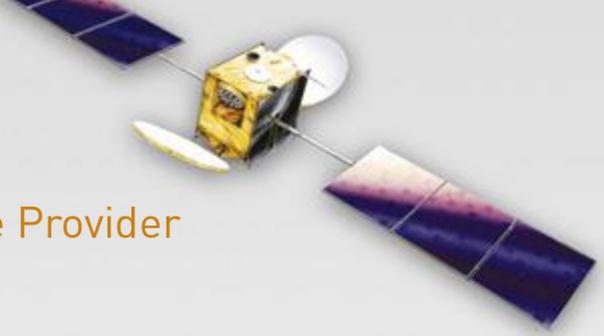


The **EGNOS** Service Provider



# Service Provision Yearly Report (April 2018 - March 2019)

EGNOS Service Provision



**We certify you're there.**

ESSP-DRD-23614P Iss. 01-00 Date: 08/07/2019

The information you need available at your fingertips!



GET IT ON  
**Google Play**

**EGNOS app**

Download on the  
**App Store**

## Get it on **iOS** and **Android** for free



  
**EGNOS Helpdesk**  
Accessible from  
app

  
**Signal in Space**  
EGNOS system  
information

  
**Docs and tools**  
Browse official  
documents & tools

  
**EGNOS performance**  
SoL, EDAS, OS  
services

<https://www.essp-sas.eu>

## Table of Contents

<b>1</b>	<b>A WORD FROM THE ESSP CEO .....</b>	<b>8</b>
<b>2</b>	<b>EXECUTIVE SUMMARY .....</b>	<b>9</b>
2.1	EGNOS SERVICE PERFORMANCE .....	9
2.2	SERVICE PROVISION AND DEVELOPMENT .....	11
<b>3</b>	<b>SERVICE PERFORMANCE.....</b>	<b>15</b>
3.1	EGNOS SIS AVAILABILITY .....	15
3.1.1	<i>SIS Availability trending .....</i>	<i>15</i>
3.2	SOL SERVICE – NON-PRECISION APPROACH (NPA).....	17
3.2.1	<i>NPA availability.....</i>	<i>18</i>
3.2.2	<i>NPA availability – Achievement against target .....</i>	<i>19</i>
3.2.3	<i>NPA availability – 99% daily compliance .....</i>	<i>20</i>
3.2.4	<i>NPA Integrity.....</i>	<i>21</i>
3.2.5	<i>NPA Continuity.....</i>	<i>23</i>
3.3	SOL SERVICE – APPROACH WITH VERTICAL GUIDANCE (APV-I) .....	24
3.3.1	<i>APV-I availability.....</i>	<i>25</i>
3.3.2	<i>APV-I availability – Achievement against target .....</i>	<i>26</i>
3.3.3	<i>APV-I availability – 99% daily compliance .....</i>	<i>27</i>
3.3.4	<i>APV-I Integrity events .....</i>	<i>29</i>
3.3.5	<i>APV-I Continuity risk .....</i>	<i>31</i>
3.3.6	<i>APV-I Continuity – Achievement against target .....</i>	<i>32</i>
3.4	SOL SERVICE – EGNOS LOCALIZER PERFORMANCE WITH VERTICAL GUIDANCE TO A DECISION ALTITUDE OF 200 FT (LPV-200).....	33
3.4.1	<i>LPV-200 availability .....</i>	<i>34</i>
3.4.2	<i>LPV-200 availability – Achievement against target.....</i>	<i>35</i>
3.4.3	<i>LPV-200 availability – 99% daily compliance .....</i>	<i>36</i>
3.4.4	<i>LPV-200 Integrity events.....</i>	<i>38</i>
3.4.5	<i>LPV-200 Continuity risk.....</i>	<i>40</i>
3.4.6	<i>LPV-200 Continuity – Achievement against target.....</i>	<i>41</i>
3.4.7	<i>EGNOS LPV-200 vertical accuracy.....</i>	<i>42</i>
3.4.8	<i>EGNOS LPV-200 accuracy extrapolated at 10<sup>-7</sup>/150 s .....</i>	<i>43</i>
3.5	OPEN SERVICE (OS).....	44
3.5.1	<i>RIMS monitoring network.....</i>	<i>45</i>
3.5.3	<i>Horizontal and Vertical Accuracy.....</i>	<i>47</i>
3.5.4	<i>Open Service Availability.....</i>	<i>51</i>
3.6	EGNOS DATA ACCESS SERVICE (EDAS).....	54
<b>4</b>	<b>EGNOS SERVICES PROVISION.....</b>	<b>57</b>
4.1	SOL AVIATION SERVICE STATUS.....	57
4.2	SERVICE DEFINITION DOCUMENTS AND SERVICE NOTICES OVER THE PERIOD.....	58
4.3	USER CONSULTATIONS AND IMPROVEMENT ACTIONS .....	60
4.3.1	<i>2018 EGNOS User Satisfaction Process.....</i>	<i>60</i>
4.4	SERVICE IMPLEMENTATION ROADMAPS.....	62
4.5	2018 EGNOS MULTIMODAL ADOPTION PLAN .....	63
4.6	COMMUNICATION AND EGNOS PROMOTION ACTIVITIES.....	65
4.6.1	<i>2018 EU Space Week – EGNOS SoL Session .....</i>	<i>65</i>
<b>5</b>	<b>KEY ACTIVITIES PLANNED FOR THE YEAR AHEAD .....</b>	<b>66</b>
5.1	EGNOS WORKING AGREEMENT IMPLEMENTATION IN AVIATION .....	66
5.2	EVOLUTION OF EGNOS SERVICE RELATED DOCUMENTS .....	67



We certify you're there.

---

5.3	USER SERVICES EVOLUTION .....	68
5.4	EGNOS MULTIMODAL ADOPTION ACTION PLAN 2019 .....	69
<b>APPENDIX A</b>	<b>FULL LIST OF EGNOS-BASED APPROACH PROCEDURES .....</b>	<b>70</b>

## Table of Figures

FIGURE 1: EGNOS SIS AVAILABILITY TREND FROM APRIL 2018 TO MARCH 2019 (%) .....	15
FIGURE 2: NPA AVAILABILITY MAP- EXPECTED MINIMUM PERFORMANCE (SoL SDD v3.1 AND v3.2) .....	17
FIGURE 3: NPA CONTINUITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.1 .....	17
FIGURE 4: NPA CONTINUITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.2 (PUBLISHED ON 28/09/2018).....	17
FIGURE 5: NPA AVAILABILITY FROM 01/04/18 TO 31/03/19.....	18
FIGURE 6: NPA AVAILABILITY MAP WITH RESPECT TO THE SERVICE AREA – 01/04/18 - 31/03/19 .....	19
FIGURE 7: NPA AVAILABILITY - PERCENTAGE OF DAYS WITH AVAILABILITY OVER 99% - 01/04/18 TO 31/03/19 .....	20
FIGURE 8: NPA HORIZONTAL SAFETY INDEX .....	22
FIGURE 9: NPA CONTINUITY RISK FROM 01/04/18 TO 31/03/19 .....	23
FIGURE 10: APV-I AVAILABILITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.1 .....	24
FIGURE 11: APV-I AVAILABILITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.2 (PUBLISHED ON 28/09/2018).....	24
FIGURE 12: APV-I CONTINUITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.1 .....	24
FIGURE 13: APV-I CONTINUITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.2 (PUBLISHED ON 28/09/2018).....	24
FIGURE 14: APV-I AVAILABILITY FROM 01/04/18 TO 31/03/19.....	25
FIGURE 15: APV-I 99% AVAILABILITY MAP WITH RESPECT TO THE 99% APV-I SERVICE AREA <sup>7</sup> - 01/04/18 TO 31/03/19 .....	26
FIGURE 16: APV-I AVAILABILITY – PERCENTAGE OF DAYS WITH AVAILABILITY OVER 99% - 01/04/17 TO 31/03/18 .....	27
FIGURE 17: ANNUAL APV-I AVAILABILITY COMPLIANCE AT AIRPORTS WITH PUBLISHED EGNOS-BASED OPERATIONS.....	28
FIGURE 18: EGNOS APV-I HORIZONTAL SAFETY INDEX .....	30
FIGURE 19: EGNOS APV-I VERTICAL SAFETY INDEX <sup>10</sup> .....	30
FIGURE 20: APV-I CONTINUITY RISK FROM 01/04/18 TO 31/03/19 .....	31
FIGURE 21: APV-I CONTINUITY RISK ( $5 \cdot 10^{-4}$ ) MAP WITH RESPECT TO THE $5 \cdot 10^{-4}$ APV-I SERVICE AREA <sup>13</sup> - 01/04/18 TO 31/03/19 .....	32
FIGURE 22: LPV-200 AVAILABILITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.1.....	33
FIGURE 23: LPV-200 AVAILABILITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.2 (PUBLISHED ON 28/09/2018) .....	33
FIGURE 24: LPV-200 CONTINUITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.1.....	33
FIGURE 25: LPV-200 CONTINUITY MAP - EXPECTED MINIMUM PERFORMANCE – SoL SDD v3.2 (PUBLISHED ON 28/09/2018) .....	33
FIGURE 26: LPV-200 AVAILABILITY FROM 01/04/18 TO 31/03/19 .....	34
FIGURE 27: LPV-200 AVAILABILITY MAP WITH RESPECT TO THE SERVICE AREA <sup>16</sup> - 01/04/18 TO 31/03/19.....	35
FIGURE 28: LPV-200 AVAILABILITY – PERCENTAGE OF DAYS WITH AVAILABILITY OVER 99% - 01/04/17 TO 31/03/18 .....	36
FIGURE 29: ANNUAL LPV-200 AVAILABILITY COMPLIANCE AT AIRPORTS WITH PUBLISHED EGNOS-BASED OPERATIONS .....	37
FIGURE 30: EGNOS LPV-200 HORIZONTAL SAFETY INDEX.....	39
FIGURE 31: EGNOS LPV-200 VERTICAL SAFETY INDEX .....	39
FIGURE 32: LPV-200 CONTINUITY RISK FROM 01/04/18 TO 31/03/19.....	40
FIGURE 33: LPV-200 CONTINUITY RISK ( $5 \cdot 10^{-4}$ ) MAP WITH RESPECT TO THE REFERENCE MAP - 01/04/18 TO 31/03/19.....	41
FIGURE 34: EGNOS LPV-200 VERTICAL ACCURACY HISTOGRAM AND CUMULATIVE PROBABILITY .....	42
FIGURE 35: EXTRAPOLATED VNSE AT 10-7/150 s IN THE RIMS WITHIN THE LPV-200 COMMITMENT.....	43
FIGURE 36: EGNOS OS COMPLIANCE AREA .....	44
FIGURE 37: RIMS LOCATIONS.....	45
FIGURE 38: EGNOS OPEN SERVICE HNSE HISTOGRAM AND CUMULATIVE PROBABILITY .....	48
FIGURE 39: EGNOS OPEN SERVICE VNSE HISTOGRAM AND CUMULATIVE PROBABILITY .....	48
FIGURE 40: OS AVAILABILITY FOR THE RIMS STATIONS.....	53
FIGURE 41: EDAS SERVICES AVAILABILITY (APRIL 2018-MARCH 2019) .....	55
FIGURE 42: EDAS SERVICES LATENCY (APRIL 2018-MARCH 2019) .....	55
FIGURE 43: SUMMARY OF RESULTS FROM USER SATISFACTION SURVEY.....	61

## Table of Tables

TABLE 1: EGNOS SERVICE PERFORMANCE DURING APRIL 2018 – MARCH 2019 PERIOD.....	9
TABLE 2: EGNOS SIS MONTHLY AVAILABILITY FROM APRIL 2018 TO MARCH 2019 (%).....	16
TABLE 3: NPA SAFETY INDEX (MAXIMUM) AT REFERENCE STATIONS.....	21
TABLE 4: EGNOS APV-I SAFETY INDEX (MAXIMUM) AT REFERENCE STATIONS.....	29
TABLE 5: EGNOS LPV-200 SAFETY INDEX (MAXIMUM) AT REFERENCE STATIONS.....	38
TABLE 6: LIST OF RIMS SITES WHERE EGNOS OS PERFORMANCE IS REPORTED.....	46
TABLE 7: EGNOS OPEN SERVICE ACCURACY (95%).....	47
TABLE 8: MONTHLY HORIZONTAL/VERTICAL ACCURACY AT RIMS-A SITES FOR PRN123 (IN METRES).....	49
TABLE 9: MONTHLY HORIZONTAL/VERTICAL ACCURACY AT RIMS-A SITES FOR PRN120/136 (IN METRES).....	50
TABLE 10: OS AVAILABILITY AT RIMS-A SITES FOR PRN123.....	51
TABLE 11: OS AVAILABILITY AT RIMS-A SITES FOR PRN120/136.....	52
TABLE 12: EDAS SERVICES MINIMUM AVAILABILITY.....	54
TABLE 13: MAXIMUM LATENCY FOR EDAS SERVICES.....	54
TABLE 14: SERVICE NOTICES PUBLISHED/UPDATED DURING THIS PERIOD.....	60
TABLE 15: FULL LIST OF EGNOS-BASED APPROACH PROCEDURES AS OF 28 <sup>TH</sup> MARCH 2019 (AIRAC CYCLE#1904).....	83



We certify you're there.

*THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK*

## 1 A WORD FROM THE ESSP CEO

---

Similarly to last year, the EGNOS performance observed in the last annual period (April 2018 to March 2019) remained at high levels with no safety or security incidents impacting users during the period.

On the system evolution side, the new ASTRA 4B geostationary satellite was introduced into EGNOS operations during the first half of 2018, increasing the robustness of the space segment, and a new EGNOS version, which improved the system operability was deployed during the summer. On top of that, works were conducted to ensure a smooth system response in front of the “GPS week-rollover” event, which was passed with no impact on the EGNOS services performance.

On the service provision side, 12 EWAs were signed, including 4 non-EU EWAs, with Isavia (Iceland), SMATSA (Serbia and Montenegro) and Arendal-Gullknapp Airport (Norway). The programme efforts towards the implementation of EGNOS-based maritime DGPS navigation services resulted in the first two operational services of this kind in Europe: EMA (Estonian Maritime Authority) and CEREMA/DGITM (the French Maritime authorities) started to broadcast EGNOS/EDAS based services from their first IALA beacons in the period.

The EGNOS Annual workshop took place in December 2018 within the frame of the larger “European Space Week”, gathering nearly 1,000 participants in Marseille.

The EGNOS users’ satisfaction reached a score of over 80% again this year (83.23%), making it the 3<sup>rd</sup> year in a row which such a high result.

ESSP’s ANSP certificate was renewed by EASA in July 2018 (for another 2 years) and the renewal of its ISO9001:2015 certificate was also achieved, while the company prepared itself for the ISO27001 certification expected to be obtained during summer 2019.

These great results have been achieved thanks to the expertise and commitment of the ESSP teams, ESSP’s partners and subcontractors, and to the fruitful relationship with our customer, the GSA, which has been ongoing for many years now: we thank them all for this.



**Thierry Racaud**  
CEO, ESSP SAS

## 2 EXECUTIVE SUMMARY

This document covers the period from 1 April 2018 to 31 March 2019.

### 2.1 EGNOS Service Performance

EGNOS service performance was excellent, providing consistent values with those committed in the Open Service, Safety-of-Life and EDAS [Service Definition Documents](#).

EGNOS Safety of Life (SoL) Service – Non-Precision Approach (NPA)		
NPA Availability	100% coverage of the 99.9% NPA Service Area ( <a href="#">EGNOS SoL SDD</a> )	
NPA Integrity	No integrity event for any of the monitoring sites	
NPA Continuity	Values below $5 \cdot 10^{-4}$ /h in continental Europe	
EGNOS Safety of Life (SoL) Service – Approach with Vertical Guidance (APV-I)		
APV-I Availability	98.02% coverage of the 99% APV-I Service Area ( <a href="#">EGNOS SoL SDD</a> )	
APV-I Integrity	No APV-I integrity event	
APV-I Continuity	99.82% coverage of the $5 \cdot 10^{-4}$ APV-I Service Area ( <a href="#">EGNOS SoL SDD</a> )	
EGNOS Safety of Life (SoL) Service – LPV-200		
LPV-200 Availability	99.18% coverage of the 99% LPV-200 Service Area ( <a href="#">EGNOS SoL SDD</a> )	
LPV-200 Integrity	No LPV-200 integrity event	
LPV-200 Continuity	98.56% coverage of the $5 \cdot 10^{-4}$ LPV-200 Service Area ( <a href="#">EGNOS SoL SDD</a> )	
LPV-200 Accuracy Tails	No events happened during the period	
EGNOS Open Service (OS)		
Horizontal Accuracy	0.8 metres (95 <sup>th</sup> percentile of the cumulative data for all stations)	
Vertical Accuracy	1.4 metres (95 <sup>th</sup> percentile of the cumulative data for all stations)	
Open Service Availability	Above 99% for all locations	
EGNOS Data Access Service (EDAS)		
Service	Availability	Latency
Service Level 0	99.91% vs 98.5% target ( <a href="#">EDAS SDD</a> )	542.44 ms vs 1300 ms target ( <a href="#">EDAS SDD</a> )
Service Level 2	99.92% vs 98.5% target ( <a href="#">EDAS SDD</a> )	547.65 ms vs 1450 ms target ( <a href="#">EDAS SDD</a> )
Ntrip	99.80% vs 98% target ( <a href="#">EDAS SDD</a> )	627.32 ms vs 1750 ms target ( <a href="#">EDAS SDD</a> )
SISNeT	99.81% vs 98% target ( <a href="#">EDAS SDD</a> )	76.21 ms vs 1150 ms target ( <a href="#">EDAS SDD</a> )
Data Filtering	99.91% vs 98% target ( <a href="#">EDAS SDD</a> )	471.87 ms vs 1750 ms target ( <a href="#">EDAS SDD</a> )
FTP	99.95% vs 98% target ( <a href="#">EDAS SDD</a> )	N/A
Signal-In-Space (SIS) Availability		
PRN120 or PRN 136 (EGNOS OP)	99.985 %	
PRN123 (EGNOS OP)	99.984 %	
EGNOS OP (at least one SIS)	100 %	

Table 1: EGNOS service performance during April 2018 – March 2019 period

The main causes for the observed EGNOS Service Performance degradations were:

- EGNOS OS and SoL services:
  - **Ionosphere monitoring:** EGNOS, as all SBAS, is sensitive to the solar cycle activity and ionospheric monitoring issues were the main cause for underperformance affecting mainly the North and West of the Service Area, typically connected to an increase of the geomagnetic activity. The most relevant case occurred on 26 August 2018 when the EGNOS service performance was degraded in the North of the Service area. In general, the impact of this kind of events is limited to some specific areas and short periods of time without having a significant impact on the monthly performance. Although it is still the leading cause of underperformance, the impact of this kind of events has decreased with respect to the previous yearly period (around 40% of the daily underperformance events vs 56% in the previous period).
  - **Data quality/RIMS anomalies:** The existence of local issues in the RIMS receivers (e.g. unhealthy data) has impacted EGNOS service performance on specific days in the areas near the affected station.
  - **GPS monitoring:** Problems related to the monitoring (e.g. non monitored satellites due to the lack of visibility from EGNOS reference stations, satellites set to 'Don't use'/'Not Monitored') of one or more GPS satellites are one of the most frequent causes for observed underperformance. This loss of monitoring of some satellites has been especially significant in terms of performance impact during periods with degraded ionosphere monitoring conditions. As for the case of ionosphere monitoring issues, the impact of this kind of events is limited both geographically and from a duration point of view.
- EDAS:
  - Very stable services with monthly performance consistently exceeding the committed values defined in the [EDAS SDD \(Service Definition Document\)](#). Considering the entire period, all EDAS services were available more than 99.8% of the time, with transit delays largely below the 1 second threshold.

## 2.2 Service Provision and Development

- **Service Evolution:**

- **Service Definition Documents (SDD):** three EGNOS SDD versions were published:
  - A new version of the SoL SDD (v3.2) was published on the 1<sup>st</sup> of October 2018 including, on top of improvements in terms of service coverage, specific considerations for non-EU and non-ATS users (for further details, refer to section 4.2).
  - Afterwards, on the 26<sup>th</sup> of March 2019, the currently applicable version of the SoL SDD (v3.3) was published, extending the EGNOS service area from 70° to 72° north.
  - Additionally, a new version of the EDAS SDD was published on June 3<sup>rd</sup> 2019, which included some updates affecting the system and service information available and the identification of the use of EDAS for IALA beacons, among others.



[EGNOS Service Definition Documents](#)

- **Services Notices:** the content of the EGNOS SDDs was complemented by the publication/update of five Service Notices. The main information about these Service Notices can be found in section 4.2.
- **EGNOS Service Implementation Roadmap:** The EGNOS Services' Roadmaps were updated to v4.0 in July 2018 and v4.1 in February 2019 with enhanced contents and format.
- **EGNOS Users' Satisfaction survey:**
  - The EGNOS Users' Satisfaction Survey was launched in December 2018 to cover the 2018 calendar year. The survey used a specific online platform where 140 responses were received.
  - A total of 115 EGNOS users and 25 non-EGNOS users responded to the survey. The main outcomes of this survey will be included in the [EGNOS Bulletin Q2 2019](#). The results show an excellent level of user satisfaction with respect to EGNOS services, with a global score close to 83%.

- **EGNOS Annual Workshop:**

- The 2018 EGNOS Annual Workshop was integrated into the [EU Space Week](https://www.euspaceweek.eu/), organised by GSA in Marseille from the 3<sup>rd</sup> to the 6<sup>th</sup> of December 2018 (<https://www.euspaceweek.eu/>). The EU Space Week brought together over 1,000 attendees representing the EGNOS, Galileo and Copernicus programmes user communities.
- The 2019 EGNOS Annual Workshop will take place on 24-25 September in Rome, Italy. Hence, this year the EGNOS Workshop will be a 2-day event fully dedicated to EGNOS users.



*EGNOS Workshop 2019 - [Register now!](#)*

- **User Service Implementation:**

- EGNOS Multimodal Adoption:

All the activities planned to be executed during 2018 were successfully conducted. The market segments where more effort has been devoted are aviation and maritime followed by agriculture & mapping and rail.

ESSP has continued engaging aerodromes to publish EGNOS-based procedures and operators to get equipped and certified. During the period reported in this document, 124 LPV procedures have been published and 131 aircrafts have been certified or achieved operational approval. Another 120 new aircraft/rotorcraft units have been engaged so that in the near future they will retrofit, start with the certification process or request SBAS options in the avionics for new unit orders.

In the maritime domain, 2018 represented the continuation of the activities launched to implement an EGNOS L1 Maritime Service as well as those linked to the use of EGNOS V2 SiS or EDAS as a positioning source for Aids to Navigation (IALA DGNS stations and AIS stations). The Estonian Maritime Authority (EMA) is using EDAS Ntrip (DGPS corrections for RIMS LAP) as the operational main source of corrections retransmitted via their Narva-Jõesuu IALA beacon and the first French IALA beacon station implementing the concept of retransmitting EDAS/EGNOS corrections over DGPS started to broadcast on 1 March 2019.

In agriculture and mapping, the contacts network has been notably increased and customised information for those market segments has been prepared and disseminated. ESSP has approached users offering a “proof of concept” or demonstration, for users to confirm how EGNOS could solve their positioning needs with the suitable equipment.

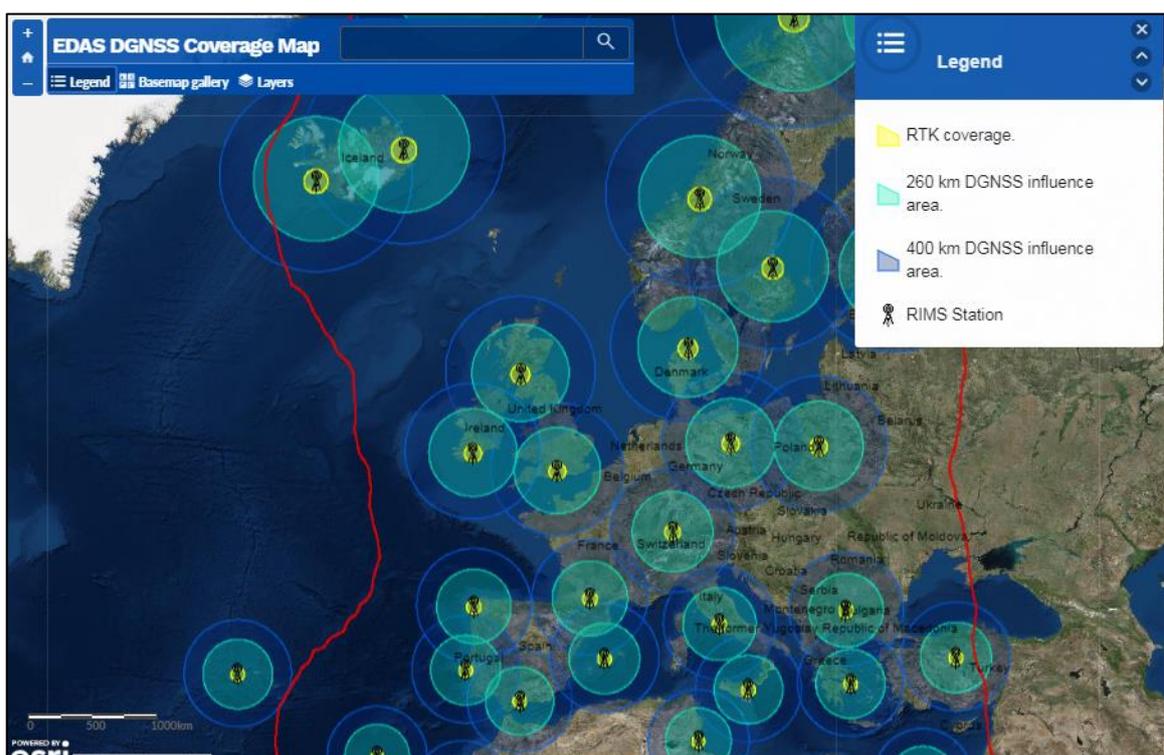
In rail, continuous support for SoL and non-SoL applications has been provided to GSA for analysing different means to use EGNOS (EDAS in particular) in the railway domain.



*The EGNOS Multimodal Adoption Plans aims at fostering EGNOS use in all application domains*

- **User Support:**

- The EGNOS App was released on Android and Apple markets on March 2<sup>nd</sup> 2018 (seventh anniversary of the EGNOS Safety of Life Service declaration) and provides all information an EGNOS user could need in connection to the EGNOS Services (SoL, OS and EDAS). Performance results (real-time, historical and forecast performance), EGNOS official documentation (Service Definition Documents, Service Notices, public reports...) and a wide range of support material and guidelines tailored to each application domain are accessible from your smartphone. Since then, two different updates have been released enabling notifications (alerts) upon service degradations/outages and including the EDAS coverage map.
- The EGNOS User Support website continued its evolution, adding new tools targeting different market segments:
  - Aviation users, with a new dedicated section (“Aviation Portal”), summarizing the relevant performance metrics and information for this user community.
  - Farmers, with a Cost Based Assessment tool (EASE).
  - EDAS users, with the addition of a coverage map which indicates the geographical areas where the different EDAS supported positioning techniques (EGNOS, DGNSS, and RTK) are available.



*EDAS coverage map - [EGNOS User Support Website](#)*

- A promotion campaign was launched after the EGNOS User Support Website revamp (new website design and look and feel in line with the other GSA websites) to invite users to visit our website and it resulted in an increase in visits to the website of over 100%.

### 3 SERVICE PERFORMANCE

#### 3.1 EGNOS SIS Availability

##### 3.1.1 SIS Availability trending

Definition
<b>Individual GEO availability:</b> Percentage of time when each geostationary satellite broadcasts a valid EGNOS SIS. A valid SIS is defined as a Signal-In-Space compliant with ICAO SARPS and RTCA MOPS.
<b>Grouped GEO Availability:</b> Percentage of time when at least one geostationary satellite in the EGNOS operational configuration (EGNOS-OP) broadcasts a valid EGNOS SIS. A valid SIS is defined as a Signal-In-Space compliant with ICAO SARPS and RTCA MOPS.

This section presents the annual performance of SIS availability. It provides the annual average performance for the individual and grouped GEO availability. Note that due to the GEO swap operation that occurred in August 2018, GEO 120 has been considered from 01/08/2018 to 29/08/2018 while GEO 136 results have been considered from 30/08/2018 until the end of March 2019.

From April 2018 to March 2019, the average (per month) EGNOS SIS availability was the following:

- Individual GEO availability - OP1: PRN120 (PRN 136 since August 2018): 99.985 %
- Individual GEO availability - OP2: PRN 123: 99.984 %
- Grouped GEO availability: 100 %

Monthly results are given by the following:

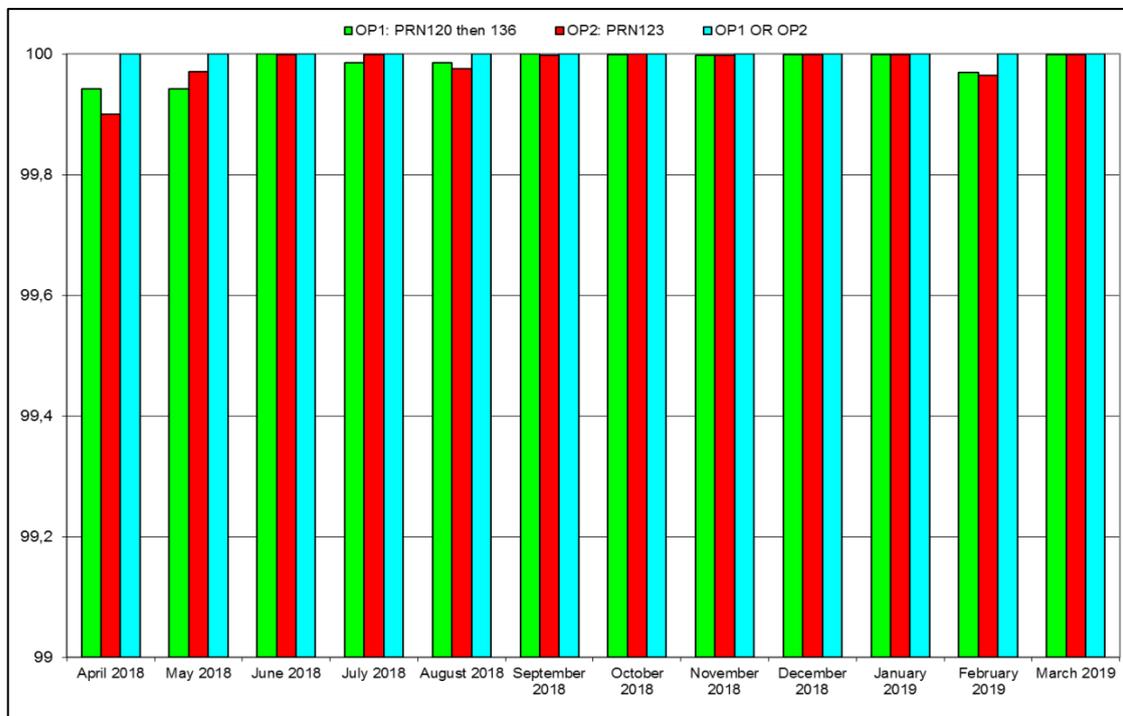


Figure 1: EGNOS SIS availability trend from April 2018 to March 2019 (%)

Numerical values for each month and for each PRN are given in the following table:

<b>DATE</b>	<b>OP1: PRN120 then 136</b>	<b>OP2: PRN123</b>	<b>OP1 OR OP2</b>
April 2018	99.943	99.900	100
May 2018	99.943	99.971	100
June 2018	100	99.999	100
July 2018	99.985	99.999	100
August 2018	99.985	99.975	100
September 2018	100	99.998	100
October 2018	99.999	100	100
November 2018	99.998	99.999	100
December 2018	100	99.999	100
January 2019	100	100	100
February 2019	99.969	99.965	100
March 2019	100	99.999	100
<b>Average Monthly availability</b>	<b>99.985</b>	<b>99.984</b>	<b>100</b>

Table 2: EGNOS SIS monthly availability from April 2018 to March 2019 (%)

### 3.2 SoL Service - Non-Precision Approach (NPA)

The following figures depict the minimum performance for the Non-Precision Approach (NPA) availability and continuity that can be expected from EGNOS, as defined in the EGNOS SoL Service Definition Document (see [EGNOS SoL Service Definition Document](#)). A new SDD was published on 28/09/2018. Therefore, some commitment maps changed at that time. The applicable versions of the SoL SDD during the reported period were:

- v3.1 until September 2018 (included).
- v3.2 from October to March 2019.

