



NAVISP LEO-PNT Webinar

28th September 2026

1. Welcome & Introduction
2. A short intro of NAVISP
3. Celeste, program, timeline, signals
4. NAVISP as a vehicle for development
5. Q&A



navisp

NAVigation
Innovation and
Support Programme

GOAL

Advance Positioning,
Navigation, and
Timing solutions

ELEMENT 1

INNOVATION –
Next-generation PNT
solutions across the
value chain

ELEMENT 2

COMPETITIVENESS
Boost European
Capabilities in global
PNT markets

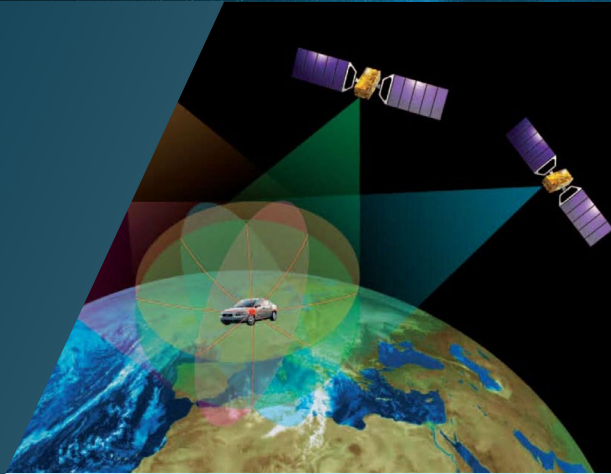
ELEMENT 3

SUPPORT TO MEMBER STATES
Support European National
Programmes across the
value chain

POWERING GLOBAL
EUROPEAN LEADERSHIP
ON PNT

Commercial PNT Missions / Payloads

- Demonstrators
- Hosted payloads
- PNT-enhanced space operations



Downstream / user segment products

- GNSS receivers / components
- Alternative PNT
- Protect, Toughen, Augment



Value – added products / services

- Commercial services
- Timing technologies
- Dual-use



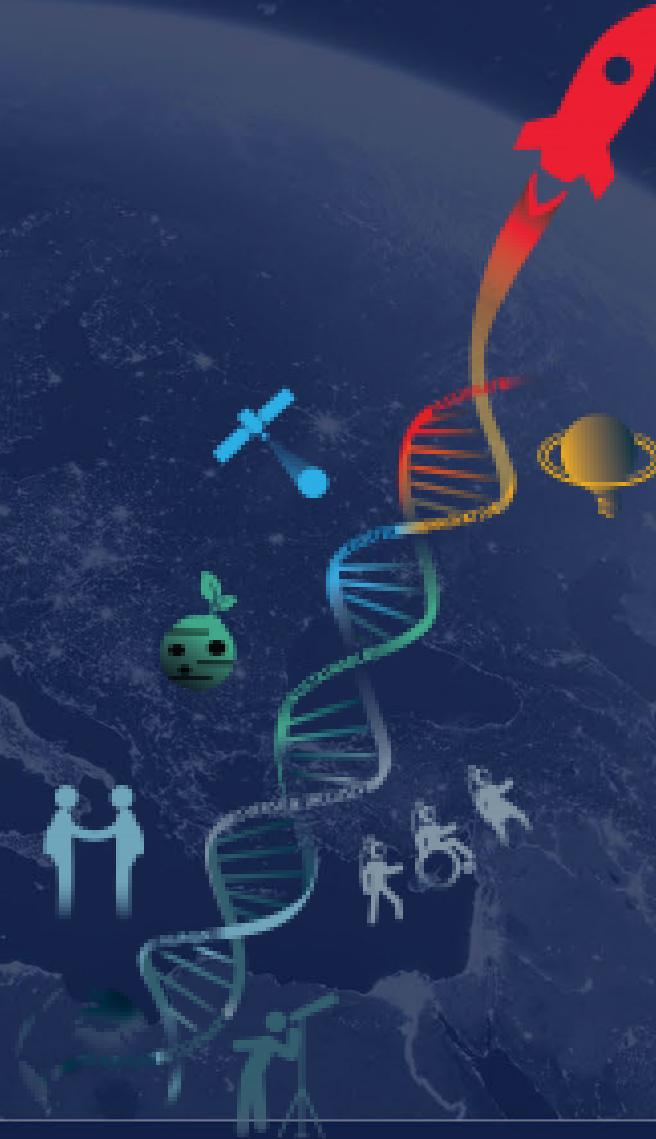
Partnerships

- R&D risk mitigation
- Coordinated actions across value chain
- Ecosystem support



Why work with navisp?

