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CSPP CONFERENCE 2026

# MEOS Polar System with Integrated CSPP SDR and other Processing Packages

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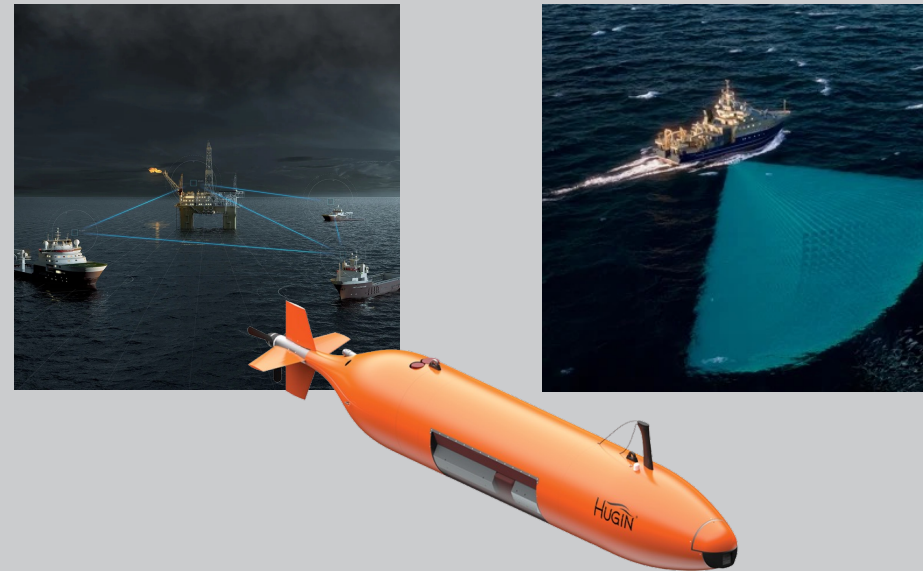
# We are KONGSBERG

- KONGSBERG is an international technology group
  - 7500 employees, in 20 countries
  - Headquarter in the small Norwegian town of Kongsberg
  - Founded in **1814** as Kongsberg Våpenfabrikk

## Defence & Security



## Ocean Space

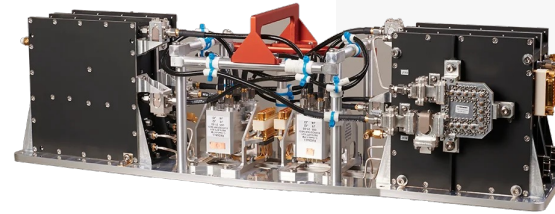
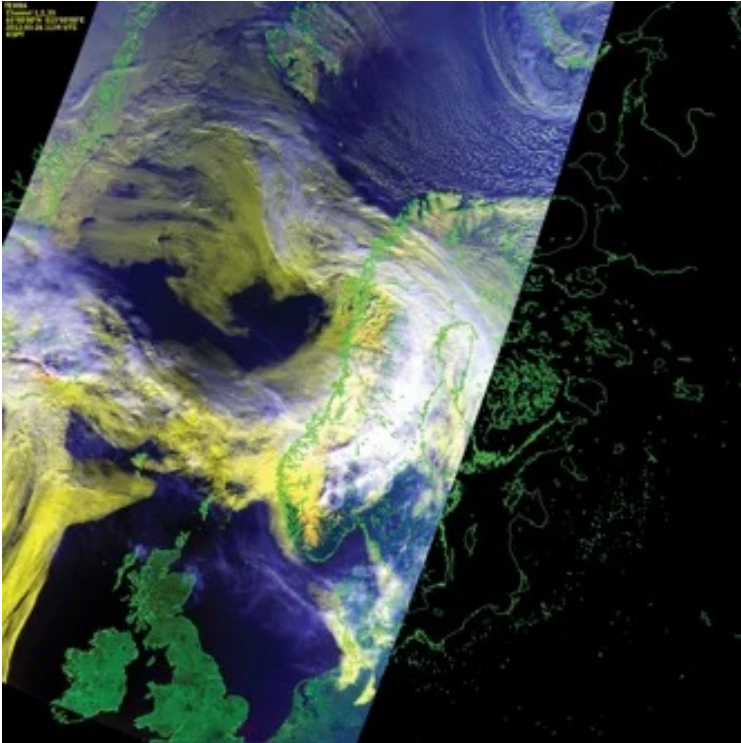
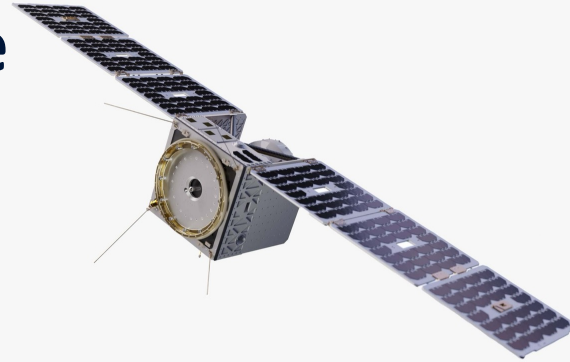


