

CSPP Users' Meeting

19-21 May 2026

# Status of the Direct Broadcast Network (DBNet) for globally coordinated real- time acquisition, processing and fast delivery of satellite direct readout data, coordinated by WMO

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Consultant to the WMO Space Programme

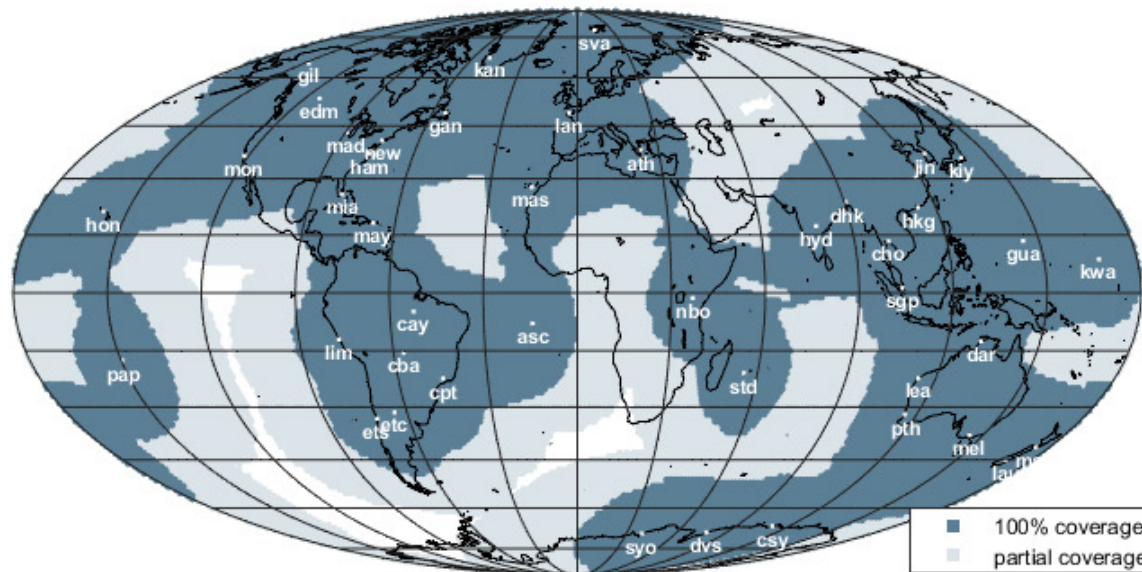
# DBNet concept and objectives

Global availability of near real-time LEO data received by a collection of Direct Broadcast stations distributed around the world

Ensuring global consistency by using common software (i.e. AAPP, CSPP SDR, FY3PP) consistent with global processors, standardized coding and file naming, and quality monitoring

Dissemination by the WMO Information System (primarily GTS/WIS 2.0)

Coordinated by WMO Space Programme, supported by CGMS



- Initial target established 2004: NOAA and Metop ATOVS<sub>a</sub> (L1b) from 90% of the globe available on the GTS in 30 min
- Latency goal revised 2015 to 20 minutes to reflect evolving SRNWP needs
- Goal achieved for ATOVS (2017)

a - ATOVS= HIRS, AMSU-A, AMSU-B, MHS

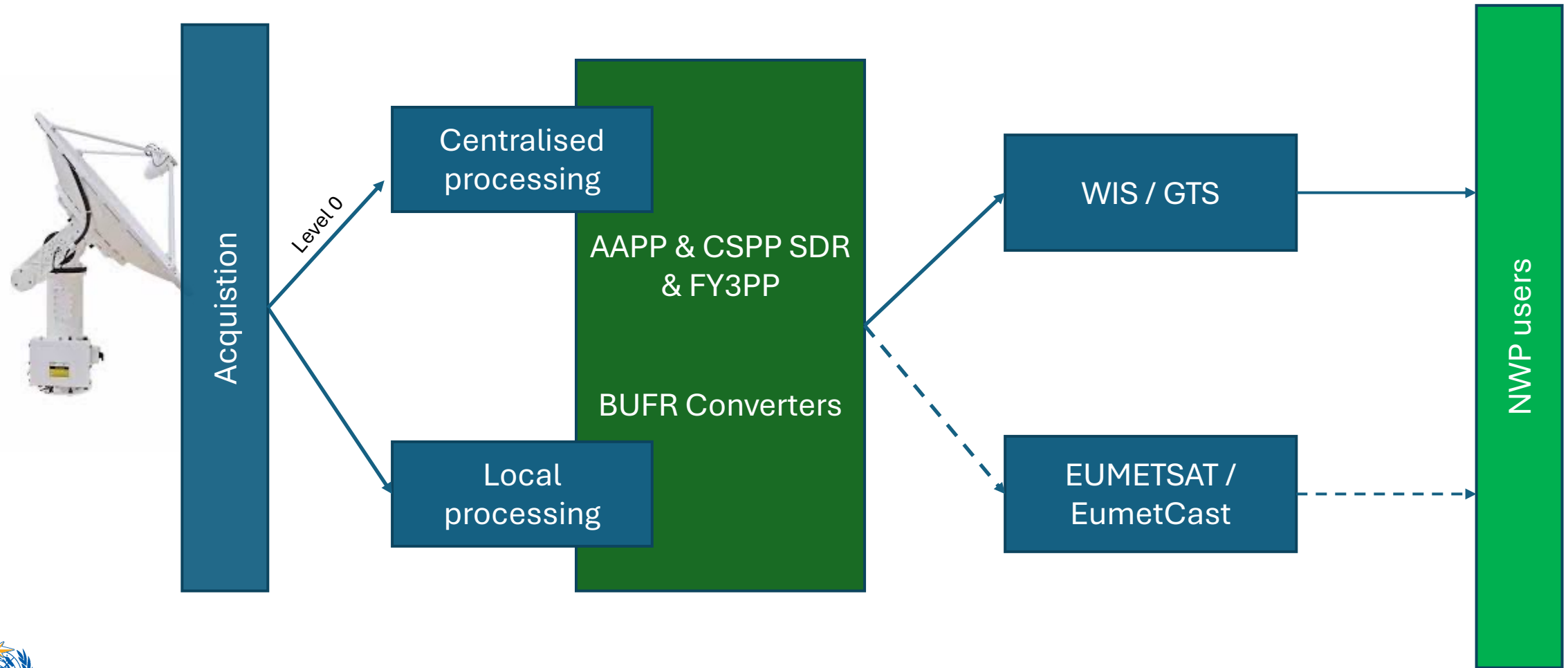
# DBNet components

- DBNet is composed of regional networks coordinated by regional or sub-regional nodes and the global DBNet Coordination Group (<https://community.wmo.int/direct-broadcast-network-dbnet>)
- Global monitoring of product consistency is performed by the NWPSAF (<http://nwpsaf.eu/site/monitoring/dbnet/>)
- Last hybrid DBNet-CG meeting in Melbourne, March 2024
- Last online DBNet-CG meeting (May 2026)



Regional Network	Regional or Sub-regional Node
DBNet - EUMETSAT (EARS)	EUMETSAT
DBNet - Asia-Pacific	JMA BoM
DBNet - South America	INPE SMN Argentina / CONAE
DBNet - NOAA	NOAA / CIMSS

# DBNet processing scheme



# DBNet Station data reception and consistency status

Network Status

Can select a specific satellite

Can show last pass received

All satellite data

Any satellite data

Any satellite data

All satellite data

All ATOVS/IASI data

All CrIS/ATMS data

METOP-B

METOP-C

NOAA-18

NOAA-19

S.NPP

NOAA20

FY-3D

Regional Centre	Country	Station	AMSU-A			CrIS		ATMS		MWHS2		MWTS2		MWTS3		MWRI
			MET-B	MET-C	MET-B	N20	N21	S.NPP	N20	N21	FY-3D	FY-3E	FY-3D	FY-3E	FY-3D	
EUMETSAT	Greenland	Kangerlussuaq (kan)	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Greece	Athens (ath)	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	France	Lannion (lan)	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Canaries	Maspalomas (mas)	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Arctic	Svalbard (sva)	●	●	●	●	●	●	●	●	●	●	●	●	●	●
				●	●	●	●	●	●	●	●	●	●	●	●	●