- Project funding
 - No equity, no loan, no grant
 - IP for industry
- ESA support and expertise in PNT
 - Dedicated ESA staff support
 - International industrial & institutional network
- ESA Brand
 - Door-opening: trusted partner, credibility
 - One of the most related brands to innovation



Element 2 – How to apply





EUROPEAN SPACE AGENCY

CELESTE IN A NUTSHELL

ELEVATING THE FUTURE OF EUROPE'S SATELLITE NAVIGATION

The Celeste in-orbit demonstration will demonstrate how a complementary layer in low Earth orbit can enhance Europe's current Galileo system in medium Earth orbit, boosting the overall **resilience**, enhancing its **performance** and opening opportunities for **new service capabilities**.

Celeste in-orbit demonstration will:

- Demonstrate PNT resilience, performance & security
- Test next-generation signals, frequencies & technologies
- Address regulatory aspects (ITU filings, space debris)



A satellite in orbit over Earth, with solar panels deployed. The satellite is a small, white, box-like structure with two large, rectangular solar panels extended outwards. The panels are blue with a grid of solar cells. The satellite is positioned above a curved horizon of the Earth, showing a mix of land and ocean. The background is the blackness of space.

Where are we in Celeste IOD?

From paper to Orbit to first transmission in less than 2 years

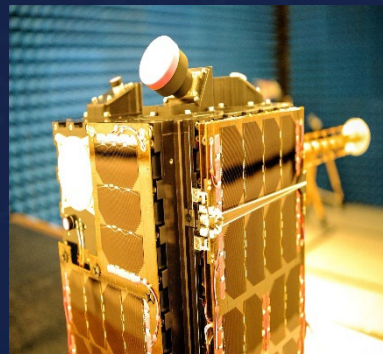
Contracts Kick-Off: April 2024



Qualification
Acceptance: February 2026



IOD-1 (GMV)



IOD-2 (TAS)

