Cloud Migration of Satellite Sea Surface Temperature Products

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NOAA/NESDIS/
Office of Satellite Products and Operations
Satellite Products and Services Division

GHRSST Meeting June 27-July 1, 2022

Overview

- Background
- NCCF Example Case
- Looking Ahead

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Office of Satellite Products and Operations
Satellite Products and Services Division

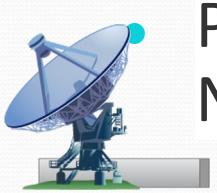
Background

OSPO collaborates with STAR on SSTs and OSPO provides

- 24-hour operational product production (PP),
- 24-hour operational product distribution(PD),
- adherance to NESDIS product requirements wrt standard operational procedures, product maintenance, and
- user services (24-hours, 7-days a week) in general.

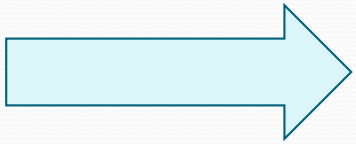
Background

- **OSPO SST** PP involves both DEV and OPS processing environments, which are being transitioned into the NESDIS Common Cloud Framework (NCCF) in collaboration with the NOAA/NESDIS/Office of Satellite Ground Services (OSGS);
- **OSPO SST** PD is primarily through the PDA (Product Distribution and Access) system; in addition to some web access components.
- Product archival components are in collaboration with NCEI-CLASS.



Background

- GHRSST products through OSPO in collaboration with STAR include
  - Level-2 and -3 Advanced Clear-Sky Processor for Oceans (ACSPO) [with Alex (Sasha) Ignatov] and
  - Level-4 Geo-Polar Blended SST products [with Eileen Maturi and Andy Harris].
- Other SSTs include
  - Himawari SSTs



- Background
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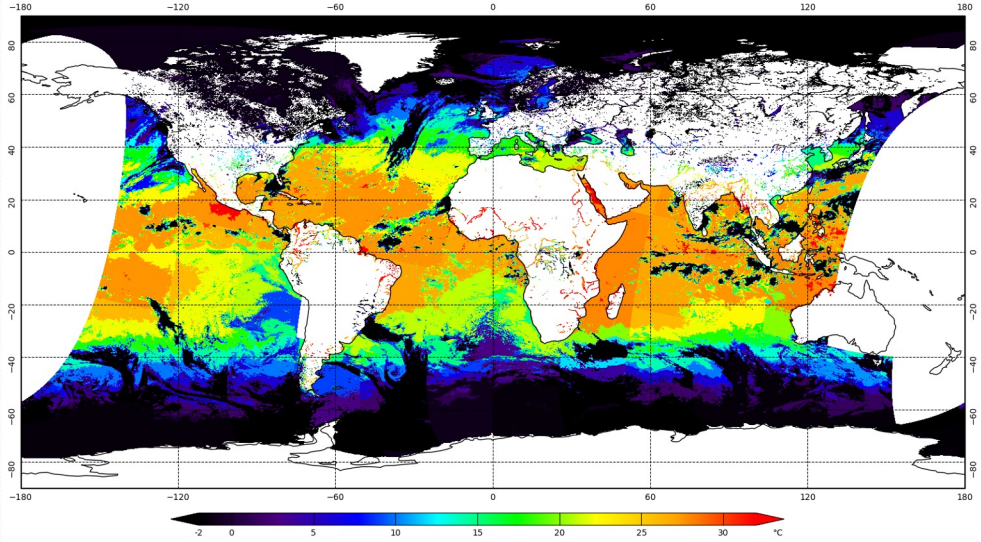
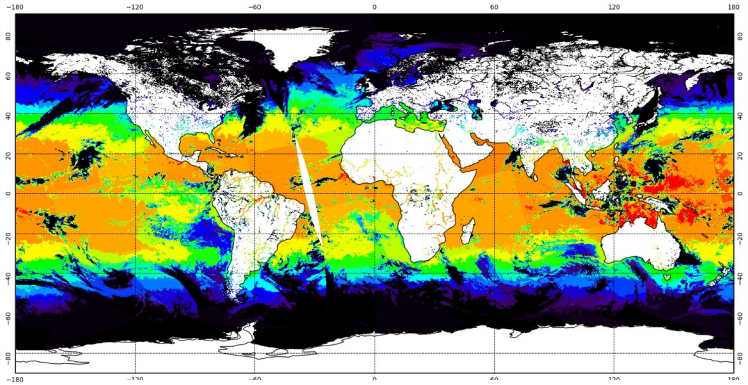
NCCF Example Case: MetOP-B/C ACSPO SSTs

