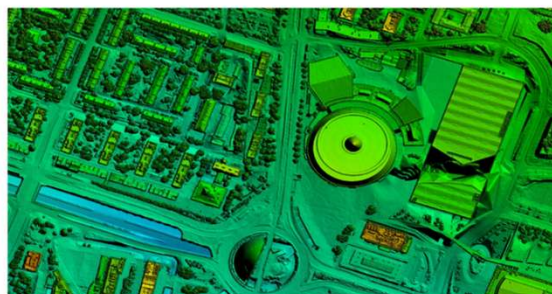
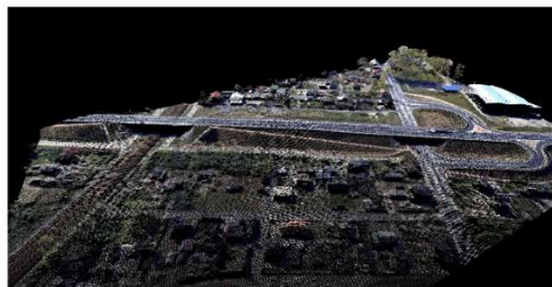
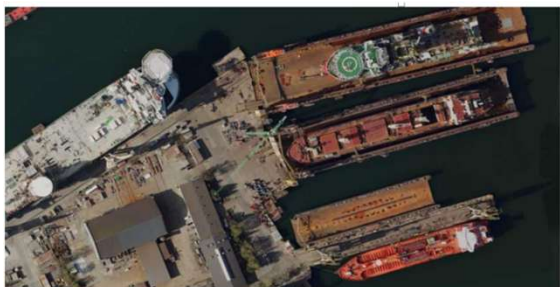
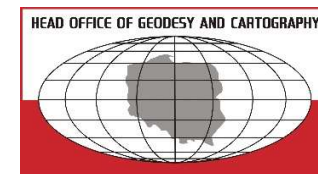


Spatial Data Acquisition in GNSS-Disturbed Environments



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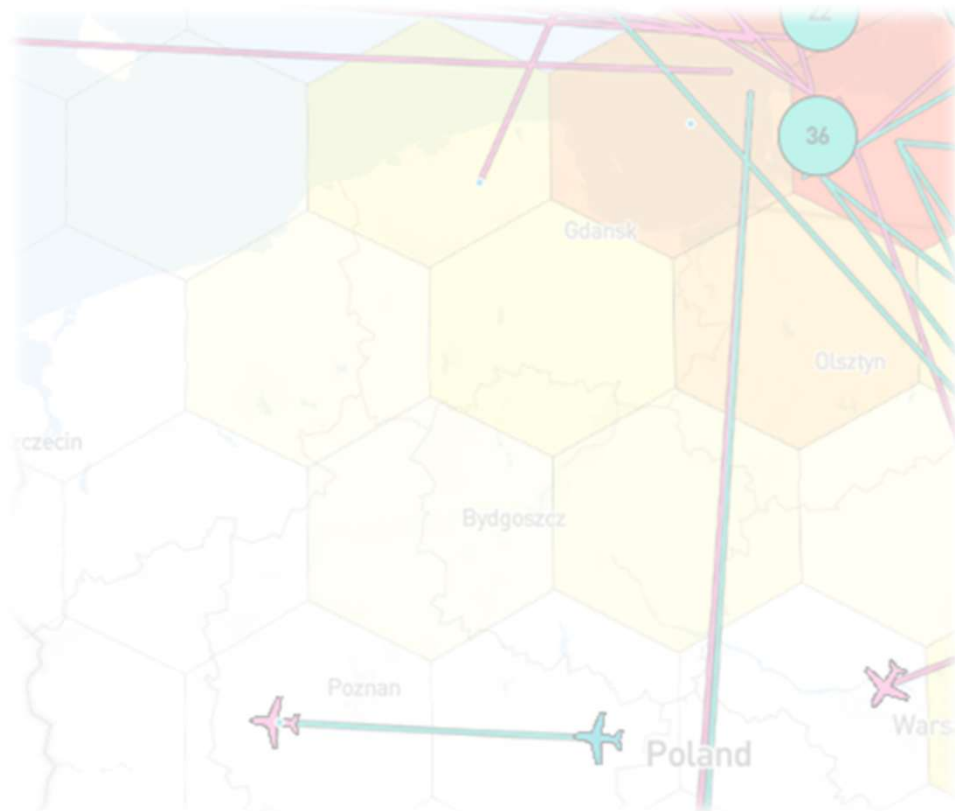
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Agenda

- UE actions on GNSS interferences
- ASG-EUPOS System
- Agreement on the Polish PNT Shield
- M-Project-PNT-E1
- Problems with photogrammetric data acquisition
- Attempts to solve problems with photogrammetric data acquisition

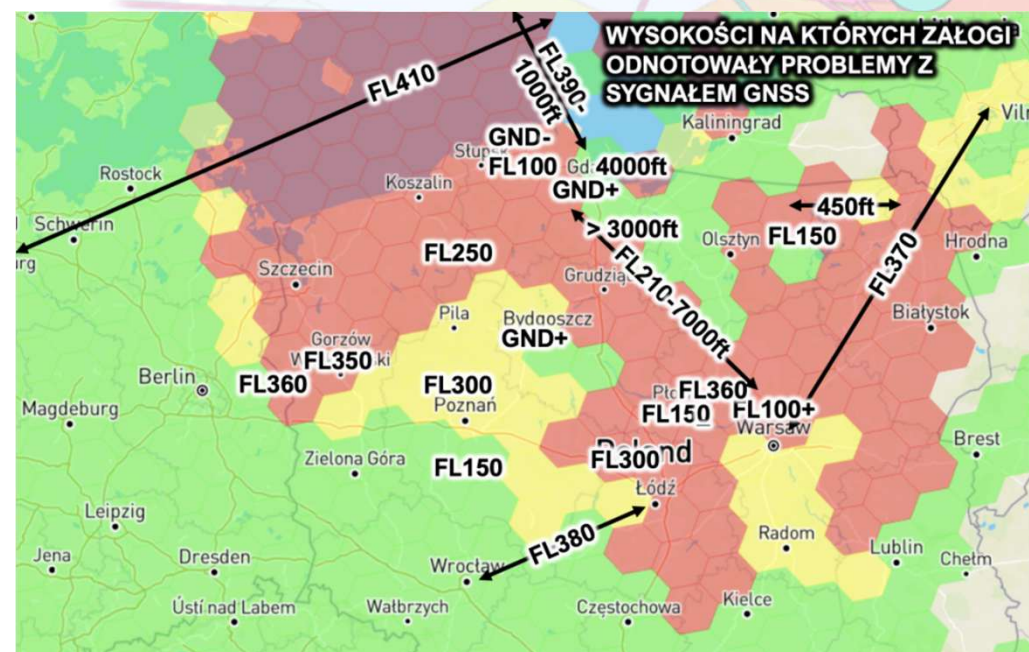


UE actions on GNSS interferences

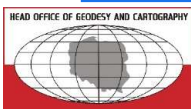
„Led by Latvia, 17 countries called on the European Union (EU) to take action on GNSS interferences originating from Russia and Belarus.

The GNSS interferences were described not as random incidents, but as systematic, deliberate actions by these two countries.”

