



# EGNOS User Demonstrator

## EGNOS workshop

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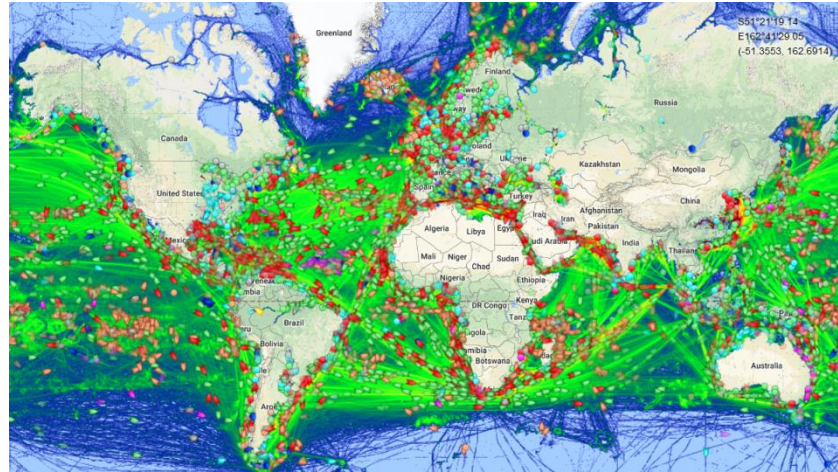


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# SBAS navigation

- ☐ Maritime community is interested in:
  - using SBAS for ocean waters, coastal waters and harbour entrances/approaches considering IMO Res A.1046(27) requirements.
  - especially where there is no back-up infrastructure (i.e. DGPS/DGLONASS) or in poorly covered environments.



# Purpose of EGNOS Maritime Campaigns

- ❑ Perform EGNOS maritime dynamic tests in European coasts.
- ❑ Assessment of EGNOS performance at user level in real maritime scenario.
- ❑ Verification that EGNOS service is compliant with maritime requirements stated in IMO Res. A. 1046 along European border area.



# Maritime GNSS campaign in Norway coast 2018

## Campaign:

- Route 1: from Trondheim (22/02/2018) to Kirkenes (26/02/2018).
- Route 2: from Kirkenes (26/02/2018) to Bergen (03/03/2018)

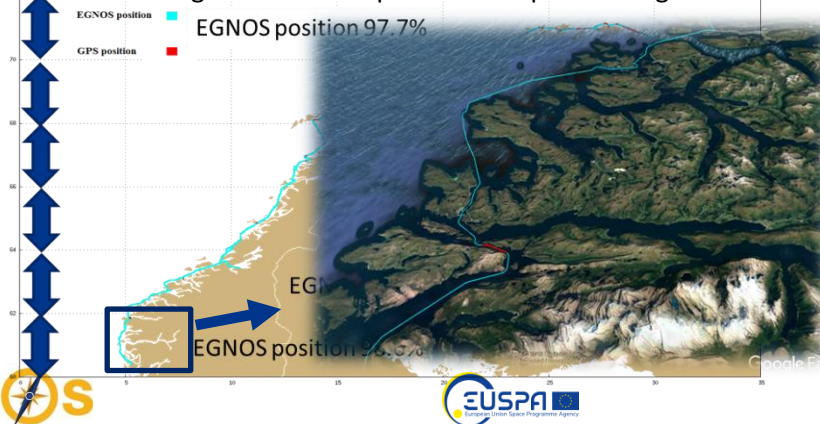
Support from Norwegian Coastal Administration



Vessel: MS Finnmarken

## EGNOS Availability

Percentage of time with position computed using EGNOS



## EGNOS Accuracy

Horizontal position error at 95<sup>th</sup> percentile in meters

DOY	Maritime Rx with EGNOS capability	GPS Rx
53	0.98	2.08
54	0.93	2.00
55	1.09	2.09
56	0.98	1.87
57	0.99	1.87
58	1.13	2.00
59	1.07	2.05
60	0.83	2.05
61	0.88	2.36
62	0.85	1.87