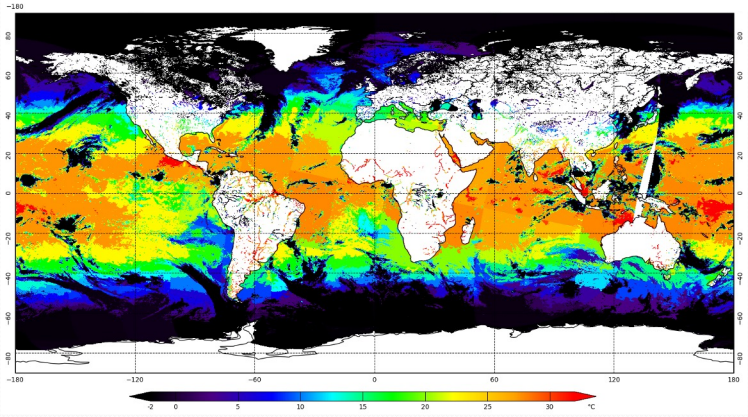
MetOp-B L2 SST File: 2021118: Descending Orbit Granules



MetOp-C L2 SST File: 20211130: Ascending Orbit Granules



MetOp-C L2: Descending Orbit Granules



Project Leads: STAR PI Alex (Sasha) Ignatov & Sheekela Baker-Yeboah (OSPO PAL)

- **STAR/OSPO Science & Maintenance Team**

NCCF Team SAFe* Roles

- ✓ The NCCF is an Amazon Web Services (AWS) cloud environment
- ✓ Scaled Agile Framework (SAFe).

Role	Resource(s)
Business Owners	• Greg Marlow (OSPO Director) • Ajay Mehta (OSGS Director) (Executive Sponsors)
Product Managers	• Chris O'Connors • Ruma Das • Tom Morreale
Enterprise/Solutions Architects	• Ed Ladd • Manan Dalal • Joe Mani
Security Engineers	• Dominic Tran • Shawnn Shears

Role	Resource(s)
Product Owners (Data Onboarding)	• Donna Sailer • **Donna McNamara** • Hongming Qi • Rita Grullon-Pingon
Product Owners (Product Generation)	• **Zhaohui Cheng** • Paul Haggerty • Rita Grullon-Pingon
Scrum Masters	• Yang Li • Erik Russell • Carlos Escaffi
Release/Solution Train Engineers	• Vacant (Pending OMS staffing)

Acronyms
*** NCCF: NESDIS Common Cloud Framework**
***ASSISTT: Algorithm Scientific Software Integration and System Transition Team (with OSGS)**
***CCAP: Containerized Cloud Algorithm Package**

NCCF Processing Environments

- **Development – NCCF Dev**
  - Development and static testing of the MetOp CCAPs
  - Pre-operational codes are integrated and tested verses the data sets provided within the CCAP
- **Integration Testing– NCCF UAT**
  - Pre-operational CCAP received from STAR will be implemented and tested on the User Acceptance Testing and modified as needed before it is promoted to operation.
- **Production – NCCF Prod**
  - Operational CCAP will be deployed on the NCCF Prod.