„They have been described as hybrid attacks aimed at affecting all types of technologies, especially transpor. The letter was considered on 5th June 2025 at the meeting of the EU Transport, Telecommunications and Energy Council. **In response, the General Secretariat of the Council of the EU issued the "Call for common actions to address threats from disruption and spoofing of Global Navigation Satellite Systems (GNSS)”.**



Source: dlapilota.pl



ASG-EUPOS System

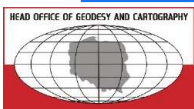
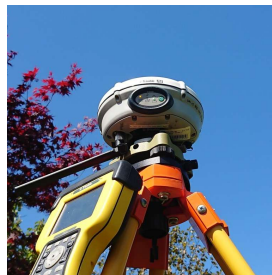
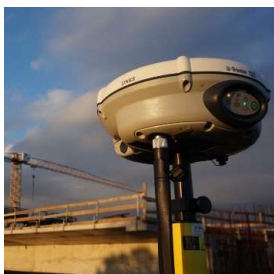
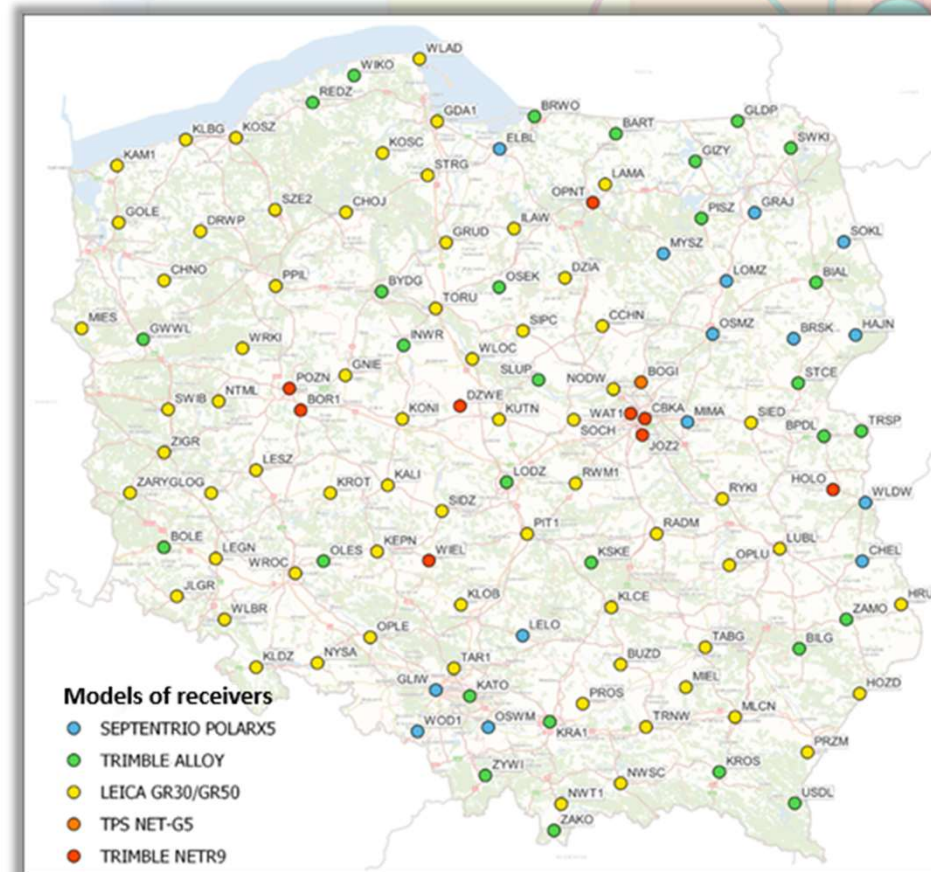
147 reference stations:

- 109 stations owned by the Head Office of Geodesy and Cartography
- 11 affiliated stations (universities, scientific institutes, etc.)
- 27 foreign stations (D, CZ, SK, LT, UA)

2 management centers: Warsaw and Katowice

Since February 2025 all stations owned by the Head Office of Geodesy and Cartography have been equipped with receivers enabling **tracking of 4 GNSS systems**, taking into account the latest BDS gen III signals.

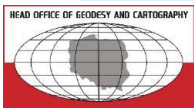
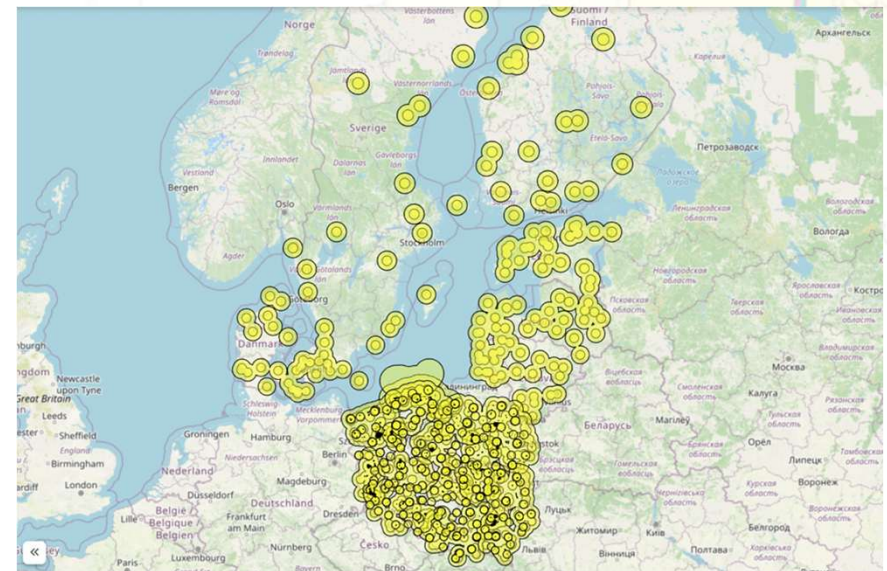
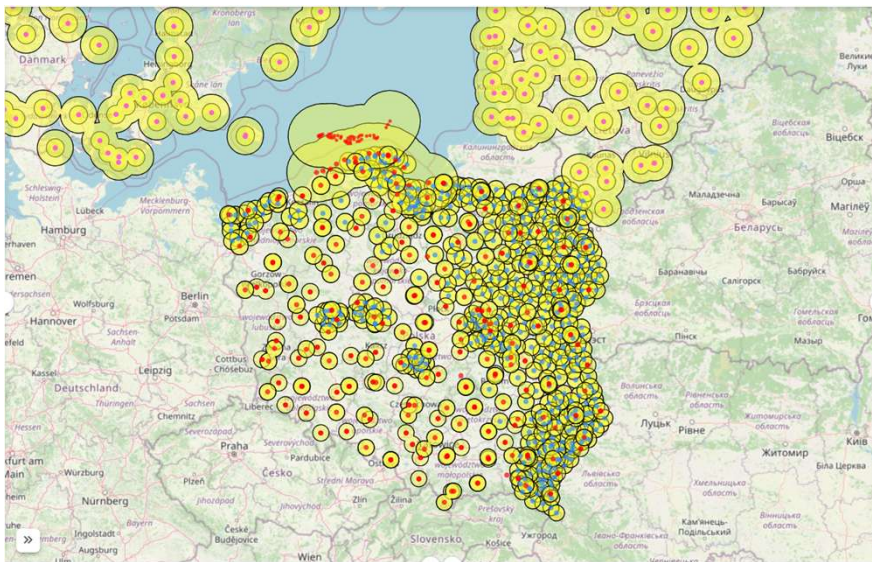
In the system there are currently **over 48.000 registered user accounts**.
Over 18,000 people used the ASG-EUPOS system last month.



