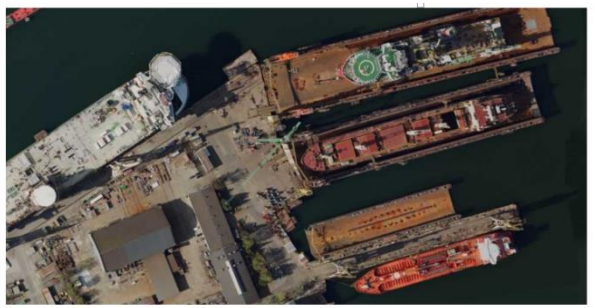
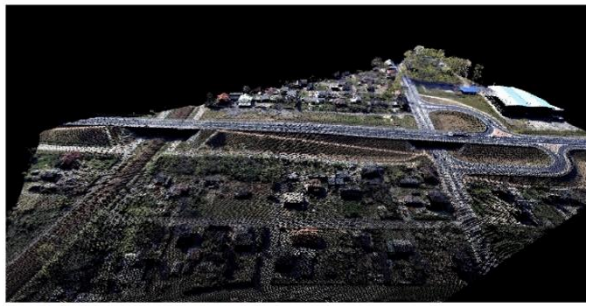
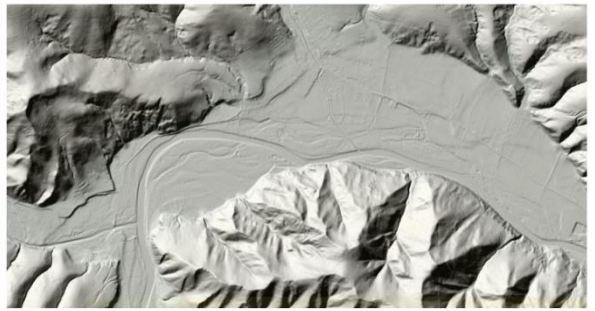
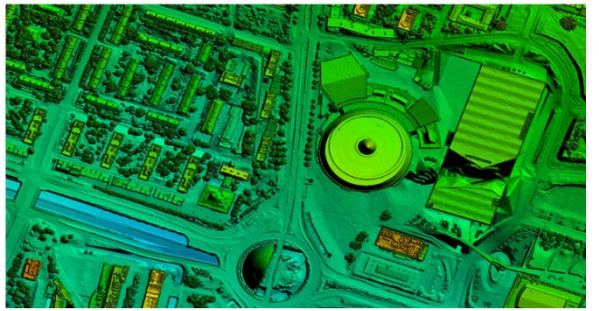
Photogrammetric data acquisition in Poland in a scope of geopolitical situation

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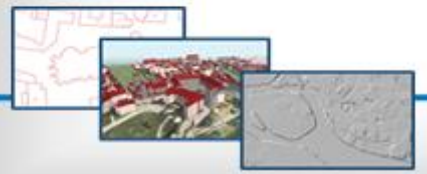
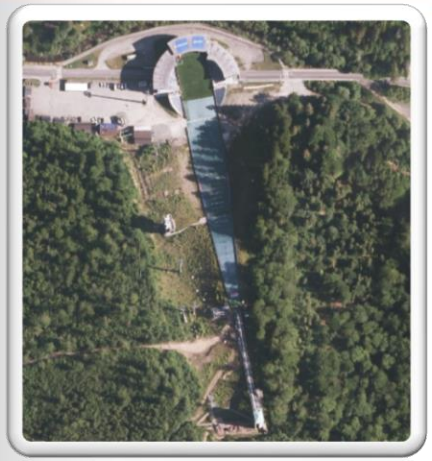
Agenda

- ❑ Photogrammetric data in the Central Geodetic and Cartographic Resource
- ❑ Multiannual plan for photogrammetric data acquisition
- ❑ Problems with photogrammetric data acquisition
- ❑ Attempts to solve problems with photogrammetric data acquisition



