The EGNOS Service Provider

Monthly Performance Report
November 2017

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EXECUTIVE SUMMARY

This report presents the EGNOS services performance during November 2017. The report contains global results for the reported period, including maps and tables with the performance observed at different locations in Europe using GEO-combined values for PRN120 – PRN123. A list of the stations analyzed in this report, including their location can be found in Appendix A. Additional and more detailed information about EGNOS performance can be found at the EGNOS User Support website (https://egnos-user-support.essp-sas.eu).

Safety of Life Service (SoL)

The results corresponding to APV-I and LPV200 Availability and Continuity for this month have been excellent in terms of service area coverage, and the compliance level with respect to the SDD commitment is even better than the previous months.

The percentage[1] of SoL SDD service area [RD-2] covered by APV-I and LPV200 Availability (99%) performance map is 99.78% for APV-I and 100.00% for LPV200. The value achieved for continuity ($5x10^{-4}$/15s) is 99.94% for APV-I and 99.14% for LPV200.

The APV-I and LPV200 performance at airports with approach operations based on the APV-I or LPV200 service level, respectively, has been outstanding and all airports presented availability higher than 99% and continuity risk lower than $5 \cdot 10^{-4}$/15s for all those airports.

The Horizontal and Vertical Safety Indexes remained below 0.34 for both APV-I and LPV200 service levels for all the analyzed sites, what represents a good integrity margin.

NPA Availability (99%) was compliant in the whole NPA service area (limited by the boundaries defined by MT27).

Open Service

The monitored stations presented an Open Service Availability higher than 99% for this month (and most of them equal or close to 100%).

The horizontal accuracy results for all the sites remained below 1.3 meters (95%) and the vertical accuracy below 2.5 meters (95%), which represents a very good level of accuracy.

Note: A new version of the Open Service Definition Document (OS SDD) was published on the 3rd October 2017, with several changes, including a new commitment map increasing EGNOS Open Service coverage. Please, note that the performance hereby reported have considered the new commitment area.

EDAS Service

In terms of availability, the observed performance for all the EDAS services has fulfilled the targets [RD-3].

Regarding the EDAS Services latency, the observed delays (for the real-time services) were also better than the committed performance [RD-3].

EGNOS Time Service

The EGNOS Time Service was available during more than 99% of the time for each day during November 2017, except on 20th November with 92.76% and on 30th November with 76.91%.

The offset between the EGNOS Network Time and the GPS time remained below 7 nanoseconds over the three previous months (August to October 2017).

[1] The coverage percentages presented represent the ratio of area after applying the mapping projection, there may be a difference compared to the actual geographical area.

1 EGNOS SIS AVAILABILITY

*In this document, **EGNOS SIS Availability** is defined as the percentage of time in the month during which at least one geostationary satellite broadcasts EGNOS messages.*

In addition to the SIS availability for PRN120 and PRN123, the following values are also reported:

- percentage of time in the month during which at least one geostationary satellite broadcasts EGNOS messages (PRN120 or PRN123);
- percentage of time in the month during which both geostationary satellites broadcast EGNOS messages (PRN120 and PRN123).

EGNOS SIS monitoring for November 2017, reports the following reception percentage of an SBAS message:

- PRN120 Availability: **99.90%**
- PRN123 Availability: **99.99%**
- SIS - PRN120 or PRN123: **100%**
- SIS - PRN120 and PRN123: **99.90%**

The following figure presents the availability of the signal in both EGNOS GEO satellites (PRN120 and PRN123). Red lines correspond to unavailability periods:

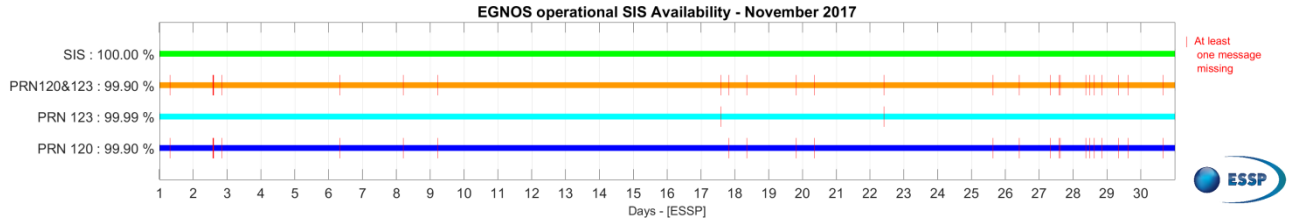

Figure 1 – EGNOS SIS & PRN Availability for November 2017.

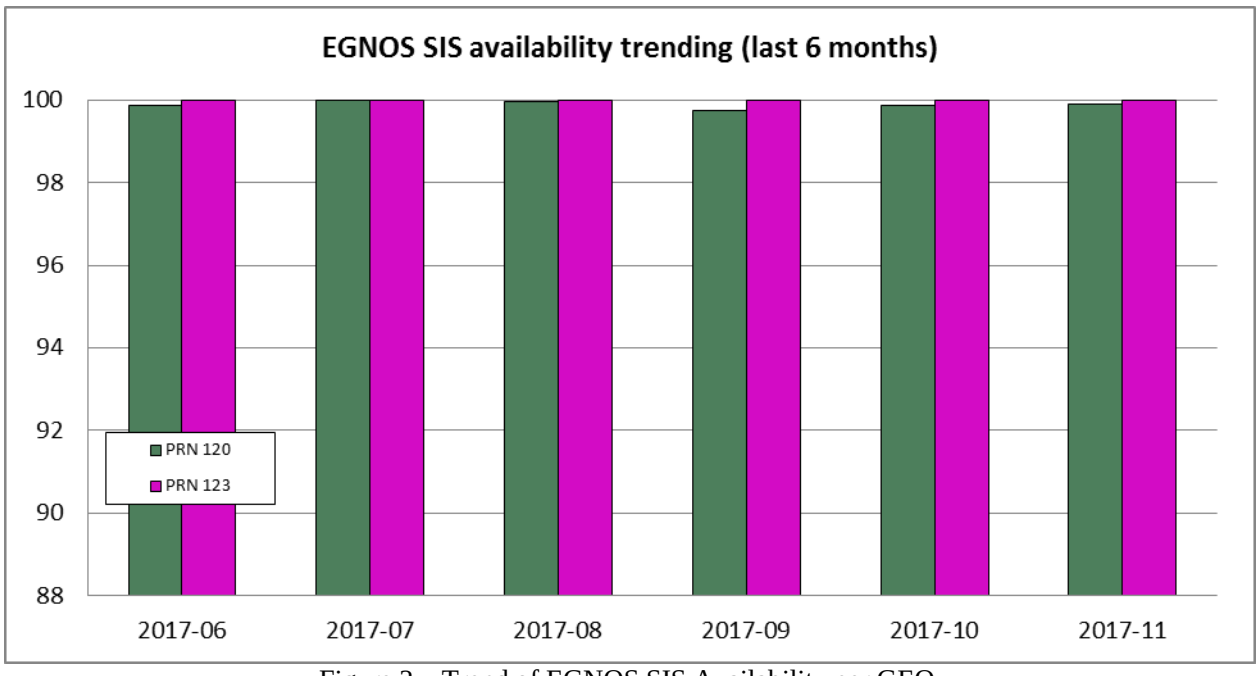

Figure 2 – Trend of EGNOS SIS Availability per GEO.

Availability (%)	2017-06	2017-07	2017-08	2017-09	2017-10	2017-11
PRN 120	99,88	99,99	99,97	99,74	99,88	99,90
PRN 123	100	99,99	99,99	99,99	99,99	99,99
At least one EGNOS GEO satellite	100	100	100	100	100	100

Table 1 – EGNOS SIS Availability (%) on EGNOS GEO satellites.

2 OPEN SERVICE (OS)

2.1 Open Service Horizontal and Vertical Accuracy

Accuracy is a measure of the position error, which is the difference between the estimated navigation position and the actual position.

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

The next table provides the values of accuracy (95%) in meters measured for this month. See Appendix A for further details of the stations where OS Accuracy are reported.

Station	HNSE 95% (meters)	VNSE 95% (meters)
Agadir	1.0	1.6
Aalborg	0.9	1.3
Alexandria	1.1	1.6
Athens	0.7	1.2
Berlin	0.9	1.1
Canarias[2]	N/A	N/A
Cork	0.9	1.2
Catania	0.7	1.1
Djerba	0.8	1.2
Egilsstadir	0.7	1.6
Glasgow	1.0	1.3
Golbasi	0.9	1.4
Gavle	0.8	1.5
Jan Mayen	1.1	2.4
Kirkenes	0.9	1.8
Lappeenranta	0.8	1.5
La Palma	1.2	1.5
Lisboa	0.8	1.3
Madeira	0.7	1.3
Malaga	0.7	1.3
Palma de Mallorca	0.6	1.0
Reykjavik	0.9	1.9
Roma	0.6	1.0
S. Compostela	0.8	1.0
Sofía	1.0	2.0
Swanwick	1.0	1.4
Toulouse	0.7	0.9
Trondheim	0.6	1.5
Tromsoe	0.9	2.1

[2] No data for Canary Islands RIMS site are available as this station is, since 6th November, out of the operational chain.

Warsaw	0.8	1.0
Zurich	1.0	1.6

Table 2 – EGNOS Open Service accuracy (95%)

The next 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 previous stations for each second over the current month.

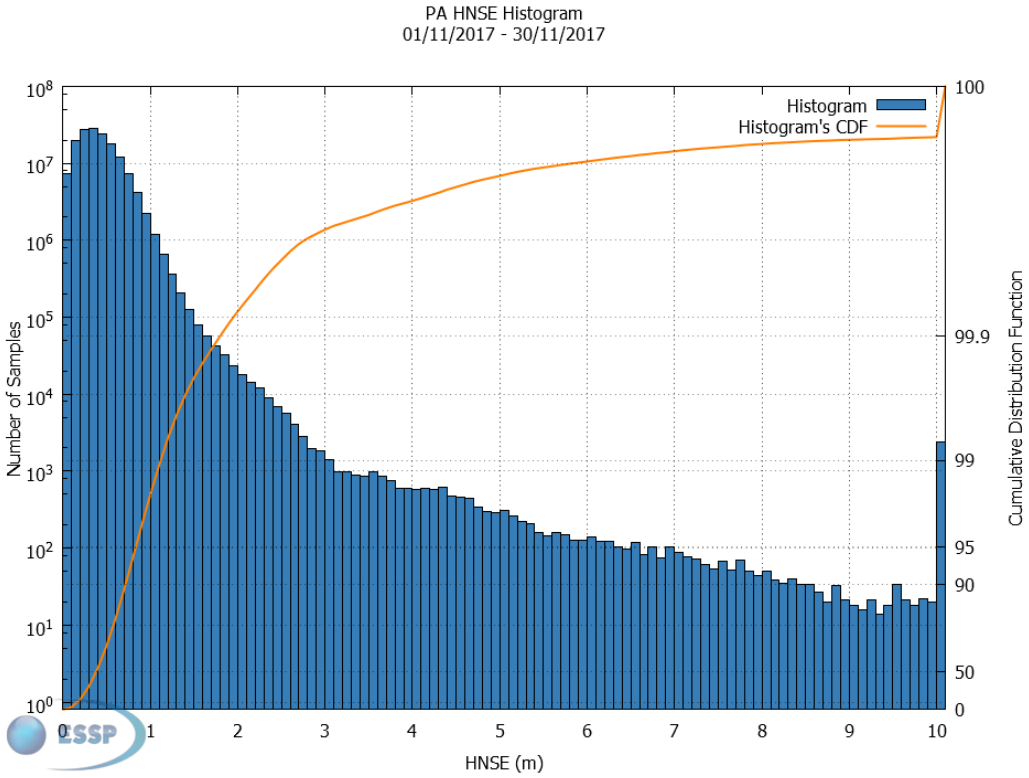

Figure 3 – EGNOS Open Service HNSE Histogram and Cumulative Probability

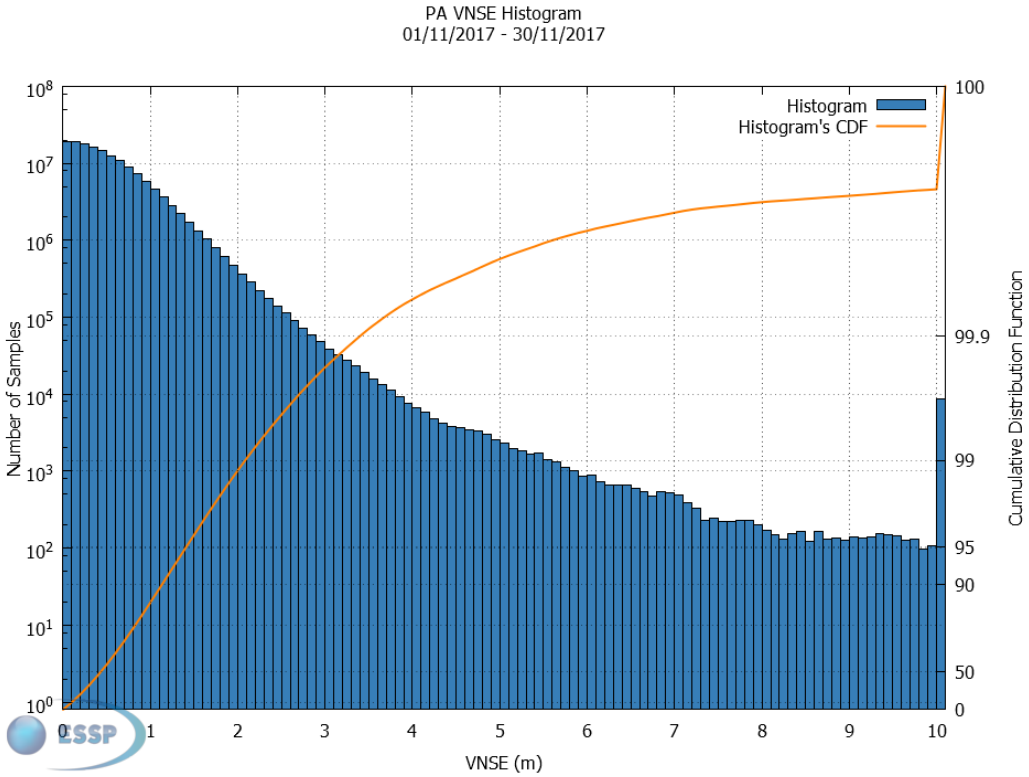

Figure 4 – EGNOS Open Service VNSE Histogram and Cumulative Probability

2.2 EGNOS Open Service Availability

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

The following figures present the Open Service Availability measured in the monitoring stations for the reported month (RIMS sites with OS Availability lower than 99%, if any, are shown in red). See Appendix A for further details of the stations where OS Accuracy are reported.

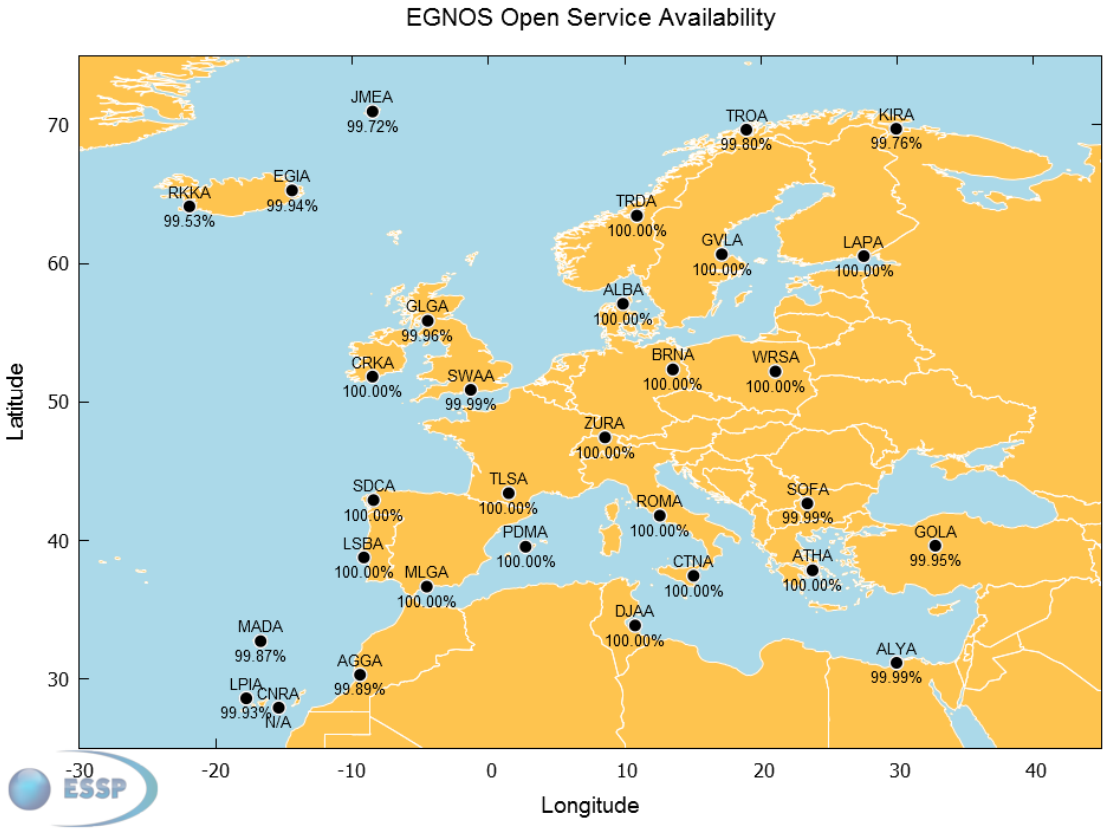

Figure 5 – EGNOS Open Service Availability at reference stations[3]

[3] No data for Canary Islands RIMS site are available as this station is, since 6th November, out of the operational chain.