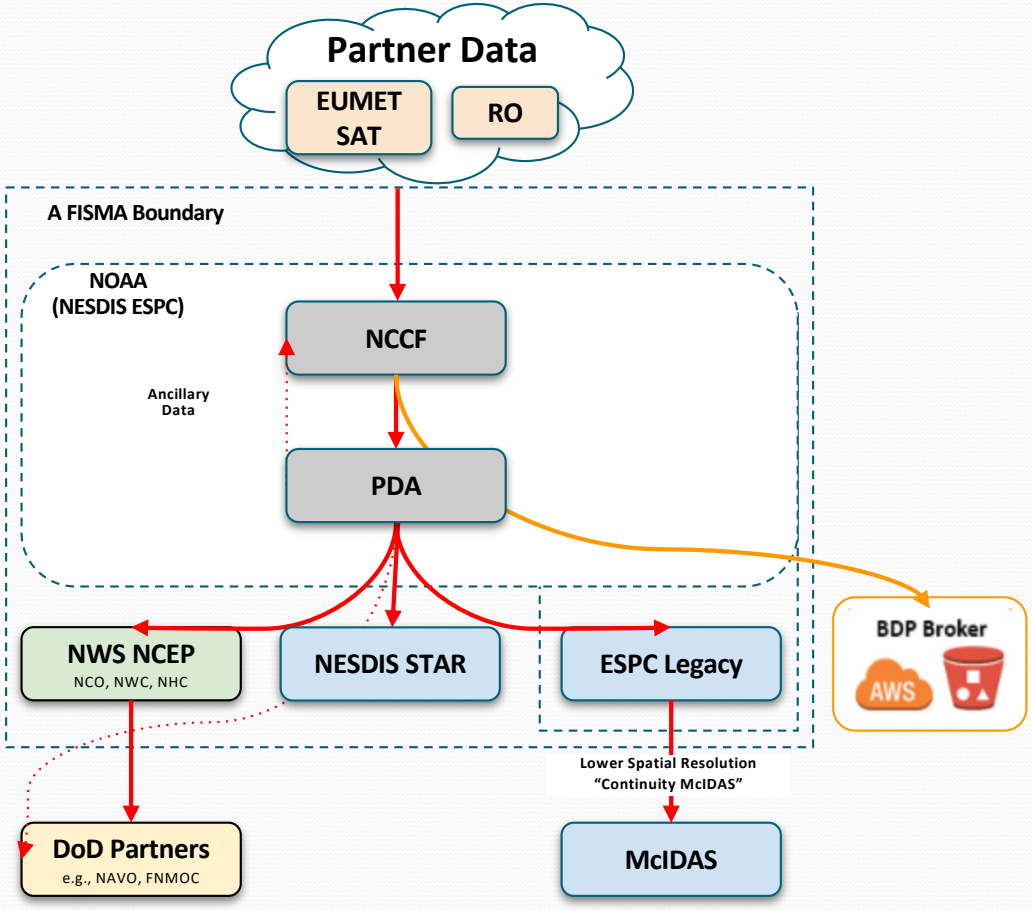


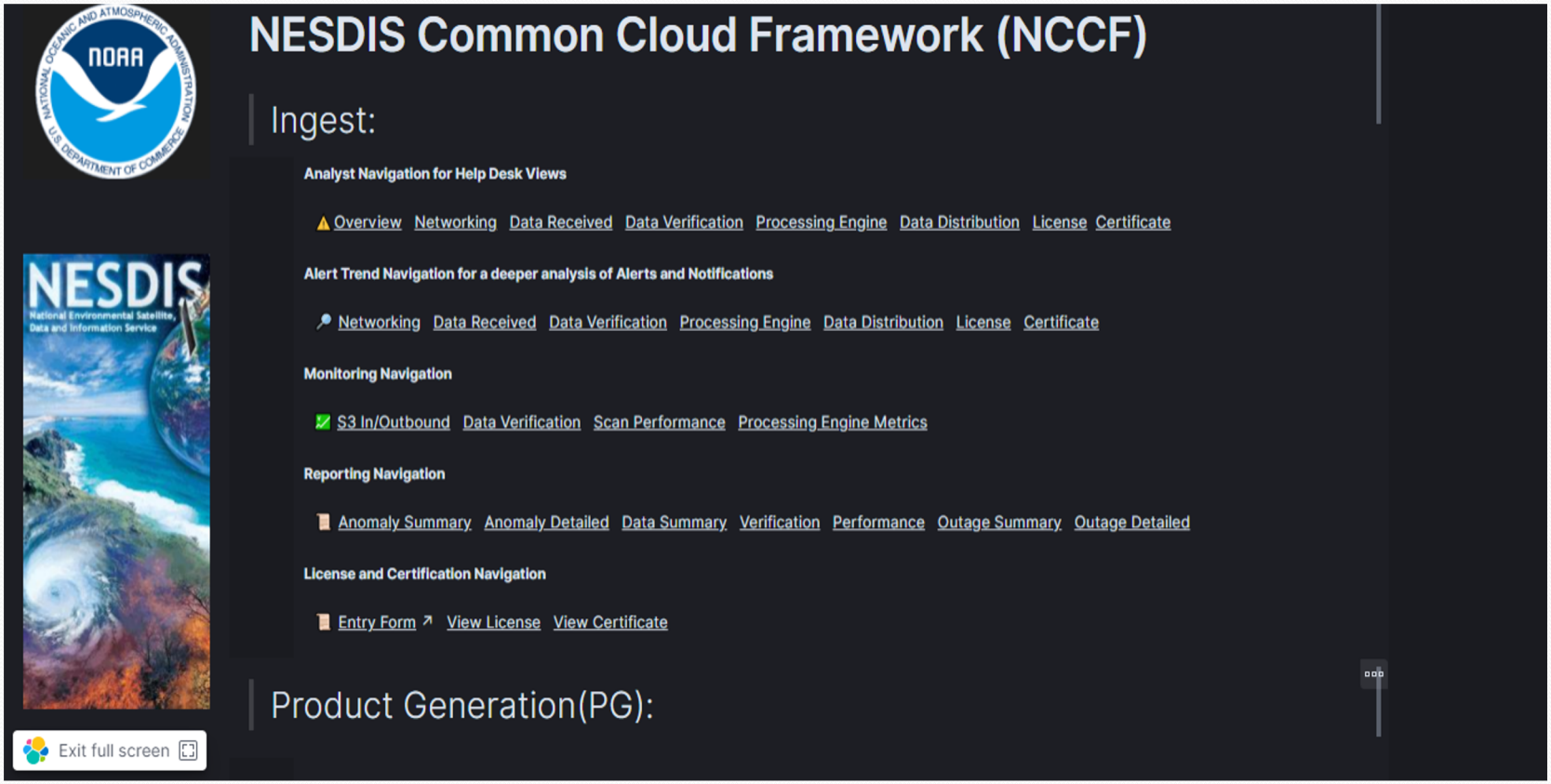
Illustration of the NCCF Process

Diagram illustrates NRT flow of data from NESDIS Partners and other data sources **through the NCCF** and out to the partners, users, and other customers.