Photogrammetric data in the Central Geodetic and Cartographic Resource

HEAD OFFICE OF GEODESY AND CARTOGRAPHY

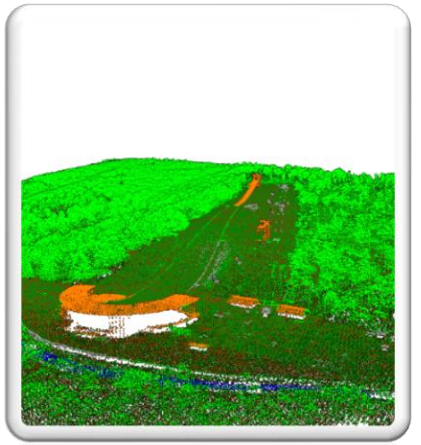


ORTHOPHOTOMAPS

(classic, oblique, true)

AERIAL IMAGERY

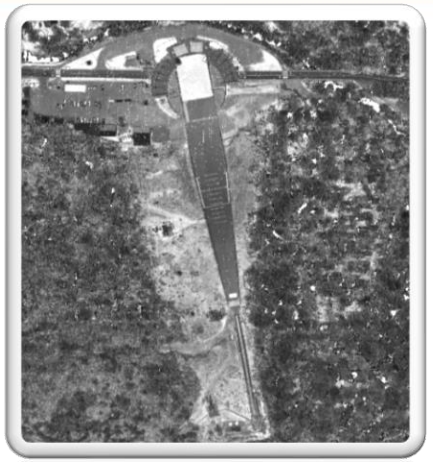
(vertical and oblique)