3 SAFETY-OF-LIFE SERVICE (SOL)

3.1 EGNOS Non Precision Approach (NPA)

3.1.1 EGNOS NPA Availability

EGNOS NPA Availability *is defined as the percentage of samples in which the Horizontal Protection Level is below Alert Limit for NPA (HPL below 556m) over the total period. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.*

The following figure presents EGNOS NPA Availability over the current month. It must be noted that NPA Availability considering RAIM is not taken into account in this report.

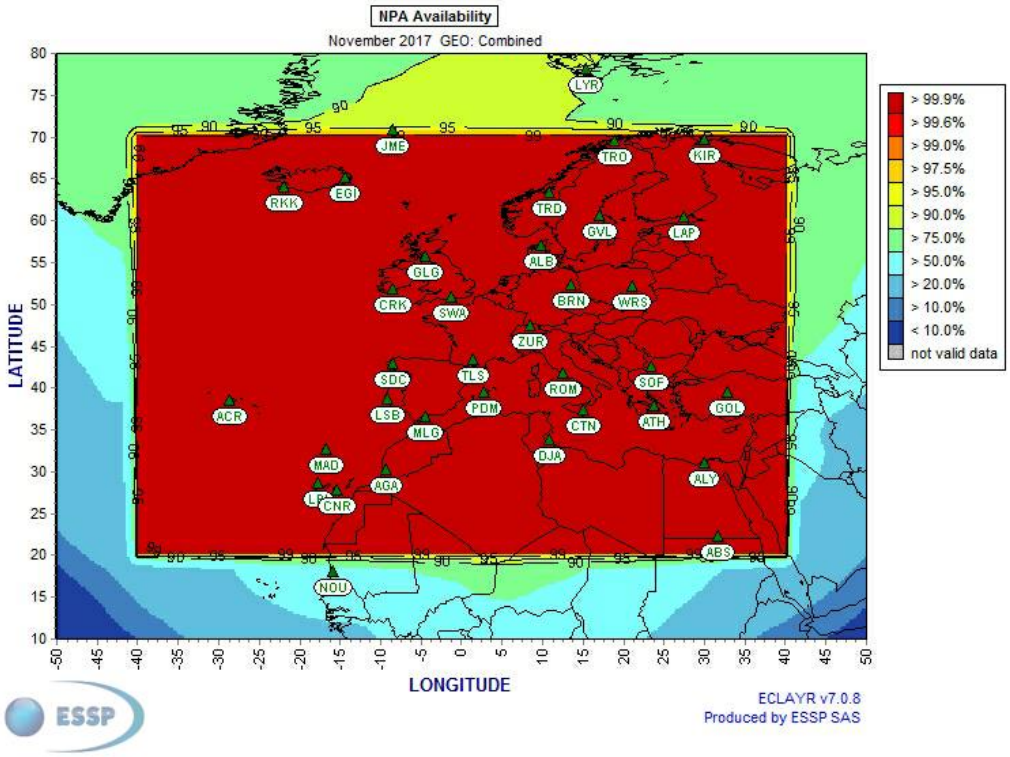

Figure 6 – EGNOS NPA availability

The evolution of the compliance area for a 30 days period with respect to NPA availability compliance area at 99% level as defined in the SoL SDD ([RD-2]) during the last 3 months is presented here:

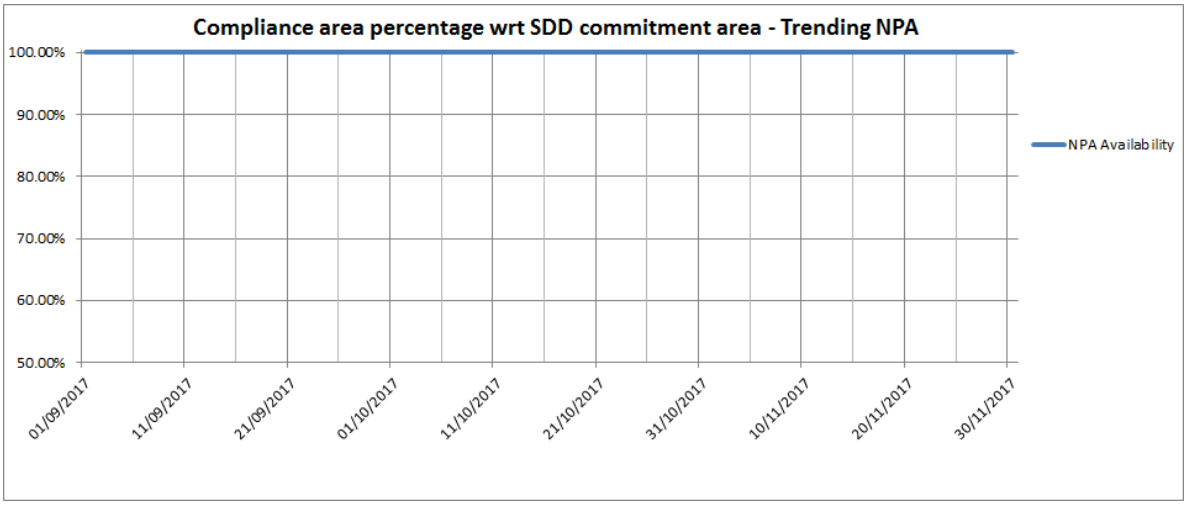

Figure 7 – EGNOS NPA availability compliance trend

3.1.2 EGNOS NPA Continuity

EGNOS NPA Continuity *is reported as the result of dividing the total number of single continuity events using a time-sliding window of 1 hour by the number 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 inside the following time-sliding window of 1 hour the system becomes not available. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.*

The following picture presents the EGNOS NPA Continuity Risk measured for the last 6 months (in order to observe the minimum NPA Continuity performance committed in the SoL SDD (2.5×10^{-4}/hour), at least 6 months of data need to be evaluated due to the discrete nature of discontinuity events). It must be noted that NPA continuity is computed in this report using only the EGNOS NPA solution and not considering the GPS RAIM solution when the EGNOS one is not available.

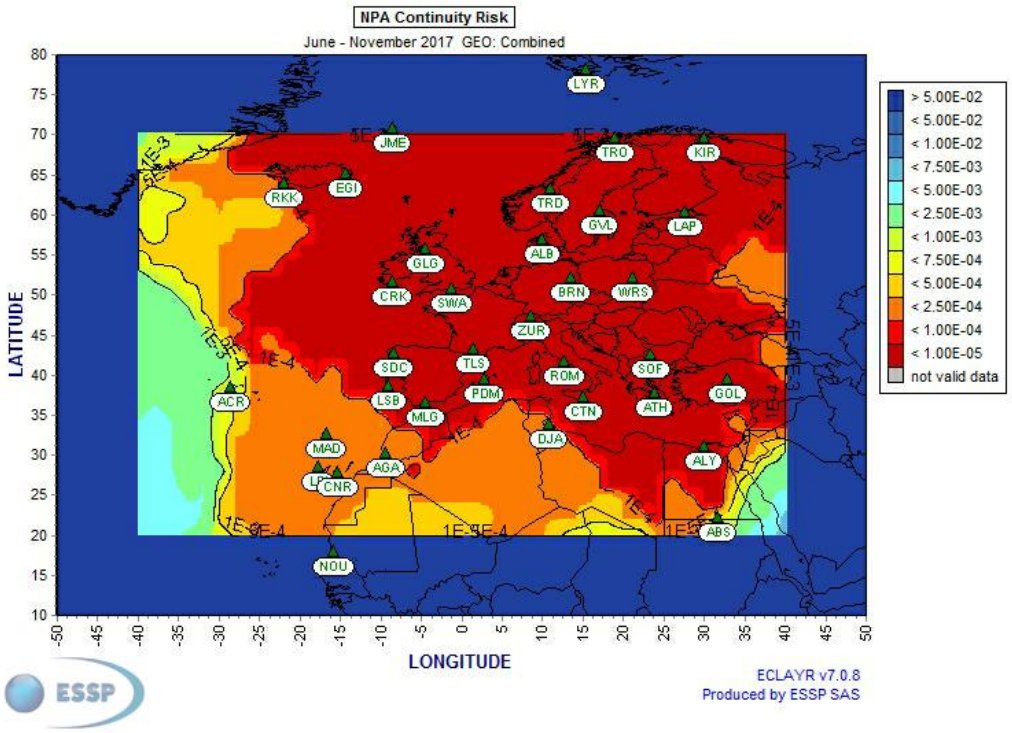

Figure 8 – EGNOS NPA Continuity over the last 6 months

3.1.3 EGNOS NPA Integrity Events

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

No integrity event was detected.

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

The next histograms show the distribution of HSI (Horizontal Safety Index), which is computed at the different EGNOS stations for each second over the current month. These histograms take into account the epochs in which the NPA service is available (Protection Level < NPA Alarm Limit).

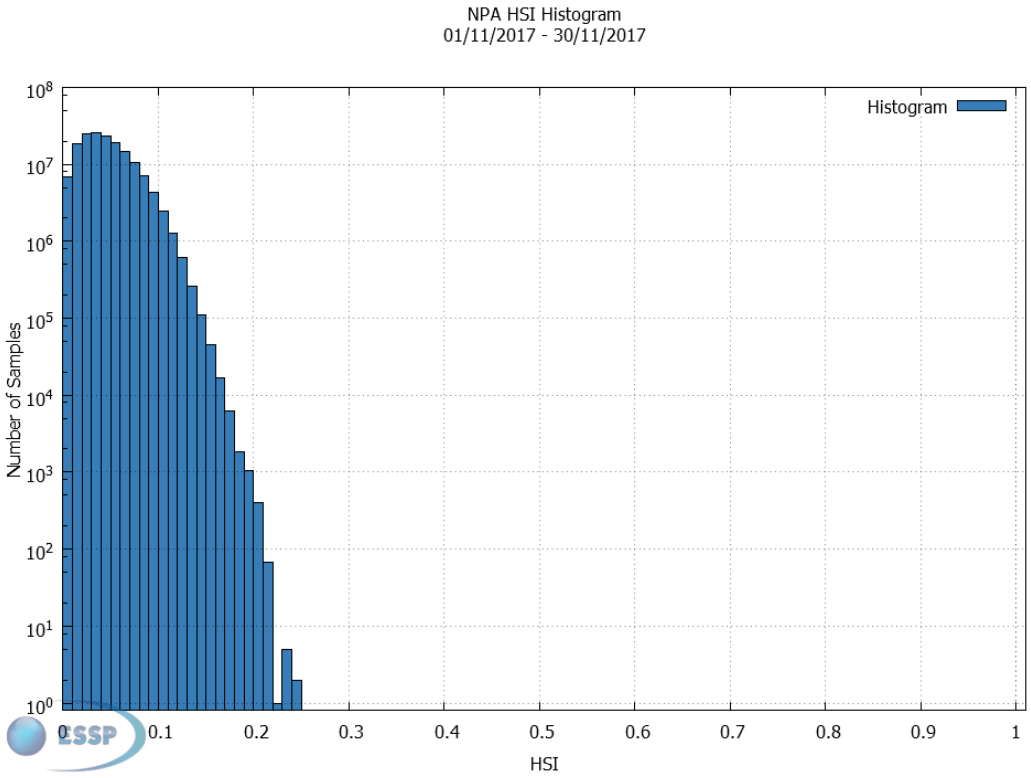

Figure 9 – EGNOS NPA Horizontal Safety Index of the month

3.1.4 EGNOS NPA Accuracy

EGNOS NPA Accuracy *is reported as the 95th percentile of the Horizontal Navigation System Error (HNSE) over the month, at the monitored sites when the NPA service is available (HPL below 556 m).*

This table shows the NPA Accuracy values in meters. See Appendix A for further details of the stations where NPA accuracy are reported.

Station	HNSE 95% (meters)	% of samples in NPA mode
Abu Simbel	2.7	100.00%
Azores	1.4	99.99%
Agadir	1.0	100.00%
Aalborg	0.9	100.00%
Alexandria	1.1	100.00%
Athens	0.7	100.00%
Berlin	0.9	100.00%
Canary Islands[4]	N/A	N/A
Cork	0.9	100.00%
Catania	0.6	100.00%
Djerba	0.8	100.00%
Egilsstadir	0.7	100.00%
Glasgow	1.0	100.00%
Golbasi	0.9	100.00%
Gavle	0.8	100.00%
Kirkenes	0.9	100.00%
Lappeenranta	0.8	100.00%
La Palma	1.2	100.00%
Lisbon	0.8	100.00%
Madeira	0.7	100.00%
Málaga	0.7	100.00%
Palma de Mallorca	0.6	100.00%
Reykjavik	0.9	100.00%
Roma	0.6	100.00%
S. de Compostela	0.8	100.00%
Sofia	1.0	100.00%
Swanwick	1.0	100.00%
Toulouse	0.7	100.00%
Trondheim	0.6	100.00%
Tromsoe	0.9	100.00%
Warsaw	0.9	100.00%
Zürich	0.8	100.00%

Table 3 – EGNOS NPA Horizontal Accuracy (95%) and percentage of time in NPA mode

[4] No data for Canary Islands RIMS site are available as this station is, since 6th November, out of the operational chain.

The following figures show the histogram and cumulative probability function of HNSE (Horizontal Navigation System Error), which are computed at RIMS sites for each second over the current month.

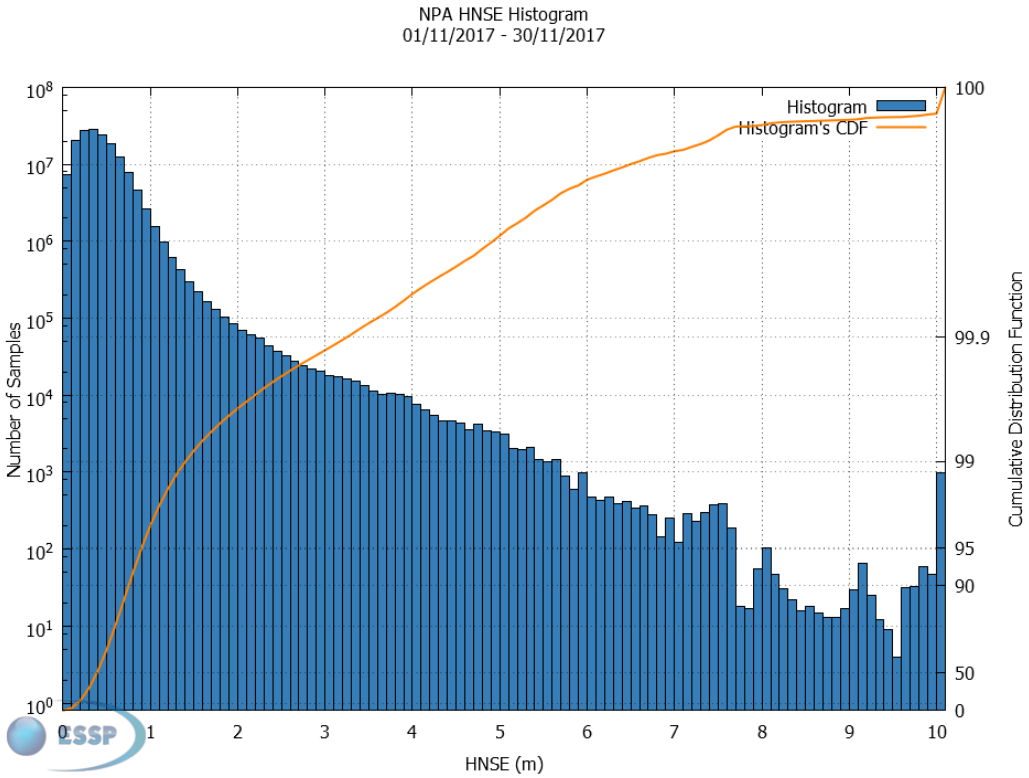

Figure 10 – EGNOS NPA HNSE Histogram and Cumulative Probability

3.2 EGNOS Approach with Vertical guidance (APV-I)

3.2.1 EGNOS APV-I Availability

EGNOS APV-I Availability *is defined as the percentage of epochs in a month in which the Protection Level are below Alert Limits for this APV-I service (HPL<40m and VPL<50m) over the total period. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.*

The following picture presents the EGNOS APV-I Availability over the current month using GEO-combined maps for the operational EGNOS GEOs.