## and ...



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... Space



# Space Ground Systems - Tromsø





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# Historic Overview

Important years:

- 1967 – Tromsø Telemetry Station
- 1982 – **Drive Electronics**: Started by employees from Tromsø Telemetry Station
- 1984 – **Spacotec**: Bankruptcy! New company created to act as supplier to ESA
- 1994 – **Kongsberg Spacotec**: Bought by KONGSBERG
- 2019 – **Space Ground Systems**: Fully Integrated into KONGSBERG, no longer a separate company

Major program participations:

- **ESA**: ERS, ENVISAT, Sentinel
- **EUMETSAT**: EPS, EARS, Jason CS, EPS-SG, EPS Sterna
- **NASA/NOAA**: EOS, JPSS/LGSS



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# What do we do in Tromsø?

- **EOS Antennas**
  - 3.7m X/L (RX-only), X/S (TT&C), KA/X/S (Tri-Band)
- **Wideband Receivers**
  - HRDFEP with 1, 2, or 4-channel
  - 400Ksym to 1200Msym
  - Heritage waveforms, CCSDS SCCC and DVB-S2(X)
- **Wideband Transmitters / Wideband Test Transmitters**
- **Meteorological Ground Stations (MEOS Polar - EARS)**
  - HRDFEP with some additional components
- **Monitoring & Control**
  - Integration of ground station operations
- **Integrated Ground Terminals**
  - Antenna, modem, and monitoring & control software.
- **Data Processing HUB**
  - Consolidate VCDU data from a network of ground stations





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# So, what is MEOS Polar?