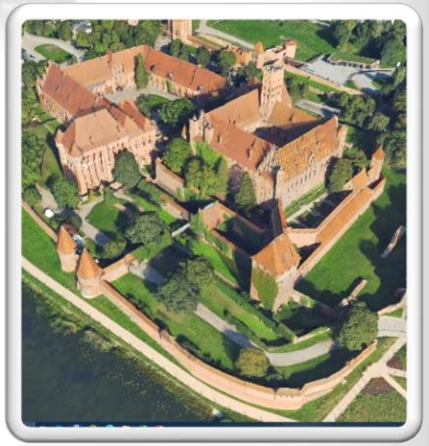
ALS DATA

DEM

DSM



IMAGES OF INTENSITY

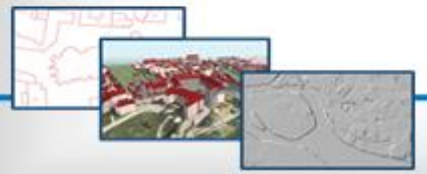


3D MESH MODELS

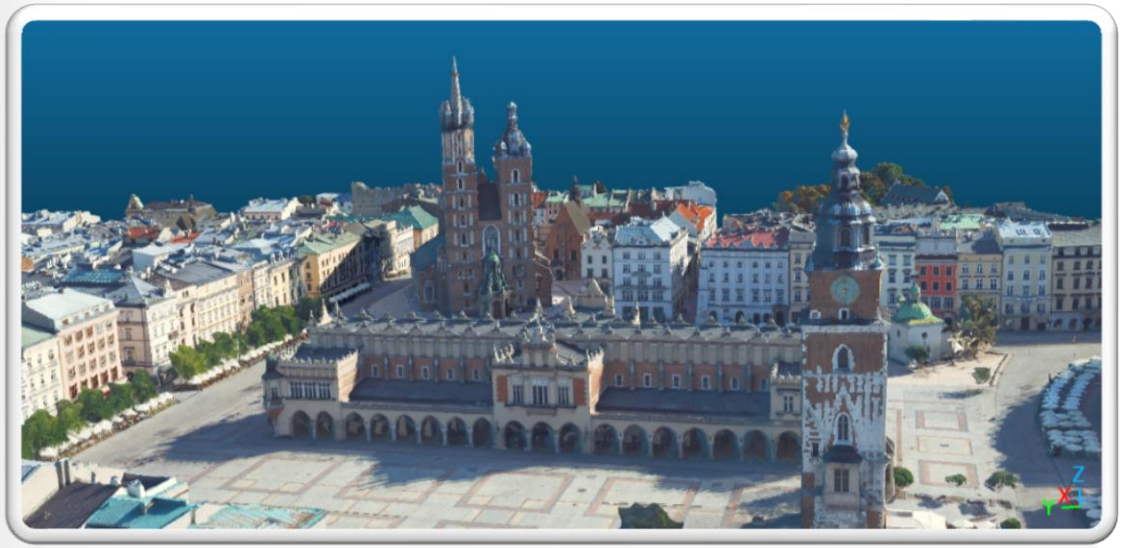
- **881 TB data**
- **7 922 400 files**

3D MODELS OF TREES

3D MODELS OF BUILDINGS

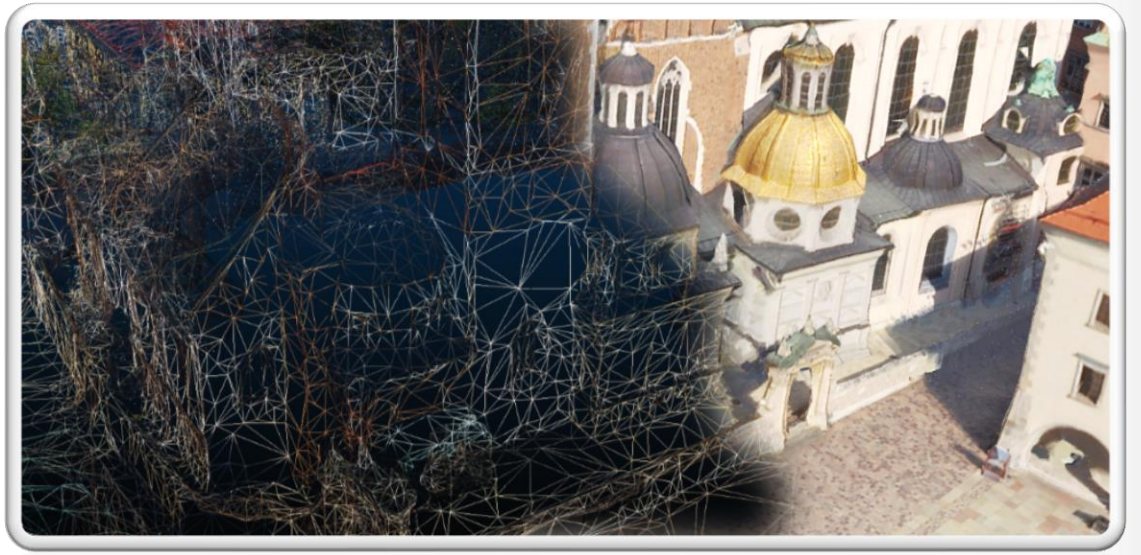


Photogrammetric data in the Central Geodetic and Cartographic Resource – 3D mesh models



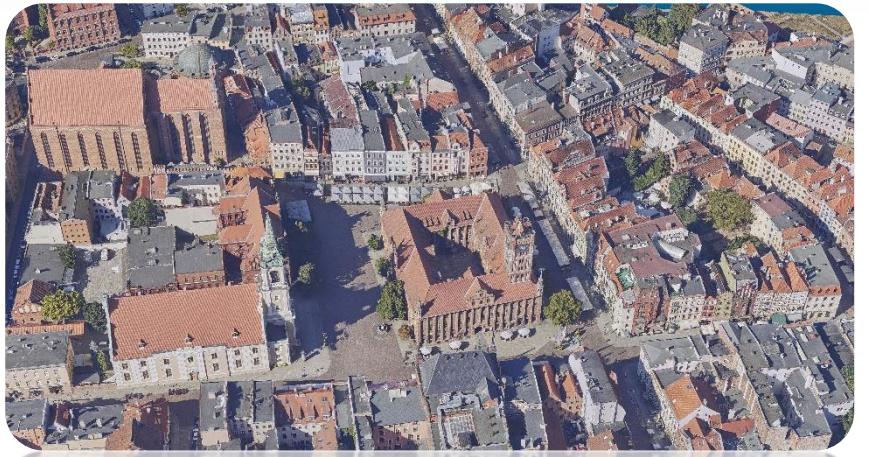
Regulation of the Minister of Development and Technology of December 16, 2022 on databases regarding aerial and satellite imagery, orthophotomap and digital terrain models (Journal of Laws of 2023, item 89)

- ✓ 3D mesh models are three-dimensional visualizations of objects covered with image textures from oblique and vertical aerial imagery, with the actual location of details and shapes of the objects.
- ✓ Created by applying algorithms for automatic matching common points on all images - both oblique and vertical.
- ✓ Increased accuracy by using ALS data.



