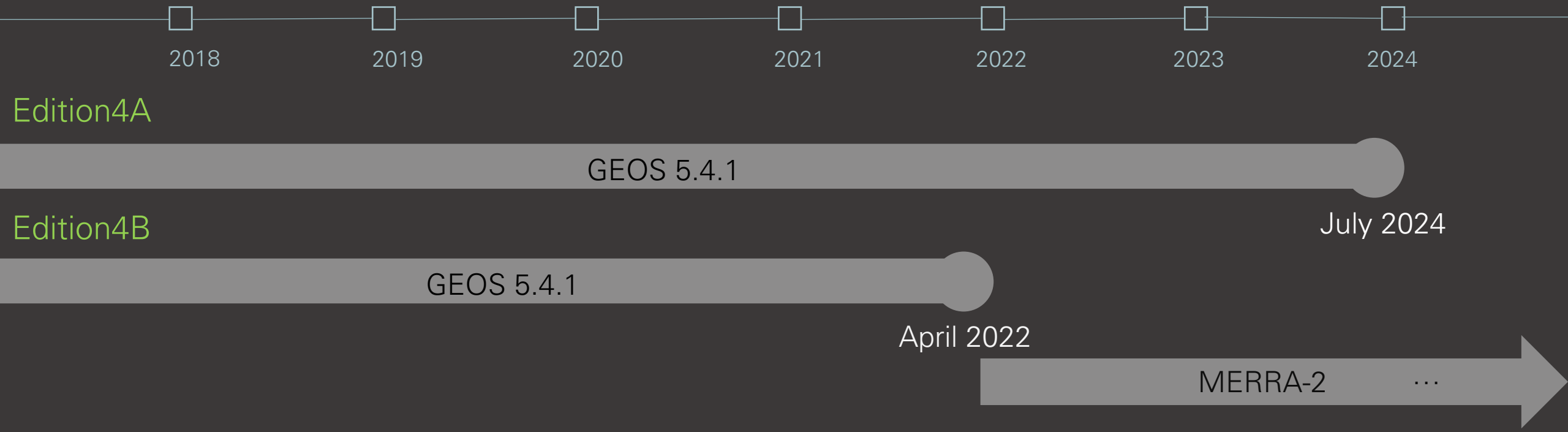
Upcoming: EBAF ToA Edition 4.2.1

Switch to MERRA-2 Reanalysis



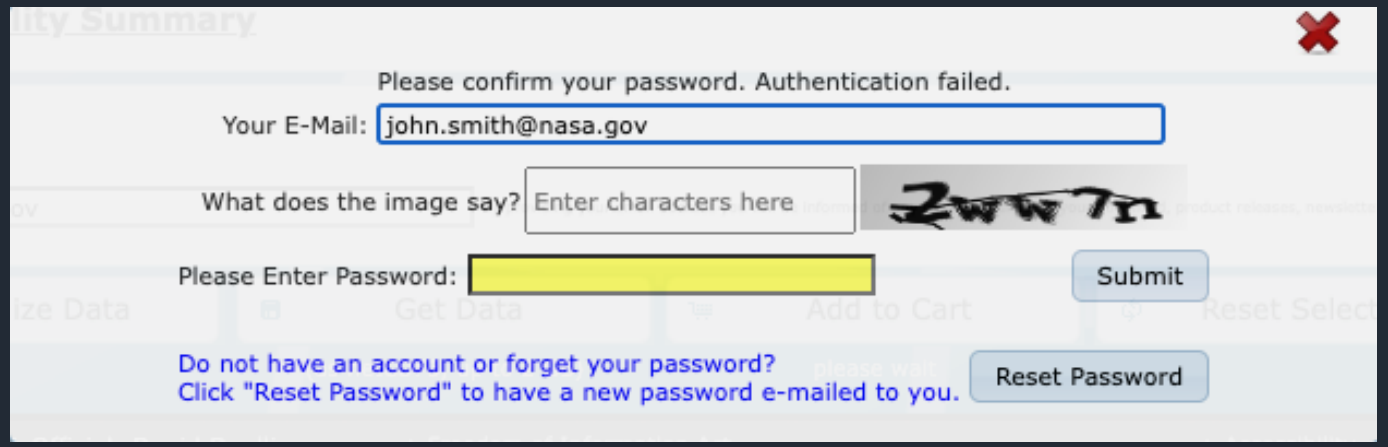
Switch to MERRA-2 Reanalysis

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