Last received data at: 2025-08-13 14:13:57.802000

## Stations currently not contributing to DBNet

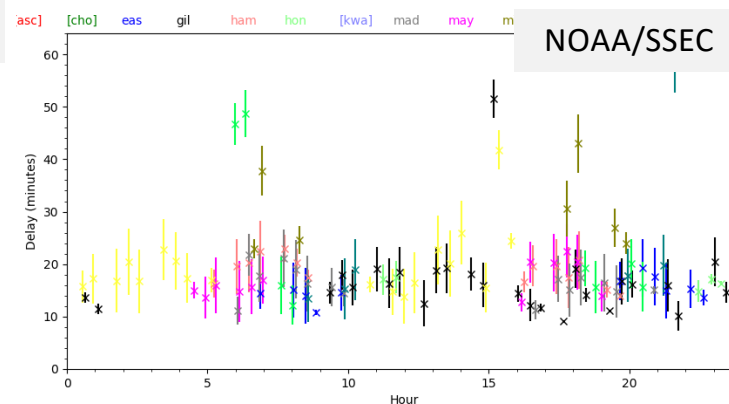
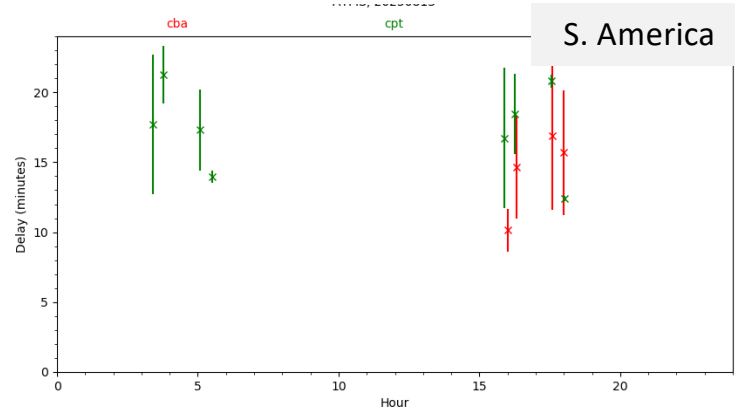
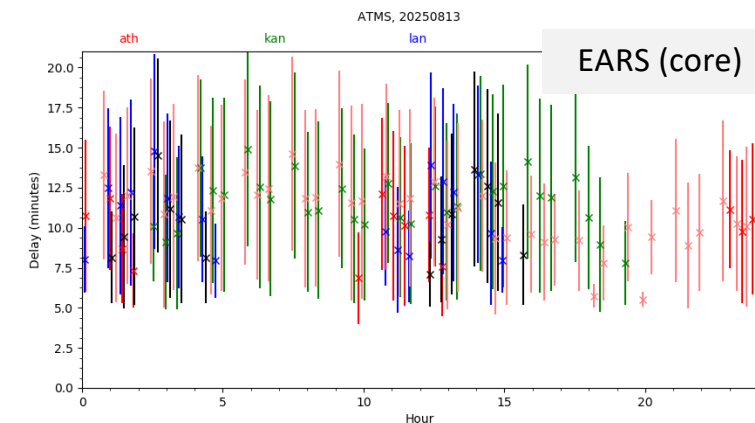
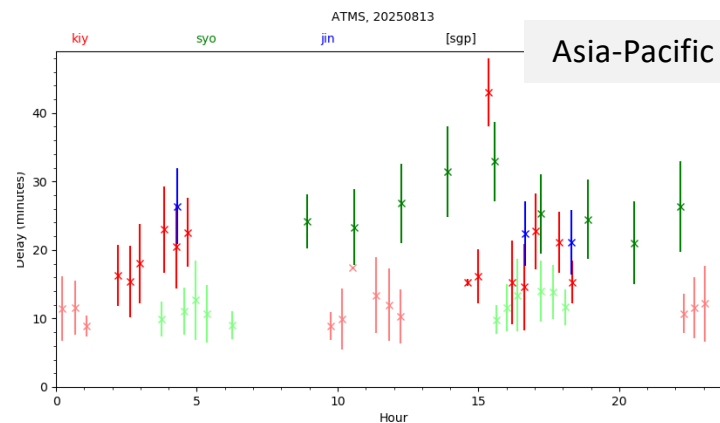
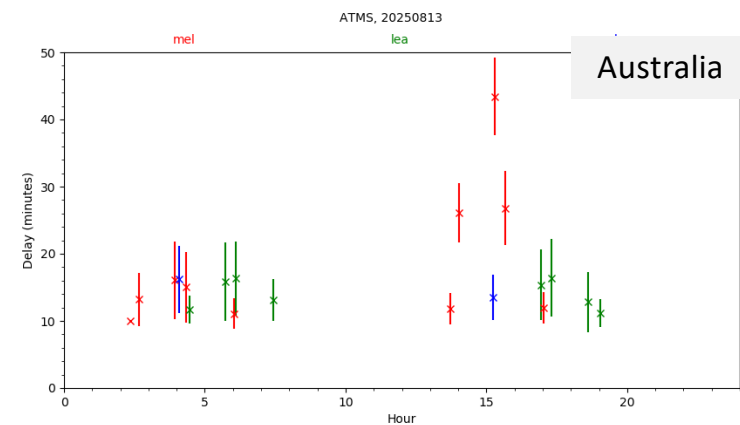
Regional Centre	Country	Station
BOM	Australia	Perth
BOM	New Zealand	Lauder
BOM	New Zealand	Maupuia
EUMETSAT	Russia	Novosibirsk
EUMETSAT	Russia	Moscow
EUMETSAT	Russia	Khabarovsk
INPE	Brazil	Belém
SAWS	Niger	Niamey
SSEC/CIMSS	S Africa	Pretoria

Key for table icons:	
●	No data received over past week
●	No data received over past three days
●	Data received during past three days
□	Data failing consistency comparison with global feed



# DBNet Station Timeliness monitoring

ATMS: 13 August 2025



atms 20250813 EARS (core)					
station	passes	0%	50%	90%	100%
ath	13	4	10	14	17
kan	31	5	12	17	21
lan	18	5	11	17	21
mas	14	5	11	16	21
sva	42	5	11	16	21

overall latency from 14 to 17 min (for 90% of data)

# Current DBNet services

Categories of services	Services (instruments)
	<i>Current services</i>
IR/MW sounding	ATOVS (AMSU-A, MHS, HIRS), ATMS, <b>VASS (MWTS, MWHS)</b>
VIS/IR imaging (incl. L2)	<b>VIIRS</b> , <b>AVHRR</b> , <b>MERSI</b>
Hyperspectral IR sounding	CrIS, IASI, <b>AIRS</b>
Scatterometry	<b>ASCAT</b>
MW imagery	<b>MWRI</b>

Services **in red** – implemented by EUMETSAT-EARS

Services **in rose** – implemented by NOAA-DBRTN

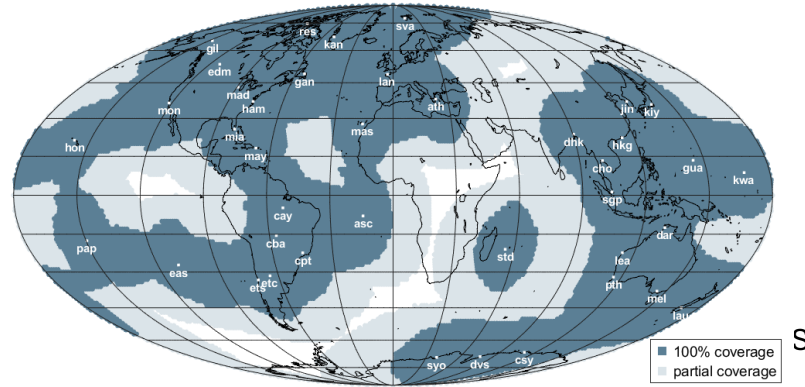
All other services – implemented globally

# DBNet Coverage – Dec 2025

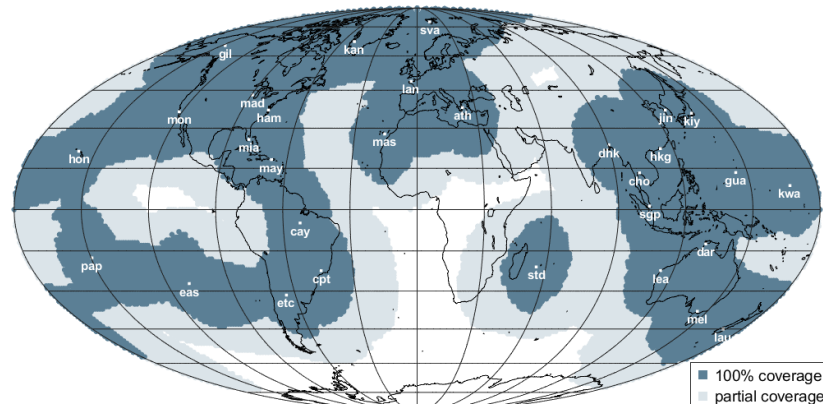
The main areas of concern in terms of coverage:

- Central Asia
- Southern Pacific
- Central and Southern Africa

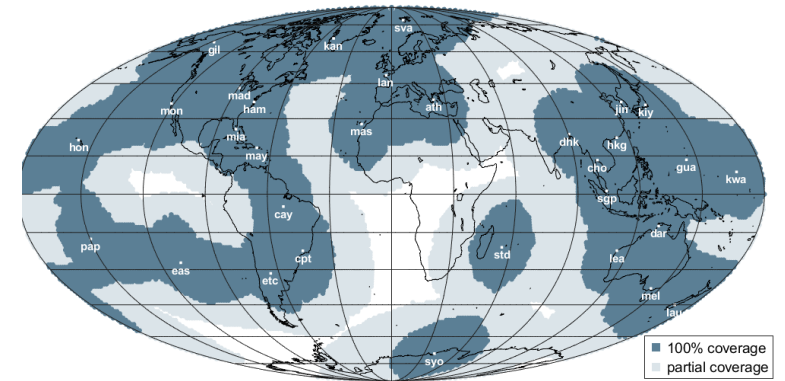
ATOVS



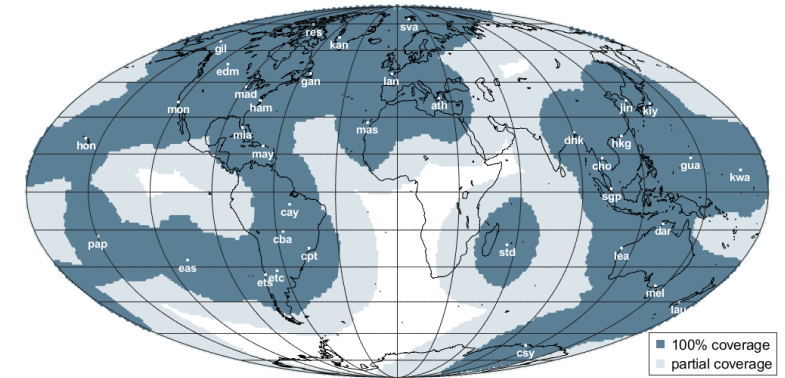
CrIS



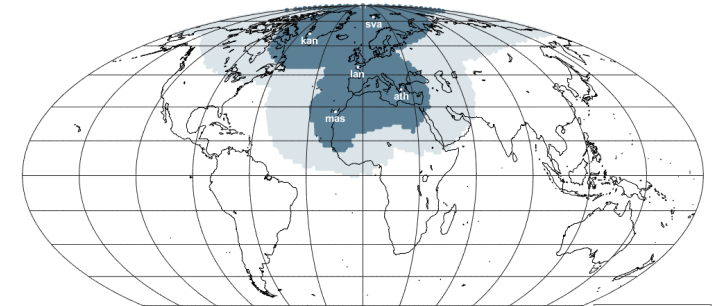
ATMS



IASI



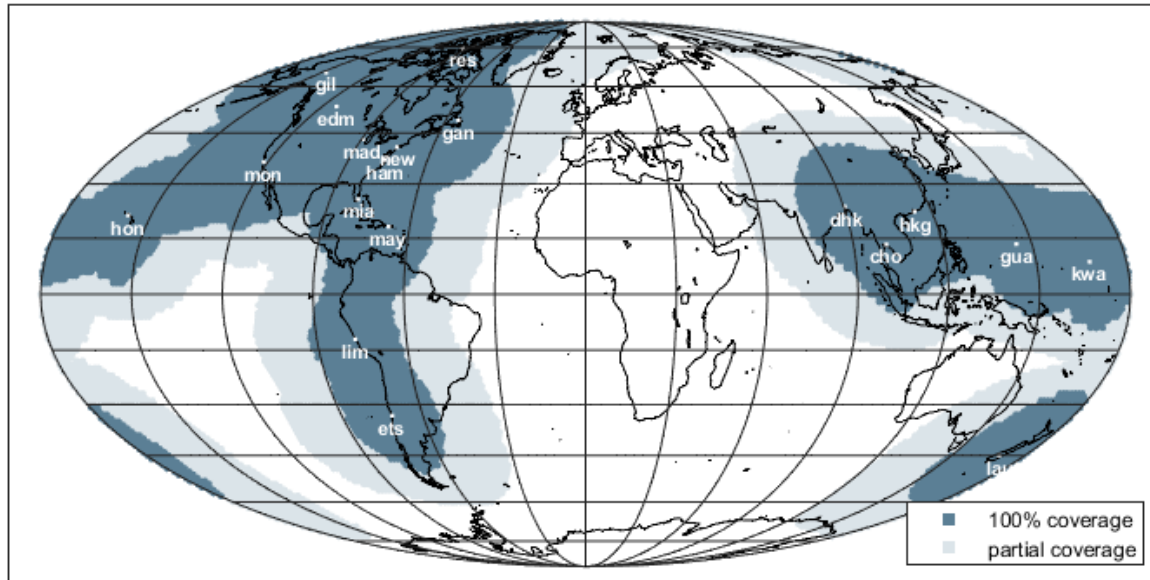
VASS (FY-3)



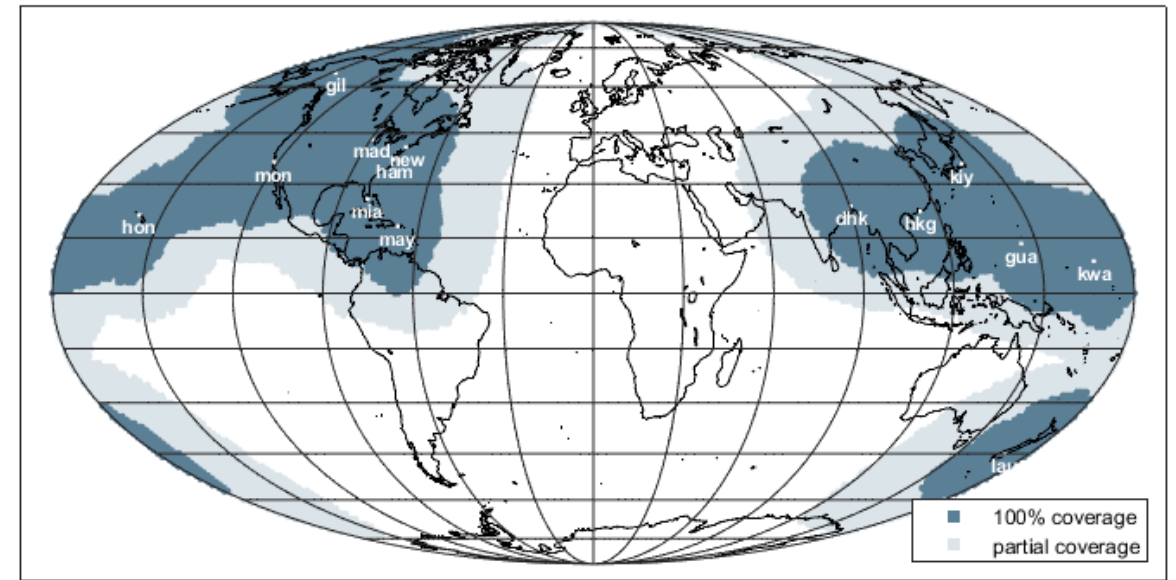
# Transition from GTS to WIS 2.0

**Full channel sets** of IASI and CrIS data from NOAA-20, NOAA-21, Metop-B, and Metop-C, disseminated by NOAA DBRTN, are already **available today via WIS 2.0**.

IASI-NOAA DBRTN



CrIS-NOAA DBRTN



Status as of October 2024

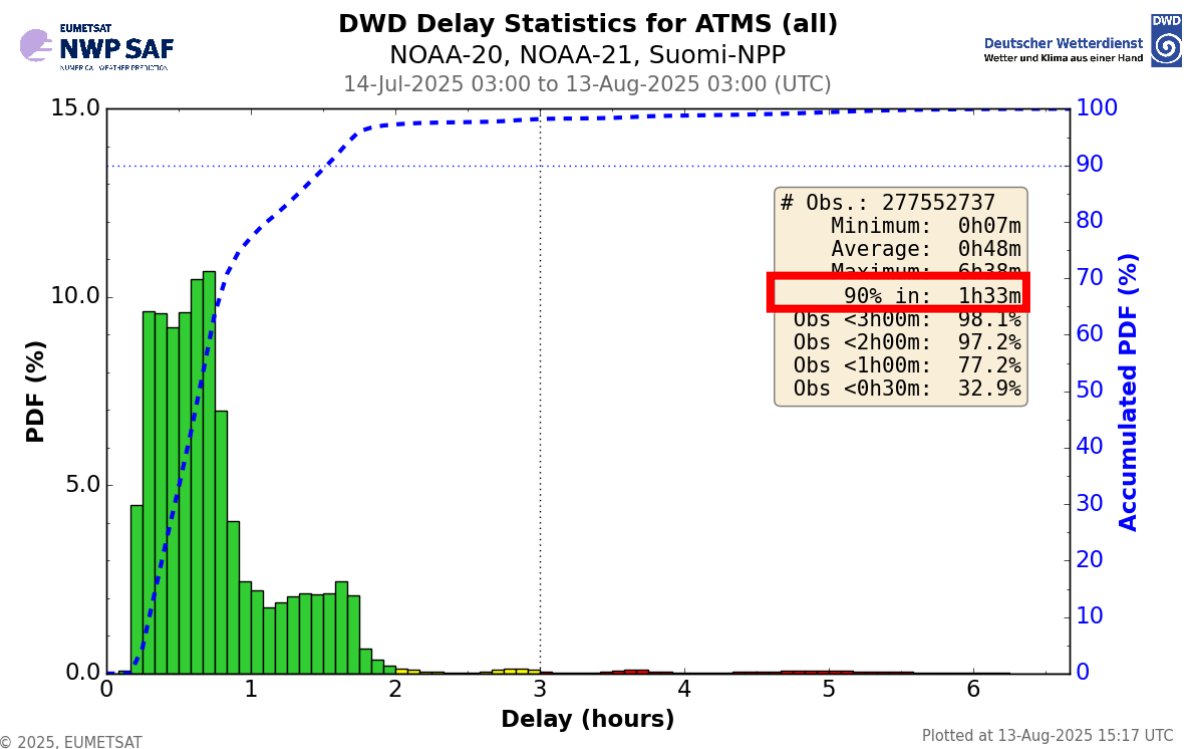
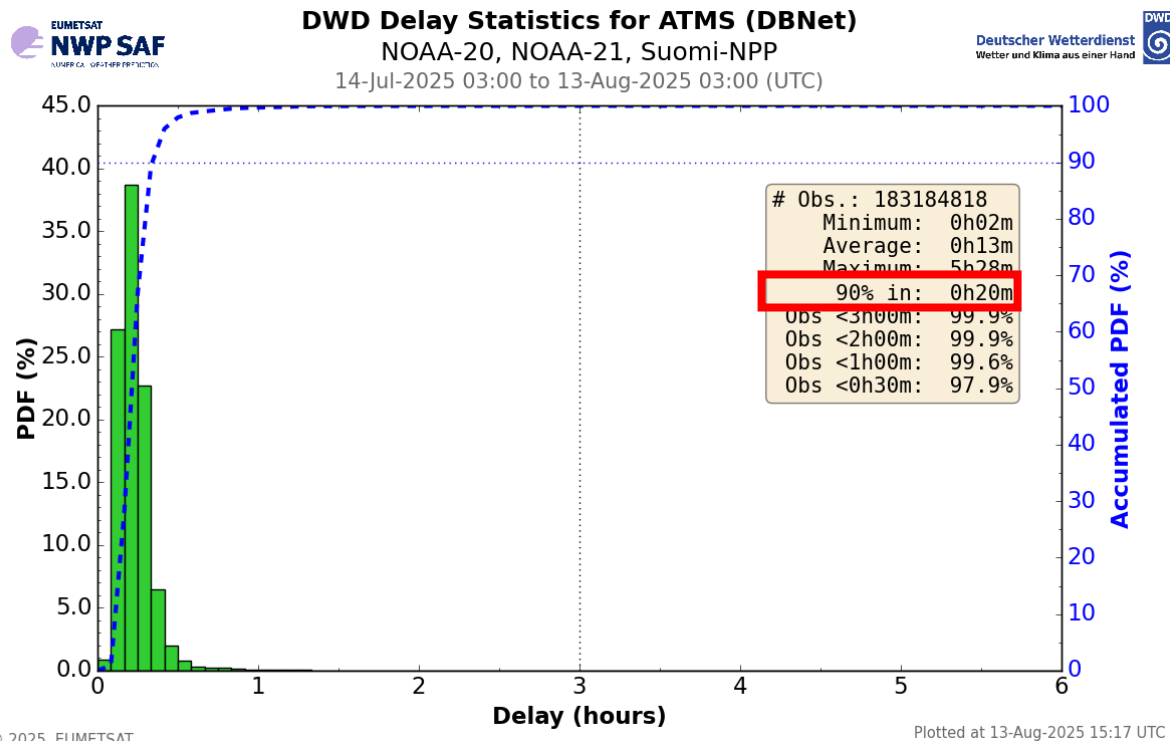
# Further DBNet coverage extension

