S3NG-TOPO Mission Status

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S3NG-T Mission Aim and Objectives

- Mission aim and Objectives stem from the analysis of User needs (EC) and CSC LTS
- Target is to **guarantee the continuity of S3 today**
  - For **ALL** topography variables SSH, Hs, U10, Sigma0, sea ice, land ice, river and lakes…

- **Then, to enhance S3** and address:
  - **Sampling and coverage → time AND space sampling (#1 User Need – for everyone working with altimetry)**
  - **Hydrology** sampling and performance (now primary Objective by EC request)
  - Provide **new products** to meet evolving Copernicus User Needs.

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4 S3NG-T MISSION AIMS AND OBJECTIVES

4.1 S3NG-T Mission Aim

Considering the User needs expressed by the European Commission and concisely articulated in the previous sections, the **aim** of the Copernicus Next Generation Sentinel-3 Topography (S3NG-T) Mission is:

To ensure continuity of Sentinel-3 in flight performance topography capability in the 2030-2050 timeframe.

4.2 S3NG-T Objectives

Mission requirements are then derived from mission Objectives.

The primary objectives of the S3NG-T mission are to:

PRI-OBJ-1. **Guarantee continuity of Sentinel-3 topography measurements** for the 2030-2050 time frame **with performance at least equivalent to Sentinel-3 in-flight performance** as defined in Table 2.4-1 ('baseline mission').

PRI-OBJ-2. Respond to evolving user requirements and **improve sampling, coverage and revisit** of the Copernicus Next Generation Topography Constellation (S3NG-T and Sentinel-6NG) to ≤50 km and ≤5 days (CMEMS, 2017) in support of Copernicus User Needs.

PRI-OBJ-3. **Enhance sampling coverage, revisit and performance for Hydrology Water Surface Elevation** measurements in support of Copernicus Services.

PRI-OBJ-4. Respond to evolving user requirements and **enhance topography Level-2 product measurement performance**.

The **secondary objectives**[9] of the S3NG-T mission are to:

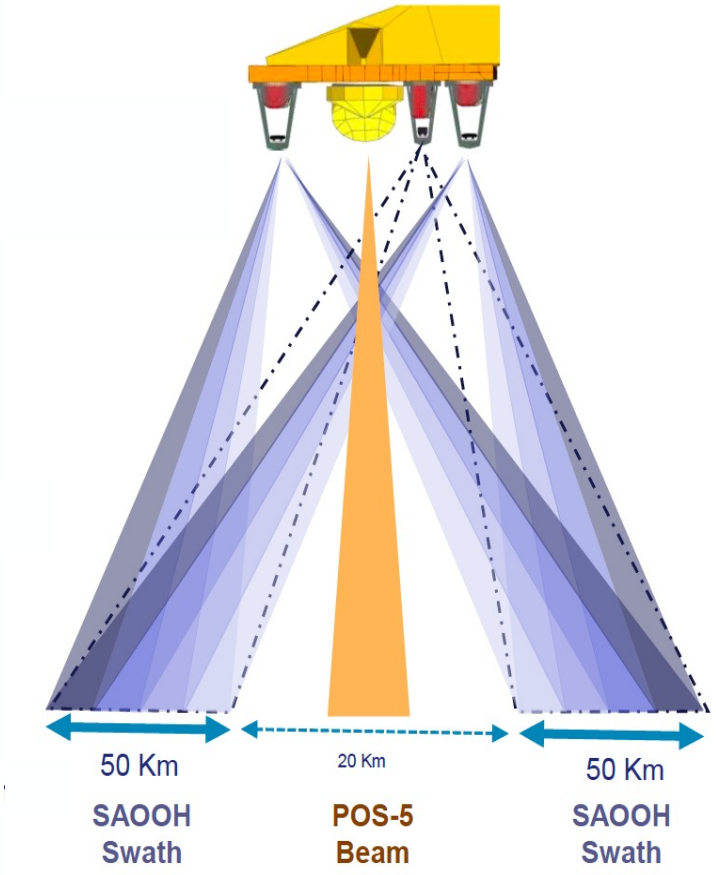
SEC-OBJ-1. Provide directional wave spectrum products that address evolving Copernicus user needs.

SEC-OBJ-2. Provide new products[10] that address evolving Copernicus user needs.

