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CSPP CONFERENCE 2026

MEOS Polar System with Integrated CSPP SDR and other Processing Packages

2026-05-21

Tom Hindenes

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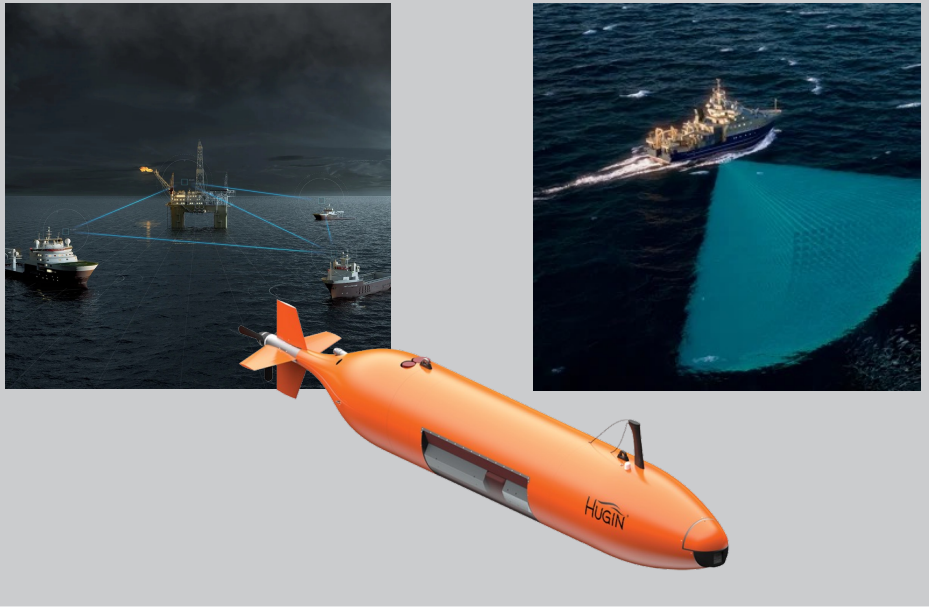
Technical Lead, MEOS Capture

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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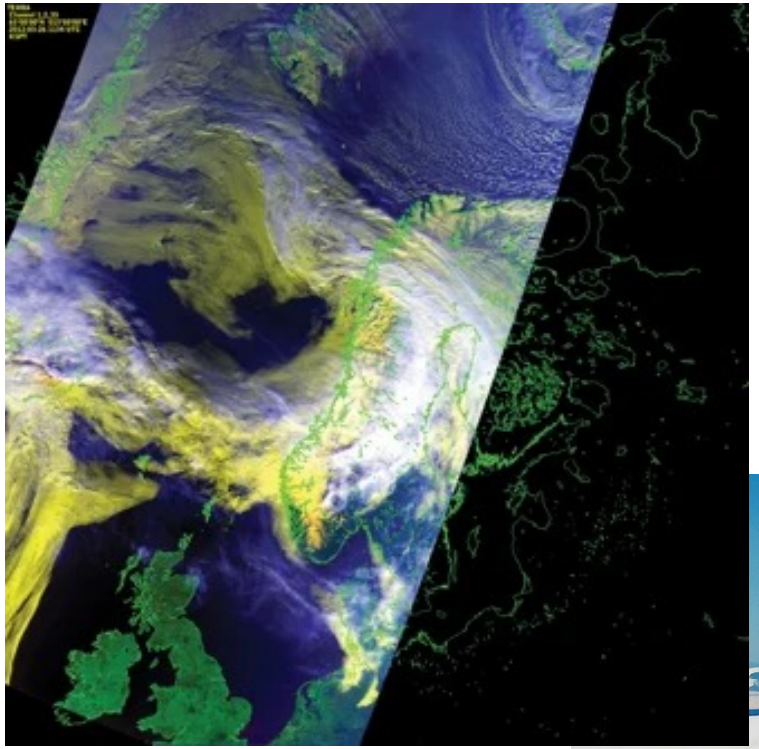
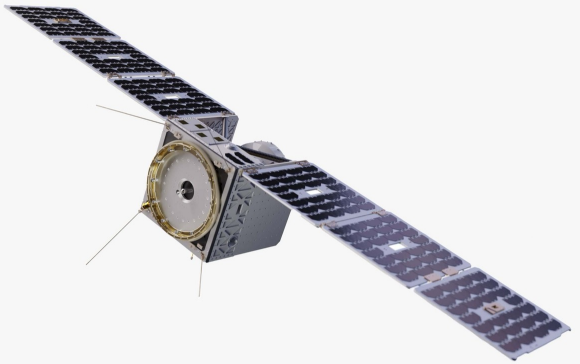
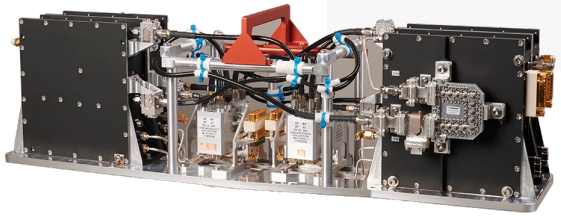
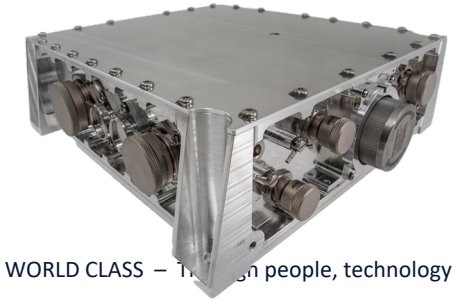
… Space









Space Ground Systems - Tromsø

Historic Overview

Important years:

- 1967 – Tromsø Telemetry Station
- 1982 – **Drive Electronics**: Started by employees from Tromsø Telemetry Station
- 1984 – **Spacetec:** Bankruptcy! New company created to act as supplier to ESA
- 1994 – **Kongsberg Spacetec**: 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

What do we do in Tromsø?