- South America
  - upgrade of SMN/CONAE high latitude station (Tierra de Fuego)
- North America
  - addition of Env. Canada stations in the Northern part of Canada (Inuvik and Iqaluit)
- Asia-Pacific
  - reintegration of CMA stations (Kashi, Urumqi, Jiamusi and Guangzhou, using new CMA cloud processing)
  - reintegration of IMD stations in the DBNet project (Delhi, Chennai)
  - reintegration of ROSHYDROMET stations in the DBNet project (Moscow, Novosibirsk, Khabarovsk)
- Europe/Africa
  - addition of the four stations of SEWA project (Libreville, Nairobi, Niamey, Pretoria)
  - new station in EUMETSAT regional Metop-SG service (Santa Maria, Azores)
  - addition of ARC Sodankylä station (FMI)

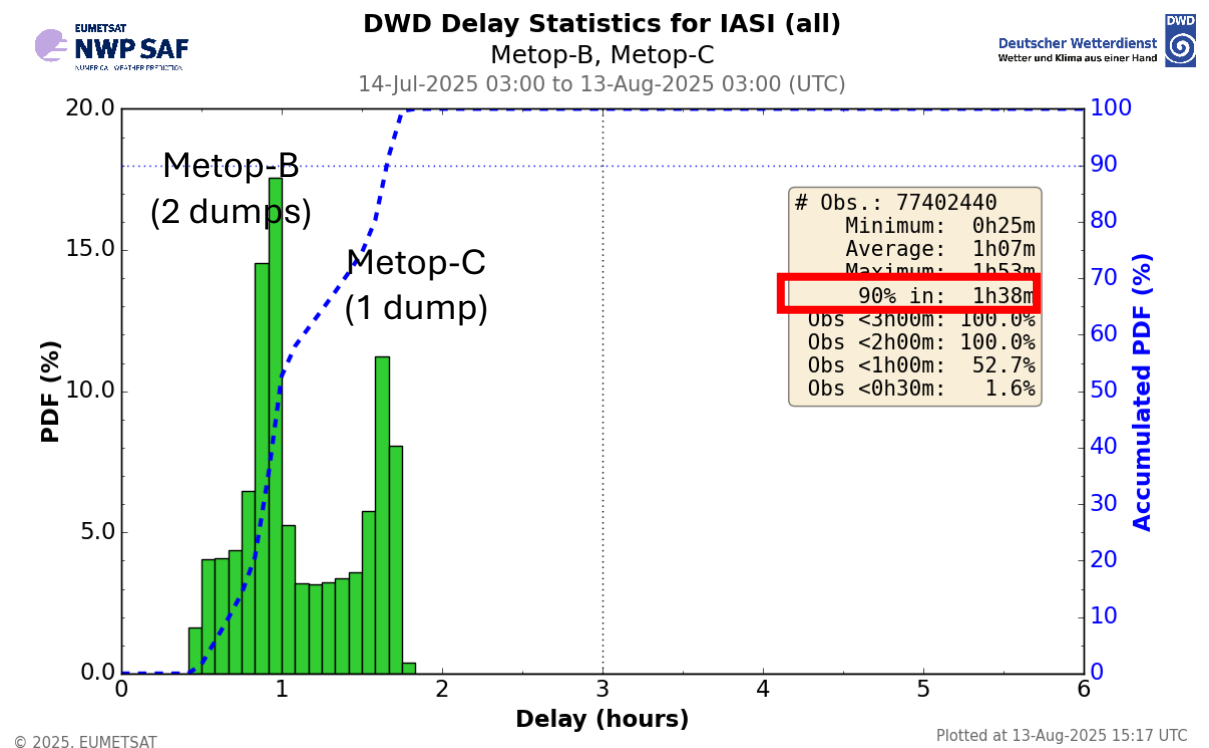
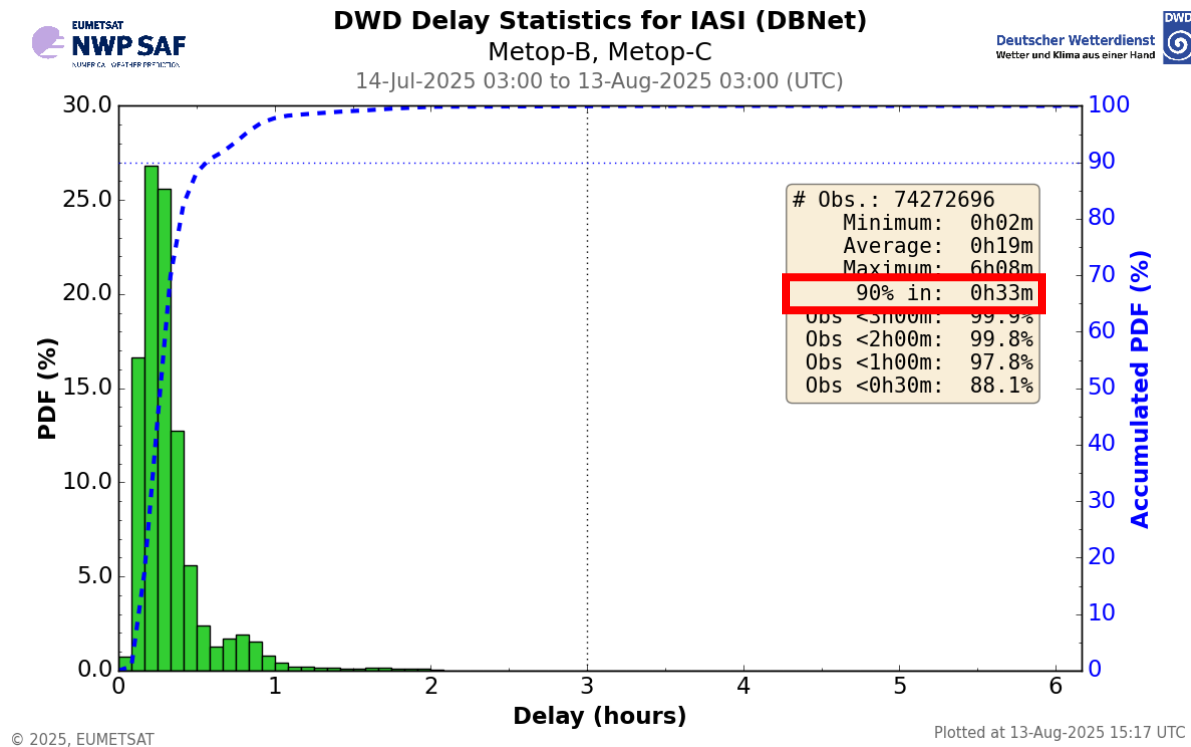
# Usage of DBNet products at NWP centres

- **ITWG NWP Survey summary 2024**
- ➤ Survey covers 24 NWP Centres
- ➤ All centres use DBNet Data
- ➤ 2 centres do not say which data they use:
- ➤ Of the others:
  - AMSU-A: 20 Centres
  - MHS: 21 Centres
  - ATMS: 14 Centres
  - IASI: 12 Centres (+ 2 under test)
  - CrIS: 6 Centres
  - MWHS-2: 6 Centres (+ 2 under test)
  - MWTS-2: 2 Centres
  - AIRS: 2 Centres

# DBNet Station data latency (ATMS)



# DBNet Station data latency (IASI)



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# DBNET PILOT LEVEL-2 PRODUCT SERVICE

CIMSS has implemented the following CSPP products in the NOAA DBRTN processing stream:

NUCAPS: NOAA-20, Metop-B, Metop-C (19 stations)

MiRS: SNPP, NOAA-20, Metop-B, Metop-C, NOAA-19 (23 stations)

Products are currently available via FTP and HTTP for authorized users (not public at this time).

