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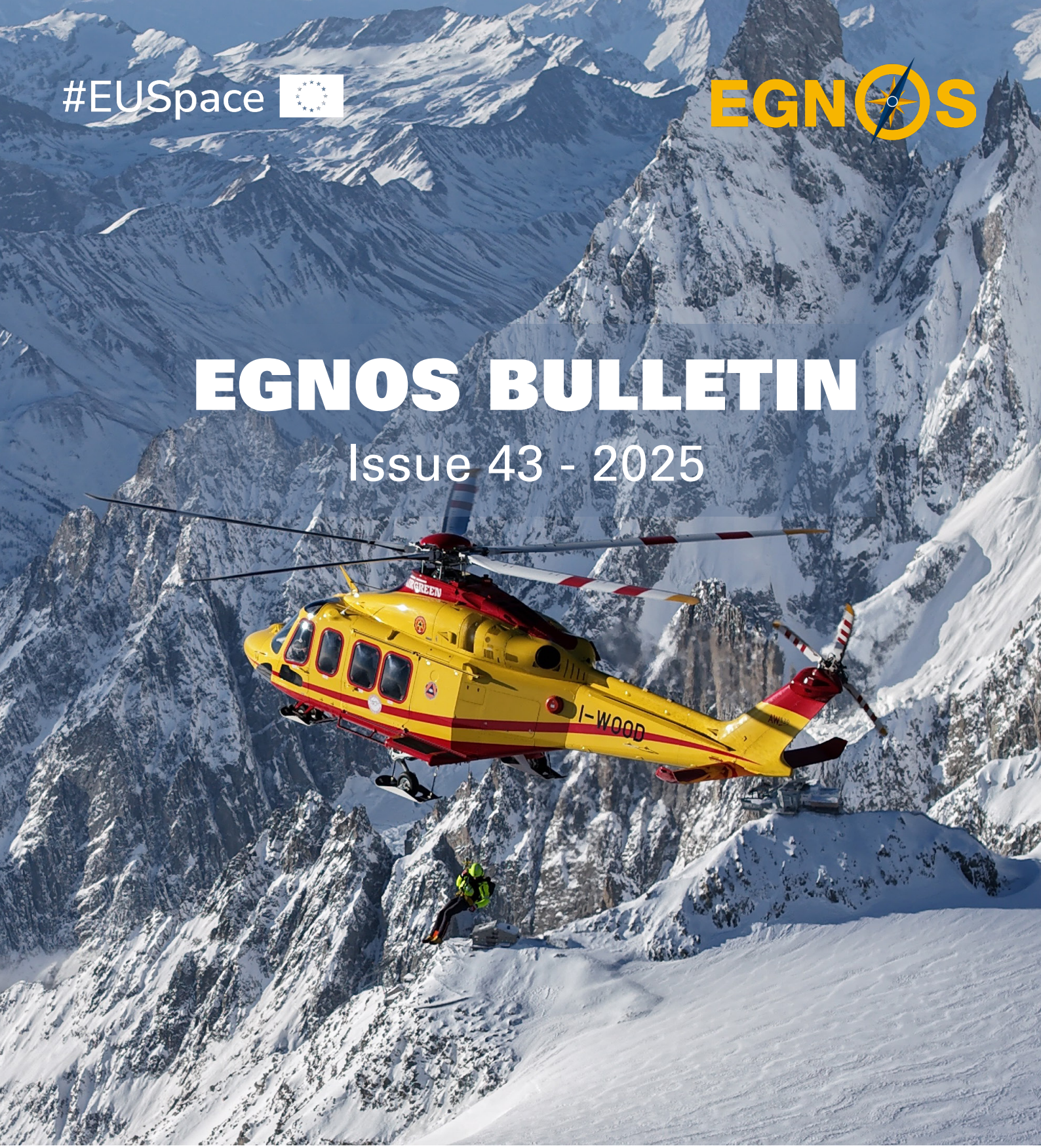
EGNOS BULLETIN

Issue 43 - 2025



Airgreen AW139 flying with EGNOS. Credits: Airgreen

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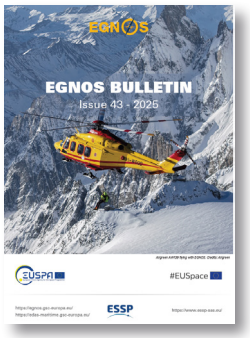

Cover Story

Airgreen: Prepared for the future of LPV-enabled helicopter

ESSP spoke with Ivo Airaudi, Head of Training and pilot at Airgreen, about the company's transition to LPV capability and why this technology is becoming essential for modern helicopter operations.

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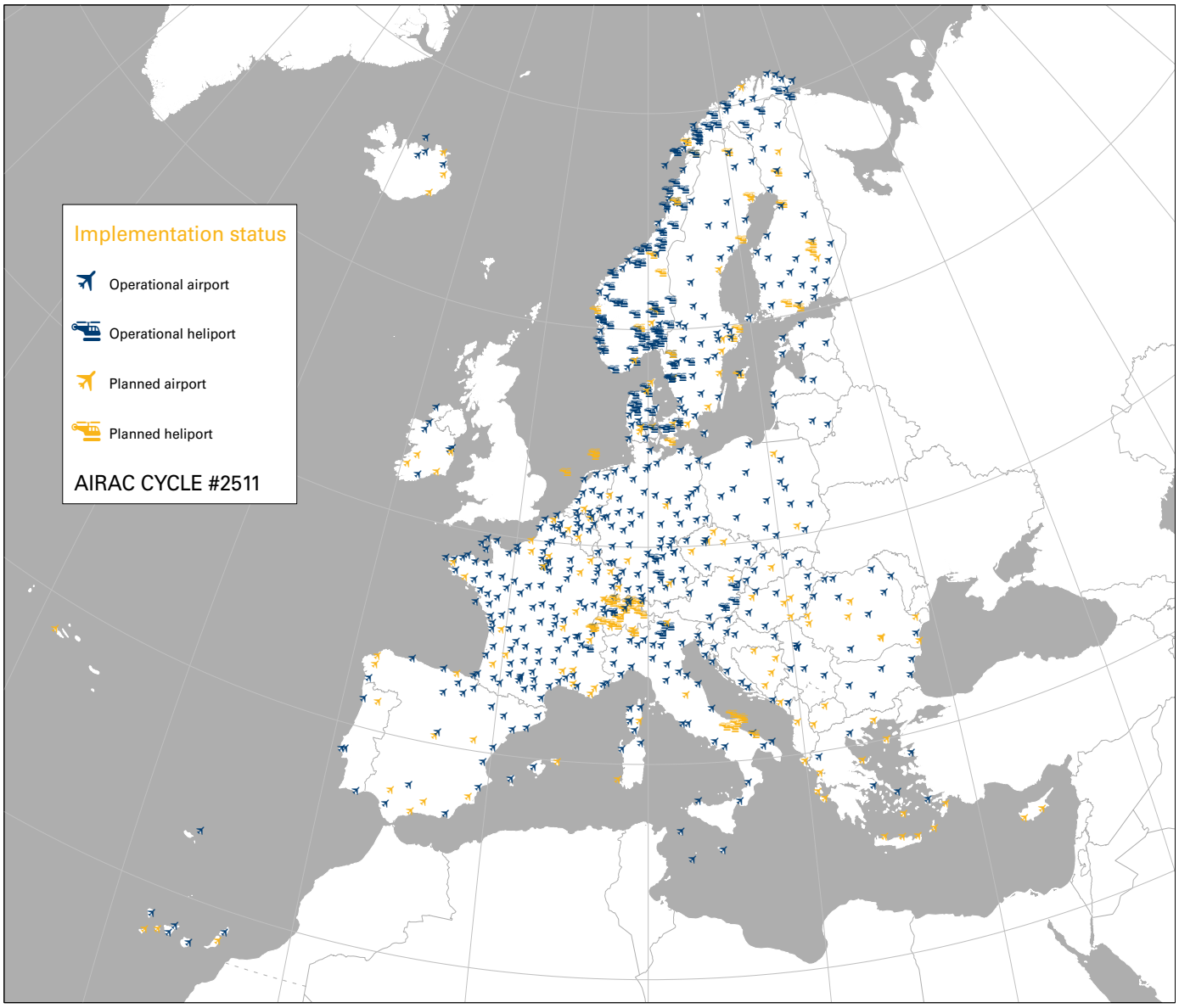
EGNOS implementation



EGNOS Success Stories

CONDOR: AT THE FOREFRONT OF LPV IMPLEMENTATION FOR LEISURE TRAVEL

German airline Condor is embracing advanced navigation technologies as part of its ongoing fleet renewal. By integrating LPV capabilities into its new Airbus aircraft, the airline aims to improve operational efficiency, safety and sustainability. This forward-thinking strategy reflects Condor's commitment to future-proofing its operations across a diverse network of destinations.

A320neo "Passion"
Credits: Condor

Condor, the world's first leisure airline

Founded in 1956 as the world's first leisure airline, Condor has been transporting millions of passengers to more than 70 holiday destinations and major cities worldwide for almost seven decades. With a workforce of over 5,000 employees, the airline operates a fleet of approximately 60 aircraft, maintained to the highest safety standards by its in-house maintenance provider, Condor Technik GmbH, based in Frankfurt and Düsseldorf. Condor is currently in the midst of a major fleet transformation, gradually phasing out its Boeing and Airbus CEO aircraft in favour of a modern fleet consisting entirely of Airbus NEO aircraft.

Fleet renewal

In 2024, Condor completed the full renewal of its long-haul fleet, which now comprises 18 highly efficient Airbus A330neo aircraft. This fleet will continue to expand and grow to 25 aircraft by 2031. Since 2024, Condor has also been renewing its short and medium-haul fleet and is expected to receive a total of 43 new Airbus A32Xneo aircraft by 2029.