Cooperation – agreement on the Polish PNT Shield

- Cooperation of the Ministry of National Defense, the Ministry of Digital Affairs, the National Institute of Telecommunications, the Head Office of Geodesy and Cartography, the Polish Space Agency, and the Government Center for Security in order to build the project of a nationwide system for monitoring PNT (Positioning, Navigation, Time) services.

The Polish PNT Shield is intended to ensure, that position, navigation and time in Poland remain precise and available "anytime, anywhere" - also when GNSS signals are intentionally or accidentally interfered.



M-Project-PNT-E1

Functional aim of the project

- ✓ Location of interferences and providing an alternative position and time to all critical users.
- ✓ Poland has its own jamming and spoofing resistant PNT ecosystem.



Ministerstwo
Obrony Narodowej



Fundusze Europejskie
na Rozwój Cyfrowy

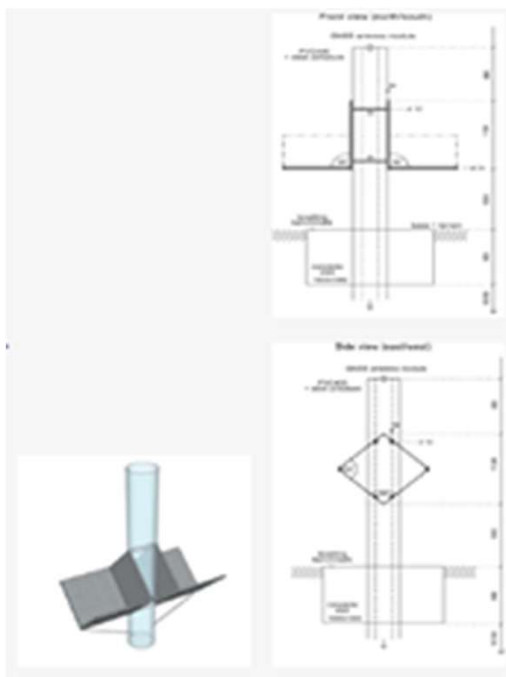


HEAD OFFICE OF GEODESY AND CARTOGRAPHY

EuroSDR workshop, 2nd December 2025

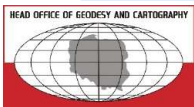
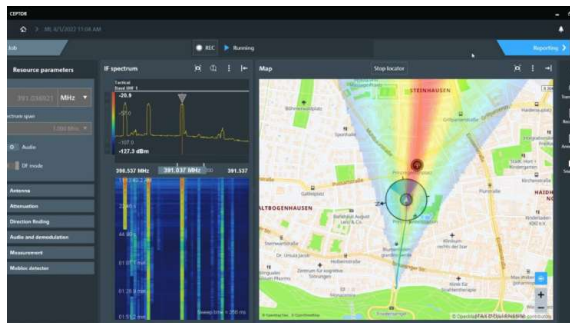
M-Project-PNT-E1

MultiPNT Points – precise and stable geodynamic points for determining GNSS positions combined with InSAR, gravimetric and leveling techniques (2-pillar pilot project)



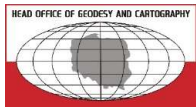
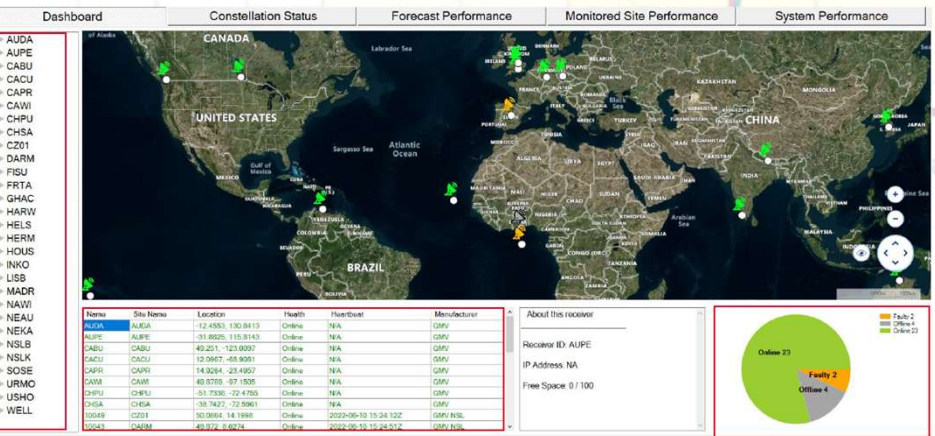
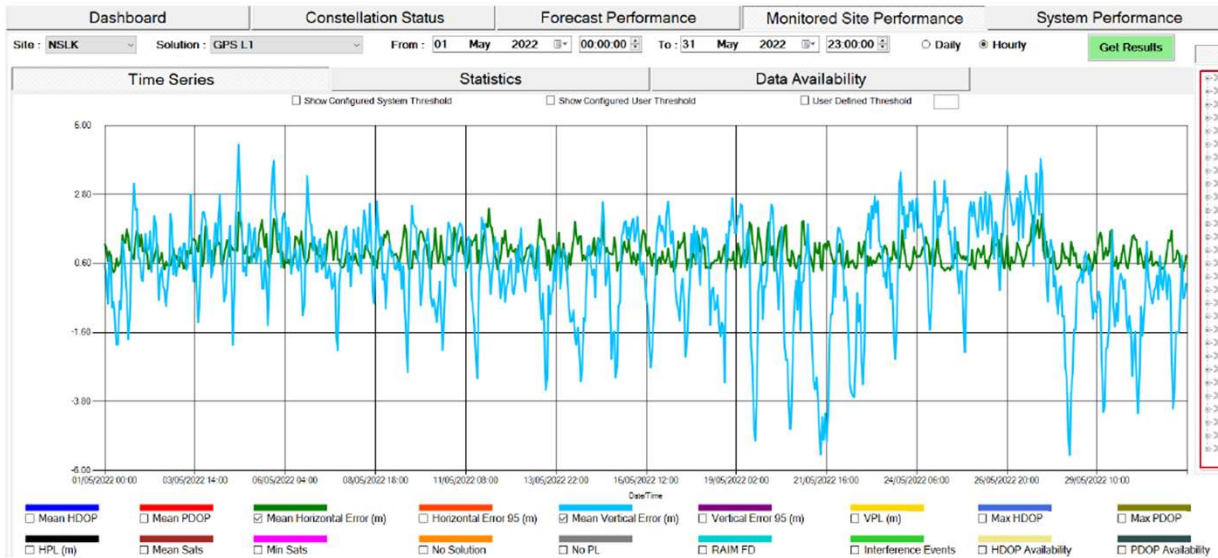
M-Project-PNT-E1

InterferenceSearch&Find (InterferenceS&F) – mobile set for detecting GNSS interferences, especially in urban infrastructure