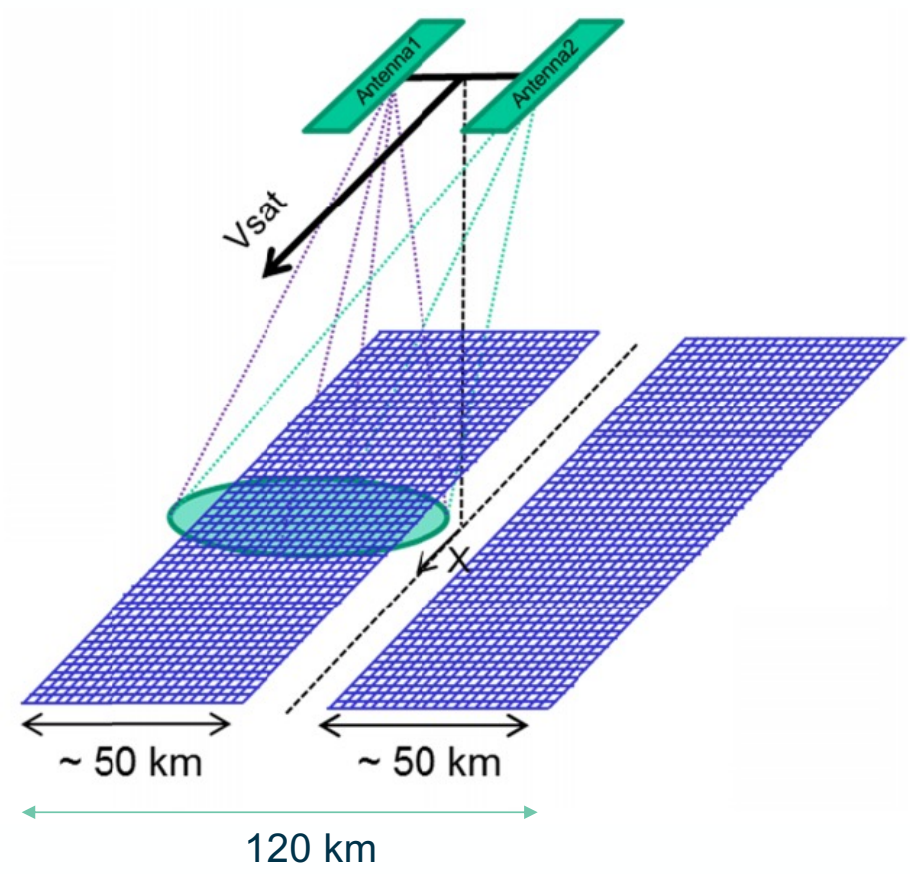
Sentinel-3 NG-Topo: Mission Status

Based on the Preliminary Concept Review (PCR) outcome (July 2022) and programmatic assessment, it is envisaged to implement the Sentinel-3 NG-T mission as:

- **two dedicated large-satellites** carrying Wide-Swath (SAOOH) and Nadir altimeters (POS-5), together with microwave radiometer (MWR) and POD instruments.
- The PCR Science Review Team (SRT) recommended that a final decision on the swath altimeter to be made based on SWOT's inflight performance.
- A **dedicated gate review** meeting will be held early 2024 taking into account the Phase A/B1 ISRR including affordability assessment and the return of the SWOT mission.
- **Two industrial consortia running the phase A/B1.**