All Airbus neo aircraft in Condor's fleet are equipped with Localizer Performance with Vertical Guidance (LPV), underscoring the airline's commitment to future-oriented operations.

A320neo "Island"
Credits: Condor

Condor's decision on LPV

Condor's decision to implement LPV and other advanced navigation technologies, such as Data Link, aims to improve operational efficiency, increase environmental sustainability, and enhance flight safety.

By leveraging SLS capabilities and other innovative concepts, such as TBO (trajectory-based operations), Condor aims to achieve more fuel-efficient, cost-effective flight profiles.

This approach is not pursued in isolation: the airline actively collaborates with key European aviation stakeholders, such as DFS (the German air navigation service provider), European agencies and others, to pilot and refine these optimised trajectories within European airspace.

In addition, safety is another major, if not the primary, reason for adopting LPV. Compared to conventional LNAV/VNAV procedures, LPV approaches offer more accurate and stable vertical guidance, as they do not rely on barometric data, which can be affected by temperature variations or incorrect QNH settings. This increased reliability significantly reduces the risk of Controlled Flight Into Terrain (CFIT), particularly during non-precision approaches at airports with limited infrastructure.

Experience with LPV and next steps

Condor pilots are adapting positively to LPV approaches. At airports with lower traffic and workload, pilots often choose LPV for its greater stability and reliability. To facilitate the effective integration of LPV into flight operations, Condor has provided specific training programmes, including computer-based training (CBT) and simulator sessions for pilots.

Looking ahead, Condor will continue its transition to a fully LPV-capable fleet. The airline remains committed to working closely with aviation stakeholders to maximise the benefits of LPV and trajectory-based operations. As the coverage and availability of procedures expand, Condor is well-positioned to lead the way in modern, efficient, and safe flight operations within European airspace and beyond.

A320neo "Maldives"
Credits: Condor

Did you know...?

That Europe already has over 1000 LPV procedures published?

In July 2025 (AIRAC Cycle #2507), with the publication of eight new LPV procedures, Europe had a total of more than 1000 LPVs already available, providing aircraft operators with the operational, economic, environmental, and safety benefits offered by PBN in the approach phase. You can consult the current and planned publications on the LPV procedures map.

AIRGREEN: PREPARED FORTHE FUTURE OF LPV-ENABLED HELICOPTER OPERATIONS

In Italy's mountainous terrain, helicopters are often the most practical means of reaching remote areas, whether to deliver essential supplies or respond to emergencies. Since 1986, Airgreen has been at the forefront of these operations. Founded initially to transport goods in the Alpine region of Piedmont, the company has steadily expanded to become one of Italy's leading helicopter operators. ESSP spoke with Ivo Airaudi, Head of Training and pilot at Airgreen, about the company's transition to LPV capability and why this technology is becoming essential for modern helicopter operations.

Today, Airgreen offers a wide range of services, including helicopter cargo transport (HESLO), firefighting support, maintenance operations, onshore oil and gas operations, and, most importantly, Helicopter Emergency Medical Services (HEMS).

The company currently operates from nine bases, four of which are staffed and operational 24 hours a day, 7 days a week, while the other five offer a 12-hour service. It has 19 helicopters, including the AW139, AW169, Bell 412, H145, and H125, allowing it to tailor the aircraft to the needs of each mission.

Credits: Airgreen

Equipping the fleet with LPV

Of the 19 helicopters in the Airgreen fleet, 14 are now equipped with LPV (Localiser Performance with Vertical guidance) and RNP 0.3, key capabilities for safe, accurate navigation in low-visibility conditions. These features improve both the approach phase, through Point in Space (PinS) procedures, and the en-route phase, enabling navigation in Low Level Routes (LLR).

The LPV upgrade for their 14-equipped aircraft involved both retrofitting legacy aircraft and acquiring newer helicopters with factory-integrated LPV capability. As Ivo explained, the company's goal has always been to prepare the fleet for the next generation of IFR operations. While the helicopters used in firefighting and HESLO missions remain VFR-only, such as the H125 and Bell 412, Airgreen's medical response aircraft are fully IFR-certified and ready for LPV operations as soon as the infrastructure supports them.

Helping to build the system of the future

Several of Airgreen's bases are located at airports with LPV procedures, including LIMZ, LIEO, LIEA and LIMG. Others such as LIEE has not published any LPV procedures yet. However, most hospital helipads and remote landing sites still lack certified approaches. To close this gap, Airgreen is actively working with ENAV and regional health authorities to expand the use of PinS (Point-in-Space) procedures nationwide.

Last year saw a major step forward thanks to the ECARO project, an EUSPA-funded initiative in which Airgreen participated, to develop a certified Low Level Route (LLR) network consisting of 3 airways connecting northern and southern Italy. This framework lays the groundwork for integrating future PinS procedures and expanding safe IFR access between hospitals and remote bases.

Additional projects are underway to implement PinS in areas such as Sardinia and the Alps. These ongoing collaborations reflect a common goal: to build a connected, modern route network that enables operators such as Airgreen to fully leverage EGNOS Safety of Life (SoL) Service and the LPV capabilities already installed in their fleet.

Credits: Airgreen

Training today for tomorrow's operations

Although widespread use of LPV is not yet possible, Airgreen is proactively preparing for it. Crews regularly use simulators to practise rescue missions in adverse weather conditions, flying with complete IFR profiles, including LPV and PinS procedures. This preparation ensures that once the infrastructure is in place, Airgreen will be able to integrate LPV into actual operations seamlessly. The advantages are clear: safer flight routes, reduced mission duration, and more predictable operations, especially in emergencies when time and visibility are limited.

Advice to other operators

Airgreen's experience highlights a crucial point: equipping helicopters is only one part of the solution. The real impact comes from developing a comprehensive system that includes procedures, infrastructure and coordination with air navigation services and health authorities.

> "By investing in technology today and working collaboratively on infrastructure development, operators can help create a safer and more efficient future for all."

Airgreen is ready and committed to that future. With the right tools already in place and the support of key partners, they are paving the way for safer helicopter missions throughout Italy.

OPERATIONAL IMPLEMENTATION OF EGNOS RETRANSMISSION FOR INLAND NAVIGATION: PORT OF SEVILLE

The IWETT project, funded by EUSPA under the latest EGNOS Call for Grants, focused on improving navigation safety on inland waterways (IWW). It was launched in September 2022 with the participation of three European authorities and organisations (WSV, APS, RSOE) responsible for inland waterway River Information Services (RIS) in Germany, Spain and Hungary.

The operational implementation phase of the project began in December 2024, following the successful preparation and testing of the infrastructure. This marked a significant milestone, with the operational deployment of EGNOS services for integration into the National RIS in these countries.

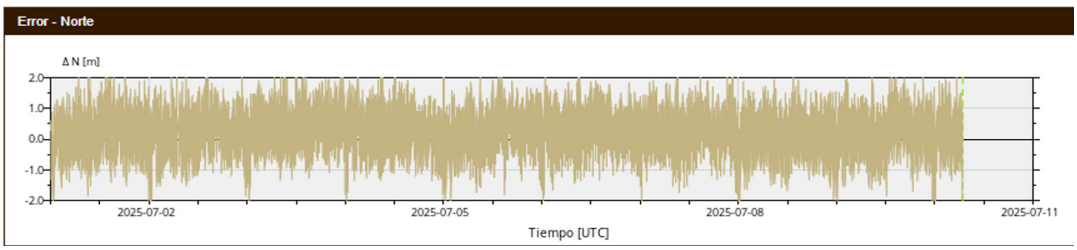
The following case offers a concrete example of this implementation, located on the IWW between the Port of Seville and the coast of Chipiona (Cádiz), an area sustained by the only navigable river in Spain, the Guadalquivir. There, an EGNOS-based service has been designed to support IWW Transport by retransmitting EGNOS corrections for vessel tracking and positioning purposes.

Managed by the Seville Port Authority (APS, for its acronym in Spanish), the complexity of traffic in the area involves different types of vessels, from small fishing boats to merchant ships over 100m in length, for which navigation in narrow channels can be particularly challenging, making the supervision carried out by the Port Authority extremely important. In this context, benefiting from the improved position and navigation accuracy provided by an augmentation system such as EGNOS becomes a significant asset that has proven to be sustainable and relevant in the long term. In fact, the EGNOS-based infrastructure remains operational even after the conclusion of the project, and the service recently declared by the APS will continue to support vessel tracking and tracing operations in the coming years.

Specifically, the service derived from the EGNOS-based infrastructure provides high-precision (differential) positioning to the AIS transponder installed on board vessels navigating inland waterways, as well as to any seagoing vessel within the infrastructure's coverage area of more than 80 km.

The first witness to this improvement for IWW operations is Shiplocus, the software provided by the Spanish Maritime Authority, Puertos del Estado, and used by the APS to access and monitor AIS data transmitted by vessels navigating the channels. According to APS, this is the first time since the dismantling of the IALA DGNSS station network that merchant ships have obtained the <=10m category thanks to the software.

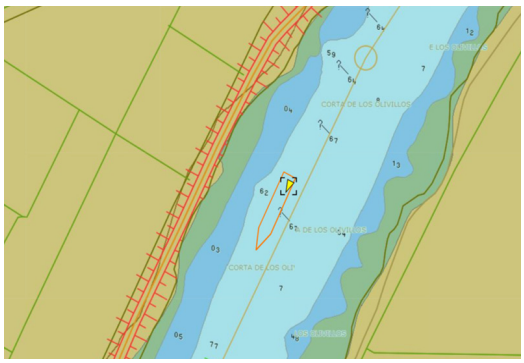
After six months of operation, the Port Authority's practical opinions are very positive. In the words of Septimio Andrés, head of Aids to Navigation (AtoNs) at the APS, "there has been a significant improvement in the positions of vessels obtained from AIS transponders, which use EGNOS corrections. Since the service was launched, we have observed that the horizontal accuracy error has remained below 3 m (95% confidence interval), reaching accuracies of 0.5-0.7 m. In addition, reliability has increased thanks to the integrity information also provided by the system."