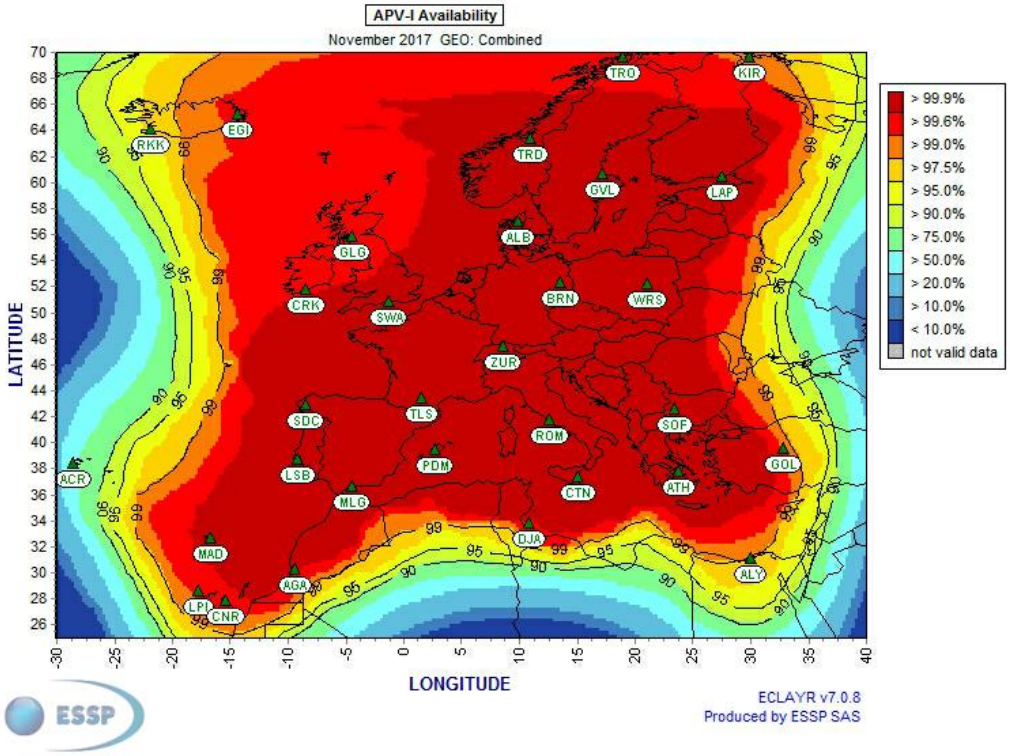

Figure 11 – EGNOS APV-I Availability

Below, the evolution of the monthly APV-I availability (99%) compliance area (30 days sliding window) is presented. The percentage is computed with respect to the commitment area at 99% level as defined in the SoL SDD ([RD-2]). The information is presented for the last 3 months.

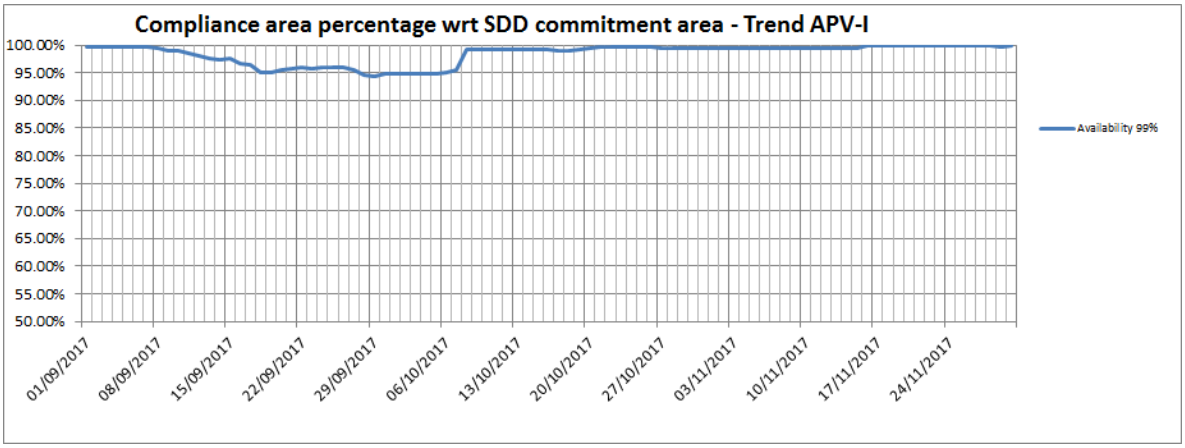

Figure 12 – EGNOS APV-I availability compliance trend

3.2.2 EGNOS 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 valid and available APV-I navigation solution.* A *single continuity event occurs if the system is available at the start of the operation and in at least one of the following 15 seconds the system becomes not available. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.*

The following picture presents the EGNOS APV-I Continuity over the current month using GEO-combined maps for the operational EGNOS GEOs.

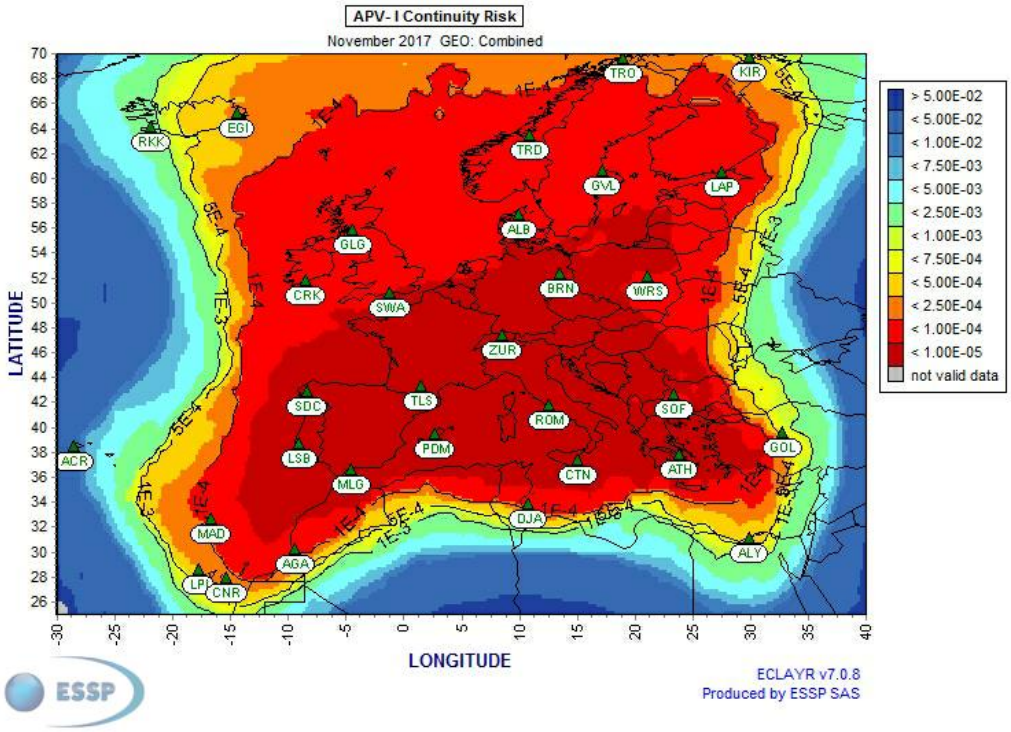

Figure 13 – EGNOS APV-I Continuity

3.2.3 EGNOS APV-I Integrity

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

No integrity event was detected.

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

The next figures provide the histogram for HSI (Horizontal Safety Index) and VSI (Vertical Safety Index) for each second when accumulating measurements from the different EGNOS stations over the current month. These histograms have considered that Protection Level is below APV-I Alarm Limit.

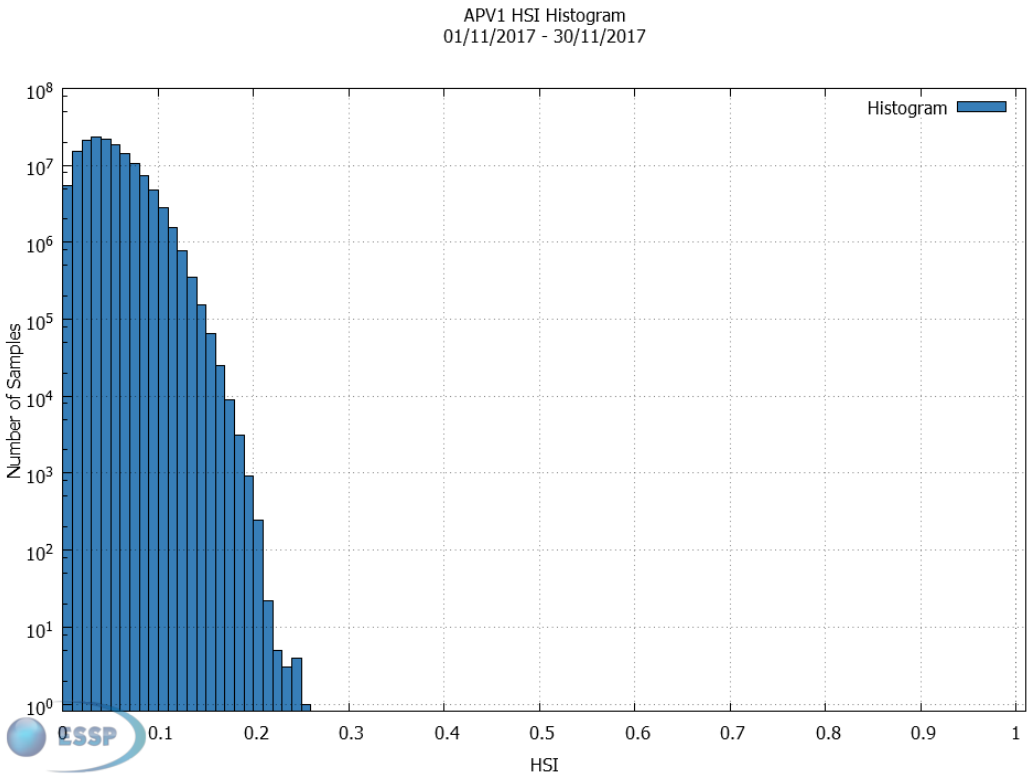

Figure 14 – EGNOS APV-I Horizontal Safety Index of the month

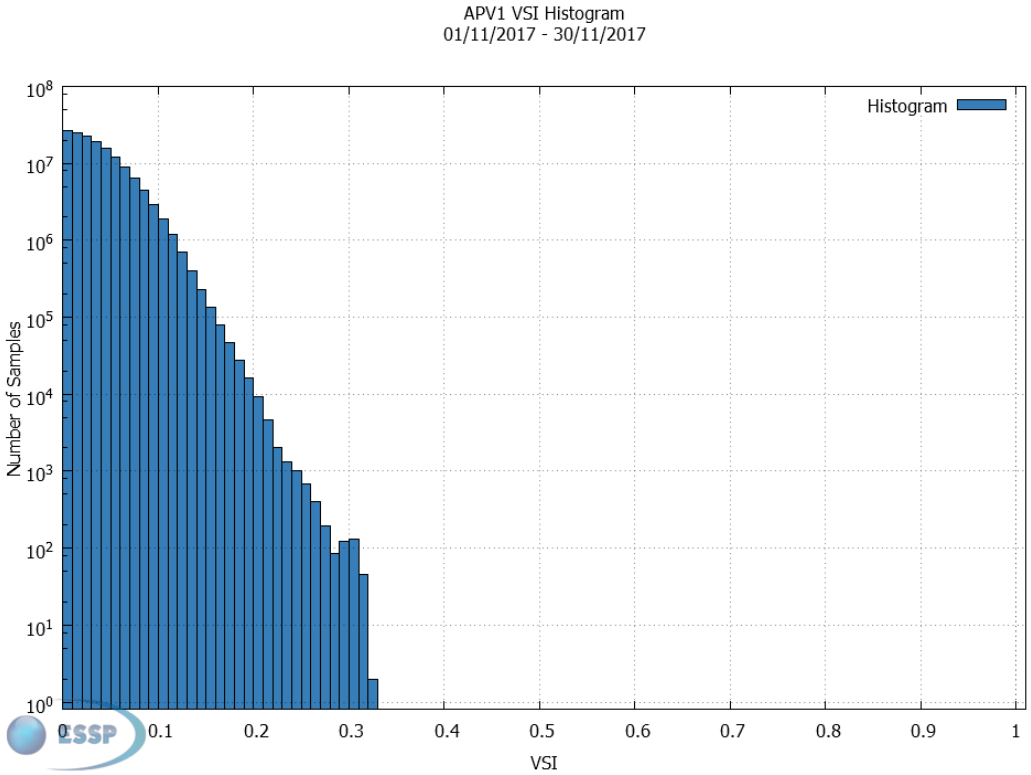

Figure 15 – EGNOS APV-I Vertical Safety Index of the month

3.2.4 EGNOS APV-I Accuracy

EGNOS APV-I Accuracy *is reported as the 95th percentile of the Horizontal and Vertical Navigation System Error over the month, at the monitored sites when the APV-I service is available (HPL<40m and VPL<50m).*

The following table shows the monthly APV-I Accuracy values in meters per operational GEO combined satellite. See Appendix A for further details of the stations where APV-I Accuracy are reported.

Station	HNSE 95% (meters)	VNSE 95% (meters)	% of samples with APV-I service available
Agadir	1.0	1.6	99.95%
Aalborg	0.9	1.3	99.96%
Alexandria	1.1	1.6	99.04%
Athens	0.7	1.2	100.00%
Berlin	0.9	1.1	100.00%
Canary Islands[5]	N/A	N/A	N/A
Cork	0.9	1.2	99.89%
Catania	0.7	1.1	100.00%
Djerba	0.8	1.2	99.93%
Egilsstadir	0.7	1.6	99.72%
Glasgow	0.9	1.3	99.86%
Golbasi	0.9	1.4	99.49%
Gavle	0.8	1.5	99.98%
Kirkenes	0.8	1.8	99.29%
Lappeenranta	0.8	1.5	99.95%
La Palma	1.1	1.5	99.75%
Lisbon	0.8	1.3	100.00%
Madeira	0.7	1.3	99.95%
Málaga	0.7	1.3	100.00%
Palma de Mallorca	0.6	1.0	100.00%
Reykjavik	0.9	1.7	98.00%
Roma	0.6	1.0	100.00%
S. de Compostela	0.8	1.0	100.00%
Sofia	1.0	2.0	99.99%
Swanwick	1.0	1.4	100.00%
Toulouse	0.7	0.9	100.00%
Trondheim	0.6	1.5	99.96%
Tromsoe	0.9	2.1	99.70%
Warsaw	0.9	1.2	99.99%
Zürich	0.8	1.0	100.00%

Table 4 – EGNOS APV-I Accuracy (95%) and percentage of time in APV-I mode at reference stations

[5] No data for Canary Islands RIMS site are available as this station is, since 6th November, out of the operational chain.

The next figures show the histogram and cumulative distribution function of HNSE (Horizontal Navigation System Error) and VNSE (Vertical Navigation System Error), which are computed at RIMS sites for each second over the current month.