Launch: 28 March 2026
22:14 NZ



First transmissions:
08th and 17th of April

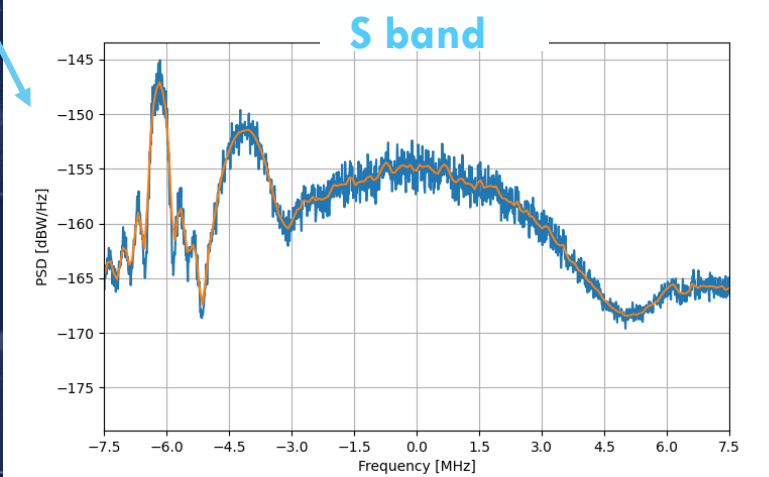
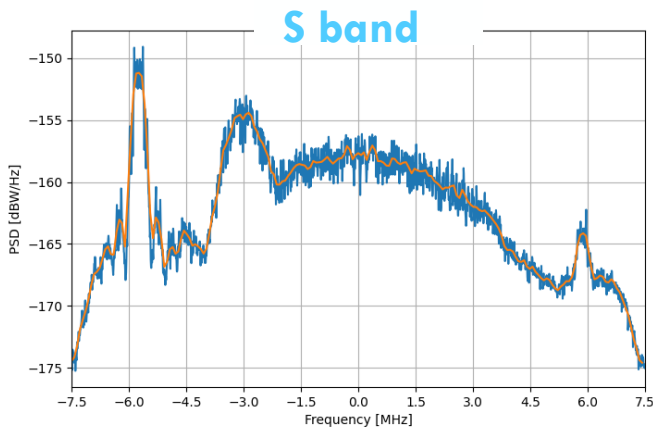
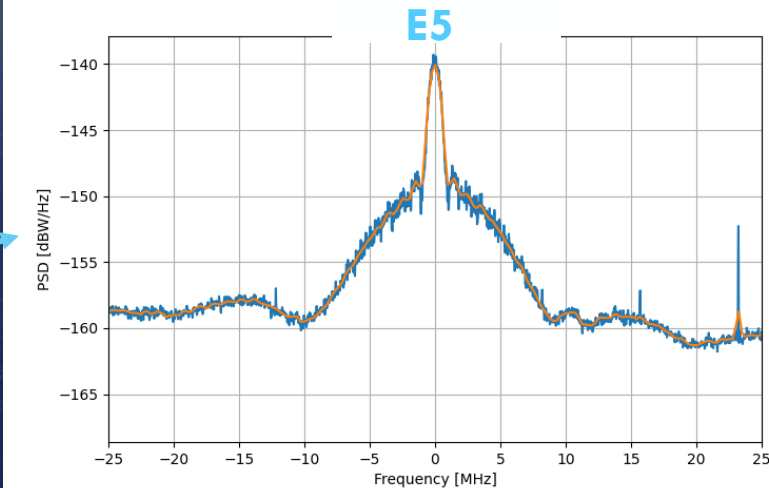
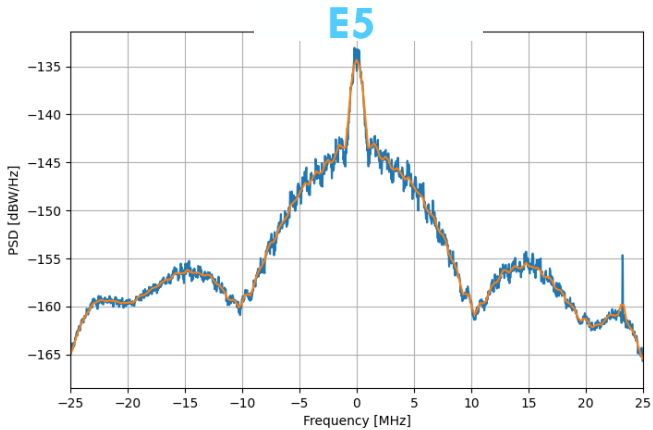
Credit to GMV, to Thales Alenia Space, to Alén Space, to GOS, to the entire consortium, and to the ESA project teams who made this happen.

Where are we in Celeste IOD?

IOD-1 first signal transmission 8th of April 2026

IOD-2 first signal transmission 17th of April 2026

ESTEC laboratory – 3m Dish with
L- and S-band feed

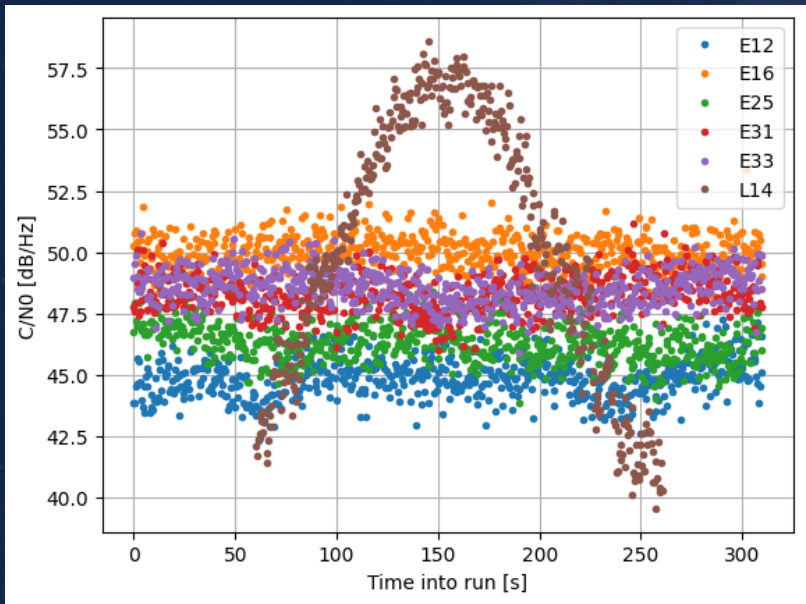


ESA UNCLASSIFIED – Limited Distribution

Where are we in Celeste IOD?