IWETT Pilot ES-APS
Credits: Alberding GmbH

Regarding the period before the launch of the service, Septimio points out that "Since the IALA stations in Spain were dismantled, there have been no freely accessible differential correction sources for Vessels, until now".

This improvement over the previous period makes a great difference to traffic monitoring, especially on IWW, where the minimum channel width reaches 60 m in some areas, of which only 30 m are suitable for navigation.



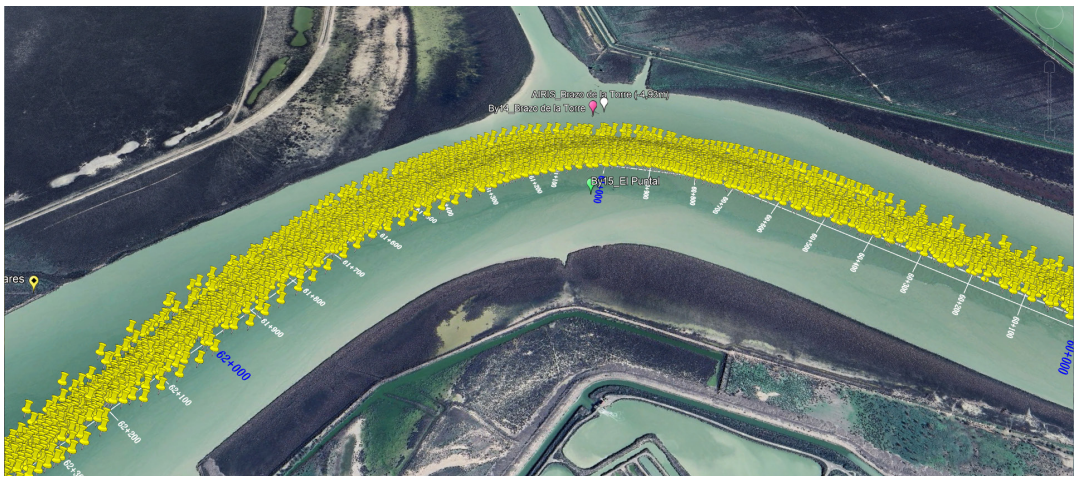
Shiplocus
Credits: Puertos del Estado. GMV

In practice, this difference could mean that the offset will no longer mistakenly locate vessels in a non-navigable area of the channel, a situation that the AtoNs department has often identified in the past.

In line with the example and, as a matter of principle, from the Port Authority's perspective, any task that relies on the position of target vessels communicated via on-board AIS transponders could benefit from the service. Examples include traffic monitoring, channel/IWW monitoring and the assessment of navigational situations reported by users.

In this context, the value added applies to both online and offline operations, to ensure safe navigation in the IWW through the analysis of operational situations, where Port Authority staff, such as Septimio Andrés, recognise greater added value.

Specifically, plotting individual positions and vessel routes on the Electronic Nautical Chart (ENC) required for analysis is much more stable than in the past. This enables identifying areas of the channel that may pose a risk to navigation (e.g., sediment deposits), planning corrective measures (e.g., dredging), and providing recommendations and/or assistance to users more efficiently, thanks to the precise location of target areas within the navigation channel. This leads to improved safety, cost savings and reduced impacts.



Shiplocus
Credits: Puertos del Estado. GMV

All these aspects highlight the importance of EGNOS-based corrections in supporting the IWW's transport, navigation and port activities, as well as the relevance of the Port of Seville in the European context, as a pioneer in the operational implementation of an EGNOS-assisted service to support users and improve port services.

THE STORY OF AIRBUS' LPV-CAPABLE FLEET

The adoption of Localiser Performance with Vertical guidance (LPV) is rapidly gaining momentum across the European aviation landscape, offering greater accessibility and operational efficiency at airports. As one of the world's leading aircraft manufacturers and a key player in shaping the future of aviation, Airbus plays a pivotal role in the widespread adoption of new navigation technologies, including EGNOS, and today offers a wide range of solutions for operators to implement in their fleet.

Satellite-Based Augmentation System (SBAS) was introduced in the early 2000s, but at that time its use was mainly targeted at general aviation users in the United States (using WAAS). However, as the deployment of SBAS-based approach procedures increased in Europe and the EGNOS Safety of Life (SoL) service became operational in 2011, Airbus introduced the SBAS Landing System (SLS) into the A350 programme in 2014.

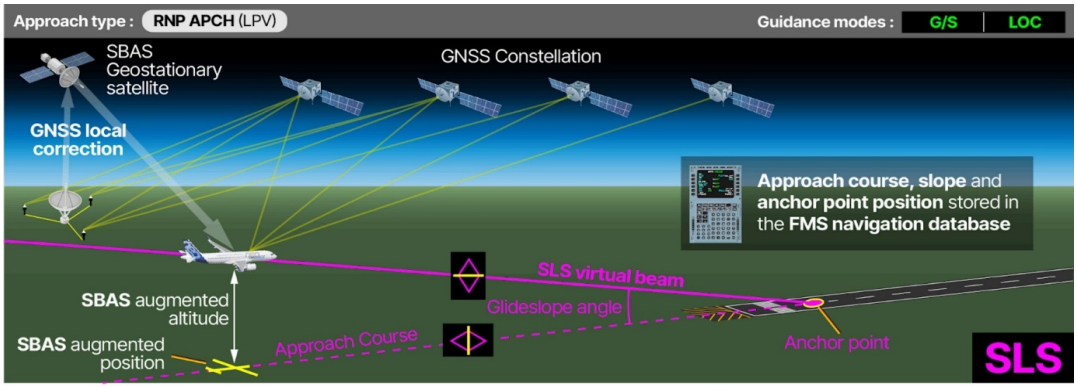
The EGNOS-based LPV200 Service Level was declared operational in 2015, enabling an approach procedure equivalent to ILS CAT-I from an operational standpoint. Airbus took advantage of this opportunity to launch a strategy to roll out the pending LPV solutions, with the intention of enabling their implementation across the entire Airbus family. As a result, the A320 and A330 programmes were launched in 2016, culminating in official EASA certification in October 2021 for the A320 programme and in November 2022 for the A330 programme.

Airbus now offers LPV capability across all its aircraft through the "xLS" concept, enabling pilots to integrate different landing systems into their operations seamlessly. The underlying premise of xLS is to offer an integration and display architecture in the cockpit that is common to all straight approaches, sharing the same guidance symbology and behaviour and thus providing pilots with a similar Human-Machine Interface (HMIs). Some examples are ILS, SLS or GLS. Specifically, SLS stands for SBAS Landing System and enables LPV approach procedures. Airbus SLS avionics mainly comprise an SBAS Multi-Mode Receiver (MMR), which houses the SLS function, and the Flight Management System, which houses the navigation database and the Final Approach Segment Data Block (FAS DB).

The following is a summary of the Airbus solution portfolio:

- **A220:** SLS equivalent functionality enabled by default from the manufacturing line.
- **A320:** SLS is optional, either as a forward-fit or retrofit via a Service Bulletin.
- **A330:** SLS is optional, either as forward-fit or retrofit via a Service Bulletin.
- **A350:** SLS is optional, either as forward-fit or retrofit via a Service Bulletin.
- **A380:** SLS available via a Service Bulletin.

In addition, SLS for A320s equipped with Thales FMS is expected to be available in the near future, allowing all Airbus installations to benefit from LPV.



Credits: Airbus

In terms of utilisation, SLS selection is very popular amongst most programmes; the A330 has an acceptance rate of over 50%, and the A350 has had a selection rate of 100% for several years. One of the main drivers is the significant and fast implementation of LPV procedures in Europe and the United States, which has convinced Airbus customers to equip themselves. This, together with the upcoming certification of SLS for Thales FMS on the A320, will contribute to a bright future for EGNOS across all aircraft models.

Over the years, SBAS has proven to deliver outstanding performance that often exceeds specifications. Being at the forefront of technology,

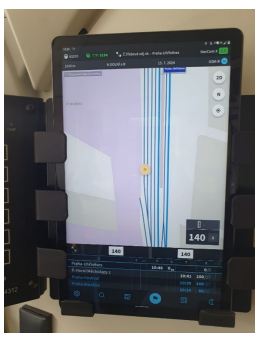
Airbus considered the possibility of providing greater operational value and analysed its signal to determine whether other, more demanding operations could benefit from EGNOS. Specifically, Airbus has been studying the "SBAS-Autoland" capability for some time, considering the use of the EGNOS signal to provide Autoland capabilities outside of low visibility operations (LVO), to enable a higher level of confidence in difficult conditions, such as:

- **Flight crew fatigue** (e.g., early morning landing after a long night flight)
- **Crosswind** (if within wind limitations for autoland)
- **Degraded visibility conditions** (landing in low sun, at night, in rain)
- **Degraded aircraft condition** (not affecting autoland capability)

Airbus has already conducted several tests in this regard, highlighting the added value that EGNOS can bring to these applications. For instance, it could reduce the aircraft separation compared to ILS, because sensitive areas must be protected to avoid multipath issues. Airbus expects to certify the SLS Autoland solution for the A350 by the end of 2027 and for the A320 by the end of 2028.
Regarding radio-frequency interference (RFI) from GNSS signals, a growing concern in the aviation sector, Airbus is well-positioned to study and develop solutions that help mitigate and enhance resilience to the effects of GNSS Interference. The first design developments are expected to be certified from 2026 and put into service in 2027.
In summary, SLS enhances airline operations by enabling stable approaches at airports that currently lack precision approach facilities; on primary runways as a backup to ILS, or at alternate airports in the event of diversion. This helps to extend precision approaches to more airports/runways, along with safety benefits through improved guidance on final approach and the application of the xLS look-alike concept to reduce pilot workload through a harmonised landing interface. In addition, SLS provides geometrical vertical guidance that is insensitive to temperature and altimeter-setting errors, making it a very good option for most air operators flying within or to Europe.