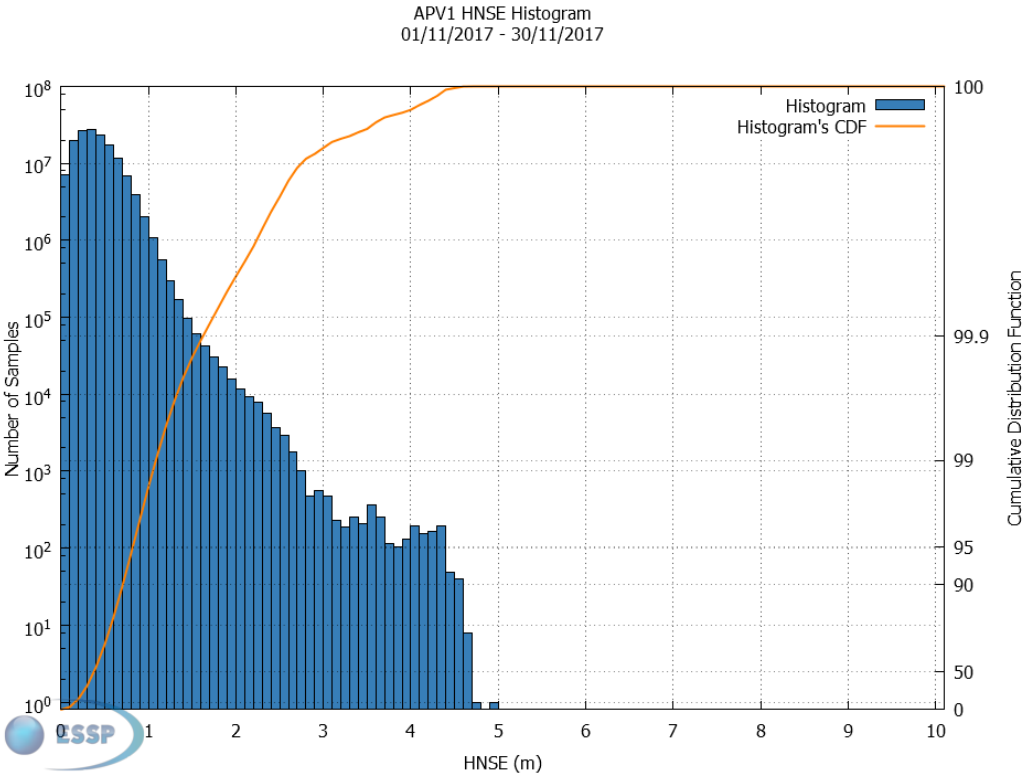

Figure 16 – EGNOS APV-I HNSE Histogram and Cumulative Probability

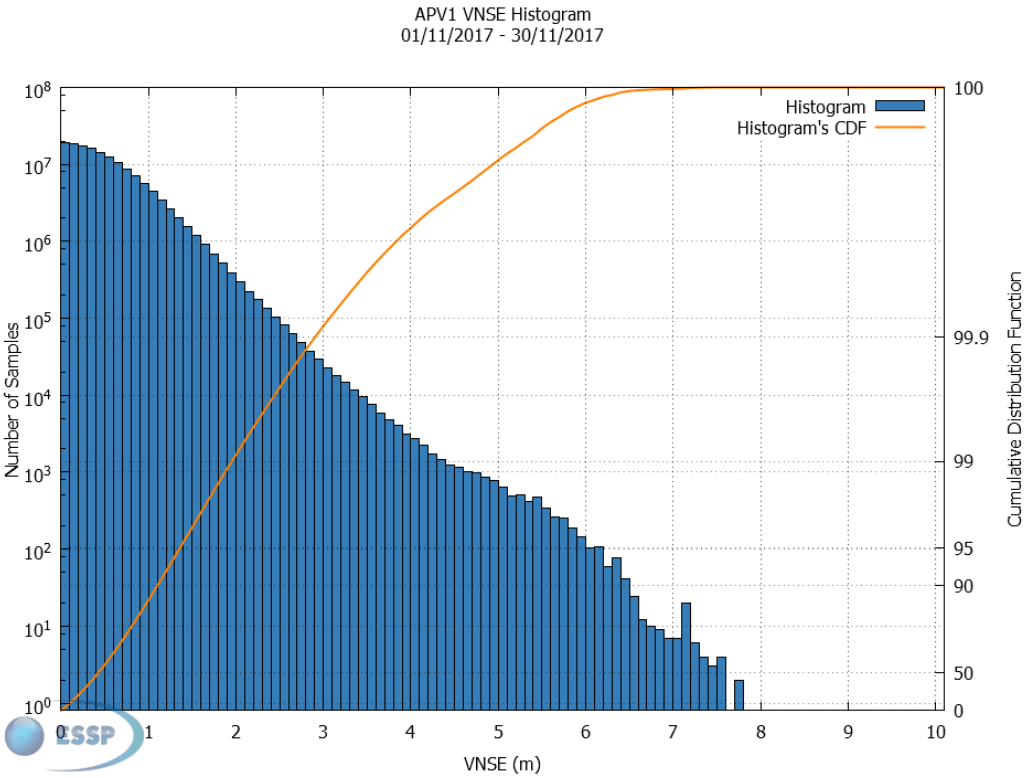

Figure 17 – EGNOS APV-I VNSE Histogram and Cumulative Probability

3.2.5 EGNOS APV-I Performance at airports

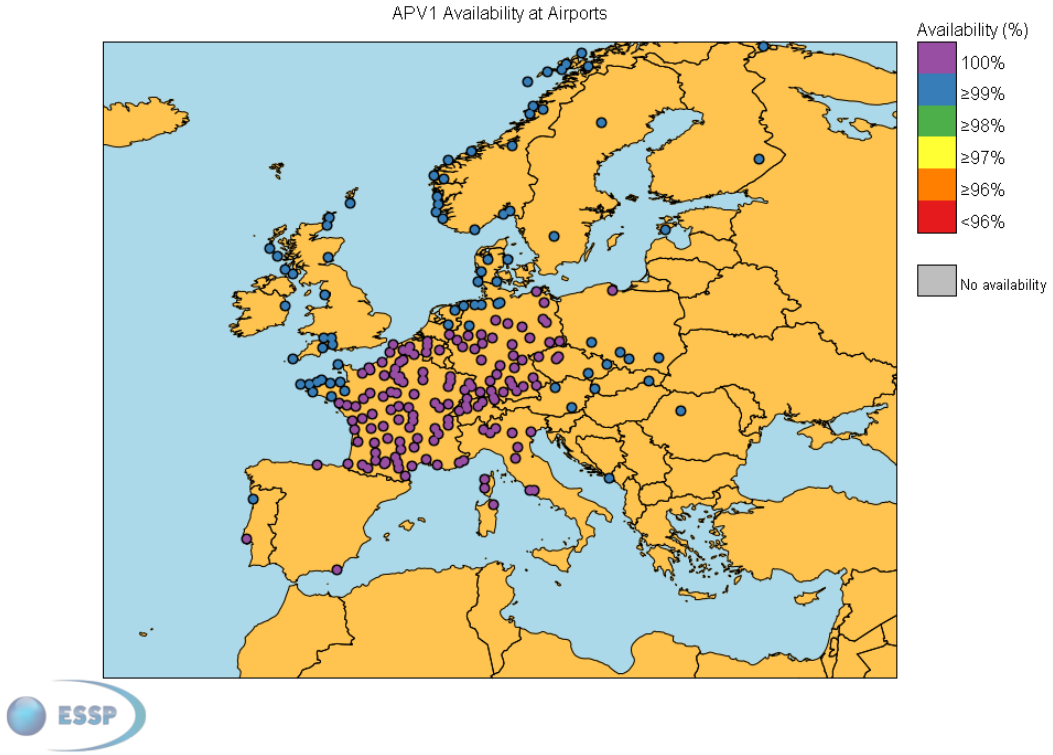

Figure 18 – EGNOS APV-I Availability at airports

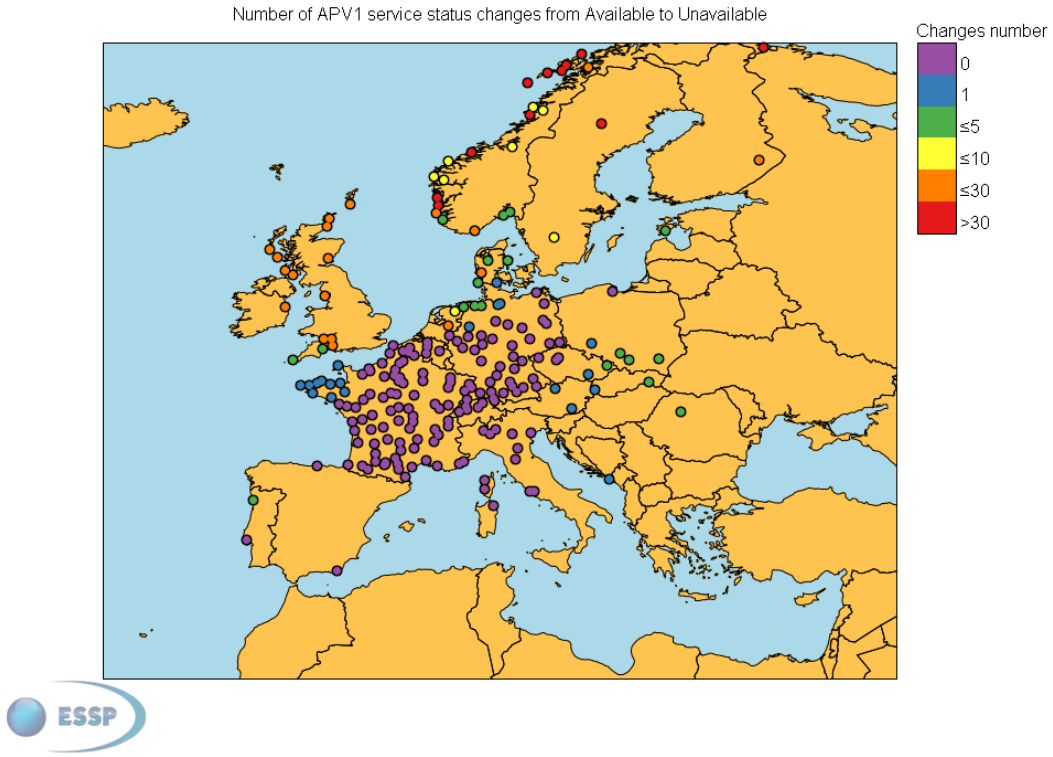

Figure 19 – EGNOS APV-I outages

See Appendix B for details of the APV-I Availability and Continuity at airports with published procedures using EGNOS.

3.3 EGNOS Localizer Performance with Vertical Guidance to a decision altitude of 200ft (LPV-200)

3.3.1 EGNOS LPV-200 Availability

EGNOS LPV-200 Availability *is defined as the percentage of epochs in a month in which the Protection Level are below Alert Limits for this LPV-200 service (HPL<40m and VPL<35m) over the total period. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.*

The following picture presents the EGNOS LPV-200 Availability over the current month using GEO-combined maps for the operational EGNOS GEOs.

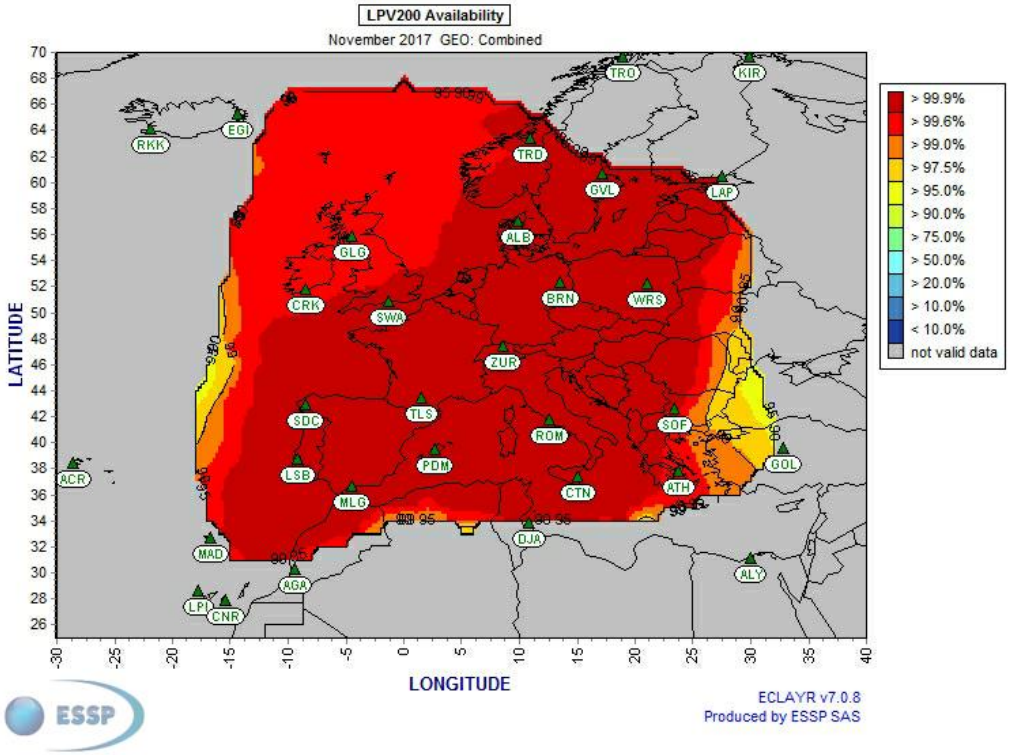

Figure 20 – EGNOS LPV-200 Availability

Below, the evolution of the monthly LPV-200 availability (99%) compliance area (30 days sliding window) is presented. The percentage is computed with respect to the commitment area at 99% level as defined in the SoL SDD ([RD-2]). The information is presented for the last 3 months.

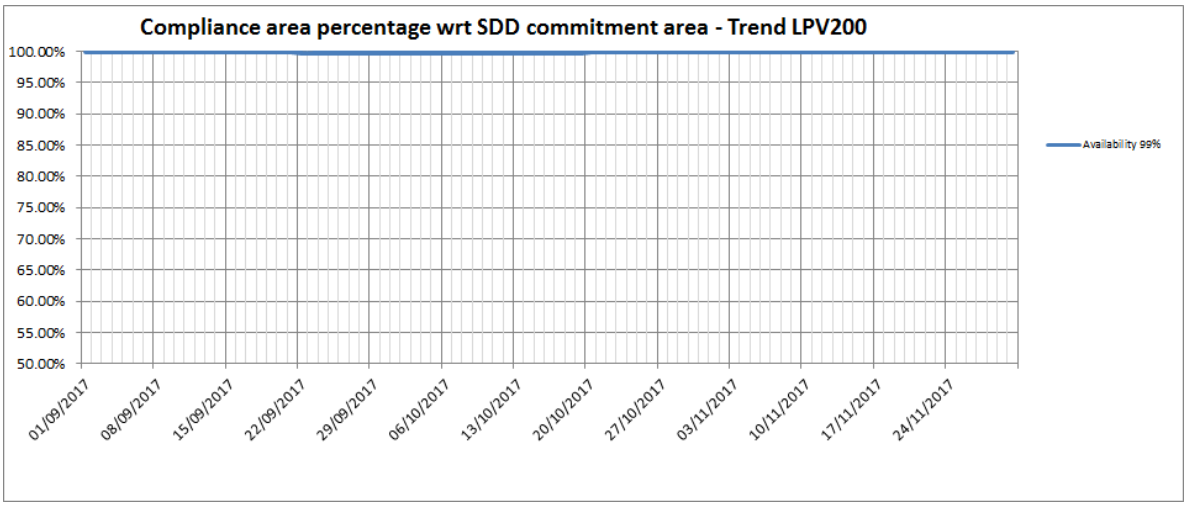

Figure 21 – EGNOS LPV-200 availability compliance trend

3.3.2 EGNOS 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 valid and available LPV-200 navigation solution. A single continuity event occurs if the system is available at the start of the operation and in at least one of the following 15 seconds the system becomes not available. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.*

The following picture presents the EGNOS LPV-200 Continuity over the current month using GEO-combined maps for the operational EGNOS GEOs.

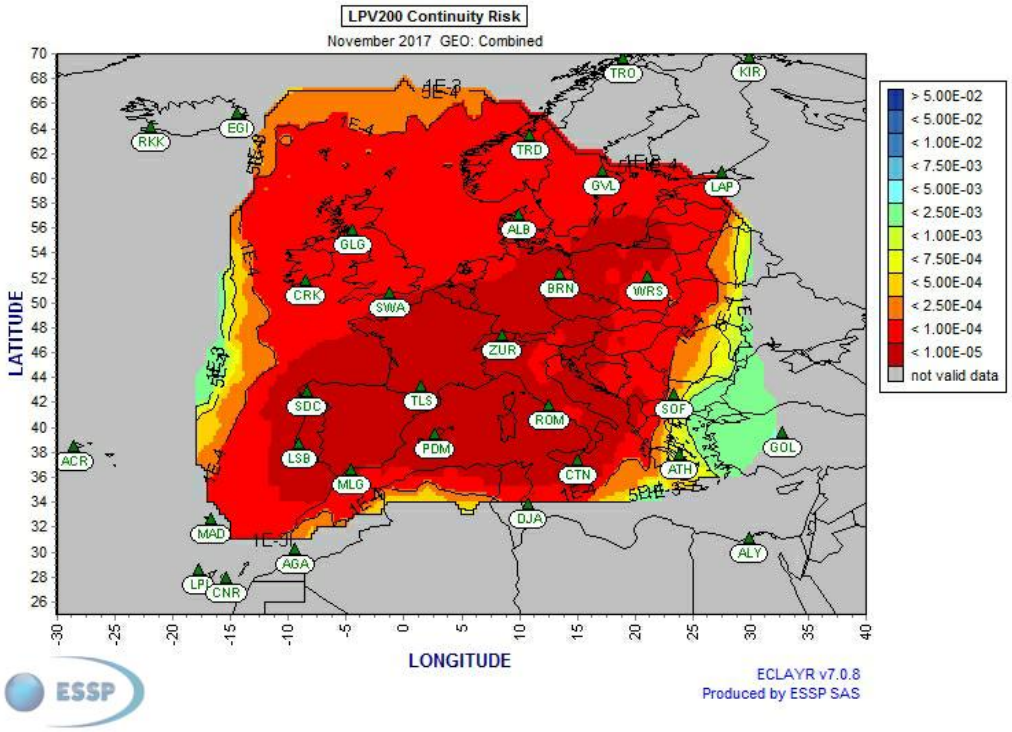

Figure 22 – EGNOS LPV-200 Continuity[6]

[6] The lack of additional performance levels in grey areas is due to the non-compliance in this region with the accuracy requirements imposed to LPV-200 service level. For more details please refer to section 6.3.3.1 of the EGNOS Safety of Life SDD [RD-2].