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- 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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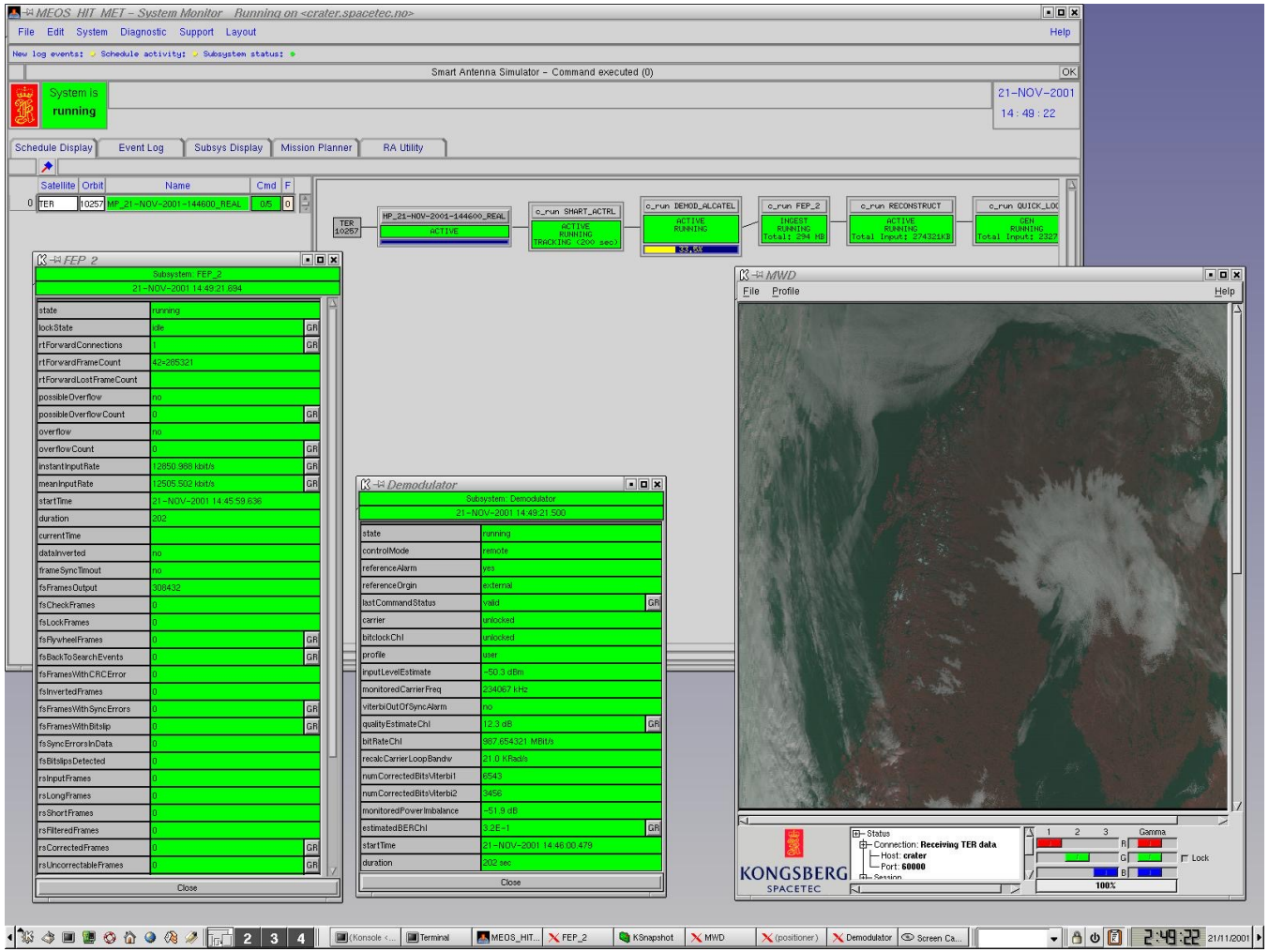
So, what is MEOS Polar?