Also, it should be noted that the current applicable EGNOS SoL SDD version (v3.3), which includes the extension of the service area to 72° north, was published on 26 March 2019 and is not considered for the reported period (which ends on 31 March 2019).

These values correspond to the expected average performance measured by a fault-free receiver using all GPS satellites in view over a period of one month, using all the operational EGNOS GEOs:

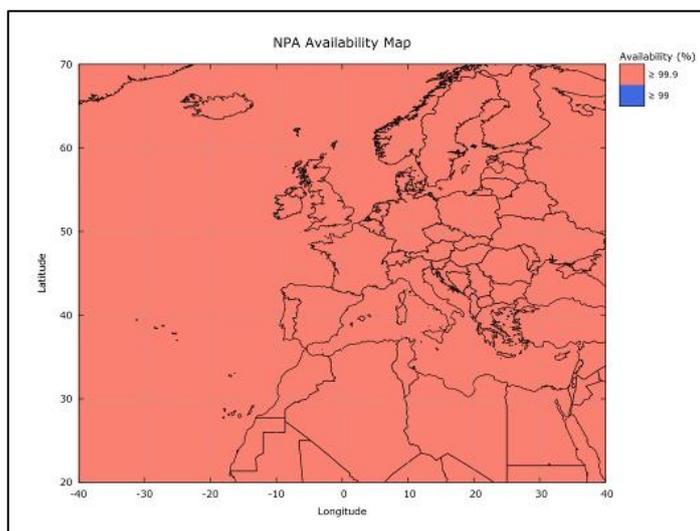


Figure 2: NPA Availability map- Expected minimum performance (SoL SDD v3.1 and v3.2)

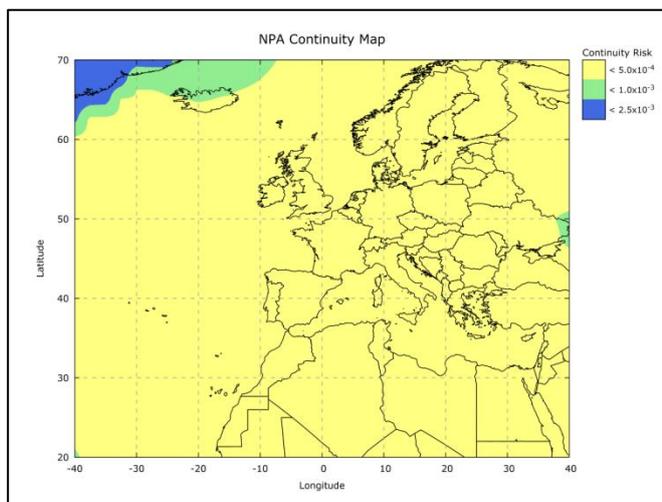


Figure 3: NPA Continuity map - Expected minimum performance – SoL SDD v3.1

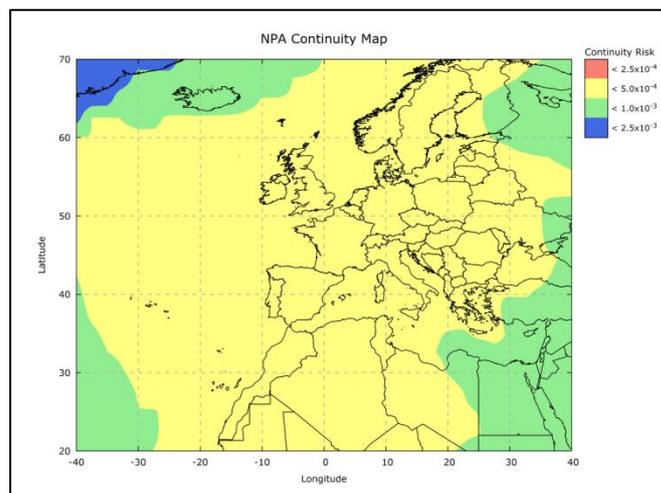


Figure 4: NPA Continuity map - Expected minimum performance – SoL SDD v3.2 (published on 28/09/2018)

NPA performance achieved during the reporting period is reported below. Additionally, NPA performance is reported through the EGNOS Monthly Performance reports, available on the [EGNOS User Support website](#).

### 3.2.1 NPA availability

**EGNOS NPA Availability** is defined as the percentage of samples in which the Horizontal Protection Level (HPL) is below the Alert Limit for NPA (HAL: 556m), computed over the total period.

The following figure provides NPA availability for the reported period, for combined GEO (understood as the use of corrections from any of both operational GEOs, switching between them in case a SIS outage longer than 3 seconds is observed):

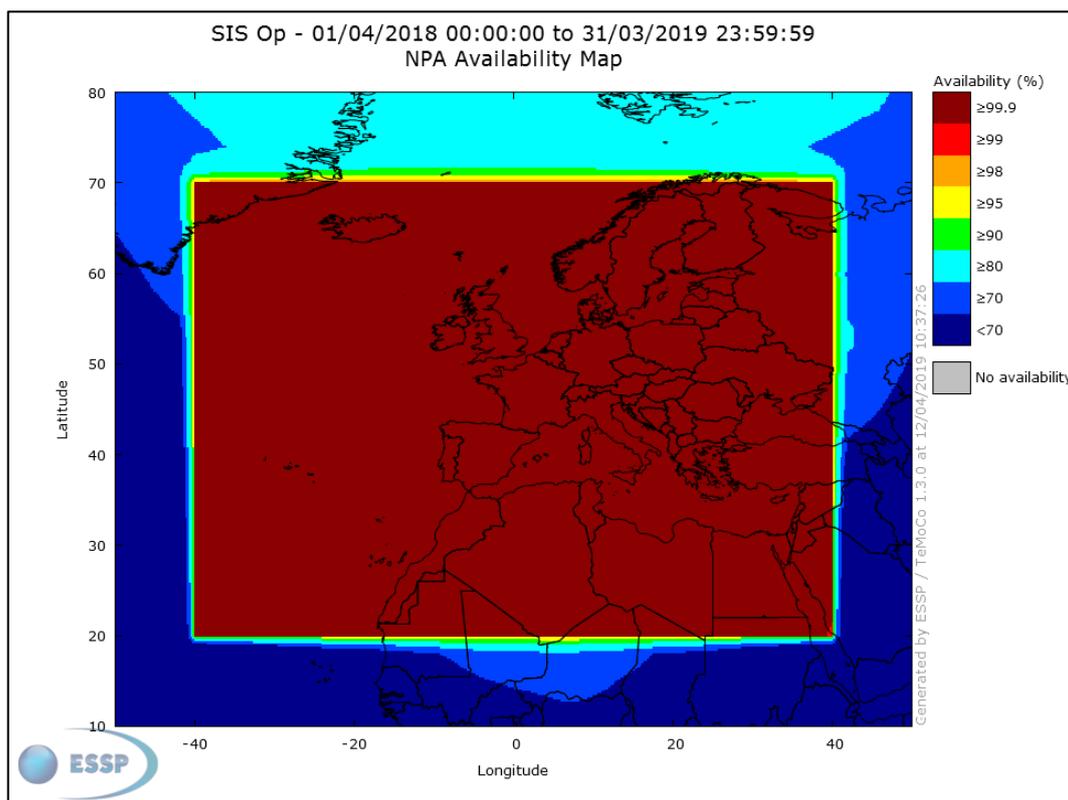


Figure 5: NPA Availability from 01/04/18 to 31/03/19

The NPA availability performance has been excellent during the reporting period: greater than 99.9% over the entire NPA Service Area<sup>1</sup>.

<sup>1</sup> NPA Service Area is the 99% NPA availability area depicted in Figure 2 coming from the [EGNOS Safety of Life SDD](#). It corresponds to the MT27 area.

### 3.2.2 NPA availability - Achievement against target

The combination of the 99% NPA Availability map and the NPA Service Area<sup>1</sup> is shown in the following figure. It should be noted that, thanks to the excellent NPA service performance, the same result would have been obtained taking the 99.9% availability target as the reference.

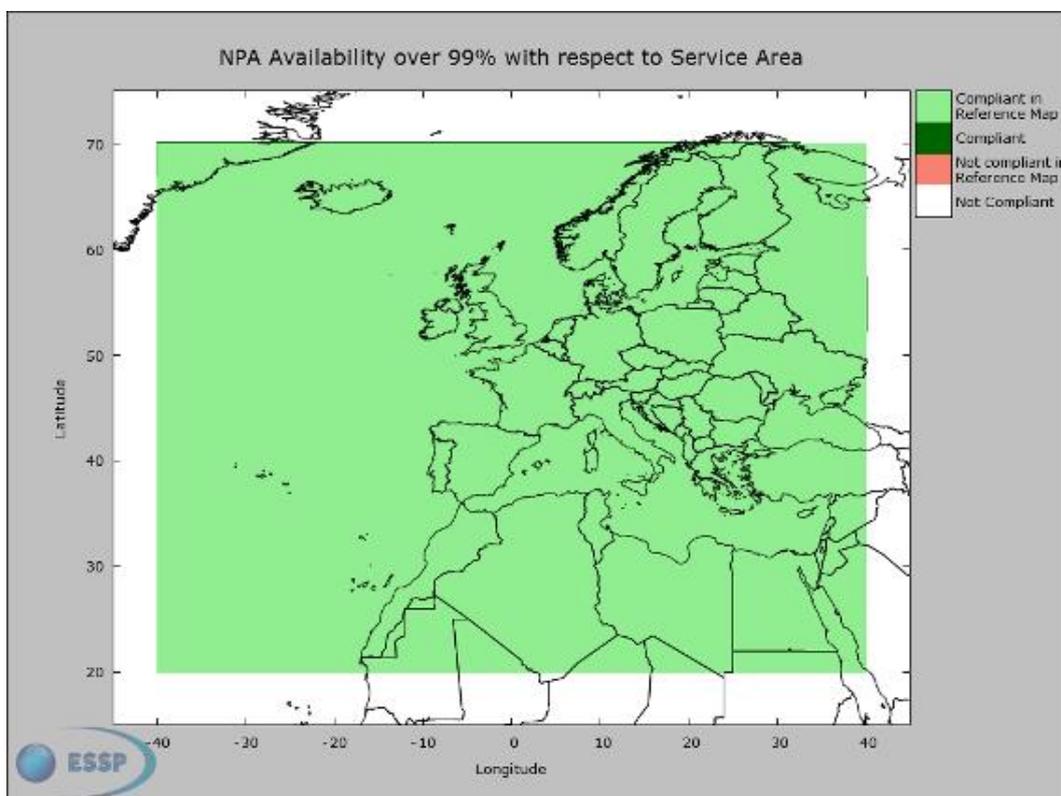


Figure 6: NPA Availability map with respect to the Service Area – 01/04/18 - 31/03/19

In the picture, the legend should be read as follows:

- **Compliant in Reference Map:** This is the part of the Service Area<sup>2</sup> where NPA availability was above 99%.
- **Compliant:** This is the zone out of the Service Area<sup>2</sup> where NPA availability was also above 99% (extension of coverage with respect to the commitment).
- **Not compliant in Reference Map:** This is the part of the Service Area<sup>2</sup> where NPA availability was lower than 99%.
- **Not compliant (white):** This is any other zone out of the Service Area<sup>2</sup> where NPA availability is lower than 99%.

As shown in the figure above, NPA availability was greater than 99% over the entire MT27 area for the reporting period.

Considering the applicable [Service Definition Document](#) map used as the reference, the percentage of points which were compliant with the commitment is **100%**. Note that the comparison with respect to the SDD SoL commitment map is included for information purposes. The commitment map is a monthly reference, while the reported period is one year. Therefore, this comparison must be interpreted with care.

<sup>2</sup> NPA Service Area is the 99% NPA availability area depicted in Figure 2 coming from the [EGNOS Safety of Life SDD](#). It corresponds to the MT27 area.

### 3.2.3 NPA availability - 99% daily compliance

The percentage of days over the reported period in which the daily NPA availability was over 99% is shown in the following figure.

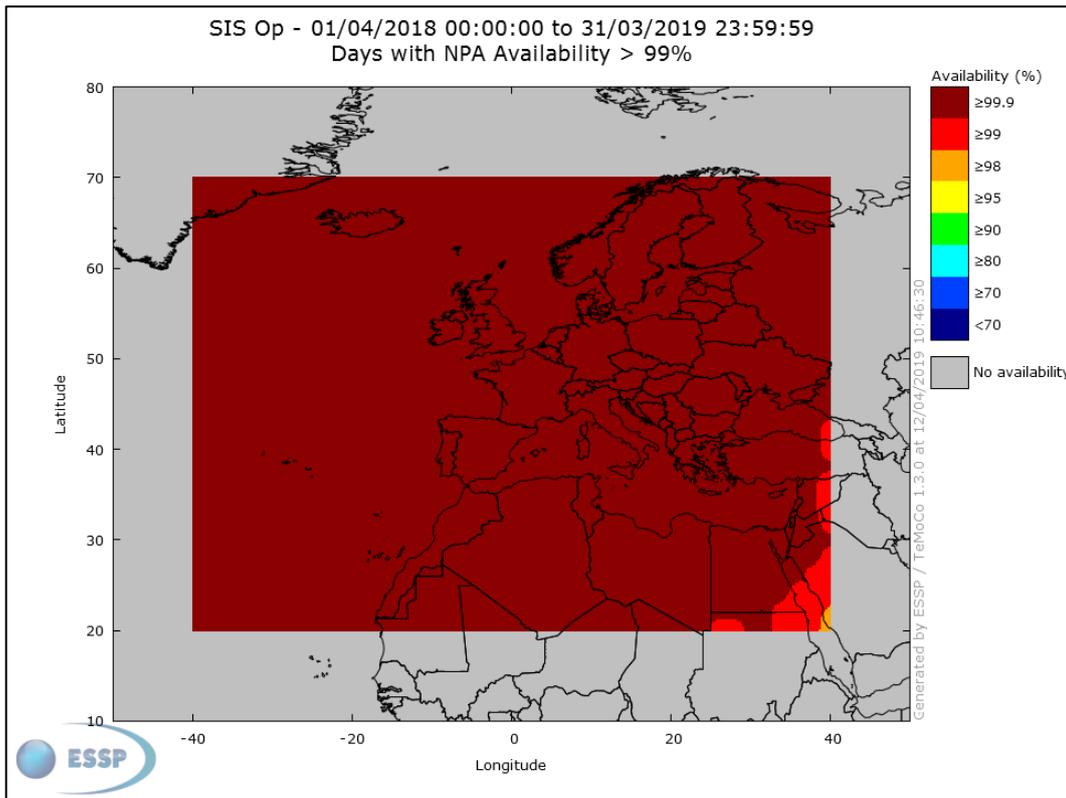


Figure 7: NPA Availability - Percentage of days with availability over 99% - 01/04/18 to 31/03/19<sup>3</sup>

As observed, the NPA daily availability was higher than 99.9% for the full period in the whole MT27 region except for a small area in the south-eastern corner.

<sup>3</sup> The grey colour is used to identify regions where no days with an NPA availability greater than 99% has been observed. This situation is observed in all regions outside the target EGNOS service area (defined by the boundaries of MT27).

### 3.2.4 NPA Integrity

**EGNOS NPA Integrity Event** is defined as an event in which the Navigation System Error is greater than or equal to the corresponding Protection Level for NPA.

The **Safety index** is defined as the Navigation System Error versus Protection Level ratio (assuming NPA algorithms to compute  $xNSE$  and  $xPL$ ) for each second. If the  $xNSE/xPL$  ratio is over 1, it indicates that a Misleading Information situation has occurred.

Table 3 shows the maximum HSI at each RIMS inside of the NPA Service Area (Figure 2).

Station	HSI	Station	HSI	Station	HSI
Aalborg	0.17	Egilsstadir	0.20	Palma de Mallorca	0.22
Abu Simbel	0.23	Gävle	0.21	Reykjavik	0.35
Agadir	0.27	Glasgow	0.17	Roma	0.19
Alexandria	0.21	Golbasi	0.24	S. de Compostela	0.50
Athens	0.23	Haifa	0.20	Sofia	0.25
Azores	0.20	Kirkenes	0.28	Swanwick	0.26
Berlin	0.22	La Palma	0.24	Toulouse	0.22
Canary Islands	0.32	Lappeenranta	0.32	Tromsoe	0.20
Catania	0.26	Lisbon	0.30	Trondheim	0.27
Cork	0.18	Madeira	0.28	Warsaw	0.20
Djerba	0.22	Malaga	0.27	Zürich	0.22

Table 3: NPA Safety Index (maximum) at reference stations

None of the RIMS stations inside the SDD commitment area has been impacted by integrity events in the position domain during the analysed period.



*EGNOS RIMS Lappeenranta (Finland)*

The following figure provides the histogram for HSI (Horizontal Safety Index) collecting measurements from the different EGNOS stations and for both operational GEOs over the entire period.

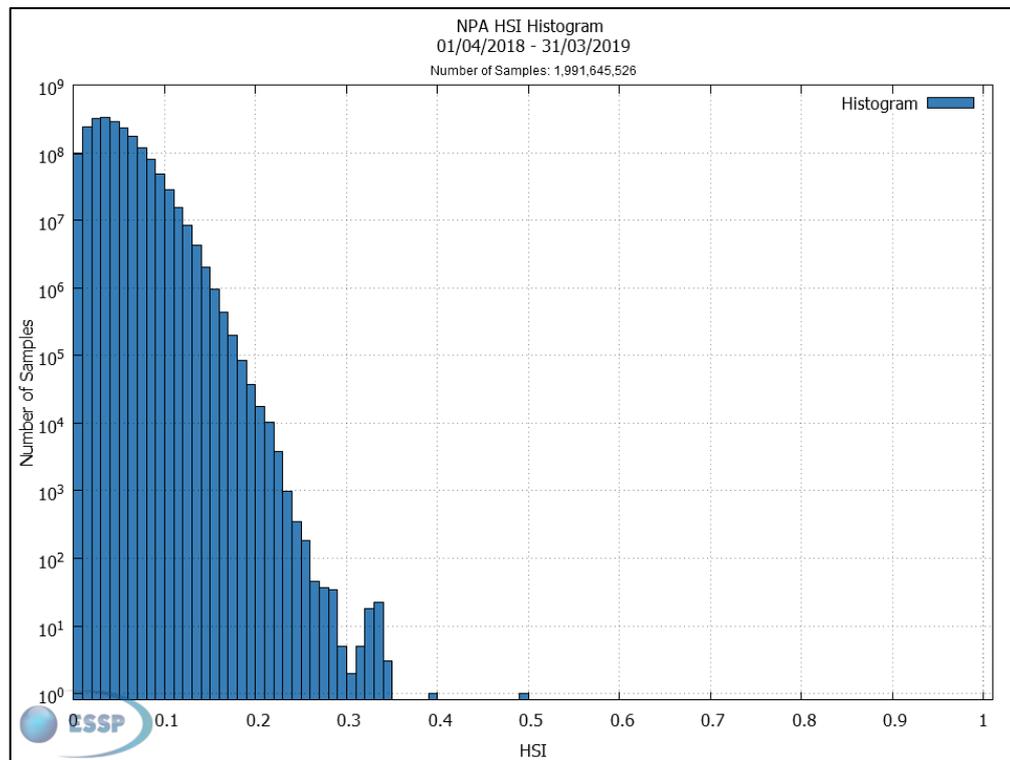


Figure 8: NPA Horizontal Safety Index<sup>4</sup>

<sup>4</sup> Note that for the computation of the different histograms presented in this document, some periods may have been removed, corresponding to stations presenting bad quality of data linked to local environment. Data removed from histograms correspond to data from RIMS in which any OR affecting data quality has been observed or presence of cycle slips affecting performance is detected or other data quality issues have been traced as cause of daily degradations.

### 3.2.5 NPA Continuity

*EGNOS NPA Continuity is computed by dividing the total number of single continuity events, using a time-sliding window of 1 hour, by the number of samples with valid and available NPA navigation solution. A single continuity event occurs if the system is available at the start of the operation and, in at least one second within the following time-sliding window of 1 hour, the system becomes unavailable.*

The following figure shows the NPA Continuity Risk obtained for the GEO combined over the entire analysed period.

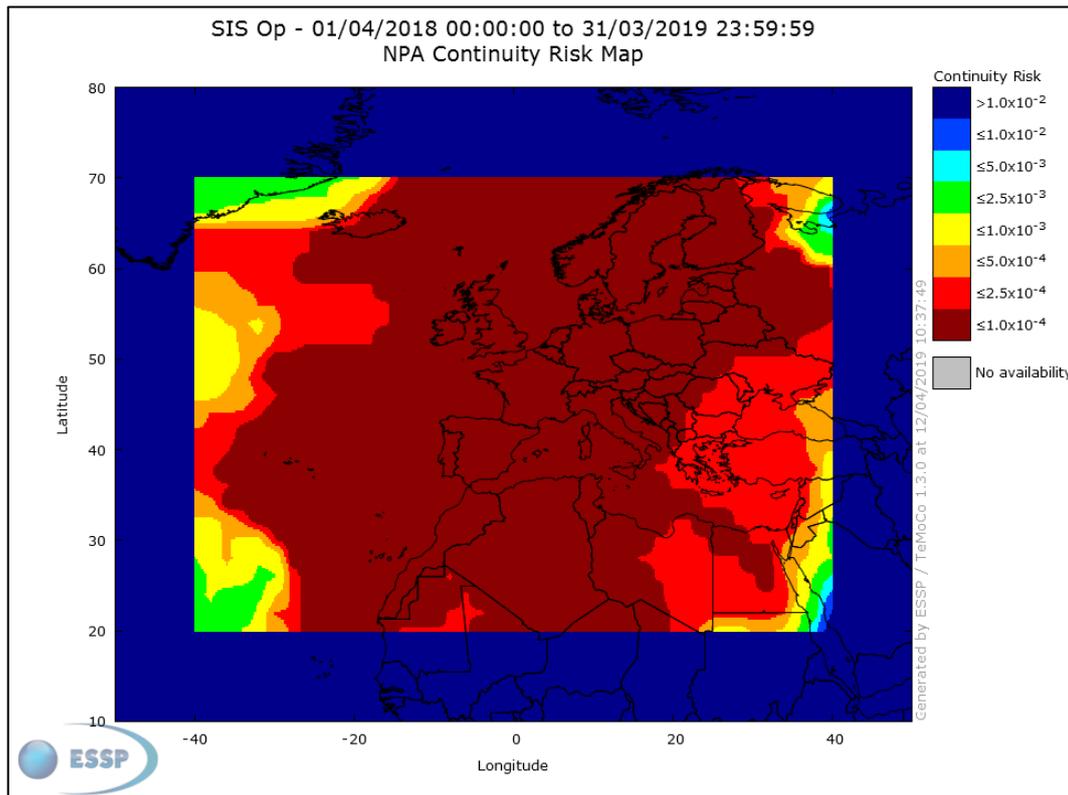


Figure 9: NPA Continuity Risk from 01/04/18 to 31/03/19

As shown in the previous figure, most of the MT27 Service Area presents a continuity risk lower than  $2.5 \cdot 10^{-4}$ , with the exception of the corners where the performance achieved is slightly worse, mainly due to the lower number of satellites monitored from these regions.

### 3.3 SoL Service - Approach with Vertical guidance (APV-I)

The following figures depict the minimum performance that can be expected from EGNOS for Approach with Vertical guidance (APV-I) availability and continuity, as defined in the [EGNOS SoL Service Definition Document](#). A new SDD was published on 28/09/2018. Therefore, the commitment maps changed at that time. The applicable versions of the SoL SDD during the reported period were:

- v3.1 until September 2018 (included).
- v3.2 from October to March 2019.

Also, please note that the current applicable EGNOS SoL SDD version (v3.3), which includes the extension of the service area to 72° north, was published on 26 March 2019 and is not considered for the reported period (which ends by 31 March 2019).

These values correspond to the expected minimum performance measured by a fault-free receiver using all satellites in view, when averaging over a period of one month, using all the operational EGNOS GEOs.

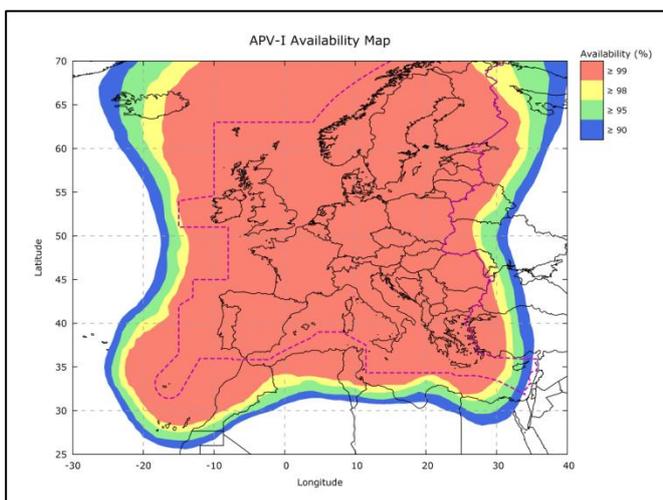


Figure 10: APV-I Availability map - Expected minimum performance – SoL SDD v3.1

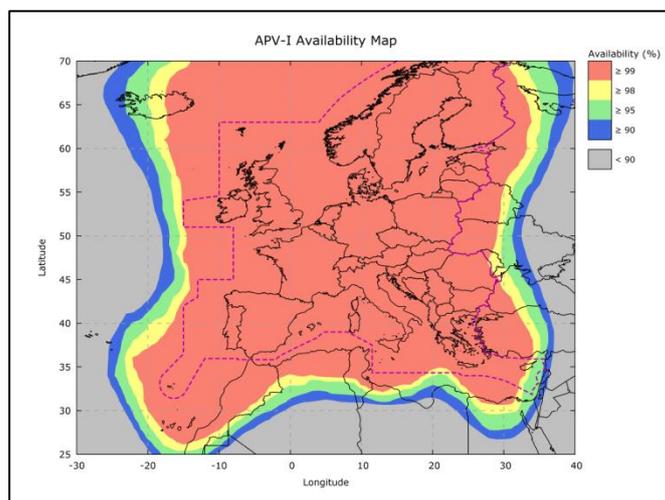


Figure 11: APV-I Availability map - Expected minimum performance – SoL SDD v3.2 (published on 28/09/2018)

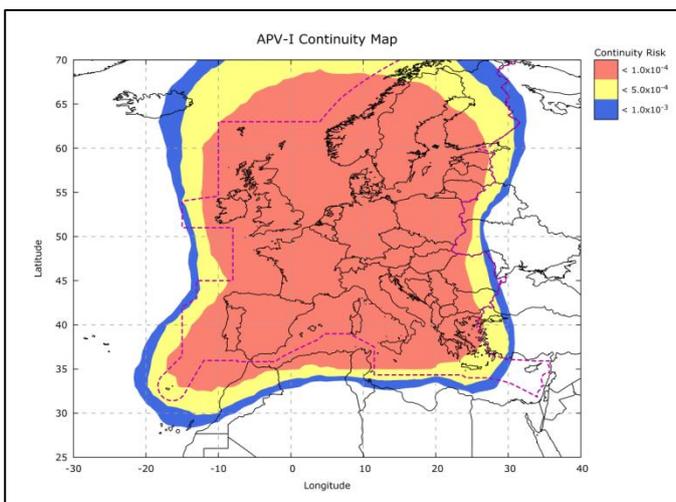


Figure 12: APV-I Continuity map - Expected minimum performance – SoL SDD v3.1

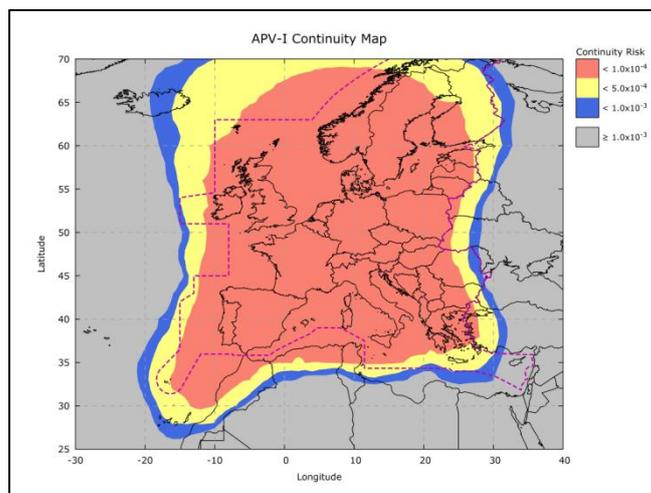


Figure 13: APV-I Continuity map - Expected minimum performance – SoL SDD v3.2 (published on 28/09/2018)

Achieved APV-I performance during the reporting period is reported below. Additionally, APV-I performance is reported through the EGNOS Monthly Performance reports, available on the [EGNOS User Support website](#).

### 3.3.1 APV-I availability

**EGNOS APV-I Availability** is defined as the percentage of epochs in the period in which the Protection Level (both HPL and VPL) is below Alert Limits for this APV-I service (HAL: 40m; VAL: 50m) over the total period.

The following figure provides, for the combination of the operational GEOs, the GEO APV-I availability for the reported period:

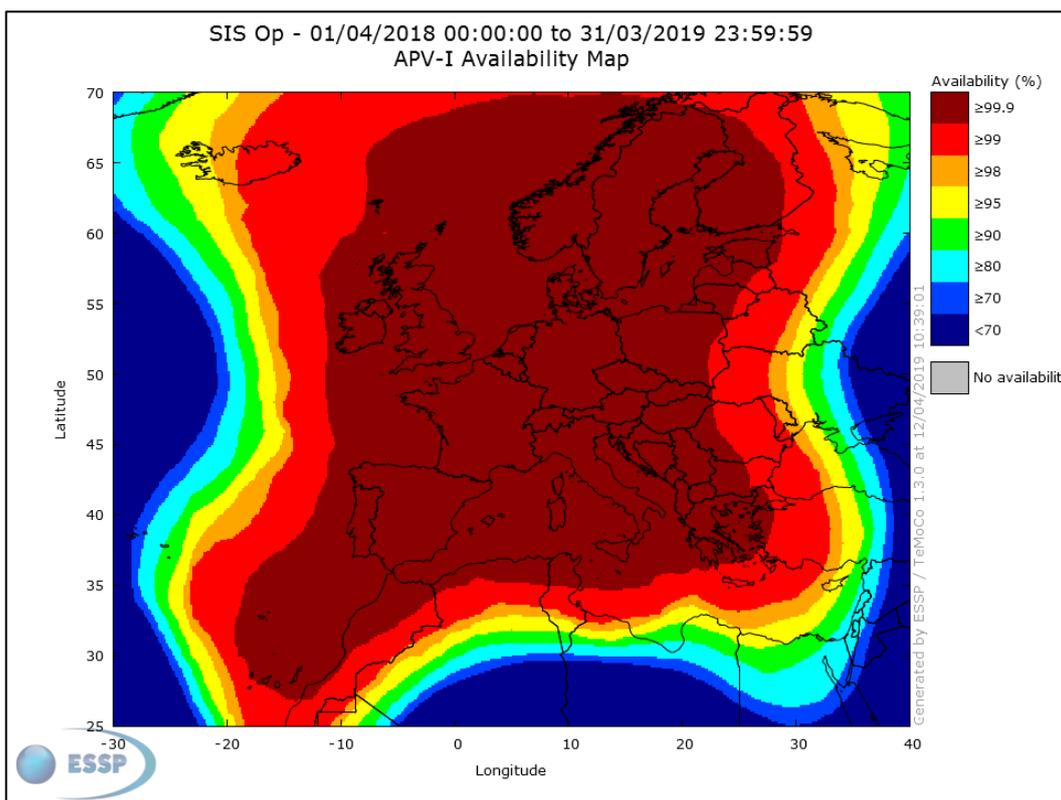


Figure 14: APV-I Availability from 01/04/18 to 31/03/19

The APV-I availability performance has been excellent during the reporting period: greater than 99% over the entire 99% APV-I Service Area<sup>5</sup> with deviations observed only in the Southeast and some small regions in the East and Northeast.