3.3.3 EGNOS LPV-200 Integrity

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

No integrity event was detected.

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

The next figures provide the histogram for HSI (Horizontal Safety Index) and VSI (Vertical Safety Index) for each second when accumulating measurements from the different EGNOS stations over the current month. These histograms have considered that Protection Level is below LPV-200 Alarm Limit.

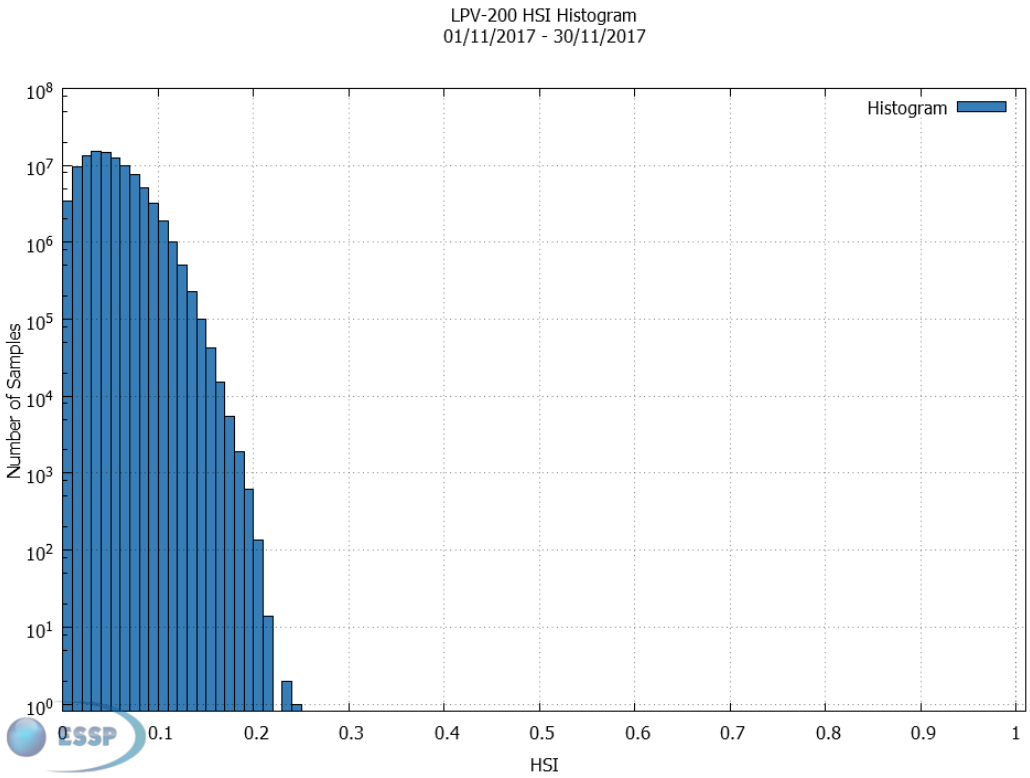

Figure 23 – EGNOS LPV-200 Horizontal Safety Index of the month

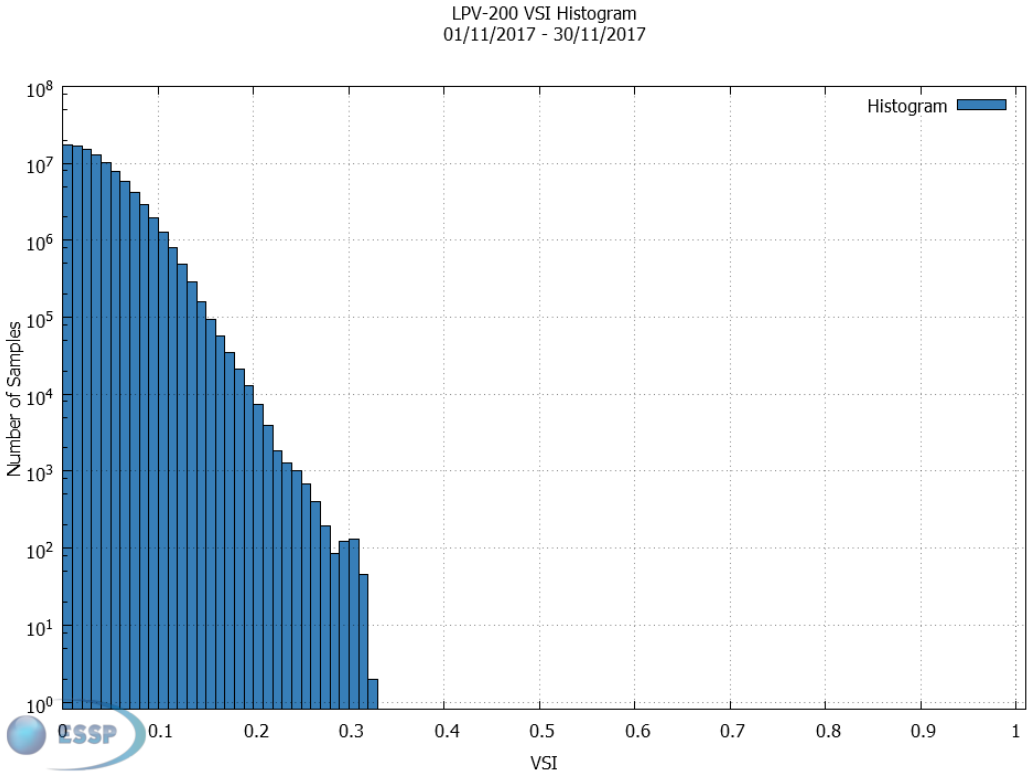

Figure 24 – EGNOS LPV-200 Vertical Safety Index of the month

3.3.4 EGNOS LPV-200 Accuracy

EGNOS LPV-200 Accuracy *is reported as the 95th percentile of the Horizontal and Vertical Navigation System Error over the month, at the monitored sites when the LPV-200 service is available (HPL<40m and VPL<35m).*

The following table shows the monthly LPV-200 Accuracy values in meters per operational GEO combined satellite. See Appendix A for further details of the stations where LPV-200 Accuracy are reported.

Station	HNSE 95% (meters)	VNSE 95% (meters)	% of samples with LPV-200 service available
Aalborg	0.9	1.3	99.94%
Athens	0.7	1.2	99.73%
Berlin	0.9	1.1	100.00%
Cork	0.9	1.2	99.85%
Catania	0.7	1.1	100.00%
Djerba	0.8	1.2	99.93%
Glasgow	0.9	1.3	99.83%
Gavle	0.8	1.5	99.97%
Lisboa	0.8	1.3	100.00%
Málaga	0.7	1.3	100.00%
Palma de Mallorca	0.6	1.0	100.00%
Roma	0.6	1.0	100.00%
S. de Compostela	0.8	1.0	100.00%
Sofia	1.0	2.0	99.97%
Swanwick	1.0	1.4	99.99%
Toulouse	0.7	0.9	100.00%
Trondheim	0.6	1.5	99.94%
Warsaw	0.9	1.2	99.98%
Zürich	0.8	1.0	100.00%

Table 5 – EGNOS LPV-200 Accuracy (95%) and percentage of time in LPV-200 mode at reference stations

The next figures show the histogram and cumulative distribution function of HNSE (Horizontal Navigation System Error) and VNSE (Vertical Navigation System Error), which are computed at RIMS sites for each second over the current month.

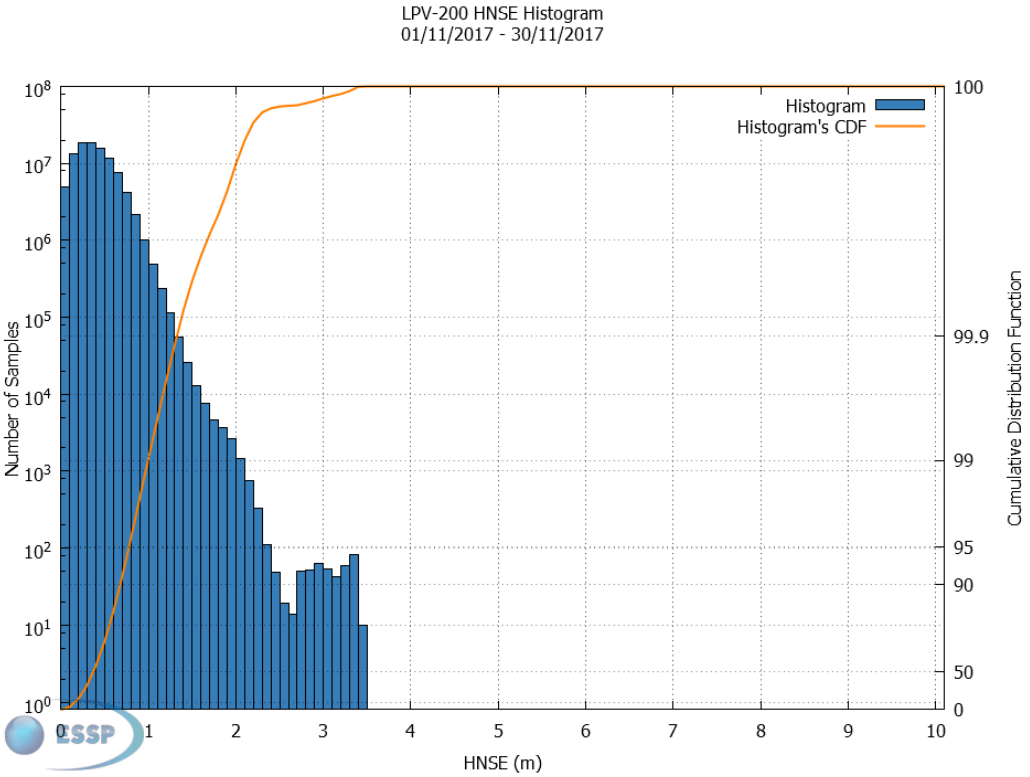

Figure 25 – EGNOS LPV-200 HNSE Histogram and Cumulative Probability

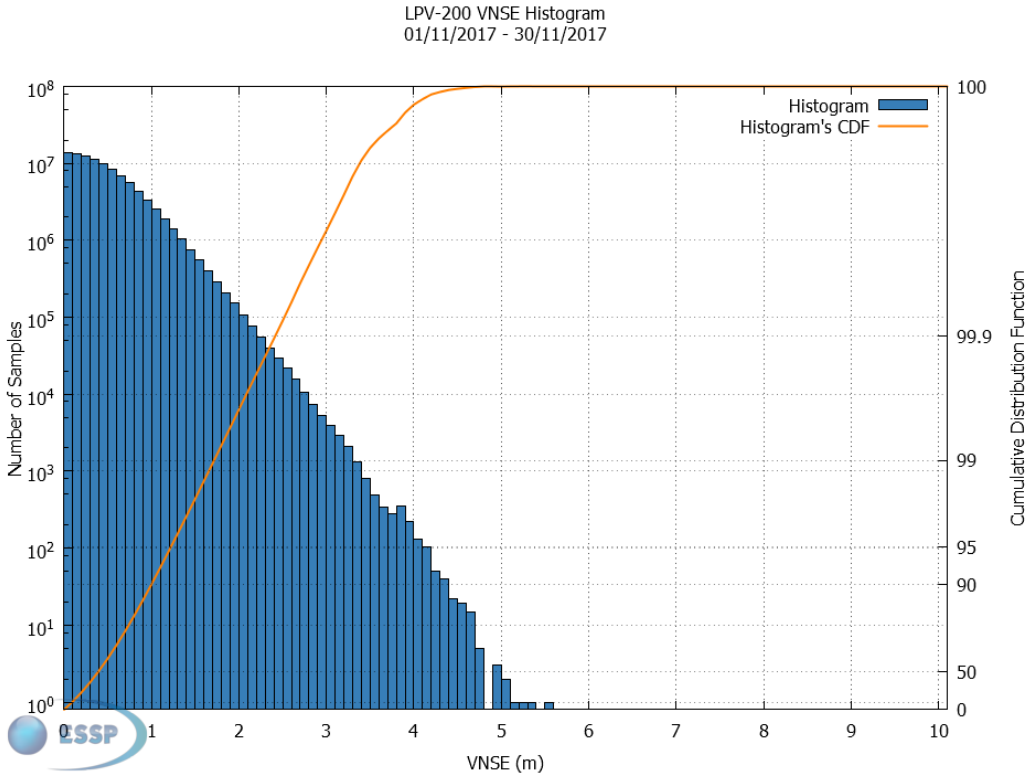

Figure 26 – EGNOS LPV-200 VNSE Histogram and Cumulative Probability

3.3.5 EGNOS LPV-200 Performance at airports

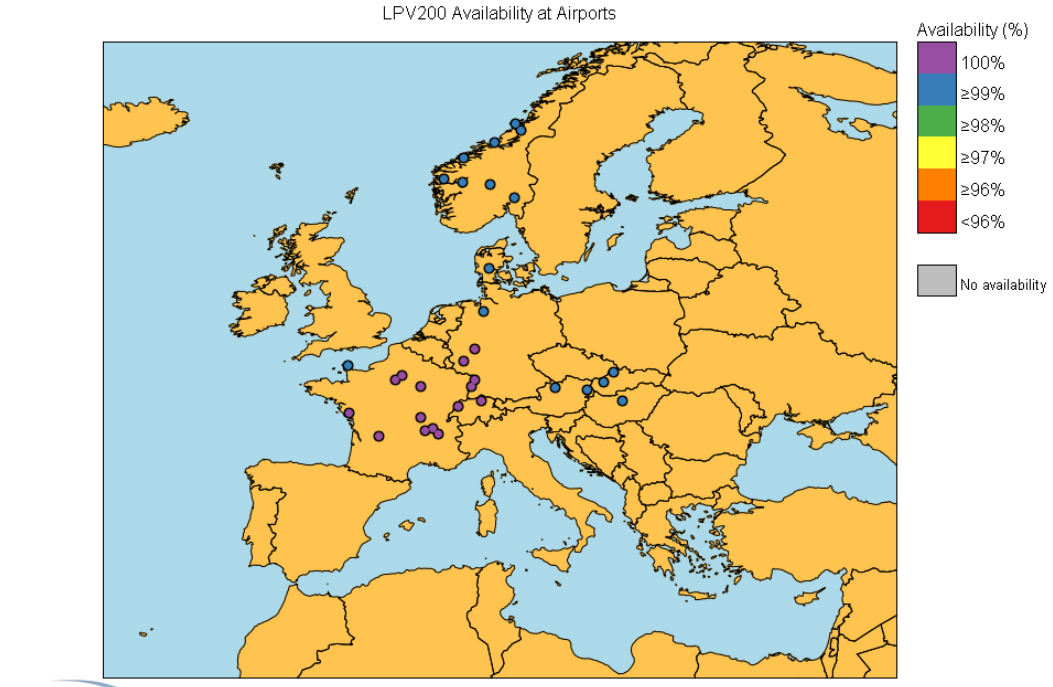

Figure 27 – EGNOS LPV-200 Availability at airports

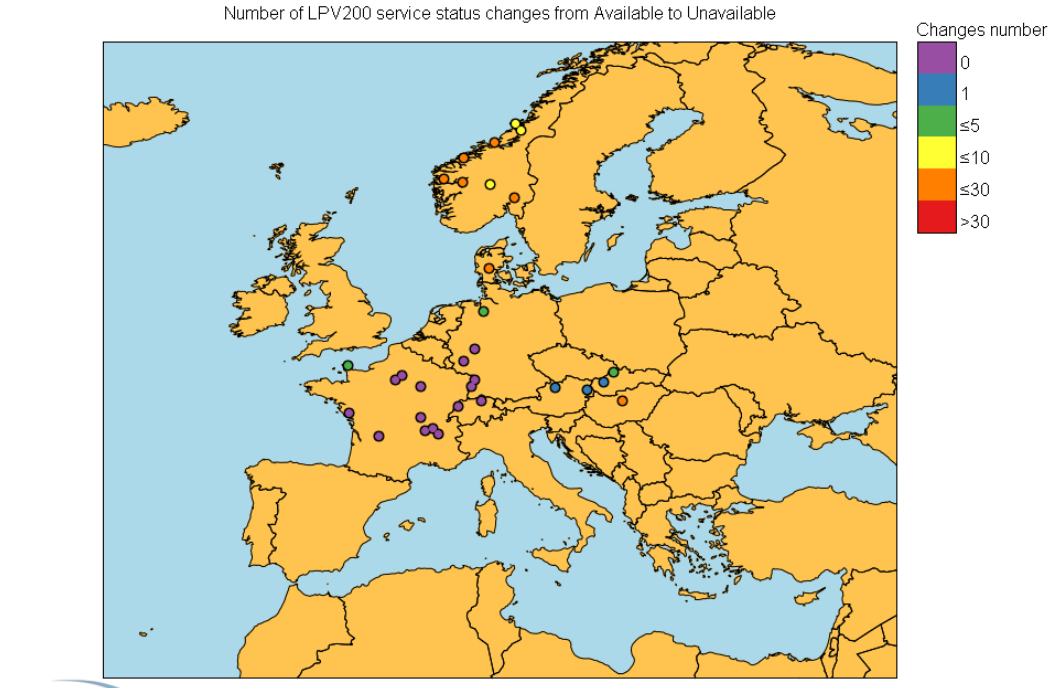

Figure 28 – EGNOS LPV-200 outages

See Appendix C for details of the LPV-200 Availability and Continuity at airports with published procedures using EGNOS.