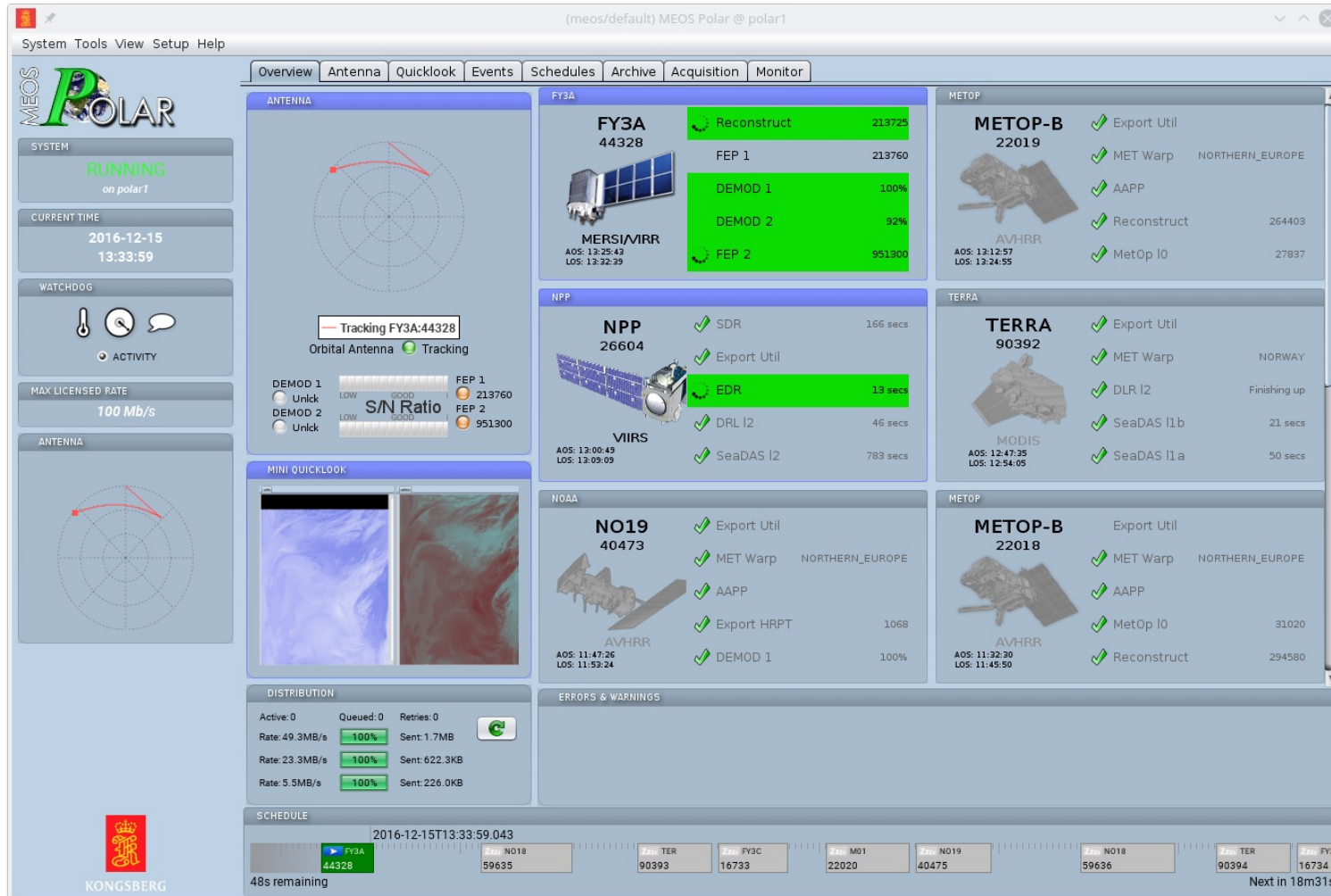
The screenshot displays the MEOS HIT MET - System Monitor interface. The main window shows a 'System is running' status and a process flow diagram with components like 'c\_run SMART\_CTRL', 'c\_run DEMOD\_4LCATEL', 'c\_run FEP\_2', 'c\_run RECONSTRUCT', and 'c\_run QUICK\_LOCK'. Three detailed sub-windows are open: 'FEP\_2' showing various operational parameters, 'Demodulator' showing signal processing metrics, and 'MWD' showing a satellite image of a mountainous region. The interface includes a menu bar, a toolbar, and a taskbar at the bottom with the system clock showing 2:48:22 on 21/11/2001.

- It is an...
  - Antenna Controller
  - Demodulator
  - Processing server
  - Data Archive (short term)
  - Data distributor
- ... all in single 2U server