- **Input from Partners (example: EUMETSAT)**
  - Two 10G Amazon Web Services (AWS) Direct Connects are in place between AWS and NOAA ESPC through N-Wave
- **Functions**
  - Consolidated Ingest performs security checks & data validation
  - Compute environment conducts PG
  - Metadata catalog collects information on the data both during ingest and after PG
- **Output to PDA**
  - MetOp data are distributed to NOAA customers via PDA
    - MetOp ACSPO L2P GHRSST, L2P Legacy
    - MetOp ACSPO L3U GHRSST

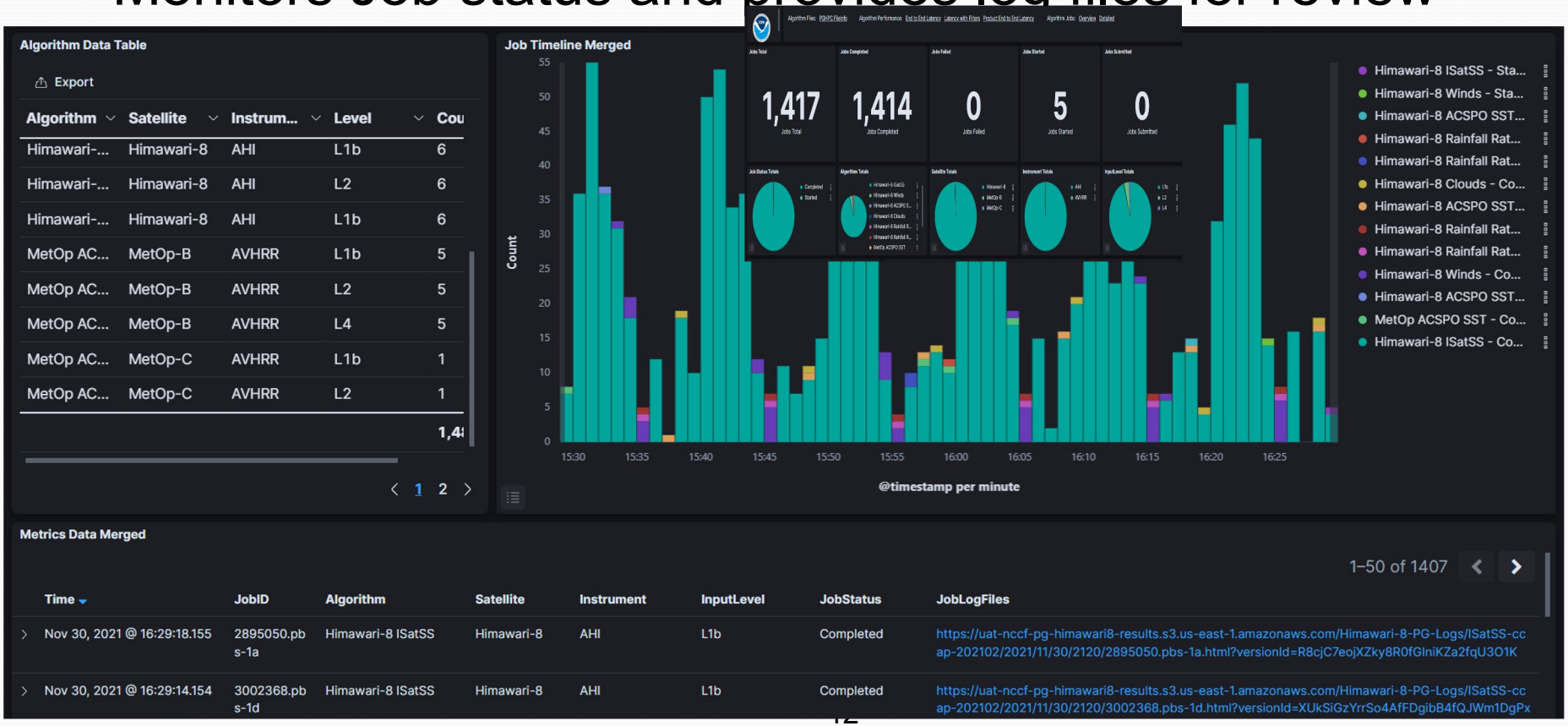
NCCF Monitoring- Dashboard