Photogrammetric data in the Central Geodetic and Cartographic Resource – 3D mesh models

Malbork



Toruń

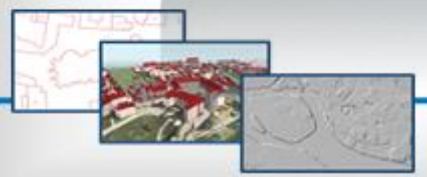
Kołobrzeg

2025
Zakopane, Olsztyn, Sanok

2026
Gorzów Wielkopolski, Wałbrzych, Kalisz

2027
Ełk, Nowy Sącz, Lublin

Zielona Góra



Photogrammetric data in the Central Geodetic and Cartographic Resource

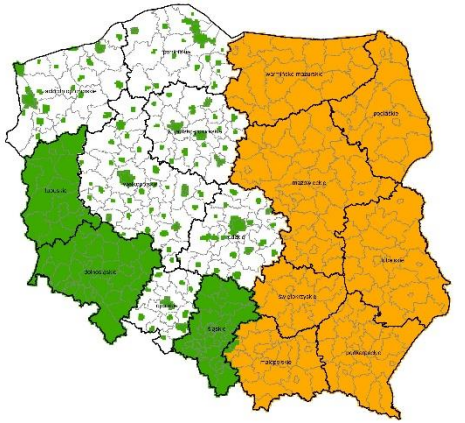
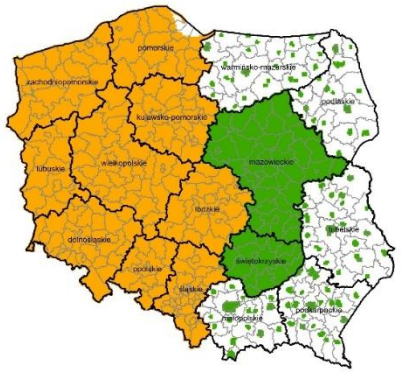
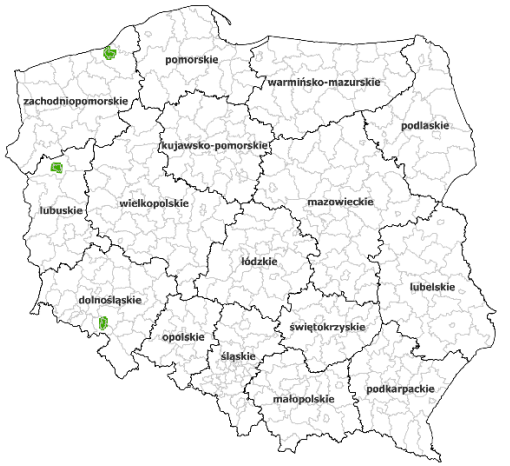
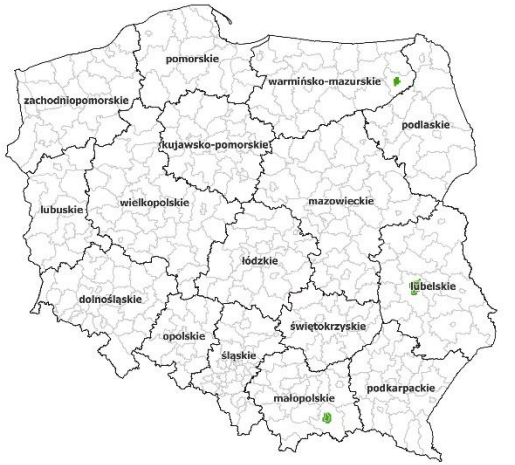
HEAD OFFICE OF GEODESY AND CARTOGRAPHY

	HIGH RESOLUTION - for urban areas	FULL PACKAGE - for urban areas	STANDARD- for non-urban areas	
	ALS + classic ORTO	ALS + classic and oblique ORTO + 3D MESH	ASL + classic ORTO	Classic ORTO
	2-year cycle	Justified need	5-year cycle	2-year cycle
Vertical aerial imagery	0,05 m	0,05 m	0,10 m	0,25 m
Oblique aerial imagery	-	0,05 m	-	-
Classic orthophotomap	0,05 m	0,05 m	0,10 m	0,25 m
True orthophotomap	-	-	-	-
Oblique orthophotomap	-	0,05 m	-	-