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# Processing



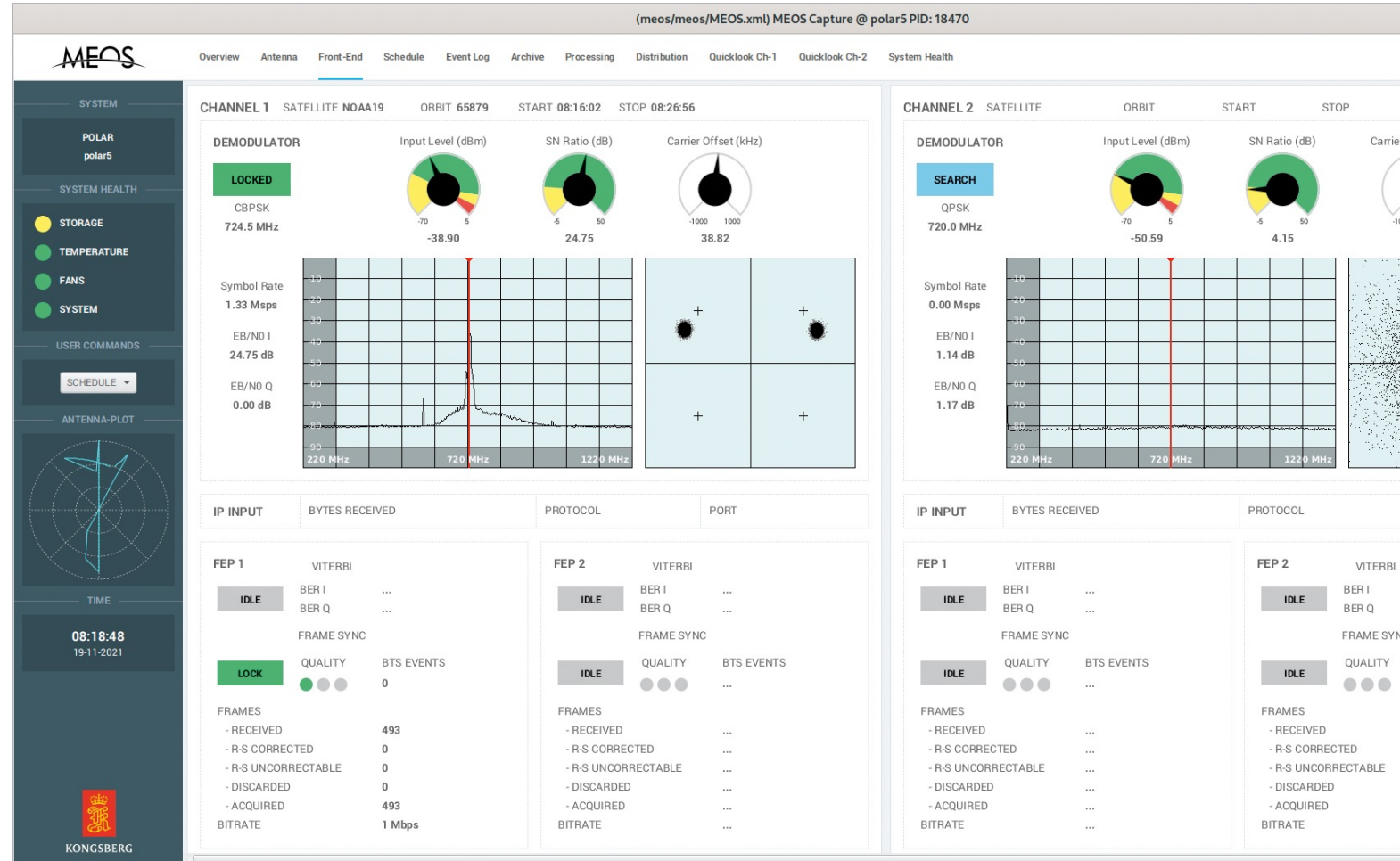
- Third party (optional):
  - AAPP
  - CSPP SDR
  - FY-3 (requires CMA ‘license’)
  - Polar2Grid
  - SeaDAS
  - RT-STPS
- Our own:
  - Package Reconstruct
  - MetOp L0
  - MetOp-SG L0



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# Continuous Updates and Improvements

- Goal is to have at least 2 releases/year
  - New OS snapshot
  - Improvements
  - Bugfixes
  - New features
  - Updates to processing packages
- New missions can be added at any time





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## This summer -> MEOS Polar V12

- MEOS Polar V12 is a hardware technology refresh
- The software will be, as much as possible, identical on both V5 and V12 hardware going forward

	MEOS Polar V5 (EARS)	MEOS Polar V12
Demodulator/Ingest board	HRDFECv5	HRDFECv12
- min symbol rate	0.16 MS/s	0.283 MS/s
- max symbol rate	500 MS/s	1200 MS/s
Server	HPE DL380 Gen10	HPE DL380 Gen12
- standard memory size	64 GB	128 GB
- standard data storage	~ 4TB (RAID5)	~ 8TB (RAID6)