Monitors Both Ingest and Product Generation



NCCF Monitoring- Dashboard

Monitors Job status and provides log files for review



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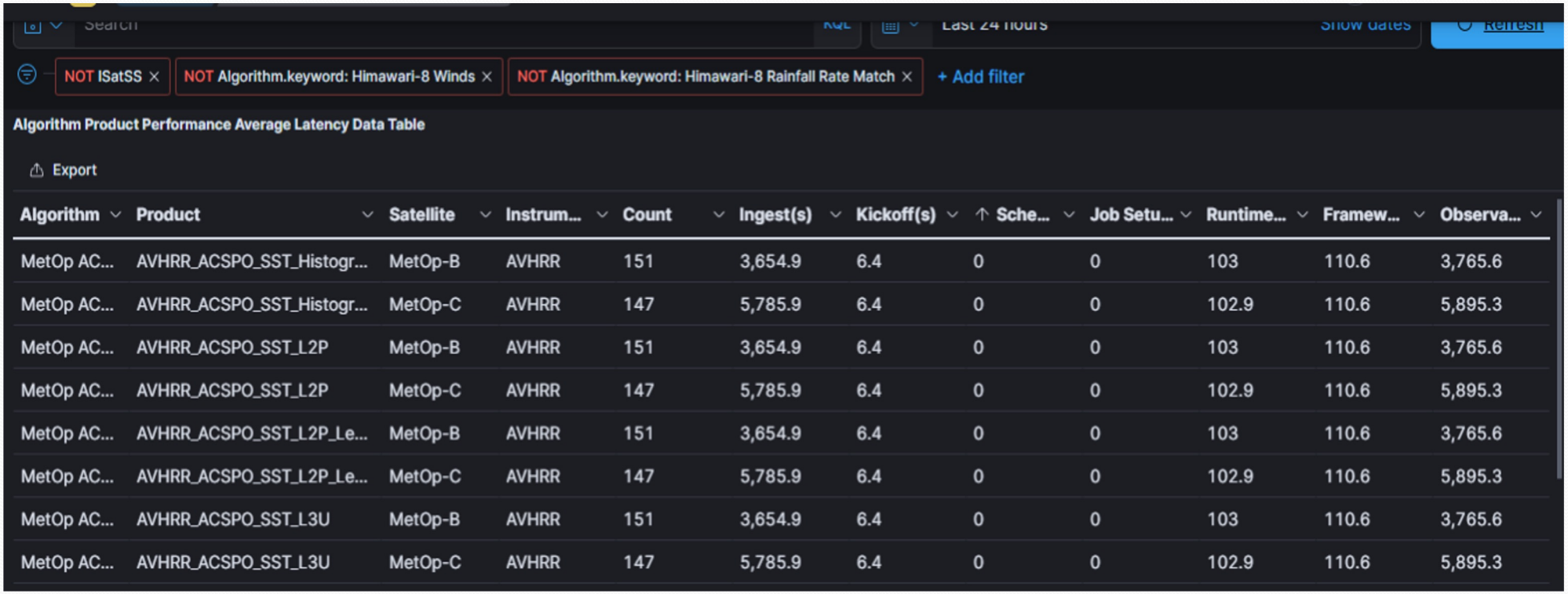
NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE

MetOp Products Refresh Rate and Latency

MetOp Products Refresh Rate and Latency



Search KQL Last 24 hours Show dates Refresh

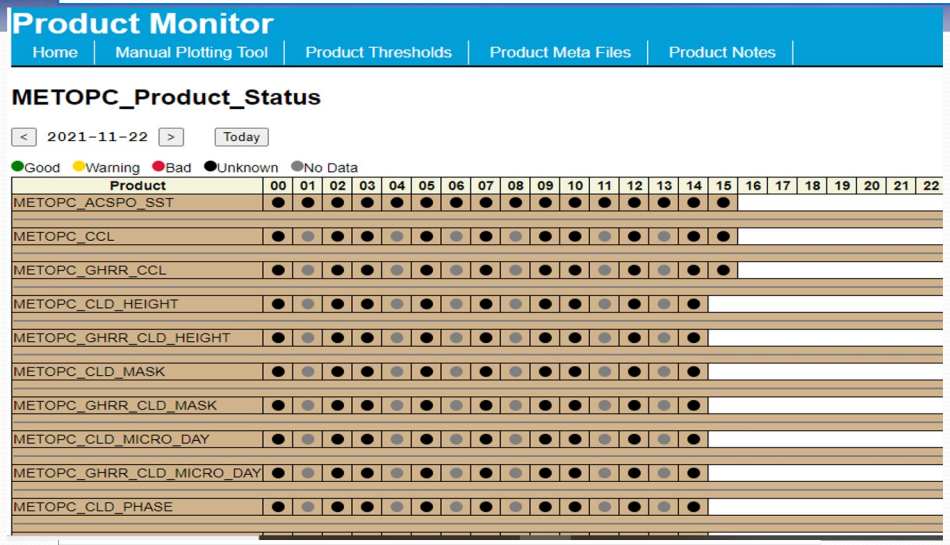
NOT ISatSS × NOT Algorithm.keyword: Himawari-8 Winds × NOT Algorithm.keyword: Himawari-8 Rainfall Rate Match × + Add filter