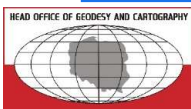
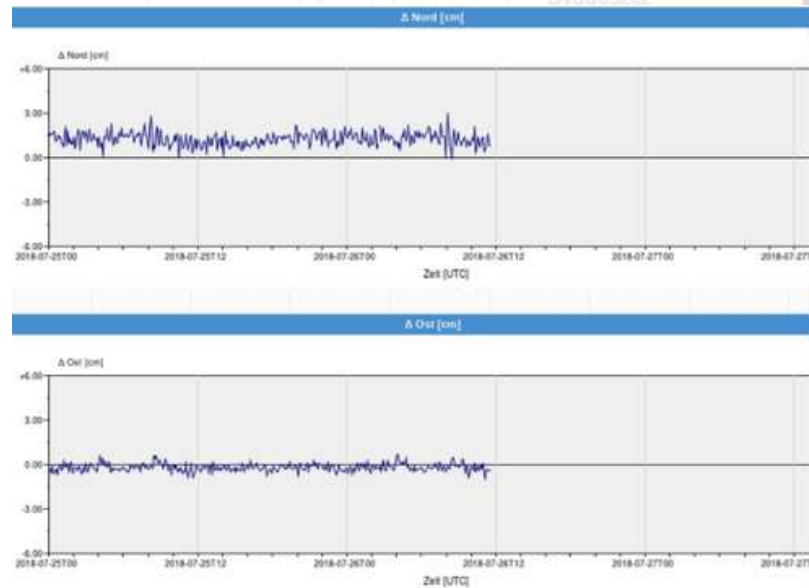
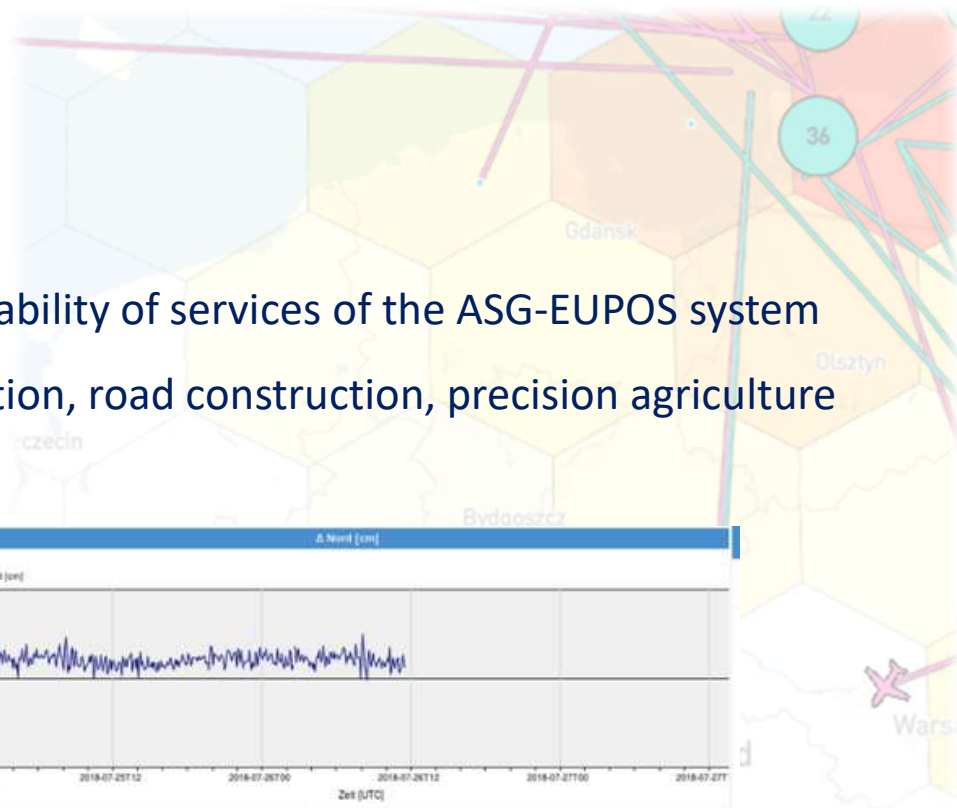
M-Project-PNT-E1

GNSS Status – software for analyzing and presenting the status of GNSS systems over Poland, which uses ASG-EUPOS reference stations as a source of observations and presents the quality of signals at these stations

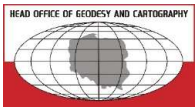
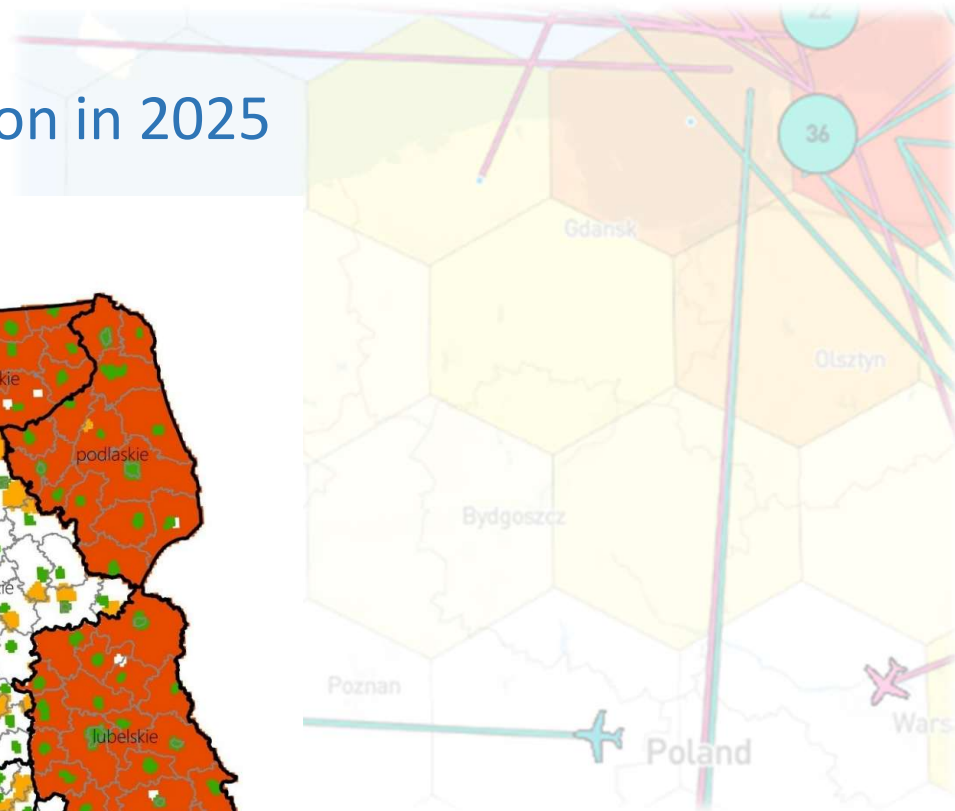
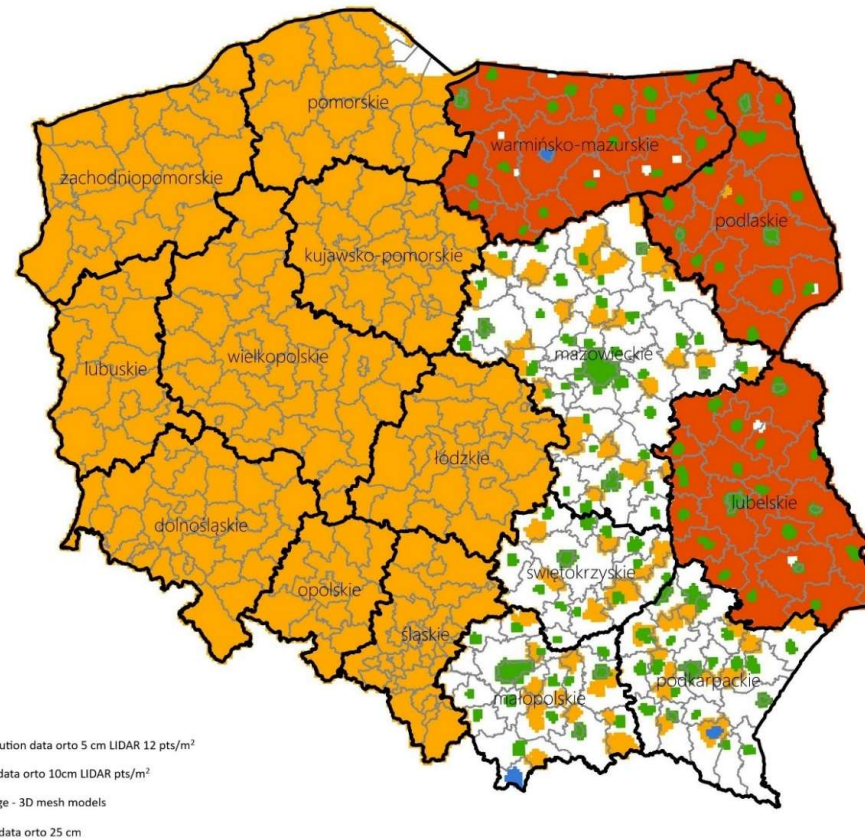