Photogrammetric data in the Central Geodetic and Cartographic Resource

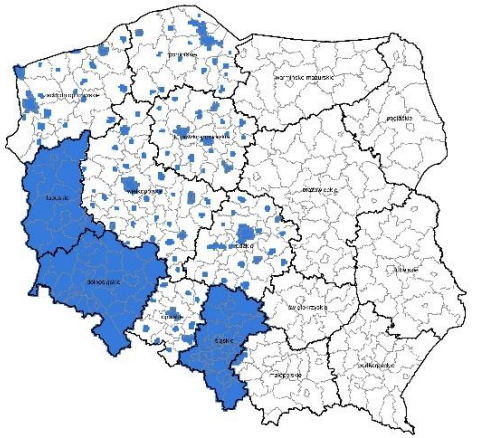
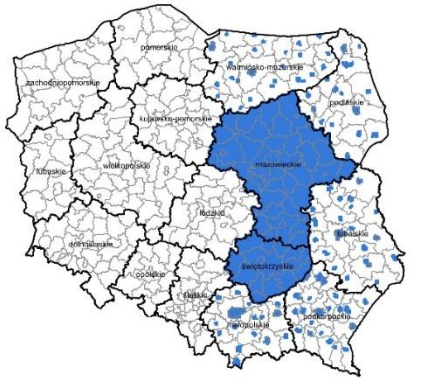
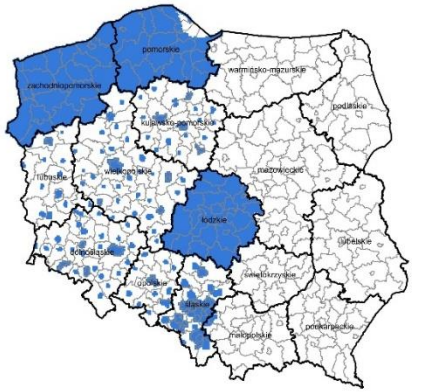
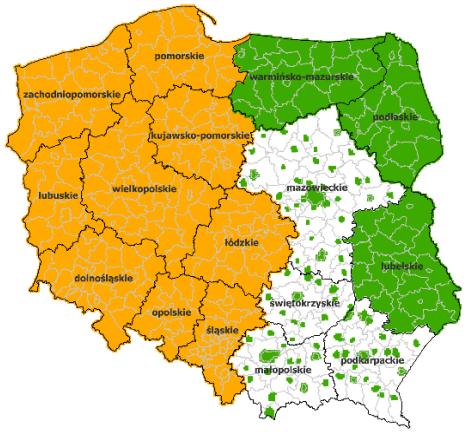
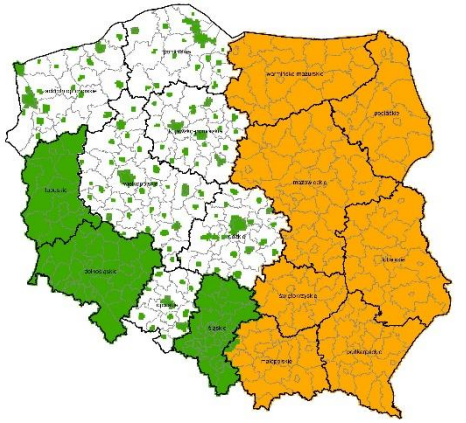
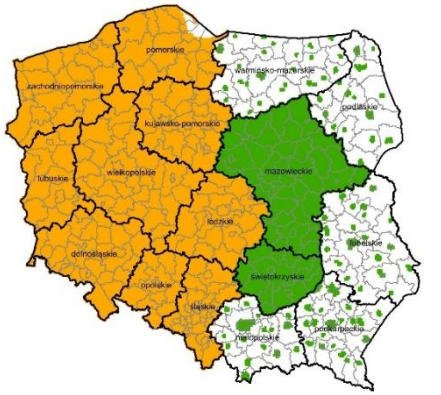
	HIGH RESOLUTION - for urban areas	FULL PACKAGE - for urban areas	STANDARD- for non-urban areas	
	ALS + classic ORTO	ALS + classic and oblique ORTO + 3D MESH	ASL + classic ORTO	Classic ORTO
	2-year cycle	Justified need	5-year cycle	2-year cycle
Point cloud	12 p/m^2	12 p/m^2	4 p/m^2	-
DEM	1,00 m	1,00 m	1,00 m	5,00 m
DSM	0,50 m	0,50 m	1,00 m	-
3D mesh models	-	Yes	-	-
Images of intensity	0,25 m	0,25 m	0,50 m	-