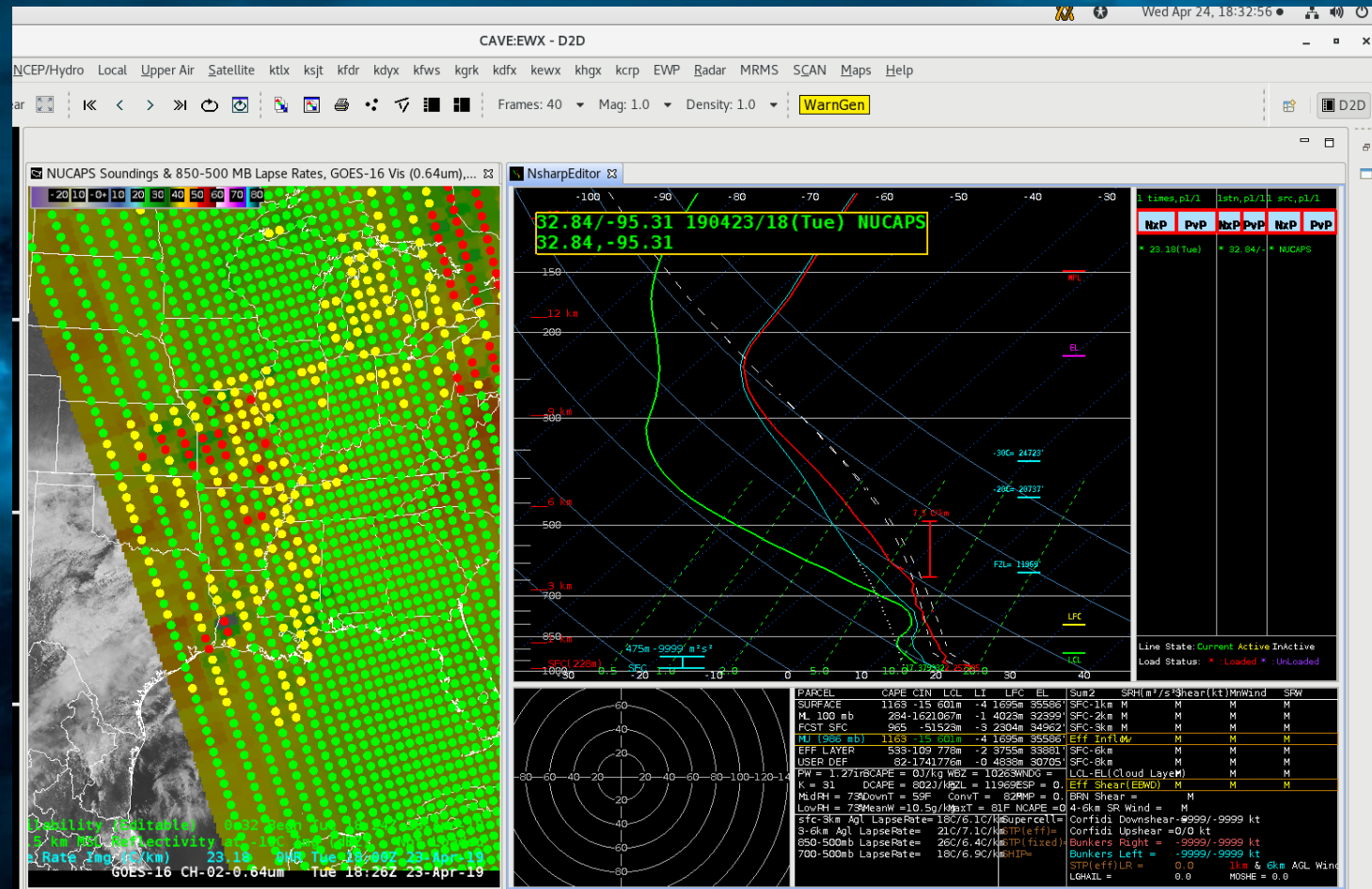
Product dissemination via WIS 2.0 is under investigation.



# JPSS Data Products available via CSPP

## CrIS and ATMS: NOAA Unique Combined Atmospheric Product Suite (NUCAPS)

Atmospheric Vertical Moisture Profile	Vertical sampling of atmospheric moisture (water vapor) between 1100 hPa and 0.016 hPa – a total of 100 layers.
Atmospheric Vertical Temperature Profile	Vertical sampling of atmospheric temperature between 1100 hPa and 0.016 hPa – a total of 100 points.
Carbon Dioxide	Retrievals of column and total carbon dioxide, calibrated by the users with ground-based measurements, of stated precision needed to afford deduction of long-term variations and trends.
Carbon Monoxide	Measure of the carbon monoxide in a specified volume of air.
Methane	Measure of the amount of methane in a specified volume of air.
Infrared Ozone Profile	Measurement or first guess of the ozone in 100 layers.
Outgoing Longwave Radiation	Instantaneous radiative energy emitted by the Earth-atmosphere system at the Top of the Atmosphere (TOA) to space



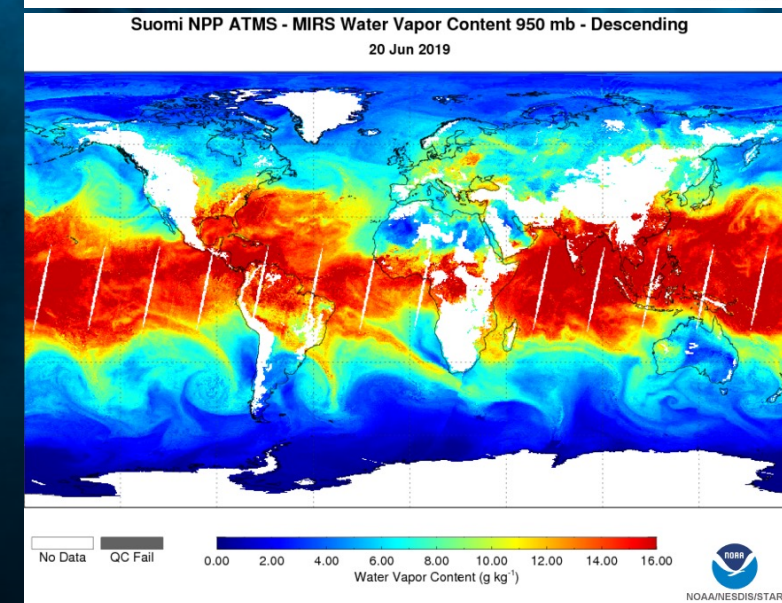
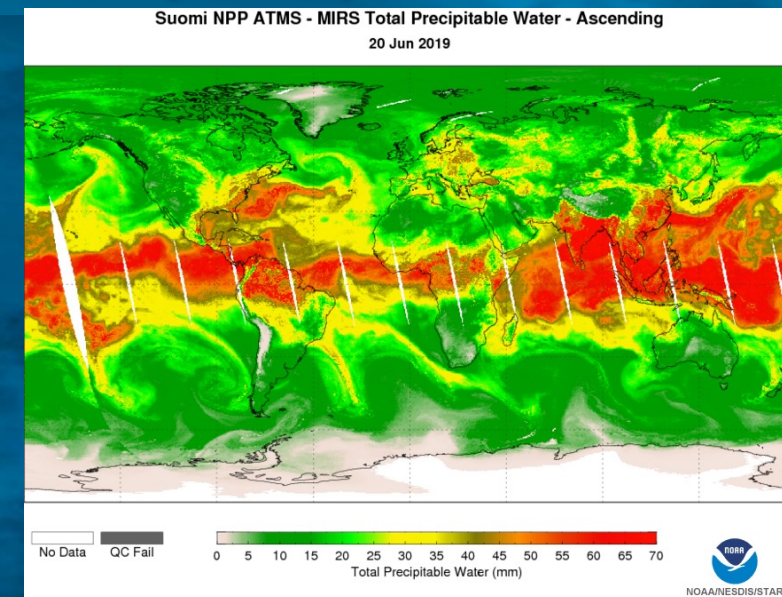
NUCAPS Sounding, April 23, 2019



# JPSS Data Products available via CSPP

## ATMS - Microwave Integrated Retrieval Suite (MIRS) Products

Cloud Liquid Water	The equivalent amount of water within a cloud in a specified segment of a vertical column of the atmosphere.
Ice Concentration	The areal extent of sea ice relative to the total at a given location in the ocean. It is empirically derived using the natural variation in the emissivity of ice and water in the microwave frequencies between 23 and 50 GHz.
Imagery	ATMS image is a limb-corrected nadir view of the ATMS Temperature Data Record.
Land Surface Emissivity	Relative ability of the land surface to emit energy by radiation.
Land Surface Temperature	The sensor-facing skin temperature of the land surface. It includes the aggregate temperature of objects comprising the land surface, including any open water, in the cell.
Moisture Profile	A calculation of the mixing ratio at specified points along a local vertical. The mixing ratio of a sample of air is the ratio of the mass of water vapor in the sample to the mass of dry air in the sample.
Rainfall Rate	The amount of rainfall during a period of time. The required Rainfall Rate products provide the instantaneous rainfall rate during the time of observation in mm/hour.
Snow Cover	
Snowfall Rate	Water equivalent snowfall rate estimate.
Snow Water Equivalent	The product of snow depth and snow relative density (with respect to the density of liquid water), a measure of the amount of water stored in a snowpack per unit area; it is expressed in units of length (e.g., cm or inches), being a quantity of type surface density, normalized by water density. It is the depth of water in the snowpack, if the snowpack were melted.
Temperature Profile	A calculation of temperatures at stated intervals throughout the atmosphere.
Total Precipitable Water	The total column amount of water vapor available in a vertical atmospheric profile.



# High priority DBNet activities in the coming years (1/2)

1. Foster transition of DBNet data from GTS to WIS 2.0.
2. Improve the geographical coverage of DBNet, in particular capitalizing on the following stations which due to their geographical locations would make very important contributions to the DBNet capabilities:
  - a) reintegration of CMA stations in the DBNet project (starting with Urumqi station),
  - b) addition of the SMN/CONAE high latitude station (Tierra del Fuego),
  - c) integration of four stations from the SEWA project (Libreville, Nairobi, Niamey, and Pretoria),
  - d) addition of Env. Canada stations in the Northern part of Canada (Inuvik and Iqaluit),
  - e) reintegration of IMD stations in the DBNet project (Delhi, Chennai),
  - f) integration of Sodankylä station as an EUMETSAT pilot station of opportunity,
  - g) reintegration of ROSHYDROMET stations in the DBNet project (Moscow, Novosibirsk, Khabarovsk)
3. Advance the implementation of FY-3 data services.

# High priority DBNet activities in the coming years (2/2)

4. Prepare for Metop-SG data services.
5. Further develop the ground station receiving infrastructure to be compliant with JPSS-2/3/4, Metop-SG, FY-3E/F/H (due to new downlink characteristics, hardware and/or software upgrades will be required).
6. Advance the implementation of HSIR sounder services (from IASI and CrIS) by providing full channel sets via DBNet using the WIS 2.0 early infrastructure to increase uptake by the Numerical Weather and Environmental Prediction (NWEPE) community, involving NWP centres as real data consumers as well as another data provider.
7. Further enhance the monitoring of the DBNet product tools developed by NWP SAF, including timeliness monitoring capabilities.
8. Analyse potential benefits and feasibility of reducing DBNet product latency.