<sup>5</sup> 99% APV-I Service Area is the 99% APV-I availability area depicted in Figure 11 obtained from the [EGNOS Safety of Life SDD](#).

### 3.3.2 APV-I availability - Achievement against target<sup>6</sup>

The combination of the 99% APV-I Availability map and the 99% APV-I Service Area<sup>7</sup> gives the following:

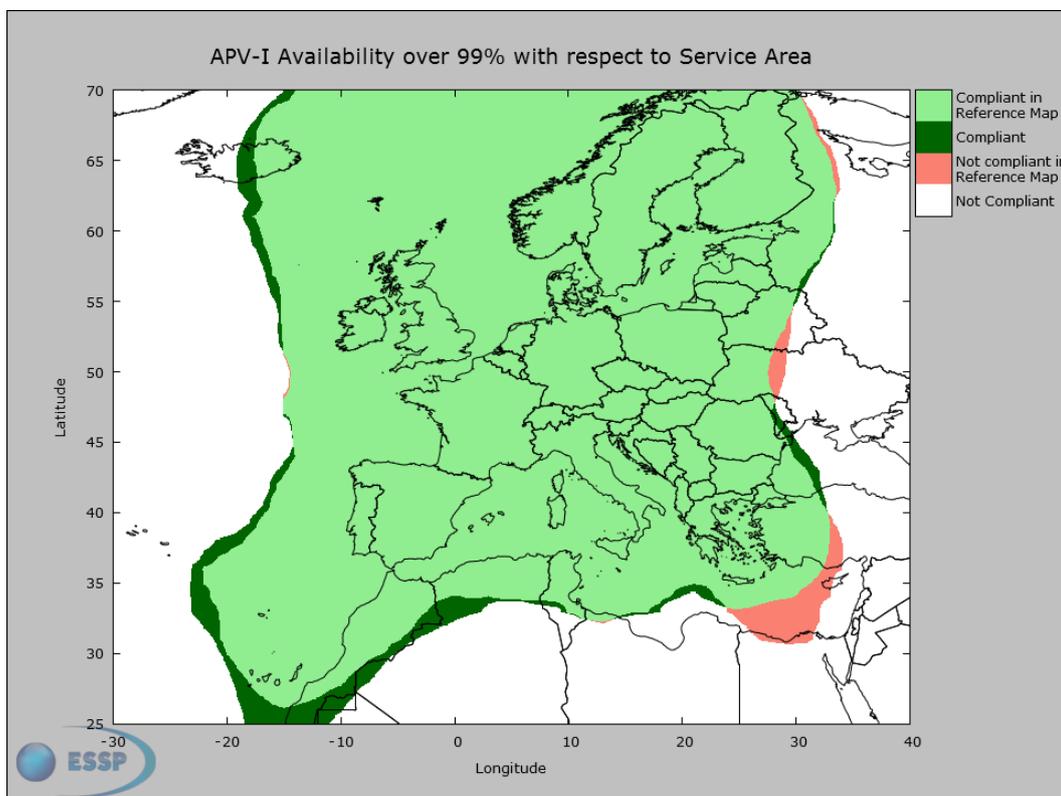


Figure 15: APV-I 99% Availability map with respect to the 99% APV-I Service Area<sup>7</sup> - 01/04/18 to 31/03/19

In the picture, the legend should be read as follows:

- **Compliant in Reference Map:** This is the part of the Service Area<sup>7</sup> where APV-I availability was above 99%.
- **Compliant:** This is the zone out of the Service Area<sup>7</sup> where APV-I availability was also above 99% (extension of coverage with respect to the commitment).
- **Not compliant in Reference Map:** This is the part of the Service Area<sup>7</sup> where APV-I availability was lower than 99%.
- **Not compliant (white):** This is any other zone out of the Service Area<sup>7</sup> where APV-I availability is lower than 99%.

The percentage of points that were compliant with the 99% APV-I Service Area<sup>7</sup> is **98.02%**. Just an area in the Southeast and some small regions in the East and Northeast present some underperformance. Focusing on the Southeast of the Service area, the reduced coverage in this region was mainly due to occasional data quality issues affecting some of the stations in the region<sup>8</sup> and some losses of the monitoring of GPS satellites (lack of visibility from the EGNOS stations network and/or changes in the GPS constellation).

<sup>6</sup> Service Area used as reference corresponds to the one presented in the EGNOS Safety of Life SDD v3.2.

<sup>7</sup> 99% APV-I Service Area is the 99% APV-I availability area depicted in Figure 11 obtained from the [EGNOS Safety of Life SDD](#)

<sup>8</sup> These events may occur from time to time mostly due to environmental/local conditions. The degradation typically lasts two or three days over a month.

Note that the comparison with respect to the SDD SoL commitment map is included for information purposes. The commitment map is a monthly reference, while the reported period is one year and, therefore, this comparison must be interpreted with care.

### 3.3.3 APV-I availability - 99% daily compliance

The percentage of days over the reported period in which the daily APV-I availability was over 99% is shown in the following figure.

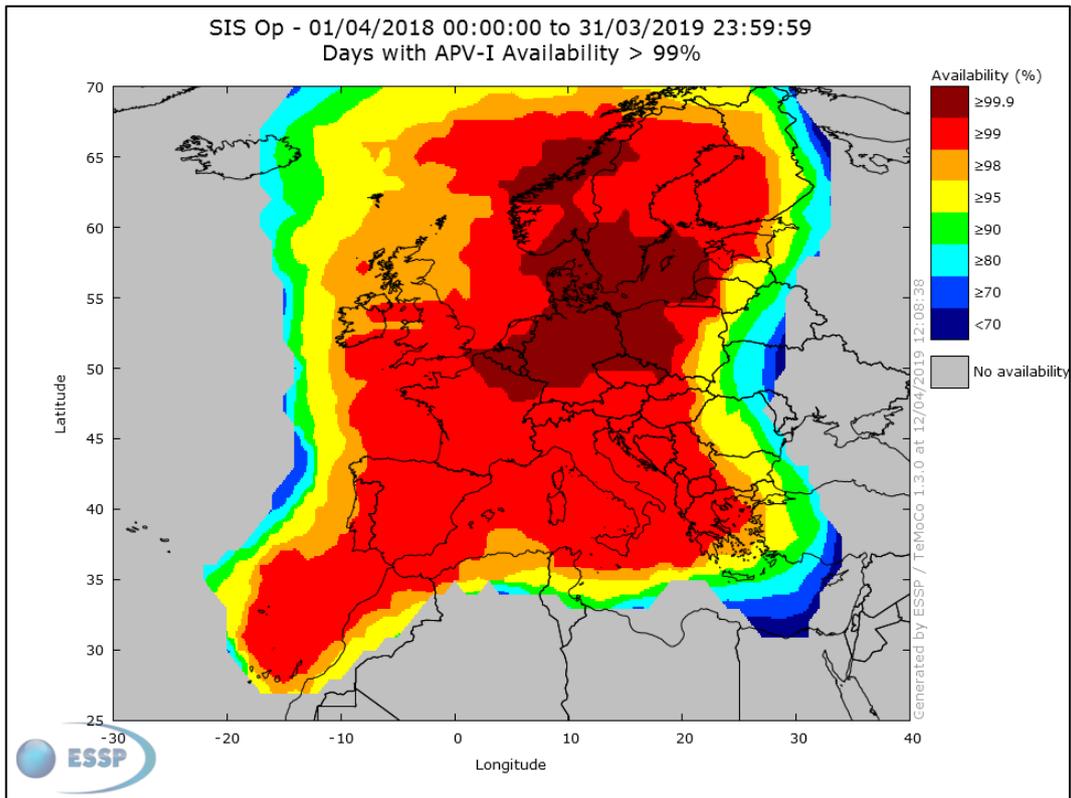


Figure 16: APV-I Availability – Percentage of days with availability over 99% - 01/04/17 to 31/03/18<sup>9</sup>

The previous figure shows that the APV-I Availability was higher than 99%:

- 99% of the days in 46.44% of the 99% APV-I Service Area.
- 95% of the days in 77.57% of the 99% APV-I Service Area.

<sup>9</sup> The grey colour is used to identify regions where the daily APV-I availability has always been below 99%.

The following figure shows the annual APV-I availability compliance with respect to the target at the airports with published EGNOS-based operations:

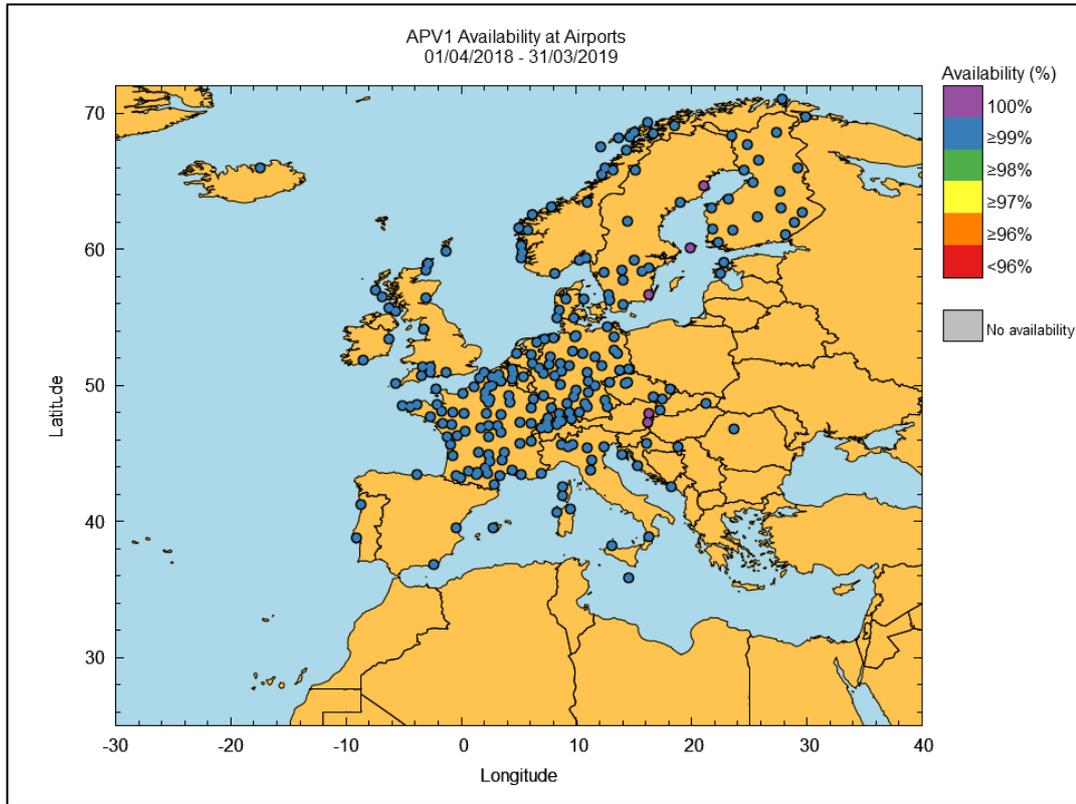


Figure 17: Annual APV-I Availability compliance at airports with published EGNOS-based operations

Moreover, the monthly APV-I service availability was greater than 99% during the entire reporting period at all airports with EGNOS-based operations, apart from Kirkenes (ENKR) airport in March and August 2018 (98.86% and 98.80% respectively).

For additional information, please refer to the corresponding [Monthly Performance Reports](#).



*LPV approved Jetstream 32 from Eagle Air (Credit: Eagle Air)*

### 3.3.4 APV-I Integrity events

**EGNOS APV-I Integrity Event** is defined as an event in which the Navigation System Error is greater than or equal to the corresponding Protection Level for APV-I.

No integrity events were detected.

The **Safety Index** is defined as the Navigation System Error versus Protection Level ratio (assuming PA algorithms to compute  $xNSE$  and  $xPL$ ) for each second. If the  $xPE/xPL$  ratio is over 1, it indicates that a Misleading Information situation has occurred.

Table 4 shows the maximum HSI and VSI at each RIMS inside of the APV-I Service Area (see Figure 10 and Figure 11). Moreover, Stanford plots are available on the [EGNOS User Support Website](#).

Station	HSI	VSI	Station	HSI	VSI
Agadir	0.28	0.26	La Palma	0.33	0.25
Aalborg	0.21	0.25	Lisbon	0.31	0.26
Alexandria	0.24	0.26	Madeira	0.29	0.27
Athens	0.20	0.23	Malaga	0.28	0.25
Berlin	0.22	0.24	Palma de Mallorca	0.23	0.22
Canary Islands	0.33	0.33	Reykjavik	0.39	0.51
Catania	0.27	0.38	Roma	0.20	0.21
Cork	0.18	0.21	S. de Compostela	0.32	0.20
Djerba	0.23	0.21	Sofia	0.26	0.43
Egilsstadir	0.21	0.31	Swanwick	0.27	0.28
Gävle	0.21	0.25	Toulouse	0.22	0.22
Haifa	0.17	0.21	Tromsoe	0.21	0.24
Glasgow	0.24	0.27	Trondheim	0.27	0.32
Golbasi	0.20	0.22	Warsaw	0.21	0.25
Kirkenes	0.29	0.27	Zürich	0.21	0.28
Lappeenranta	0.25	0.30			

Table 4: EGNOS APV-I Safety Index (maximum) at reference stations

The following figures provide the histogram for HSI (Horizontal Safety Index) and VSI (Vertical Safety Index) for each second when collecting measurements from the different EGNOS stations and for both operational GEOs over the reported period.

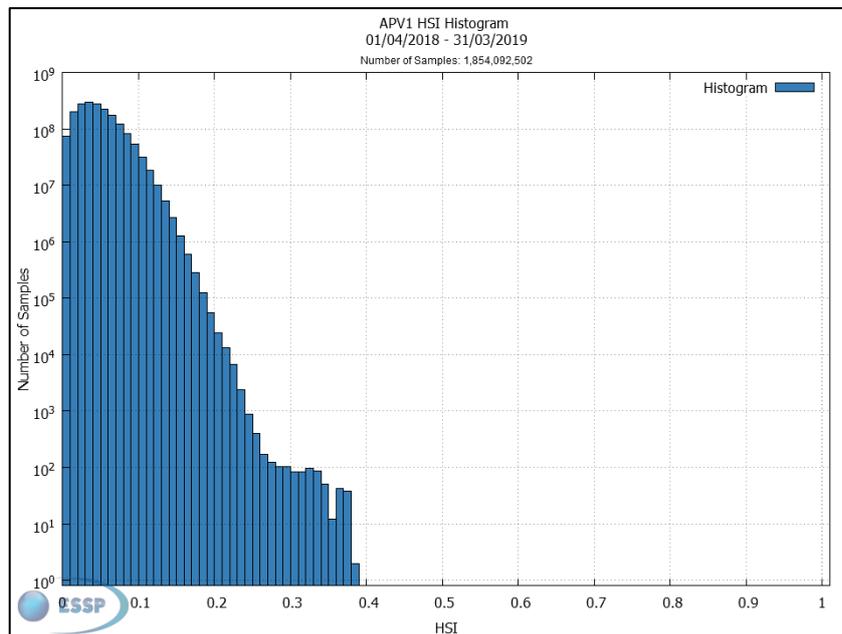


Figure 18: EGNOS APV-I Horizontal Safety Index<sup>10</sup>

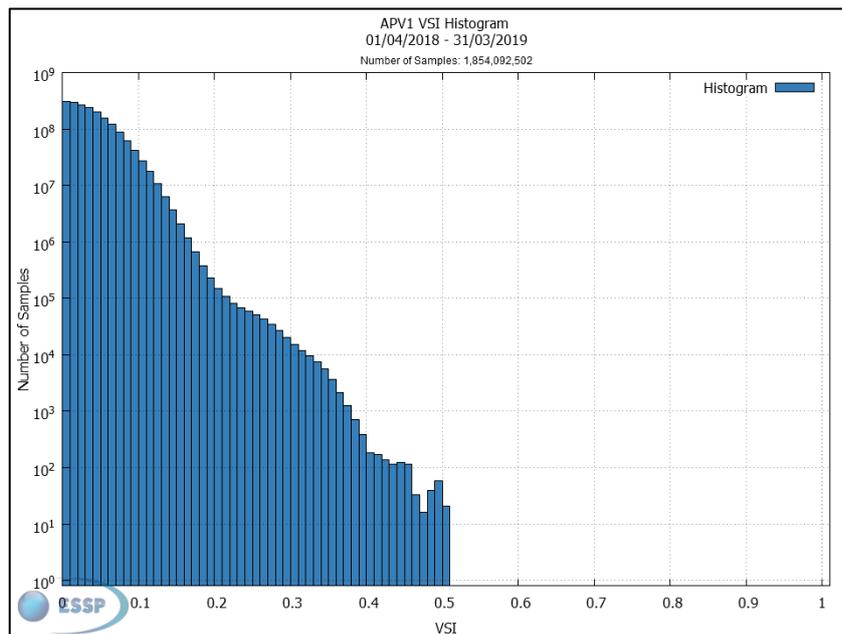


Figure 19: EGNOS APV-I Vertical Safety Index<sup>10</sup>

Previous figures show that the horizontal and vertical safety index for APV-I remained below 0.39 and 0.51 respectively for all stations, which represents a particularly good safety margin.

<sup>10</sup> Note that for the computation of the different histograms presented in this document, some periods may have been removed, corresponding to stations presenting bad quality of data linked to local environment. Data removed from histograms correspond to data from RIMS in which any OR affecting data quality has been observed or presence of cycle slips affecting performance is detected or other data quality issues have been traced as cause of daily degradations.

### 3.3.5 APV-I Continuity risk

*EGNOS APV-I Continuity Risk is defined as the result of dividing the total number of single continuity events, using a time-sliding window of 15 seconds, by the number of samples with a valid and available APV-I navigation solution. A single continuity break occurs if the system is available at the start of the operation and becomes unavailable during one of the following 15 seconds.*

The following figure provides the GEO combined APV-I continuity risk for the reported period:

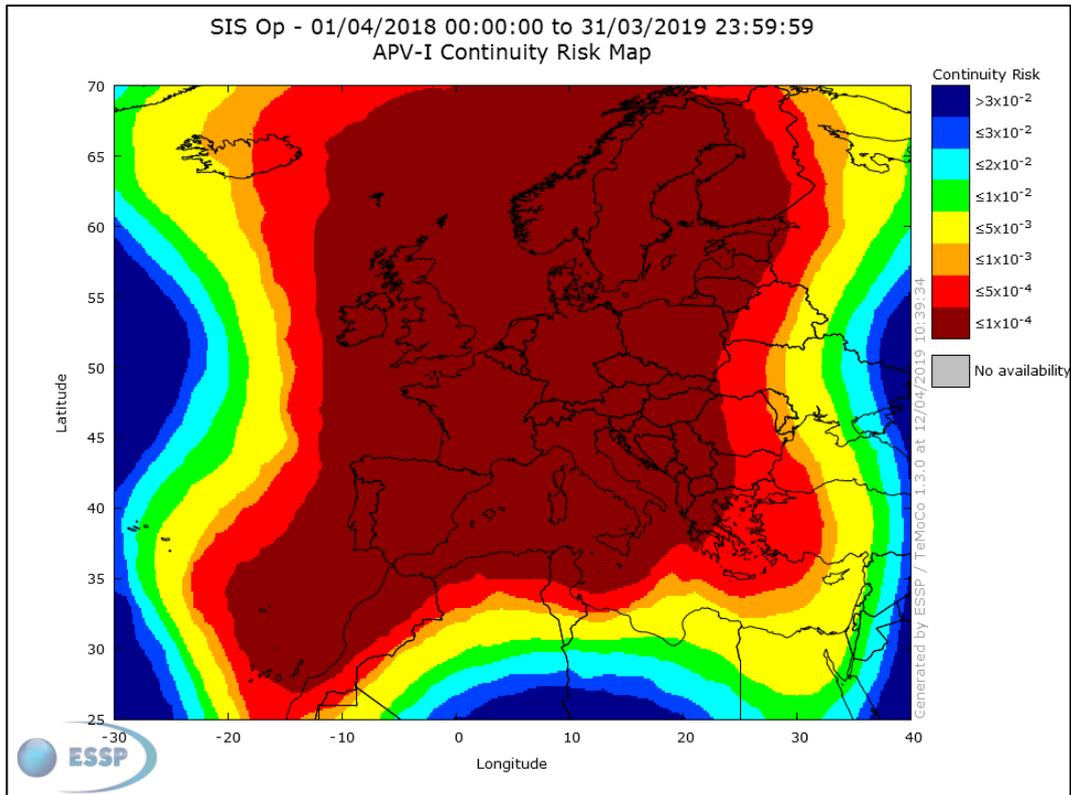


Figure 20: APV-I Continuity Risk from 01/04/18 to 31/03/19

The APV-I continuity performance has been excellent during the reporting period: lower than  $5 \cdot 10^{-4}$  over almost the entire  $5 \cdot 10^{-4}$  APV-I Service Area<sup>11</sup> with only minor deviations observed in the West and Southeast.

<sup>11</sup>  $5 \cdot 10^{-4}$  APV-I Service Area is the  $5 \cdot 10^{-4}$  APV-I continuity risk area depicted in Figure 13 obtained from the [EGNOS Safety of Life SDD](#).

### 3.3.6 APV-I Continuity - Achievement against target<sup>12</sup>

The combination of the  $5 \cdot 10^{-4}$  APV-I Continuity Risk map and the  $5 \cdot 10^{-4}$  APV-I Service Area<sup>13</sup> gives the following:

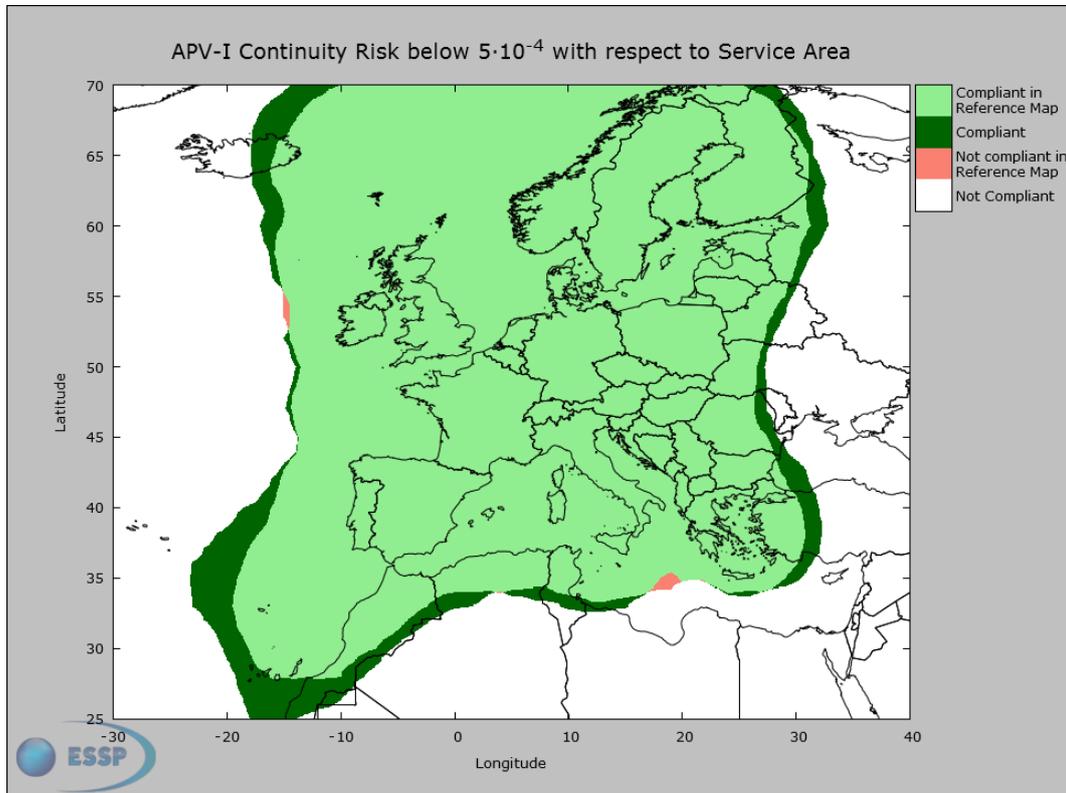


Figure 21: APV-I Continuity Risk ( $5 \cdot 10^{-4}$ ) map with respect to the  $5 \cdot 10^{-4}$  APV-I Service Area<sup>13</sup> - 01/04/18 to 31/03/19

In the picture, the legend should be read as follows:

- **Compliant in Reference Map:** This is the part of the Service Area<sup>13</sup> where APV-I continuity was above  $5 \cdot 10^{-4}$ .
- **Compliant:** This is the zone out of the Service Area<sup>13</sup> where APV-I continuity was also above  $5 \cdot 10^{-4}$  (extension of coverage with respect to the commitment).
- **Not compliant in Reference Map:** This is the part of the Service Area<sup>13</sup> where APV-I continuity was lower than  $5 \cdot 10^{-4}$ .
- **Not compliant (white):** This is any other zone out of the Service Area<sup>13</sup> where APV-I continuity is lower than  $5 \cdot 10^{-4}$ .

Considering the SDD v3.2 map used as the reference the percentage of points which were compliant with the  $5 \cdot 10^{-4}$  APV-I Service Area ( $5 \cdot 10^{-4}/15\text{sec}$ ) is **99.82%**. Note that the comparison with respect to the SDD SoL commitment map is included for information. The commitment map is a monthly reference while the reported period is one year and, therefore, this comparison must be interpreted with care.

<sup>12</sup> Service Area used as reference corresponds to the one presented in the EGNOS Safety of Life SDD 3.2.

<sup>13</sup>  $5 \cdot 10^{-4}$  APV-I Service Area is the  $5 \cdot 10^{-4}$  APV-I continuity risk area depicted in Figure 13 obtained from the [EGNOS Safety of Life SDD](#).

### 3.4 SoL Service - EGNOS Localizer Performance with Vertical guidance to a decision altitude of 200 FT (LPV-200)

The following figures depict the minimum performance that can be expected from EGNOS for LPV-200 availability and continuity, as defined in the [EGNOS SoL Service Definition Document](#). A new SDD was published on 28/09/2018. Therefore, the commitment maps changed at that time. The applicable versions of the SoL SDD during the reported period were:

- v3.1 until September 2018 (included).
- v3.2 from October to March 2019. This version included a very relevant extension of the LPV-200 service area towards the North (see Figure 23 and Figure 24).

Also, please note that the current applicable EGNOS SoL SDD version (v3.3), which includes the extension of the service area to 72° north, was published on 26 March 2019 and is not considered for the reported period (which ends by 31 March 2019).

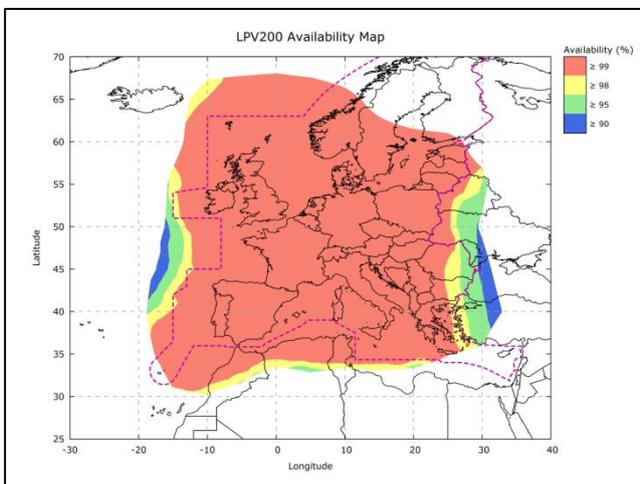


Figure 22: LPV-200 Availability map - Expected minimum performance – SoL SDD v3.1

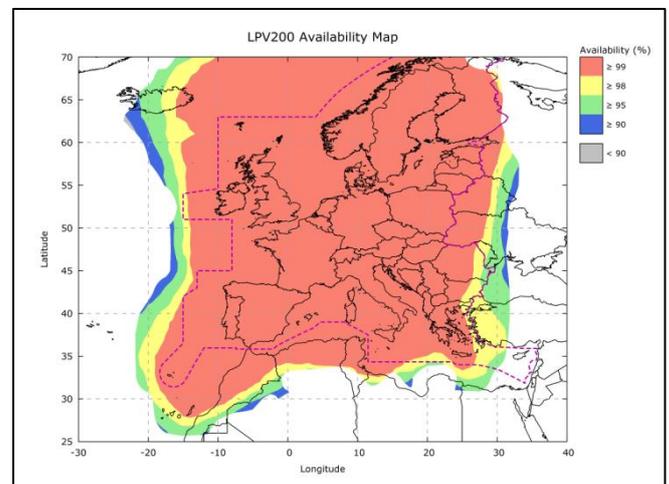


Figure 23: LPV-200 Availability map - Expected minimum performance – SoL SDD v3.2 (published on 28/09/2018)

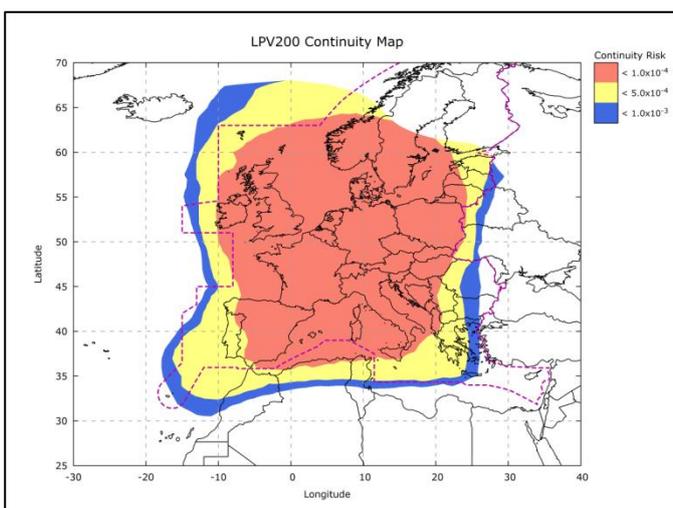


Figure 24: LPV-200 Continuity map - Expected minimum performance – SoL SDD v3.1

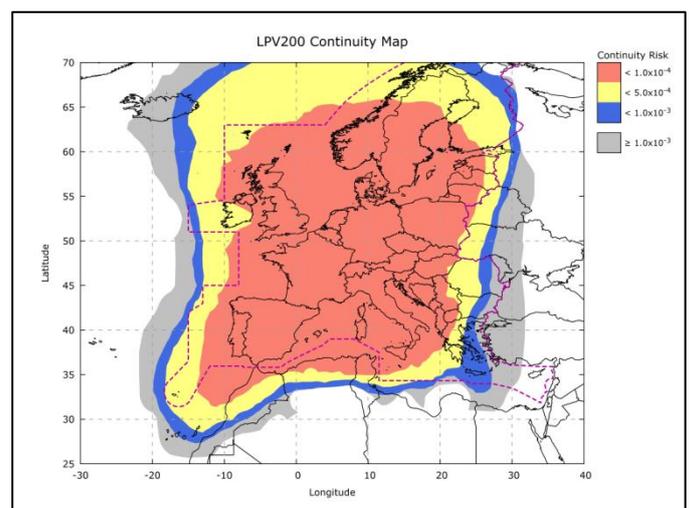


Figure 25: LPV-200 Continuity map - Expected minimum performance – SoL SDD v3.2 (published on 28/09/2018)

These values correspond to the expected average performance measured by a fault-free receiver using all GPS satellites in view over a period of one month, using all the operational EGNOS GEOs.