SUCCESSFUL INTEGRATION OF INFORMATIVE EGNOS-BASED TRAIN POSITIONING SYSTEM COMPLETED UNDER EUSPA GRANT

Between the end of 2022 and the fourth quarter of 2024, the project "NavCom Train Positioning System Powered by EGNOS" was carried out, funded by EUSPA and led by Betrian.
At the heart of the project is the NavCom system, an advanced GNSS-based positioning unit designed for installation in locomotives. The system provides high-precision positional data to onboard applications, most notably NavTrain, an informative mobile application used by train drivers. NavTrain displays essential operational data, such as track information tables, timetables and the current train position, which has now significantly improved thanks to the integration of NavCom.
Before the project, NavTrain relied on the tablet's internal GNSS receiver, which frequently suffered from poor signal reception and limited accuracy. To overcome this, the NavCom unit was developed and installed on locomotives, with its GNSS antenna mounted on the vehicle roof. This greatly improved signal reception and data reliability.
The first phase of the project focused on hardware and software updates and the integration of NavCom as the new positioning source for NavTrain. The second phase concentrated on field testing and system validation.
NavCom was successfully tested in trial operations on two locomotives. Following these tests, 50 units were permanently installed in the implementation partner, CD Cargo's fleet.



Credits: Betrian

Talking about EGNOS with… DSNA

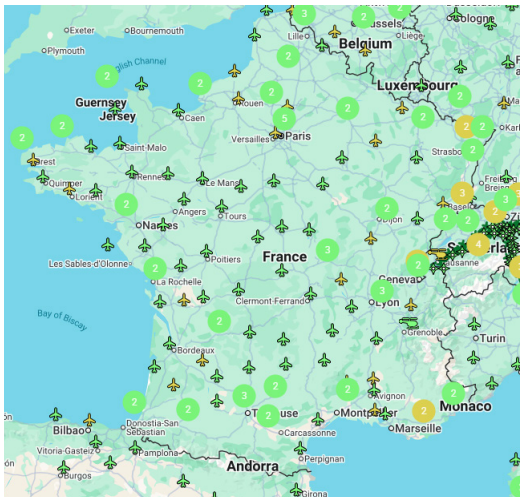
In 2024, the EGNOS (European Geostationary Navigation Overlay Service) programme reached a significant milestone: 1,000 approach procedures in Europe covered by the Safety of Life (SoL) Service. Since the EGNOS SoL Service was declared operational in March 2011, it has played a transformative role in aviation safety, accessibility and sustainability by enabling approaches down to Localizer Performance with Vertical Guidance (LPV) minima at airports across Europe, comparable to the Category I Instrument Landing System (ILS).
The EGNOS User Support website provides a specific LPV Procedures map, where the growing number of publications of these procedures across Europe can be consulted.
To commemorate this milestone, the main achievements since the EGNOS declaration were discussed with Benoît Roturier, Director of the Satellite-based CNS Programme at Direction des Services de la Navigation Aérienne (DSNA), the French Air Navigation Service Provider (ANSP), who shared insights on the organisation's journey with EGNOS and its prospects.

DSNA was the first ANSP to sign an EGNOS Working Agreement (EWA) and to implement an operational LPV procedure at Pau Airport in France in 2011, shortly after the EGNOS SoL Service was declared operational. How would you describe overall DSNA's experience with EGNOS as an ANSP?

EGNOS LPV implementation has, in fact, been a success story over the years for DSNA. The large-scale implementation of LPV in France in the context of PBN implementation has enabled DSNA to rationalise its ILS infrastructure, improve accessibility, and, crucially, enhance safety at runway ends when ILS is not available. At airfields where LPV procedures rely mostly on EGNOS, the operational costs of ground-based navigation aids are significantly reduced, while offering higher accessibility and a safety level comparable to ILS. The most relevant lessons learnt are EGNOS' geometric on-board positioning and guidance, instead of barometric measurements, and SoL Service's capacity to provide information on the integrity of the service. These key benefits give EGNOS a significant safety advantage over other PBN enablers based on barometric vertical guidance, which face considerable safety limitations, as demonstrated by the quasi-CFIT of an A-320 at Paris-Charles De Gaulle in May 2022 and subsequent studies led by DSNA and Eurocontrol.
However, the main drawback today is the still slow adoption by commercial aviation, which remains a critical challenge in the transition from ground-based to satellite-based navigation.

DSNA is positioned as a leading ANSP in Europe in light of the remarkable number of LPV approach procedures published, as can be seen on the mentioned LPV Procedures Map (see Figure). Could you describe the LPV Landscape in France?

DSNA's LPV publication strategy is aligned to EASA's targets stated in the PBN IR (Performance-Based Navigation Implementing Regulation (EU) 2018/1048), with 124 LPV procedures published over 73 airports.
Beyond DSNA-managed commercial airports, DSNA also supported the deployment of LPV procedures at smaller airfields in France equipped only with Aerodrome Flight Information Service (AFIS), delivering significant benefits for the general aviation community.



LPV Procedures Map in the EGNOS User Support website

Could you elaborate on how the implementation of satellite-based procedures has impacted the French airspace? What has been the most significant operational benefit and drawback observed from such implementation?

DSNA's experience with satellite-based trajectories highlights one key driving factor: flight efficiency. Satellite-based trajectories in general enable shorter routes, reduced fuel consumption, and lower CO_2 emissions.

These benefits also extend to satellite-based landings, such as LPV approaches, which can be operationally implemented at most runway ends without additional ground infrastructure while providing enhanced airport accessibility and operational safety. RNP AR is also implemented at several runway ends now in France when LPVs are unavailable. We also develop a new satellite-based landing technology, RNP VPT, that aims to provide PBN-like benefits during visual landings, shortening the track and avoiding noise infringement near large cities. Industry is asked to develop RNP AR/RNP VPT solutions based on EGNOS vertical guidance in the future, to avoid the safety limitations of barometric landings for these challenging procedures.

DSNA is confident that the widespread implementation of LPV in France will accelerate uptake in commercial aviation, which remains the main obstacle to greater PBN and EGNOS expansion.

Looking ahead, what is DSNA's strategy with regard to EGNOS LPVs implementation in DSNA airports?

DSNA's PBN policy is to publish all new approach procedures with LPV-200 (i.e. Category I approaches) and to upgrade older APV-I LPVs to LPV-200 during scheduled reviews progressively. Ultimately, the whole LPV infrastructure in France would thus be LPV-200.

In relation to the mentioned DSNA's rationalisation plan for ILS in favour of satellite and EGNOS-based flight procedures: what is the mindset behind this? How is it progressing?

As reflected in DSNA's PBN transition plan, the Minimum Operating Network (MON) of ILS has been defined and is now implemented. The main concept behind maintaining an ILS MON was the ability to clear French airspace in the event of a wide-scale shortage of GPS, which would also impact EGNOS landings. It has resulted in a reduction of approximately 50% of DSNA's total Category I ILS installations (from 116 to 64).

What would be, according to DSNA, the biggest institutional or regulatory challenges in transitioning from ground-based to satellite-based navigation?

From DSNA's perspective, there are two main challenges for such a transition.

One primary area of concern contributing to the community's reluctance to adopt satellite-based trajectories is radio frequency interference, including spoofing—an emerging threat that must be addressed and which has driven DSNA's initiatives to assess the vulnerability of its CNS/ATM systems to these issues.

The second challenge has to do with the already mentioned safety limitations of barometric-based PBN landings. In this regard, DSNA believes that the role of EGNOS LPVs in Europe's PBN strategy will be strengthened in the coming years due to EGNOS's safety contribution to PBN landings and reliability-enhancing features, noting also the improvements brought by EGNOS Version 3 (cybersecurity, DFMC services, "Galileo-only" mode).

EU institutions and their regulatory actions are one important means to support the mitigation of these challenges.

You have already mentioned reluctance by some actors to adopt EGNOS in Europe. Could you describe DSNA's experience with airlines and pilots in this regard?

The feedback from airlines like Air France, EasyJet, and also from major aircraft manufacturers (Airbus, ATR...), is in general very supportive of LPV. We also collected positive feedback from many airlines' chief pilots when we implemented the first European LPV 200 at Paris-CDG in 2015. However, commercial airline adoption of EGNOS still has a long way to go. There was indeed some degree of naivety in the PBN regulation regarding the adoption rate of LPVs, given the absence of any mandate for commercial aviation. French authorities are now asking EASA to reconsider this point.

Beyond traditional aviation, can you elaborate on expanding applications of EGNOS, as, for example, GNSS-based helicopter routes and UAS integration in the French airspace?

The use of EGNOS is indeed finding other areas of activity within the French airspace.

DSNA has begun supporting the deployment of satellite-based helicopter RNP0.3 routes, with two PBN routes already published in the French Aeronautical Information Publication (AIP).

Meanwhile, in line with Europe's advances in Unmanned Aerial Systems (UAS) integration into airspace, DSNA is undertaking several initiatives to safely introduce UAS and implement U-spaces (geographical zones for UAS operations) within French airspace.