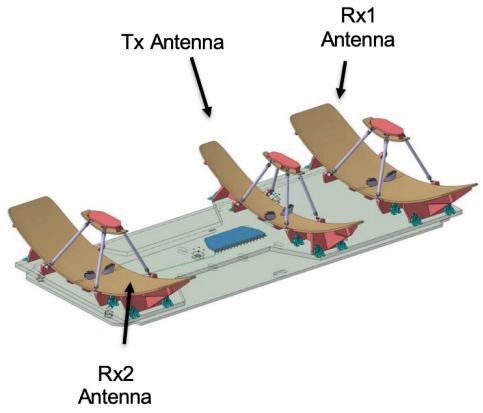
Sentinel-3 NG-TOPO Mission Concept

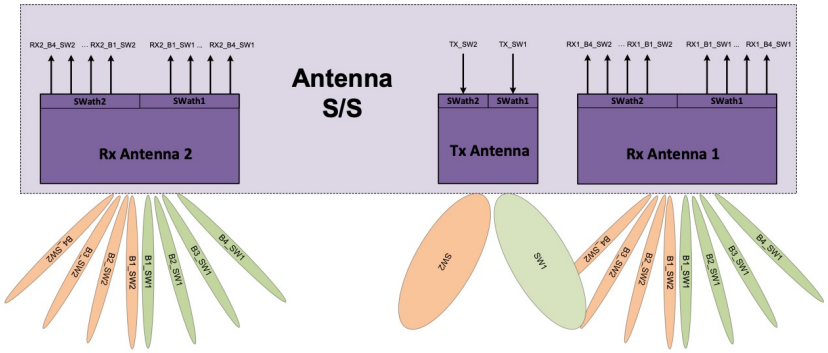


- Constellation of **2 large satellites,** flying in formation **in sun-synchronous dawn-dusk (LTAN 6pm) orbit.** Same ground-track as Sentinel-3 A/B.
- ka-band across-track interferometer, *a la SWOT*.
- 2 operation modes: LR for open ocean and land ice, and HR for ocean and hydro/sea ice.

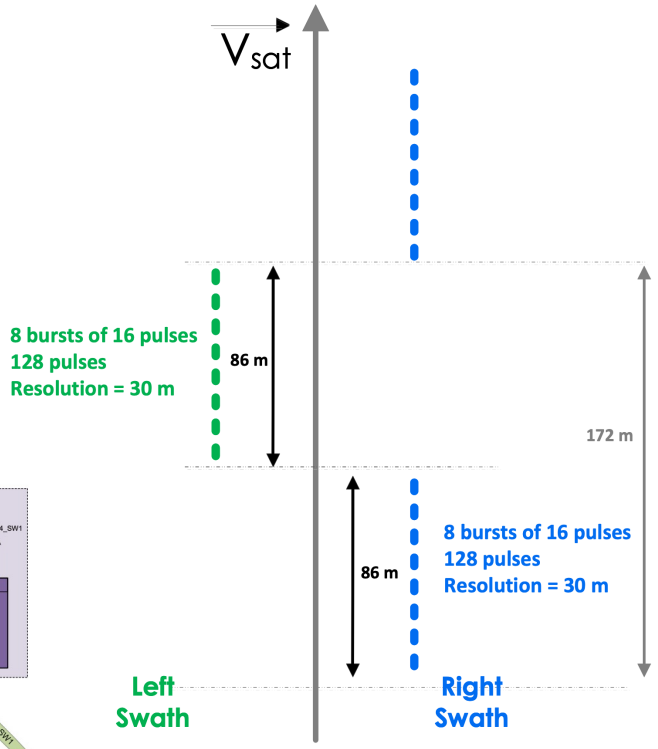
- POS-5 Ku-band Nadir SAR altimeter to measure Hs and long wavelength roll error, provides baseline continuity.
- Constellation can achieve global 5-day revisit with an effective ocean spatial resolution of 50 km (key driving requirements for mission design).