LPV-200 performance achieved during the reporting period is reported below. Additionally, LPV-200 performance is reported through the EGNOS Monthly Performance reports, available on the [EGNOS User Support website](#).

### 3.4.1 LPV-200 availability

*EGNOS LPV-200 Availability is defined as the percentage of epochs in the period in which the Protection Level (both HPL and VPL) is below Alert Limits for this LPV-200 service (HAL: 40m; VAL: 35m) over the total period.*

The following figure provides, for the combination of the operational GEOs, the LPV-200 availability for the period from April 2018 to March 2019:

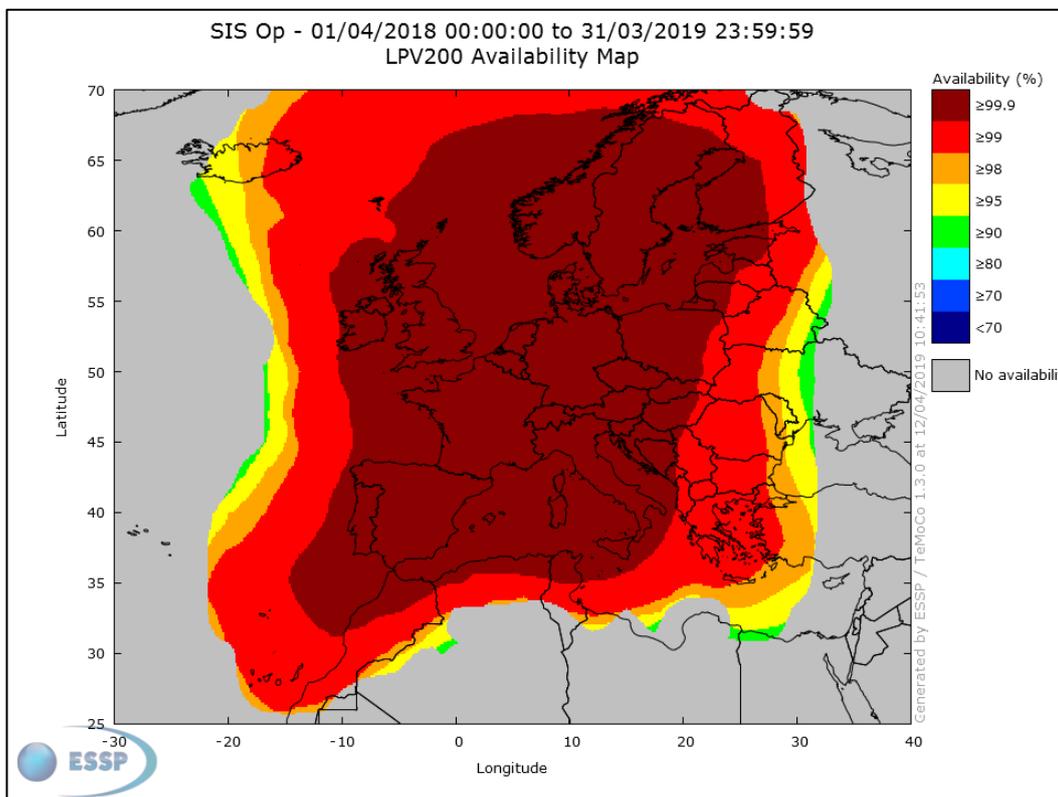


Figure 26: LPV-200 Availability from 01/04/18 to 31/03/19

LPV-200 availability performance over the Service Area has been excellent during the reporting period: greater than 99% over the entire LPV-200 99% Service Area<sup>14</sup> except for two regions in the Southwest and East.

<sup>14</sup> 99% LPV-200 Service Area is the 99% LPV-200 availability area depicted in Figure 23 obtained from the [EGNOS Safety of Life SDD](#).

### 3.4.2 LPV-200 availability - Achievement against target<sup>15</sup>

The combination of the 99% LPV-200 Availability map and the 99% LPV-200 Service Area<sup>16</sup> gives the following:

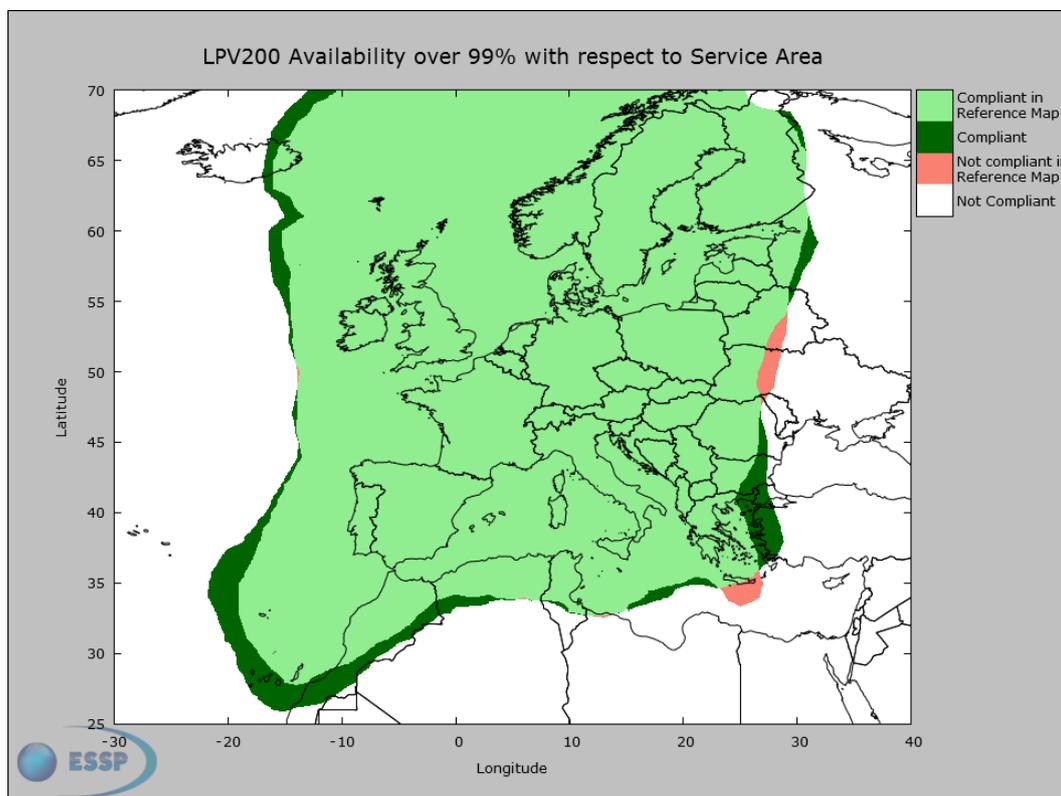


Figure 27: LPV-200 Availability map with respect to the Service Area<sup>16</sup> - 01/04/18 to 31/03/19

In the picture, the legend should be read as follows:

- **Compliant in Reference Map**: This is the part of the Service Area<sup>16</sup> where LPV-200 availability was above 99%.
- **Compliant**: This is the zone out of the Service Area<sup>16</sup> where LPV-200 availability was also above 99% (extension of coverage with respect to the commitment).
- **Not compliant in Reference Map**: This is the part of the Service Area<sup>16</sup> where LPV-200 availability was lower than 99%.
- **Not compliant (white)**: This is any other zone out of the Service Area<sup>16</sup> where LPV-200 availability is lower than 99%.

Considering the applicable [Service Definition Document \(SDD\)](#) map as reference, the percentage of points which were compliant with the 99% LPV-200 Service Area<sup>16</sup> is **99.18%**. Only two small regions in the Southeast and East deviated from the SDD commitment for similar reasons to the ones explained in section 3.3.2.

Note that the comparison with respect to the SDD SoL commitment map is included for information. The commitment map is a monthly reference while the reported period is one year and, therefore, this comparison must be interpreted with care.

<sup>15</sup> Service Area used as reference corresponds to the one presented in the EGNOS Safety of Life SDD 3.2.

<sup>16</sup> 99% LPV-200 Service Area is the 99% LPV-200 availability area depicted in Figure 23 obtained from the [EGNOS Safety of Life SDD](#)

### 3.4.3 LPV-200 availability - 99% daily compliance

The percentage of days over the reported period in which the daily LPV-200 availability was over 99% is shown in the following figure.

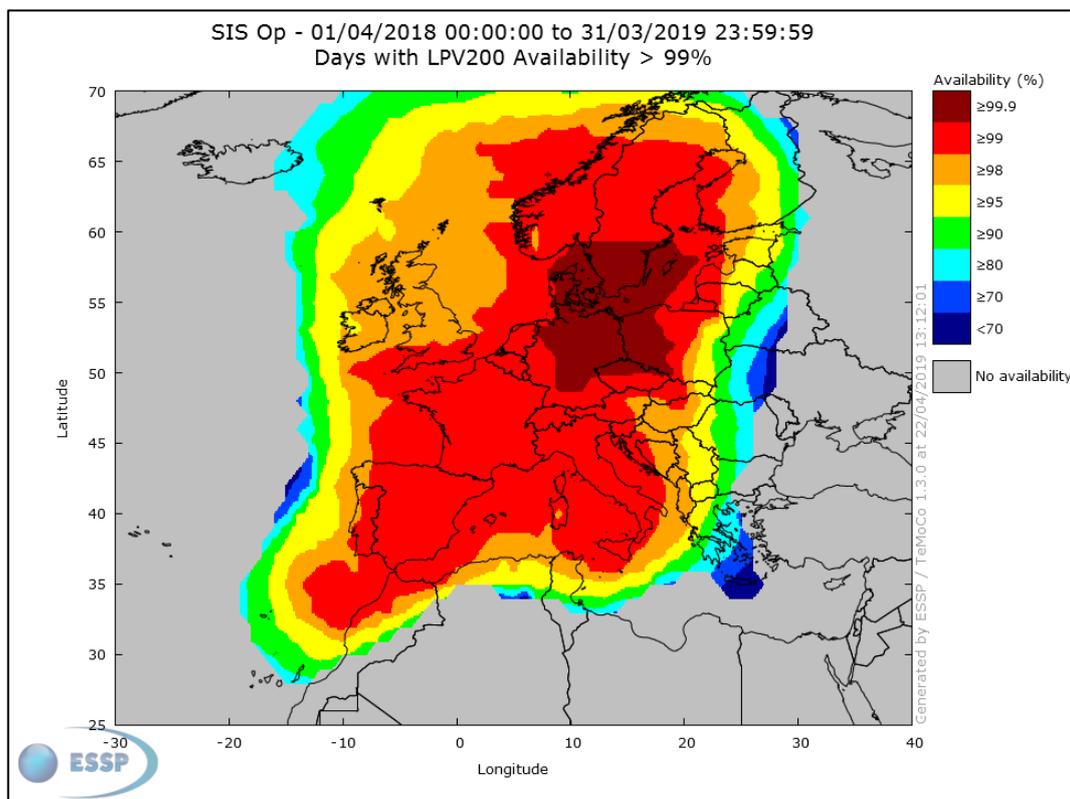


Figure 28: LPV-200 Availability – Percentage of days with availability over 99% - 01/04/17 to 31/03/18<sup>17</sup>

The previous figure indicates that the LPV-200 Availability was higher than 99%:

- 99% of the days in 42.63% of the 99% LPV-200 Service Area.
- 95% of the days in 79.71% of the 99% LPV-200 Service Area.

<sup>17</sup> The grey colour is used to identify regions where the daily LPV-200 availability has always been below 99% (note that all the grey area is outside the LPV-200 Service area as defined in the [EGNOS Safety of Life SDD](#)).

The following figure shows annual LPV-200 availability compliance with respect to the target at the airports with published EGNOS-based operations:

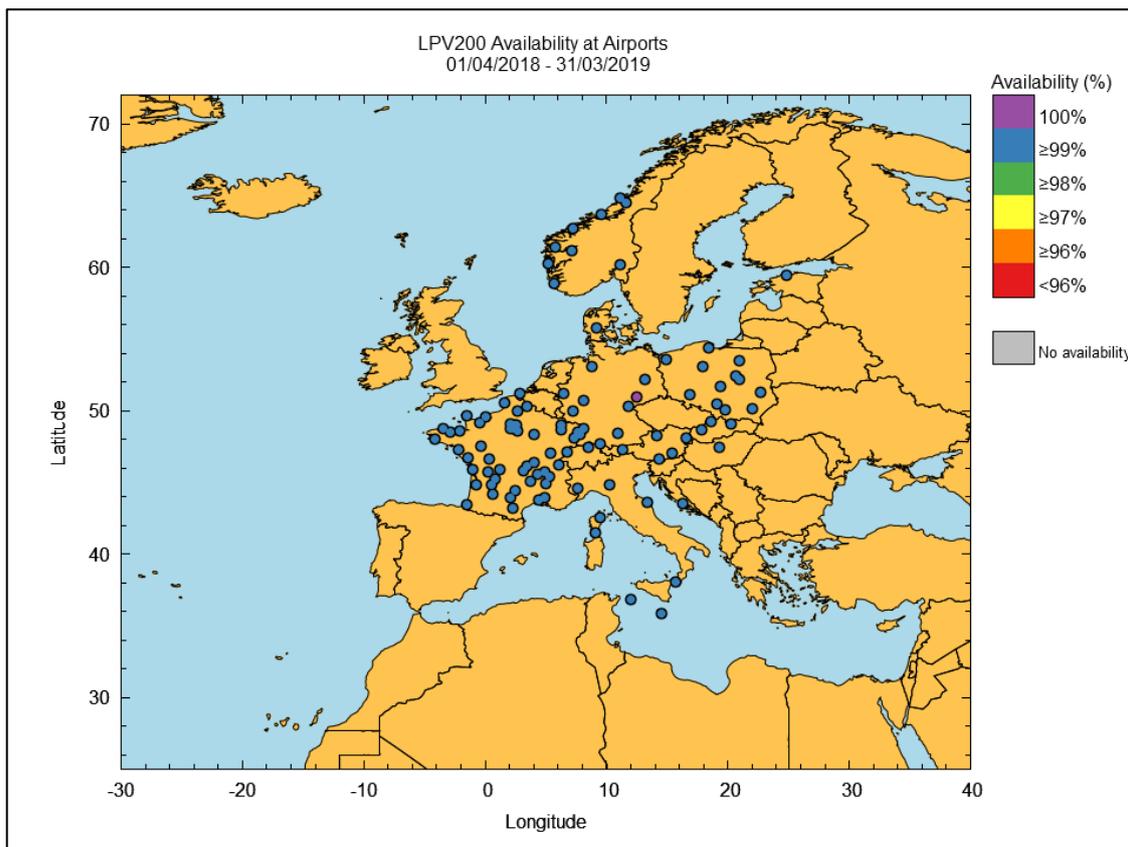


Figure 29: Annual LPV-200 Availability compliance at airports with published EGNOS-based operations

Moreover, the monthly LPV-200 service availability was higher than 99% during the whole reporting period at all airports with EGNOS-based operations.



Vienna Airport counts on 4 SBAS CAT-I (LPV-200) approaches (Credit: Vienna Airport)

### 3.4.4 LPV-200 Integrity events

**EGNOS LPV-200 Integrity Event** is defined as an event in which the Navigation System Error is greater than or equal to the corresponding Protection Level for LPV-200.

No integrity events were detected.

The **Safety Index** is defined as the Navigation System Error versus Protection Level ratio (assuming PA algorithms to compute  $xNSE$  and  $xPL$ ) for each second. If the  $xPE/xPL$  ratio is over 1, it indicates that a Misleading Information situation has occurred.

Table 5 shows the maximum HSI and VSI at each RIMS inside of the LPV-200 Service Area (see Figure 22 and Figure 23). Moreover, Stanford plots are available on the operations website ([http://egnoss-user-support.essp-sas.eu/egnoss\\_ops/index.php](http://egnoss-user-support.essp-sas.eu/egnoss_ops/index.php)).

Station	HSI	VSI	Station	HSI	VSI
Agadir	0.27	0.23	Madeira	0.26	0.27
Aalborg	0.21	0.25	Malaga	0.28	0.25
Athens	0.20	0.23	Palma de Mallorca	0.23	0.22
Berlin	0.22	0.24	Reykjavik	0.22	0.32
Canary Island	0.26	0.25	Roma	0.20	0.21
Cork	0.25	0.23	S. de Compostela	0.32	0.20
Catania	0.18	0.21	Sofia	0.26	0.43
Djerba	0.23	0.21	Swanwick	0.36	0.37
Egilsstadir	0.21	0.23	Toulouse	0.22	0.22
Glasgow	0.21	0.25	Trondheim	0.21	0.24
Gävle	0.24	0.27	Tromsø	0.25	0.31
Lappeenranta	0.21	0.22	Warsaw	0.21	0.25
La Palma	0.26	0.25	Zürich	0.28	0.28
Lisbon	0.31	0.26			

Table 5: EGNOS LPV-200 Safety Index (maximum) at reference stations

The following figures provide the histogram for HSI (Horizontal Safety Index) and VSI (Vertical Safety Index) for each second when collecting measurements from the different EGNOS stations and for both operational GEOs over the reported period.

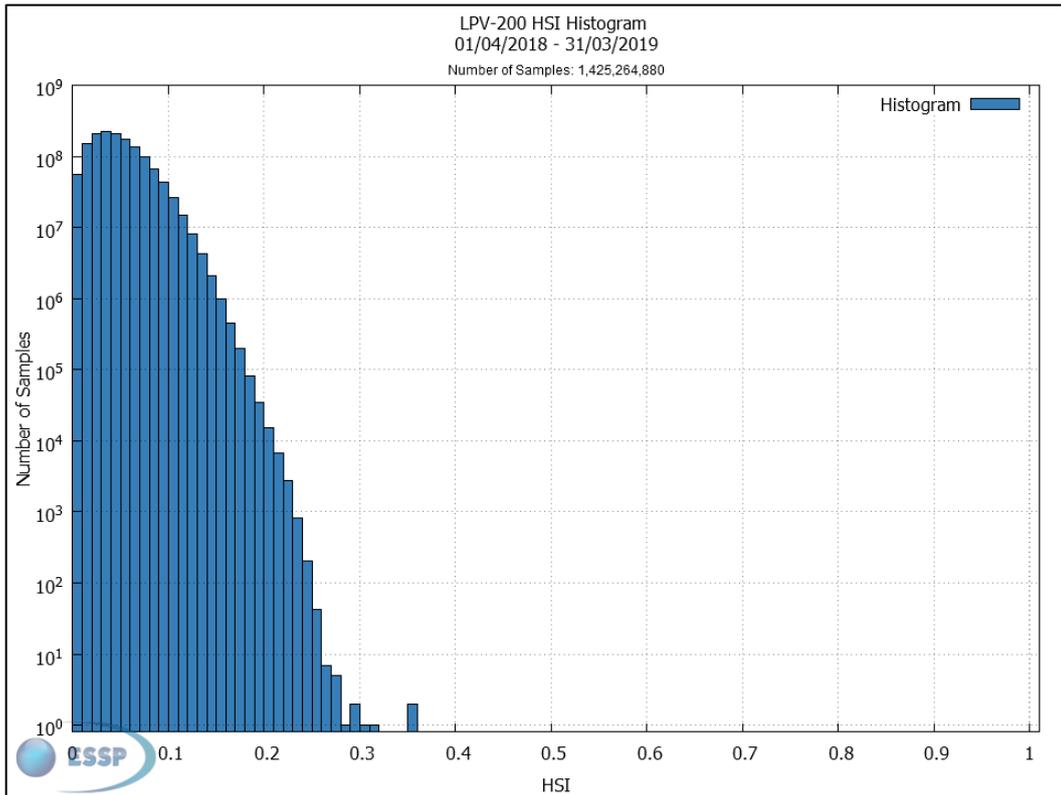


Figure 30: EGNOS LPV-200 Horizontal Safety Index

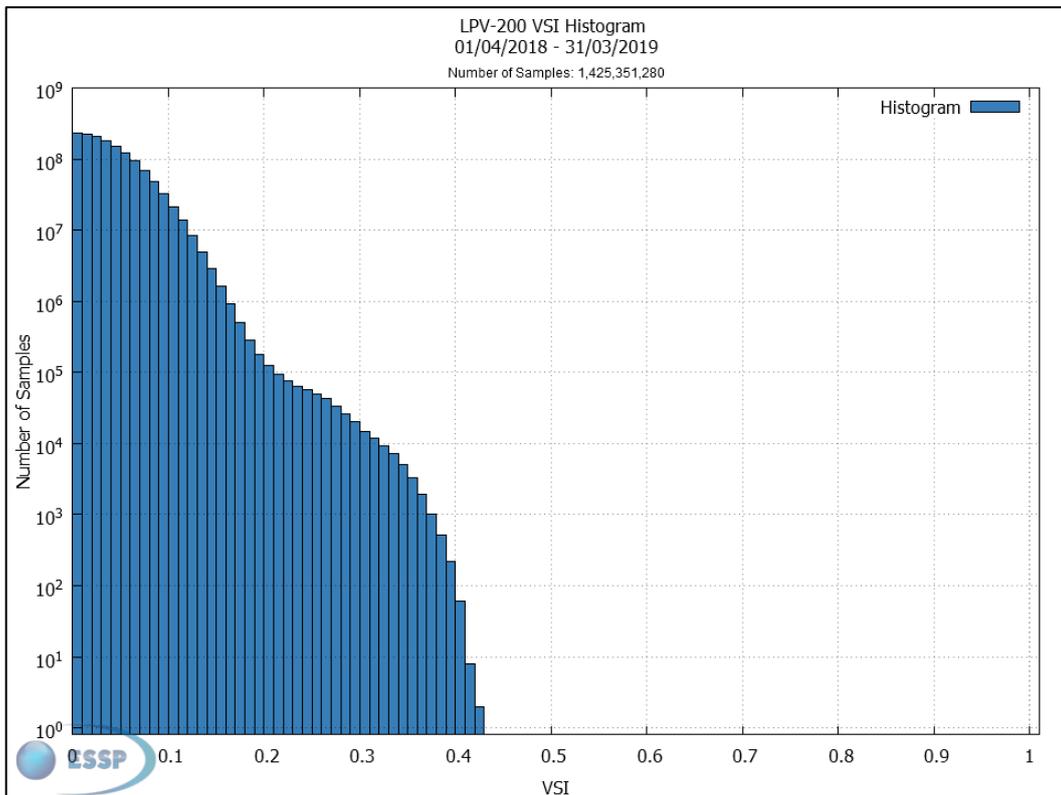


Figure 31: EGNOS LPV-200 Vertical Safety Index

The above figures show that the horizontal and vertical safety index for LPV-200 remained below 0.36 and 0.43, respectively, for all stations, which represents a particularly good safety margin.

### 3.4.5 LPV-200 Continuity risk

**EGNOS LPV-200 Continuity Risk** is defined as the result of dividing the total number of single continuity events, using a time-sliding window of 15 seconds, by the number of samples with a valid and available LPV-200 navigation solution. A single continuity event occurs if the system is available at the start of the operation and becomes unavailable in at least one of the following 15 seconds.

The following figure provides the GEO combined LPV-200 continuity risk for the reported period:

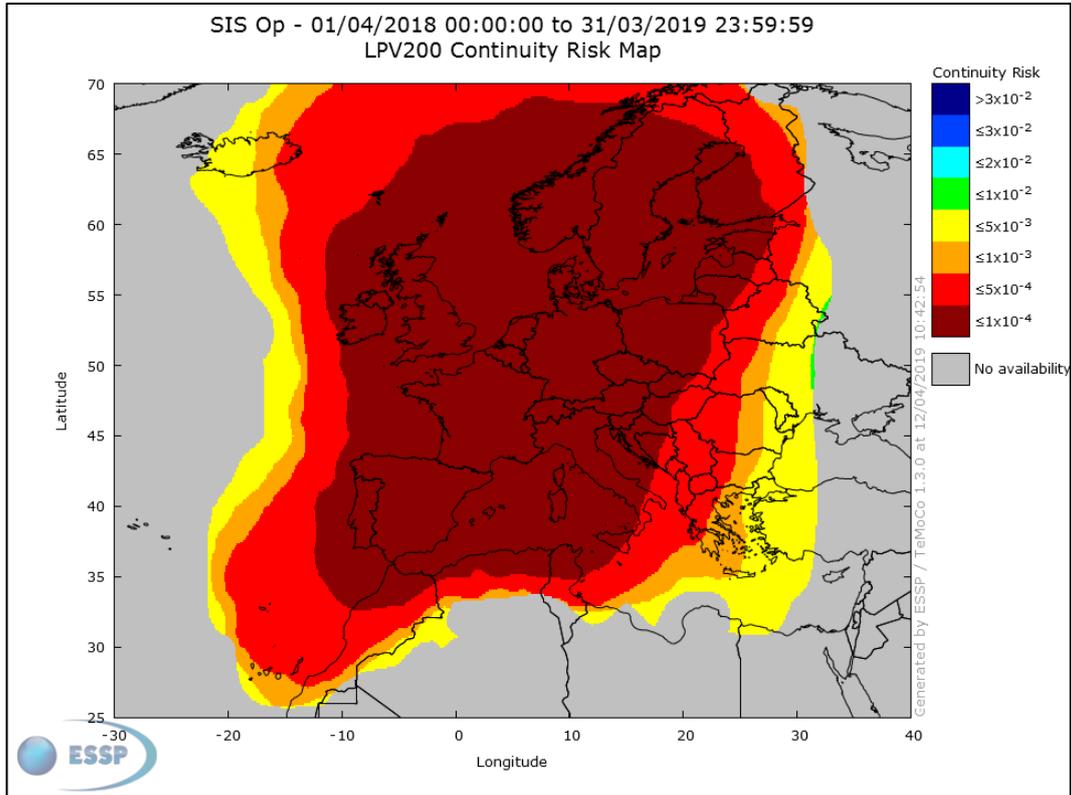


Figure 32: LPV-200 Continuity Risk from 01/04/18 to 31/03/19<sup>18</sup>

The LPV200 continuity performance has been excellent during the reporting period: lower than  $5 \cdot 10^{-4}$  over the entire LPV200  $5 \cdot 10^{-4}$  Service Area<sup>19</sup> with minor deviations only observed in the south-eastern part.

<sup>18</sup> The grey colour is used to identify regions outside the LPV-200 Service area as defined in the [EGNOS Safety of Life SDD](#).

<sup>19</sup>  $5 \cdot 10^{-4}$  LPV200 Service Area is the  $5 \cdot 10^{-4}$  LPV200 continuity risk area depicted in Figure 25 obtained from the [EGNOS Safety of Life SDD](#).

### 3.4.6 LPV-200 Continuity - Achievement against target<sup>20</sup>

The combination of the  $5 \cdot 10^{-4}$  LPV-200 Continuity Risk map and the Service Area<sup>21</sup> gives the following:

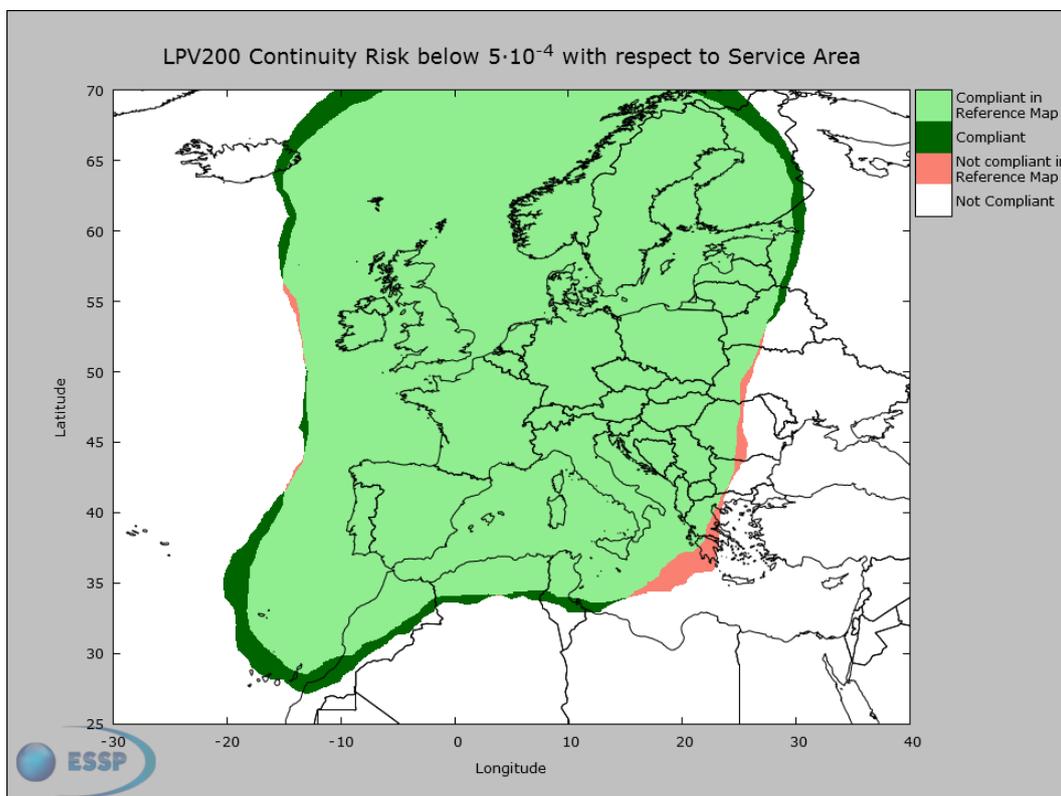


Figure 33: LPV-200 Continuity Risk ( $5 \cdot 10^{-4}$ ) map with respect to the reference map - 01/04/18 to 31/03/19

In the picture, the legend should be read as follows:

- **Compliant in Reference Map**: This is the part of the Service Area<sup>21</sup> where LPV-200 continuity was above  $5 \cdot 10^{-4}$ .
- **Compliant**: This is the zone out of the Service Area<sup>21</sup> where LPV-200 continuity was also above  $5 \cdot 10^{-4}$  (extension of coverage with respect to the commitment).
- **Not compliant in Reference Map**: This is the part of the Service Area<sup>21</sup> where LPV-200 continuity was lower than  $5 \cdot 10^{-4}$ .
- **Not compliant (white)**: This is any other zone out of the Service Area<sup>21</sup> where LPV-200 continuity is lower than  $5 \cdot 10^{-4}$ .

Considering the SDD v3.2 map used as the reference, the percentage of points which were compliant with the  $5 \cdot 10^{-4}$  LPV-200 Service Area ( $5 \cdot 10^{-4}/15\text{sec}$ ) is **98.56%**. The reasons for the reduced coverage on the Southeast of the Service Area are the ones already explained in section 3.3.2.

Note that the comparison with respect to the SDD SoL commitment map is included for information. The commitment map is a monthly reference while the reported period is one year and, therefore, this comparison must be interpreted with care.

<sup>20</sup> Service Area used as reference corresponds to the one presented in the EGNOS Safety of Life SDD 3.2.

<sup>21</sup>  $5 \cdot 10^{-4}$  LPV200 Service Area is the  $5 \cdot 10^{-4}$  LPV200 continuity risk area depicted in Figure 25 obtained from the [EGNOS Safety of Life SDD](#).

### 3.4.7 EGNOS LPV-200 vertical accuracy

When compared to APV-I, LPV-200 is based on more stringent performance requirements such as Vertical Navigation System Error (VNSE) of 4 m (95%), and Vertical Alert Limit (VAL) of 35 m. In addition, specific requirements are defined regarding the probability that the VNSE exceeds 10 m in nominal system operation conditions, set to  $10^{-7}$ /per approach, or 15 m in degraded system operation conditions, defined as  $10^{-5}$ /per approach.

Whenever the instantaneous VNSE exceeds 10 m, in nominal conditions, or 15 m under degraded scenarios, it is said that an Accuracy Major Event (AME) occurs.

The following figures show the histogram and cumulative distribution function of VNSE, which are computed at the RIMS stations inside the LPV-200 Service Area for each second over the entire period.