Multiannual plan for photogrammetric data acquisition

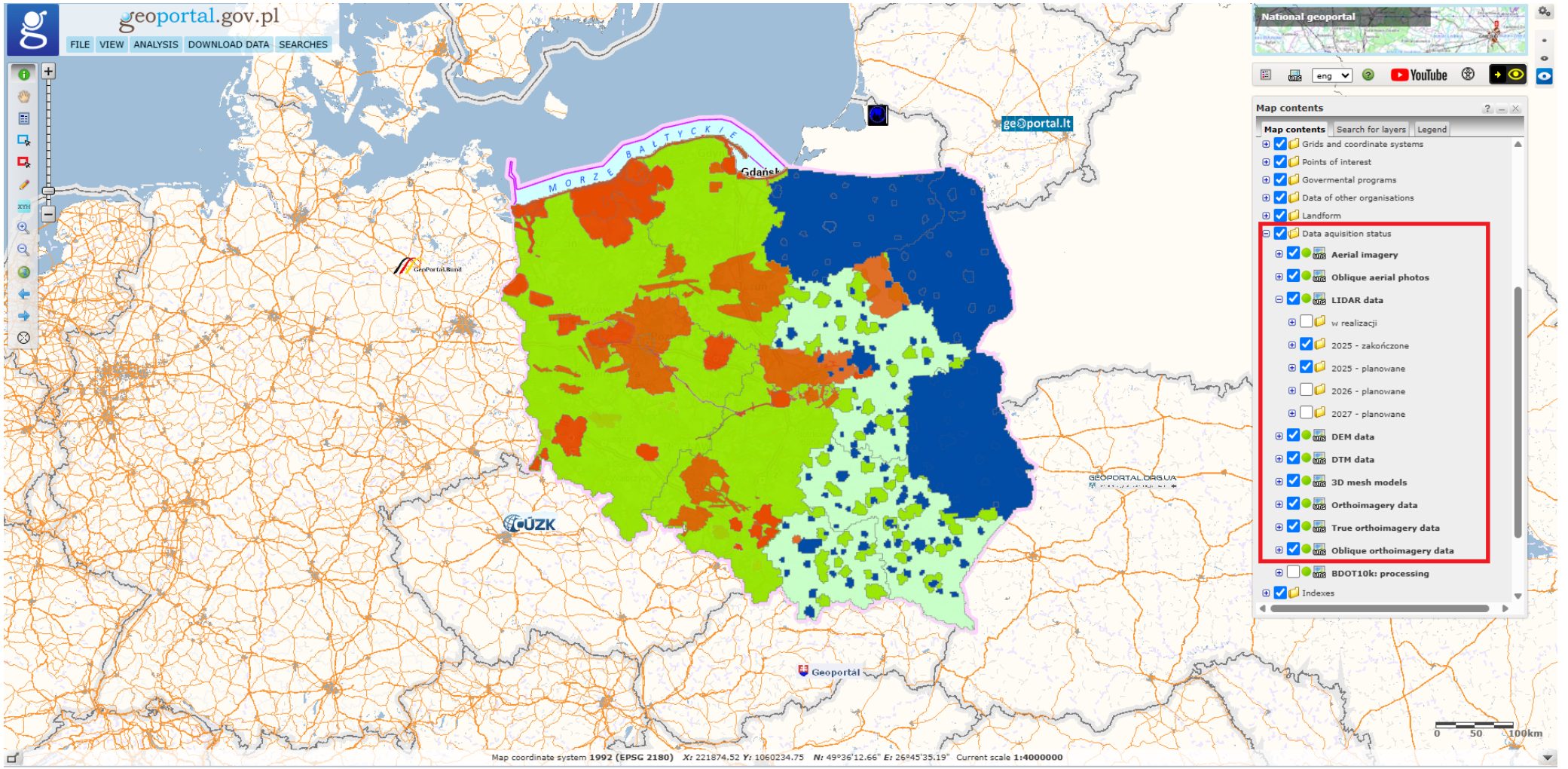
	2025	2026	2027
Classic orthophotomap/ Vertical aerial imagery			
Oblique aerial imagery/Oblique orthophotomap/ 3D mesh models			