# Thank you for your attention

Many thanks to

- Liam Gumley, DBNet Coordination Group Chair, CIMSS
- DBNet Coordination Group
- DBNet Operators
- Zoya Andreeva, DBNet Coordination, WMO Space Programme



WORLD  
METEOROLOGICAL  
ORGANIZATION

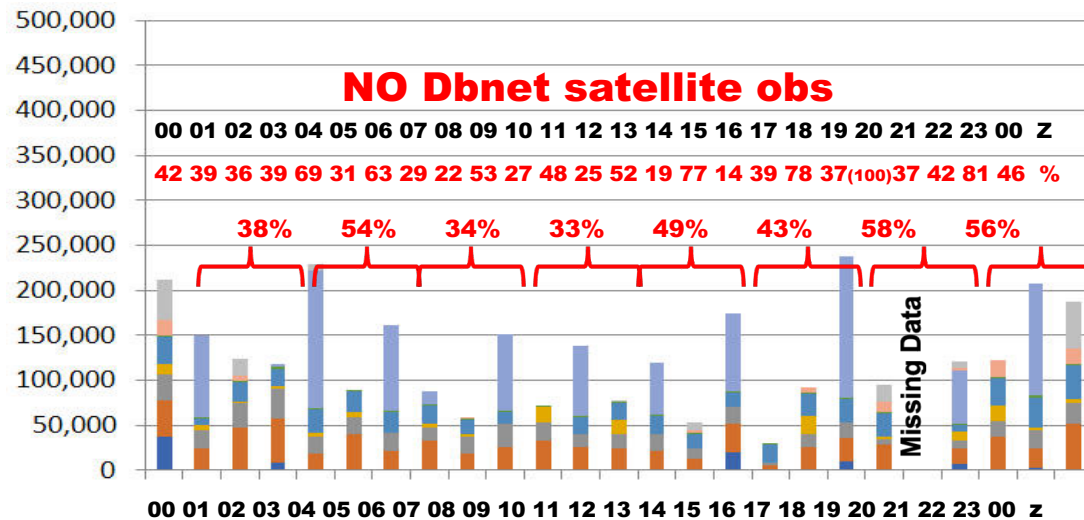
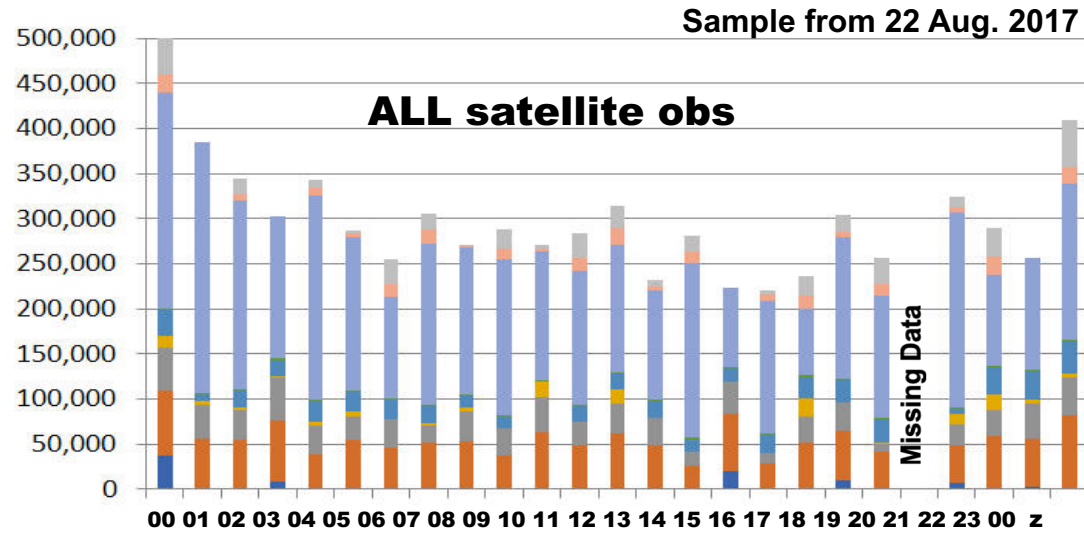
# Reserve Slides

# DBNet data denial

## Radiance observation counts w/ and w/o DBNet data



Without DB less than half the data would be available to the NOAA Hourly RAP model



% of obs Retained Without DBNet (hourly) (3-hourly)

← IASI (hourly)

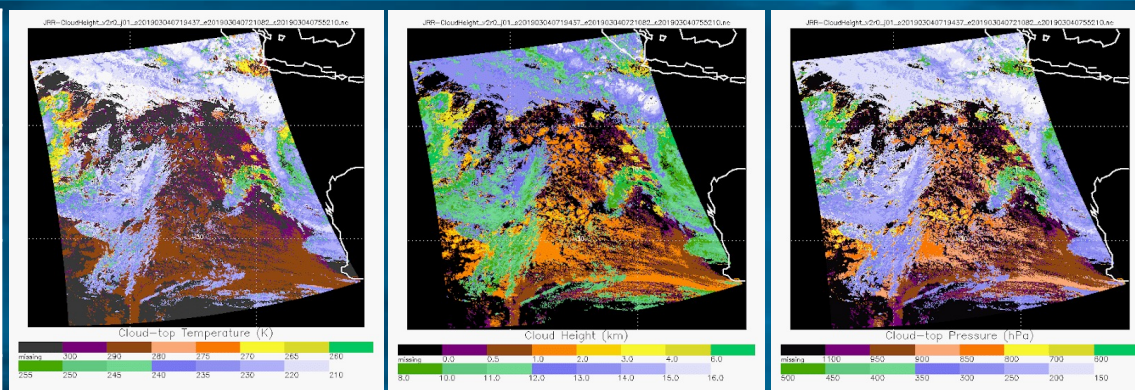
← SNDR (3-hourly)



# JPSS Data Products available via CSPP

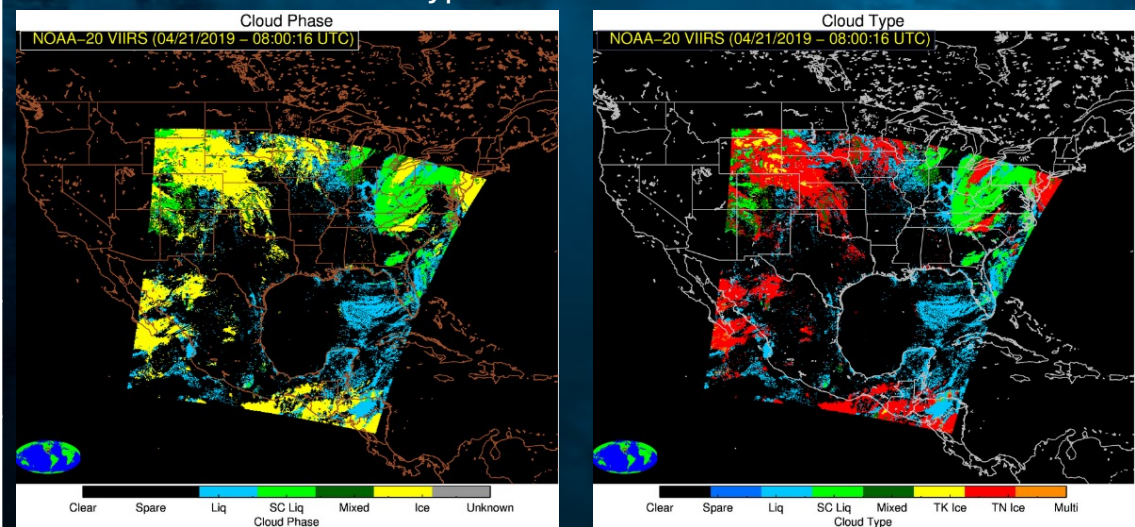
## VIIRS Cloud Products

Cloud Mask	Describes the area of the Earth's horizontal surface that is masked by the vertical projection of detectable clouds.
Cloud Top Height	Set of heights above mean sea level of the tops of the cloud layers for each cloud-covered Earth location.
Cloud Base Height	Height above sea level where clouds occur.
Cloud Cover Layers	Fraction of a given area of the Earth's horizontal surface that is masked by the vertical projection of clouds.
Cloud Optical Depth	Optical depth of the atmosphere due to cloud droplets, per unit cross section integrated over every distinguishable cloud layer and all distinguishable cloud layers in aggregate, in a vertical column above a horizontal cell on the Earth's surface.
Cloud Particle Size Distribution	Representation of the cloud particle size distribution. The effective radius is defined as the ratio of the third moment of the drop size distribution to the second moment, averaged over a layer of air within a cloud.
Cloud Phase and Type	Provides the primary phase of the cloud (Clear, Liquid, supercooled, Mixed, Ice, and Unknown).
Cloud Top Pressure	Atmospheric pressures at the tops of the cloud layers overlying each cloud-covered Earth location.
Cloud Top	Atmospheric temperature at the tops of the cloud layers



Above (from left to right)  
Cloud Top Temperature, Cloud Height, and Cloud Top Pressure