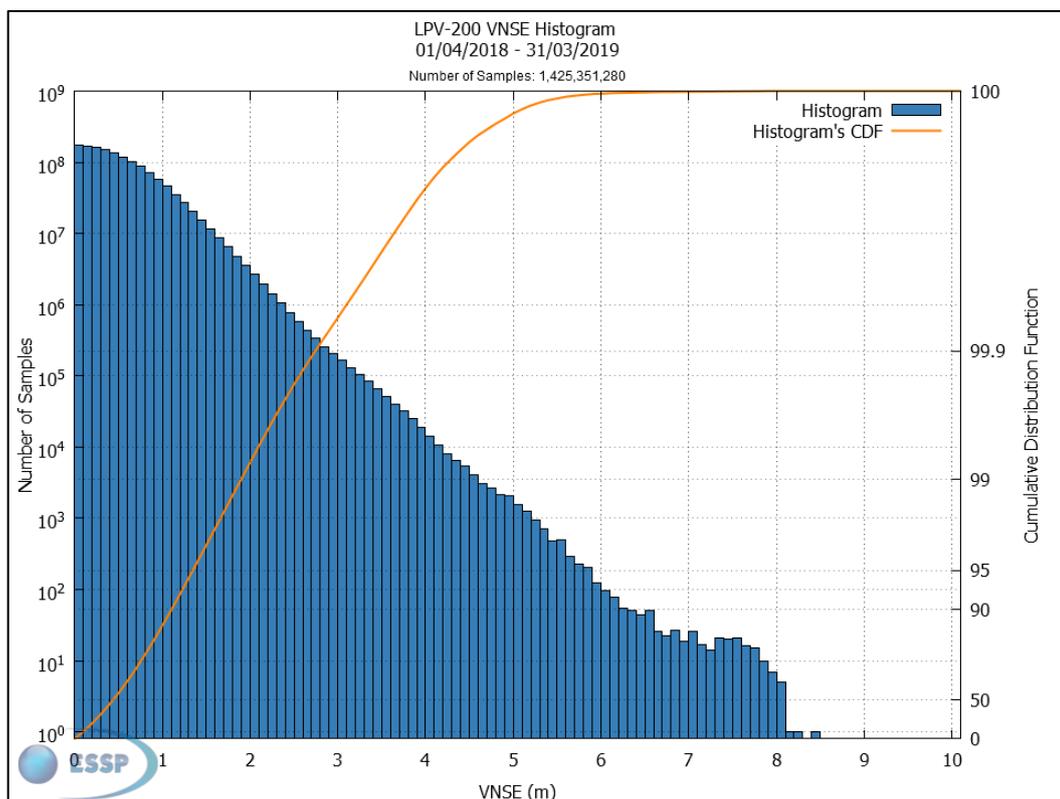


Figure 34: EGNOS LPV-200 Vertical Accuracy Histogram and Cumulative Probability

As can be observed, the cumulative results confirm that the vertical accuracy remained below 10 metres during the period analysed. In other words, no AME took place during the period analysed. The 95<sup>th</sup> percentile is below 1.4 metres. The worst accuracy measured in any of the stations is lower than 8.5 metres.

### 3.4.8 EGNOS LPV-200 accuracy extrapolated at $10^{-7}/150$ s

This section presents the results of extrapolating the accuracy results for every station to  $10^{-7}/150$  s. This extrapolation enables the characterisation of the accuracy distribution tails by means of a Gaussian extrapolation applied to the vertical navigation error<sup>22</sup>.

The following results present the values obtained from the 1<sup>st</sup> January 2018 to 31<sup>st</sup> December 2018, using values obtained from both operational GEOs. For this period, all the RIMS within the [LPV-200 Service Area](#) present extrapolated accuracy values within the requirement:  $Pr(VNSE > 10\text{ m}) < 10^{-7}/150$  s.

For the period of analysis, the accuracy tail extrapolated at  $10^{-7}/150$  s values for the RIMS within the LPV-200 commitment are:

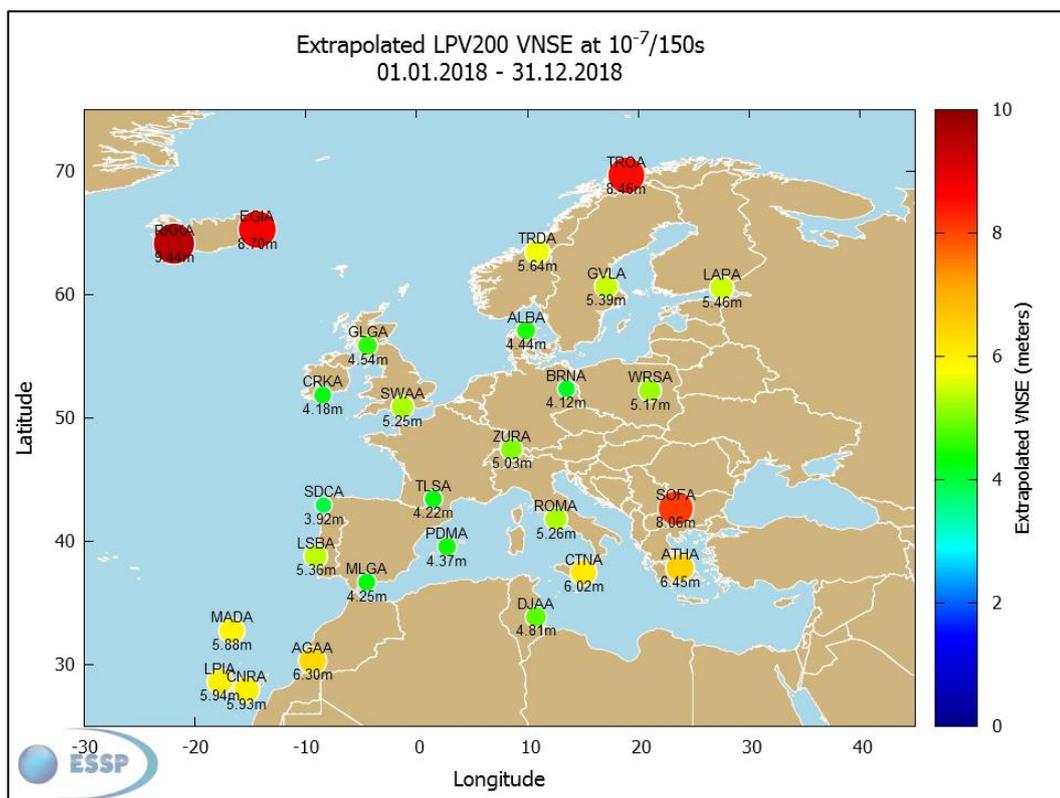


Figure 35: Extrapolated VNSE at  $10^{-7}/150$  s in the RIMS within the LPV-200 commitment

The highest value is 9.44 m obtained for RIMS Reykjavik, which still complies with the requirement.

<sup>22</sup> Using the cumulative VNSE distribution, an overbounding Gaussian distribution is computed ( $\sigma_{bound}$ ), which enables obtaining the  $VNSE_{bound}$  extrapolated to the required probability of  $10^{-7}/150$  s. For additional details on the method used, please refer to “SBAS CAT-I available in Europe: LPV-200 commitment area and performance results” [ESSP SAS, ENC GNSS 2016].

### 3.5 Open Service (OS)

The EGNOS OS area defines the geographical region where, 99% of the time, users are able to calculate their position and the accuracy performance is better than 3 metres horizontally and 4 metres vertically. The minimum compliance area can be seen in the following figure:

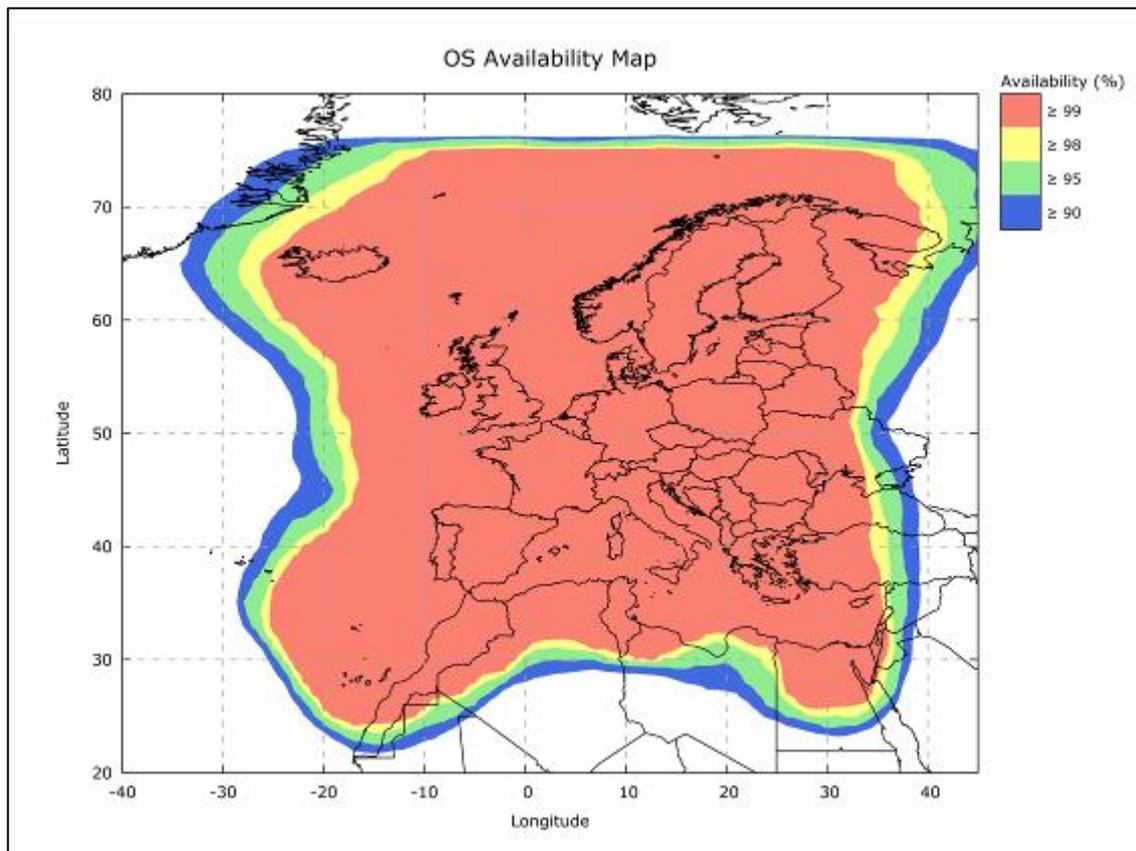


Figure 36: EGNOS OS compliance area

Further details can be found in the [EGNOS OS Service Definition](#). Additionally, OS performance is reported through the EGNOS Monthly Performance reports, available on the [EGNOS User Support website](#).

### 3.5.1 RIMS monitoring network

The following map shows the location of the deployed RIMS:



Figure 37: RIMS locations<sup>23</sup>

<sup>23</sup> Source: [EGNOS SDDs](#) (OS, SoL, EDAS)

The receiver network used to report Open Service corresponds to the subset of RIMS that are inside the [EGNOS OS SDD](#) commitment map.

ID	Location name	Country	ID	Location name	Country
ALB	Alborg	Denmark	LAP	Lappeenranta	Finland
AGA	Agadir	Morocco	LPI	La Palma	Spain
ALY	Alexandria	Egypt	LSB	Lisbon	Portugal
ATH	Athens	Greece	MAD	Madeira	Portugal
BRN	Berlin	Germany	MLG	Malaga	Spain
CNR	Canary Islands	Spain	PDM	Palma de Mallorca	Spain
CRK	Cork	Ireland	RKK	Reykjavik	Iceland
CTN	Catania	Italy	ROM	Rome	Italy
DJA	Djerba	Tunisia	SDC	S. de Compostela	Spain
EGI	Egilsstadir	Iceland	SOF	Sofia	Bulgaria
GLG	Glasgow	United Kingdom	SWA	Swanwick	United Kingdom
GOL	Golbasi	Turkey	TLS	Toulouse	France
GVL	Gävle	Sweden	TRD	Trondheim	Norway
HFA <sup>24</sup>	Haifa	Israel	TRO	Tromsoe	Norway
JME	Jan Mayen	Norway	WRS	Warsaw	Poland
KIR	Kirkenes	Norway	ZUR	Zürich	Switzerland

Table 6: List of RIMS sites where EGNOS OS performance is reported

<sup>24</sup> As of March 2019.

### 3.5.3 Horizontal and Vertical Accuracy

**EGNOS OS Horizontal (resp Vertical) Accuracy** is reported as the 95<sup>th</sup> percentile of the Horizontal (resp Vertical) Navigation System Error (HNSE/VNSE) over the period, at the monitored sites when applying EGNOS messages.

The following table provides the values of accuracy (95%) in metres measured for the reported period.

Station	HNSE 95% (metres)	VNSE 95% (metres)	Station	HNSE 95% (metres)	VNSE 95% (metres)
Aalborg	0.9	1.4	Lappeenranta	0.8	1.6
Agadir	0.8	1.4	La Palma	0.9	1.5
Alexandria	1.2	1.9	Lisbon	0.9	1.3
Athens	0.8	1.3	Madeira	0.8	1.2
Berlin	0.9	1.2	Malaga	0.7	1.1
Canary Islands	1.0	1.4	Palma de Mallorca	0.7	1.0
Cork	0.9	1.3	Reykjavik	0.9	1.9
Catania	0.7	1.2	Roma	0.7	1.1
Djerba	0.9	1.2	S. de Compostela	0.8	1.1
Egilsstadir	0.7	1.7	Sofia	1.1	2.0
Glasgow	0.9	1.4	Swanwick	1.1	1.6
Golbasi	0.9	1.5	Toulouse	0.8	1.1
Gävle	0.8	1.6	Trondheim	0.7	1.6
Haifa	1.2	1.8	Tromsoe	0.9	2.2
Jan Mayen	1.2	2.3	Warsaw	0.9	1.4
Kirkenes	0.8	1.9	Zürich	0.8	1.2

Table 7: EGNOS Open Service accuracy (95%)

The horizontal accuracy results for all the stations remained below 1.3 metres (95%), and the vertical accuracy below 2.4 metres (95%), which represents a particularly good level of accuracy.

The following figures show the histogram and cumulative distribution function of HNSE (Horizontal Navigation System Error) and VNSE (Vertical Navigation System Error), which are computed at the above stations for each second over the entire period, across the range of values.

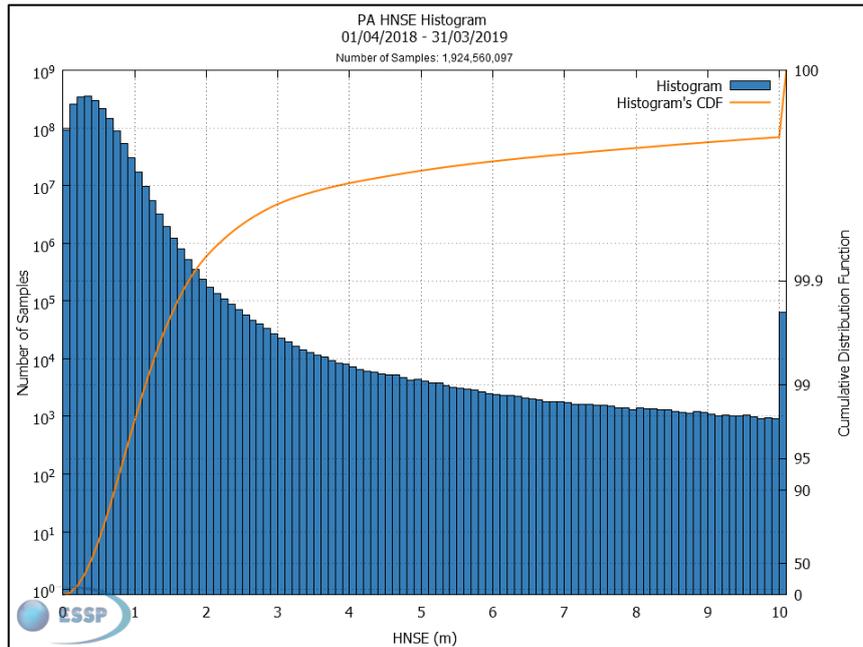


Figure 38: EGNOS Open Service HNSE Histogram and Cumulative Probability<sup>25</sup>

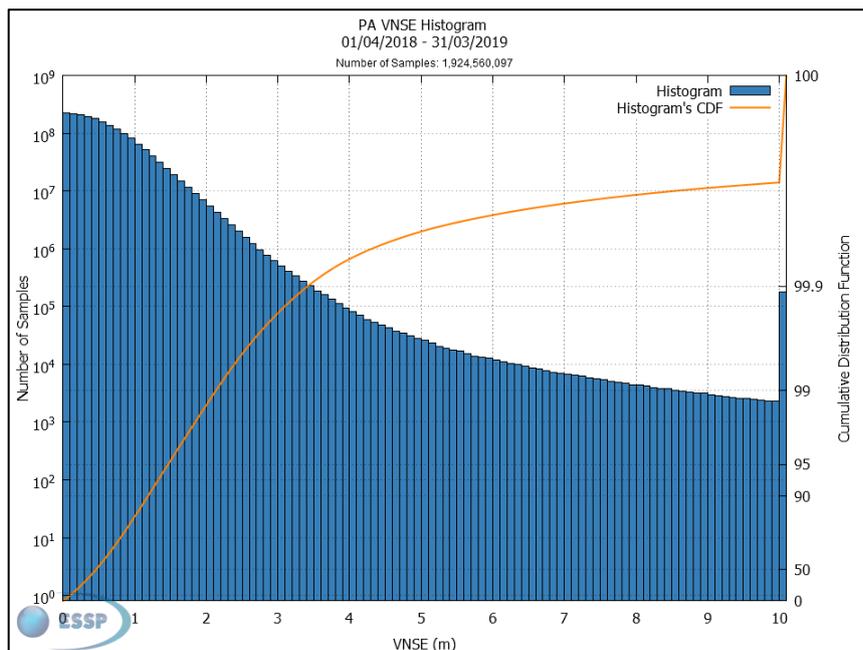


Figure 39: EGNOS Open Service VNSE Histogram and Cumulative Probability<sup>25</sup>

As shown, the cumulative results confirm the positive values observed at all stations. The 95<sup>th</sup> percentile of the observed accuracy performance is below 0.8 metres in the horizontal domain and below 1.4 metres in the vertical one.

Table 8 and Table 9 provide the monthly maximum of the daily values for Horizontal and Vertical Accuracy (95%) while using EGNOS message broadcast by PRN 123 and PRN 120/PRN 136, respectively.

<sup>25</sup> Note that for the computation of the different histograms presented in this document, some periods may have been removed, corresponding to stations presenting bad quality of data linked to local environment. Data removed from histograms correspond to data from RIMS in which any OR affecting data quality has been observed or presence of cycle slips affecting performance is detected or other data quality issues have been traced as cause of daily degradations.

PRN 123		04/18	05/18	06/18	07/18	08/18	09/18	10/18	11/18	12/18	01/19	02/19	03/19	Average
AGA	HPE	1.67	1.13	1.14	0.93	1.10	1.52	1.15	1.09	1.30	1.35	1.53	1.23	1.26
	VPE	1.43	1.61	1.92	1.74	1.94	1.79	1.82	1.69	1.93	1.67	1.64	1.53	1.73
ALB	HPE	0.72	0.72	0.80	0.60	0.71	0.93	0.88	1.11	1.02	1.08	0.96	0.85	0.87
	VPE	2.06	1.91	1.75	1.60	1.71	1.63	1.57	1.52	1.61	1.61	1.93	1.62	1.71
ALY	HPE	4.33	1.57	1.47	1.35	1.48	2.01	1.29	1.23	1.39	1.60	1.60	1.33	1.72
	VPE	9.98	2.43	2.27	2.53	2.57	3.43	2.36	2.29	2.10	2.27	4.58	2.05	3.24
ATH	HPE	0.93	0.99	0.90	0.81	0.84	0.86	0.87	0.81	0.76	0.84	0.97	0.90	0.87
	VPE	1.44	1.43	1.51	1.77	1.95	1.94	1.64	1.45	1.55	1.32	1.37	1.43	1.57
BRN	HPE	0.91	0.80	0.93	0.78	0.75	1.01	0.95	1.10	1.14	1.10	1.09	0.93	0.96
	VPE	1.64	1.56	1.53	1.31	1.31	1.36	1.28	1.16	1.30	1.43	1.38	1.46	1.39
CNR	HPE	1.69	1.18	1.01	1.00	1.29	2.00	1.67	1.56	1.43	1.43	1.73	1.71	1.48
	VPE	1.60	1.49	1.97	1.70	1.87	1.86	1.73	1.61	1.74	1.70	2.06	1.50	1.74
CRK	HPE	1.01	0.69	0.87	0.75	0.77	1.05	1.03	1.05	1.31	1.15	1.10	1.05	0.99
	VPE	1.51	1.51	1.55	1.41	1.48	1.58	1.34	1.30	1.82	1.71	1.57	1.64	1.54
CTN	HPE	0.93	0.99	0.79	0.74	0.75	0.81	0.79	0.77	0.87	0.81	0.79	0.89	0.83
	VPE	1.25	1.39	1.51	1.48	1.38	1.68	1.49	1.52	1.57	1.46	1.19	1.24	1.43
DJA	HPE	1.53	1.13	1.09	0.93	0.89	1.05	0.91	0.97	1.02	1.01	0.95	0.93	1.03
	VPE	1.12	1.39	1.72	1.72	1.40	1.52	1.69	1.50	1.61	1.42	1.27	1.35	1.48
EGI	HPE	0.92	0.75	0.80	0.77	1.26	0.90	0.82	0.90	0.88	0.74	0.73	0.64	0.84
	VPE	2.50	2.09	2.36	1.92	2.72	2.18	2.08	2.29	2.24	2.14	2.33	2.18	2.25
GLG	HPE	0.92	0.91	0.83	0.71	0.76	0.97	1.03	1.17	1.20	1.20	1.07	1.04	0.98
	VPE	1.88	1.64	1.60	1.47	1.43	1.48	2.21	1.34	1.61	1.68	1.80	1.70	1.65
GOL	HPE	1.18	1.16	1.05	0.89	1.05	1.64	1.02	0.88	0.97	1.04	1.08	0.96	1.08
	VPE	2.22	1.73	1.56	1.80	2.47	2.31	1.98	1.60	1.56	1.75	1.75	1.81	1.88
GVL	HPE	0.82	0.74	0.85	0.64	0.71	0.80	0.94	0.99	0.99	0.97	0.85	0.75	0.84
	VPE	1.98	2.16	1.94	1.91	1.75	2.24	1.94	1.81	1.84	1.99	2.01	1.84	1.95
HFA	HPE												1.41	0.12
	VPE												2.13	0.18
JME	HPE	1.63	1.43	1.31	1.22	1.68	1.43	1.35	1.49	1.55	1.22	1.34	1.18	1.40
	VPE	3.01	2.59	2.98	2.62	2.65	2.78	3.08	2.92	3.16	3.18	2.85	2.52	2.86
KIR	HPE	1.07	1.13	0.96	0.74	1.26	0.91	1.03	0.97	1.14	1.27	0.94	0.87	1.02
	VPE	2.38	3.12	2.44	2.20	2.34	2.27	3.19	2.76	2.78	2.39	2.26	2.28	2.53
LAP	HPE	0.87	0.82	0.87	0.69	0.76	1.10	0.94	1.08	1.00	1.01	0.89	0.77	0.90
	VPE	1.98	2.33	1.85	1.87	1.81	2.07	1.92	1.93	1.65	1.95	1.90	1.85	1.93
LPI	HPE	2.25	1.10	0.92	0.87	1.70	2.06	1.55	1.09	1.26	1.25	2.08	2.00	1.51
	VPE	1.62	1.55	1.74	1.91	1.87	2.09	1.78	1.74	1.96	1.75	2.00	1.64	1.80
LSB	HPE	1.03	0.99	0.93	0.84	0.87	0.87	0.90	0.97	0.99	1.01	1.01	1.00	0.95
	VPE	1.60	1.61	1.59	1.46	1.45	1.37	1.59	1.37	1.43	1.42	1.56	1.70	1.51
MAD	HPE	1.79	0.95	0.79	0.70	0.94	0.80	0.80	0.83	0.84	0.95	1.31	0.90	0.97
	VPE	1.75	1.23	1.23	1.44	1.58	1.73	1.61	1.56	1.60	1.34	1.46	1.37	1.49
MLG	HPE	1.01	0.84	0.85	0.73	0.76	0.79	0.75	0.87	0.84	0.85	0.88	0.81	0.83
	VPE	1.27	1.19	1.25	1.49	1.37	1.53	1.56	1.31	1.65	1.28	1.23	1.12	1.35
PDM	HPE	0.77		0.69	0.67	0.65	0.68	0.73	0.79	0.83	0.69	0.71	0.67	0.72
	VPE	1.15		1.16	1.36	1.12	1.25	1.38	1.26	1.18	1.23	1.10	1.07	1.21
RKK	HPE	1.44	1.22	1.04	1.21	1.18	1.09	1.12	1.26	1.26	1.11	1.02	0.94	1.16
	VPE	3.17	2.22	2.51	2.27	2.77	2.53	2.38	2.80	2.49	2.45	2.17	2.18	2.50
ROM	HPE	0.89	0.82	0.87	0.70	0.75	0.83	0.80	0.79	0.82	0.84	0.77	0.82	0.81
	VPE	1.38	1.29	1.43	1.23	1.41	1.39	1.28	1.40	1.33	1.26	1.15	1.22	1.31
SDC	HPE	0.98	2.50	1.88	0.79	0.78	0.87	0.96	0.96	1.01	1.03	1.00	0.93	1.14
	VPE	1.27	3.84	3.30	1.13	1.12	1.08	1.39	1.21	1.25	1.31	1.13	1.25	1.61
SOF	HPE	1.33	1.42	1.21	1.04	1.04	1.25	1.25	1.23	1.27	1.28	1.28	1.47	1.26
	VPE	3.01	2.47	2.51	2.13	2.38	2.02	1.97	1.98	1.92	2.14	2.07	2.31	2.24
SWA	HPE	1.15	0.98	1.20	0.97	0.97	1.15	1.21	1.19	1.44	1.28	1.20	1.09	1.15
	VPE	2.09	1.69	1.70	1.68	1.63	1.64	1.74	1.47	1.97	2.11	2.13	1.94	1.82
TLS	HPE	1.01	0.87	0.85	0.73	0.70	0.80	0.84	0.86	0.92	0.89	0.82	0.80	0.84
	VPE	1.48	1.41	1.45	1.37	1.17	1.26	1.12	1.32	1.27	1.22	1.30	1.29	1.31
TRD	HPE	0.79	0.70	0.87	0.63	1.02	0.82	0.76	0.90	0.85	0.77	0.81	0.67	0.80
	VPE	2.02	2.00	1.94	1.70	1.71	1.78	1.84	1.98	2.01	1.95	2.04	1.91	1.91
TRO	HPE	1.19	1.01	1.07	0.94	1.49	1.05	1.04	1.04	1.09	1.33	0.95	0.98	1.10
	VPE	2.64	3.37	2.87	2.49	2.81	2.42	2.50	2.96	2.74	2.35	2.54	2.44	2.68
WRS	HPE	0.92	1.02	0.89	0.80	1.03	1.02	0.92	1.02	0.89	0.80	1.03	1.02	0.95
	VPE	1.81	1.69	1.74	1.68	1.76	1.45	1.81	1.69	1.74	1.68	1.76	1.45	1.69
ZUR	HPE	0.90	1.46	0.78	0.76	0.88	0.96	0.90	1.46	0.78	0.76	0.88	0.96	0.96
	VPE	1.52	3.00	1.30	1.35	1.32	1.17	1.52	3.00	1.30	1.35	1.32	1.17	1.61

Table 8: Monthly Horizontal/Vertical Accuracy at RIMS-A sites for PRN123 (in metres)<sup>26 27</sup>

<sup>26</sup> RIMS HFA was deployed in March 2019.

<sup>27</sup> RIMS PDM was removed from the operational system configuration from 24 April 2018 to 18 of June 2018 for maintenance purposes.