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

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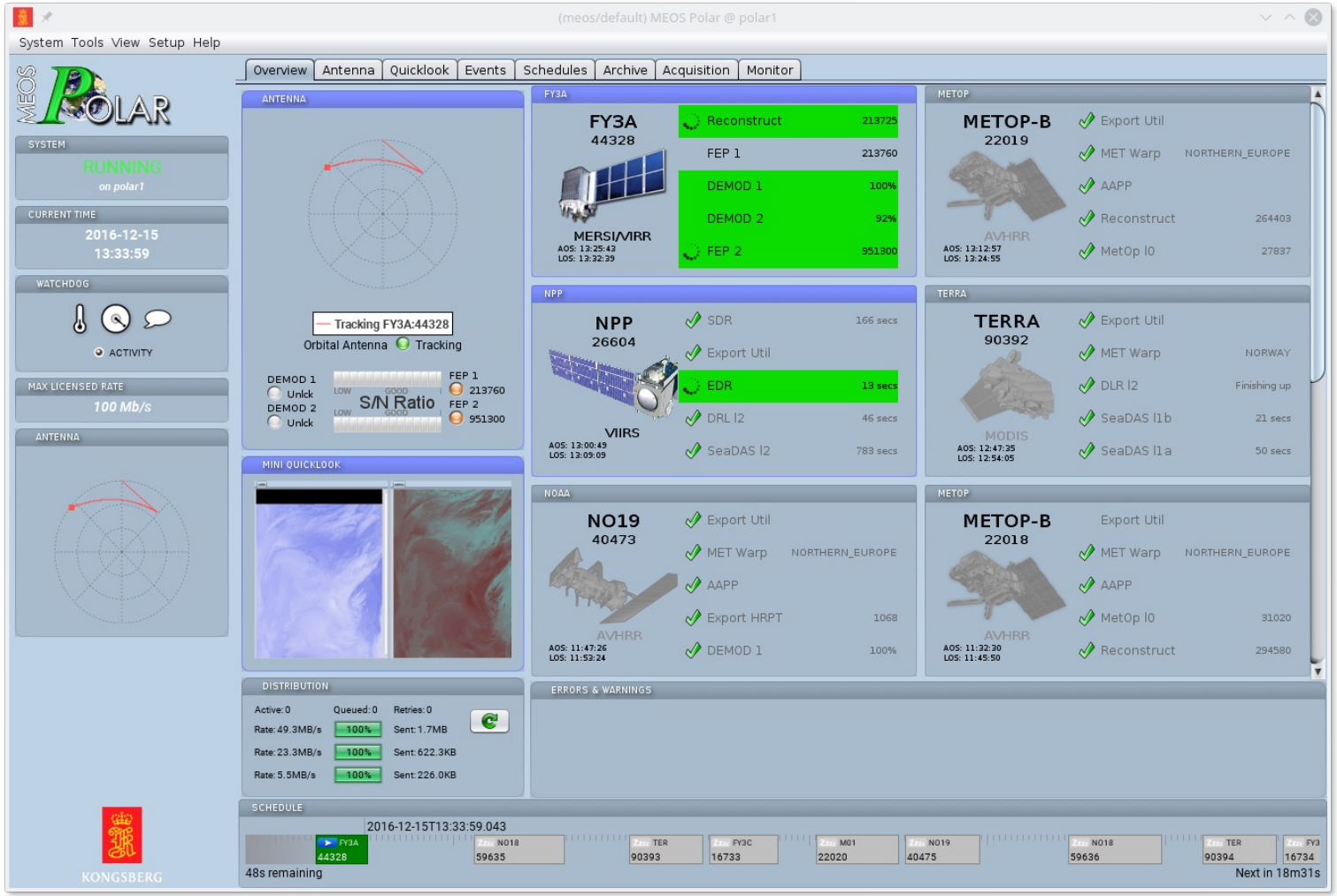
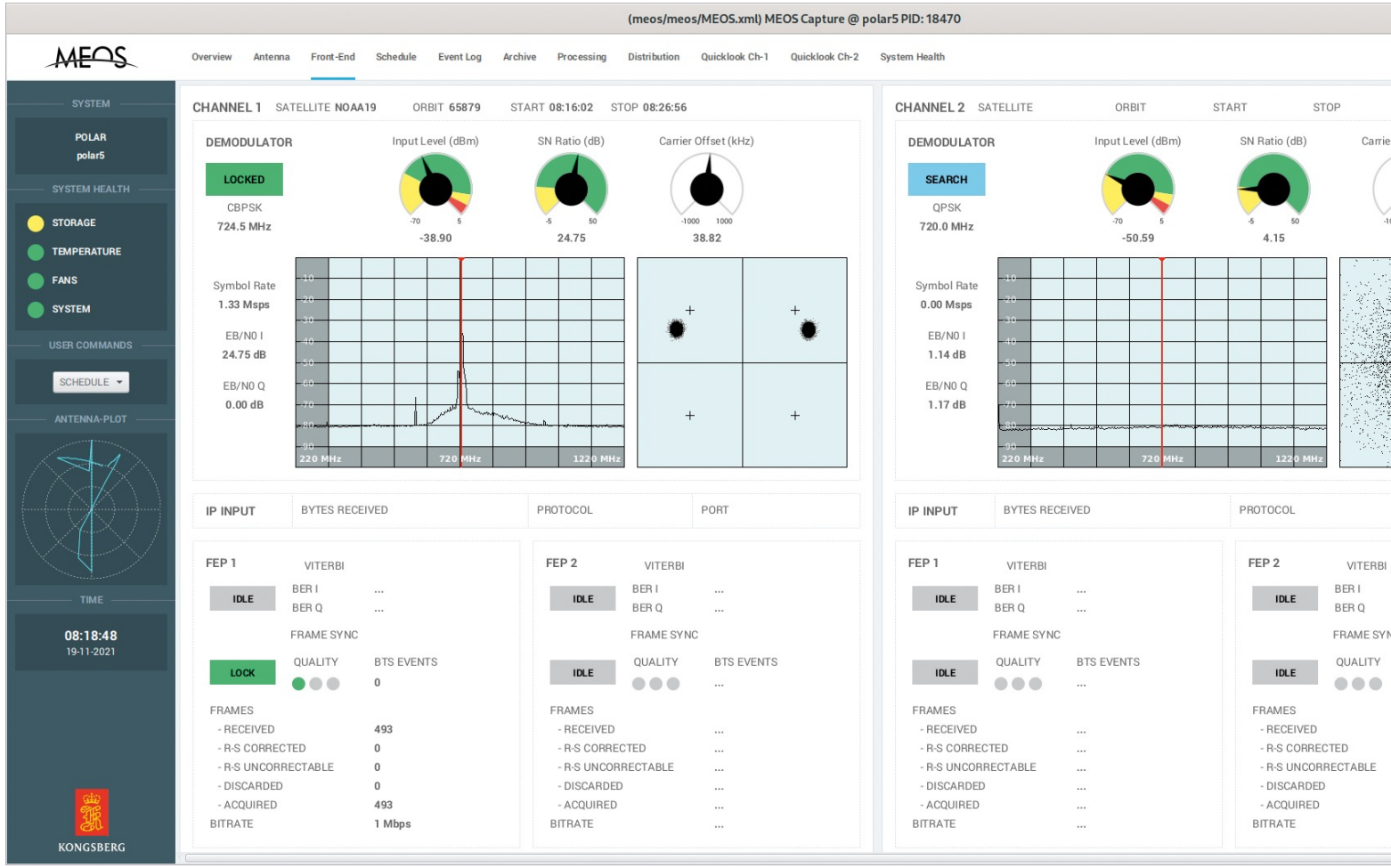
Processing



