EPS Sterna and the Arctic Weather Satellite (AWS)

1.8 Community Satellite Processing Package
19 May 2026

EPS-Sterna Introduction

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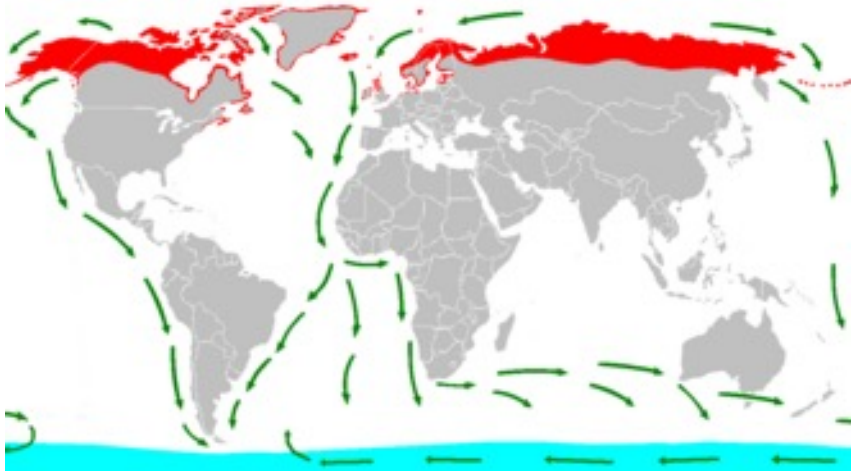
Objectives

- To expand and complement the microwave sounding observations from the EPS-SG and NOAA JPSS polar-orbiting, meteorological satellites, as well as CMA FY-3 polar-orbiting meteorological satellites;
- To improve accuracy of global Numerical Weather Prediction models by increasing the number of microwave sounding observations;
- To contribute to Nowcasting applications at high latitudes through an increase in the frequency of microwave observations;
- To contribute to climate monitoring by improving global reanalysis based on NWP models and by adding to the record of upper tropospheric humidity with increased spatiotemporal sampling.



Key Programmatic Features

- EPS-Sterna is **a EUMETSAT programme**; EUMETSAT will be responsible for the overall system, the development and provision of the ground segment, the procurement of the launch services, the LEOP, the system operations including the management of the constellation.

- The space segment is procured in cooperation with ESA.

- EPS-Sterna satellites are recurrent models of the ESA Arctic Weather Satellite (AWS)- minor modifications/adaptations are expected for the constellation.