Below (from left to right)  
Cloud Phase and Cloud Type

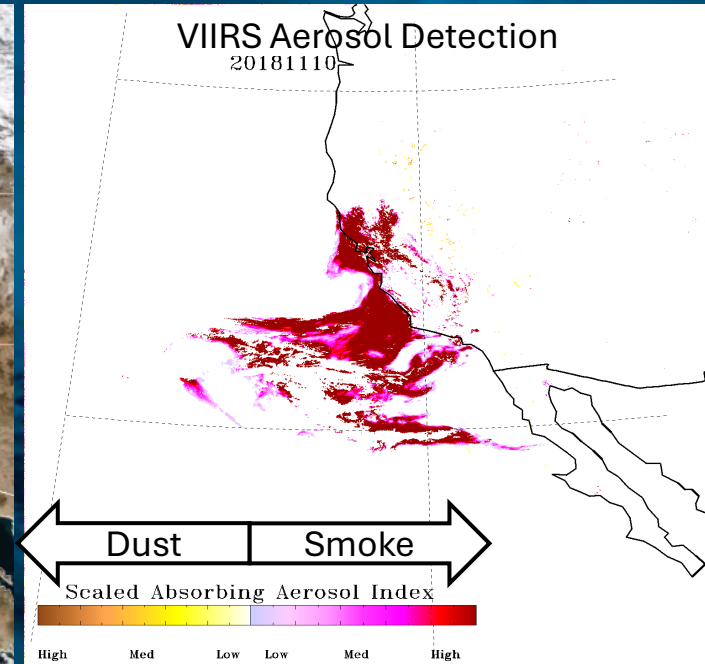
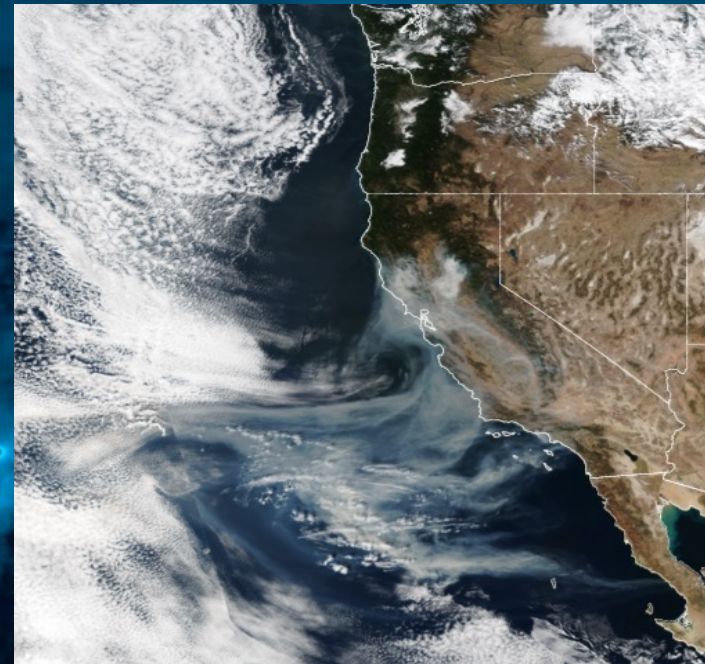




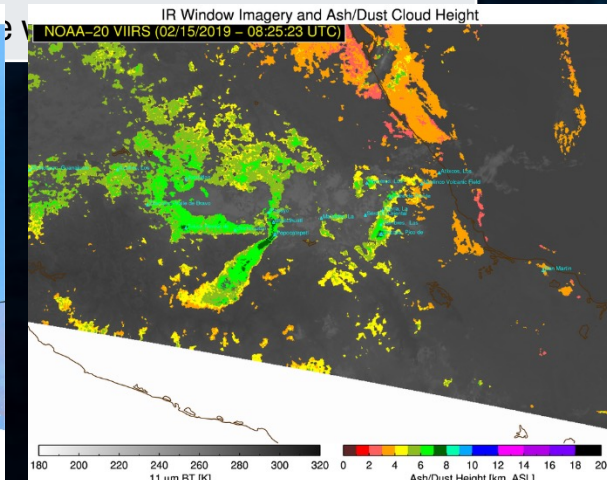
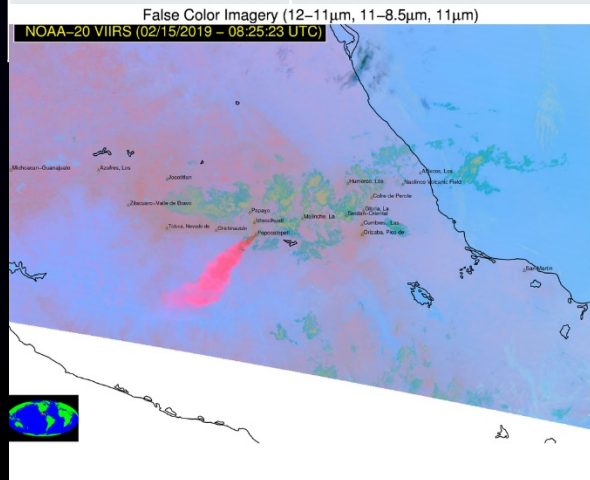
# JPSS Data Products available via CSPP

## VIIRS Aerosol and Volcanic Ash Products

Aerosol Detection	A summary map that indicates the extent of smoke/aerosol coverage and a measure of smoke albedo indicates relative intensity.
Aerosol Optical Depth	A measure of the fine solids suspended in the air including dust, sand, volcanic ash, smoke and urban/industrial aerosols.
Aerosol Particle Size	A measure of the bimodal size distribution of the aerosol population in terms of the effective radius ( $r_e$ ) and effective variance ( $v_e$ ) of each mode.
Volcanic Ash – Detection	Maps the location and concentration of volcanic ash after an eruption and



Above: Smoke from California Camp Fire on November 10, 2018  
VIIRS Imagery (left) and Aerosol Detection (right)



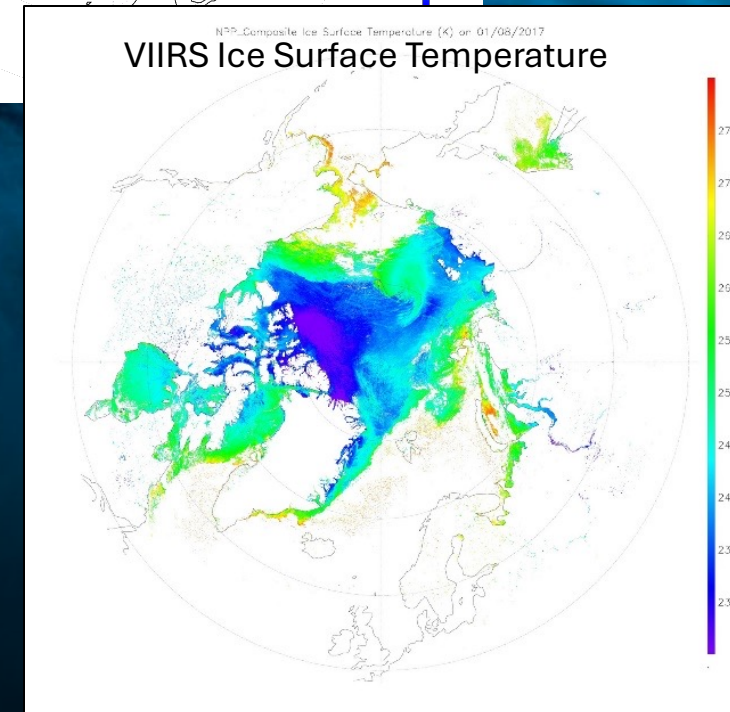
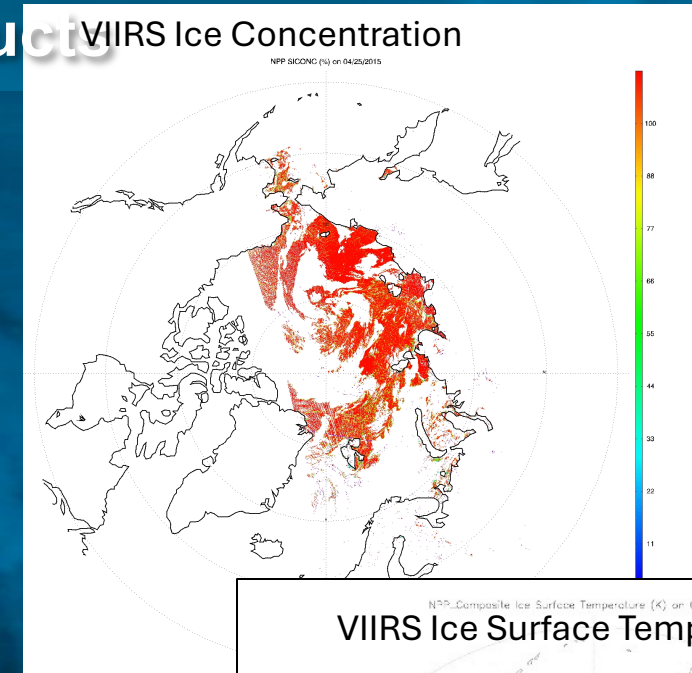
Left: False Color Imagery + Volcanic Ash/Dust Cloud Height (Feb 15, 2019)