DSNA and EGNOS: A Lasting Partnership

It is no coincidence that, as the first LPV deployer and EWA signatory in 2011, DSNA is considered a reference point for EGNOS implementation in Europe. The large number of LPV implementations in France and DSNA's PBN Transition Plan reflect deep confidence in EGNOS as today´s real enabler for PBN implementation and fundamental asset for the future of European air navigation.

According to DSNA, EGNOS not only has proven successful in enhancing the efficiency of French airspace for both commercial and general aviation, but today its benefits extend to helicopters and unmanned aircraft, ensuring that EGNOS will remain at the heart of aviation innovation in Europe for years to come.

Benoît Roturier

Guiding France's satellite navigation initiatives at DGAC and DSNA, Benoît Roturier blends technical expertise with a lifelong passion for aviation. A graduate on CNS systems engineer of ENAC and PhD in Electronics from INP Toulouse, he has spent over 30 years advancing the use of GNSS in air navigation. As both engineer and IFR pilot, he bridges research and real-world flight operations. Beyond France, Benoît plays a key role in international standardisation as former Chair of the ICAO Navigation Systems Panel, shaping the global evolution of Performance-Based Navigation, and was the French representative of the Performance Based Navigation Study Group. He is also a co-chair of the International SBAS WG ops group. His career reflects a commitment to safety, innovation, and international collaboration in aviation technology.

Did you know...?

That next year marks the 10th anniversary of the first-ever LPV200 procedure?

It was published in May 2016 at Paris Charles de Gaulle Airport. Today, there are more than 500 LPV200 procedures in 27 countries, and the number continues to grow!

Status and Evolution of EGNSS Devices Penetration in Freight Tracking

Nowadays, mobility, logistics management, and connectivity play a crucial role in the development of transportation networks, especially in the rail sector. Being able to monitor cargo in real time helps companies keep track of their fleet, improve security, and minimise delays, resulting in reduced costs. Real-time freight tracking not only improves operations but also optimises planning, making it easier for companies to manage their fleets and logistics more efficiently.

As part of this development, the European Global Navigation Satellite Systems (EGNSS), including EGNOS and Galileo, provide greater reliability and precision in positioning applied to freight tracking. In particular, the EGNOS Open Service improves GPS performance, making it a valuable technology for enhancing rail asset positioning. From various non-safety-related applications, such as tracking devices, asset management and passenger information systems, EGNSS is driving the transformation of railway logistics, enabling smarter, more efficient operations across Europe. The Clean Industrial Deal outlines concrete actions to make decarbonisation a driver of growth for European industries. The Deal presents measures to boost all stages of production, focusing on energy-intensive industries and the cleantech sector. New technologies contributing to sustainable transport are a key area of cleantech, and EGNSS tracking devices applied to freight assets support the transition to energy efficiency by providing real-time, high-precision positioning across different transport modes. This enables better route optimisation, reduced consumption, and improved supply chain visibility, ultimately contributing to lower emissions and greater sustainability in freight transport.

Intermodal freight transport has experienced significant growth in recent years. Several rail companies contacted, both manufacturers and leasing companies, are indeed talking about growth and expansion into other modes of transport. However, a significant share of road traffic must continue to be shifted to more sustainable modes, such as rail, to improve environmental efficiency. GNSS-based tracking devices allow customers and operators to access location and event data more quickly and smoothly, improving the efficiency of maintenance and logistics processes. In addition to rail operators, leasing companies and vehicle manufacturers include tracking devices as part of telematics systems to monitor their fleets. In some cases, tracking devices are integrated into the manufacturing line.

Tracking devices have evolved over the years into advanced systems with multiple sensors and functionalities. The introduction of GNSS-based positioning enables more accurate real-time tracking. Today, with the rise of the IoT, these devices not only provide location data but also monitor environmental conditions and cargo status. As a result, tracking systems have gone from being optional tools to essential components. Although not mandatory, most rail operators and leasing companies now integrate them into their wagons by default.

Among manufacturing companies, Nexxiot dominates the global market with more than 150,000 wagons equipped with its tracking devices across Europe. Its technology has evolved from a basic real-time monitoring device to a sophisticated system that not only offers accurate

positioning but also integrates a range of advanced sensors. According to market studies on tracking devices conducted by ESSP and EUSPA, most equipment includes accelerometers, load sensors, and temperature and humidity measurements, in addition to real-time positioning. These devices are typically powered by solar panels and require ultra-low power monitoring. Those that are not solar-powered usually rely on highly efficient batteries that can last more than five years before replacement.

This study also highlights a significant increase in the number of European rail freight operators that have equipped their wagons in recent years. Furthermore, the total number of equipped wagons has grown compared to previous years. According to these stakeholders' plans, the trend will continue toward further equipping wagons with telematic devices, and most of them will rely on EGNSS solutions for improved positioning and tracking. **Figure 1** shows the evolution since 2020. By the end of 2024, nearly 206,000 wagons were equipped with EGNSS tracking devices. By 2028, more than 271,000 wagons are expected to be equipped.

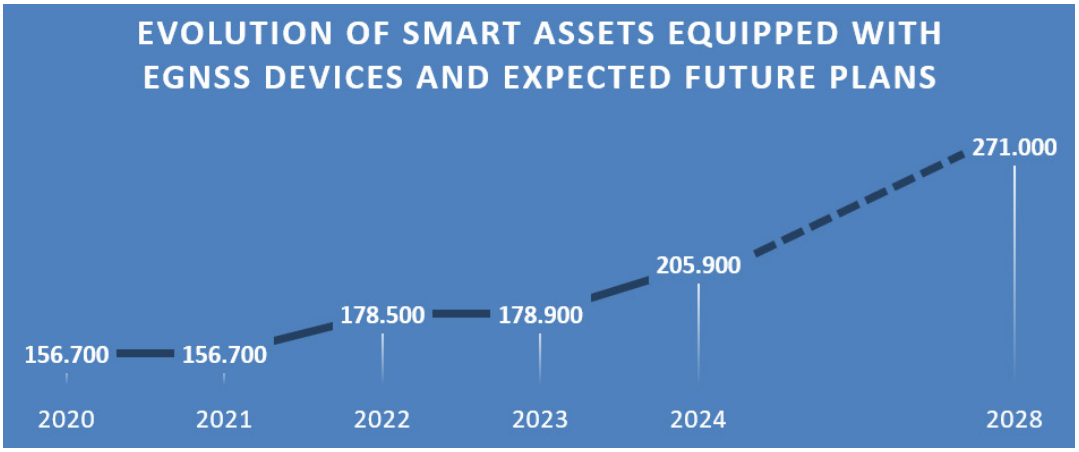


Figure 1. Evolution of the number of wagons equipped with EGNSS solutions and expected plans

On the other hand, **Figure 2** shows the number of railway operators and wagon rental companies that have decided to implement EGNSS devices in their fleets, and the trend suggests that this

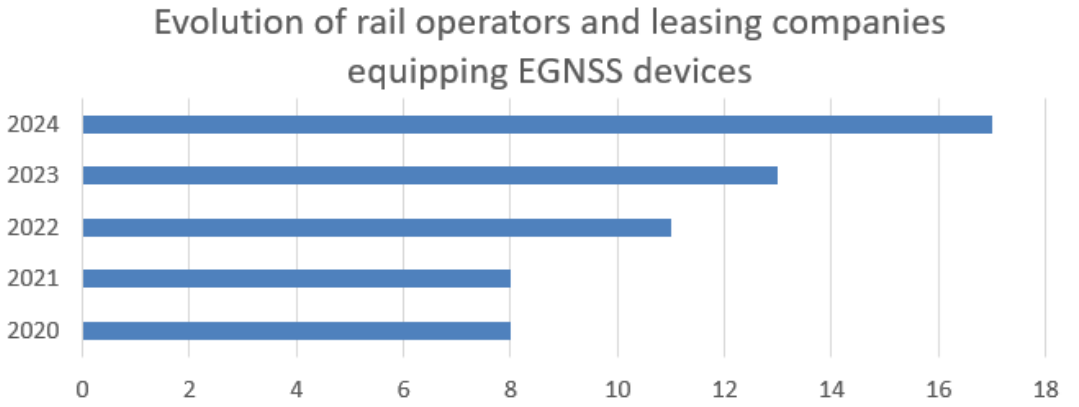


Figure 2. Number of rail operators and leasing companies that include EGNSS devices in their fleet

The main results of the market study conducted by ESSP and EUSPA over the years are shown in the map in **Figure 3**. It shows the operators and leasing companies that are equipping their wagons with EGNSS tracking devices. It also shows the number of assets per company and the manufacturer of the tracking device. Several companies have already equipped their wagons with EGNSS tracking devices and plan to continue expanding their fleets in the coming years.

For example, Transwaggon went from 7,500 wagons equipped in 2021 to 13,500 by 2025 using SAVVY devices. Similarly, Ermewa had 20,000 wagons equipped in 2021 and aims to reach 36,000 devices by 2025 from Amsted Digital Solutions. Meanwhile, VTG Europe had 66,500 wagons equipped in 2023, rising to 76,000 by 2025, thanks to Nexxiot and IMT Intermodal Telematics. These figures highlight the continued growth in EGNSS adoption in the rail freight sector.