Multiannual plan for photogrammetric data acquisition

HEAD OFFICE OF GEODESY AND CARTOGRAPHY

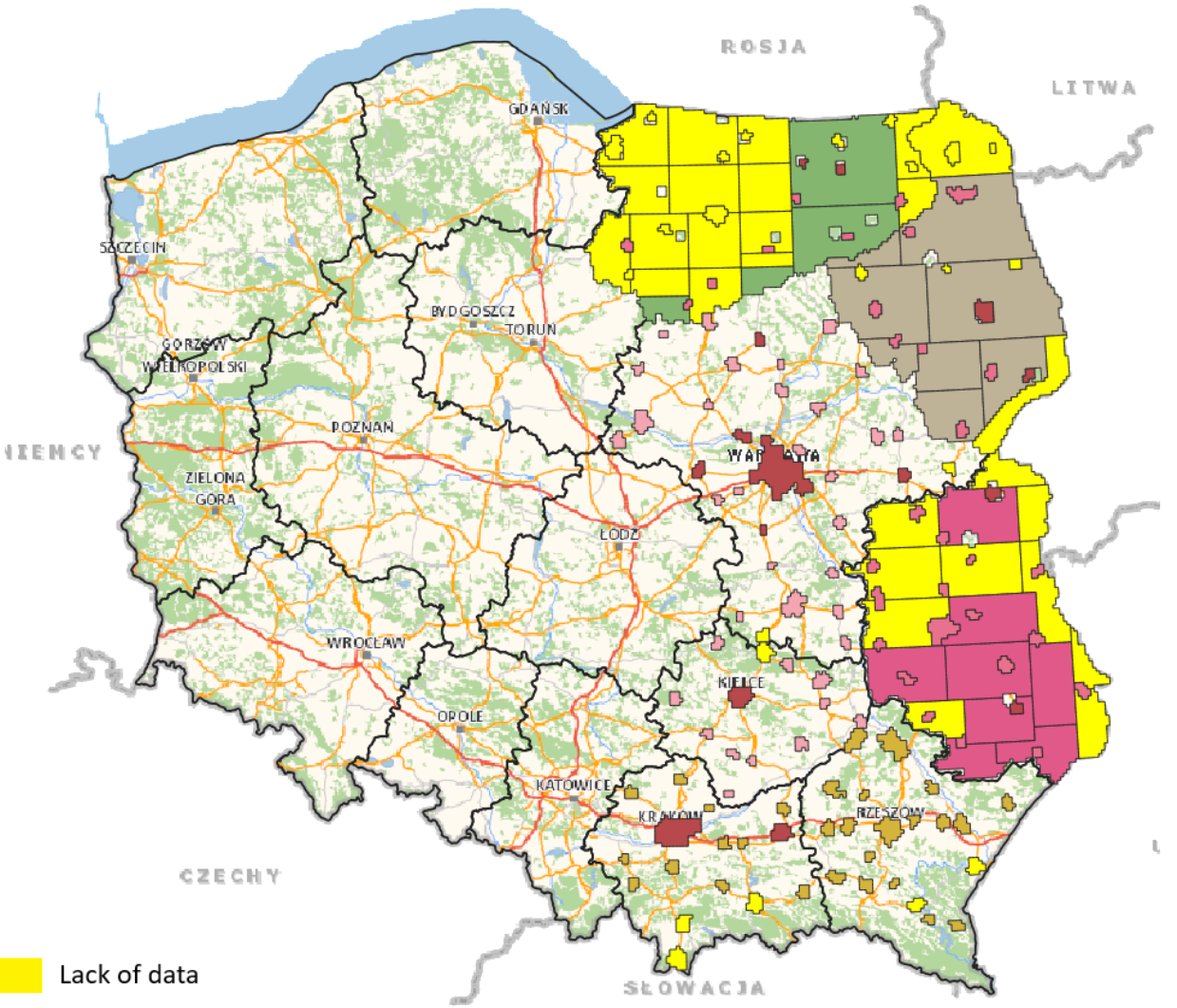
	2025	2026	2027
Point cloud/DSM			