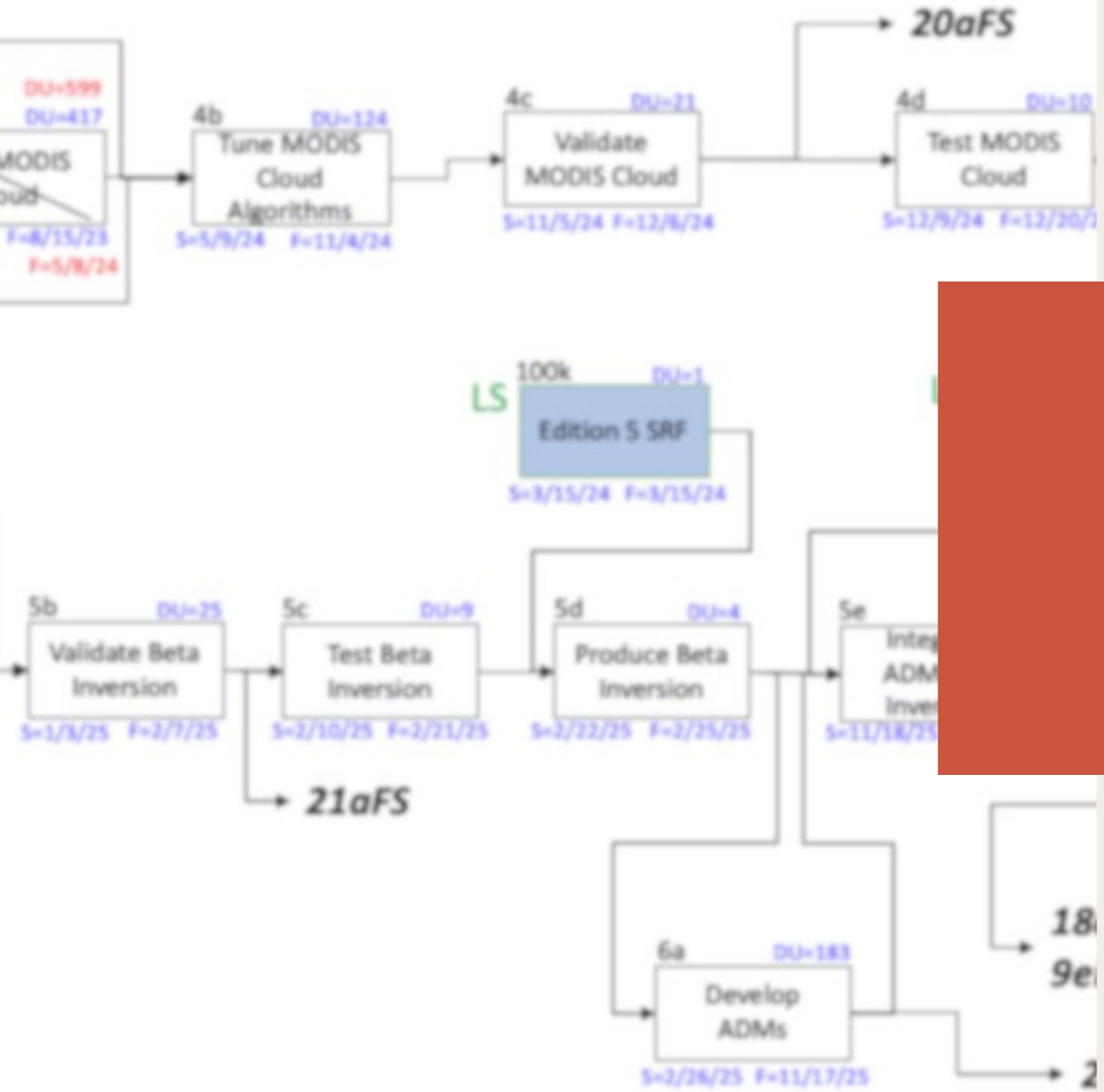


CERES Ordering Tool

- Cybersecurity improvements, e.g. CAPTCHA:



- Pre-production tool migration to virtual machines – no bare medal hosts remain!
- Save-as-ASCII
- RHEL8 testing underway