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

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



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)

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OVERVIEW | CHANNEL 1 | ANTENNA | EVENTS | MISSION PLANNER | QUICKLOOK | FILES | PROCESSING | DISTRIBUTION

13:44:32 | c129

Antenna

Orbital AEHP

Connected	OK
Mode Switch	RUN
Time to LOS	0 s

FEED

LOCK X | PURGE

Frequency 7825 MHz

AZIMUTH / ELEVATION

CONTACTOR

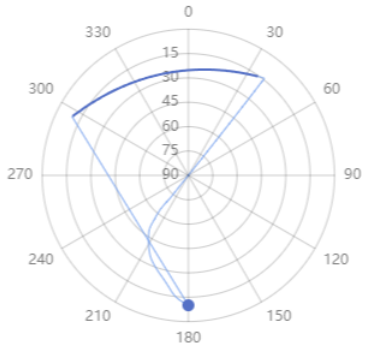
AZIMUTH	ELEVATION
BRAKE	BRAKE
DRIVE	DRIVE
OVERSPEED	OVERSPEED
LOW LIMIT	LOW LIMIT
HIGH LIMIT	HIGH LIMIT
PRE LIMIT	

ACU

ACU +24V	FEED +24V
+3.3V	HEATER
CONTROL	STOW PINS
MODE WIRING	LIMIT WIRING

Time 15.05.2026, 11:44:31 UTC

SGA1 3916



Azimuth 180 °

Elevation 10 °

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

FY3E 25196	AOS 15:44:40	LOS 15:50:03	Starts in 2h
SGA1 3917	AOS 15:11:10	LOS 15:18:48	Starts in 1h 26m
METOP-B 70863	AOS 14:40:25	LOS 14:48:03	Starts in 55m
FY3E 25195	AOS 14:07:44	LOS 14:13:22	Starts in 23m