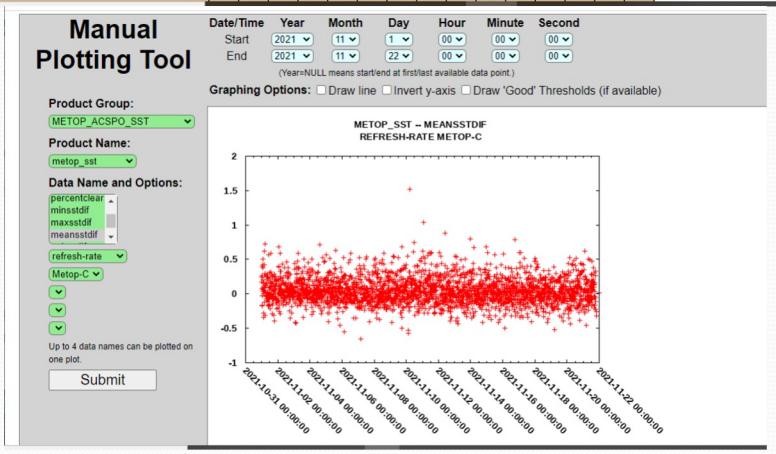
Algorithm Product Performance Average Latency Data Table

Export

Algorithm	Product	Satellite	Instrum...	Count	Ingest(s)	Kickoff(s)	↑ Sche...	Job Setu...	Runtime...	Framew...	Observa...
MetOp AC...	AVHRR_ACSPO_SST_Histogr...	MetOp-B	AVHRR	151	3,654.9	6.4	0	0	103	110.6	3,765.6
MetOp AC...	AVHRR_ACSPO_SST_Histogr...	MetOp-C	AVHRR	147	5,785.9	6.4	0	0	102.9	110.6	5,895.3
MetOp AC...	AVHRR_ACSPO_SST_L2P	MetOp-B	AVHRR	151	3,654.9	6.4	0	0	103	110.6	3,765.6
MetOp AC...	AVHRR_ACSPO_SST_L2P	MetOp-C	AVHRR	147	5,785.9	6.4	0	0	102.9	110.6	5,895.3
MetOp AC...	AVHRR_ACSPO_SST_L2P_Le...	MetOp-B	AVHRR	151	3,654.9	6.4	0	0	103	110.6	3,765.6
MetOp AC...	AVHRR_ACSPO_SST_L2P_Le...	MetOp-C	AVHRR	147	5,785.9	6.4	0	0	102.9	110.6	5,895.3
MetOp AC...	AVHRR_ACSPO_SST_L3U	MetOp-B	AVHRR	151	3,654.9	6.4	0	0	103	110.6	3,765.6
MetOp AC...	AVHRR_ACSPO_SST_L3U	MetOp-C	AVHRR	147	5,785.9	6.4	0	0	102.9	110.6	5,895.3