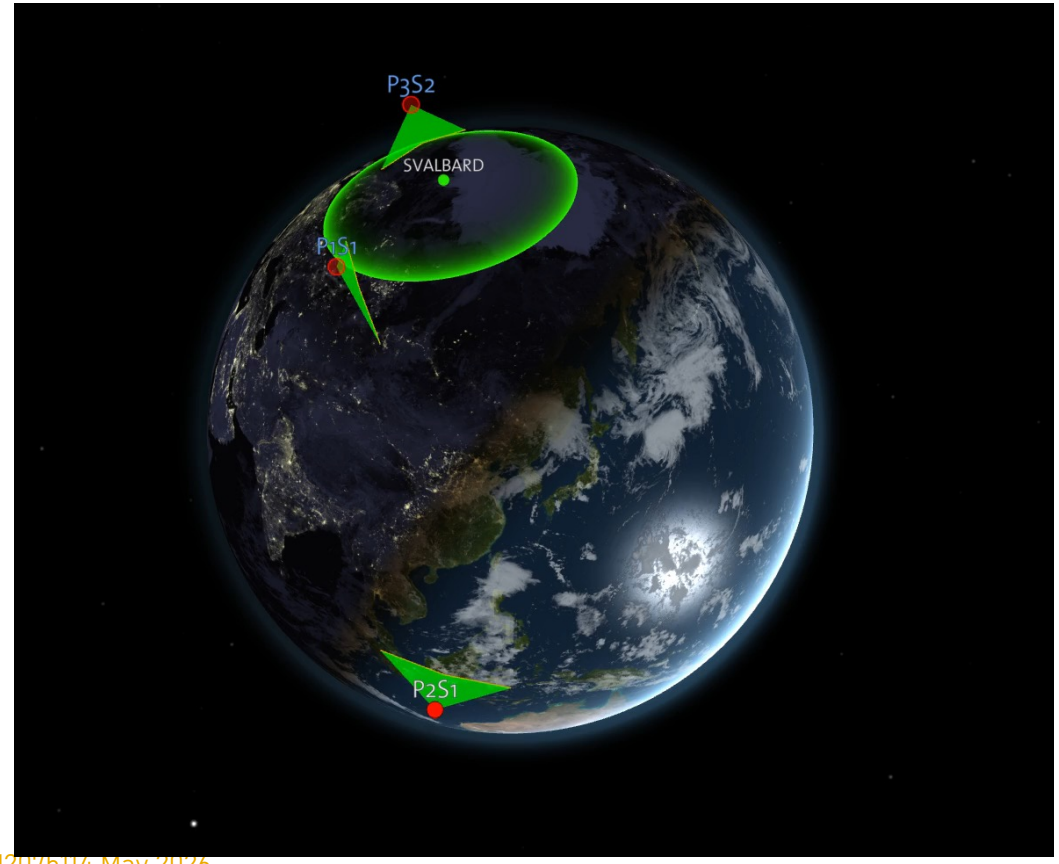
- Cooperation with other partner agencies (e.g. NOAA) being considered for exchange of data and acquisition of data in the southern hemisphere at high latitudes.

- EPS-Sterna overall operational mission duration will be 13 years with the initial constellation expected in 2029.

EPS-Sterna - Constellation

Constellation Architecture

- 3 Sun-synchronous orbital planes at 595 km altitude.
- Inclination: 97-98°, LTDN 03:30, 07:30, 11:30.
- Complementary to EPS-SG and JPSS orbits.
- Nominal constellation: 6 satellites, 2 satellites per each orbital plane phased at 180° apart.