# Maritime GNSS campaign to Antarctica 2019

## Campaign:

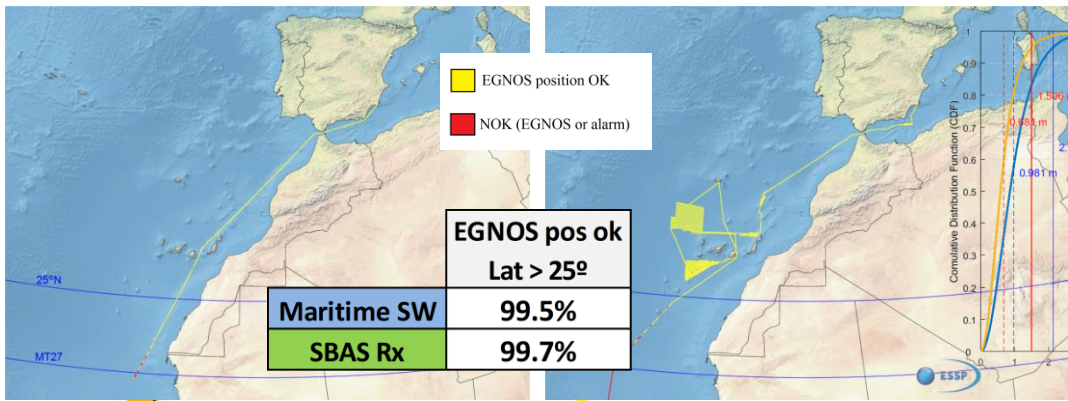
- Route 1: from Cartagena (19/12/2018) to Canary Island (24/12/2018).
- Route 2: from Canary Island (15/05/2019) to Cartagena (25/06/2019)

Support from Spanish Navy and Spanish Navy Hydrographic Institute

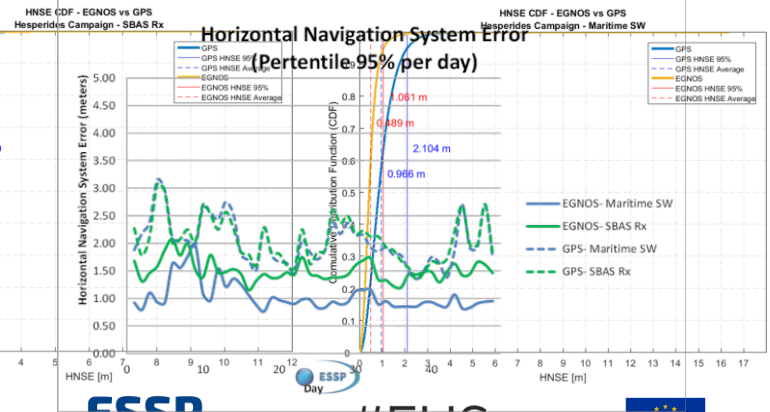


Vessel: Hespérides

## EGNOS Availability



## EGNOS Accuracy



#EUSpace





# Maritime GNSS campaign in Gulf of Finland 2019

## Campaign:

- Route: from Porvoo (01/11/2019) to Porvoo (14/11/2019).
- Harbours: Porvoo (Finland) - Primorsk (Russia) - Naantali (Finland)