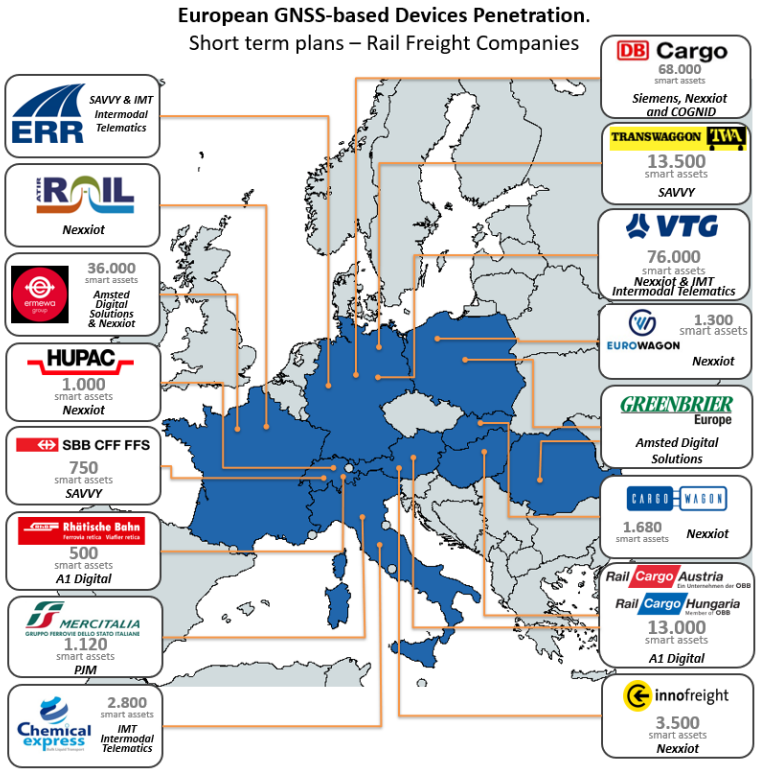


Figure 3. European short-term plans for EGNSS devices implementation

In conclusion, EGNOS technology plays a crucial role in enhancing freight tracking by providing accurate real-time positioning, improved monitoring, and increased operational efficiency. Rail operators can improve cargo security by equipping wagons with EGNSS tracking devices. Leasing companies also benefit by offering customers better tracking capabilities and improving asset operations. Beyond rail transport, the adoption of EGNSS is expanding across different applications, contributing to better efficiency and sustainability. Its integration helps reduce fuel consumption, optimise routes, and lower CO2 emissions, aligning with global environmental goals.

EGNOS Services highlights

OPEN SERVICE SDD V3.0 PUBLICATION

The EGNOS Open Service (OS) was the first EGNOS service declared operational on 1 October 2009. It is intended for general-purpose applications and provides signals to enhance GPS, which can be accessed freely with no direct cost.

On 12 November 2024, a new version of the OS Service Definition Document (SDD) was published. This latest release, version 3.0, of the **OS SDD** introduces several updates to keep users informed and up to date on the current status of the service. The document has undergone several revisions, including:

- **New OS commitment map**

The most significant update is the integration of a new OS commitment map, which reflects the performance observed following the deployment of EGNOS System Release 2.4.2B. This update provides enhanced robustness, particularly in adverse ionospheric conditions.

- **Updated EGNOS architecture: space and ground segments**

The document also describes updates to the EGNOS architecture across the space and ground segments, including the deployment of the new RIMS station in Kuusamo, Finland.

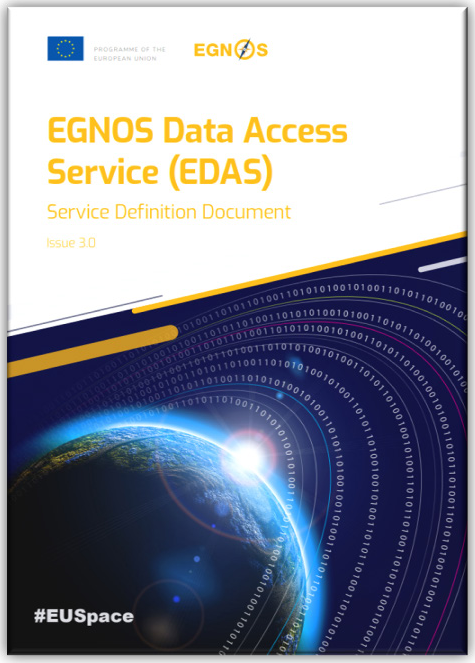
The release of OS SDD version 3.0 reflects EGNOS's ongoing commitment to providing reliable, high-precision positioning and navigation services, which are vital to industries that depend on accurate location data.

Did you know...?

That EGNOS v3 will be backwards compatible with v2?
This means that users who have an EGNOS v2 receiver will be able to continue using it when EGNOS v3 is launched. EGNOS V3.1 will ensure the continued improvement of EGNOS for GPS L1, with enhanced resilience, while EGNOS V3.2 will support a new SBAS service transmitting on the L5 frequency, improving Galileo L1/E1 – L5/E5 alongside GPS.

EGNOS DATA ACCESS SERVICE SDD V3.0 PUBLICATION

The EGNOS Data Access Service (EDAS) provides ground-based access to EGNOS data via a specific Internet domain (egnos-edas.eu).
EDAS is free of charge and intended exclusively for non-safety-critical purposes, i.e., those that do not affect human safety and where a failure in availability, integrity, continuity, or accuracy



A new version of the EDAS SDD was published on 18 December 2024. This latest edition, version 3.0, introduces several updates to keep users informed and up to date on the current status of the service. The document has undergone several revisions, including:

- **New EGNOS service provision scheme**

EUSPA has become the EDAS service provider, and the declaration of the EGNOS Safety of Life assisted service for Maritime Users (ESMAS) on 13 March 2024 has required the redefinition of the service provision scheme.

- **Updated EGNOS architecture: space and ground segments**

The document also details updates to the EGNOS architecture, covering both the space and ground segments. In particular, it highlights the deployment of a new RIMS station in Kuusamo, Finland, associated with the introduction of EGNOS system release 2.4.2B

This information is available online, and the document can be downloaded in PDF format at **EDAS SDD**.

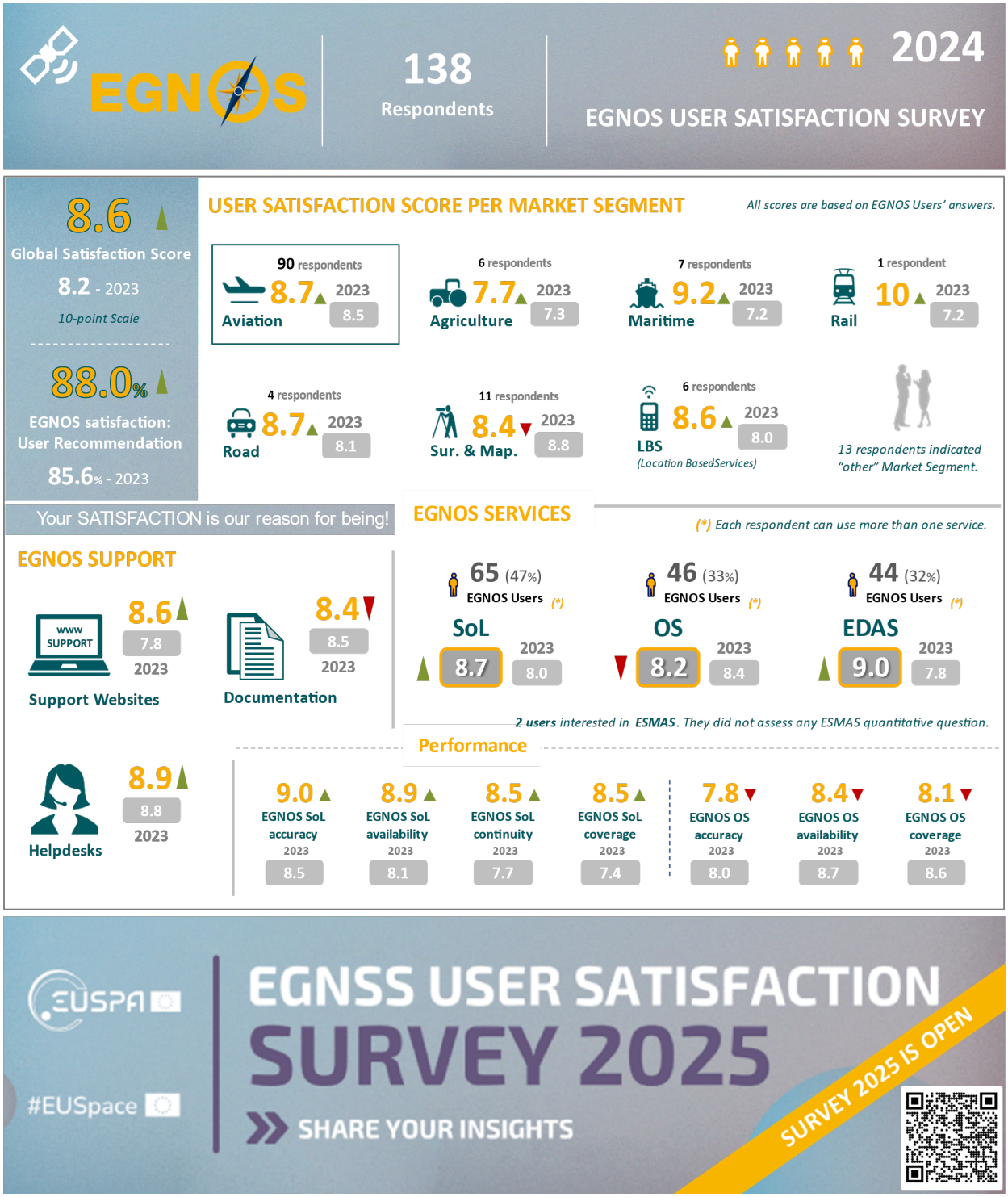
EGNOS SERVICE IMPLEMENTATION ROADMAP

The EGNOS Service Implementation Roadmap (SIR) has been updated as needed to keep users informed of the current status of EGNOS. The first update was released on 5 February 2025, followed by a second update on 2 July 2025.