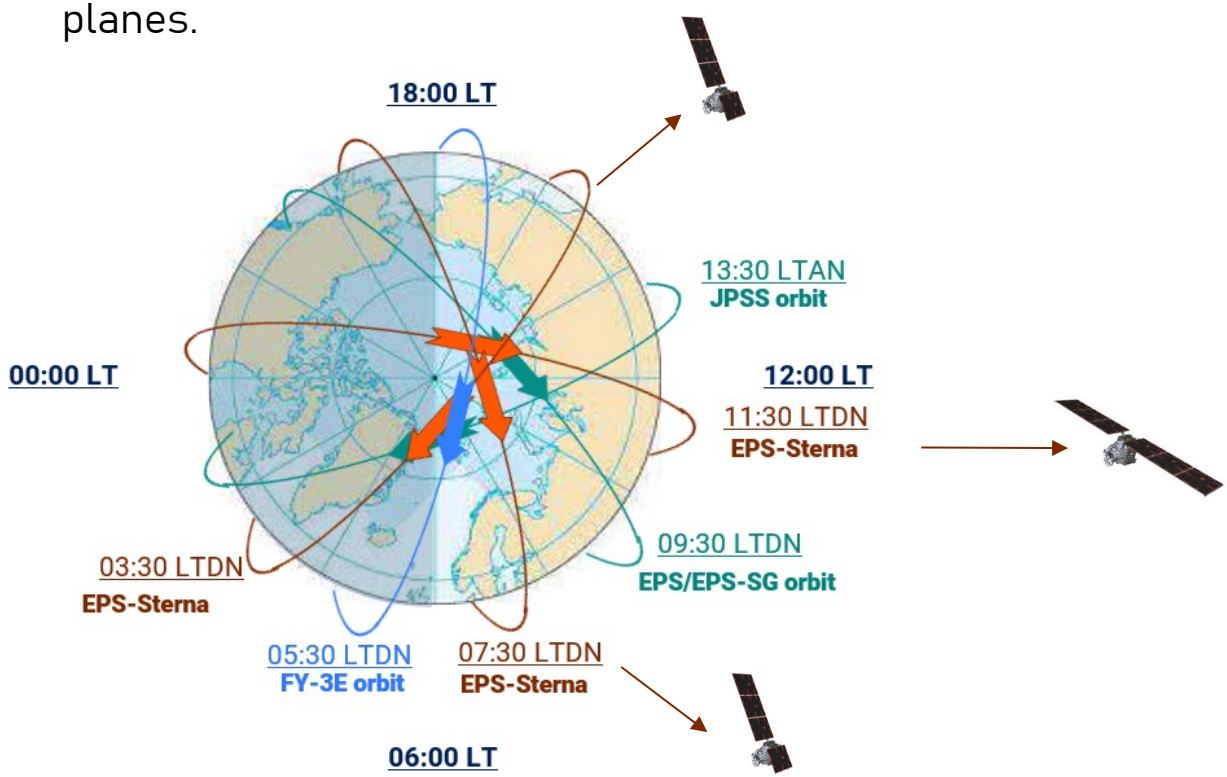


Constellation Performance (time to achieve 90% coverage):

EPS-Sterna only: 3.1-4.7 hours.
EPS-Sterna + EPS-SG +JPSS: 2.4-3.8 hours.

Mean time between observations:

20 min-3 hours, with 6 EPS-Sterna satellites in 3 orbital planes.



Satellite & Payload Overview

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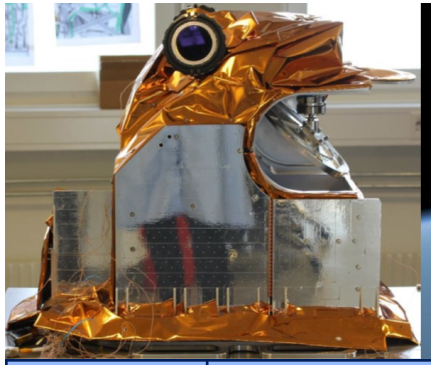
Spacecraft – three axis stabilised with electric propulsion:

- Mass (incl. payload): ca. 135 kg;
- Volume: 1.1x 0.7 x 0.8m;
- Power (nominal): ca. 143 W;
- Science data : L-band (1.707 GHz);
- Command and Control: S-band (2.230/2.053 GHz).