M-Project-PNT-E1

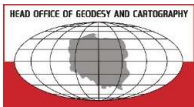
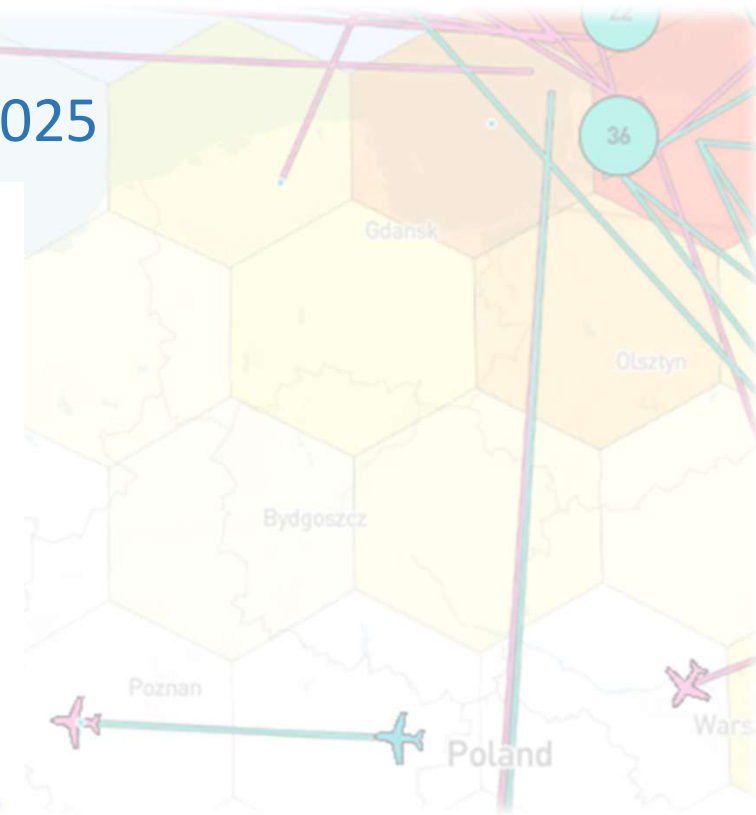
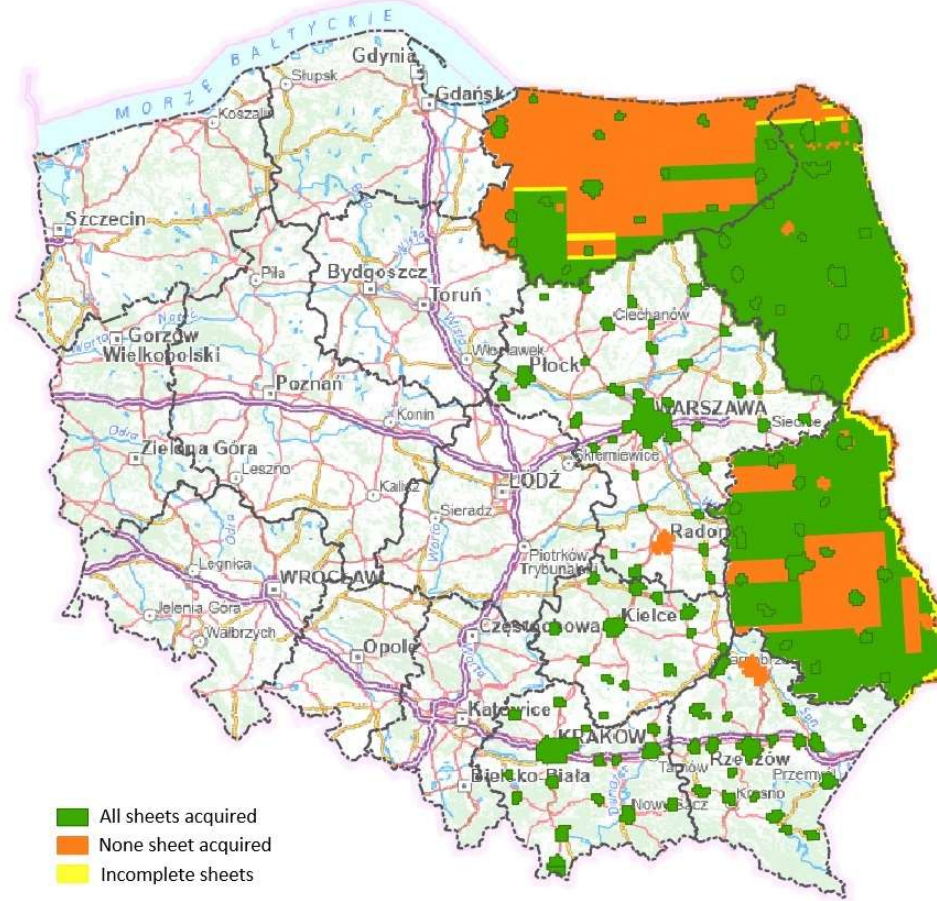
ASG-EUPOS Status – external system for monitoring the availability of services of the ASG-EUPOS system used by professional entities in the field of geodesy, construction, road construction, precision agriculture



The plan of photogrammetric data acquisition in 2025



The state of photogrammetric data acquisition in 2025



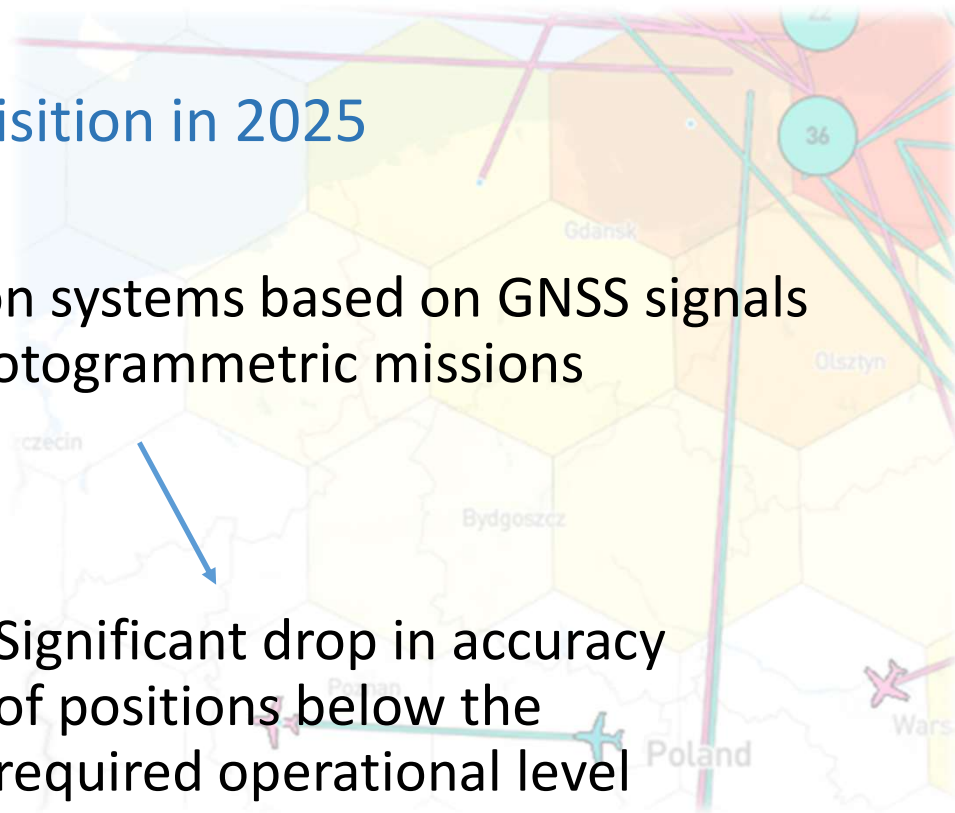
Problems with photogrammetric data acquisition in 2025