Product Quality Monitoring



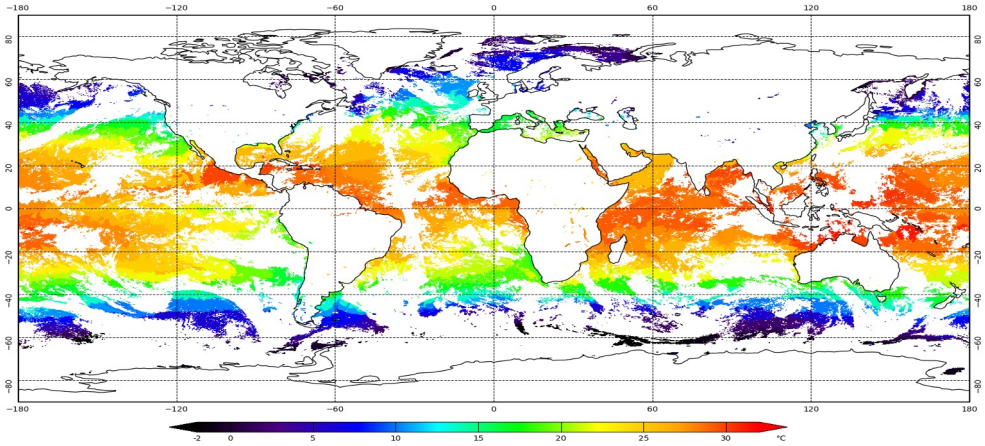


Overview

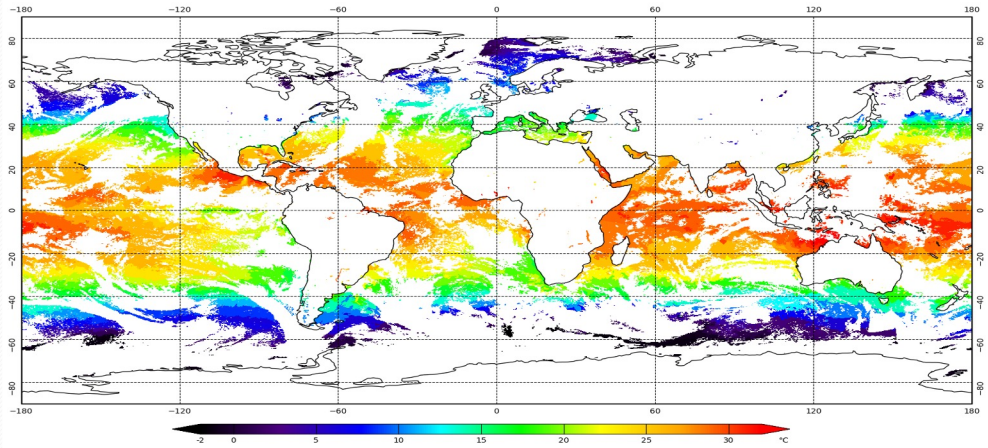
- Monitors the quality of generated products
- Simple interface shows the hourly product quality status for a given day.
- Each product team defines the parameters to be monitored.
- Configurable thresholds for indicating “good”, “warning”, or “bad” results, thresholds can be set.

Product Visualization

MetOp-C L3 SST: 2021130: Ascending Orbit Granules



MetOp-C L3 SST: 2021130: Descending Orbit Granules



ACSPO MetOp SST Migration Schedule

NCCF Migration completed with STAR and OSGS/ASSISTT)

- MetOp ACSPO SST Migration (MetOp-B/C products)

Operations Readiness Review/ Algorithm Readiness Review	→	**December 2021**
NCCF Operations Date	→	**December 2021**
Retirement of current PP	→	**June 2022***

AVHRR ACSPO 2.7 SST products in OSPO on heritage machines will be retired.

- Products are generated in the NCCF & distributed via PDA.

NCCF Project Leads:
STAR/Sasha Ignatov
OSPO/Sheekela Baker-Yeboah

ACSPO VIIRS SST Migration Schedule

NCCF Migration completed with STAR and OSGS/ASSISTT)

- VIIRS ACSPO SST Migration (S-NPP, NOAA-20, with J2 VIIRS to be included)
  - NDE VIIRS ACSPO 2.8 → June 2, 2022
  - Full NDE migration into the NCCF (Coming)

NCCF Project Leads:
STAR/Sasha Ignatov
OSPO/Sheekela Baker-Yeboah

- J2 launch: November 1, 2022
- Products are generated in the NCCF & distributed via PDA.

ACSPO Himawari 8 SST Migration Schedule

NCCF Migration completed with STAR and OSGS/ASSISTT)

Topic: Operational Implementation of the Himawari-8 Products in NCCF

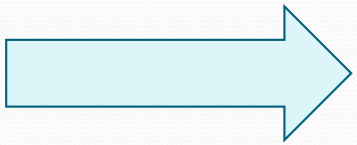
Date/Time Issued: April 27, 2021 1845 UTC

NCCF Project Leads:
STAR/Sasha Ignatov
OSPO/Sheekela Baker-Yeboah

Product(s) or Data Impacted: Himawari-8 L2 Products

Date/Time of Initial Impact: May 3, 2021 (Time of official PDA activation TBD)

- Products are generated in the NCCF & distributed via PDA.



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ACSPO L3S SST Migration Schedule

NCCF Migration in progress with STAR and OSGS/ASSISTT)

- ACSPO SST using MetoOp-B/C, S-NPP, NOAA-20, J2 VIIRS to be included)

Operations Readiness Review/ Algorithm Readiness Review	→	**February 2023**
NCCF Operations Date	→	**April 2023**

NCCF Project Leads:
STAR/Sasha Ignatov
OSPO/Sheekela Baker-Yeboah

- J2 launch: November 1, 2022
- Products are generated in the NCCF & distributed via PDA*.

Geo-Polar BSST MetOp SST Migration Schedule

NCCF Migration in progress with STAR and OSGS/ASSISTT)

- MetOp-C data will be included (2022)
- Schedule for Geo-Polar BSST

Operations Readiness Review/ Algorithm Readiness Review	→	**August 2022*** → **Early 2023**
NCCF Operations Date	→	**February 2023*** → **2024**
Retirement of current PP	→	**February 2023*** → **2024**

products in OSPO on heritage machines will be retired

*Due to a recent change with plans for MatLab in the NCCF, dates are being revised!