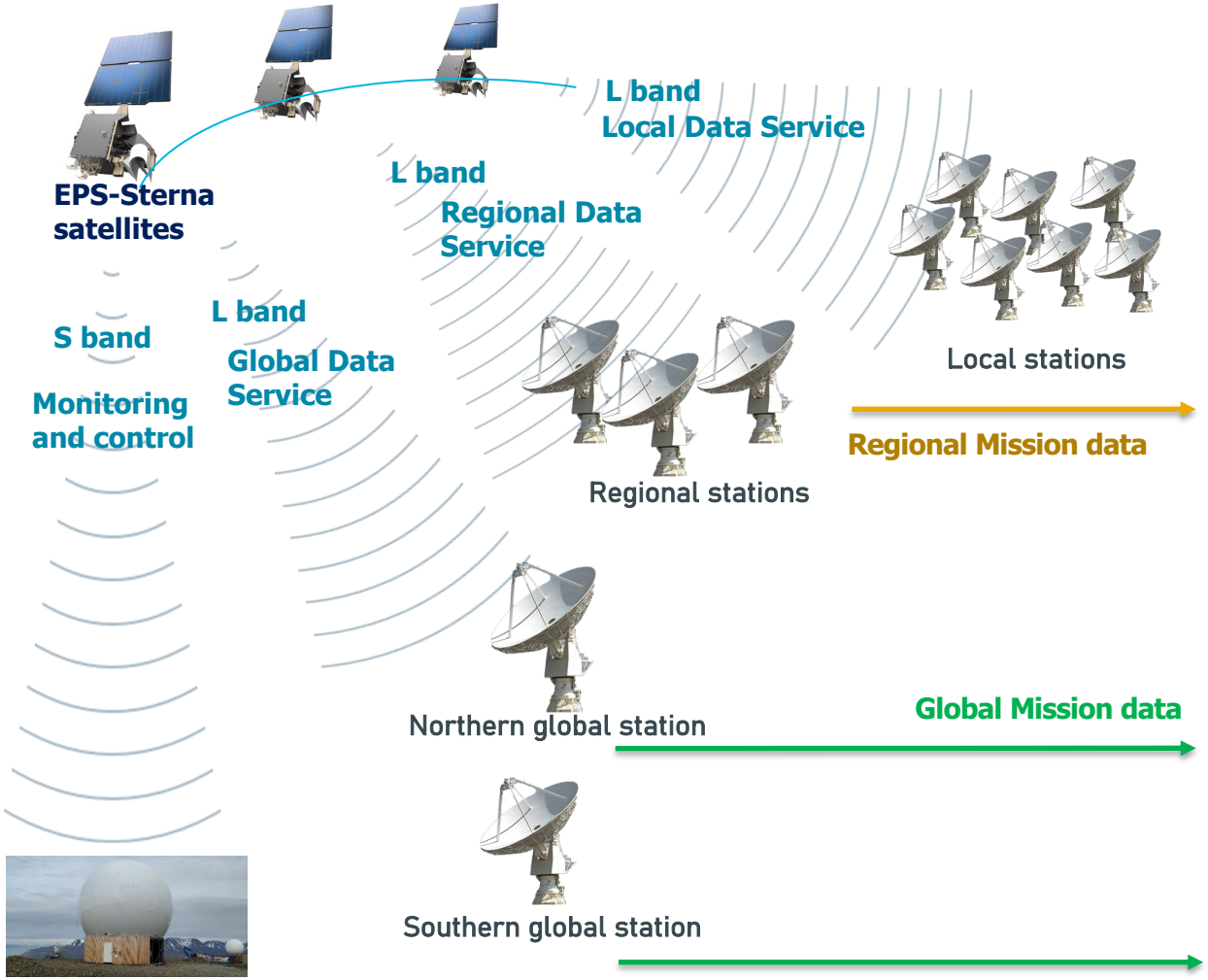
Payload – Passive Microwave Radiometer 19 channels (MWR):

- Mass: 30 kg (MWS on EPS-SG ca. 150 kg);
- Power: ca. 35 W (MWS ca. 120W);
- Data rate: 60 kbps;
- Scan period: 1.19s (constant rate ~50 rpm);
- Scan angle ±54.42°;
- 145 Earth views, oversampled at <100GHz;
- Swath ~ 2000 Km.



Channel name	Centre Frequency [GHz]	BW [MHz]	NEΔT [K]	footprint size [km]	Related application
STERNA-11	50.3	180	<0.6	≤ 40 km (±25%)	Temperature Sounding
STERNA-12	52.8	400	<0.4		
STERNA-13	53.246	300	<0.4		
STERNA-14	53.596	370	<0.4		
STERNA-15	54.4	400	<0.4		
STERNA-16	54.94	400	<0.4		
STERNA-17	55.5	330	<0.5		
STERNA-18	57.290344	330	<0.6		
STERNA-21	89	4000	<0.3	≤ 20 km (±25%)	Window and Cloud detection
STERNA-31	165.5	2800	<0.6	≤ 10 km (±25%)	Window/humidity sounding
STERNA-32	176.311	2000	<0.7		Humidity sounding
STERNA-33	178.811	2000	<0.7		
STERNA-34	180.311	1000	<1		
STERNA-35	181.511	1000	<1		
STERNA-36	182.311	500	<1.3		
STERNA-41	325.15±1.2	(2x) 800	<1.7	≤ 10 km (±25%)	Humidity sounding/cloud detection
STERNA-42	325.15±2.4	(2x) 1200	<1.4		
STERNA-43	325.15±4.1	(2x) 1800	<1.2		
STERNA-44	325.15±6.6	(2x) 2800	<1		