**Antenna**
**Orbital AEHP**

Connected OK  
 Mode Switch RUN  
 Time to LOS 0 s

**FEED**

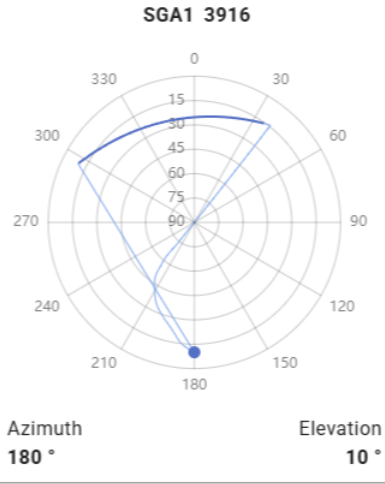
LOCK X PURGE  
 Frequency 7825 MHz

**AZIMUTH ELEVATION**

**CONTACTOR**  
BRAKE BRAKE  
DRIVE DRIVE  
OVERSPEED OVERSPEED  
LOW LIMIT LOW LIMIT  
HIGH LIMIT HIGH LIMIT  
PRE LIMIT

**ACU**

ACU +24V FEED +24V  
+3.3V HEATER  
CONTROL STOW PINS  
MODE WIRING LIMIT WIRING  
 Time 15.05.2026, 11:44:31 UTC


**ENVIRONMENTAL STATUS**

	Temp	Humidity	Dew P.	Pressure
Cab	29.4 °C	9.1 %	-6.7 °C	0 PSI
Feed	25.7 °C	46 %	13.2 °C	N/A

**Manual Commanding**

CONNECT DISCONNECT  
PARK SET PARK  
TRACK SAT TRACK SUN  
GOTO

**Channel 1**

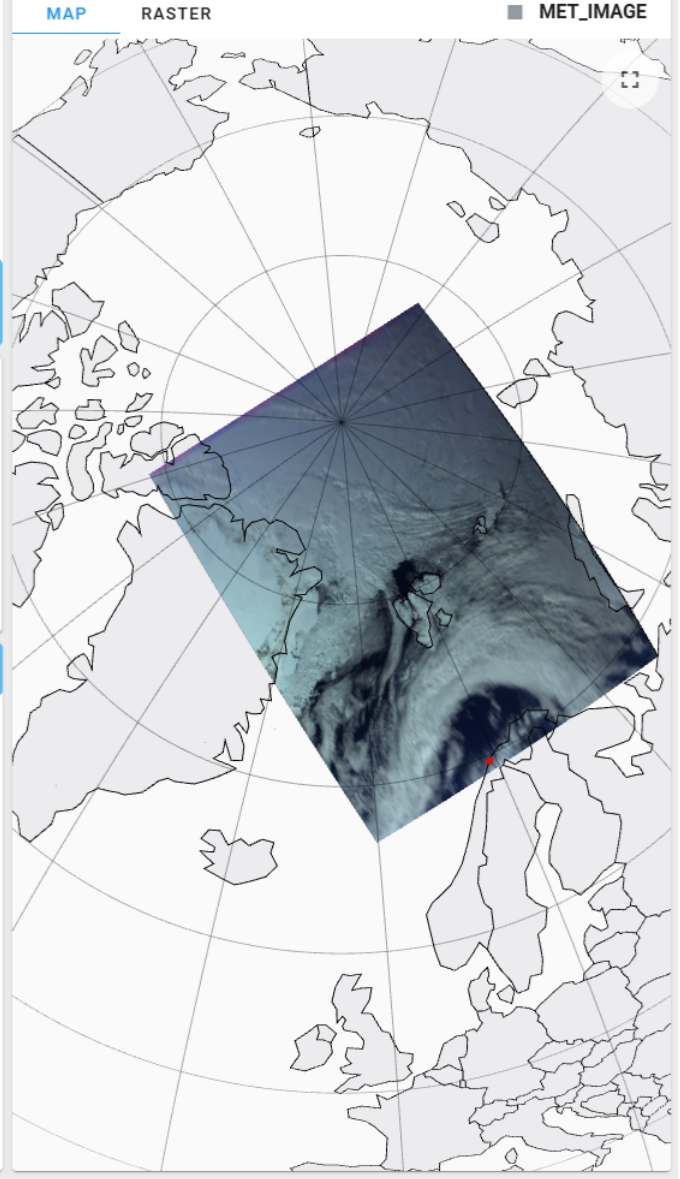
<span style="background-color: blue; color: white; padding: 2px 5px;">FY3E</span>	AOS 15:44:40	Starts in 2h	
25196	LOS 15:50:03		
<span style="background-color: blue; color: white; padding: 2px 5px;">SGA1</span>	AOS 15:11:10	Starts in 1h 26m	
3917	LOS 15:18:48		
<span style="background-color: blue; color: white; padding: 2px 5px;">METOP-B</span>	AOS 14:40:25	Starts in 55m	
70863	LOS 14:48:03		
<span style="background-color: blue; color: white; padding: 2px 5px;">FY3E</span>	AOS 14:07:44	Starts in 23m	
25195	LOS 14:13:22		