Support from Väylä and OSM Group



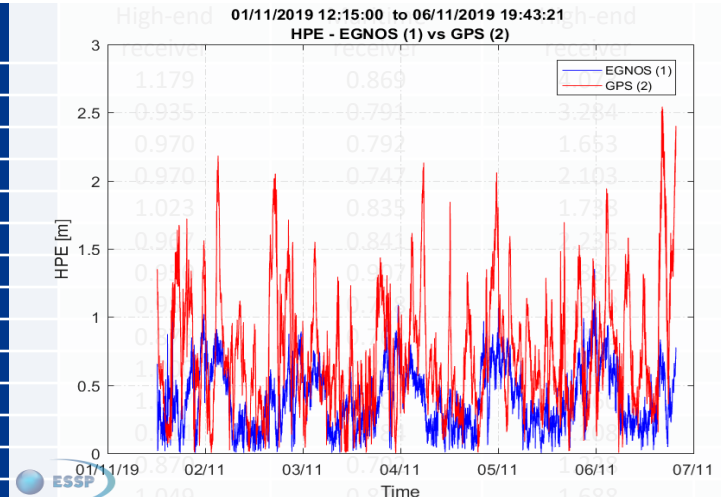
Vessel: Mastera

## EGNOS Availability

Percentage of time with position computed using EGNOS



DOY	EGNOS HNSE 95% percentile [m]		GPS standalone HNSE 95% percentile [m]	
	High-end receiver	Low-end receiver	High-end receiver	Low-end receiver
305	1.179	0.869	1.444	1.444
306	0.935	0.791	1.809	1.809
307	0.970	0.792	1.222	1.222
308	0.970	0.747	1.638	1.638
309	1.023	0.835	1.307	1.307
310	0.961	0.841	2.000	2.000
311	0.961	0.917	--	--
312	0.961	0.917	--	--
313	0.961	0.917	--	--
314	0.961	0.917	--	--
315	0.961	0.917	--	--
316	0.961	0.917	--	--
317	0.961	0.917	--	--
318	0.961	0.917	--	--
<b>TOTAL</b>	<b>0.971</b>	<b>0.815</b>	<b>3.149</b>	<b>1.551</b>



# Maritime GNSS campaign to Baltic Sea 2021

## Campaign:

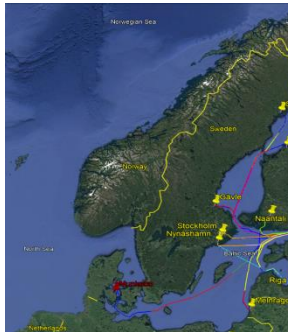
- Route: from Munkebo (01/09/2021) to Porvoo (01/12/2021).
- Harbours: Munkebo (Denmark), Melnrage (Lithuania), Riga (Latvia), Nynäshamn (Sweden), Stockholm (Sweden), Gävle (Sweden), Strömören (Sweden), Kokkola (Finland), Naantali (Finland), Hamina (Finland) and Porvoo (Finland)



Vessel: Kiisla

Support from Väylä and OSM Group

## EGNOS Performance



Period of time (DOY)	EGNOS horizontal accuracy [m]			EGNOS Position Avail. [%]	EGNOS Position Cont. [%]
	Mean	95%-percent.	Max.	--	--
244 - 253	0.310	0.715	1.168	100	100
254 - 263	0.337	0.844	2.350	100	100
264 - 273	0.327	0.749	1.145	100	100
274 - 282	0.419	0.925	1.829	99.93 (*)	99.88 (*)
283 - 293	0.351	0.826	1.447	100	100
294 - 303	0.359	0.881	1.730	100	100
304 - 313	0.360	0.955	2.068	100	100
314 - 320	0.387	0.920	1.617	100	100
321 - 335	0.399	0.939	1.466	100	100
<b>TOTAL</b>	<b>0.361</b>	<b>0.779</b>	<b>2.350</b>	<b>99.99</b>	<b>99.99</b>

(\*) Local failure at receiver level.





# Maritime GNSS campaign Irish Coast 2022

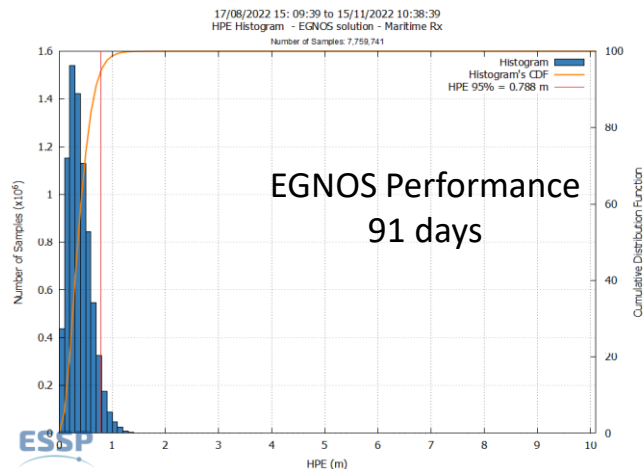
## Campaign:

- Route: from Killybegs (17/08/2022) to Dublin (12/10/2022).