No active contacts

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

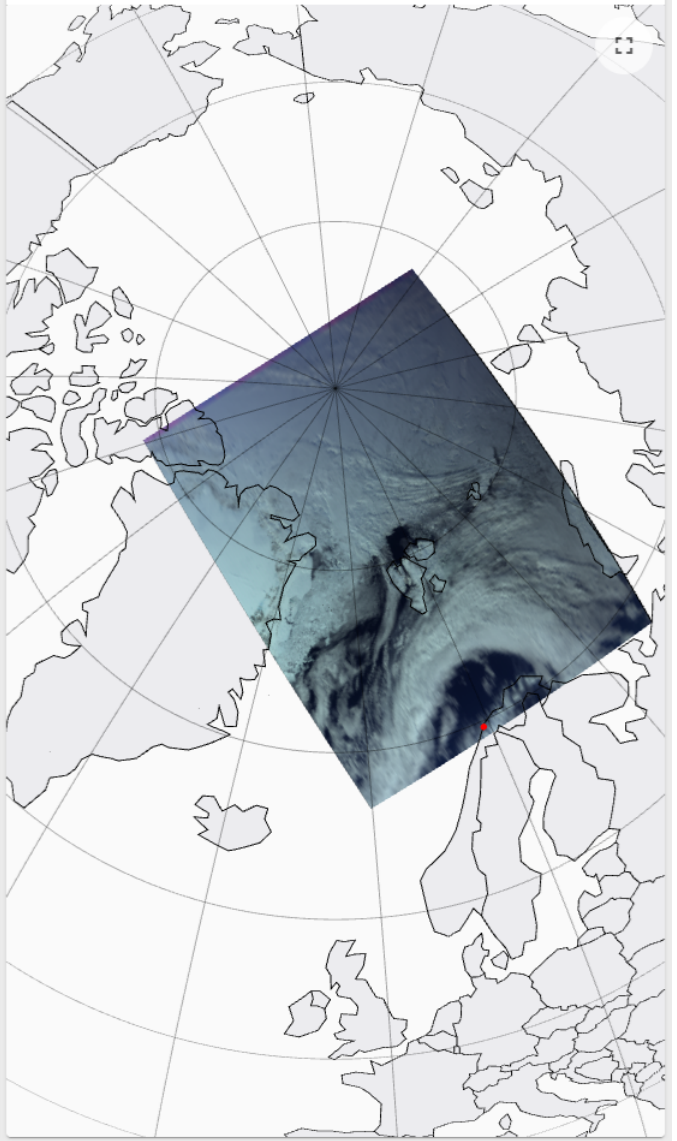
I/F | FEP 1 | PROC | DIST

IP | FEP 2

✓	SGA1	3916	AOS 13:34:03	LOS 13:41:33
✓	METOP-B	70862	AOS 13:03:25	LOS 13:10:40
✓	AWS-PFM	9443	AOS 12:40:09	LOS 12:47:24
✗	NOAA20	43984	AOS 12:27:52	LOS 12:32:07
✓	NPP	75380	AOS 12:09:10	LOS 12:14:03