Overall System Overview



TT&C Station
Existing stations
Svalbard (NO)

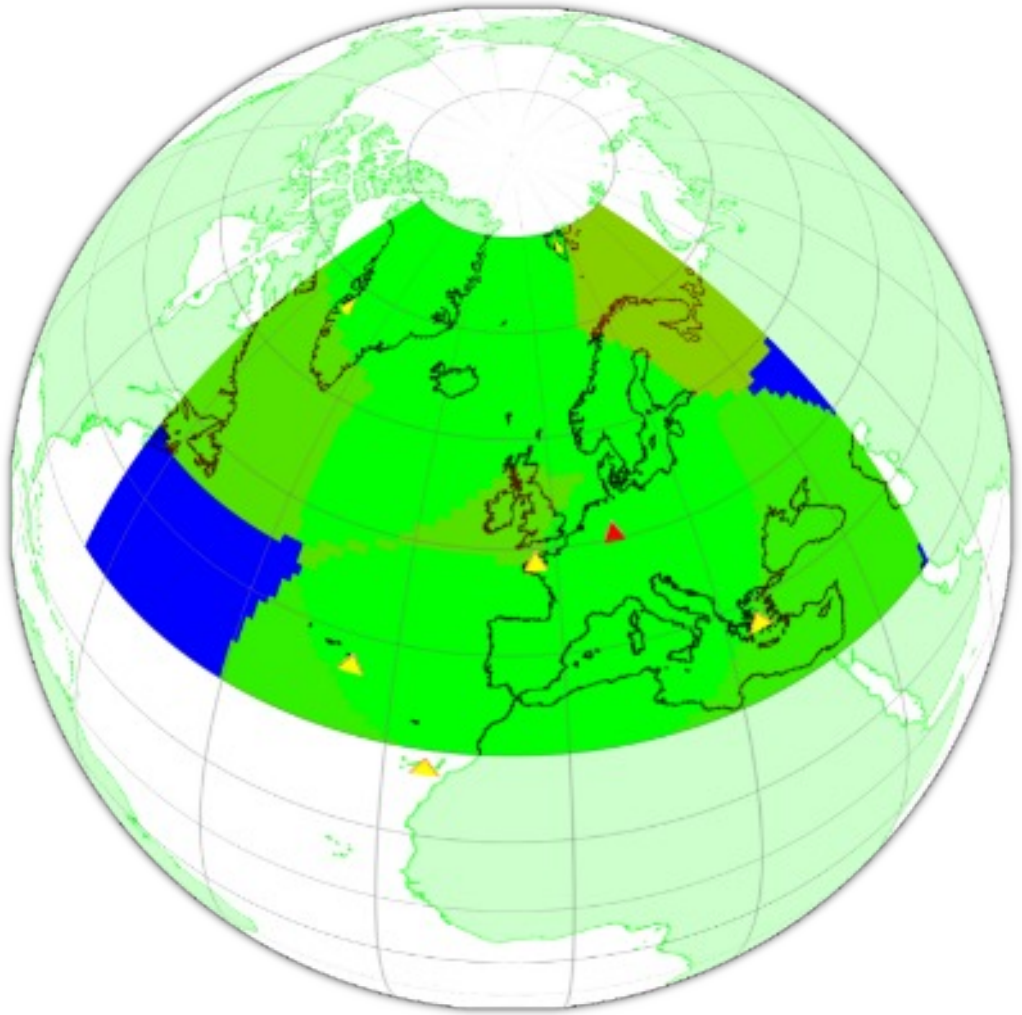
Timeliness of global mission products:

- threshold: 75 min(50%) 100 min (80%);
- breakthrough: 45 min (50%), 75 min (80%);

EPS-Sterna EARS network

- EARS Stations Used by EPS-Sterna:
  - Kanguerlussuaq
  - Lanion
  - Maspalomas
  - Athens

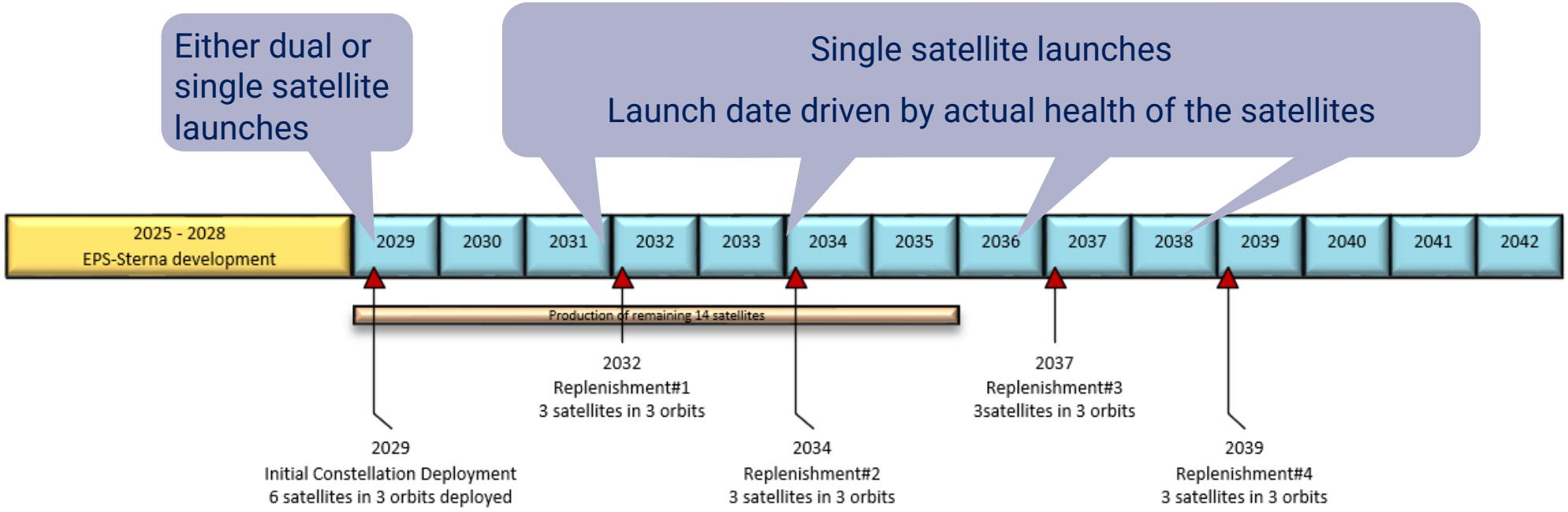
- Timeliness : 20 min (T), 15 min (B).