L-band frequency brought into use (an ITU milestone)

C/N0 Celeste IOD as expected



Complete navigation messages from **Celeste IOD-1 (16th of April)** and **IOD-2 (27th of April)**, including clock model, and with a message update during the pass.

```
> EPH L04 LNAV
L04 2026 04 16 08 00 00-3.478955477476E-06+1.463718035666E-12+0.000000000000E+00
+0.000000000000E+00+1.346875000000E+02-3.645466134011E-07-2.514764173108E+00
+1.685135066509E-05+1.289986306801E-03+1.144185662270E-04+2.625046324730E+03
+3.744000000000E+05+1.203268766403E-06+2.583040634285E+00+5.409121513367E-06
+1.700265900751E+00+1.562687500000E+03+2.968495845973E+00+2.253179568259E-07
-7.457453490014E-09+1.000000000000E+00+2.414000000000E+03+2.414000000000E+03
-1.000000000000E+00+1.000000000000E+00+0.000000000000E+00+0.000000000000E+00
+3.745880000000E+05+0.000000000000E+00+0.000000000000E+00+0.000000000000E+00
+9.765625000000E-03+3.710937500000E-02+1.757812500000E-02+4.101562500000E-02
+1.367187500000E-02+7.031250000000E-02+0.000000000000E+00+0.000000000000E+00
+0.000000000000E+00+0.000000000000E+00+3.906250000000E-03+9.765625000000E-03
+5.859375000000E-03+9.765625000000E-03+7.812500000000E-03+1.562500000000E-02
+0.000000000000E+00+0.000000000000E+00+0.000000000000E+00+0.000000000000E+00
> EPH L04 LNAV
L04 2026 04 16 08 05 00-3.478664439172E-06+3.268496584496E-13+0.000000000000E+00
+2.000000000000E+00-9.217187500000E+01-3.104872187532E-07-2.265087117970E+00
-1.330301165581E-05+1.361906877719E-03+1.101549714804E-04+2.624919962883E+03
+3.747000000000E+05+3.335997462273E-06+2.583085134790E+00-4.654750227928E-06
+1.700250695180E+00+1.592468750000E+03+3.049808848529E+00+1.879221134246E-07
+1.085188059581E-08+1.000000000000E+00+2.414000000000E+03+2.414000000000E+03
-1.000000000000E+00+1.000000000000E+00+0.000000000000E+00+0.000000000000E+00
+3.747020000000E+05+0.000000000000E+00+0.000000000000E+00+0.000000000000E+00
-4.296875000000E-02-4.101562500000E-02-9.375000000000E-02-3.906250000000E-02
-1.523437500000E-01-3.320312500000E-02+0.000000000000E+00+0.000000000000E+00
+0.000000000000E+00-1.953125000000E-03+5.859375000000E-03+1.757812500000E-02
+9.765625000000E-03+1.757812500000E-02+5.859375000000E-03+5.078125000000E-02
+0.000000000000E+00+0.000000000000E+00+0.000000000000E+00+0.000000000000E+00
```

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SVID;IOD;Band;WeekNumber;ToW;STRF;t0c;af0;af1;af2;t0e;m0;sqrtA;ecc;deltaN;omega0;omegaDot;iDot;o
mega;crs;crs;cic;cuc;cus;a0;a1;a2;a3;a4;a5;c0;c1;c2;c3;r0;r1;r2;r3;r4;r5;shs
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09;1.700198569946304e+00;2.360252424524455e+00;1.599203125000000e+03;-
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1.953125000000000e-03;0.000000000000000e+00;-5.859375000000000e-03;-1.562500000000000e-02;-
1.171875000000000e-02;-1.367187500000000e-02;-9.765625000000000e-03;-7.812500000000000e-03;1
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Courtesy: Rui Sarnadas, Cesar Vazquez, Noori Bni Lam