Improvements

Edition 5 Progress

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- 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-1Hour/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

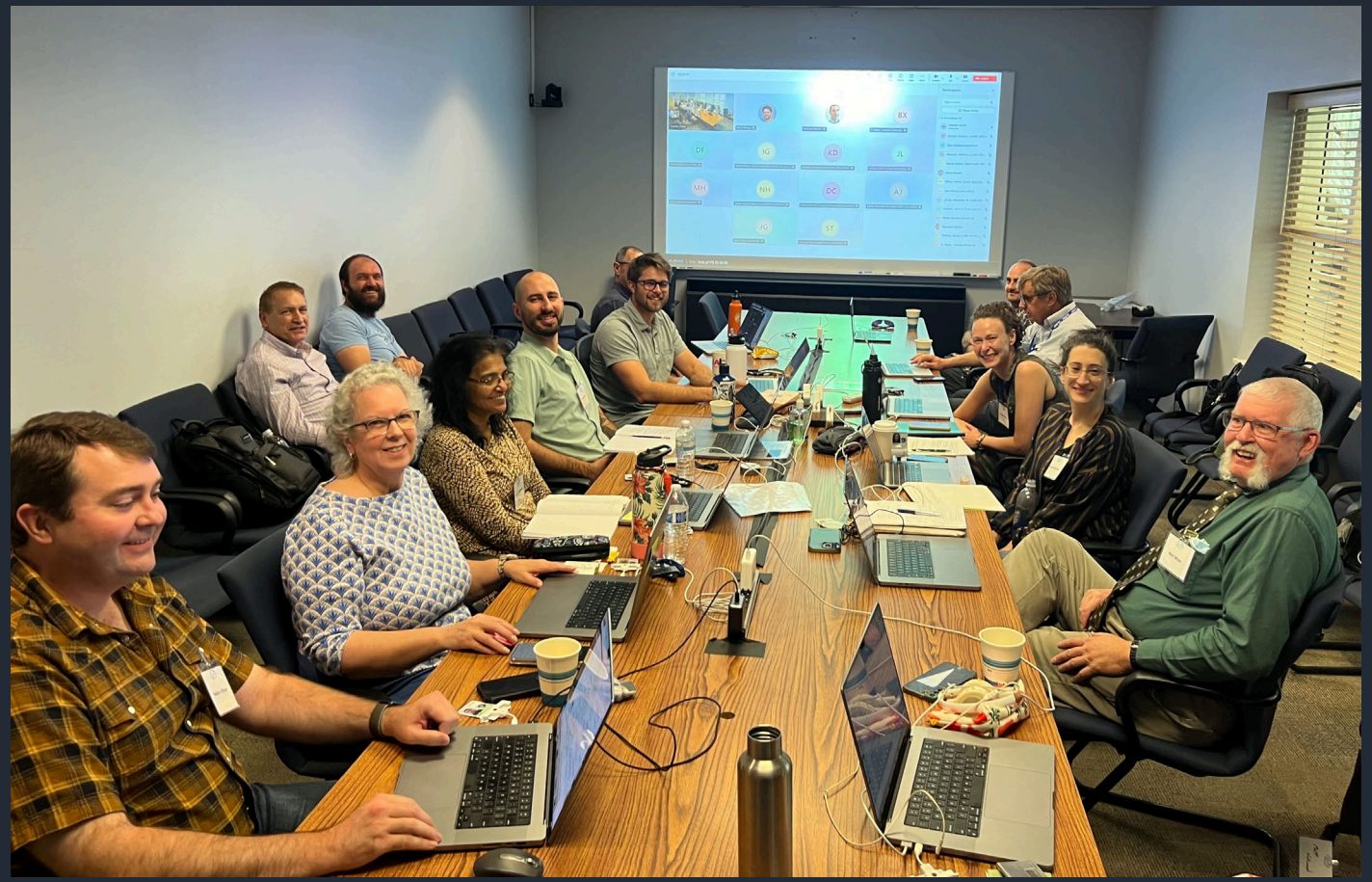
Clouds Re-Architecture

- 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
- Summer 2024 transition to Edition 4B for SYN1deg products
- Code re-architecture ongoing
- Working with ASDC to upkeep infrastructure & metadata

Questions?