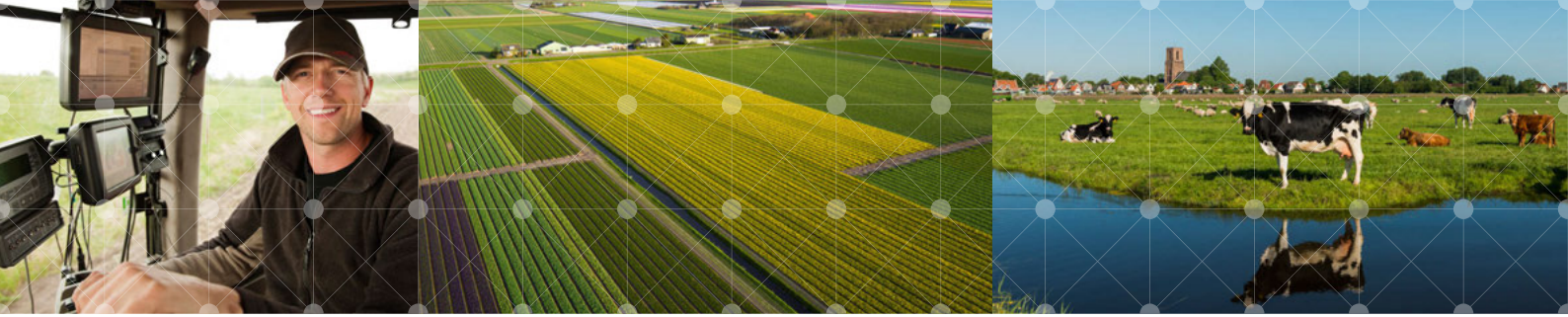


EGNOS and GALILEO for AGRICULTURE



High Precision, Low Cost





E-GNSS and precision agriculture

Precision agriculture is a highly effective farming strategy that increases yield and productivity, while lowering costs and minimising environmental impact.

With costs perpetually on the rise and environmental demands gaining ground by the day, efficient and sustainable farming solutions are needed more than ever.

Traditionally, the barrier to precision agriculture has been a substantial equipment investment and costly ongoing subscriptions.

Now EGNOS, the European Geostationary Overlay Service, and Galileo, the European Satellite System change this equation. They provide an affordable precision solution, thanks to excellent positioning and timing information that further improves the performance of GNSS-assisted agriculture and brings benefits in every phase of the farming operation.

E-GNSS can support:

- Variable rate applications
- Manual and auto guidance
- Yield and biomass monitoring
- Livestock tracking
- Virtual fencing
- Post-harvest pick-up
- Field measurement and boundary mapping
- Asset management

E-GNSS will help:

- Increase availability, accuracy and reliability of GNSS-assisted agriculture and thus enhance precision
- Eliminate waste and over-application of fertilisers and herbicides
- Save time and increase profit margins
- Extend equipment lifetime by optimising its use
- Optimise crop yields and increase productivity
- Reduce environmental impact



Why EGNOS?

1. EGNOS is the best available option for a wide range of precision agriculture applications:
2. EGNOS is **absolutely free**; it does not require installation of hardware on farms, nor ongoing subscriptions.
3. EGNOS signals are received in **real time** thanks to its three geostationary satellites.
4. EGNOS is **widely available**. More than one in 10 tractors sold in Europe today are equipped with GNSS receivers. Most of these receivers are EGNOS-enabled.
5. EGNOS does not need an additional long-wave device to receive correction data; signals are **integrated** into all EGNOS-enabled receivers.

Why Galileo Open Service?

Galileo's **free-of-charge** Open Service offers either single (E1) or multi frequency (E1, E5 and E6) capabilities, which will further improve augmentation services such as RTK/DGNSS or Precise Point Positioning (PPP). More GNSS satellites available and high performance Galileo signals are bringing many benefits to precision farming.

1. Improved operations in difficult environments where the number of satellites plays a crucial role (e.g., the edge of forests, valleys).
2. Higher performance of the Signal in Space, with several frequencies using more robust modulations.
3. Provides better results in guidance and auto-steering systems (including repeatability).

Why Galileo Commercial Service?

Galileo Commercial Service is a High Accuracy Service (CS-HA). It will directly disseminate PPP corrections around the world via the Galileo satellites without additional communication channels. This will allow the development of many precision farming applications with no investment on additional ground network infrastructure.

CS-HA will offer high precision positioning service that improves the trajectory with convenience and flexibility.

- Lower convergence time for faster initial positioning.
- Does not rely on proximity to ground network infrastructure
- Eliminate overlap and underlap, and reduce operator stress



How does EGNOS work?

EGNOS, the European Geostationary Navigation Overlay Service, uses geostationary satellites and a network of ground stations to increase the accuracy of existing satellite positioning signals while providing a crucial 'integrity message' that informs users in the event of signal problems.

The EGNOS reference stations pick up signals from GPS satellites, which are processed in Mission Control Centres (MCC). The accuracy of the original signals is determined and confounding factors are corrected.

This data is then incorporated into EGNOS signals and sent to its three geostationary satellites. The satellites relay these signals back to users on the ground, providing greater positioning accuracy than would be achieved through GPS alone.

Galileo Initial Services

With the declaration of Initial Services in December 2016, Galileo - the European Global Satellite Navigation System (GNSS)- has moved from testing to the provision of live services. Users around the world can now be guided using the positioning, navigation and timing information provided by Galileo's global satellite constellation.

By working together with GPS, Galileo satellites provide better positioning and navigation for users, particularly in cities, where satellite signals can often be blocked by buildings. Plus, Galileo's excellent timing accuracy helps make

the synchronisation of banking and financial transactions and telecommunication and energy distribution networks more resilient, allowing them to operate more efficiently.

Galileo's Search and Rescue service reduces the time it takes to detect emergency distress beacon signals from up to three hours to just ten minutes, potentially saving many more lives. The additional resiliency provided by Galileo is expected to help drive economic growth in Europe and beyond by enabling a range of new applications and services.

useGALILEO.eu

Mass-market devices containing a Galileo-enabled chipset, such as smartphones or vehicle navigation devices, can use Galileo signals for positioning, navigation and timing. The www.useGALILEO.eu tool helps you keep track of Galileo-enabled in-vehicle, portable, road tolling and fleet management systems, serving a variety of needs, as they become available.

GSA: linking space to user needs

The GSA is the European Union Agency in charge of managing operations and service provision of Galileo and EGNOS, ensuring that European citizens get the most out of Europe's satellite navigation programmes in terms of innovation, competitiveness, economic growth, and benefit to users.

As Europe's link between space technology and user needs, GSA keeps users at the centre of Galileo and EGNOS.

www.gsa.europa.eu

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