✓	SGA1	3915	AOS 11:52:48	LOS 12:02:56
✓	NOAA21	18191	AOS 11:32:18	LOS 11:38:03
✓	METOP-B	70861	AOS 11:22:03	LOS 11:31:18

Quicklook

MAP | RASTER | MET_IMAGE



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

Third Party Configuration

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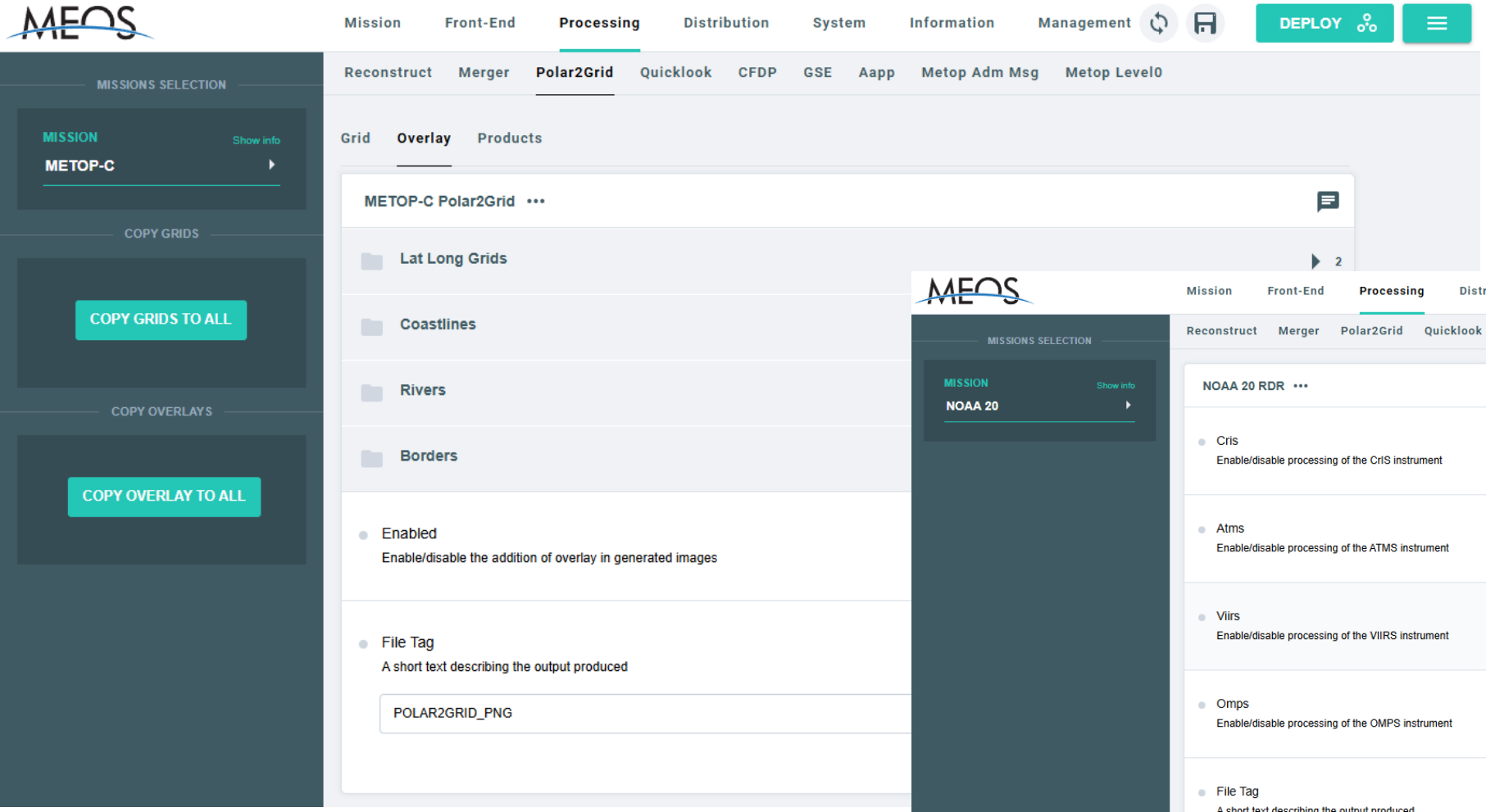
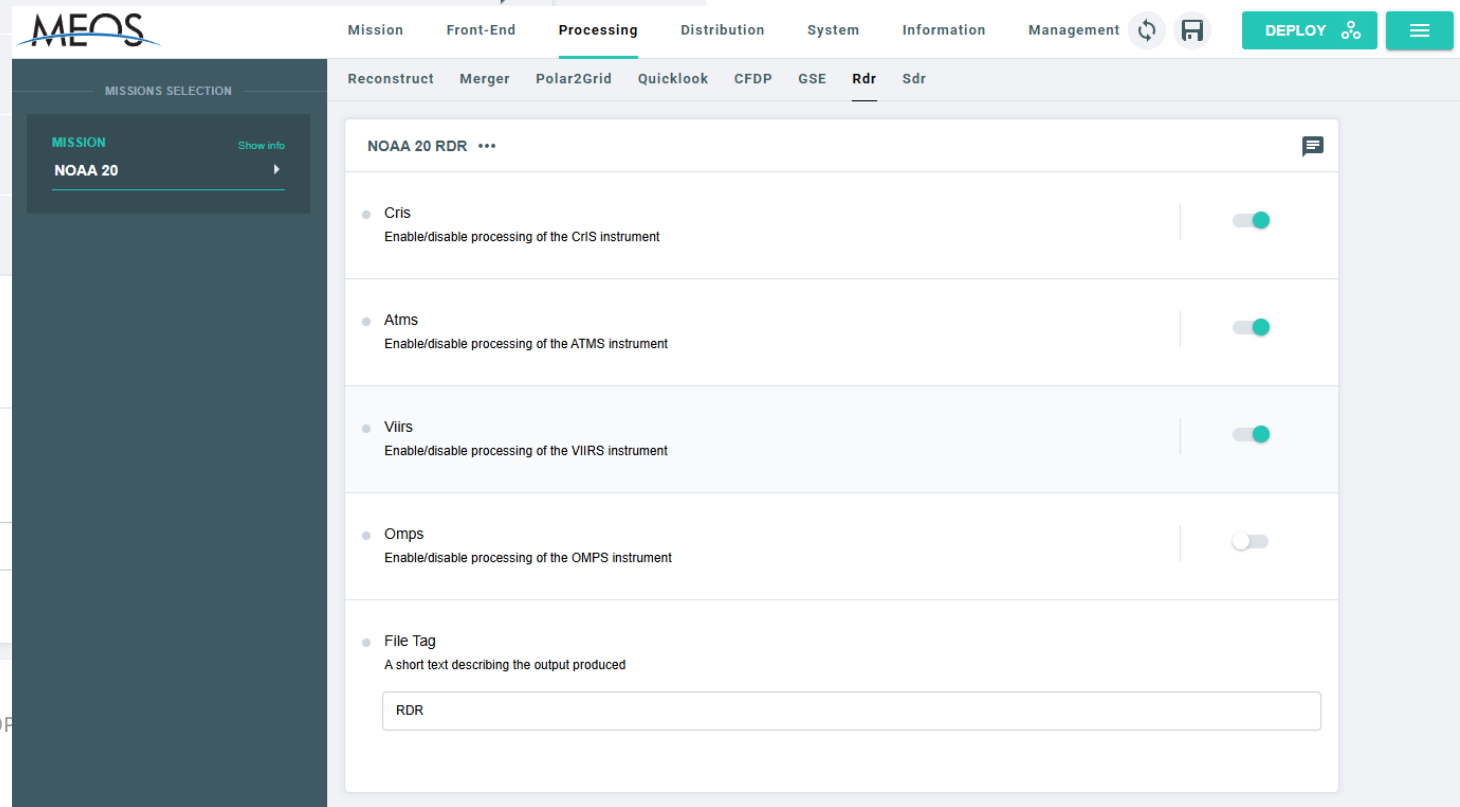
MEOS