*Support from Commissioners of Irish Lights and GLA Research & Development*



Vessel: ILV Granuaile



# EGNOS USER DEMONSTRATOR

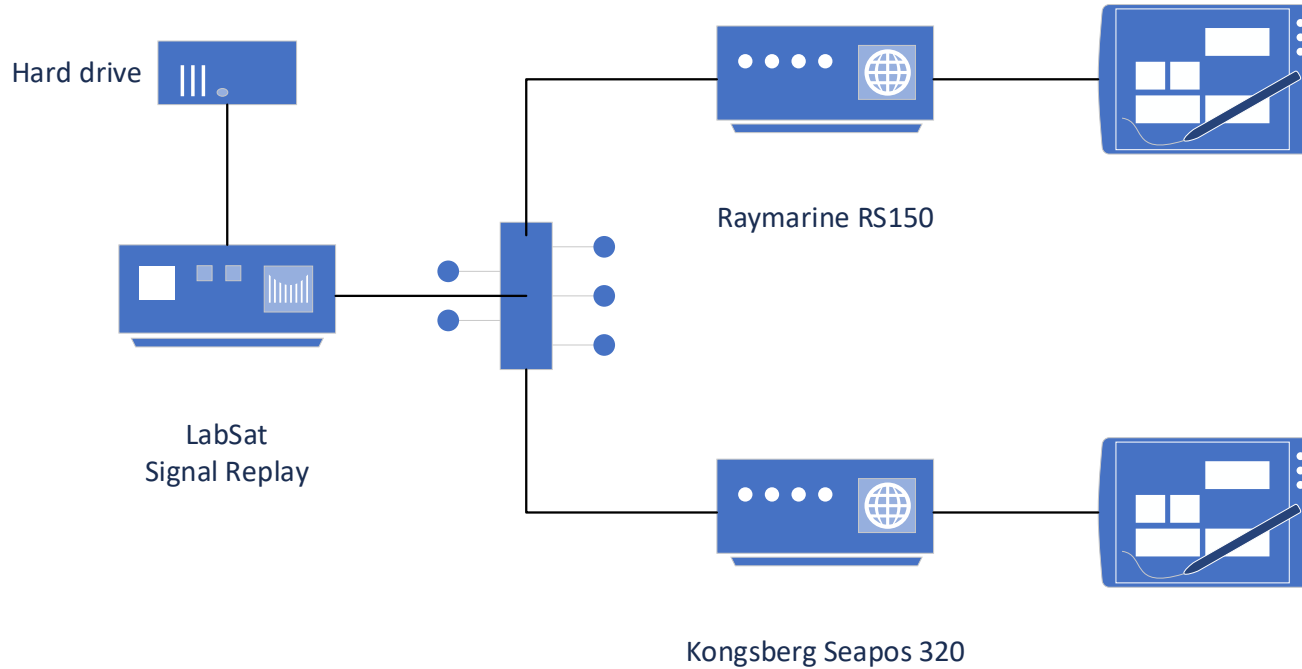


## ☐ Maritime receivers navigating with EGNOS

- Labsat with recorded data from the 2022 Irish campaign, from 27/08/2022 to 01/09/2022.
- Raymarine RS150 + Display
- Kongsberg Seapos 320 + Display



# EGNOS USER DEMONSTRATOR



# EGNOS USER DEMONSTRATOR

☐ Raymarine RS150

VIDEO

# EGNOS USER DEMONSTRATOR

❑ Kongsberg Seapos 320

VIDEO

# EGNOS USER DEMONSTRATOR

- ❑ ESSP in communication with maritime receiver manufacturers (Kongsberg, SAAB, Raymarine) to support them in the **update of their receivers to be compliant to the IEC 61108-7**.
- ❑ ESSP can support receiver manufacturers in:
  - Executing most of the IEC 61108-7 tests.
  - Reporting results with compliances and potential update needs.
- ❑ Looking for potential new collaborations. Receiver manufacturers are welcome to contact ESSP and EUSPA in order to find free-of-charge technical support for this potential update.



# Conclusion

SBAS system can be KEY for maritime navigation.

- ❑ EGNOS not only improves the accuracy compared to GPS only, as shown in the different maritime campaign performed, but also provide an integrity layer.
- ❑ EGNOS enables coastal waters and harbour entrances/approaches, not currently supported with GNSS standalone solutions.
- ❑ Some differences in the receiver SBAS implementation have been detected.
- ❑ **Ensure a worldwide common understanding of use of SBAS receivers**
  - EGNOS Maritime Service
  - IEC standard for SBAS L1 maritime receivers: IEC 61108 Part 7



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Corporate Video

# Thank you!