Constellation Deployment and Replenishment

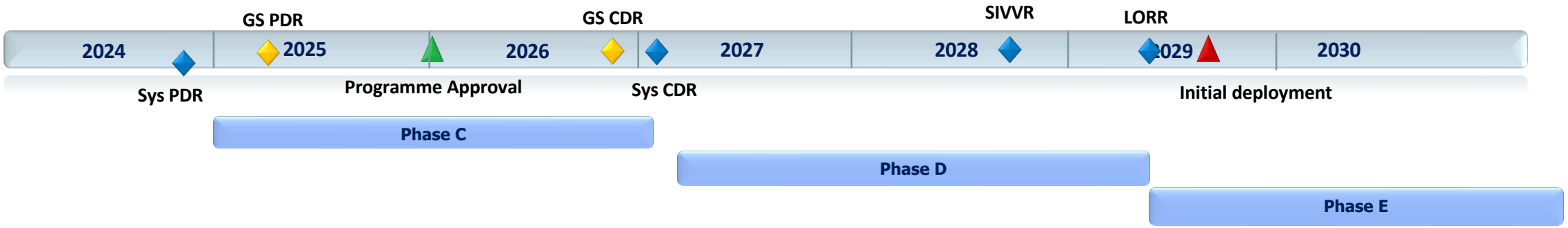
Deployment and Replenishment Approach :

- Approach maximises probability of success of the constellation- goal to maintain at least 4 fully operational satellites in 3 different orbital planes ➔ minimum to achieve the mission requirements;
- Total number of satellites launched: 18+2 (spares)= 20;
  - Spares satellites required to cope with potential launcher and satellite failures;
- The launch dates will be adapted dynamically according to the health of the satellites in the constellation.



EPS-Sterna Programme- Status Overview (1)

- EPS-Sterna Programme approved in January 2026



- System Requirement Review (SRR) successfully closed in December 2023
- Ground Segment Requirement Review (GSRR) successfully closed in April 2024
- System Preliminary Design Review (PDR) successfully closed in Jan 2024.
- Ground Segment Preliminary Design Review (PDR) successfully closed in May 2025.
- Ground Segment Critical Design Review (CDR) planned for November 2026 / January 2027
- System Critical Design Review (CDR) planned for March / April 2027 (may be brought forward)

EPS-Sterna Programme- Status Overview (2)

Ground Segment:

- **Northern Hemisphere :** Foundations completed and RFI survey performed successfully in September 2025.
- **Southern Hemisphere :** worked kicked off in March 2026 Location: Puntarenas in Chile. RFI ongoing.
- **Payload Data Processing (PDP):**
  - Level 1B processor kicked off in 2025 and progressing nominally-V1 delivered
  - Level 0 processor kicked off in 2025 and progressing nominally-V1 delivered
  - Orchestrator: EUMETSAT product already tested with AWS L0 and L1
- **Mission Control & Operation System (MCO)**
  - Development of the core sub-element of the MCO (i.e. E-MCS) kicked off in March 2026- first delivery in Q2/Q3 2026.
  - Built leveraging on existing software at EUMETSAT
- **Multi-Mission Elements:** for data distribution archiving and monitoring
  - First delivery block enabling the delivery of the first versions of MCO and PDP already delivered

Picture on the left of the completed foundation for SG105 with the foundation for SG107 in the background. Picture on the right side of the completed foundation for SG114.

EPS-Sterna Programme- Status Overview (3)

Space Segment:

- Space Segment activities kicked off in March 2026
- Activities to prepare manufacturing of satellites ongoing.

Launcher Segment:

- Procurement preparation for Frame Contract ongoing
- Primary and Backup Launchers will be necessary, at least for initial constellation

Arctic Weather Satellite (AWS)

- **AWS is an ESA mission considered as the demonstrator for the EPS-Sterna satellites. EUMETSAT role on AWS is currently to distribute its L1b data.**
- **AWS was launched successfully in August 2024.**
- **In-orbit data** evaluated by EUMETSAT and other institutions
  - **Good performance aligned with EPS-Sterna SEB studies.**
- **AWS data distribution to all Users** since April 2025 (via EUMETCast and the Data Store).
- **Several NWP centres started** or planning to start **operational assimilation** (link to ECMWF article).
- AWS operations currently funded by ESA until August 2026, and **Users encouraged EUMETSAT to continue supporting AWS** beyond this date.
- **AWS extension with EUMETSAT funding being proposed to EUMETSAT Member States.**

Thank you!