PRN 120/136		04/18	05/18	06/18	07/18	08/18	09/18	10/18	11/18	12/18	01/19	02/19	03/19	Average
AGA	HPE	1.66	1.14	1.12	0.92	1.10	1.48	1.16	1.10	1.28	1.38	1.52	1.26	1.26
	VPE	1.42	1.55	1.96	1.72	1.92	1.78	1.77	1.76	1.83	1.62	1.61	1.52	1.71
ALB	HPE	0.72	0.71	0.79	0.63	0.73	0.93	0.89	1.11	1.02	1.11	0.95	0.84	0.87
	VPE	2.06	1.88	1.75	1.64	1.71	1.65	1.57	1.48	1.62	1.62	1.92	1.61	1.71
ALY	HPE	4.64	1.57	1.45	1.36	1.49	1.95	1.28	1.23	1.41	1.61	1.51	1.33	1.74
	VPE	9.65	2.42	2.35	2.49	2.60	3.42	2.39	2.40	1.99	2.17	4.25	2.04	3.18
ATH	HPE	0.91	0.98	0.91	0.81	0.84	0.86	0.87	0.80	0.75	0.84	0.98	0.87	0.87
	VPE	1.47	1.41	1.51	1.77	1.81	1.95	1.63	1.48	1.53	1.30	1.40	1.43	1.56
BRN	HPE	0.91	0.80	0.92	0.78	0.77	1.01	0.95	1.10	1.14	1.13	1.10	0.93	0.96
	VPE	1.66	1.58	1.55	1.27	1.27	1.37	1.29	1.12	1.33	1.45	1.39	1.45	1.39
CNR	HPE	1.63	1.21	0.99	1.02	1.30	1.97	1.67	1.54	1.42	1.41	1.74	1.70	1.47
	VPE	1.58	1.49	1.98	1.70	1.84	1.84	1.71	1.67	1.65	1.63	2.08	1.51	1.72
CRK	HPE	1.01	0.72	0.87	0.76	0.80	1.05	1.01	1.05	1.30	1.18	1.12	1.06	0.99
	VPE	1.51	1.51	1.56	1.44	1.48	1.58	1.33	1.31	1.77	1.72	1.60	1.62	1.54
CTN	HPE	0.93	1.02	0.80	0.76	0.77	0.80	0.78	0.76	0.86	0.82	0.77	0.88	0.83
	VPE	1.26	1.31	1.50	1.48	1.33	1.67	1.52	1.55	1.54	1.39	1.16	1.26	1.41
DJA	HPE	1.50	1.14	1.13	0.94	0.96	1.04	0.92	0.97	1.01	0.97	0.94	0.91	1.04
	VPE	1.13	1.39	1.74	1.68	1.35	1.54	1.69	1.51	1.58	1.41	1.26	1.34	1.47
EGI	HPE	0.92	0.75	0.80	0.77	1.32	0.89	0.82	0.87	0.91	0.78	0.72	0.62	0.85
	VPE	2.52	2.10	2.31	1.94	2.61	2.18	2.09	2.26	2.29	2.18	2.35	2.22	2.25
GLG	HPE	0.92	0.93	0.82	0.71	0.79	0.97	1.04	1.17	1.22	1.21	1.08	1.04	0.99
	VPE	1.88	1.61	1.61	1.49	1.35	1.46	2.30	1.37	1.63	1.71	1.82	1.71	1.66
GOL	HPE	1.17	1.17	1.03	0.89	1.01	1.68	1.02	0.86	0.96	1.02	1.08	0.96	1.07
	VPE	2.20	1.83	1.52	1.79	1.97	2.28	1.99	1.57	1.52	1.78	1.75	1.85	1.84
GVL	HPE	0.82	0.75	0.83	0.64	0.72	0.80	0.94	0.99	1.00	0.97	0.85	0.75	0.84
	VPE	1.99	2.14	1.93	1.92	1.74	2.23	1.95	1.75	1.89	1.94	1.99	1.83	1.94
HFA	HPE												1.43	0.12
	VPE												2.13	0.18
JME	HPE	1.60	1.38	1.33	1.21	1.58	1.43	1.40	1.57	1.58	1.24	1.46	1.18	1.41
	VPE	3.02	2.55	2.86	2.65	2.64	2.83	3.08	2.90	3.16	3.20	2.88	2.52	2.86
KIR	HPE	1.09	1.09	0.98	0.76	1.31	0.95	0.99	0.98	1.19	1.22	0.88	0.88	1.03
	VPE	2.36	3.12	2.45	2.24	2.26	2.31	3.17	2.77	2.88	2.33	2.23	2.31	2.54
LAP	HPE	0.89	0.84	0.86	0.69	0.78	1.14	0.96	1.07	1.00	0.99	0.88	0.76	0.91
	VPE	1.99	2.35	1.85	1.88	1.79	2.05	1.93	1.93	1.75	1.87	1.83	1.87	1.92
LPI	HPE	2.27	1.09	0.92	0.88	1.71	2.05	1.55	1.11	1.24	1.26	2.08	2.01	1.51
	VPE	1.62	1.52	1.76	1.90	1.82	2.08	1.78	1.75	1.98	1.74	2.01	1.65	1.80
LSB	HPE	1.02	0.96	0.93	0.85	0.94	0.87	0.90	0.98	0.98	1.00	1.01	1.00	0.95
	VPE	1.57	1.62	1.55	1.43	1.51	1.36	1.58	1.37	1.45	1.40	1.55	1.72	1.51
MAD	HPE	1.77	0.98	0.78	0.71	0.95	0.80	0.80	0.83	0.84	0.91	1.28	0.90	0.96
	VPE	1.76	1.26	1.22	1.41	1.58	1.72	1.59	1.52	1.56	1.33	1.42	1.37	1.48
MLG	HPE	1.01	0.85	0.85	0.74	0.81	0.79	0.75	0.87	0.84	0.85	0.88	0.80	0.84
	VPE	1.29	1.18	1.24	1.54	1.40	1.52	1.57	1.31	1.60	1.25	1.24	1.11	1.35
PDM	HPE	0.78		0.69	0.66	0.68	0.68	0.72	0.79	0.83	0.68	0.70	0.68	0.72
	VPE	1.16		1.13	1.41	1.18	1.26	1.38	1.25	1.20	1.24	1.09	1.06	1.21
RKK	HPE	1.48	1.19	1.05	1.17	1.11	1.09	1.15	1.24	1.29	1.13	0.99	0.93	1.15
	VPE	3.24	2.31	2.41	2.20	2.66	2.48	2.40	2.72	2.47	2.54	2.21	2.17	2.48
ROM	HPE	0.90	0.84	0.87	0.70	0.70	0.82	0.80	0.79	0.81	0.84	0.76	0.82	0.80
	VPE	1.37	1.34	1.43	1.23	1.38	1.37	1.28	1.40	1.35	1.25	1.14	1.21	1.31
SDC	HPE	0.98	2.53	1.92	0.79	0.80	0.87	0.96	0.96	1.02	1.02	0.98	0.93	1.15
	VPE	1.28	3.76	3.40	1.14	1.17	1.08	1.39	1.20	1.29	1.28	1.10	1.28	1.61
SOF	HPE	1.32	1.42	1.20	1.02	1.22	1.25	1.24	1.24	1.27	1.28	1.28	1.51	1.27
	VPE	3.02	2.52	2.51	2.15	2.36	2.03	1.95	1.99	1.91	2.21	2.04	2.34	2.25
SWA	HPE	1.15	0.99	1.21	0.99	0.72	0.80	0.84	0.86	0.91	0.90	0.82	0.81	0.92
	VPE	2.09	1.70	1.68	1.66	1.23	1.25	1.13	1.33	1.27	1.23	1.30	1.29	1.43
TLS	HPE	1.02	0.87	0.85	0.75	1.01	1.16	1.21	1.19	1.44	1.27	1.19	1.09	1.09
	VPE	1.49	1.42	1.46	1.34	1.65	1.64	1.73	1.47	2.00	2.12	2.16	1.95	1.70
TRD	HPE	0.80	0.70	0.87	0.63	1.00	0.81	0.76	0.90	0.86	0.77	0.80	0.67	0.80
	VPE	2.05	1.98	1.94	1.73	1.63	1.77	1.83	1.97	2.06	1.93	2.04	1.92	1.90
TRO	HPE	1.20	0.99	1.05	0.91	1.37	1.05	1.05	1.01	1.12	1.34	0.95	0.99	1.09
	VPE	2.72	3.29	2.81	2.46	2.78	2.40	2.53	2.94	2.83	2.39	2.54	2.42	2.68
WRS	HPE	1.08	0.92	1.01	0.88	0.91	1.03	1.02	1.11	1.07	1.18	1.04	0.95	1.02
	VPE	1.86	1.81	1.69	1.74	1.65	1.77	1.44	1.36	1.23	1.44	1.63	1.59	1.60
ZUR	HPE	0.99	0.90	1.49	0.77	0.90	0.96	0.94	1.53	2.08	0.79	0.90	0.96	1.10
	VPE	1.60	1.50	2.82	1.31	1.32	1.17	1.65	3.46	2.25	1.35	1.32	1.17	1.74

Table 9: Monthly Horizontal/Vertical Accuracy at RIMS-A sites for PRN120/136 (in metres)<sup>28 29</sup>

The degradations at RIMS ALY in April 2018 and February 2019 were both due to isolated (only present on specific days) local issues that affected the quality of the GPS measurements gathered by this station.

<sup>28</sup> RIMS HFA was deployed in March 2019.

<sup>29</sup> RIMS PDM was removed from the operational system configuration from 24 April 2018 to 18 of June 2018 for maintenance purposes.

### 3.5.4 Open Service Availability

*EGNOS OS Availability performance is defined in this document as the percentage of time in the month when the instantaneous HNSE is lower than 3 metres and the instantaneous VNSE is lower than 4 metres over the total number of samples with valid PA navigation solution.*

The following tables provide the values measured using PRN 123 and PRN 120/136 respectively.

PRN123	04/18	05/18	06/18	07/18	08/18	09/18	10/18	11/18	12/18	01/19	02/19	03/19	Average
AGAA	99.99%	99.97%	99.99%	99.98%	99.99%	99.99%	99.99%	100.00%	99.88%	100.00%	100.00%	99.99%	99.98%
ALBA	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%
ALYA	99.61%	99.97%	99.99%	99.97%	99.80%	98.52%	99.97%	99.99%	99.56%	99.95%	99.36%	100.00%	99.72%
ATHA	99.97%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	99.99%	100.00%	100.00%
BRNA	100.00%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
CNRA	99.95%	99.97%	99.99%	99.95%	99.97%	99.94%	99.99%	99.99%	99.99%	99.97%	99.97%	99.96%	99.97%
CRKA	100.00%	100.00%	100.00%	100.00%	100.00%	99.96%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%
CTNA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	99.99%	100.00%	100.00%	100.00%	100.00%
DJAA	99.80%	99.98%	100.00%	99.96%	99.99%	100.00%	100.00%	100.00%	100.00%	99.99%	99.99%	100.00%	99.98%
EGIA	99.79%	99.95%	99.95%	99.84%	99.90%	99.96%	99.94%	99.92%	99.98%	99.98%	100.00%	99.95%	99.93%
GLGA	99.98%	99.99%	100.00%	100.00%	100.00%	100.00%	99.97%	99.98%	100.00%	100.00%	99.98%	100.00%	99.99%
GOLA	99.97%	99.98%	99.99%	100.00%	99.94%	99.64%	99.99%	99.96%	100.00%	99.96%	100.00%	99.99%	99.95%
GVLA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
HFAA												99.89%	99.89%
JMEA	99.62%	99.84%	99.80%	99.89%	99.70%	99.73%	99.72%	99.83%	99.73%	99.76%	99.72%	99.92%	99.77%
KIRA	99.66%	99.51%	99.60%	99.60%	99.28%	99.44%	99.55%	99.53%	99.34%	99.52%	99.59%	99.71%	99.53%
LAPA	99.97%	100.00%	99.99%	99.99%	99.98%	99.97%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	99.99%
LPIA	99.94%	99.98%	99.97%	99.94%	99.97%	99.94%	99.98%	99.97%	99.88%	99.96%	99.95%	99.91%	99.95%
LSBA	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.96%	100.00%
MADA	99.99%	99.99%	100.00%	99.95%	99.99%	99.96%	100.00%	99.98%	100.00%	99.99%	99.99%	99.96%	99.98%
MLGA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
PDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RKKA	98.92%	99.27%	99.36%	99.50%	99.41%	99.23%	99.18%	99.46%	99.37%	99.53%	99.58%	99.65%	99.37%
ROMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%
SDCA	100.00%	99.60%	99.58%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	99.97%	99.93%
SOFA	99.87%	99.70%	99.80%	99.88%	99.89%	99.86%	99.88%	99.93%	99.96%	99.97%	99.98%	99.91%	99.89%
SWAA	100.00%	100.00%	99.99%	100.00%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	100.00%
TLSA	100.00%	99.98%	99.98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TRDA	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%
TROA	99.84%	99.86%	99.86%	99.90%	99.76%	99.90%	99.92%	99.77%	99.88%	99.85%	99.96%	99.92%	99.87%
WRSA	99.97%	99.99%	100.00%	99.99%	100.00%	99.99%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%
ZURA	99.99%	100.00%	99.84%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%

Table 10: OS Availability at RIMS-A sites for PRN123<sup>30 31</sup>

<sup>30</sup> RIMS HFA was deployed in March 2019.

<sup>31</sup> RIMS PDM was removed from the operational system configuration from 24 April 2018 to 18 of June 2018 for maintenance purposes.

PRN120/136	04/18	05/18	06/18	07/18	08/18	09/18	10/18	11/18	12/18	01/19	02/19	03/19	Average
AGAA	100.00%	99.98%	100.00%	99.98%	99.99%	99.99%	100.00%	100.00%	99.88%	100.00%	100.00%	100.00%	99.98%
ALBA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%
ALYA	99.59%	99.97%	99.98%	99.98%	99.86%	98.50%	99.96%	99.99%	99.58%	99.96%	99.45%	100.00%	99.74%
ATHA	99.96%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%
BRNA	100.00%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
CNRA	99.96%	99.96%	99.99%	99.94%	99.95%	99.92%	100.00%	99.98%	99.99%	99.98%	99.96%	99.96%	99.97%
CRKA	100.00%	100.00%	100.00%	100.00%	100.00%	99.96%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%
CTNA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%
DJAA	99.79%	99.98%	100.00%	99.97%	99.99%	100.00%	100.00%	100.00%	100.00%	99.99%	99.99%	100.00%	99.98%
EGIA	99.81%	99.95%	99.96%	99.85%	99.90%	99.97%	99.95%	99.92%	99.98%	99.98%	100.00%	99.96%	99.94%
GLGA	99.97%	99.98%	100.00%	99.99%	100.00%	99.99%	99.97%	99.96%	100.00%	99.99%	99.98%	100.00%	99.99%
GOLA	99.96%	99.98%	99.99%	100.00%	99.93%	99.62%	99.99%	99.97%	99.99%	99.96%	100.00%	99.99%	99.95%
GVLA	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
HFAA												99.89%	99.89%
JMEA	99.62%	99.82%	99.82%	99.88%	99.76%	99.76%	99.73%	99.81%	99.76%	99.77%	99.76%	99.93%	99.78%
KIRA	99.69%	99.50%	99.61%	99.61%	99.33%	99.44%	99.53%	99.52%	99.35%	99.52%	99.64%	99.67%	99.53%
LAPA	99.97%	99.99%	99.99%	99.99%	99.99%	99.97%	100.00%	99.99%	100.00%	99.99%	100.00%	100.00%	99.99%
LPIA	99.95%	99.98%	99.97%	99.95%	99.97%	99.93%	99.99%	99.96%	99.90%	99.96%	99.95%	99.92%	99.95%
LSBA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.97%	100.00%
MADA	99.99%	99.98%	100.00%	99.95%	99.98%	99.95%	100.00%	99.97%	100.00%	99.99%	99.98%	99.96%	99.98%
MLGA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%
PDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%
RKKA	98.88%	99.19%	99.39%	99.55%	99.49%	99.15%	99.20%	99.44%	99.36%	99.53%	99.59%	99.64%	99.37%
ROMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%
SDCA	100.00%	99.61%	99.55%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	99.97%	99.93%
SOFA	99.88%	99.70%	99.80%	99.87%	99.88%	99.85%	99.88%	99.92%	99.96%	99.98%	99.99%	99.91%	99.88%
SWAA	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	100.00%
TLSA	100.00%	99.98%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TRDA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TROA	99.83%	99.85%	99.85%	99.90%	99.79%	99.90%	99.93%	99.78%	99.88%	99.84%	99.97%	99.92%	99.87%
WRSA	99.96%	99.98%	100.00%	99.99%	99.99%	99.99%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%
ZURA	99.99%	100.00%	99.84%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%

Table 11: OS Availability at RIMS-A sites for PRN120/136<sup>32 33</sup>

The monthly Open Service availability performance in all RIMS stations was over 99% except for Reykjavik and Alexandria RIMS in April 2018 and September 2018, respectively.

The following map shows, for each location, the OS availability value during the year. The worst value between PRN 120/136 and PRN 123 is shown.

<sup>32</sup> RIMS HFA was deployed in March 2019.

<sup>33</sup> RIMS PDM was removed from the operational system configuration from 24 April 2018 to 18 of June 2018 for maintenance purposes.

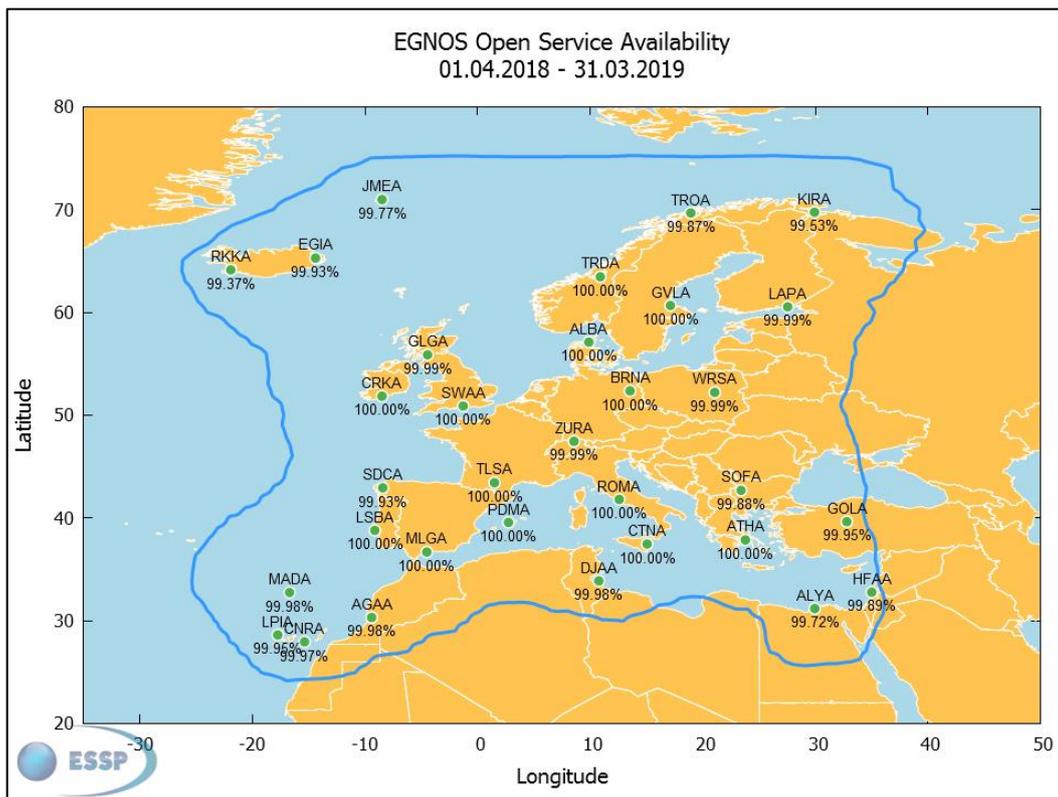


Figure 40: OS availability for the RIMS stations

As shown in the previous figure, the global Open Service Availability performance has been greater than 99% at all stations.



Spanish Mountain Bike Routes powered by EGNOS ([EGNOS Bulletin Q1 2019](#))

### 3.6 EGNOS Data Access Service (EDAS)

EDAS (EGNOS Data Access Service) is the free-of-charge ground-based access (through the Internet) to EGNOS and GNSS (GPS&GLONASS) data in real-time, as well as through a historical archive, which collects all the data generated by the EGNOS ground stations, mainly distributed over Europe and North Africa.

EDAS, as with all the other EGNOS Services, has its own [EDAS SDD \(Service Definition Document\)](#). Among other content, the EDAS SDD defines the committed performance for EDAS (which should always be met in a nominal situation) in terms of availability and latency:

- **Availability:** percentage of time in which EDAS is providing its services according to specifications. The availability of EDAS services is measured at the EDAS system output (excluding external network performance).
- **Latency:** time elapsed from the transmission of the last bit of the navigation message from the space segment (EGNOS and GPS/GLONASS satellites) until the data leave the EDAS system (formatted according to the corresponding service level specification). EDAS latency is a one-way parameter defined for real-time services.

Based on the above definitions, the tables below provide minimum availability and maximum latency for the EDAS services:

SL0	SL2	SISNeT	FTP	Data Filtering	Ntrip
98.5%	98.5%	98%	98%	98%	98%

Table 12: EDAS services minimum availability

SL0	SL2	SISNeT	FTP	Ntrip	Data Filtering	
					SL0	SL2
1.3 seconds	1.450 seconds	1.150 seconds	N/A	1.75 seconds	1.6 seconds	1.75 seconds

Table 13: Maximum latency for EDAS Services

EDAS performance is reported through the EGNOS Monthly Performance reports, available on the [EGNOS User Support website](#).

The availability achieved during the last annual period is shown in Figure 41.

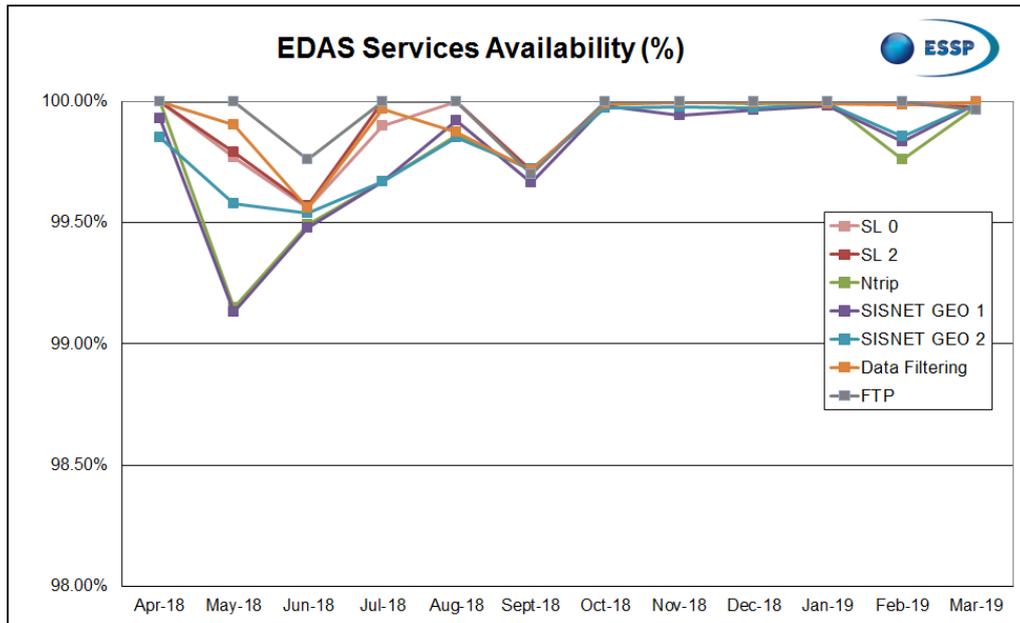


Figure 41: EDAS Services Availability (April 2018-March 2019)

As shown above, EDAS availability has been consistently above 99.5% for all services over the entire reporting period, except in May 2018, when the availability of EDAS Ntrip and SiSNeT services dropped to 99.15%. During that month, an exhaustive preventive maintenance campaign was implemented at the EDAS system level, which implied some sporadic service disruptions (notified to EDAS users). Nevertheless, the availability figures remained largely above the commitments defined in the [EDAS SDD \(Service Definition Document\)](#).

The latency during the last annual period for real-time services (not applicable for the FTP service) is shown below, computed as the average of the 95<sup>th</sup> percentile latencies monitored for every 5-minute period during the year.

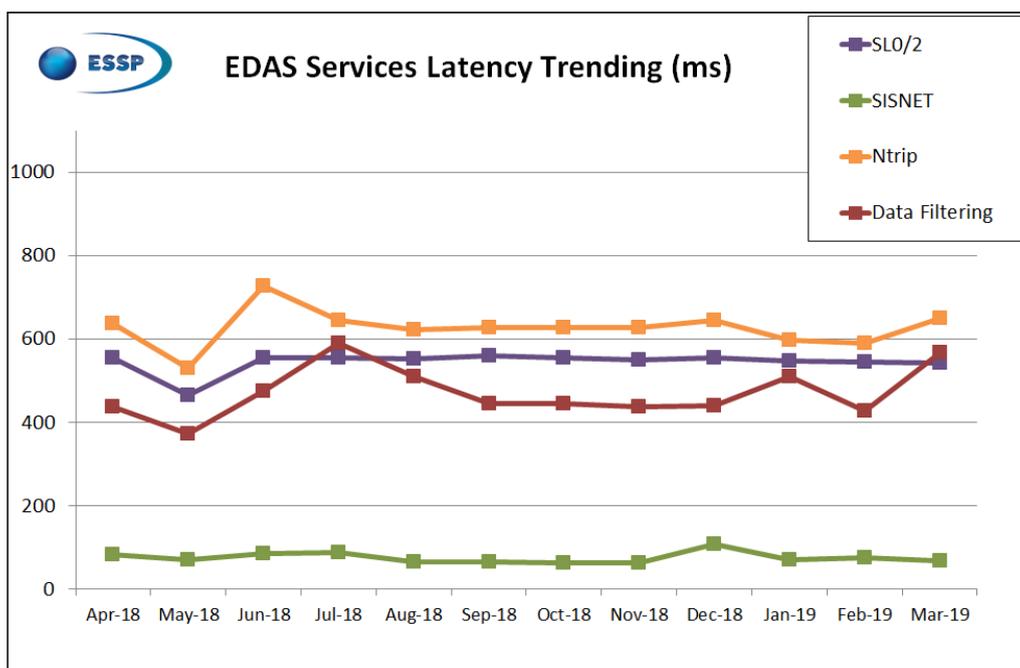


Figure 42: EDAS Services Latency (April 2018-March 2019)

As shown in Figure 42, EDAS services latency has been consistently below the target delays for all the services over the entire reporting period. Moreover, all real-time services have been provided regularly with delays below the 1-second threshold.

**DESIGN & INTEGRATION TRENDS**

## Precision Ag Aided by Internet, SBAS

**A reliable, repeatable, free solution with better than 20-centimeter pass-to-pass accuracy**

Differential GNSS corrections via the EGNOS Data Access Service (EDAS) enable pass-to-pass accuracy for a range of precision agriculture applications: spraying and sowing of any crop type, tilling and harvesting of grains. Tests with auto-steering systems looked at key performance indicators.

BY Juan Vázquez, Elisabet Lacarra, Jorge Morán and Miguel A. Sánchez, ESSP SAS, and Julian Rioja and Jimmy Bruzaal, Topcon Agriculture

The European Geostationary Navigation Overlay Service (EGNOS), a satellite-based augmentation system (SBAS), provides corrections and integrity information to GPS signals over Europe and is fully interoperable with other SBAS such as North America's WAAS. Among its services is the Internet-based EGNOS Data Access Service (EDAS). EDAS gathers raw data from GPS, GLONASS and EGNOS GEO satellites collected by receivers at approximately 40 EGNOS ground stations distributed over Europe and North Africa. EDAS reformats and disseminates GNSS data in real time and through an FTP archive to EDAS users and/or service providers. Additionally, EDAS provides differential GNSS corrections to the GPS and GLONASS satellites in view by the EGNOS system network through its Ntrip service. The tests summarized in this article focused on the EDAS Ntrip Service, which can be used for differential positioning. An earlier test near Seville, Spain concluded that these corrections could support pass-to-pass accuracies in the order of 20 cm in a consistent manner and with a high degree of repeatability. To assess EDAS performance validity for agriculture applications, two additional tests were done in Lisbon, Portugal and York, UK. These locations provide diversity with respect to the Seville test, especially in terms of distance from the farm to the selected EGNOS reference station (~320 km in York and 40 km in Lisbon, versus the 110 km baseline of the test in Seville) and also geographically. In all tests, a real-time kinematic solution operated in parallel to the EDAS DGPS solution to provide the required reference for the post-processing of the recorded data. Nine different runs with a total of 78 passes were performed in these two campaigns. Considering the results from the three tests, the pass-to-pass accuracy supported by EDAS DGPS corrections was below 10 cm for more than 60% of passes and below 20 cm for more than 85% of the passes.

**continued on page 48**



P2P accuracy = 10m  
R2P accuracy = 1m  
**PASS-TO-PASS (P2P) accuracy concept.**



Article photos and figure: Topcon

46 GPS WORLD [WWW.GPSWORLD.COM](http://www.gpsworld.com)
JANUARY 2019

GPS World article (<https://www.gpsworld.com/>) on EDAS for precision agriculture

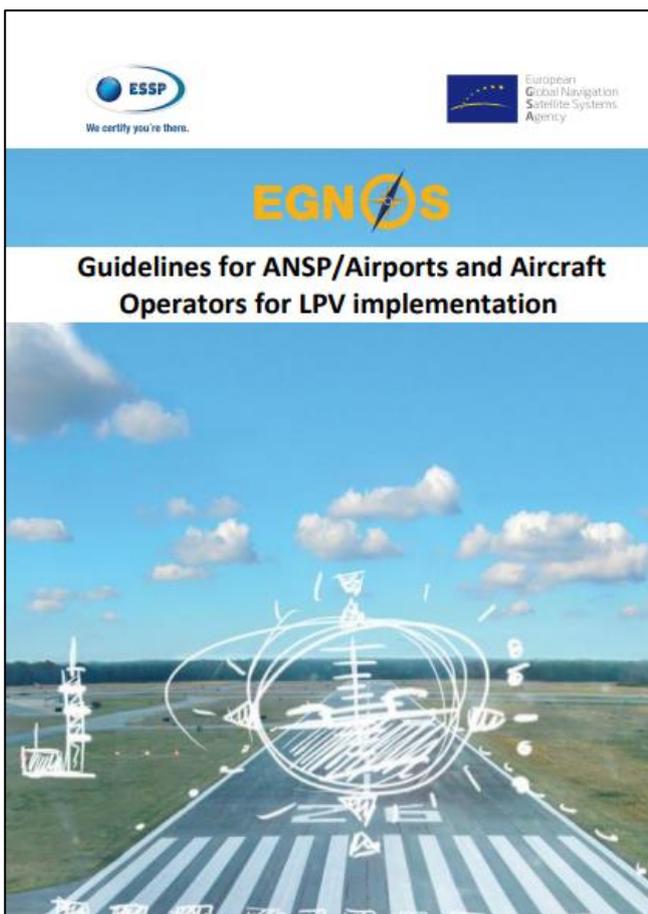
## 4 EGNOS SERVICES PROVISION

### 4.1 SoL Aviation Service Status

All the available EGNOS Safety-of-Life Service Levels enable aircraft approaches from NPA to those operationally equivalent to ILS CAT I. APV-I and LPV-200 Service Levels provide lateral and angular vertical guidance without the need for visual contact with the ground until a Decision Height (DH) of down to 250 ft. and 200 ft. respectively above the runway. In particular EGNOS LPV-200-based approaches guarantee the advantages provided by an ILS CAT I approach with the airspace design flexibility of a PBN approach.

The EGNOS SoL Service remained quite stable and robust during the reported period, not suffering degradations leading to contingency situations (according to the definition in place as per EGNOS Working Agreement). The EGNOS Working Agreement (EWA) lays the operational and legal foundations formalising the working procedures, technical baseline and required interfaces between ESSP and the SES Certified Air Navigation Service Provider (ANSP) or other organisations entitled by the corresponding competent authority willing to use the EGNOS Safety-of-Life Service as a navigation aid.

The new [SoL Service Definition Document \(SDD 3.3\)](#) is in force since 26 March 2019.



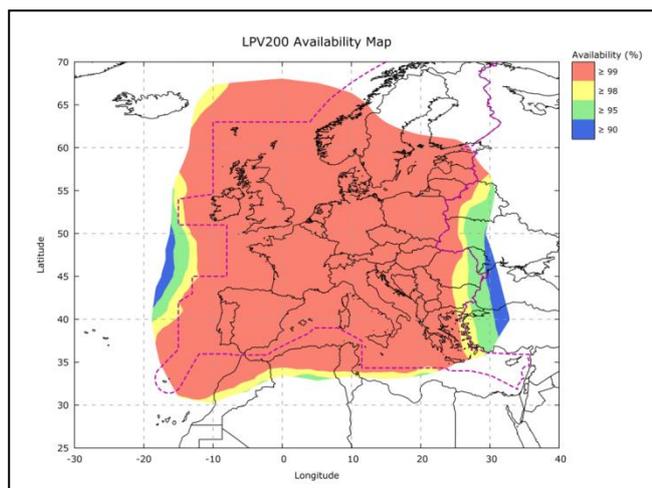
Guidance documentation from the [EGNOS User Support Website](#)

## 4.2 Service Definition Documents and Service Notices over the period

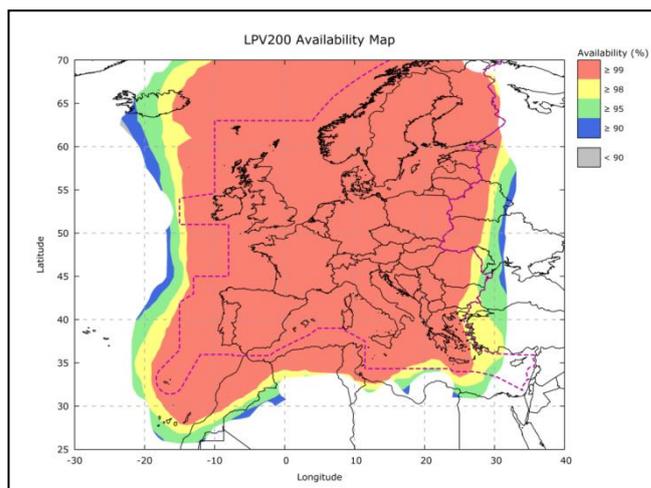
EGNOS Service Definition Documents (SDD) describe the characteristics and conditions for access to each EGNOS service (OS, SoL and EDAS).