The SAOOH Instrument





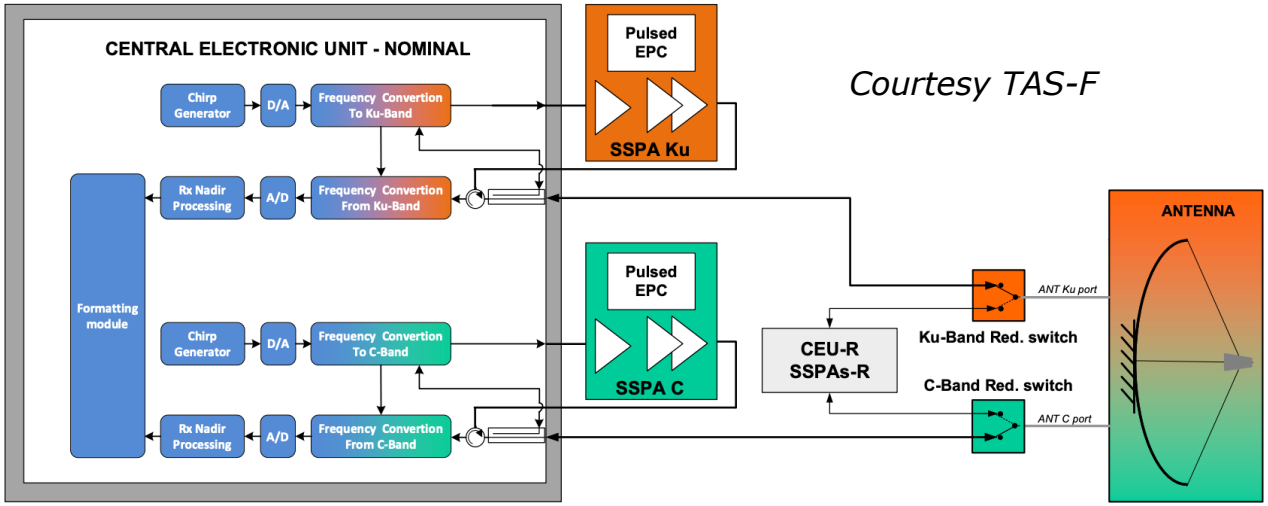
Courtesy TAS-F



Courtesy TAS-F

- **HR mode**
  - **max. resolution along-track ~ 35 metres**
  - **Across-track resolution: 70m near range, ~10m far range**
- **LR Mode**
  - **Along-track resolution ~ 365 metres**
  - **Across-track resolution ~ 166 metres**
- **HRFF Mode (not operational)**
  - **Specialized mode, continuous acquisition on one side only.**
  - **Along-track resolution ~ 2 meters.**

The POS-5 Instrument



Courtesy TAS-F

Figure 5-9 : Poseidon5 functional architecture

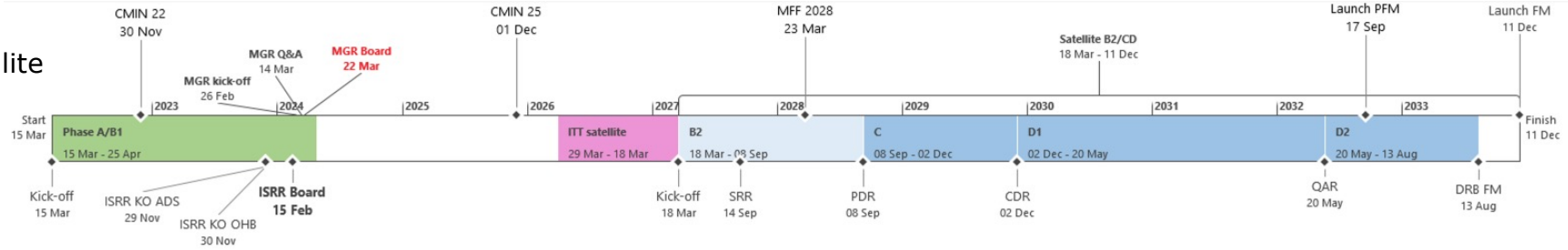
- Dual Tx/Rx chain for Ku and C band, with dual chirp generator, allowing simultaneous transmission of Ku- and C- band pulses.
- About 8 times more C-band pulses than POS-4 ➔ improvement in iono estimation.

- Single mode SAR altimeter operating at an intermediate PRF 12.6 kHz.
  - All calibration pulses interleaved in the open-burst chronogram.
  - Improvement over open-ocean (initially proposed as Half-PRF ~9 kHz).
  - No degradation over inland water targets…improvement due to continuous sampling.

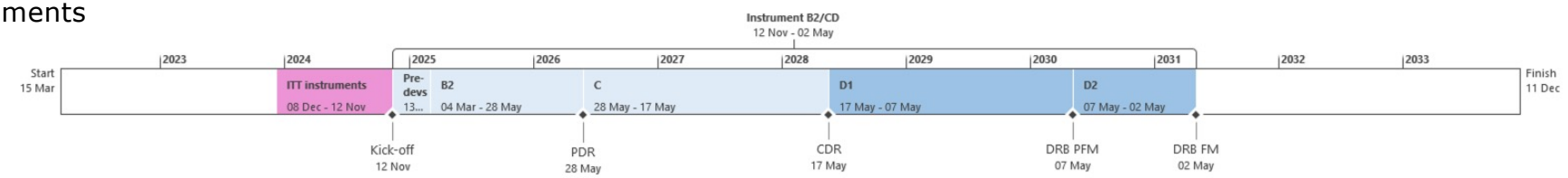
Sentinel-3NGT Programatics and Schedule

- ESA Member States funding subscribed at Ministerial'22.
  - EU funding in next MFF, from 2028.
- Overall timeline

Satellite



Instruments



  - Intermediate System Requirements Review – 29th 30th Nov kick-off – 15th Feb Board
  - Mission Gate Review – 14th March Q&A session – 22nd March Board
  - "Instrument first" development phase B2 from 2024
  - Launch, 2nd half 2032

Any questions ?

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