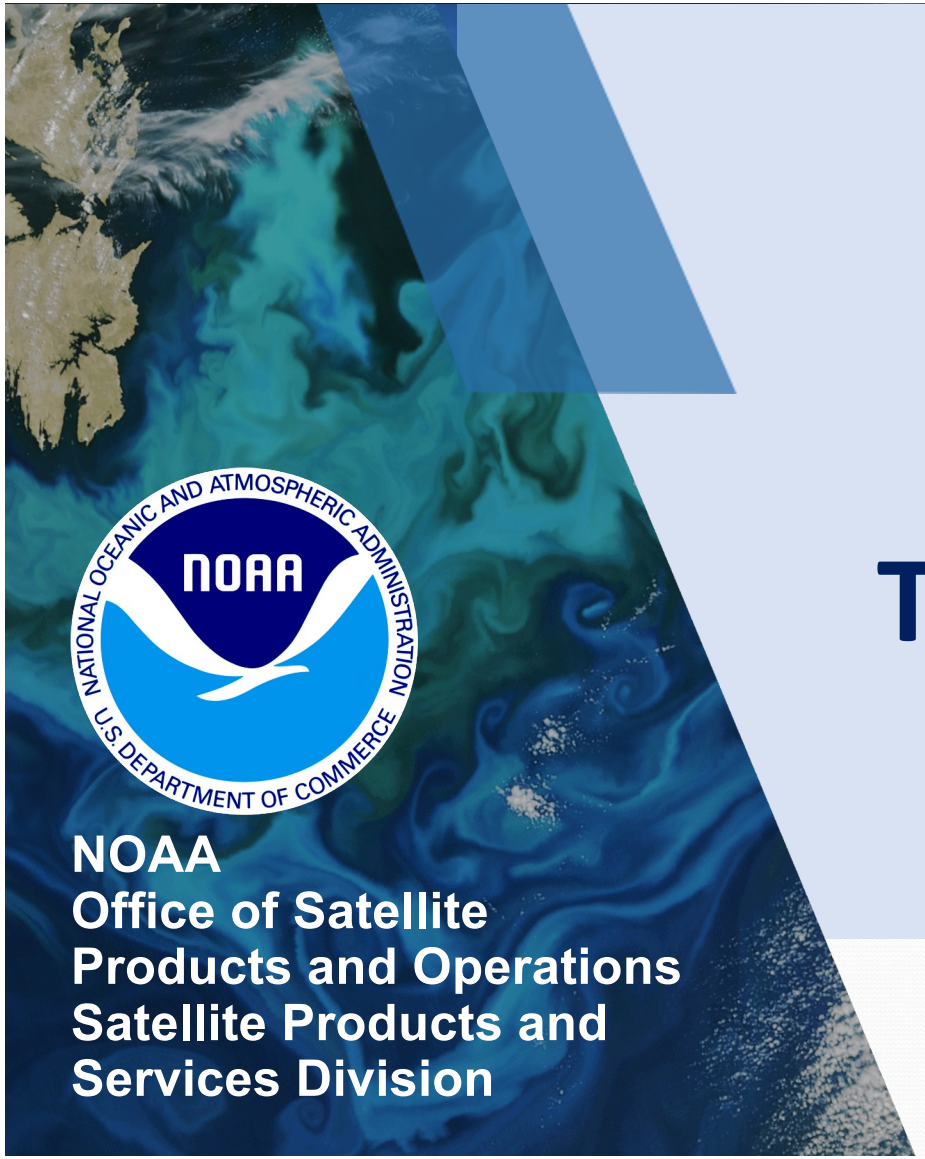
NCCF Project Leads:
STAR/Eileen Maturi
OSPO/Sheekela Baker-Yeboah

NOAA SST Filenames & GDPs (RDACs)

Ocean Product Oversight Panel in NESDIS

Lead by Sheekela Baker-Yeboah (OSPO) and Eileen Maturi (STAR)

- Discussed NOAA/NESDIS GDP (RDAC) names, which are part of the SST filenames.
  - Current NOAA GHRSST products: NESDIS will retain the current GHRSSST file naming conventions in current SST products going into to NCCF. No change.
  - New/future SST products: STAR, NCEI and OSPO have decided on a new OneNOAA GDP (RDAC) = 'NOAA' ('NOAA' was recommended by Alex (Sasha) Ignatov).
  - NOAA/NESDIS will continue to work on filename revisions and we are working to keep the GHRSST filename specifications (in general).



Thank You

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Office of Satellite Products and Operations
Satellite Products and Services Division

Acknowledgments

OSPO SST Team Members

- Robert (Bob) Potash (Senior Lead Scientific Programmer)
- Punyam Satya (Scientific Programmer)
- Dan Jacobs (Senior Scientific Programmer)
- Eric Boesch (Senior Scientific Programmer)
- Kristina Sprietzer (Senior Scientific Programmer)
- Patricia Ficke (Scientific Programmer)