Following the deployment of a new EGNOS System Release, the SoL SDD (v3.2) was published on the 1<sup>st</sup> of October 2018 with the following key updates:

- New commitment maps **extending EGNOS SoL service area for APV-I and LPV-200,**
- A significant **coverage increase** is declared over **Norway, Sweden and Finland, and the Canary Islands.**



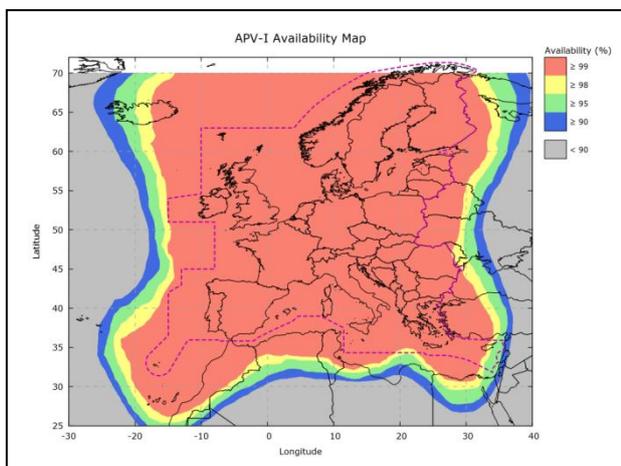
*SoL SDD v3.1 – LPV200 availability map*



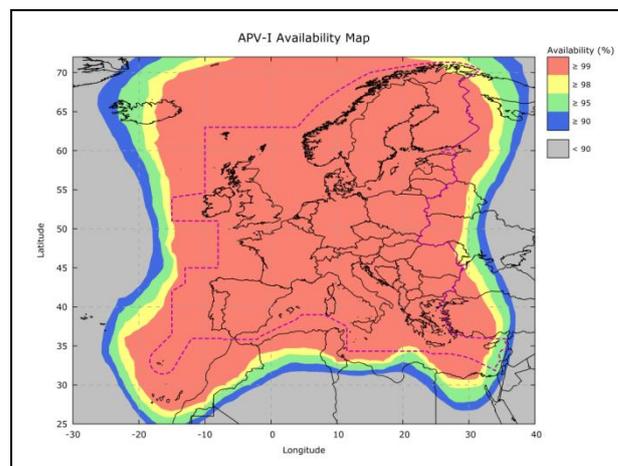
*SoL SDD v3.2 – LPV200 availability map*

- Clarifications for **non-EU organisations** or **non-ATS environments** (such as **aerodrome and rotorcraft operators**) interested in implementing EGNOS-based procedures.
- New Appendix D summarising the **PBN Navigation Specifications for which each EGNOS SoL service level is an enabler.**
- New Appendix E detailing the **SoL availability performance achieved** in a yearly timespan.

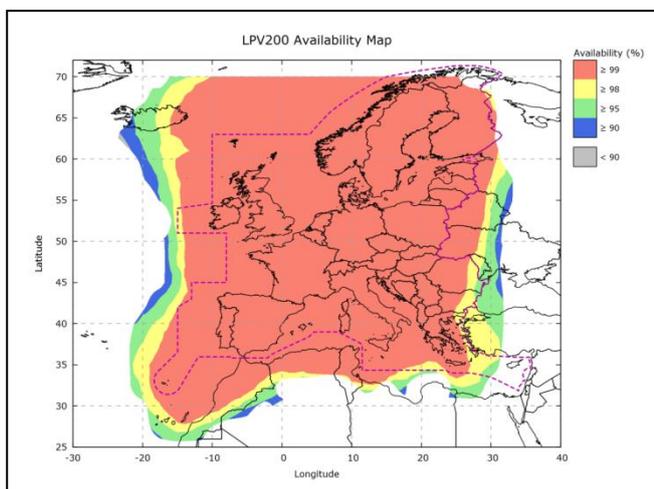
Recently and in connection with the deployment of a new EGNOS System Release, the SoL SDD (v3.3) was published on the 26<sup>th</sup> of March 2019 with an *extension of EGNOS Service Area from 70° to 72° north*.



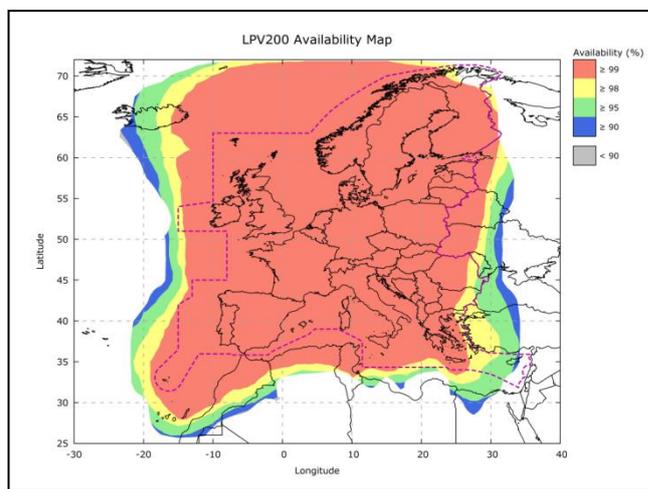
*SoL SDD v3.2 – APV-I availability map*



*SoL SDD v3.3 – APV-I availability map*



*SoL SDD v3.2 – LPV200 availability map*



*SoL SDD v3.3 – LPV200 availability map*

Additionally, a new version of the [EDAS SDD](#) was published on June 3<sup>rd</sup> 2019. This new version provides the following updates:

- EDAS related contents and services performances updated.
- Clarification regarding the redistribution of EDAS data.
- Use of EDAS for IALA beacons.
- EGNOS system and service information update.

Whenever complementary information, affecting the SDD perimeter, needs to be provided to users, an EGNOS Service Notice is published.

During the period reported here, ESSP published/updated 5 Service Notices, and 2 Service Notices have been changed to the “Expired” status:

N°	Subject	Version	Date of Publication	Status	Target Users
21	EGNOS System Release #YSR 3 & YSR#4 deployment	1.0	15/02/2019	In Force	All Users
20	PRN120 Decommissioning	1.0	20/12/2018	In Force	All Users
19	Single GEO coverage in North-West corner of SDD service areas	1.0	31/08/2018	In Force	SoL
18	EDAS Ntrip service evolution: support to HTTP based communication	1.0	19/07/2018	Superseded	EDAS
15	EGNOS Space Segment Update	2.2	20/12/2018	In Force	All Users
15	EGNOS Space Segment Update	2.1	31/08/2018	Expired	All Users
15	EGNOS Space Segment Update	2.0	14/08/2018	Expired	All Users

Table 14: Service Notices published/updated during this period

The current status of the Service Notices is available at the [EGNOS User support website](#).

### 4.3 User Consultations and Improvement Actions

#### 4.3.1 2018 EGNOS User Satisfaction Process

Each year, an overall EGNOS User Satisfaction Process is performed jointly by GSA and ESSP on the three EGNOS Services (SoL, OS and EDAS), in order to obtain valuable feedback on EGNOS use and ESSP performance, and to identify areas of improvement and define recommendations on the EGNOS services.

This process considers the feedback received via different means and interfaces like the EGNOS Service Provision Workshop, EGNOS User Support activities and the ESSP participation in multimodal forums, GNSS implementation projects, working groups or relevant events. The main input, however, are the user satisfaction surveys that are widely distributed to the key users and stakeholders of each EGNOS Services.

The EGNOS User Satisfaction Survey was launched in December 2018 and closed on 18/03/2019 using a specific online platform. A total of 140 responses were received.

The outputs from this survey will be included in the [EGNOS Bulletin Q2 2019](#) and published on the EGNOS User Support Website.

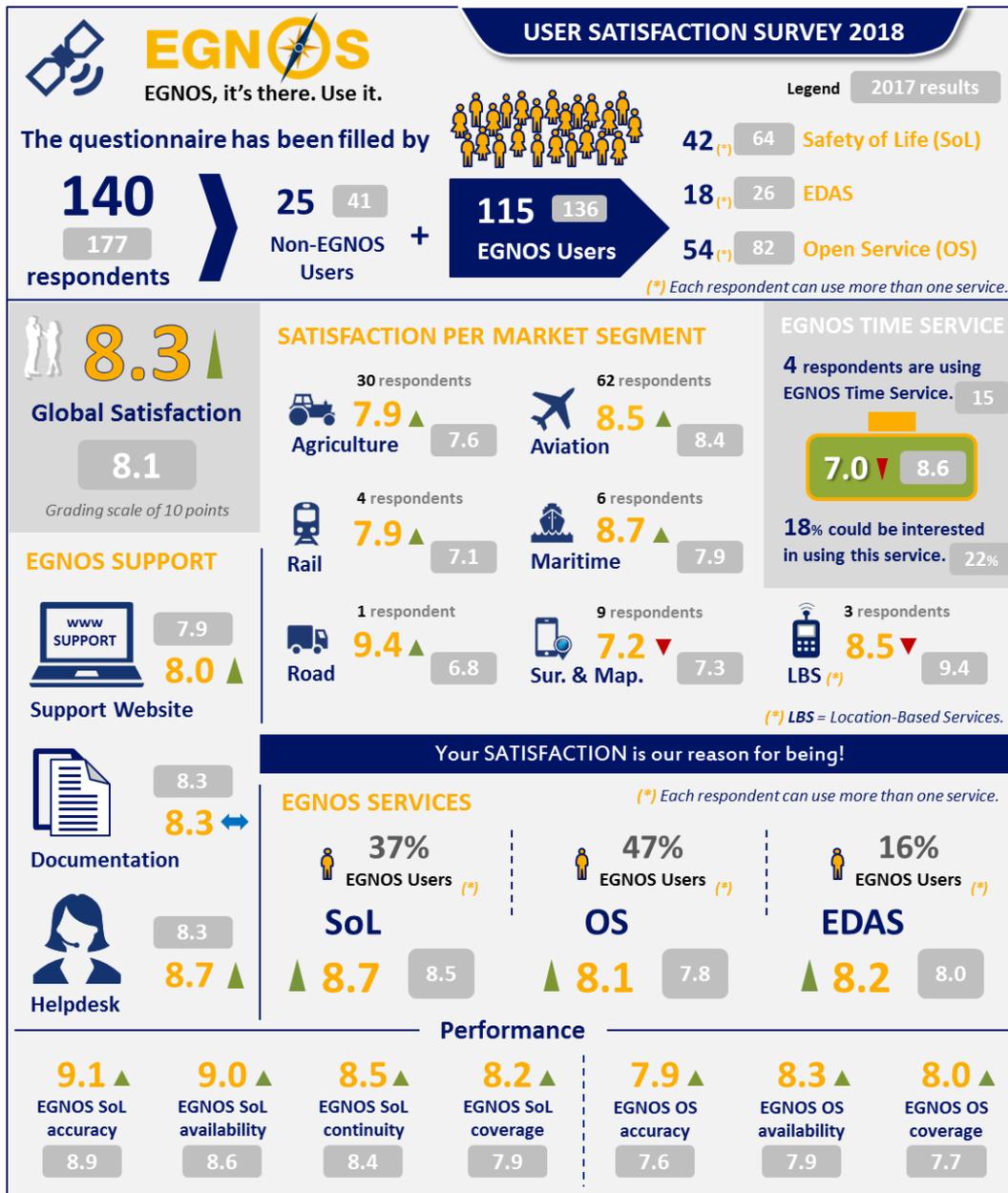


Figure 43: Summary of results from User Satisfaction Survey

Key conclusions on EGNOS User Satisfaction (Evolution from 2017 to 2018):

EGNOS users show a satisfaction level higher than that obtained in 2017 (8.3 in 2018 versus 8.1 in 2017). This represents an exceptionally good level of satisfaction with respect to EGNOS in general terms. In particular, note the increase achieved in Agriculture (from 7.6 in 2017 to 7.9 in 2018).

- **EGNOS SERVICES:** the scores have improved for all EGNOS Services (SoL, OS and EDAS), with all of them at over 8.0. Note that performance scores have increased with respect to those obtained in 2017 in all services.
- **EGNOS USER SUPPORT:** the user satisfaction level is higher in 2018 than it was in 2017 for the website (8.0 versus 7.9) and for the helpdesk (8.7 versus 8.3). Among the EGNOS Documentation elements, the EGNOS Service Implementation Roadmaps have significantly increased the satisfaction level ( 8.2 versus 7.7)

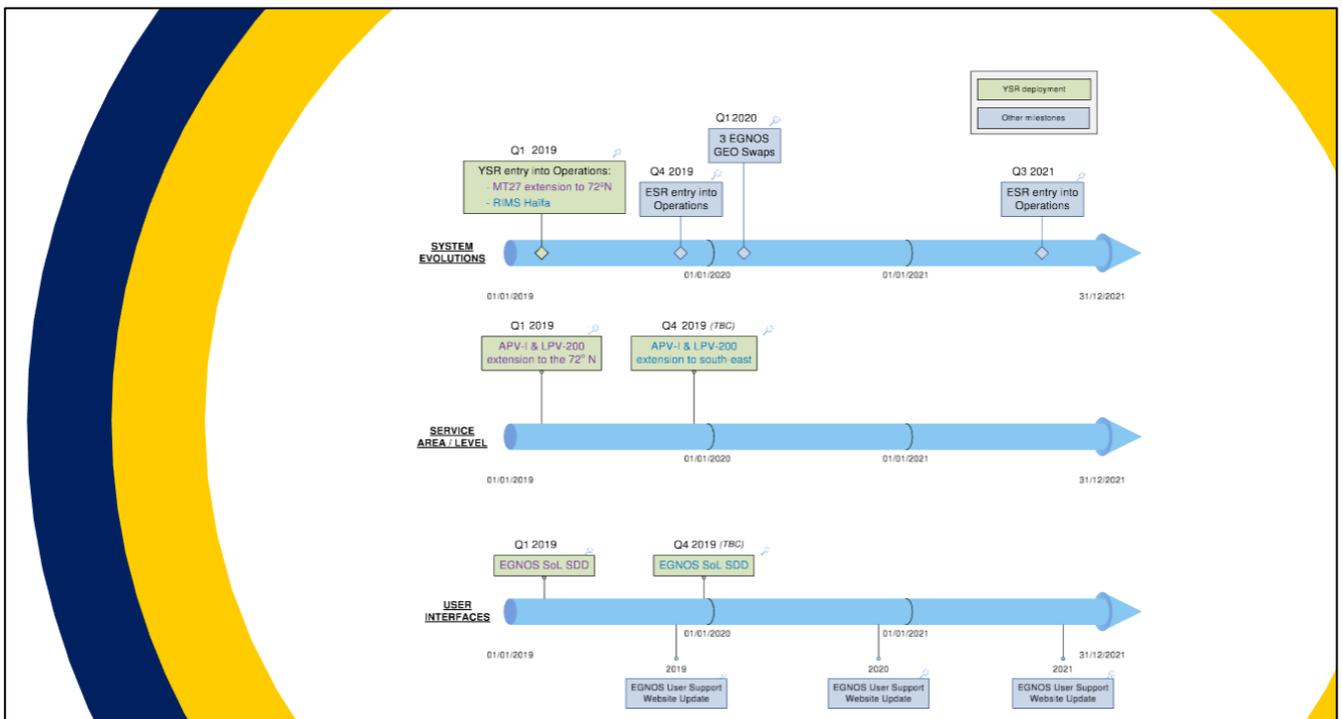
#### 4.4 Service Implementation Roadmaps

The EGNOS Services' Roadmaps provide a high-level overview of the EGNOS Services' current status and their expected evolutions in a 3-year timeframe linked to the consecutive EGNOS System Releases' deployments and information/interfaces improvements/changes. These roadmaps are mainly focused on 4 different areas: Service Evolution, Service Area / Service Level (or Data availability in EDAS), Service Robustness and User Interfaces.

The three EGNOS Services' Roadmaps were updated twice during the period of this report, first in July 2018 (v4.0) and later in February 2019 (v4.1). The current applicable version is available at:

- [EGNOS Open Service Roadmap](#)
- [EGNOS Safety of Life Service Roadmap](#)
- [EGNOS Data Access Service \(EDAS\) Roadmap](#)

Improvements of the SIR contents and presentation were done in these three documents mainly by the new visualisation of SIR contents intended to provide EGNOS users with a more user friendly, dynamic and interactive of obtaining information on the evolution of EGNOS services.



High level view of the EGNOS SoL service roadmap ([EGNOS User Support Website](#))

## 4.5 2018 EGNOS Multimodal Adoption Plan

The EGNOS adoption activities, as during the previous years, has proven to be a useful means of enhancing EGNOS use in aviation, maritime, agriculture & mapping and rail market segments. In aviation, ESSP and GSA have continued to engage aerodromes to publish EGNOS-based procedures and operators to get equipped and certified. Relevant stakeholders have also been identified during this period: aircraft lessors, as they represent a significant percentage of EU aircraft owners. Additionally, ESSP performed traffic assessments and Cost Benefit Analyses to support airline, OEM and airport decision-making processes regarding the adoption of EGNOS.

During the period reported in this document, 124 LPV procedures have been published (17 of them are “upgrades” from LPV to LPV200) and 131 aircraft have been certified or achieved operational approval.

Another 120 new aircraft/rotorcraft units have been engaged so that in the near future they will retrofit, start with the certification process or request SBAS options in the avionics for new unit orders. ESSP has proven to be a key facilitator in promoting, explaining and connecting potential partners within ANSPs, Avionics Manufacturers, Operators and Aircraft Manufacturers.

The flight simulator (each year with new flying procedures available, some not even published yet) has proven to be a useful tool for demonstrating to aviation users the benefits EGNOS can bring.



*Attendee trying the LPV simulator at the 2019 World ATM congress in Madrid*

Regarding the maritime domain, in 2018 the work done during previous years has materialized:

- on the one hand, it is now a reality that EDAS is being used as a positioning source for a number of IALA DGNSS stations in some EU countries (France and Estonia), demonstrating both the technical feasibility and the cost savings from the point of view of infrastructure deployment/maintenance. EGNOS SIS is used as a back-up in German IALA beacon infrastructure.

- On the other, the preliminary work needed to assess the feasibility to declare an EGNOS L1 Service has been triggered.

In agriculture and mapping, the contacts network has increased significantly, in particular in farming, where both “Precision Farming Instructors” and leading tractor manufacturers have been approached, enabling further understanding of the use of EGNOS in this market segment, and liaising with key stakeholders to foster EGNOS awareness and promotion. In this period, ESSP has continued to offer users “proof of concept” or demonstrations; that is, offering the possibility to evaluate in a practical situation how EGNOS could resolve their positioning needs. This approach has proven successful in engaging users. The most relevant case has been IMBA Spain, who were convinced about EGNOS performance so as to include in their signalling manual the use of EGNOS for location purposes. ESSP has also continued preparing customized information for those market segments prepared and provided both at specific workshops held at events and made available through the EGNOS User Support Website.

In relation to rail activities, ESSP has continued supporting GSA in accordance with the [E- GNSS in rail signalling roadmap](#).

Extract of guidelines “[How to configure agriculture EGNOS receivers](#)”

## 4.6 Communication and EGNOS Promotion Activities

### 4.6.1 2018 EU Space Week - EGNOS SoL Session

The [EU Space Week 2018](#) took place in Marseille between the 3rd and 6th of December. The event, comprised of a series of workshops, conferences and sessions around the EU space programmes Copernicus, EGNOS and Galileo, was organised by the European GNSS Agency (GSA). The session devoted to the EGNOS Safety Of Life service and applications was attended by nearly 100 attendees from across Europe.

The session started with a first set of presentations from some of the key actors from the EGNOS programme: GSA (as EGNOS Programme Manager), ESSP (in its role of EGNOS Service Provider) and EASA (as Oversight Authority for EGNOS). Those presentations focused on the progress made in the implementation of EGNOS based operations, the strategy from the programme to keep increasing EGNOS adoption, and the new PBN implementing rule.

After that, EGNOS users from the aviation market segment took the floor. Major European ANSPs (DSNA from France and DFS from Germany) explained how EGNOS is driving their strategy to increase airspace management efficiency and safety. On the operators side, one of the main commercial (Air France) and business aviation (Netjets) companies in Europe briefed the audience about the benefits that EGNOS provides and/or will provide for their daily operations. Airport accessibility and cost reduction were two of the headlines. On the user equipment side, a receiver manufacturer (Collins Aerospace) provided its view on the EGNOS benefits and shared his immediate plans linked to the development of new generation receivers. Finally, attendees could learn about a pioneer implementation of EGNOS-enabled routes for helicopter rescue operations in Italy (Caproni Airport).

EGNOS was also present in the first half of the [Plenary session](#). GSA presented both the EGNOS programme status and the market strategy, together with the achievements reached in adopting this service in different segments. ESSP presented an overview of the different EGNOS services, and explained the different interfaces established with users.

Finally, the EU Space Week attendees could experience the benefits of EGNOS for airport approach operations and farming activities thanks to the LPV and the Agriculture simulators.



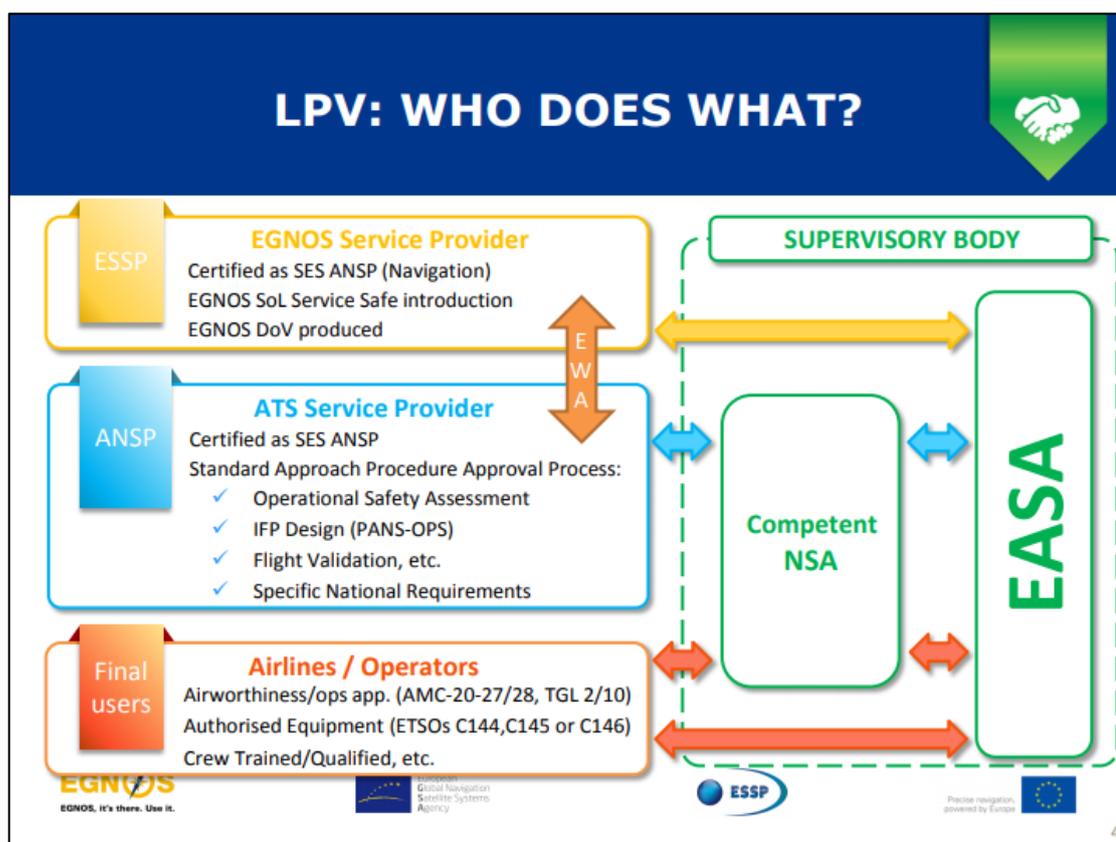
*Carlo des Dorides, Executive Director (GSA) at the EU Space Week*

## 5 KEY ACTIVITIES PLANNED FOR THE YEAR AHEAD

### 5.1 EGNOS Working Agreement Implementation in Aviation

The EWA contents are expected to evolve and to be improved to cover the users' eventual needs and the applicable EU regulation. The main activities planned with regards to the EWA are:

- EWA improvement activities: addressing the improvement of the Collaborative Decision Making, GNSS Data recording service arrangements and reinforcing the communication with all types of users under the EGNOS Working Agreement..
- Finalization/confirmation of the EWA for Aerodrome Operators concept, facilitating the implementation of EGNOS based procedures in scenarios where non-SES certified ANSPs operate, supporting the application of National Regulation.
- Finalization/confirmation of the EWA for Rotorcraft Operators concept, facilitating the implementation of EGNOS based procedures in scenarios where Rotorcraft operate without the support of an ATS Provider (e.g. HEMS operations to hospitals using PinS approaches).



The EGNOS Working Agreement as an enabler for LPV implementation  
([EGNOS in aviation: implementation status](#) presentation at the EU Space Week)

## 5.2 Evolution of EGNOS Service related documents

### EGNOS Service Definition Documents (SDD)

One Service Definition Document is planned to be published over the next yearly period:

- A new version of the SoL SDD linked to ESR 2.4.1N (YSR#4\_PSS1) with the inclusion on the new RIMS station in the East-Mediterranean Region (RIMS Haifa). This new SoL SDD is expected to be published before 28<sup>th</sup> of November 2019.

### Service Implementation Roadmaps

The next publication is expected after summer 2019. The main items addressed by the next versions of the Service Roadmaps are:

- The publication of the SoL SDD with the inclusion of RIMS Haifa, it is expected an extension of the commitment areas for APV-I and LPV-200 to the south-east of Europe.
- GEO swaps due to ESR 2.4.2I new release deployment between INMARSAT 4F2 (PRN126), ASTRA SES-5 (PRN136) and ASTRA 5B (PRN123).
- Information regarding next EGNOS system releases.

**Filter by:**

Status ▼

Segments ▼

Document type ▼  
Service Notices

Audience ▼



**Service Notice #21 EGNOS System Release 2.4.1N\_YSR4-PSS1 entry in operations - (In Force)**

Service Notices | Friday, February 15, 2019

The EGNOS Service Notices are notifications published whenever there is any complementary information that could have a relevant impact in any of the EGNOS Service Definition Documents' contents. Hence, an EGNOS Service Notice is a temporal amendment to the EGNOS Service Definition Documents.

[service\\_notice\\_21.pdf](#)



**Service Notice #20 EGNOS GEO PRN 120 Decommissioning - (In Force)**

Service Notices | Thursday, December 20, 2018

The EGNOS Service Notices are notifications published whenever there is any complementary information that could have a relevant impact in any of the EGNOS Service Definition Documents' contents. Hence, an EGNOS Service Notice is a temporal amendment to the EGNOS Service Definition Documents.

[service\\_notice\\_20.pdf](#)

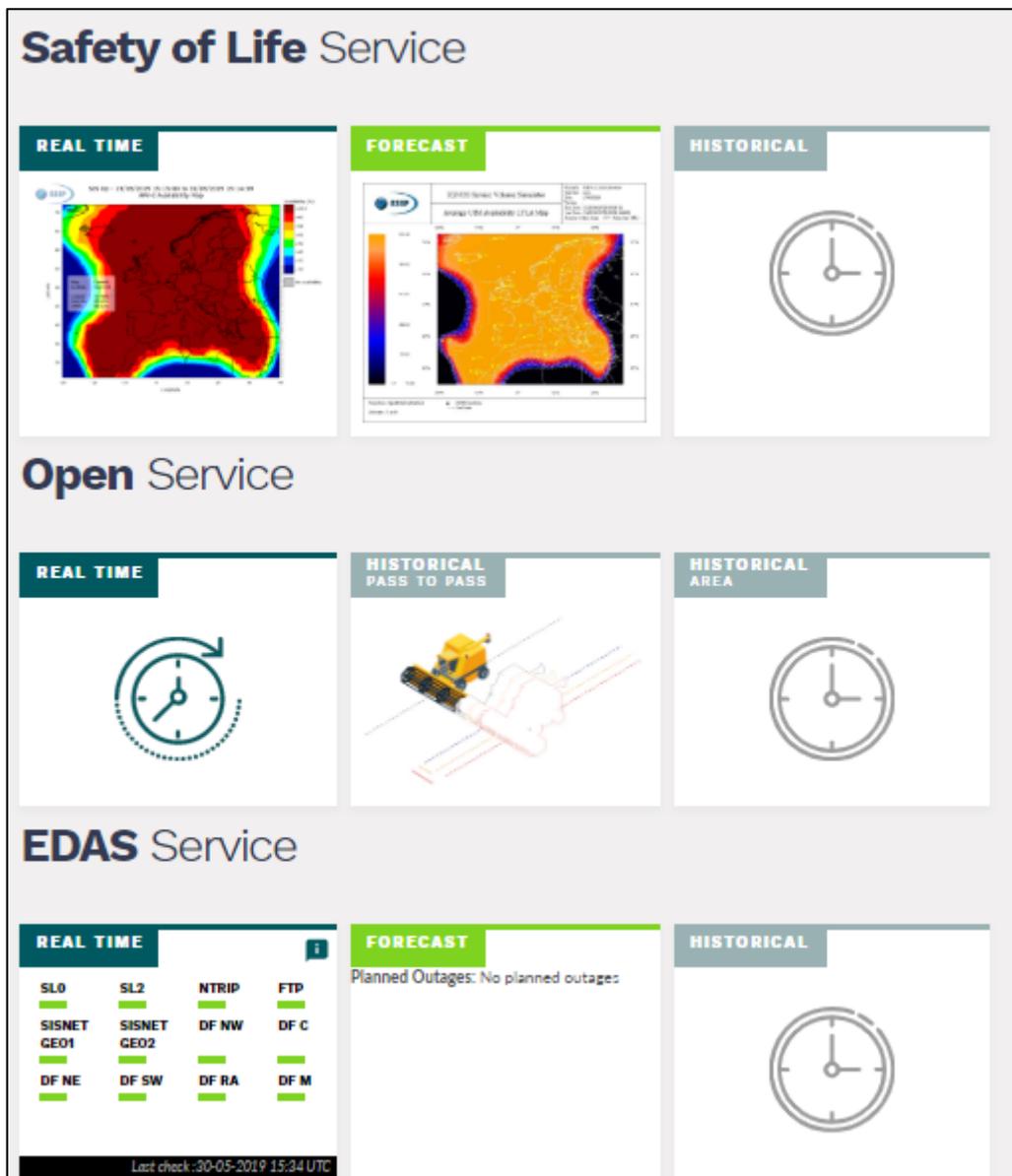
Service Notices at the [EGNOS User Support Website](#)

### 5.3 User Services Evolution

The EGNOS User Support website is continuously evolving to better support the adoption of EGNOS and the needs from the different user communities.

The main priorities for the next period are:

- Publish contents focused on the Aviation segment like the Aviation Portal, Aviation Dashboard, and Customized Dashboard for ANPS.
- Continue publishing news articles in coordination with GSA/communication.
- Anticipate the impact of the future GEO Swap on EGNOS OS users and launch an awareness campaign to minimize issues.
- Increase the robustness of the EGNOS alerts system.



EGNOS Service status dashboard – [EGNOS User Support Website](#)

## 5.4 EGNOS Multimodal Adoption Action Plan 2019

The EGNOS Multimodal Adoption (EMA) plan establishes, on a yearly basis, the different activities that should be put in place to leverage the use of EGNOS by all different market segments. These are agreed between the GSA and the ESSP at the beginning of the year and their progress is reviewed on a regular basis. The activities to be developed during 2019 are distributed into four different market segments: aviation (where the major effort is placed), maritime, agriculture & surveying & timing and finally rail.

In relation with aviation, the activities focus on an active promotion and engagement of aviation stakeholders (aerodromes, ANSPs, and operators) by means of Traffic Assessments and CBAs and the continuous follow-up of EGNOS implementation status (that allows to update each month the [LPV procedures map](#) in the EGNOS User Support Website). Support on drones activities and potential new applications as ADS-B will be also provided. Last, but not least, ESSP will continue supporting GSA in the key aviation events in Europe as WATM, AeroFriedrichshafen, EBACE; Helitech, ERAA, etc.:

In the maritime segment, support will be provided to those maritime and inland waterways authorities interested in the transmission of EGNOS corrections via IALA beacons and AIS stations by offering a trade-off architecture analysis (supported with a CBA). Additionally, a continuous analysis of the different SBAS compatible devices, focusing also on the notified bodies, will be performed.

In the scope of agriculture & mapping, contacts triggered on previous years will be maintained to keep supporting users and demonstrating EGNOS benefits.

Finally, looking at the rail sector, a market analysis devoted to telematics wagons in freight cargo operators is ongoing.