4 EGNOS DATA ACCESS SERVICE (EDAS)

EDAS (EGNOS Data Access Service) offers internet-based access to EGNOS data [RD-3]. It is the single point of access for the data collected and generated by the EGNOS infrastructure composed of ground stations distributed over Europe and North Africa.

The main data provided by EDAS are:

- Raw GPS, GLONASS and EGNOS GEO observations and navigation data collected by the entire network of Ranging and Integrity Monitoring Stations (RIMS) and Navigation Land Earth Stations (NLES).
- EGNOS augmentation messages, as normally received by users via the EGNOS Geostationary satellites.

These data are provided through different EDAS Services in different formats in order to meet different set of applications and needs. For a description of the EDAS services, please refer to the EDAS SDD [RD-3].

Additional information on the EDAS services is available at the EDAS specific section of the EGNOS User Support website (https://egnos-user-support.essp-sas.eu), including a new entry with the EDAS services status in real-time.

Below, the performance of EDAS Services (please refer to the EDAS SDD [RD-3] for definition details) corresponding to November 2017 is presented:

- Availability: Percentage of time during which the service provides the data according to the specifications.
- Latency: Average of the percentile 95% latencies monitored for every 5 minutes period within the month.

EDAS Service		Availability	Latency (ms)
Service Level 0	-	98,69%	556,83
Service Level 2	-	98,69%	561,50
Ntrip Service	-	98,71%	642,17
SISNeT Service	GEO Operational 1	98,59%	82,23
	GEO Operational 2	98,68%	82,67
Data Filtering Service	RIMS A	98,71%	574,70
	Central	98,70%	460,45
	MEDA	98,71%	494,90
	North-East	98,71%	179,83
	North-West	98,71%	480,47
	South-West	98,71%	534,33
FTP Service	-	98,71%	N/A

Table 6 – Performance of EDAS Services

5 EGNOS TIME SERVICE

The EGNOS Time Service supports timing application by providing specific corrections that allow the tracing of EGNOS Network Time (ENT) to the physical realisation of the Coordinated Universal Time by Observatoire de Paris, UTC (OP).

The **EGNOS Time Service availability**[7] is computed as the percentage of time per day in which it is possible to obtain the time solution referred to UTC scale by applying a valid offset between the EGNOS Network Time (ENT) and the UTC scale, provided through the EGNOS Message Type 12.

The information is presented for the combination of both operational GEOs. As it can be observed, it is 100% or very close to 100% all days of the month, except on 20th November with a 92.76% and on 30th November, when a failure in Paris RIMS site caused a loss of the Time Service.

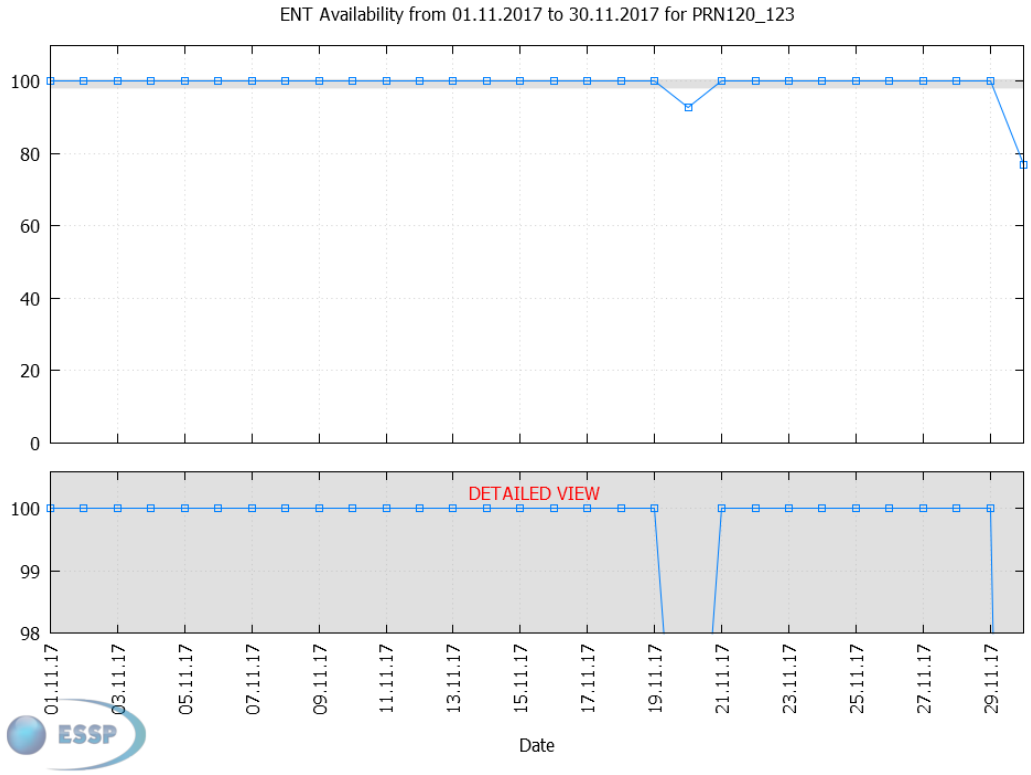

Figure 29 – EGNOS Time Service availability

The EGNOS Network Time is computed assuring its alignment with the GPS timescale, due to this requirement it must be satisfied that the offset between both timescales is below 50ns. The next figure shows the relative consistency of both ENT and GPS timescales from August to October 2017. It can be observed that the offset between them remains below 7 nanoseconds.

[7] EGNOS Time Service availability is computed taking into account that it is not possible to obtain the time solution if the navigation solution is not obtained. Therefore, if a SiS outage longer than 3 seconds happens the MT12 data will be set as invalid in order to simulate the unavailability of the receiver to compute the PVT solution and no Time Service will be available until a new valid MT12 is received. In order to take into account the user capability of switching from one operational GEO to the other in case of SiS outage, the EGNOS Time Service availability is computed over the combination of both GEOs.

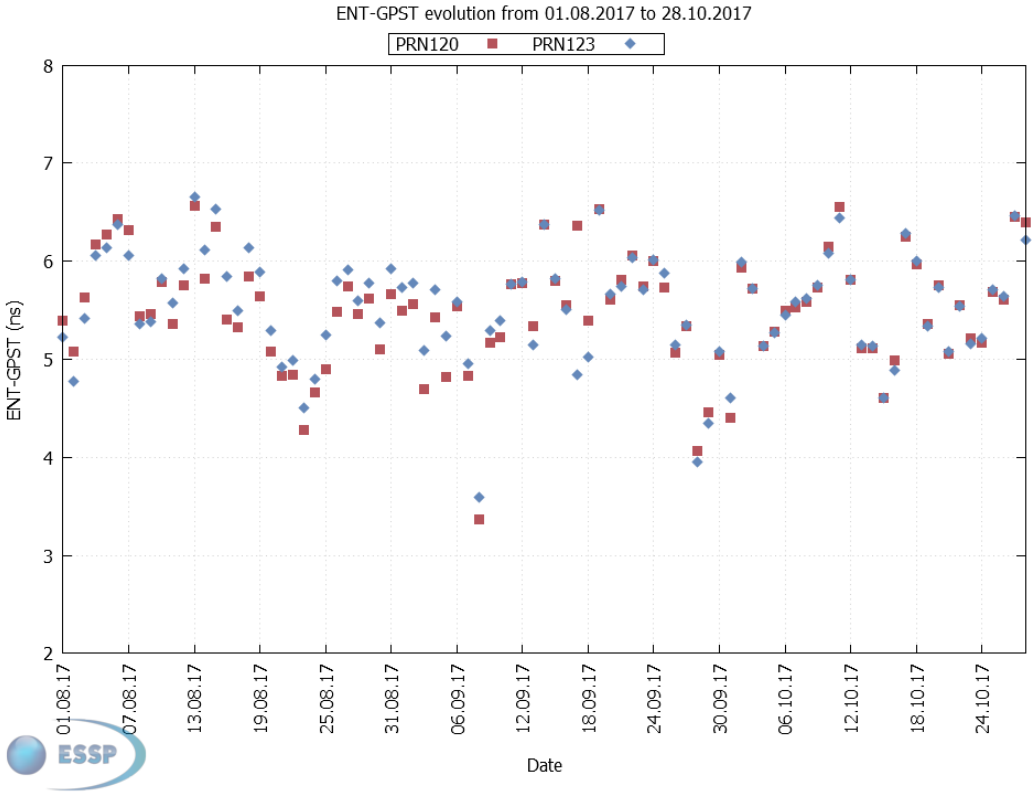

Figure 30 – ENT-GPS offset evolution

FOR MORE INFORMATION

To get more information about EGNOS performance:

Please visit the EGNOS User Support website:

https://egnos-user-support.essp-sas.eu

or

Contact the EGNOS helpdesk:

egnos-helpdesk@essp-sas.eu

+34 911 236 555

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APPENDIX A RECEIVER MONITORING NETWORK

The receiver network used to report EGNOS performances in this document is based on the EGNOS monitoring stations (RIMS).

Next map shows the location of this receiver monitoring network, used in this report to present the EGNOS performances:

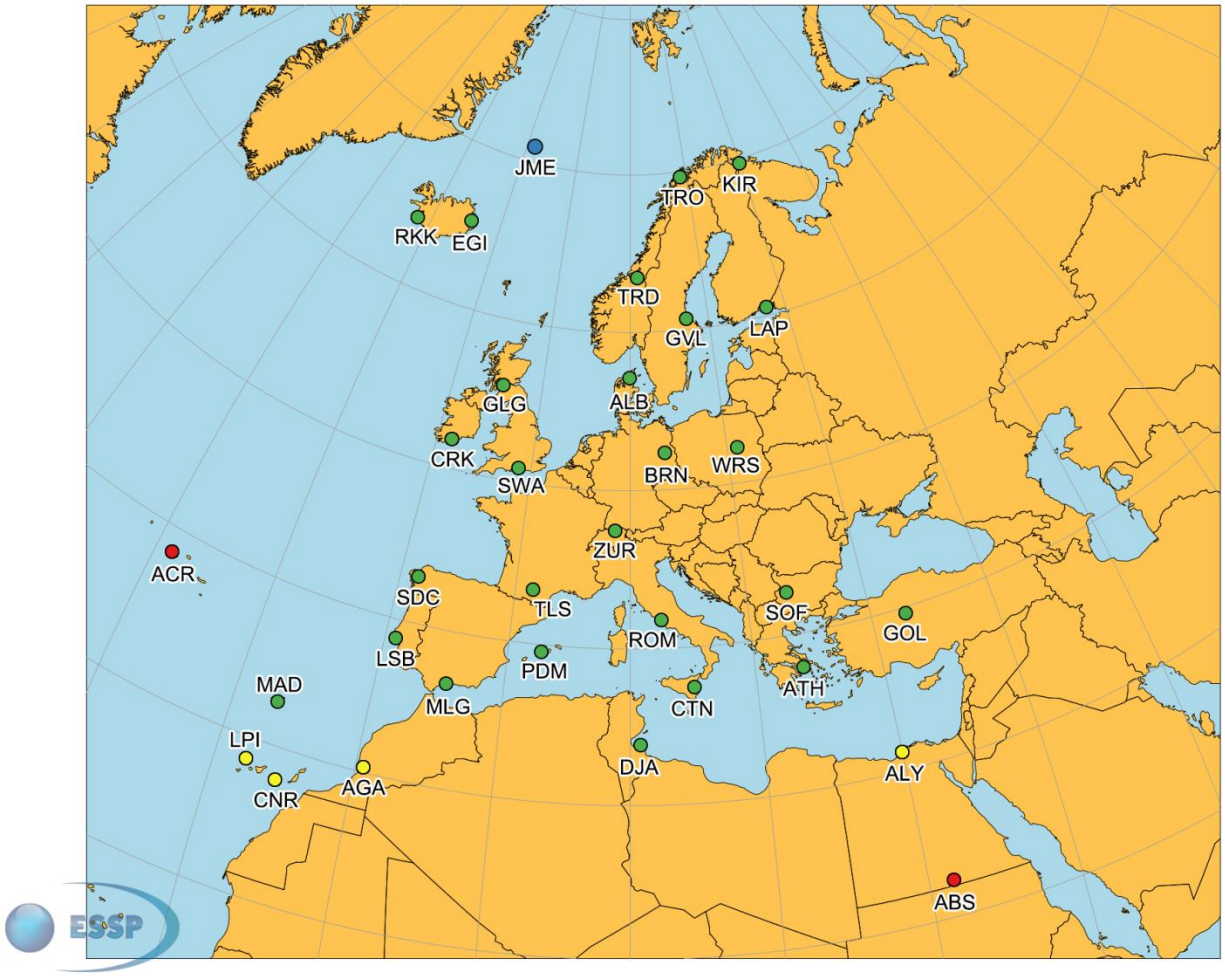

Figure 31 – EGNOS RIMS sites used in this report

The stations in green colour are used to report LPV-200[8], APV-I and Open Service results. Performances corresponding to NPA include all the stations in green and red colour. Jan Mayen RIMS site (JME) (blue colour) is used only to report Open Service results. Canary Island (CNR), La Palma Island (LPI), Agadir (AGA) and Alexandria (ALY) RIMS sites (yellow colour) are used to report Open Service and NPA results.

Next table shows the name and location of each one, so as to calculate which service is used each one of them.

[8] Except RIMS Egilsstadir, Reykjavik, Tromsoe, Lappeeranta, Kirkenes, Madeira and Golbasi stations.

Id	Location name	Country	APV-I	LPV-200	OS	NPA
ABS	RIMS Abu Simbel	Egypt				X
ACR	RIMS Azores	Portugal				X
ALB	RIMS Aalborg	Denmark	X	X	X	X
AGA	RIMS Agadir	Morocco			X	X
ALY	RIMS Alexandria	Egypt			X	X
ATH	RIMS Athens	Greece	X	X	X	X
BRN	RIMS Berlin	Germany	X	X	X	X
CNR	RIMS Canary Isl.	Spain			X	X
CRK	RIMS Cork	Ireland	X	X	X	X
CTN	RIMS Catania	Italy	X	X	X	X
DJA	RIMS Djerba	Tunisia	X	X	X	X
EGI	RIMS Egilsstadir	Iceland	X		X	X
GLG	RIMS Glasgow	United Kingdom	X	X	X	X
GOL	RIMS Golbasi	Turkey	X		X	X
GVL	RIMS Gävle	Sweden	X	X	X	X
JME	RIMS Jan Mayen	Norway			X	
KIR	RIMS Kirkenes	Norway	X		X	X
LAP	RIMS Lappeenranta	Finland	X		X	X
LPI	RIMS La Palma	Spain			X	X
LSB	RIMS Lisbon	Portugal	X	X	X	X
MAD	RIMS Madeira	Portugal	X		X	X
MLG	RIMS Málaga	Spain	X	X	X	X
PDM	RIMS Palma de Mallorca	Spain	X	X	X	X
RKK	RIMS Reykjavik	Iceland	X		X	X
ROM	RIMS Roma	Italy	X	X	X	X
SDC	RIMS S. de Compostela	Spain	X	X	X	X
SOF	RIMS Sofia	Bulgaria	X	X	X	X
SWA	RIMS Swanwick	United Kingdom	X	X	X	X
TLS	RIMS Toulouse	France	X	X	X	X
TRD	RIMS Trondheim	Norway	X	X	X	X
TRO	RIMS Tromsoe	Norway	X		X	X
WRS	RIMS Warsaw	Poland	X	X	X	X
ZUR	RIMS Zürich	Switzerland	X	X	X	X

Table 7 – List of sites where performances are reported

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.