- Serious operational disruptions of navigation systems based on GNSS signals (GPS/GLONASS) during the execution of photogrammetric missions

Inability to detect the appropriate number of satellites by FMSs

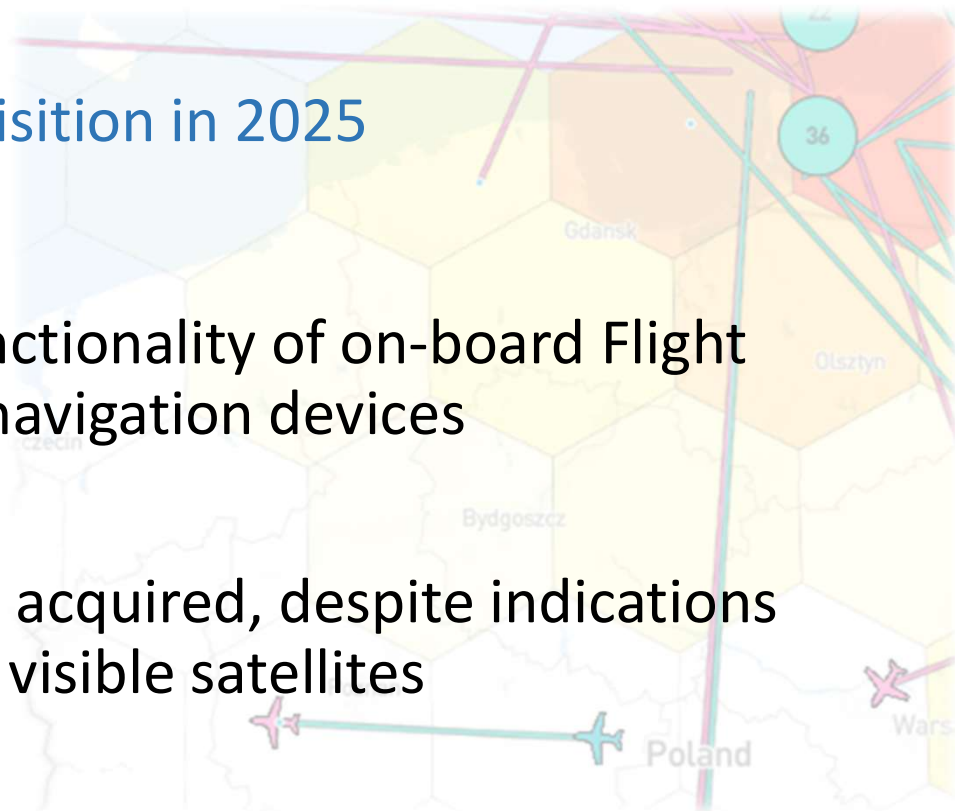
Significant drop in accuracy of positions below the required operational level

Inability to proper registration of aerial photos and LIDAR data due to the lack of correct registration of the flight trajectory



Problems with photogrammetric data acquisition in 2025

- Signal interferences lead to the loss of functionality of on-board Flight Management Systems and other aircraft navigation devices
- Sometimes no data for further use can be acquired, despite indications during the flight of a sufficient number of visible satellites
- Sometimes even at the airport there are no satellites available
- In many cases all types of GPS/GNSS signals are interfered