**No active contacts**

SNR	FEP 1	FEP 2
-5.89 dB	Frames 5 062 431	
	Bit rate 93.30 Mbps	

I/F FEP 1 PROC DIST  
IP FEP 2

<span style="color: green;">✓</span>	<span style="background-color: green; color: white; padding: 2px 5px;">SGA1</span>	3916	AOS 13:34:03	LOS 13:41:33	
<span style="color: green;">✓</span>	<span style="background-color: green; color: white; padding: 2px 5px;">METOP-B</span>	70862	AOS 13:03:25	LOS 13:10:40	
<span style="color: green;">✓</span>	<span style="background-color: green; color: white; padding: 2px 5px;">AWS-PFM</span>	9443	AOS 12:40:09	LOS 12:47:24	
<span style="color: red;">✗</span>	<span style="background-color: red; color: white; padding: 2px 5px;">NOAA20</span>	43984	AOS 12:27:52	LOS 12:32:07	
<span style="color: green;">✓</span>	<span style="background-color: green; color: white; padding: 2px 5px;">NPP</span>	75380	AOS 12:09:10	LOS 12:14:03	
<span style="color: green;">✓</span>	<span style="background-color: green; color: white; padding: 2px 5px;">SGA1</span>	3915	AOS 11:52:48	LOS 12:02:56	
<span style="color: green;">✓</span>	<span style="background-color: green; color: white; padding: 2px 5px;">NOAA21</span>	18191	AOS 11:32:18	LOS 11:38:03	
<span style="color: green;">✓</span>	<span style="background-color: green; color: white; padding: 2px 5px;">METOP-B</span>	70861	AOS 11:22:03	LOS 11:31:18	

**Quicklook**




# Third Party Integration

- We use **SUSE Linux Enterprise Server** on all our systems, not very common in DB community
- Therefore, prefer to run in a container (singularity), to use recommended OS
  - **Singularity**: CSPP SDR and FY-3 processors
  - **Docker**: Polar2Grid
  - AAPP is natively compiled on SLES
  - SeaDAS and RT-STPS are java-based
- Processors are run from dedicated subsystem instance, fully integrated in our M&C Middleware









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# Third Party Configuration




Mission Front-End **Processing** Distribution System Information Management   **DEPLOY**  

Reconstruct Merger **Polar2Grid** Quicklook CFDP GSE Aapp Metop Adm Msg Metop Level0

Grid **Overlay** Products

METOP-C Polar2Grid ... 

Lat Long Grids  2





Coastlines

Rivers

Borders

- Enabled  
Enable/disable the addition of overlay in generated images
- File Tag  
A short text describing the output produced




Mission Front-End **Processing** Distribution System Information Management   **DEPLOY**  

Reconstruct Merger Polar2Grid Quicklook CFDP GSE **Rdr** Sdr

MISSIONS SELECTION

MISSION 

**NOAA 20** 

NOAA 20 RDR ... 

- Cris  
Enable/disable processing of the CrIS instrument
- Atms  
Enable/disable processing of the ATMS instrument
- Viirs  
Enable/disable processing of the VIIRS instrument
- Omeps  
Enable/disable processing of the OMPS instrument
- File Tag  
A short text describing the output produced

- Necessary configuration is available in our configuration web app, including help text for each parameter.