APPENDIX B EGNOS APV-I PERFORMANCE AT AIRPORTS

The table reports APV-I Availability and Continuity at airports with published procedures using EGNOS. These values correspond to the performance obtained under fault-free conditions using all satellites in view:

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages[9]	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
EBAW / Antwerpen - Deurne	Belgium	100.00%	0.00E+00	0	10/12/2015	99.98%	5.52E-06
EBBR / Brussels-National	Belgium	100.00%	0.00E+00	0	02/03/2017	99.96%	5.73E-06
EBCI / Charleroi-Brussels South	Belgium	100.00%	0.00E+00	0	31/03/2016	99.97%	4.55E-06
EBLG / Liège	Belgium	100.00%	0.00E+00	0	13/10/2016	99.98%	3.81E-06
EBKT / Kortrijk/Wevelgem	Belgium	100.00%	0.00E+00	0	09/11/2017	100.00%	0.00E+00
EDAB / Bautzen	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.84E-05
EDBH / Barth	Germany	100.00%	0.00E+00	0	03/06/2010	99.89%	2.06E-05
EDBM / Magdeburg-City	Germany	100.00%	0.00E+00	0	13/12/2012	99.90%	1.86E-05
EDBN / Neubrandenburg	Germany	100.00%	0.00E+00	0	02/04/2015	99.99%	1.02E-05
EDDB / Berlin/Schönefeld	Germany	100.00%	0.00E+00	0	04/06/2009	99.90%	2.09E-05
EDDC / Dresden	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.64E-05
EDDE / Erfurt-Weimar	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.46E-05
EDDF / Frankfurt Main	Germany	100.00%	0.00E+00	0	15/12/2011	99.91%	1.54E-05
EDDG / Münster-Osnabrück	Germany	≥ 99.99%	5.79E-06	1	15/12/2011	99.90%	1.67E-05
EDDH / Hamburg	Germany	≥ 99.99%	5.79E-06	1	15/12/2011	99.89%	2.03E-05
EDDK / Köln/Bonn	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.53E-05
EDDL / Düsseldorf	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.42E-05
EDDM / München	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	2.00E-05
EDDN / Nürnberg	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.49E-05
EDDP / Leipzig-Halle	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.73E-05
EDDS / Stuttgart	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	2.02E-05
EDDT / Berlin-Tegel	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	2.03E-05
EDDV / Hannover	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.84E-05
EDFQ / Allendorf/Eder	Germany	100.00%	0.00E+00	0	21/08/2014	99.90%	1.57E-05
EDGS / Siegerland	Germany	100.00%	0.00E+00	0	12/10/2017	100.00%	0.00E+00
EDHI / Hamburg-Finkenwerder	Germany	≥ 99.99%	5.79E-06	1	13/12/2012	99.89%	2.09E-05
EDJA / Memmingen	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	2.02E-05
EDLP / Paderborn-Lippstadt	Germany	100.00%	0.00E+00	0	13/12/2012	99.90%	1.79E-05

[9] *Outages* refer to events when the APV-I service changes its status from Available to Unavailable for the reported month.

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages[9]	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
EDLV / Niederrhein	Germany	100.00%	0.00E+00	0	23/06/2016	99.98%	3.30E-06
EDLW / Dortmund	Germany	100.00%	0.00E+00	0	12/12/2013	99.90%	1.59E-05
EDMA / Augsburg	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.98E-05
EDME / Eggenfelden	Germany	100.00%	0.00E+00	0	11/12/2014	99.90%	2.09E-05
EDMO / Oberpfaffenhofen	Germany	100.00%	0.00E+00	0	13/12/2012	99.90%	2.01E-05
EDMS / Straubing	Germany	100.00%	0.00E+00	0	11/12/2014	99.90%	1.69E-05
EDNY / Friedrichshafen	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.94E-05
EDPR / Donauwörth	Germany	100.00%	0.00E+00	0	08/12/2016	99.99%	3.39E-06
EDQC / Coburg-Brandensteinsebene	Germany	100.00%	0.00E+00	0	11/12/2014	99.91%	1.41E-05
EDQD / Bayreuth	Germany	100.00%	0.00E+00	0	15/12/2011	99.91%	1.48E-05
EDQG / Giebelstadt	Germany	100.00%	0.00E+00	0	14/02/2012	99.91%	1.47E-05
EDTD / Donaueschingen-Villingen	Germany	100.00%	0.00E+00	0	11/12/2014	99.90%	1.95E-05
EDTL / Lahr	Germany	100.00%	0.00E+00	0	23/06/2016	99.99%	8.08E-06
EDTM / Mengen-Hohentengen	Germany	100.00%	0.00E+00	0	11/12/2014	99.90%	2.07E-05
EDTY / Schwäbisch-Hall	Germany	100.00%	0.00E+00	0	13/12/2012	99.90%	1.72E-05
EDVE / Braunschweig-Wolfsburg	Germany	100.00%	0.00E+00	0	18/10/2012	99.90%	1.85E-05
EDVK / Kassel-Calden	Germany	100.00%	0.00E+00	0	04/04/2013	99.96%	1.03E-05
EDWB / Bremerhaven	Germany	99.99%	1.16E-05	2	15/12/2011	99.89%	1.88E-05
EDWE / Emden	Germany	99.99%	1.16E-05	2	30/05/2013	99.98%	1.01E-05
EDWI / Wilhelmshaven JadeWeser	Germany	99.99%	1.16E-05	2	15/12/2011	99.89%	1.83E-05
EDXW / Sylt	Germany	99.98%	1.74E-05	3	10/12/2015	99.98%	1.00E-05
EEKE / Kuressaare	Estonia	99.98%	1.74E-05	3	02/03/2017	99.98%	1.50E-05
EFJO / Joensuu	Finland	99.98%	3.40E-05	16	12/12/2013	99.72%	1.64E-04
EGEC / Campbeltown	United Kingdom	99.85%	9.08E-05	25	23/06/2016	99.94%	2.08E-05
EGFF / Cardiff	United Kingdom	99.94%	6.45E-05	20	13/10/2016	99.96%	1.50E-05
EGGD / Bristol	United Kingdom	99.96%	7.06E-05	22	21/08/2014	99.98%	1.18E-05
EGHC / Lands End	United Kingdom	99.98%	1.74E-05	3	27/04/2017	99.99%	6.37E-06
EGHG / Yeovil	United Kingdom	99.98%	4.24E-05	22	09/06/2017	≥ 99.99%	8.41E-06
EGJA / Alderney	Guernsey	≥ 99.99%	5.79E-06	1	07/12/2011	99.90%	1.69E-05
EGNL / Barrow/Walney Island	United Kingdom	99.88%	5.52E-05	13	17/01/2017	99.94%	1.61E-05
EGPA / Kirkwall	United Kingdom	99.83%	5.84E-05	13	21/07/2016	99.93%	2.13E-05

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages[9]	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
EGPB / Sumburgh	United Kingdom	99.83%	7.65E-05	17	27/04/2017	99.95%	2.92E-05
EGPC / Wick	United Kingdom	99.83%	8.08E-05	18	23/06/2016	99.93%	1.88E-05
EGPI / Islay	United Kingdom	99.85%	6.95E-05	14	18/08/2016	99.93%	1.79E-05
EGPN / Dundee	United Kingdom	99.86%	6.14E-05	19	30/03/2017	99.93%	1.25E-05
EGPR / Barra	United Kingdom	99.85%	6.45E-05	15	18/08/2016	99.93%	2.13E-05
EGPU / Tiree	United Kingdom	99.85%	6.07E-05	16	04/02/2016	99.93%	2.03E-05
EGTE / Exeter	United Kingdom	99.98%	2.32E-05	4	21/08/2014	99.98%	9.64E-06
EHGG / Elde	Netherlands	99.99%	2.08E-05	7	13/11/2014	99.98%	9.78E-06
EHTE / Teuge	Netherlands	99.99%	2.74E-05	18	13/11/2014	99.98%	8.82E-06
EIDW / Dublin	Ireland	99.88%	5.49E-05	13	25/05/2017	99.98%	1.16E-05
EKAH / Aarhus	Denmark	99.97%	2.89E-05	5	05/03/2015	99.98%	1.21E-05
EKEB / Esbjerg	Denmark	99.98%	3.32E-05	12	15/10/2015	99.98%	1.26E-05
EKKA / Karup	Denmark	99.97%	2.89E-05	5	02/04/2015	99.99%	1.06E-05
EKSB / Sonderborg	Denmark	99.99%	5.79E-06	1	18/08/2016	99.98%	8.86E-06
ENAL / Alesund-Vigra	Norway	99.92%	4.17E-05	8	03/03/2016	99.96%	2.27E-05
ENAN / Andoya-Andenes	Norway	99.71%	1.13E-04	50	02/04/2015	99.79%	1.18E-04
ENBL / Forde-Bringeland	Norway	99.91%	4.32E-05	9	28/05/2015	99.97%	1.86E-05
ENBN / Bronnoysund-Bronnoy	Norway	99.95%	7.49E-05	37	08/12/2016	99.93%	3.82E-05
ENBR / Bergen-Flesland	Norway	99.92%	6.91E-05	37	03/03/2016	99.97%	1.79E-05
ENCN / Kristiansand-Kjevik	Norway	99.95%	4.01E-05	14	03/03/2016	99.98%	1.28E-05
ENEV / Harstad/Narvik/Evenes	Norway	99.80%	1.01E-04	27	30/03/2017	99.74%	9.06E-05
ENFL / Floro	Norway	99.91%	4.21E-05	9	02/04/2015	99.97%	1.90E-05
ENHD / Haugesund-Karmoey	Norway	99.92%	4.79E-05	28	03/03/2016	99.97%	1.57E-05
ENKB / Kristiansund-Kvernberget	Norway	99.94%	5.71E-05	31	26/05/2016	99.96%	2.44E-05
ENKR / Kirkenes/Hoybuktmoen	Norway	99.30%	4.76E-04	264	27/04/2017	99.19%	4.72E-04
ENLK / Leknes	Norway	99.82%	1.15E-04	37	02/02/2017	99.81%	9.10E-05
ENMS / Namsos	Norway	99.93%	4.05E-05	7	02/04/2015	99.89%	4.65E-05
ENRS / Rost	Norway	99.85%	1.20E-04	44	06/03/2014	99.81%	1.02E-04
ENRY / Moss - Rygge	Norway	99.96%	2.89E-05	5	10/12/2015	99.98%	1.53E-05
ENSH / Svolvar-Helle	Norway	99.83%	1.24E-04	37	08/12/2016	99.82%	8.77E-05
ENSK / Stokmarknes-Skagen	Norway	99.78%	1.42E-04	41	08/12/2016	99.80%	9.78E-05
ENSO / Stord-Sorstokken	Norway	99.92%	5.79E-05	36	03/03/2016	99.97%	1.57E-05

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages[9]	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
ENST / Sandnessjoen-Stokka	Norway	99.93%	5.21E-05	9	23/07/2015	99.93%	4.14E-05
ENTO / Sandefjord-Torp	Norway	99.96%	2.32E-05	4	20/08/2015	99.98%	1.40E-05
ENVA / Trondheim-Varnes	Norway	99.96%	3.63E-05	8	03/03/2016	99.96%	2.43E-05
ENZV / Stavanger-Sola	Norway	99.93%	2.90E-05	5	03/03/2016	99.97%	1.45E-05
EPGD / Gdansk Lech Watesa	Poland	100.00%	0.00E+00	0	28/05/2015	99.98%	1.30E-05
EPKK / Krakow - Balice	Poland	99.99%	1.74E-05	3	18/08/2016	99.98%	1.36E-05
EPKT / Katowice	Poland	99.99%	1.16E-05	2	03/04/2014	99.98%	1.27E-05
EPRZ / Rzeszow - Jasionka	Poland	99.98%	1.74E-05	3	15/09/2016	99.97%	2.17E-05
EPWR / Wroclaw/Strachowice	Poland	99.99%	5.79E-06	1	13/10/2016	99.99%	7.20E-06
ESGJ / Jönköping	Sweden	99.98%	2.72E-05	6	09/11/2017	99.98%	2.72E-05
ESUD / Storuman	Sweden	99.97%	4.79E-05	32	11/12/2014	99.90%	6.55E-05
LDDU / Dubrovnik	Croatia	99.99%	5.79E-06	1	10/12/2015	99.98%	1.15E-05
LEAM / Almeria	Spain	100.00%	0.00E+00	0	02/02/2017	99.99%	4.25E-06
LEXJ / Santander	Spain	100.00%	0.00E+00	0	17/10/2013	99.93%	4.87E-05
LFAB / Dieppe Saint Aubin	France	100.00%	0.00E+00	0	02/03/2017	99.96%	4.45E-06
LFAC / Calais	France	100.00%	0.00E+00	0	20/09/2012	99.95%	1.48E-05
LFAQ / Albert Bray	France	100.00%	0.00E+00	0	15/11/2012	99.95%	1.39E-05
LFAT / Le Touquet Paris Plage	France	100.00%	0.00E+00	0	04/02/2016	99.97%	5.63E-06
LFAV / Valenciennes Denain	France	100.00%	0.00E+00	0	19/09/2013	99.98%	9.70E-06
LFAY / Amiens Glisy	France	100.00%	0.00E+00	0	27/06/2013	99.95%	1.21E-05
LFBA / Agen La Garenne	France	100.00%	0.00E+00	0	06/03/2014	99.97%	1.44E-05
LFBD / Bourdeaux Mérignac	France	100.00%	0.00E+00	0	08/03/2012	99.89%	2.07E-05
LFBE / Bergerac	France	100.00%	0.00E+00	0	09/01/2014	99.97%	1.85E-05
LFBF / Toulouse Francazal	France	100.00%	0.00E+00	0	23/06/2016	99.99%	5.26E-06
LFBH / La Rochelle	France	100.00%	0.00E+00	0	20/09/2012	99.94%	1.91E-05
LFBI / Poitiers Biard	France	100.00%	0.00E+00	0	12/11/2015	99.98%	6.59E-06
LFBK / Montluçon Gueret	France	100.00%	0.00E+00	0	17/12/2013	99.97%	1.75E-05
LFBL / Limoges	France	100.00%	0.00E+00	0	28/06/2012	99.95%	1.83E-05
LFBN / Niort Marais Poitevin	France	100.00%	0.00E+00	0	02/03/2017	99.96%	5.98E-06
LFBO / Toulouse Blagnac	France	100.00%	0.00E+00	0	03/05/2012	99.89%	2.05E-05
LFBP / Pau	France	100.00%	0.00E+00	0	17/03/2011	99.88%	2.86E-05
LFBR / Muret Leherm	France	100.00%	0.00E+00	0	15/10/2015	99.99%	7.48E-06

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages[9]	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
LFBT / Tarbes Lourdes Pyrenees	France	100.00%	0.00E+00	0	28/05/2015	99.98%	8.67E-06
LFBU / Angouleme Brie Champniers	France	100.00%	0.00E+00	0	03/04/2014	99.98%	1.14E-05
LFBZ / Biarritz	France	100.00%	0.00E+00	0	09/02/2012	99.86%	4.04E-05
LFCI / Albi Le Sequestre	France	100.00%	0.00E+00	0	26/05/2016	99.99%	8.96E-06
LFCK / Castres Mazamet	France	100.00%	0.00E+00	0	22/08/2013	99.97%	2.03E-05
LFCR / Rodez-Marcillac	France	100.00%	0.00E+00	0	31/05/2012	99.89%	2.12E-05
LFCY / Royan Medis	France	100.00%	0.00E+00	0	30/04/2015	99.98%	8.30E-06
LFDH / Auch Lamothe	France	100.00%	0.00E+00	0	28/05/2015	99.98%	7.98E-06
LFEC / Ouessant	France	99.99%	5.79E-06	1	11/12/2014	99.98%	1.21E-05
LFGA / Colmar Housse	France	100.00%	0.00E+00	0	02/05/2013	99.95%	1.91E-05
LFGJ / Dole Tavaux	France	100.00%	0.00E+00	0	09/01/2014	99.98%	1.78E-05
LFHP / Le Puy Loudes	France	100.00%	0.00E+00	0	04/02/2016	99.99%	7.42E-06
LFHY / Moulins Montbeugny	France	100.00%	0.00E+00	0	01/05/2014	99.98%	9.00E-06
LFJL / Metz Nancy Lorraine	France	100.00%	0.00E+00	0	04/04/2013	99.95%	1.63E-05
LFJR / Angers Marce	France	100.00%	0.00E+00	0	07/01/2016	99.97%	6.72E-06
LFKC / Calvi Sainte Catherine	France	100.00%	0.00E+00	0	30/04/2015	99.99%	7.15E-06
LFKJ / Ajaccio	France	100.00%	0.00E+00	0	23/06/2016	99.99%	3.04E-06
LFLA / Auxerre Branches	France	100.00%	0.00E+00	0	21/08/2014	99.98%	9.45E-06
LFLC / Clermont Ferrand	France	100.00%	0.00E+00	0	05/05/2011	99.90%	1.81E-05
LFLD / Bourges	France	100.00%	0.00E+00	0	18/08/2016	99.98%	3.87E-06
LFLL / Lyon St Exupery	France	100.00%	0.00E+00	0	07/02/2013	99.95%	1.75E-05
LFLP / Annecy Meythet	France	100.00%	0.00E+00	0	19/09/2013	99.98%	1.93E-05
LFLS / Grenoble Isere	France	100.00%	0.00E+00	0	07/03/2013	99.95%	1.90E-05
LFLU / Valence	France	100.00%	0.00E+00	0	13/12/2012	99.95%	1.87E-05
LFLV/ Vichy Charmeil	France	100.00%	0.00E+00	0	05/02/2015	99.98%	1.21E-05
LFLW / Aurillac	France	100.00%	0.00E+00	0	26/06/2014	99.98%	1.52E-05
LFLX / Chateauroux Deols	France	100.00%	0.00E+00	0	06/02/2014	99.98%	1.34E-05
LFMD/ Cannes Mandelieu	France	100.00%	0.00E+00	0	05/02/2015	99.99%	1.17E-05
LFMK / Carcassonne Salvaza	France	100.00%	0.00E+00	0	24/07/2014	99.89%	1.97E-05
LFML / Marseille	France	100.00%	0.00E+00	0	08/01/2015	99.99%	9.65E-06
LFMN / Nice Cote D'Azur	France	100.00%	0.00E+00	0	25/06/2015	99.99%	5.87E-06
LFMP / Perpignan-Rivesaltes	France	100.00%	0.00E+00	0	15/10/2015	99.99%	7.62E-06