The main objective of the SIR is to provide a high-level overview of the planned developments of the EGNOS system and services, in line with the consecutive deployments of EGNOS System Releases (ESR). It also details improvements and changes to information and interfaces, with a particular focus on:

- Developments in the EGNOS system that affect the service,
- Developments in the service area of any EGNOS service and/or the declaration/decommissioning of a Service level,
- System developments to ensure that performance levels are maintained or improved,
- Changes to interfaces for EGNOS users.

EGNOS users can access this information in the online version of the **EGNOS SIR**.


EGNOS
138
Respondents
2024
EGNOS USER SATISFACTION SURVEY
8.6
Global Satisfaction Score
8.2 - 2023
10-point Scale
88.0%
EGNOS satisfaction: User Recommendation
85.6% - 2023
USER SATISFACTION SCORE PER MARKET SEGMENT
All scores are based on EGNOS Users' answers.
90 respondents
8.7 2023 8.5
Aviation
6 respondents
7.7 2023 7.3
Agriculture
7 respondents
9.2 2023 7.2
Maritime
1 respondent
10 2023 7.2
Rail
4 respondents
8.7 2023 8.1
Road
11 respondents
8.4 2023 8.8
Sur. & Map.
6 respondents
8.6 2023 8.0
LBS
(Location BasedServices)
13 respondents indicated "other" Market Segment.
Your SATISFACTION is our reason for being!
EGNOS SERVICES
(*) Each respondent can use more than one service.
EGNOS SUPPORT
8.6 7.8 2023
Support Websites
8.4 8.5 2023
Documentation
65 (47%) EGNOS Users (*)
SoL
8.7 2023 8.0
46 (33%) EGNOS Users (*)
OS
8.2 2023 8.4
44 (32%) EGNOS Users (*)
EDAS
9.0 2023 7.8
2 users interested in ESMAS. They did not assess any ESMAS quantitative question.
8.9 8.8 2023
Helpdesks
Performance
9.0 EGNOS SoL accuracy 2023 8.5
8.9 EGNOS SoL availability 2023 8.1
8.5 EGNOS SoL continuity 2023 7.7
8.5 EGNOS SoL coverage 2023 7.4
7.8 EGNOS OS accuracy 2023 8.0
8.4 EGNOS OS availability 2023 8.7
8.1 EGNOS OS coverage 2023 8.6

EUSPA
#EUSpace
EGNSS USER SATISFACTION
SURVEY 2025
SHARE YOUR INSIGHTS
SURVEY 2025 IS OPEN

What's new? Since the last bulletin...

SIGNED EGNOS WORKING AGREEMENTS (EWAs)

The following EWAs have been signed in the last year:

PONTE DE SOR MUNICIPALITY
Ponte de Sor Municipality is an ANSP based in Portugal, is certified to provide AFIS at Ponte de Sor Aerodrome (LPPS).

Portugal

FINNHEMS
FINNHEMS is a Finnish air operator performing HEMS operations in Finland.

Finland

ALBCONTROL
Albcontrol is the main ANSP providing ATM/ANS services in Albania, making it the eighth EWA to enable EGNOS-based procedures in non-EU states (in addition to Switzerland, Norway, Iceland, Guernsey, Jersey, Serbia and Montenegro).

Albania

TRIWO
TRIWO is an ANSP based in Germany, is responsible for providing AFIS at Zweibrücken Aerodrome (EDRZ).

Germany

WESTON AIRPORT
Weston Airport is an ANSP based in Ireland, is responsible for providing ATC at Weston Airport (EIWT).

Ireland

MUNICIPIO DE EVORA
Municipio de Evora is an ANSP based in Portugal, is certified to provide AFIS.

Portugal

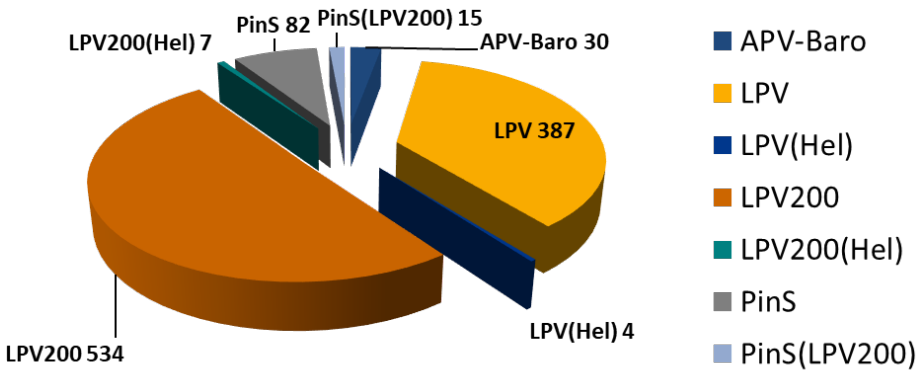
SBAS IN THE WORLD

South Korea has taken an important step in satellite-based navigation with the introduction of its first LPV procedures, enabled by the Korea Augmentation Satellite System (KASS). Four LPV approaches are now operational at three aerodromes: Jeju International (RKPC), Muan International (RKJB), and Ulsan (RKPU), marking a milestone in the country's use of SBAS.
This achievement highlights the growing global adoption of SBAS-based procedures, which bring the benefits of precision approaches—such as increased accessibility and safety—beyond traditional ILS and support the continued evolution of performance-based navigation worldwide.

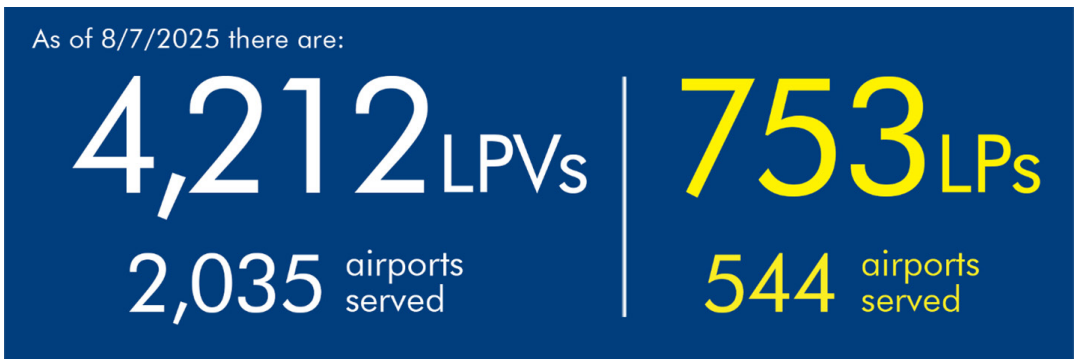
LPV PROCEDURES

LPV, LPV-200, PinS & APV Baro procedures published
(including AIRAC cycle 2025 #11– 30/10/2025)

Next graph shows, the number of procedures LPV, LPV-200, PinS, APV-Baro, LPV-Hel, LPV200-Hel and PinS-LPV200. The total number is **1059**



FAA PROCEDURES



Courtesy of the FAA WAAS Team

EGNOS Workshop 2025: Highlights from Berlin

On 1 and 2 October, the Leonardo Royal Hotel in Berlin hosted this year's EGNOS Workshop. The event brought together representatives from a wide range of sectors, offering two days of informative presentations and valuable networking opportunities within the EGNOS community. More than 180 representatives from 50 different organisations and 25 countries participated both in person and online during this year's first hybrid edition of the workshop.

The workshop opened with a presentation by Rodrigo da Costa, EUSPA Executive Director, and Charlotte Neyret, CEO of ESSP, who both reaffirmed their commitment to the continued evolution and resilience of the EGNOS programme. Caroline Richter, from the German Federal Ministry of Transport, also welcomed participants to Berlin.

The first day featured several key presentations. Jean-Marc Piéplu, Head of the EGNOS Deployment Department, provided an update on the programme, highlighting the 10th anniversary of the first published LPV200 procedure, which now has more than 500 procedures in 27 countries, and announced the entry into service of GEO-3 PRN 121 on 25 August. He also outlined the EGNOS roadmap for the next five years, highlighting the commitment to strengthening resilience.

Miguel Ángel Sánchez, EGNOS Service Manager at ESSP, followed with an overview of the performance of EGNOS services (SoL, OS, EDAS, and ESMAS). Katerina Peña, Aviation Market Officer, then presented the implementation status in aviation & drones, rail, and maritime sectors, highlighting ongoing projects and SBAS-related initiatives.

The maritime session included several noteworthy talks. Guillermo Fernández, Receiver and Standards Expert, discussed IEC maritime receiver standardisation. Daniel Karbach presented the use of EGNOS for inland waterways, particularly in narrow rivers, canals, and harbours, and the ongoing IWETT project, which enables EGNOS

integration through AIS. Septimio Andrés and Elisa Oyonarte shared a success story from the Port of Seville, demonstrating how EGNOS supports navigation along the Guadalquivir River.

Beyond maritime applications, the day also featured presentations by Simon Ouriani, who described the use of EGNOS data via EDAS for the ICAO Space Weather Monitoring Service, and Armin Forouharfard from U-blox, who presented their current and future portfolio of mass-market receivers.

In the afternoon, Julien Lapie presented ANGA (Augmented Navigation for Africa), highlighting progress towards the introduction of SBAS services in Africa, followed by Toru Ishita with updates on Japan's MSAS system. Stuart Deathridge from Collins Aerospace then presented the progress of the MUGG project and the future of SBAS with DFMC, and Valentin Barreau from SNCF closed the day with a presentation on EGNOS applications for the rail industry.

Day two was dedicated to aviation, where ESSP, EUROCONTROL, and DFS presented detailed information on the performance and operational advantages of the EGNOS SoL service.

Lufthansa and the Bundeswehr presented their respective success stories on LPV implementation, covering the integration of LPV into the Lufthansa fleet and German military airfields.