ESA UNCLASSIFIED – Limited Distribution

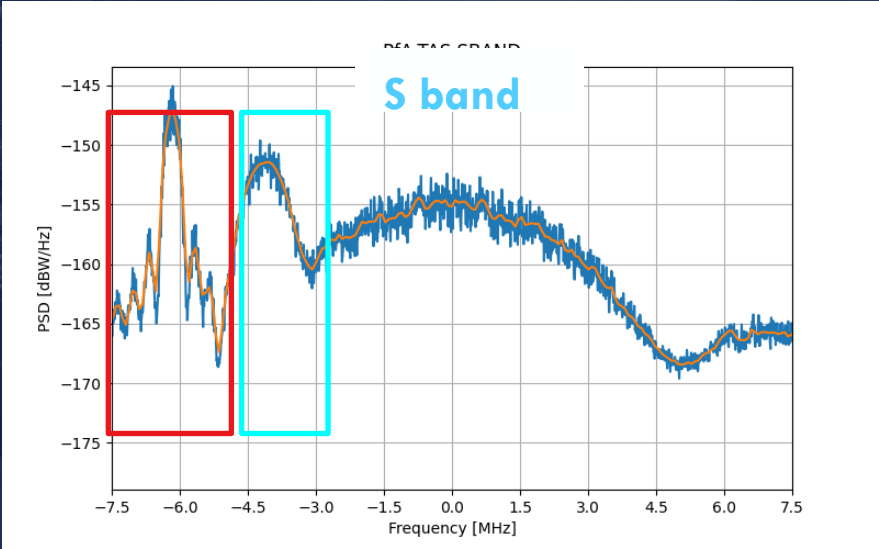
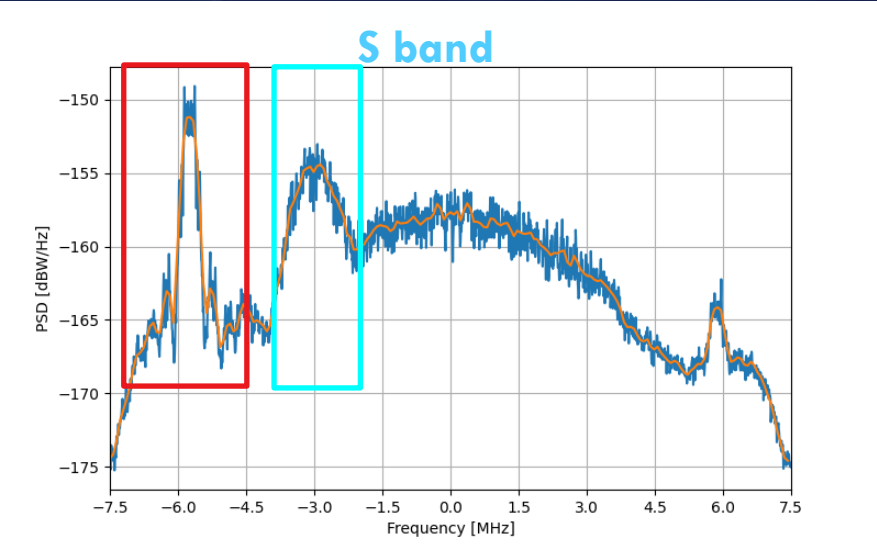
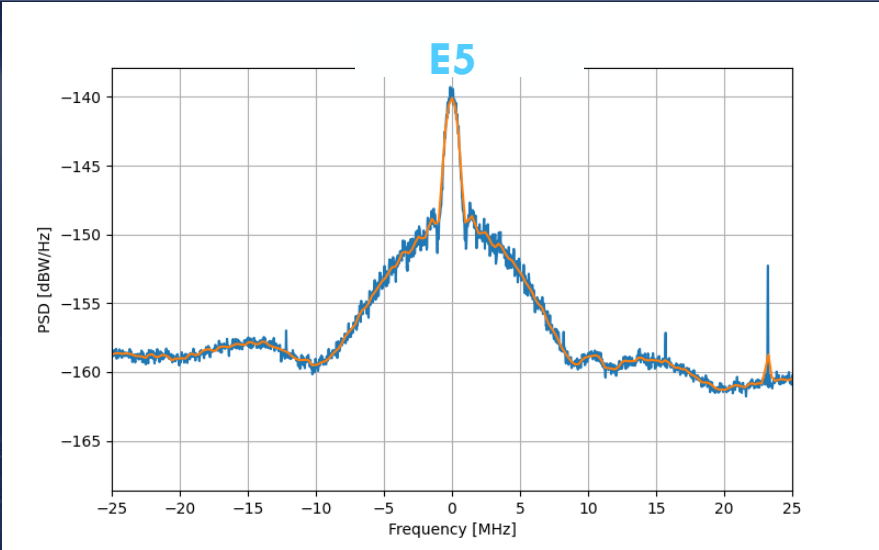
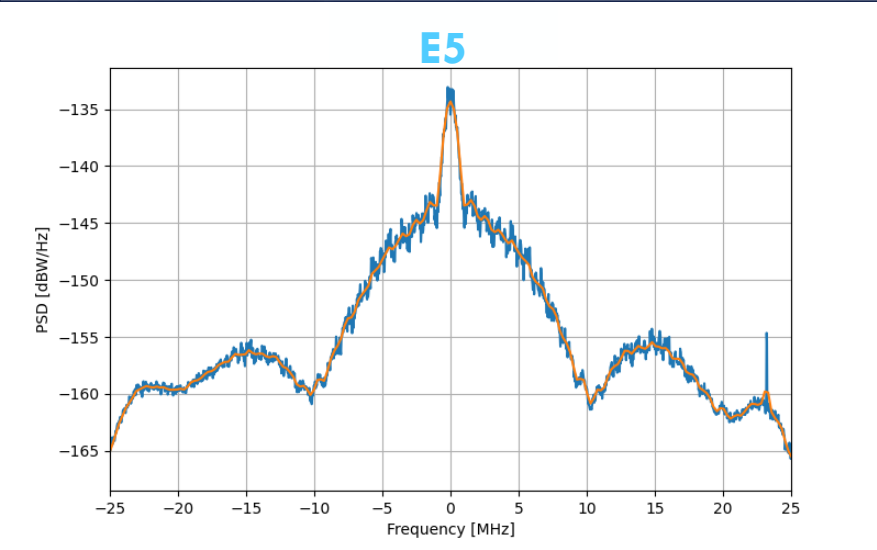
Celeste IOD signals are meant:

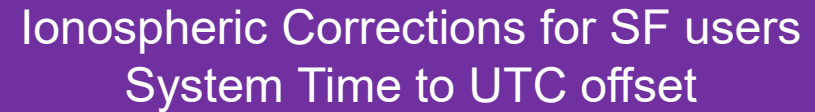
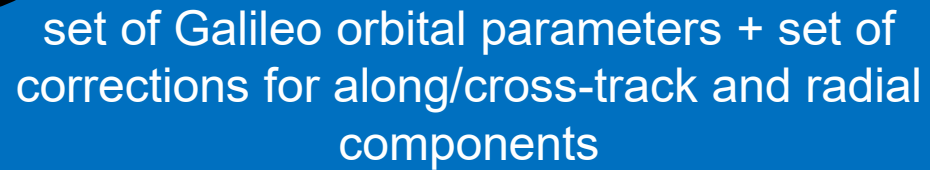
To be a vehicle to conduct in-orbit experiments of LEO-PNT concepts and technologies

To experiment with different frequency bands and innovative signal features

Future projects (Celeste IOP, EU LEO-PNT) will use their own signal design which may or may not use the bands and features of Celeste IOD signals

IOD-1 and -2 signals





Celeste IOD – Call for 3rd Party Experimentation



What it is

Test and validate next-generation PNT with real live signals using Celeste IOD mission.



Who Can Apply

Industry, research & academia from **ESA Participating States** to the **Celeste programme**



How to Engage

Register via [OSIP campaign](#) & sign the attached Terms of Use

Experiment Focus Areas		Potential End-User Verticals		
High-Accuracy Positioning (PPP)	PNT Resilience (L/S/C-band)	Autonomous Vehicles	Railway & Maritime	Critical Infrastructure
5G / 6G NTN Compatibility	Low-Energy PNT for IoT / Mobile			
LEO-PNT Science Experiments	Additional PNT Data Services	Polar & Arctic Users	Wireless Networks 5G/6G	Asset Tracking & IoT
Indoor Navigation (UHF)	MEO + LEO Fused PNT			

OSIP is the official platform to engage with ESA on Experimentation opportunities.