- 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:
  - Reconctruction, 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:

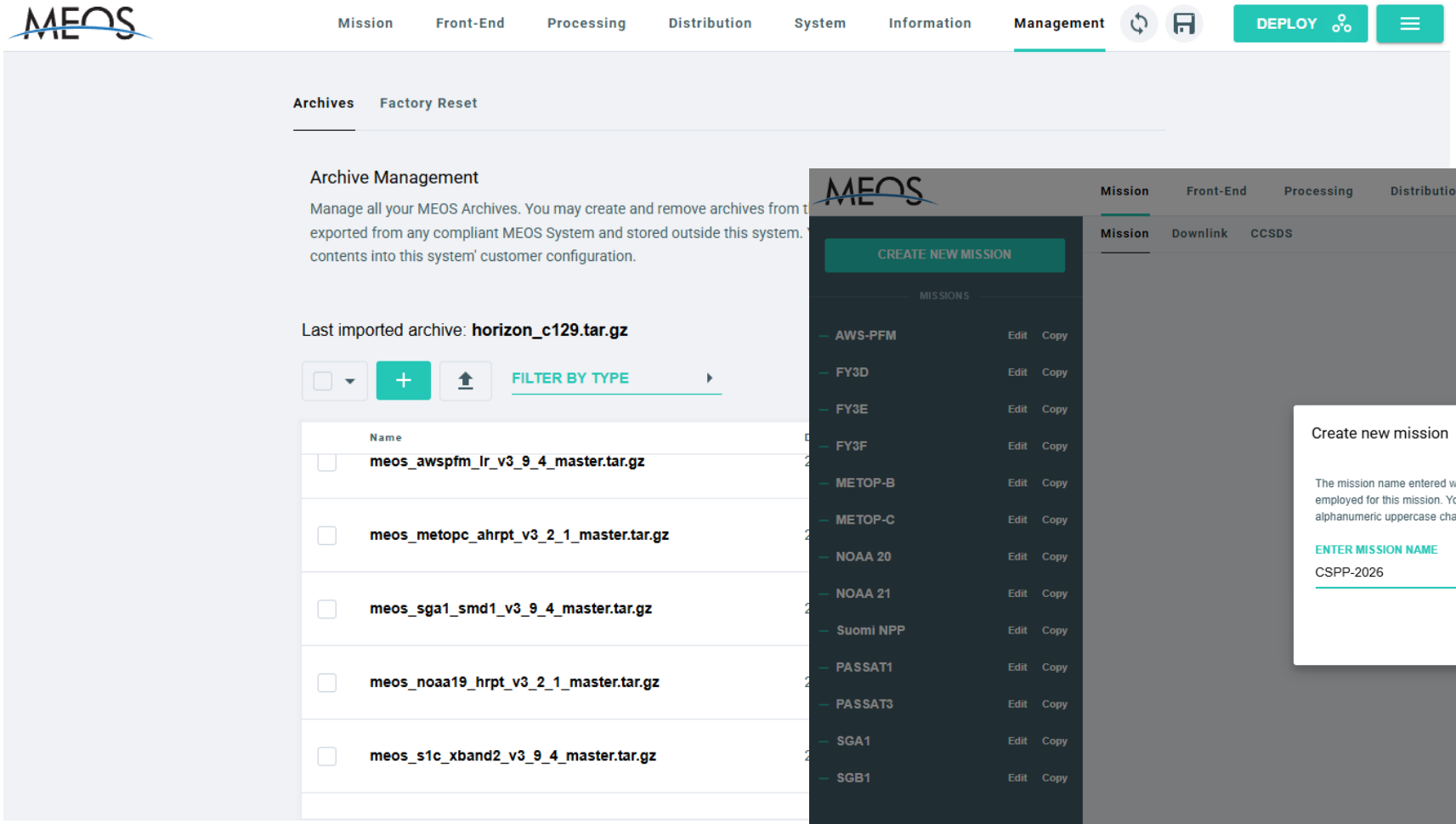
	NPP	NOAA20	NOAA21
Acquisition	9m 23s	11m 0s	10m 7s
RDR**	1m 45s	2m 5s	3m 14s
SDR VIIRS granules	8 - 2m 33s	8 - 2m 31s	8 – 2m 44s
SDR ATMS granules	14 – 0m 25s	18 – 0m 22s	16 – 0m 17s
SDR CRIS granules		12 - 7m 48s	10 – 12m 6s

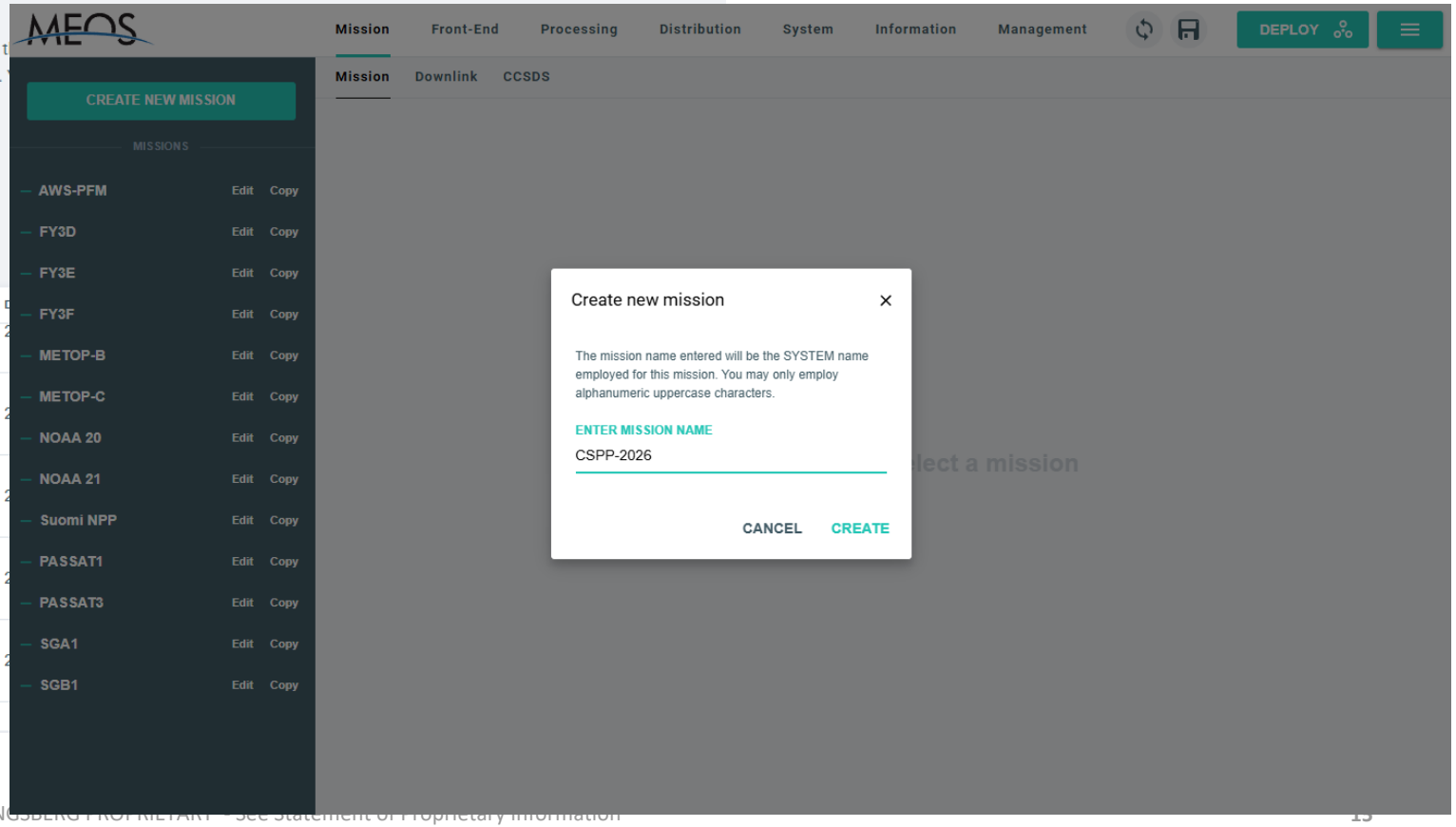
* Change to 8, based on IMGW findings (more memory on V12)