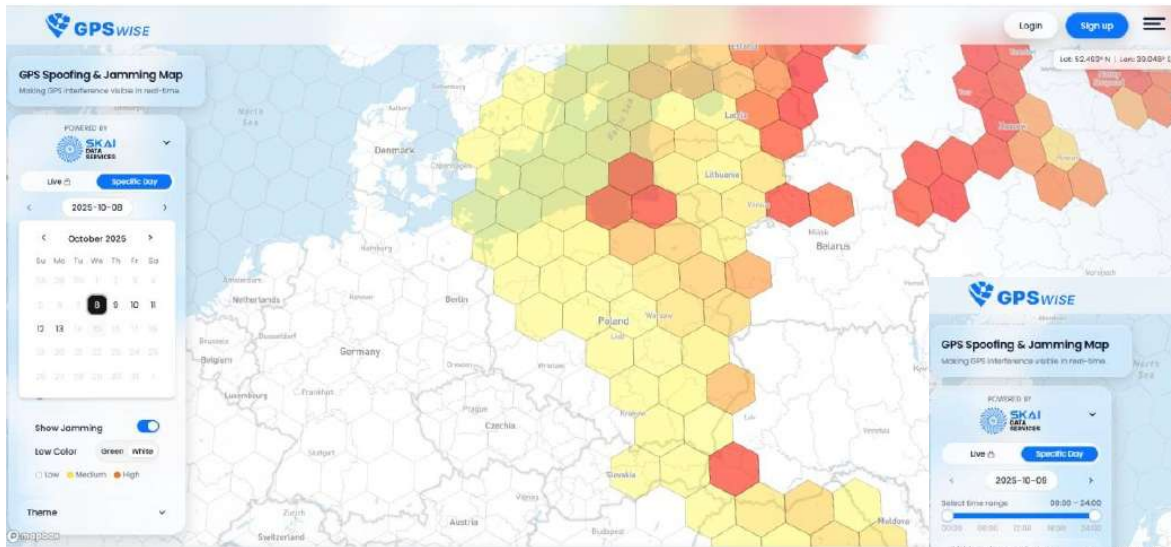


Problems with photogrammetric data acquisition in 2025

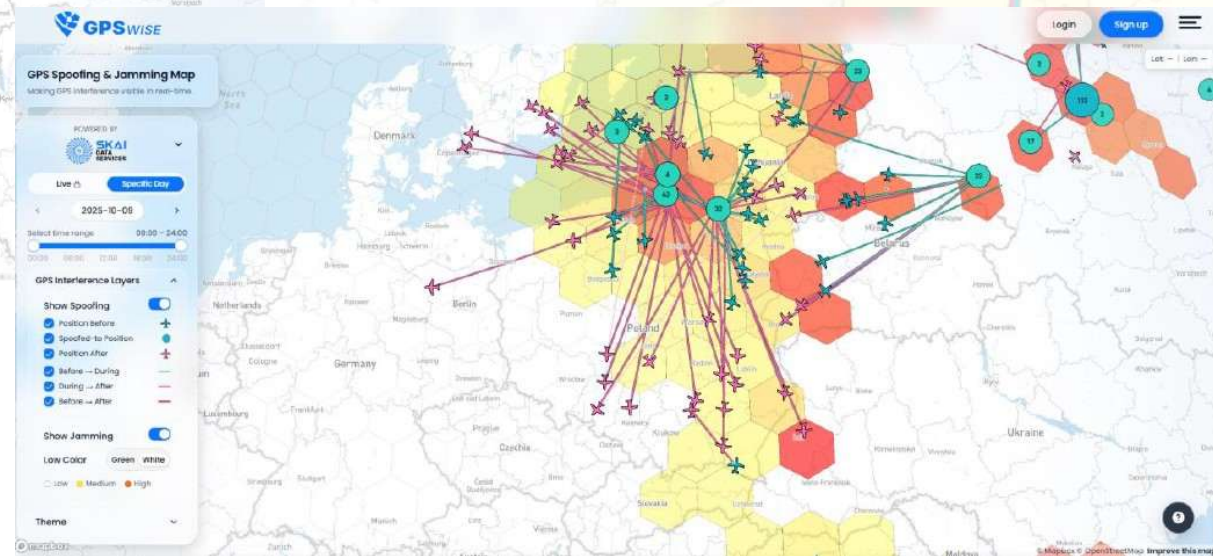
- Nowadays signal interferences are present at higher altitudes and occur not only in the east part of Poland, but also in other parts of our country (e.g. Słupsk, Koszalin)



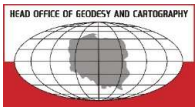
Problems with photogrammetric data acquisition in 2025



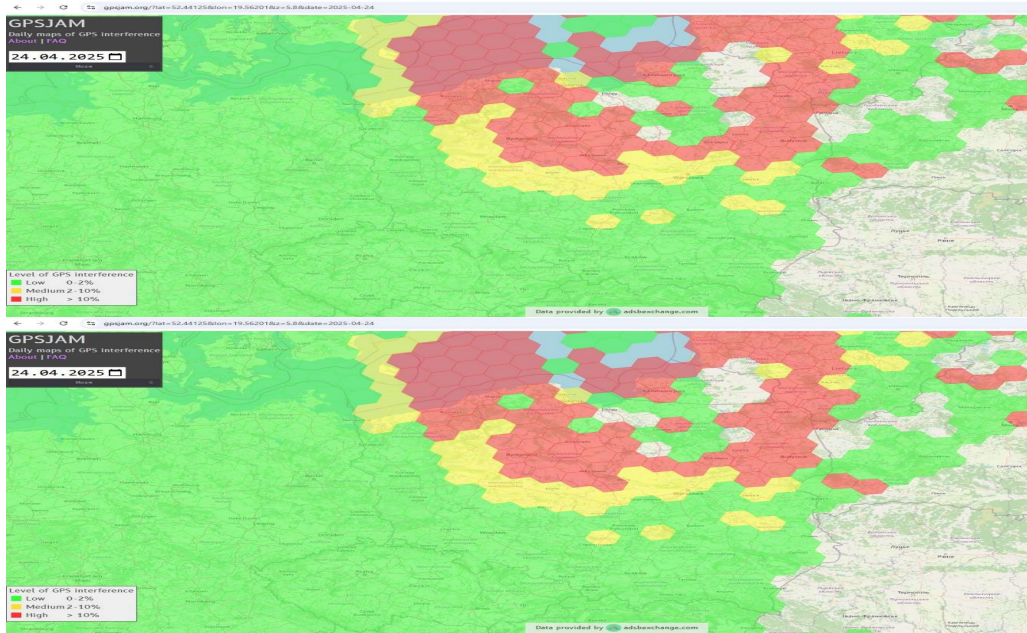
08.10.2025 GPS Jamming



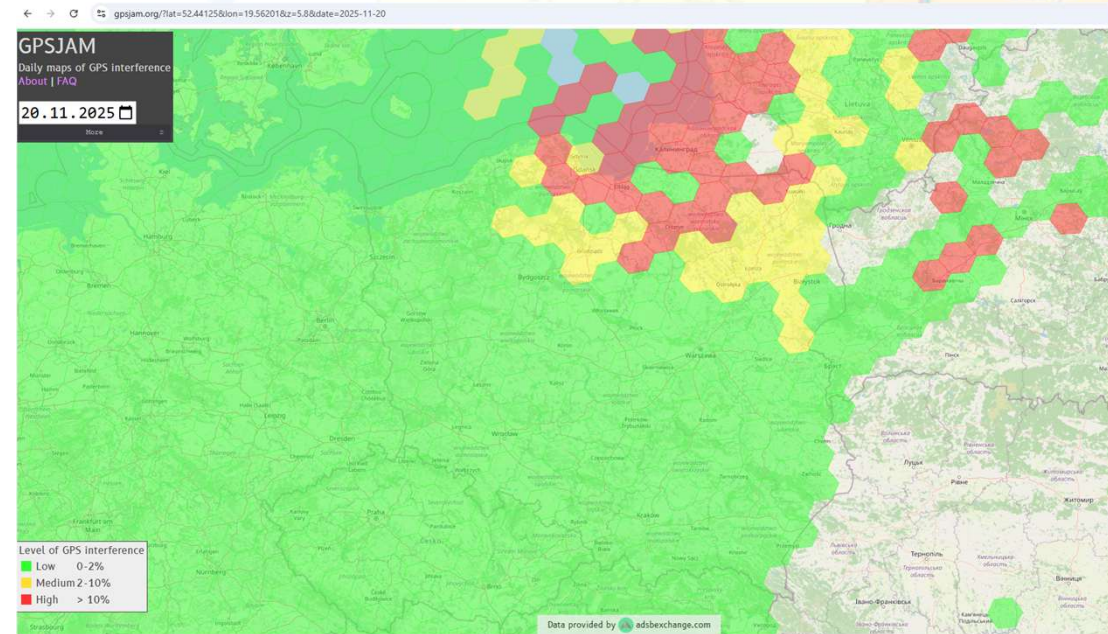
10.10.2025 GPS Jamming and Spoofing



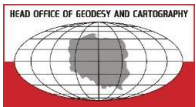
Problems with photogrammetric data acquisition in 2025