All communication and information will be provided here.

Submission
8 months left

Evaluation
Starts Jan 1, 2027

Closed

Celeste In-Orbit Demonstrator – Call for LEO-PNT experimentation opportunities



Do you want to be among the first to test the future of satellite-based positioning? Join the experiments of the ESA's Celeste In-Orbit Demonstration! Between 2026 and 2027, we will launch more than 11 LEO satellites to trial new navigation concepts, and we invite organisations from ESA Participating States to collaborate in shaping the future of satellite navigation in Europe.

Whether you're a receiver manufacturer, application developer, public safety organisation, or research center, this is your chance to evaluate LEO-PNT positioning concepts and technologies under real-world conditions.

Why join?

- Early access to Celeste IOD satellite signals
- Opportunity to validate LEO-PNT user technology and concepts
- Collaborate with ESA and innovators across the New Space ecosystem
- Contribute to shaping the future of satellite navigation in Europe

 Director of Navigation - Francisco-Javier Benedicto-Ruiz

Orbit Demonstration:

Submit Document request

Experimentation Campaign

New: Document request

Campaign: Celeste In-Orbit Demonstrator – Call for LEO-PNT experimentation opportunities

The proposals will be evaluated as received.

We are inviting interested parties to submit the following documents:

1. **Signed Celeste IOD Exp Additional Terms of Use**

This document outlines the terms for using ESA-provided information (e.g., signal-in-space characteristics, etc.). A signed copy is mandatory.

2. **A short document (between 5 and 7 pages long) outlining their planned involvement in this experiment.**

This document must clearly detail three things:

- **Participation Plan:** How your organization will contribute to and engage in the experimentation process.
- **Tools & Resources:** The specific technologies, equipment, or methods you intend to employ.
- **Expected Outcomes:** The precise, measurable results you aim to achieve.

In addition, please provide a **clear list of all participating entities** and their corresponding **ESA Participating States to Celeste (ESA's FutureNAV Programme - Component 1 LEO-PNT): Austria, Belgium, Czech Republic, Finland, France, Germany, Hungary, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, United Kingdom.**

TITLE *

200

SUBMISSION CATEGORY *

DESCRIPTION *

B I U T V E A L T

ESA:

- Data intended to be shared with OSIP participants was collected in July and September and is currently being processed.
- Assess the possibility of a one-week open testing campaign in November. If approved, information will be communicated via the Celeste IOD OSIP mailing list.

3rd parties:

- Provide preliminary feedback on the **SIS-ICD** to ESA. Please contact florin-catalin.grec@esa.int; information can be provided by email or discussed during a call.
- Submit proposals for joint experimentation through the **OSIP campaign by the end of this year**, allowing ESA sufficient time to assess them for the IOD 3–10 satellites.
- Consider leveraging **NAVISP Element 2** for co-funding.

NAVISP Element 2 Projects in LEO-PNT



LEO-PNT Enabled
Mass Market
Chipset



LEO-PNT ODTs



Reliable GNSS
Navigation with PNT
from LEO

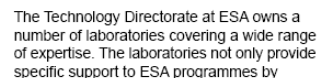


LEO-PNT
Simulation
Innovations





The ESTEC Navigation Laboratory (NavLab) supports test campaigns for navigation and telecommunications services for both ESA and non-ESA projects based on a contract. It manages the laboratory where there are all the required tools and equipment to test GNSS systems and applications.

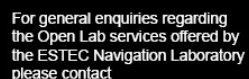


ESA has the mandate to maintain unique facilities and expertise when not commercially viable and needed for ESA missions. The simplified access to Laboratories allows SME's, Start-ups, Mid-Caps, Research Institutes,

Universities, etc. to have quick, secure and affordable access to ESA laboratories when client organisations are able to perform their own tests using TEC facilities.