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

Adding New Missions

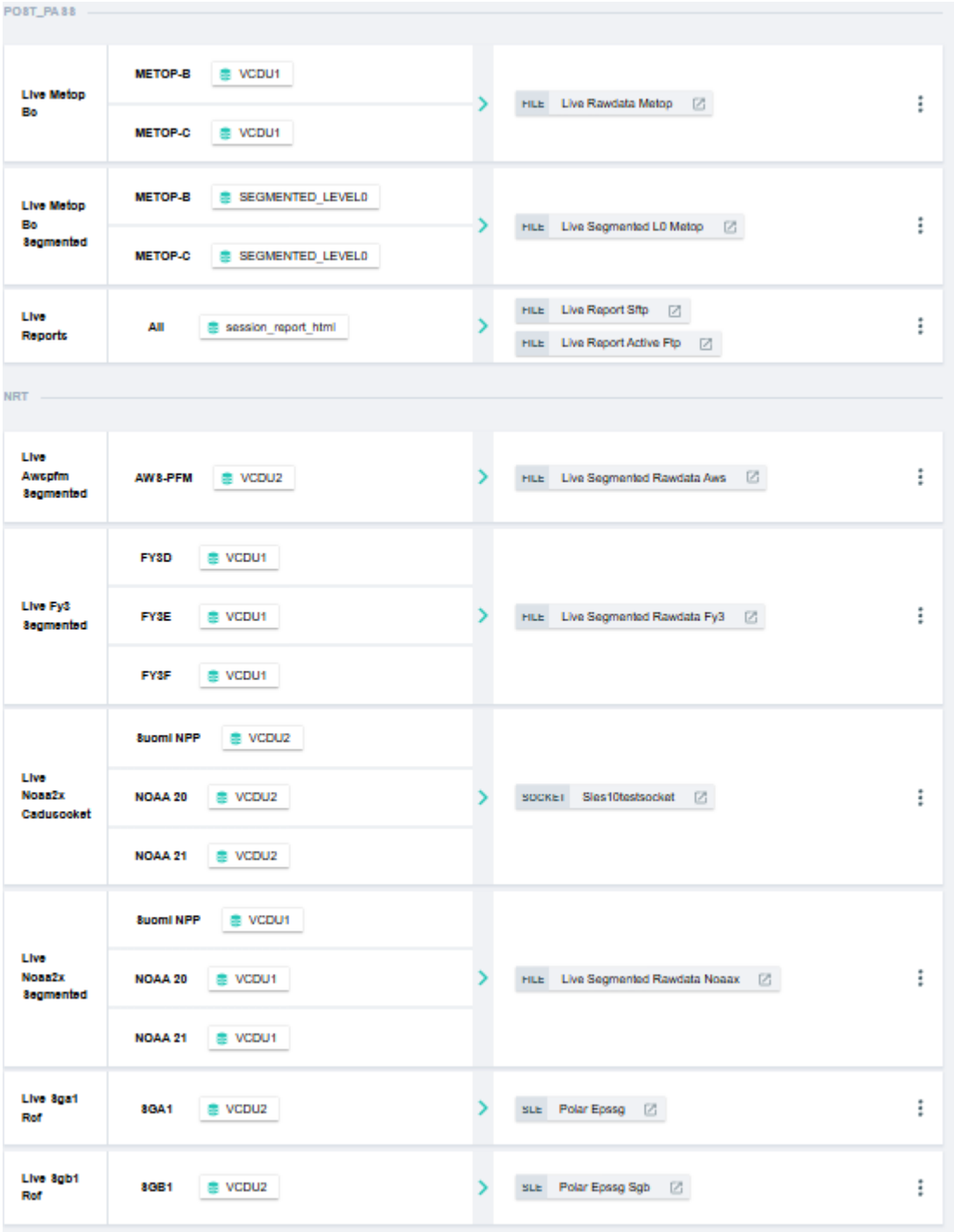
- Import archive (a few KB)
- Manually in the configuration app





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



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Thank you for your attention!

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