**EGNOS Success Story**

### AirBaltic starts LPV operation in Dash8 fleet

March 2018



Credits: Air Baltic

EGNOS Success Story

After successful completion of PBN training for crew, the Latvian operator has carried out over 20 LPV operations on their Dash 8 Q400 fleet. These operations are not new to [AirBaltic](#) as the functionality is also available on their Bombardier CS300 for which they are the launch customer worldwide. However, contrary to the CSeries which are LPV ready by default, the Dash8 required certain modifications to receive certification for LPV.

The Supplemental Type Certificate for this retrofit, which was developed by the USA design organisation Canard, had been previously approved by the FAA in November 2016 and received EASA certification under STC number 10061069 on the 22nd of February 2017. To date, airBaltic has upgraded 8 units out of 12 in fleet while the remaining 4 will be upgraded during the next maintenance C-check scheduled in winter 2018.

The STC is based on the installation of Universal Avionics UNS-1Ew FMS, GPS/SBAS antennas and Blue Avionics BA-440 router/filter which feeds FMS data into the EGPWS computer during a LPV approach, fully complying with the former EASA regulation on "Excessive Downward Deviation From Glideslope" alerting for TAWS.

[AirBaltic](#), which performs more than 40 thousand flights per year, is currently flying to 25 European destinations with an LPV in place and these could grow up to 34 by 2019 according to current ANSPs' plans, putting the performed LPV numbers on a clearly growing trend.

The development of such STC as well as the purchase of the equipment, its installation, certification and crew training have been funded by GSA through a Competitive Call for Grants launched in 2014.





*The Multimodal Adoption plan is a key enabler for new [EGNOS Success Stories](#)*

## APPENDIX A FULL LIST OF EGNOS-BASED APPROACH PROCEDURES

The information shown in this annex corresponds to the situation at AIRAC Cycle#1904 (28/03/2019). For an up to date list of the published EGNOS based procedures, please refer to the [EGNOS User Support Website](#).

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	HUSAVIK	Iceland	BIHU	1	29/03/2019							1
Aerodrome	Antwerpen / Deurne	Belgium	EBAW	1	10/12/2015							1
Aerodrome	Brussels-National	Belgium	EBBR	4	06/12/2018							4
Aerodrome	Charleroi / Brussels South	Belgium	EBCI	2	31/03/2016							2
Aerodrome	Liège	Belgium	EBLG	2	13/10/2016							2
Aerodrome	Kortrijk/Wevelgem	Belgium	EBKT	1	09/11/2017							1
Aerodrome	Oostende-Brugge	Belgium	EBOS					2	03/01/2019			2
Aerodrome	Bautzen	Germany	EDAB	2	27/04/2017		15/12/2011					2
Aerodrome	Leipzig/Altenburg	Germany	EDAC					2	28/03/2019			2
Aerodrome	Schoenhagen	Germany	EDAZ					1	11/10/2018			1
Aerodrome	Barth	Germany	EDBH			1	03/06/2010					1
Aerodrome	Magdeburg/City	Germany	EDBM	1	13/12/2012							1
Aerodrome	Neubrandenburg	Germany	EDBN	2	02/04/2015							2
Aerodrome	Berlin/Schönefeld	Germany	EDDB			2	04/06/2009					2
Aerodrome	Dresden	Germany	EDDC			2	15/12/2011					2
Aerodrome	Erfurt-Weimar	Germany	EDDE			2	15/12/2011					2
Aerodrome	Frankfurt Main	Germany	EDDF			4	15/12/2011					4
Aerodrome	Münster/Osnabrück	Germany	EDDG			2	15/12/2011					2
Aerodrome	Hamburg	Germany	EDDH			4	15/12/2011					4
Aerodrome	Köln/Bonn	Germany	EDDK			6	15/12/2011					6
Aerodrome	Düsseldorf	Germany	EDDL			4	15/12/2011					4
Aerodrome	München	Germany	EDDM			4	15/12/2011					4

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Nürnberg	Germany	EDDN			1	15/12/2011					1
Aerodrome	Leipzig/Halle	Germany	EDDP			4	15/12/2011					4
Aerodrome	Saarbrücken	Germany	EDDR		01/03/2018	2	28/03/2019					2
Aerodrome	Stuttgart	Germany	EDDS			1	15/12/2011					1
Aerodrome	Berlin-Tegel	Germany	EDDT			4	15/12/2011					4
Aerodrome	Hannover	Germany	EDDV			4	15/12/2011					4
Aerodrome	Bremen	Germany	EDDW				15/12/2011	2	30/03/2017			2
Aerodrome	Frankfurt Hahn	Germany	EDFH		23/07/2015			2	14/09/2017			2
Aerodrome	Allendorf/Eder	Germany	EDFQ	1	21/08/2014							1
Aerodrome	Siegerland	Germany	EDGS	1	12/10/2017			1	12/10/2017			2
Aerodrome	Hamburg-Finkenwerder	Germany	EDHI	2	13/12/2012							2
Aerodrome	Memmingen	Germany	EDJA			2	15/12/2011					2
Aerodrome	Moenchengladbach	Germany	EDLN					2	06/12/2018			2
Aerodrome	Paderborn/Lippstadt	Germany	EDLP	2	13/12/2012							2
Aerodrome	Niederrhein	Germany	EDLV	1	23/06/2016							1
Aerodrome	Dortmund	Germany	EDLW	2	12/12/2013							2
Aerodrome	Augsburg	Germany	EDMA			1	15/12/2011	1	11/10/2018			2
Aerodrome	Eggenfelden	Germany	EDME	1	11/12/2014							1
Aerodrome	Oberpfaffenhofen	Germany	EDMO	1	13/12/2012							1
Aerodrome	Straubing	Germany	EDMS	1	11/12/2014							1
Aerodrome	Friedrichshafen	Germany	EDNY				15/12/2011	2	19/07/2018			2
Aerodrome	Donauwörth	Germany	EDPR	2	08/12/2016							2
Aerodrome	Coburg- Brandensteinebene	Germany	EDQC	1	11/12/2014							1
Aerodrome	Bayreuth	Germany	EDQD			1	15/12/2011					1
Aerodrome	Giebelstadt	Germany	EDQG			2	14/02/2012					2
Aerodrome	Hof-Plauen	Germany	EDQM					2	21/06/2018			2

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Karlsruhe/Baden-Baden	Germany	EDSB		17/09/2015			2	27/04/2017			2
Aerodrome	Donaueschingen- Villingen	Germany	EDTD	1	11/12/2014							1
Aerodrome	Lahr	Germany	EDTL	1	23/06/2016			1	27/04/2017			2
Aerodrome	Mengen-Hohentengen	Germany	EDTM	1	11/12/2014							1
Aerodrome	Schwäbisch-Hall	Germany	EDTY	2	13/12/2012							2
Aerodrome	Braunschweig-Wolfsburg	Germany	EDVE	2	18/10/2012							2
Aerodrome	Kassel-Calden	Germany	EDVK	2	04/04/2013							2
Aerodrome	Emden	Germany	EDWE	4	30/05/2013							4
Aerodrome	Wilhelmshaven JadeWeserAirport	Germany	EDWI			2	15/12/2011					2
Aerodrome	Sylt	Germany	EDXW	2	10/12/2015							2
Aerodrome	KÄRDLA	Estonia	EEKA	2	31/01/2019							2
Aerodrome	Kuressaare	Estonia	EEKE	2	02/03/2017							2
Aerodrome	LENNART MERI TALLINN	Estonia	EETN					2	06/12/2018			2
Aerodrome	Enontekiö	Finland	EFET			2	07/12/2017					2
Aerodrome	Ivalo	Finland	EFIV			2	07/12/2017					2
Aerodrome	Joensuu	Finland	EFJO	2	12/12/2013							2
Aerodrome	Jyväskylä	Finland	EFJY			2	07/12/2017					2
Aerodrome	Kemi-Tornio	Finland	EFKE			2	07/12/2017					2
Aerodrome	Kajaani	Finland	EFKI			2	07/12/2017					2
Aerodrome	Kokkola-Pietarsaari	Finland	EFKK			2	07/12/2017					2
Aerodrome	Kuusamo	Finland	EFKS			2	07/12/2017					2
Aerodrome	Kittilä	Finland	EFKT			2	07/12/2017					2
Aerodrome	Kuopio	Finland	EFKU			2	07/12/2017					2
Aerodrome	Lappeenranta	Finland	EFLP			2	07/12/2017					2
Aerodrome	MARIEHAMN	Finland	EFMA			2	08/12/2017					2

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Oulu	Finland	EFOU			2	07/12/2017					2
Aerodrome	Pori	Finland	EFPO			1	07/12/2017					1
Aerodrome	Rovaniemi	Finland	EFRO			2	07/12/2017					2
Aerodrome	Savonlinna	Finland	EFSA			2	07/12/2017					2
Aerodrome	Tampere-Pirkkala	Finland	EFTP			2	07/12/2017					2
Aerodrome	Turku	Finland	EFTU			2	07/12/2017					2
Aerodrome	Vaasa	Finland	EFVA			2	07/12/2017					2
Aerodrome	Campbeltown	United Kingdom	EGEC	2	23/06/2016							2
Aerodrome	Cardiff	United Kingdom	EGFF	2	13/10/2016							2
Aerodrome	Bristol	United Kingdom	EGGD	2	21/08/2014							2
Aerodrome	Lands End	United Kingdom	EGHC	4	27/04/2017							4
Aerodrome	Yeovil	United Kingdom	EGHG	2	09/06/2017							2
Aerodrome	Southampton	United Kingdom	EGHI	1	11/10/2018							1
Aerodrome	Alderney	Guernsey	EGJA	2	07/12/2011							2
Aerodrome	Barrow/Walney Island	United Kingdom	EGNL	2	23/06/2016							2
Aerodrome	Kirkwall	United Kingdom	EGPA	2	21/07/2016							2
Aerodrome	Sumburgh	United Kingdom	EGPB	3	11/10/2018							3
Aerodrome	Wick	United Kingdom	EGPC	2	23/06/2016							2
Aerodrome	Islay	United Kingdom	EGPI	2	18/08/2016							2
Aerodrome	Dundee	United Kingdom	EGPN	2	30/03/2017							2
Aerodrome	Barra	United Kingdom	EGPR	2	18/08/2016							2

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Tiree	United Kingdom	EGPU	2	04/02/2016							2
Aerodrome	Exeter	United Kingdom	EGTE	2	21/08/2014							2
Aerodrome	Amsterdam	Netherlands	EHAM	1	21/06/2018							1
Aerodrome	Eelde	Netherlands	EHGG	2	13/11/2014							2
Aerodrome	Teuge	Netherlands	EHTE	1	13/11/2014							1
Aerodrome	Cork Airport	Ireland	EICK	3	16/08/2018							3
Aerodrome	Dublin	Ireland	EIDW	4	25/05/2017							4
Aerodrome	Aarhus	Denmark	EKAH	2	05/03/2015							2
Aerodrome	Billund	Denmark	EKBI					2	20/07/2017			2
Aerodrome	Esbjerg	Denmark	EKEB	2	15/10/2015							2
Aerodrome	Karup	Denmark	EKKA	2	02/04/2015							2
Aerodrome	Sønderborg	Denmark	EKSB	2	18/08/2016							2
Aerodrome	Ålesund/Vigra	Norway	ENAL	2	03/03/2016							2
Aerodrome	Andøya/Andenes	Norway	ENAN	2	02/04/2015							2
Aerodrome	Førde/Bringeland	Norway	ENBL	1	28/05/2015			1	27/04/2017			2
Aerodrome	Brønnøysund/Brønnøy	Norway	ENBN	1	08/12/2016							1
Aerodrome	Bodo	Norway	ENBO	1	06/12/2018							1
Aerodrome	Bergen/Flesland	Norway	ENBR			1	03/03/2016	1	28/02/2019			2
Aerodrome	Kristiansand/Kjevik	Norway	ENCN			2	03/03/2016					2
Aerodrome	Bardufoss	Norway	ENDU	2	26/04/2018							2
Aerodrome	Harstad/Narvik/Evenes	Norway	ENEV	1	30/03/2017							1
Aerodrome	Florø	Norway	ENFL	1	02/04/2015							1
Aerodrome	Gardermoen	Norway	ENGM					4	10/11/2016			4
Aerodrome	Haugesund/Karmøy	Norway	ENHD			2	03/03/2016					2
Aerodrome	Kristiansund/Kvernberget	Norway	ENKB	2	26/05/2016							2

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Kirkenes/Hoybuktkmoen	Norway	ENKR	2	27/04/2017							2
Aerodrome	Leknes	Norway	ENLK	1	02/02/2017							1
Aerodrome	Mehamn	Norway	ENMH			2	28/03/2019					2
Aerodrome	Molde/Årø	Norway	ENML					2	30/03/2017			2
Aerodrome	Mosjøen/Kjærstad	Norway	ENMS	1	30/03/2017							1
Aerodrome	Namsos	Norway	ENNM		02/04/2015			2	27/04/2017			2
Aerodrome	Ørland	Norway	ENOL				03/03/2016	2	12/10/2017			2
Aerodrome	Rørvik/Ryum	Norway	ENRM					2	02/02/2017			2
Aerodrome	Røst	Norway	ENRS	2	06/03/2014							2
Aerodrome	Moss/Rygge	Norway	ENRY	2	10/12/2015							2
Aerodrome	Sogndal/Haukasen	Norway	ENSG		17/08/2017			1	14/09/2017			1
Aerodrome	Svolvær/Helle	Norway	ENSH	1	08/12/2016							1
Aerodrome	Stokmarknes/Skagen	Norway	ENSK	1	08/12/2016							1
Aerodrome	Stord/Sørstokken	Norway	ENSO			2	03/03/2016					2
Aerodrome	Sandnessjøen/Stokka	Norway	ENST	2	23/07/2015							2
Aerodrome	Sandefjord/Torp	Norway	ENTO	2	20/08/2015							2
Aerodrome	Trondheim/Vårnes	Norway	ENVA			2	03/03/2016					2
Aerodrome	Stavanger/Sola	Norway	ENZV				03/03/2016	4	09/11/2017			4
Aerodrome	Bydgoszcz - Szwederowo	Poland	EPBY					2	26/04/2018			2
Aerodrome	Gdańsk Lech Wałęsa	Poland	EPGD		28/05/2015			2	26/04/2018			2
Aerodrome	Kraków - Balice	Poland	EPKK		18/08/2016			2	26/04/2018			2
Aerodrome	Katowice	Poland	EPKT		03/04/2014			2	26/04/2018			2
Aerodrome	Lublin	Poland	EPLB					2	26/04/2018			2
Aerodrome	Łódź - Lublinek	Poland	EPLL					2	21/06/2018			2
Aerodrome	Warszawa/Modlin	Poland	EPMO					2	26/04/2018			2
Aerodrome	Rzeszów - Jasionka	Poland	EPRZ		15/09/2016			2	26/04/2018			2

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Szczecin - Goleniów	Poland	EPSC					2	26/04/2018			2
Aerodrome	Olsztyn - Mazury	Poland	EPSY					2	26/04/2018			2
Aerodrome	Warszawa - F. Chopin	Poland	EPWA					4	26/04/2018			4
Aerodrome	Wroclaw/Strachowice	Poland	EPWR		13/10/2016			2	26/04/2018			2
Aerodrome	Jönköping	Sweden	ESGJ	2	09/11/2017							2
Aerodrome	Skövde	Sweden	ESGR	2	31/05/2018							2
Aerodrome	Trollhättan-Vänersborgs flygplats	Sweden	ESGT	2	29/03/2018							2
Aerodrome	Kristianstad	Sweden	ESMK	2	06/12/2018							2
Aerodrome	Kalmar Öland Airport	Sweden	ESMQ	1	28/03/2019	1	28/03/2019					2
Aerodrome	Halmstad	Sweden	ESMT	2	08/11/2018							2
Aerodrome	Sveg	Sweden	ESND	2	31/01/2019							2
Aerodrome	Örnsköldsvik	Sweden	ESNO	2	07/12/2017							2
Aerodrome	Skellefteå Airport	Sweden	ESNS			2	28/03/2019					2
Aerodrome	Örebro Airport	Sweden	ESOE	2	16/08/2018							2
Aerodrome	Linköping/Saab	Sweden	ESSL	2	31/01/2019							2
Aerodrome	Norrköping Kungsängen	Sweden	ESSP	2	29/03/2018							2
Aerodrome	Ängelholm	Sweden	ESTA			2	19/07/2018					2
Aerodrome	Hemavan Tärnaby Airport AB	Sweden	ESUT	1	11/10/2018							1
Aerodrome	Dubrovnik	Croatia	LDDU	1	10/12/2015							1
Aerodrome	Pula	Croatia	LDPL	2	26/04/2018							2
Aerodrome	Osijek/Klisa	Croatia	LDOS	1	29/03/2018							1
Aerodrome	Split/Kastela	Croatia	LDSP					1	29/03/2018			1
Aerodrome	Zagreb/Pleso	Croatia	LDZA	2	29/03/2018							2
Aerodrome	Zadar	Croatia	LDZD	3	11/10/2018							3
Aerodrome	Almería	Spain	LEAM	2	02/02/2017							2

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Palma de Mallorca	Spain	LEPA	3	01/03/2018							3
Aerodrome	Valencia Airport	Spain	LEVC	2	01/02/2018							2
Aerodrome	Santander	Spain	LEXJ	2	17/10/2013							2
Aerodrome	Dieppe Saint Aubin	France	LFAB	1	02/03/2017							1
Aerodrome	Calais	France	LFAC	1	20/09/2012							1
Aerodrome	Albert Bray	France	LFAQ	1	15/11/2012			1	21/11/2017			2
Aerodrome	Le Touquet Paris Plage	France	LFAT	1	04/02/2016			1	21/11/2017			2
Aerodrome	Valenciennes Denain	France	LFAV	1	19/09/2013			1	21/11/2017			2
Aerodrome	Amiens Glisy	France	LFAY	1	27/06/2013							1
Aerodrome	Agen La Garenne	France	LFBA		06/03/2014			1	21/11/2017			1
Aerodrome	Bordeaux Merignac	France	LFBD	3	08/03/2012			1	21/11/2017			4
Aerodrome	Bergerac	France	LFBE		09/01/2014			2	21/11/2017			2
Aerodrome	Toulouse Francazal	France	LFBF	2	23/06/2016							2
Aerodrome	La Rochelle	France	LFBH	1	20/09/2012							1
Aerodrome	Poitiers Biard	France	LFBI	1	12/11/2015			1	21/11/2017			2
Aerodrome	Montluçon Gueret	France	LFBK	1	17/12/2013							1
Aerodrome	Limoges	France	LFBL		28/06/2012			2	21/11/2017			2
Aerodrome	Niort Marais Poitevin	France	LFBN	1	02/03/2017							1
Aerodrome	Toulouse Blagnac	France	LFBO	4	03/05/2012							4
Aerodrome	Pau-Pyrénées	France	LFBP	1	17/03/2011							1
Aerodrome	Muret Lherm	France	LFBR	1	15/10/2015							1
Aerodrome	Tarbes Lourdes Pyrénées	France	LFBT	1	28/05/2015							1
Aerodrome	Angoulême Brie Champniers	France	LFBU		03/04/2014			2	21/11/2017			2
Aerodrome	Périgueux Bassillac	France	LFBX		28/05/2015			1	25/05/2017			1
Aerodrome	Biarritz Bayonne Anglet	France	LFBZ		09/02/2012		01/01/2013	2	26/04/2018			2
Aerodrome	Albi Le Sequestre	France	LFCI	1	26/05/2016			1	21/11/2017			2

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Castres Mazamet	France	LFCK	1	22/08/2013							1
Aerodrome	Rodez Marcillac	France	LFGR	1	31/05/2012			1	21/11/2017			2
Aerodrome	Royan Médis	France	LFCY	1	30/04/2015							1
Aerodrome	Auch Lamothe	France	LFDH	2	28/05/2015							2
Aerodrome	Rochefort Charente Maritime	France	LFDN					1	23/05/2018			1
Aerodrome	Ouessant	France	LFEC	2	11/12/2014							2
Aerodrome	Colmar Houssen	France	LFGA		02/05/2013			2	21/06/2018			2
Aerodrome	Dole Tavaux	France	LFGJ		09/01/2014			1	21/11/2017			1
Aerodrome	Le Puy Loudes	France	LFHP	1	04/02/2016			1	28/02/2019			2
Aerodrome	Moulins Montbeugny	France	LFHY	1	01/05/2014							1
Aerodrome	Metz Nancy Lorraine	France	LFJL	1	04/04/2013			1	21/11/2017			2
Aerodrome	Angers Marcé	France	LFJR		07/01/2016			1	21/11/2017			1
Aerodrome	Bastia Poretta	France	LFKB					1	07/12/2017			1
Aerodrome	Calvi Sainte Catherine	France	LFKC	2	30/04/2015							2
Aerodrome	Ajaccio Napoléon Bonaparte	France	LFKJ	1	23/06/2016							1
Aerodrome	Figari Sud Corse	France	LFKF					1	21/11/2017			1
Aerodrome	Auxerre Branches	France	LFLA	2	21/08/2014							2
Aerodrome	Clermont-Ferrand Auvergne	France	LFLC		05/05/2011			1	21/11/2017			1
Aerodrome	Bourges	France	LFLD	1	18/08/2016							1
Aerodrome	Lyon St Exupery	France	LFLI	4	07/02/2013							4
Aerodrome	Saint Yan	France	LFLN					2	02/03/2017			2
Aerodrome	Annecy Meythet	France	LFLP	2	19/09/2013							2
Aerodrome	Grenoble Isere	France	LFLS		07/03/2013			2	13/10/2016			2
Aerodrome	Valence	France	LFLU		13/12/2012			1	21/11/2017			1
Aerodrome	Vichy Charmeil	France	LFLV		05/02/2015			1	26/04/2018			1

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Aurillac	France	LFLW	1	26/06/2014							1
Aerodrome	Chateauroux Deols	France	LFLX	1	06/02/2014							1
Aerodrome	Lyon Bron	France	LFLY					2	28/09/2016			2
Aerodrome	Cannes Mandelieu	France	LFMD	1	05/02/2015							1
Aerodrome	Saint Étienne Bouthéon	France	LFMH		24/07/2014			2	02/02/2017			2
Aerodrome	Carcassonne Salvaza	France	LFMK		03/05/2012			1	21/11/2017			1
Aerodrome	Marseille	France	LFML	4	08/01/2015	2	25/06/2015					6
Aerodrome	Nice Côte d'Azur	France	LFMN	2	25/06/2015							2
Aerodrome	Perpignan Rivesaltes	France	LFMP	1	15/10/2015							1
Aerodrome	Béziers Vias	France	LFMU	2	18/10/2012							2
Aerodrome	Avignon Caumont	France	LFMV					3	21/06/2018			3
Aerodrome	Mende	France	LFNB	1	17/12/2013							1
Aerodrome	Beauvais	France	LFOB	1	20/09/2012							1
Aerodrome	Évreux Fauville	France	LFOE	2	15/11/2012							2
Aerodrome	Le Havre Octeville	France	LFOH		10/12/2015			1	21/11/2017			1
Aerodrome	Orleans Bricy	France	LFOJ	2	18/09/2014							2
Aerodrome	Chalons Vatry	France	LFOK	2	02/02/2017							2
Aerodrome	Blois Le Breuil	France	LFOQ	1	15/09/2016							1
Aerodrome	Cholet le Pontreau	France	LFOU	2	04/02/2016							2
Aerodrome	Laval Entrammes	France	LFOV	2	26/04/2018							2
Aerodrome	Orléans St. Denis De L'Hotel	France	LFOZ	2	28/06/2012							2
Aerodrome	Paris-Le Bourget	France	LFPB	1	02/06/2011			1	21/11/2017			2
Aerodrome	Paris Charles de Gaulle	France	LFPG					8	28/04/2016			8
Aerodrome	Melun Villaroche	France	LFPM		10/12/2015			2	21/11/2017			2
Aerodrome	Toussus Le Noble	France	LFPN					2	27/04/2017			2
Aerodrome	Paris Orly	France	LFPO	4	30/05/2013	1	30/04/2015	1	21/11/2017			6

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Pontoise Cormeilles en Vexin	France	LFPT	1	01/05/2014			2	21/11/2017			3
Aerodrome	Reims Prunay	France	LFQA	1	03/04/2014							1
Aerodrome	Troyes Barberey	France	LFQB					2	18/08/2016			2
Aerodrome	Nevers Fouchambault	France	LFQG	1	13/12/2012							1
Aerodrome	Besançon La Vèze	France	LFQM	1	18/09/2014							1
Aerodrome	Lille Lesquin	France	LFQQ	3	26/06/2014							3
Aerodrome	Merville	France	LFQT	2	15/11/2012							2
Aerodrome	Brest Bretagne	France	LFRB	1	03/05/2012	1	01/01/2014					2
Aerodrome	Cherbourg Maupertus	France	LFRC					1	23/06/2016			1
Aerodrome	Dinard	France	LFRD	1	06/02/2014			1	21/11/2017			2
Aerodrome	Deauville Saint Gatien	France	LFRG	1	18/09/2014							1
Aerodrome	La Roche Sur Yon	France	LFRI		13/12/2012			1	10/11/2016			1
Aerodrome	Caen Carpiquet	France	LFRK		11/12/2014			1	21/11/2017			1
Aerodrome	Le Mans	France	LFRM	1	15/11/2012							1
Aerodrome	Rennes	France	LFRN	2	30/05/2013							2
Aerodrome	Lannion	France	LFRO		07/01/2016			1	21/11/2017			1
Aerodrome	Quimper	France	LFRQ	1	29/03/2019			1	21/11/2017			2
Aerodrome	Nantes	France	LFRS	1	28/06/2012							1
Aerodrome	Saint Briec Armor	France	LFRT		10/12/2015			1	21/11/2017			1
Aerodrome	Morlaix Ploujean	France	LFRU	1	13/10/2016							1
Aerodrome	Vannes Meucon	France	LFRV	1	31/05/2012							1
Aerodrome	Saint Nazaire Montoir	France	LFRZ		28/10/2014			1	21/11/2017			1
Aerodrome	Bâle-Mulhouse	France	LFSB	2	10/12/2015							2
Aerodrome	Dijon-Longvic	France	LFSD	1	28/04/2016							1
Aerodrome	Epinal Mirecourt	France	LFSG	1	30/05/2013							1
Aerodrome	Brive Souillac	France	LFSL	2	22/08/2013							2

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Nancy Essey	France	LFSN		02/05/2013			1	26/04/2018			1
Aerodrome	Strasbourg Entzheim	France	LFST		10/12/2015			2	21/11/2017			2
Aerodrome	Nîmes Garons	France	LFTW	1	18/10/2012			1	21/11/2017			2
Aerodrome	Budapest Liszt Ferenc	Hungary	LHBP					4	15/09/2016			4
Aerodrome	Lamezia Terme	Italy	LICA	1	23/05/2018							1
Aerodrome	PANTELLERIA	Italy	LICG					1	21/06/2018			1
Aerodrome	PALERMO/Punta Raisi	Italy	LICJ	3	11/10/2018							3
Aerodrome	Reggio Calabria	Italy	LICR					1	19/07/2018			1
Aerodrome	ALGHERO/Fertilia	Italy	LIEA	2	11/10/2018							2
Aerodrome	Olbia/Costa Smeralda	Italy	LIEO	2	12/11/2015							2
Aerodrome	Milano/Malpensa	Italy	LIMC	2	21/08/2014							2
Aerodrome	Bergamo / Orio al Serio	Italy	LIME	1	20/07/2017							1
Aerodrome	Milano/Linate	Italy	LIML	2	13/12/2012							2
Aerodrome	Parma	Italy	LIMP					1	23/05/2018			1
Aerodrome	Cuneo/Levaldigi	Italy	LIMZ					1	23/05/2018			1
Aerodrome	BOLOGNA / Borgo Panigale	Italy	LIPE	2	03/01/2019							2
Aerodrome	ANCONA / Falconara	Italy	LIPY					1	03/01/2019			1
Aerodrome	Venezia/Tessera	Italy	LIPZ	4	27/06/2013							4
Aerodrome	Verona/Villafranca	Italy	LIPX	1	22/06/2017							1
Aerodrome	Roma/Fiumicino	Italy	LIRF	6	10/01/2013							6
Aerodrome	Firenze/Peretola	Italy	LIRQ	1	22/06/2017							1
Aerodrome	Kunovice	Czech Republic	LKKU	1	01/12/2017							1
Aerodrome	Karlovy Vary	Czech Republic	LKKV	2	13/11/2014							2
Aerodrome	Ostrava	Czech Republic	LKMT	2	09/01/2014							2

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Praha	Czech Republic	LKPR			4	09/01/2014					4
Aerodrome	Brno	Czech Republic	LKTB	2	09/01/2014							2
Aerodrome	Praha/Vodochody	Czech republic	LKVO	2	25/06/2015							2
Aerodrome	Luqa	Malta	LMML	2	11/10/2018			2	11/10/2018			4
Aerodrome	Vöslau	Austria	LOAV	1	28/02/2019							1
Aerodrome	ÖAMTC/Oberwart	Austria	LODO	1	28/02/2019							1
Aerodrome	Graz	Austria	LOWG		09/01/2014			1	01/03/2018			1
Aerodrome	Innsbruck	Austria	LOWI					1	01/02/2018			1
Aerodrome	Klagenfurt	Austria	LOWK					1	11/10/2018			1
Aerodrome	Linz	Austria	LOWL		09/01/2014			2	02/02/2017			2
Aerodrome	Wien - Schwechat	Austria	LOWW					3	02/02/2017			3
Aerodrome	Porto	Portugal	LPPR	1	12/10/2017							1
Aerodrome	Lisboa	Portugal	LPPT	2	28/05/2015							2
Aerodrome	Cluj - Napoca / Avram Iancu	Romania	LRCL	2	10/11/2016							2
Aerodrome	Les Eplatures	Switzerland	LSGC					2	26/05/2016			2
Aerodrome	Genève	Switzerland	LSGG		12/11/2015			2	13/09/2018			2
Aerodrome	Bern-Insel Hospital	Switzerland	LSHI	1	23/07/2015							1
Aerodrome	Dübendorf	Switzerland	LSMD	2	21/08/2014							2
Aerodrome	Emmen	Switzerland	LSME	1	03/04/2014							1
Aerodrome	Payerne	Switzerland	LSMP	1	17/09/2015							1
Aerodrome	Berne-Belp	Switzerland	LSZB	1	07/03/2013							1
Aerodrome	Grenchen	Switzerland	LSZG	1	25/07/2013							1
Aerodrome	Zurich	Switzerland	LSZH	1	06/12/2018			1	25/05/2017			2
Aerodrome	St. Gallen-Altentrhein	Switzerland	LSZR	1	17/11/2011							1

Operational Aerodromes / Heliports /Routes												
Aerodrome/ Route	Name	Country	ICAO Code	APV-I Procedure	Activation APV-I procedure	APV Baro Procedure	Activation APV Baro Procedure	LPV-200 Procedur e	Activation LPV-200 procedure	RNP 0.3 Procedure	Activation RNP 0.3 procedure	Total Procedures
Aerodrome	Bratislava-Milan Rastislav Štefánik	Slovak Republic	LZIB	2	05/02/2015							2
Aerodrome	Košice	Slovak Republic	LZKZ	2	05/02/2015							2
Aerodrome	Piešťany	Slovak Republic	LZPP					1	02/02/2017			1
Aerodrome	POPRAD-Tatry	Slovak Republic	LZTT					2	29/03/2018			2
Aerodrome	Žilina	Slovak Republic	LZZI					1	25/05/2017			1
Route	Hel Low-Flight Route KY251	Switzerland	KY251							1	22/06/2017	1
Route	Hel Low-Flight Route KY252	Switzerland	KY252							1	22/06/2017	1
Route	Hel Low-Flight Route KY253	Switzerland	KY253							1	22/06/2017	1
Route	Hel Low-Flight Route KY256	Switzerland	KY256							1	22/06/2017	1
Route	Hel Low-Flight Route KY257	Switzerland	KY257							1	22/06/2017	1

Table 15: Full list of EGNOS-based Approach Procedures as of 28<sup>th</sup> March 2019 (AIRAC cycle#1904)



We certify you're there.

END OF DOCUMENT