The workshop concluded with an open panel discussion featuring Logic Air, CMC Electronics and ASL Belgium, three major players in the aviation industry, who shared their experiences implementing LPV technology through a retrofit solution for the B737.

Finally, the event closed with an awards ceremony recognising outstanding achievements in LPV implementation. ENAIRE, the Bundeswehr, Albcontrol and DFS each received well-deserved awards for their contributions to the advancement of EGNOS operations at their aerodromes.

Were you unable to attend? You can now access the event presentations at **this link**.

Did you know...?

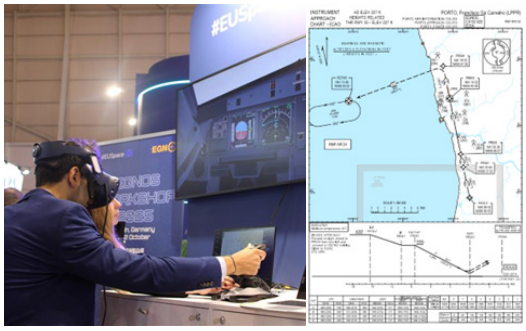
That EGNOS' system release 2.4.3 is already operational?

The release of ESR 243 includes the deployment of two units of the new generation of Navigation Land Earth Stations (NLES) G3 in Rambouillet (France) and Cagliari (Italy). This new release re-establishes a configuration of three GEO satellites (ASTRA SES-5 (PRN136) and Eutelsat 5 West B (PRN121) as operational, and ASTRA 5-B (PRN123) as backup), thereby improving system redundancy.

in aviation & drones

AIRSPACE WORLD 2025

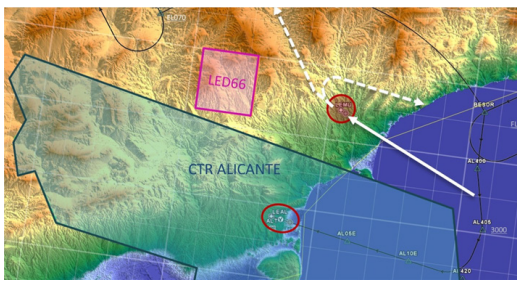
At Airspace World 2025, EGNOS took centre stage at the Europe for Aviation stand with an exciting VR flight simulator experience. Attendees had the opportunity to enter the cockpit of an Airbus A321NEO and virtually perform an LPV approach to Porto Airport (LPPR). This immersive demonstration showcased the precision and advantages of satellite-based navigation systems, allowing visitors to experience first-hand the increased accuracy and safety offered by LPV approaches.



PUBLICATION OF NEW GUIDE ON USING COPERNICUS DEM GLO-30 FOR FLIGHT PROCEDURE DESIGN

ESSP and the European Union Agency for the Space Programme (EUSPA) have published new guidelines on the use of the Copernicus Digital Elevation Model (DEM) GLO-30 for Flight Procedure Design (FPD). Released after a dedicated webinar held in March 2025, this high-level material introduces aviation professionals to the benefits of using the Copernicus DEM GLO-30 as a standardised, cost-free terrain data source for Instrument Flight Procedures (IFPs).

By offering global, high-resolution elevation data through the Copernicus Data Space Ecosystem, the DEM GLO-30 supports the design of safer, more consistent, and cost-effective procedures, especially in areas where national datasets are insufficient or missing. Its adoption is expected to enhance the quality and interoperability of IFPs across Europe and beyond, further facilitating the design of LPV procedures throughout the region and reinforcing the EU's commitment to open and accessible geospatial data for aviation.



Conceptual design of Instrument Flight Procedures using Copernicus DEM GLO-30. Credits: ESSP

Feel free to **download the guide** from the Guidance material section of the EGNOS User Support Website. Readers are encouraged to share their comments, ask questions or suggest improvements for future revisions of these guidelines.

GUIDANCE MATERIAL ON EGNOS IN UAS

The "**Guidance material**" section of the EGNOS User Support Website gathers diverse material on leveraging EGNOS services in specific areas of application. This section covers most of the market segments in which EGNOS can play a role, and it has recently been updated to include further guidance on EGNOS assessment and activation for UAV operators.

In addition to the white paper on **EGNOS performance in UAS**, a video titled "EGNSS training for UAS operators" has been added, which provides an overview of EGNOS use in drones, featuring an excerpt from the face-to-face training offered by EUSPA on demand. The first edition of the year took place at the Galileo Research Centre in Noordwijk, the Netherlands, in April 2025.

DRONEX 2025

EGNOS participated in DroneX 2025 in London, showcasing the key role of European satellite navigation in Innovative Air Mobility (IAM). During the event, ESSP highlighted how EGNOS supports safe and efficient UAS operations by improving GNSS navigation in challenging environments and reinforcing its value as an enabler of emerging applications. The participation provided an opportunity to engage with manufacturers, operators and authorities, reinforcing EGNOS' visibility in this leading European forum for the future of unmanned aviation.

UAV FLIGHT TEST CONVENTION

Organised by the DLR Innovation Centre for Small Aircraft Technology, the **UAV Flight Test Convention** celebrated its 6th anniversary in October 2025. The event took place in Cochstedt, Germany, and gathered professionals and enthusiasts of UAV flight testing, including a flight event where participants showcased specific applications. UAS training was provided, covering the use of EGNOS on eligible platforms.

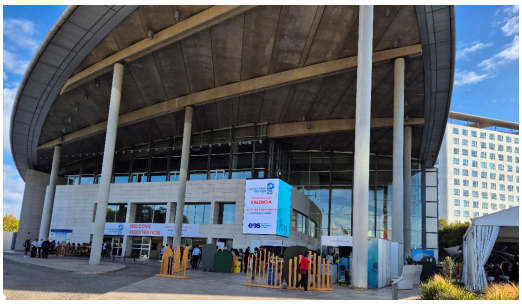
Stay tuned to join the next edition!

in maritime & aquaculture

AQUACULTURE EUROPE 2025

Aquaculture Europe is a leading international event for the aquaculture industry. Aquaculture is establishing itself as an essential sector in global food supply, due to the diversity of technologies used for its production, the variety of market proposals and its respect for the environment. The international event included an international trade exhibition, industry forums, student sessions and activities, and updates on EU research.

The event took place from 22 to 25 September at the Valencia Congress Centre in Spain. EGNOS representatives attended the event, visited the trade exhibition, promoted the service and identified potential technologies, operations and partners that could benefit from the European SBAS. Additionally, an electronic poster was prepared for the event, titled "EGNOS for Aquaculture Applications 2025", and made available to all attendees. The poster showcased EGNOS capabilities for users and highlighted possible operational applications and target technologies for EGNOS in the aquaculture field.



The diversity of European aquaculture was on display at the International Trade Exhibition. This event offered an excellent opportunity to meet with leading companies in the sector and explore the latest products and services. In addition to the trade show, the industry forum, held in parallel with technical workshops and the innovation forum, provided an excellent way to stay up to date with trends in this dynamic market, where positioning is becoming increasingly important.

"ESMAS READY FOR MARITIME SAFE NAVIGATION USING EGNOS" AT CIRM

ESSP participated in the CIRM (Comité International Radio-Maritime) annual conference, held from 14 to 16 October 2025 in Lisbon, Portugal. CIRM is the leading international association of companies engaged in maritime electronics, comprising over 100 member companies from 30 countries worldwide.

EGNOS representatives reported that the standard for SBAS L1 shipborne receivers, IEC 61108-7, was published in May 2024 and is currently included in MED. The status of the EGNOS Safety of Life assisted service for Maritime userS (ESMAS) was provided, which requires receivers to be certified according to the IEC 61108-7 standard. Finally, manufacturers of shipborne receivers were invited to certify their receivers in accordance with the standard IEC 61108-7 to benefit from the EGNOS Safety of Life (SoL) assisted service for MAritime userS (ESMAS).

CESNI-RIS WEEK

As every year, CESNI RIS Week was held from 17 to 20 June 2025 in the city of Esztergom (Hungary). This is one of the key forums where stakeholders from across Europe meet to exchange information on the status of River Information Services (RIS) on EU inland waterways and activities related to the harmonisation and standardisation of RIS implemented in Europe.
Highlighting the growing importance of European space technology, a specific workshop was held as part of the general session to provide information on the use of EGNOS and GNSS on inland waterways, with specific presentations from the IWETT and AVIS projects.

Other relevant topics addressed during the week were related to technological research and experimentation (including the role of EGNSS systems and services, the potential impact of interference and spoofing on their use, and how to mitigate their effects), which will bring autonomous navigation of vessels on Europe's large (and very busy) waterways closer, while also improving their safe use.

EUROPORT

The EUROPORT maritime exhibition is the leading international event dedicated to cutting-edge technology and complex shipbuilding. This biannual international event covers all aspects of the maritime industry, with a special focus on high-tech vessels. With over 1,000 exhibiting companies and 24,000 professionals from 100 countries, the event took place in Rotterdam from 4 to 7 November 2025. This year, EGNOS was present at the event, taking the opportunity to connect with relevant industry stakeholders, keep up to date with the latest developments in the technology market and identify potential opportunities for collaboration.

in rail

TRANSPORT LOGISTIC

On 3 and 4 June 2025, ESSP participated in Transport Logistic 2025, the world's leading trade fair for logistics, mobility, IT and supply chain management, held every two years in Munich, Germany. The event brings together exhibitors and professionals to showcase the latest innovations, products and solutions in the sector.
During the fair, EGNOS representatives met with rail operators, leasing companies and manufacturers to promote the advantages of EGNOS and encourage its adoption in the rail sector.

#EUSpace

EGNOS

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EUSPA European Union Agency for the Space Programme

ESSP