THE SYNERGY OF THE LABORATORIES



ESA-ESTEC
Keplerlaan 1, 2201 AZ Noordwijk,
The Netherlands

ESA-ESTEC
Keplerlaan 1, 2201 AZ Noordwijk,
The Netherlands

LOGIN →

SUBMIT →

Privacy agreement ☐

The Celeste IOD at ESTEC's Navigation Laboratory

ESTEC's Navigation Laboratory in support of Celeste:

- Leveraging on R&D and pre-developments (both external and internal) for concept definitions and studies
- Preliminary analysis and System/Segment studies to sustain LEO-PNT performances, trade-offs and drivers

Infrastructure maintenance and evolutions:

- Extensive know-how and capabilities for L-band PNT signals
- Evolution of capabilities

Support to IOD-1 and IOD-2 In-Orbit Testing (IOT):

- Readiness to receive Celeste Signal-in-Space since launch
- Operations of IOD-1 Test User Segment for Payload IOT

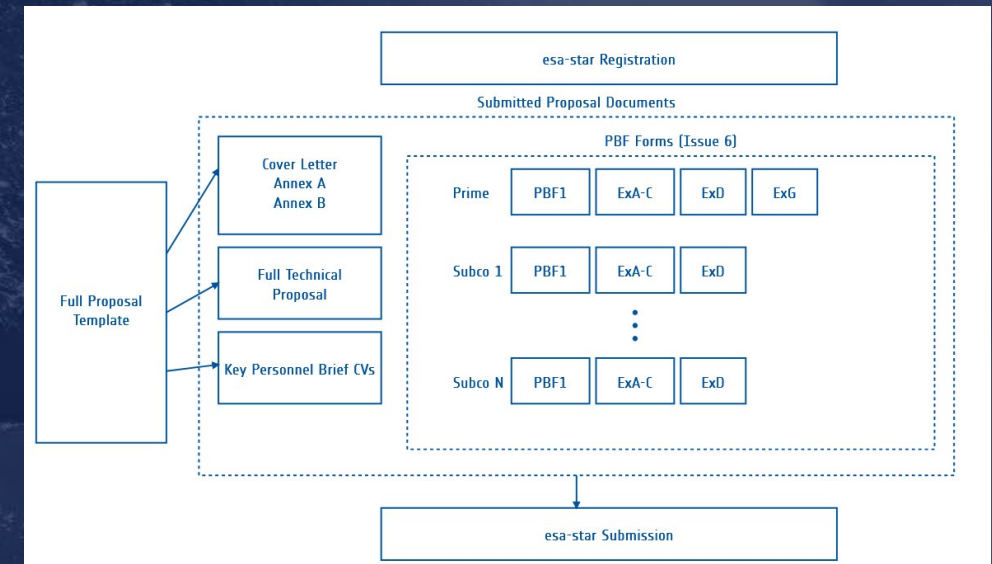
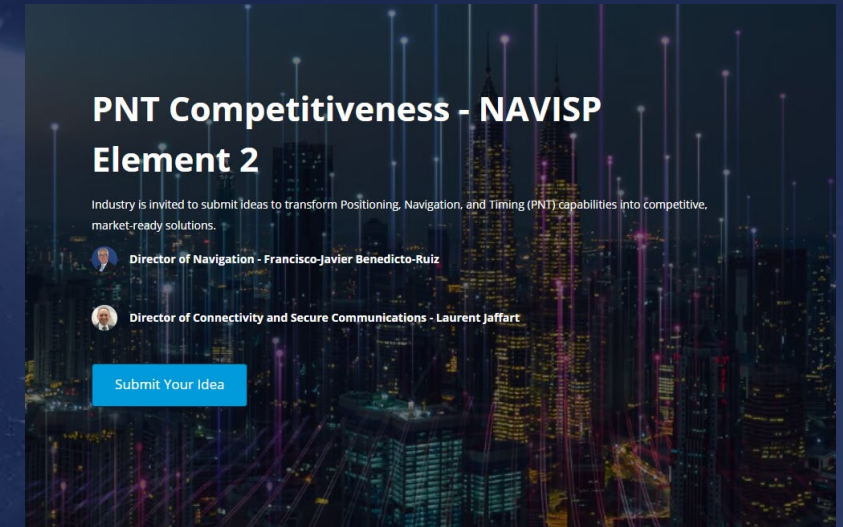


New OSIP submission Channel for Co-operative Agreements:

<https://ideas.esa.int/core/servlet/hype/IMT?documentTableId=8527279057914738502&userAction=Browse&templateName=&documentId=5655bd68fc87c649853708e4ff178484>

New step-by-step guides for Element 2 project applications:

https://navisp.esa.int/element/competitiveness/application_process





Thank you!