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages[9]	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
LFMU / Beziers Vias	France	100.00%	0.00E+00	0	18/10/2012	99.95%	1.88E-05
LFNB / Mende	France	100.00%	0.00E+00	0	17/12/2013	99.97%	1.75E-05
LFOB / Beauvais	France	100.00%	0.00E+00	0	20/09/2012	99.95%	1.46E-05
LFOE / Evreux Fauville	France	100.00%	0.00E+00	0	15/11/2012	99.98%	9.49E-06
LFOH / Le Havre Octeville	France	100.00%	0.00E+00	0	10/12/2015	99.97%	6.35E-06
LFOJ / Orleans Bricy	France	100.00%	0.00E+00	0	18/09/2014	99.98%	1.00E-05
LFOK / Chalons Vatry	France	100.00%	0.00E+00	0	02/02/2017	99.97%	4.60E-06
LFOQ / Blois Le Breuil	France	100.00%	0.00E+00	0	15/09/2016	99.97%	4.32E-06
LFOU / Cholet Le Pontreau	France	100.00%	0.00E+00	0	04/02/2016	99.97%	7.11E-06
LFOZ / Orleans	France	100.00%	0.00E+00	0	28/06/2012	99.95%	1.52E-05
LFPB / Le Bourget	France	100.00%	0.00E+00	0	02/06/2011	99.90%	1.50E-05
LFPM / Melun Villaroche	France	100.00%	0.00E+00	0	10/12/2015	99.98%	7.67E-06
LFPO / Paris Orly	France	100.00%	0.00E+00	0	30/05/2013	99.95%	1.46E-05
LFPT / Pontoise Cormeilles en Vexin	France	100.00%	0.00E+00	0	01/05/2014	99.98%	9.70E-06
LFQA / Reims Prunay	France	100.00%	0.00E+00	0	03/04/2014	99.98%	1.07E-05
LFQG / Nevers Fouchambault	France	100.00%	0.00E+00	0	13/12/2012	99.95%	1.63E-05
LFQM / Besanson La Veze	France	100.00%	0.00E+00	0	18/09/2014	99.99%	1.31E-05
LFQQ / Lille Lesquin	France	100.00%	0.00E+00	0	26/06/2014	99.98%	6.23E-06
LFQT / Merville	France	100.00%	0.00E+00	0	15/11/2012	99.95%	1.32E-05
LFRB / Brest Bretagne	France	≥ 99.99%	5.79E-06	1	03/05/2012	99.89%	2.09E-05
LFRD / Dinard	France	≥ 99.99%	5.79E-06	1	06/02/2014	99.98%	1.22E-05
LFRG / Deauville Saint Gatien	France	100.00%	0.00E+00	0	18/09/2014	99.98%	9.41E-06
LFRK / Caen Capiquet	France	100.00%	0.00E+00	0	11/12/2014	99.98%	8.94E-06
LFRM / Le Mans	France	100.00%	0.00E+00	0	15/11/2012	99.95%	1.62E-05
LFRN / Rennes	France	≥ 99.99%	5.79E-06	1	30/05/2013	99.94%	1.65E-05
LFRO / Lannion	France	≥ 99.99%	5.79E-06	1	07/01/2016	99.97%	8.99E-06
LFRQ / Quimper	France	≥ 99.99%	5.79E-06	1	09/01/2014	99.97%	1.61E-05
LFRS / Nantes	France	100.00%	0.00E+00	0	28/06/2012	99.94%	1.92E-05
LFRT / Saint Brieuc Armor	France	≥ 99.99%	5.79E-06	1	10/12/2015	99.97%	9.16E-06
LFRU / Morlaix Ploujean	France	≥ 99.99%	5.79E-06	1	13/10/2016	99.97%	5.76E-06
LFRV / Vannes-Meucon	France	≥ 99.99%	5.79E-06	1	31/05/2012	99.89%	1.85E-05
LFRZ / Saint Nazaire Montoir	France	100.00%	0.00E+00	0	28/10/2014	99.97%	1.06E-05
LFSB / Bale - Mulhouse	France	100.00%	0.00E+00	0	10/12/2015	99.99%	8.79E-06

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages[9]	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
LFSD / Dijon Longvic	France	100.00%	0.00E+00	0	28/04/2016	99.99%	6.94E-06
LFSG / Epinal Mirecourt	France	100.00%	0.00E+00	0	30/05/2013	99.95%	1.77E-05
LFSL / Brive Souillac	France	100.00%	0.00E+00	0	22/08/2013	99.97%	1.89E-05
LFSN / Nancy Essey	France	100.00%	0.00E+00	0	02/05/2013	99.95%	1.70E-05
LFST / Strasbourg Entzheim	France	100.00%	0.00E+00	0	10/12/2015	99.99%	9.43E-06
LFTW / Nimes Garons	France	100.00%	0.00E+00	0	18/10/2012	99.95%	1.79E-05
LIEO / Olbia Costa Smeralda	Italy	100.00%	0.00E+00	0	12/11/2015	99.99%	6.40E-06
LIMC / Milano/Malpensa	Italy	100.00%	0.00E+00	0	21/08/2014	99.98%	1.14E-05
LIME / Bergamo / Orio al Serio	Italy	100.00%	0.00E+00	0	20/07/2017	≥ 99.99%	2.59E-06
LIML / Milano/Linate	Italy	100.00%	0.00E+00	0	13/12/2012	99.95%	1.83E-05
LIPE / Bologna Borgo Panigale	Italy	100.00%	0.00E+00	0	18/11/2014	99.98%	1.81E-05
LIPZ / Venezia/Tessera	Italy	100.00%	0.00E+00	0	27/06/2013	99.93%	2.38E-05
LIPX / Verona/Villafranca	Italy	100.00%	0.00E+00	0	22/06/2017	≥ 99.99%	2.14E-06
LIRA / Roma/Ciampino	Italy	100.00%	0.00E+00	0	10/01/2013	99.91%	4.05E-05
LIRF / Roma/Fiumicino	Italy	100.00%	0.00E+00	0	10/01/2013	99.90%	4.18E-05
LIRQ / Firenze/Peretola	Italy	100.00%	0.00E+00	0	22/06/2017	≥ 99.99%	2.14E-06
LKKV / Karlovy Vary	Czech Rep.	100.00%	0.00E+00	0	13/11/2014	99.99%	8.69E-06
LKMT / Ostrava	Czech Rep.	99.99%	6.56E-06	3	09/01/2014	99.98%	1.64E-05
LKPR / Praha	Czech Rep.	100.00%	0.00E+00	0	09/01/2014	99.99%	9.85E-06
LKTB / Brno	Czech Rep.	99.99%	5.79E-06	1	09/01/2014	99.98%	1.66E-05
LKVO / Praha-Vodochody	Czech Rep.	100.00%	0.00E+00	0	25/06/2015	99.99%	8.22E-06
LOWG / Graz	Austria	99.99%	5.79E-06	1	09/01/2014	99.96%	2.10E-05
LOWL / Linz	Austria	99.99%	5.79E-06	1	09/01/2014	99.98%	1.92E-05
LPPR / Porto	Portugal	≥ 99.99%	6.56E-06	4	12/10/2017	≥ 99.99%	8.74E-06
LPPT / Lisboa	Portugal	100.00%	0.00E+00	0	28/05/2015	99.98%	1.47E-05
LRCL / Cluj – Napoca -Avram Iancu	Romania	99.98%	1.16E-05	2	10/11/2016	99.96%	2.74E-05
LSGG / Geneva	Switzerland	100.00%	0.00E+00	0	12/11/2015	99.99%	8.84E-06
LSMD / Dübendorf	Switzerland	100.00%	0.00E+00	0	21/08/2014	99.99%	1.37E-05
LSME / Emmen	Switzerland	100.00%	0.00E+00	0	03/04/2014	99.98%	1.18E-05
LSMP / Payerne Air Base	Switzerland	100.00%	0.00E+00	0	17/09/2015	99.99%	7.85E-06
LSZB / Berne-Belp	Switzerland	100.00%	0.00E+00	0	07/03/2013	99.95%	1.78E-05
LSZG / Grenchen	Switzerland	100.00%	0.00E+00	0	25/07/2013	99.95%	1.98E-05
LSZR / St.Gallen-Altenrhein	Switzerland	100.00%	0.00E+00	0	17/11/2011	99.90%	1.91E-05

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages[9]	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
LZIB / Bratislava/M. R. Stefanik	Slovak Rep.	99.99%	5.79E-06	1	05/02/2015	99.98%	2.73E-05
LZKZ / Kosice	Slovak Rep.	99.98%	1.16E-05	2	05/02/2015	99.96%	6.82E-05

Table 8 – Monthly APV-I Availability at airports with published procedures using EGNOS

APPENDIX C EGNOS LPV-200 PERFORMANCE AT AIRPORTS

The table reports LPV-200 Availability and Continuity at airports with published procedures using EGNOS. These values correspond to the performance obtained under fault-free conditions using all satellites in view:

Airports	Country	Monthly LPV-200 Availability	Monthly LPV-200 Continuity Risk	Outages[10]	Publication date of first LPV-200 procedure	LPV-200 Availability since procedure publication	LPV-200 Continuity Risk since procedure publication
EDDW / Bremen	Germany	99.98%	1.16E-05	2	30/03/2017	99.97%	1.09E-05
EDFH / Frankfurt–Hahn	Germany	100.00%	0.00E+00	0	14/09/2017	100.00%	0.00E+00
EDGS / Siegerland	Germany	100.00%	0.00E+00	0	12/10/2017	100.00%	0.00E+00
EDSB / Karlsruhe/Baden-Baden	Germany	100.00%	0.00E+00	0	27/04/2017	99.99%	4.78E-06
EDTL / Lahr	Germany	100.00%	0.00E+00	0	27/04/2017	99.99%	4.78E-06
EKBI / Billund	Denmark	99.97%	3.67E-05	12	20/07/2017	99.99%	1.56E-05
ENBL / Forde/Bringeland	Norway	99.88%	4.94E-05	19	27/04/2017	99.95%	2.26E-05
ENFG / Fagernes	Norway	99.93%	5.21E-05	9	14/09/2017	99.97%	2.23E-05
ENGM / Gardemoon	Norway	99.95%	3.59E-05	13	10/11/2016	99.96%	1.88E-05
ENML / Molde/Aro	Norway	99.89%	6.26E-05	29	30/03/2017	99.94%	2.51E-05
ENNM / Namsos	Norway	99.93%	3.94E-05	7	27/04/2017	99.89%	6.54E-05
ENOL / Orland	Norway	99.94%	7.37E-05	25	12/10/2017	99.96%	4.51E-05
ENRM / Rorvik/Ryum	Norway	99.93%	3.94E-05	7	02/02/2017	99.90%	6.00E-05
ENSG / Sogndal/Haukasen	Norway	99.89%	4.13E-05	12	14/09/2017	99.95%	1.81E-05
LFBX / Périgueux Bassillac	France	100.00%	0.00E+00	0	25/05/2017	≥ 99.99%	9.33E-07
LFLN / Saint Yan	France	100.00%	0.00E+00	0	02/03/2017	99.97%	8.91E-06
LFLS / Grenoble Isere	France	100.00%	0.00E+00	0	13/10/2016	99.98%	7.14E-06
LFLY / Lyon Bron	France	100.00%	0.00E+00	0	28/09/2016	99.98%	7.24E-06
LFMH / Saint Etienne Boutheon	France	100.00%	0.00E+00	0	02/02/2017	99.98%	7.67E-06
LFPG / Paris Charles de Gaulle	France	100.00%	0.00E+00	0	28/04/2016	99.98%	4.18E-06
LFPN / Toussus Le Noble	France	100.00%	0.00E+00	0	27/04/2017	99.99%	3.98E-06
LFQB / Troyes Barberey	France	100.00%	0.00E+00	0	18/08/2016	99.98%	3.33E-06
LFRC / Cherbourg Maupertus	France	≥ 99.99%	6.94E-06	4	23/06/2016	99.98%	5.83E-06
LFRI / La Roche Sur Yon	France	100.00%	0.00E+00	0	10/11/2016	99.97%	7.68E-06
LHBP / Budapest Liszt Ferenc	Hungary	99.98%	2.39E-05	18	15/09/2016	99.98%	1.89E-05
LOWL / Linz	Austria	99.99%	5.79E-06	1	02/02/2017	99.99%	2.67E-05
LOWW / Wien - Schwechat	Austria	99.99%	5.79E-06	1	02/02/2017	99.99%	2.28E-05
LSGC / Les Eplatures	Switzerland	100.00%	0.00E+00	0	26/05/2016	99.99%	4.49E-06

[10] *Outages* refer to events when the LPV-200 service changes its status from Available to Unavailable for the reported month.

Airports	Country	Monthly LPV-200 Availability	Monthly LPV-200 Continuity Risk	Outages[10]	Publication date of first LPV-200 procedure	LPV-200 Availability since procedure publication	LPV-200 Continuity Risk since procedure publication
LSZH / Zurich	Switzerland	100.00%	0.00E+00	0	25/05/2017	≥ 99.99%	9.33E-07
LZPP / Piestany	Slovak Rep.	99.99%	5.79E-06	1	02/02/2017	99.99%	2.04E-05
LZZI / Žilina	Slovak Rep.	99.99%	1.16E-05	2	25/05/2017	99.99%	1.61E-05

Table 9 – Monthly LPV-200 Availability at airports with published procedures using EGNOS

APPENDIX D REFERENCE DOCUMENTS

[RD-1]	Open Service Definition Document, EGN-SDD-OS; v.02-03 (https://egnos-user-support.essp-sas.eu/new_egnos_ops/sites/default/files/library/official_docs/egnos_os_sdd_in_force.pdf)
[RD-2]	Safety Of Life Definition Document, EGN-SDD-SoL; v.03-01 (https://egnos-user-support.essp-sas.eu/new_egnos_ops/sites/default/files/library/official_docs/egnos_sol_sdd_in_force.pdf)
[RD-3]	EGNOS Data Access Service (EDAS) Service Definition Document, EGN-SDD-EDAS; v.02-01 (https://egnos-user-support.essp-sas.eu/new_egnos_ops/sites/default/files/library/official_docs/egnos_edas_sdd_v2_1.pdf)

APPENDIX E LIST OF ACRONYMS

Acronym	Definition
APV	Approach with Vertical Guidance
ASN	Abstract Syntax Notation
ECAC	European Civil Aviation Conference
EDAS	EGNOS Data Access Service
EGNOS	European Geostationary Navigation Overlay Service
ENT	EGNOS Network Time
ESSP	European Satellite Services Provider
FTP	File Transfer Protocol
GEO	Geostationary Satellite
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HAL	Horizontal Alarm Limit
HNSE	Horizontal Navigation System Error
HPE	Horizontal Position Error
HPL	Horizontal Protection Level
HSI	Horizontal Safety Index
LPV	Localizer Performance with vertical guidance
MI	Misleading Information
MT27	Message Type 27
NA	Not Applicable/ Not Available
NLES	Navigation Land Earth Station
NPA	Non-Precision Approach
NTRIP	Networked Transport of RTCM via Internet Protocol
OP	Operation
OPS	Operations
OS	Open Service
PA	Precision Approach
PL	Protection Level
PRN	Pseudo-Random Number
RAIM	Receiver Autonomous Integrity Monitoring
RD	Reference Document
RIMS	Ranging and Integrity Monitoring Station
RTCM	Radio Technical Commission for Maritime Services
SBAS	Satellite-Based Augmentation System
SDD	Service Definition Document
SIS	Signal-In-Space
SL0	Service Level 0
SL2	Service Level 2
SoL	Safety of Life
UTC	Universal Time Coordinated
VAL	Vertical Alarm Limit
VNSE	Vertical Navigation System Error
VPE	Vertical Position Error
VPL	Vertical Protection Level
VSI	Vertical Safety Index

END OF THE DOCUMENT