# JPSS Data Products available via CSPP

## VIIRS Cryosphere Products

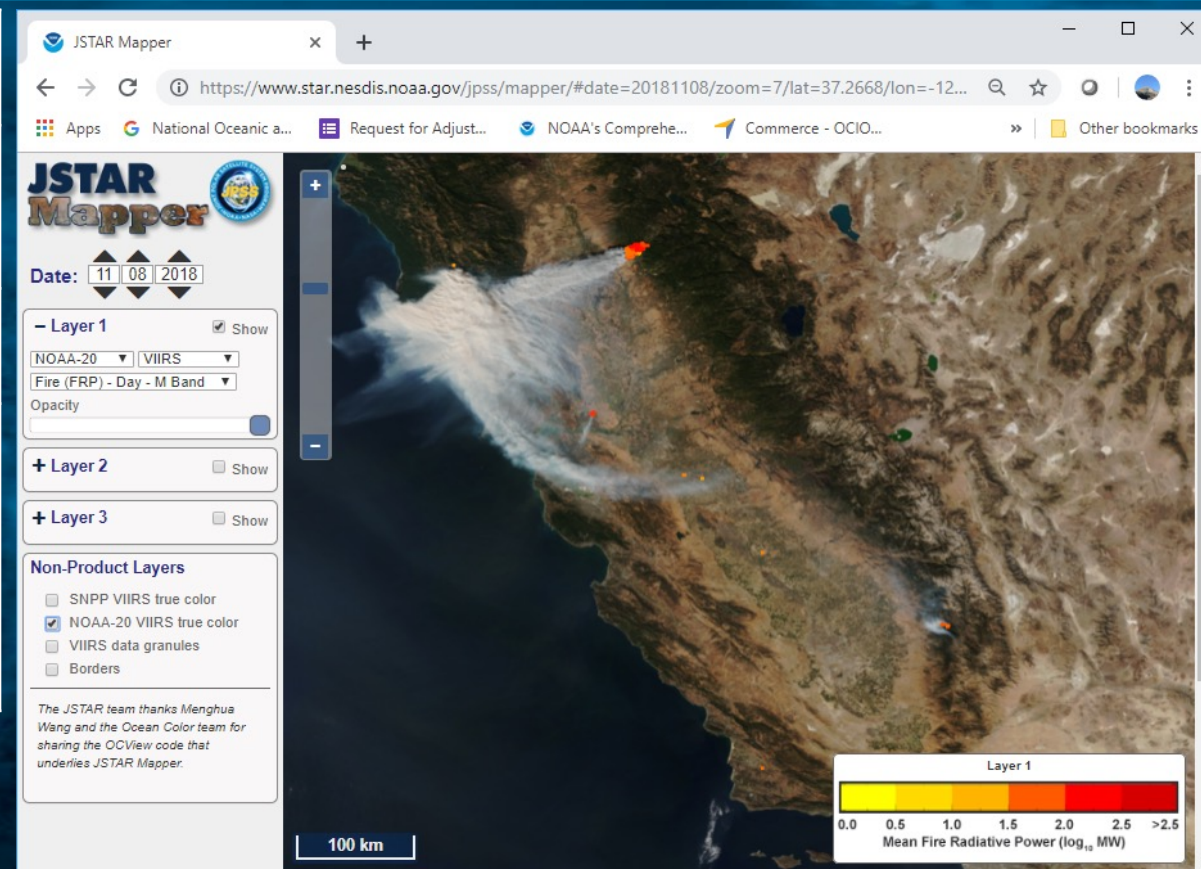
Ice Surface Temperature	IST provides the radiating, or “skin”, temperature of the sea and fresh water ice surface under clear-sky conditions. It includes the aggregate temperature of objects comprising the ice surface, including snow and melt water on the ice. The VIIRS IST EDR provides surface temperatures retrieved at VIIRS moderate resolution for ice-covered oceans both day and night.
Ice Concentration	Ice concentration provides the fraction of an area covered by ice. It is calculated for every VIIRS moderate resolution band pixel (750 m) over unfrozen ocean and inland water bodies.
Ice Thickness	VIIRS ice thickness provides estimates of sea, lake, and river ice thickness under clear-sky conditions. The ice surface may be covered by snow or, in the summer, melt ponds. The depth of snow is not included in ice thickness product. Calculations are done at VIIRS moderate resolution (750 m) for ice-covered water bodies both day and night. It is not a direct measurement, but rather a model-based approach driven by other satellite products.
Snow Cover	The snow cover product contains two products: a fractional snow cover (FSC) and a binary snow cover (BSC) mask. The fractional snow cover is defined as the fraction of a given area of the earth’s horizontal surface that is masked by snow. The binary snow/no-snow mask provides a mapping of snow covered areas as either containing or not having snow.





# JPSS Data Products available via CSPP VIIRS Land Products

Land Surface Temperature	Measurement of the skin temperature over global land coverage including coastal and inland water.
Land Surface Albedo	The Ratio between solar radiation reflected by Earth's land surface and solar radiation incident at the surface.
Active Fires	A 2-Dimensional array of values representing the fire and other relevant thematic classes of each pixel.
Flood Detection	High resolution remotely-sensed data identifying flood inundation and extent generated from the 375 m VIIRS Initially designed to capture snowmelt and ice jam flooding and inundation but has expanded applications to levee breaches, post-storm flooding, and more



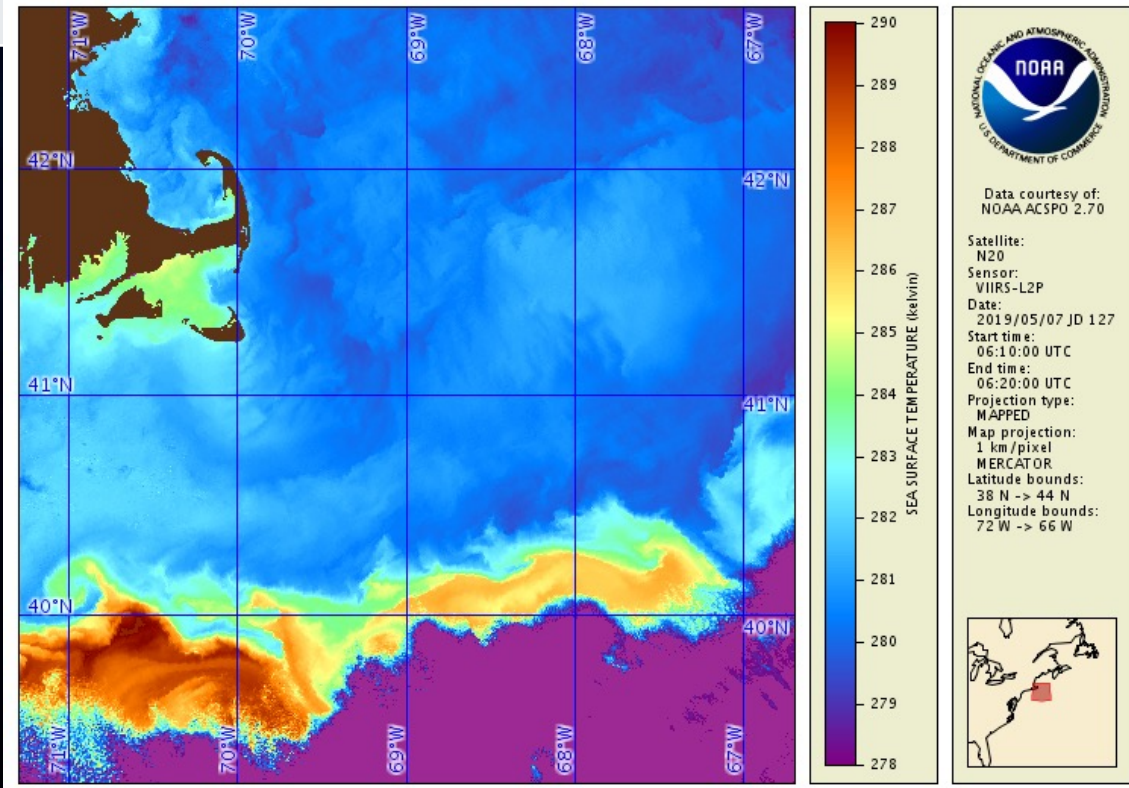
N20 Active Fires – Fire Radiative Power



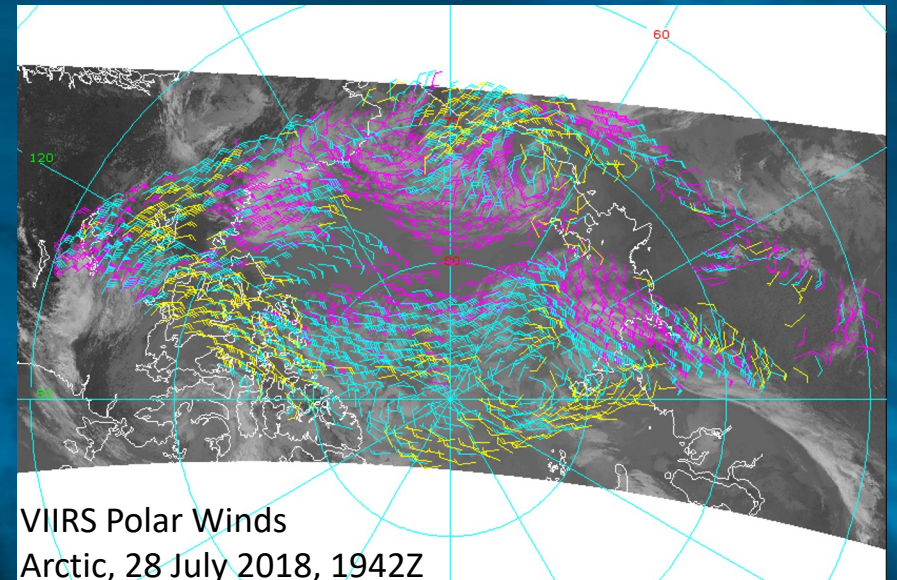
# JPSS Data Products available via CSPP

## VIIRS Sea Surface Temperature and Polar Winds Products

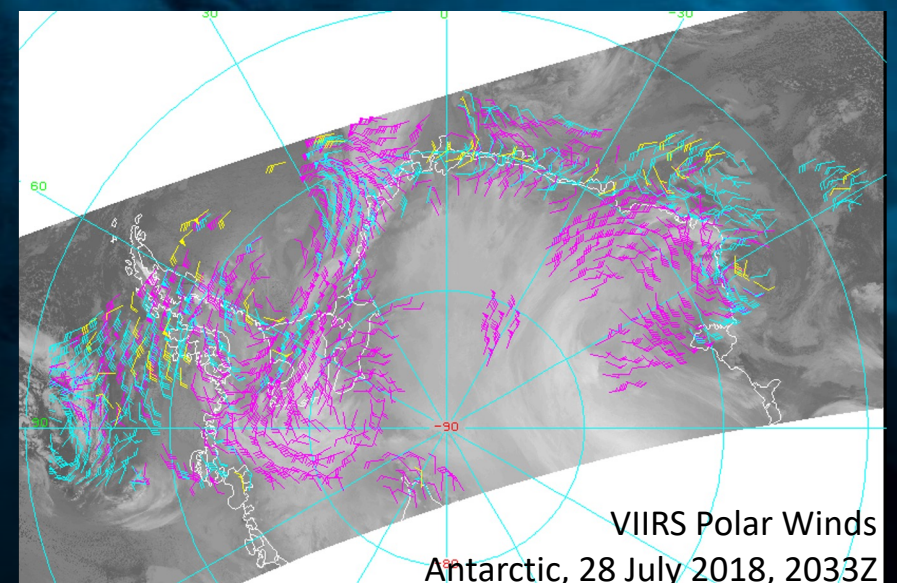
Sea Surface Temperature	Skin temperature of the ocean at depths on the order of 10 microns is retrieved in each cloud-free pixel over water.
Polar Winds	Winds derived by tracking clouds features in the VIIRS longwave infrared channel. Wind speed, direction, and height are measured throughout the troposphere, poleward of approximately 65 degrees latitude, in cloudy areas



N20 Sea Surface Temperature, May 7, 2019



VIIRS Polar Winds  
Arctic, 28 July 2018, 1942Z



VIIRS Polar Winds  
Antarctic, 28 July 2018, 2033Z