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# Processing Performance

- We always strive to stream data as much as possible, to improve latency:
  - Reconstruction, MetOp L0, MetOp-SG L0, distribution (cadu/vcdu/isp) all start at AOS
- Processing on V12, CSPP SDR configured with 4\* cores and local auxdata:

	NPP	NOAA20	NOAA21
Acquisition	9m 23s	11m 0s	10m 7s
RDR**	1m 45s	2m 5s	3m 14s
SDR VIIRS granules	8 - 2m 33s	8 - 2m 31s	8 – 2m 44s
SDR ATMS granules	14 – 0m 25s	18 – 0m 22s	16 – 0m 17s
SDR CRIS granules		12 - 7m 48s	10 – 12m 6s

\* Change to 8, based on IMGW findings (more memory on V12)

\*\* To be replaced by Reconstruct + RDR file formatting script



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# Adding New Missions

Mission Front-End Processing Distribution System Information **Management** **DEPLOY**

Archives **Factory Reset**

## Archive Management

Manage all your MEOS Archives. You may create and remove archives from the system. Archives are files exported from any compliant MEOS System and stored outside this system. They contain the system's customer configuration.

Last imported archive: **horizon\_c129.tar.gz**

**FILTER BY TYPE**

Name
<input type="checkbox"/> <b>meos_awspfm_lr_v3_9_4_master.tar.gz</b>
<input type="checkbox"/> <b>meos_metopc_ahrpt_v3_2_1_master.tar.gz</b>
<input type="checkbox"/> <b>meos_sga1_smd1_v3_9_4_master.tar.gz</b>
<input type="checkbox"/> <b>meos_noaa19_hrpt_v3_2_1_master.tar.gz</b>
<input type="checkbox"/> <b>meos_s1c_xband2_v3_9_4_master.tar.gz</b>

The screenshot shows the MEOS Mission Management interface. A modal dialog titled "Create new mission" is open, allowing the user to create a new mission. The dialog includes a "CREATE NEW MISSION" button at the top, a list of mission names, and a form to enter a mission name. The mission name "CSPP-2026" is entered in the form. The dialog also includes "CANCEL" and "CREATE" buttons at the bottom.

**CREATE NEW MISSION**

MISSIONS

- AWS-PFM Edit Copy
- FY3D Edit Copy
- FY3E Edit Copy
- FY3F Edit Copy
- METOP-B Edit Copy
- METOP-C Edit Copy
- NOAA 20 Edit Copy
- NOAA 21 Edit Copy
- Suomi NPP Edit Copy
- PASSAT1 Edit Copy
- PASSAT3 Edit Copy
- SGA1 Edit Copy
- SGB1 Edit Copy

**Create new mission** ×

The mission name entered will be the SYSTEM name employed for this mission. You may only employ alphanumeric uppercase characters.

**ENTER MISSION NAME**

CSPP-2026

**CANCEL CREATE**

- Import archive (a few KB)
- Manually in the configuration app



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# Distribution

- All configurable distribution is push-based:
  - File: (s)FTP(S), FILE
  - Socket: TCP, UDP, RAW (IP-packets)
  - SLE: RCF, RAF
- All data files are stored directly on disk
  - manual retrieval from GUI
  - pull using sftp

POST_PA 88		
Live Metop Bo	METOP-B	FILE Live Rawdata Metop
	METOP-C	
Live Metop Bo Segmented	METOP-B	FILE Live Segmented L0 Metop
	METOP-C	
Live Reports	All	FILE Live Report Sftp
		FILE Live Report Active Ptp
NRT		
Live Awcftm Segmented	AW8-PFM	FILE Live Segmented Rawdata Aws
Live Fy3 Segmented	FY3D	
	FY3E	FILE Live Segmented Rawdata Fy3
	FY3F	
Live Noaa2x Cadusocket	Suomi NPP	
	NOAA 20	SOCKET Sles10testsocket
	NOAA 21	
Live Noaa2x Segmented	Suomi NPP	
	NOAA 20	FILE Live Segmented Rawdata Noaa
	NOAA 21	
Live Sga1 Ref	SGA1	SLE Polar Epsg
Live Sgb1 Ref	SGE1	SLE Polar Epsg Sgb



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Thank you for your  
attention!

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