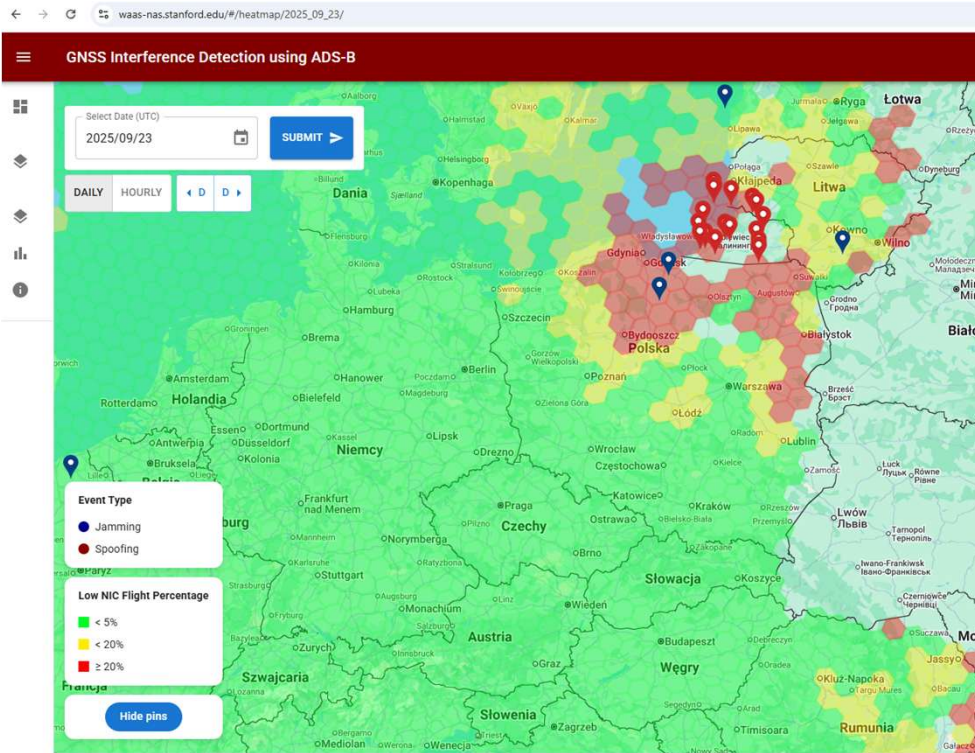
24.04.2025 GPS Jamming



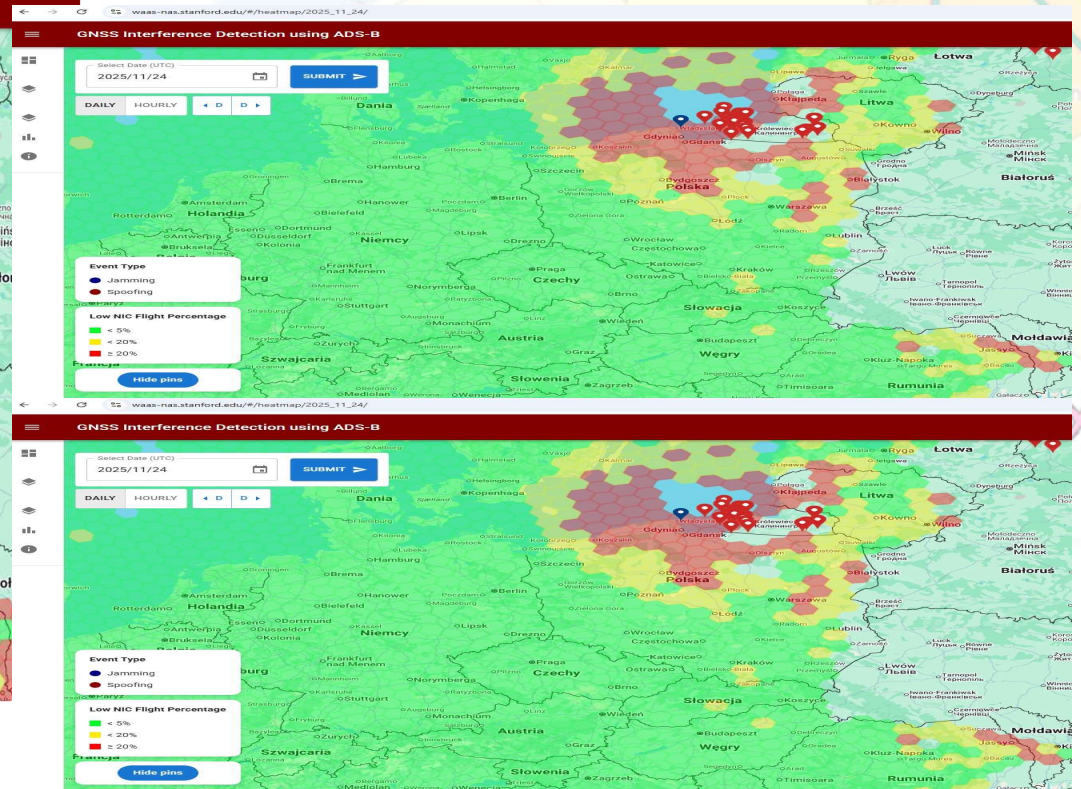
20.11.2025 GPS Jamming



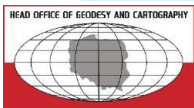
Problems with photogrammetric data acquisition in 2025



23.09.2025 GNSS Jamming and Spoofing

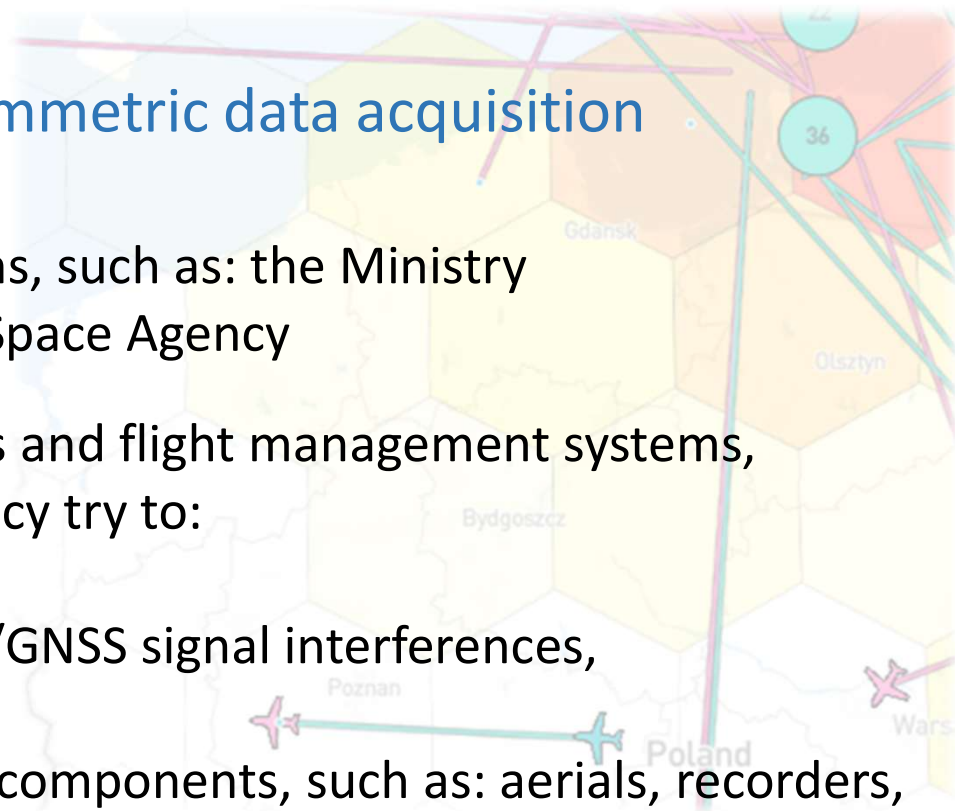


24.11.2025 GNSS Jamming and Spoofing

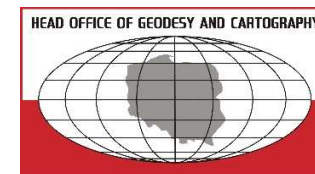


Attempts to solve problems with photogrammetric data acquisition

- We hold conversations with other public institutions, such as: the Ministry of National Defense, the Border Guard, the Polish Space Agency
- Our contractors together with producers of sensors and flight management systems, universities and also the Polish Air Navigation Agency try to:
 - increase resistance of the used systems to GPS/GNSS signal interferences,
 - develop and integrate additional and technical components, such as: aerials, recorders,
 - improve software for registration and processing of flight trajectories
- Our contractors use aerials more and more resistant to signal interferences (denoising, looking for less interfered bands)



Thank you for your attention



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