DEM			

Data acquisition status at https://mapy.geoportal.gov.pl



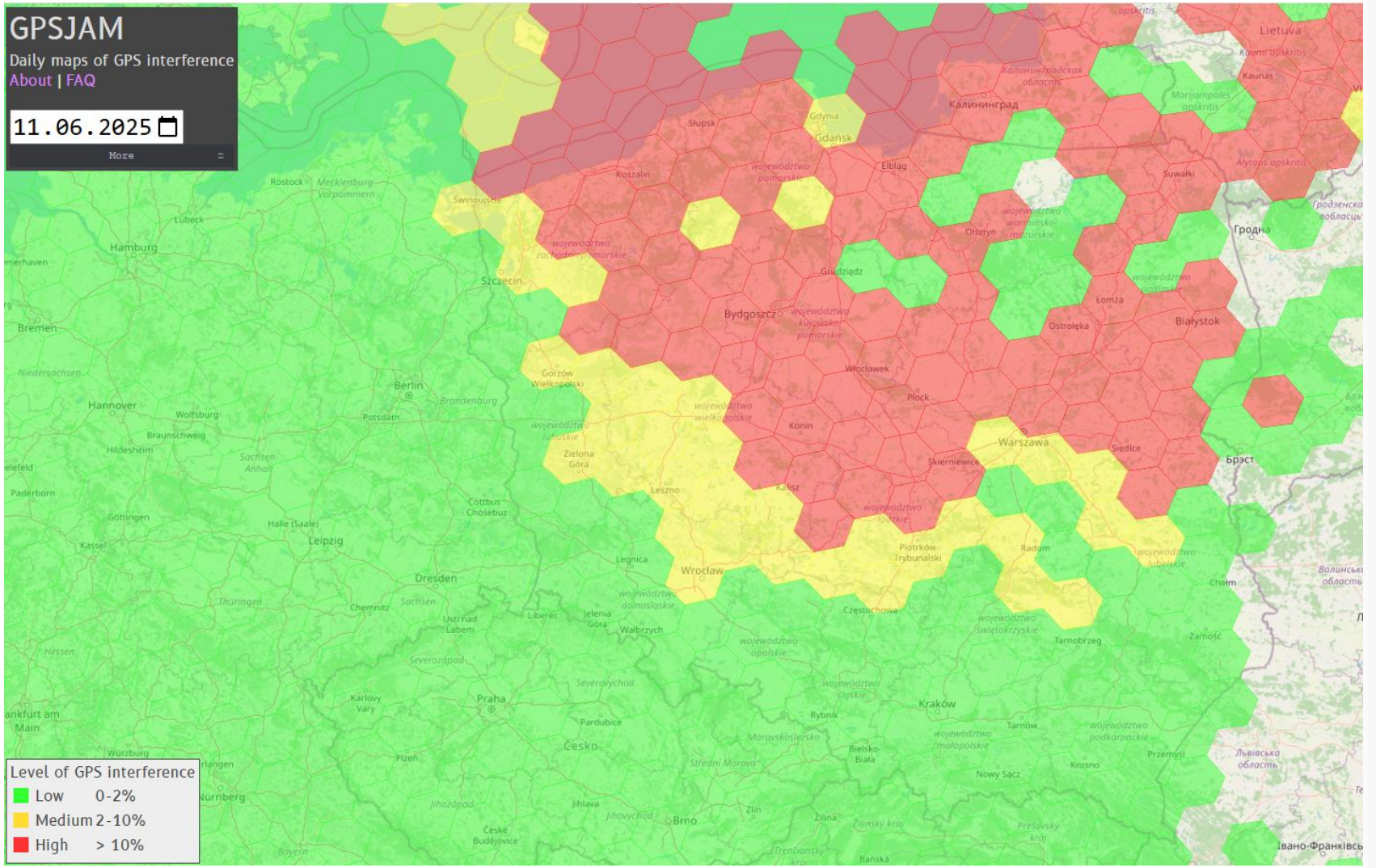
Problems with photogrammetric data acquisition

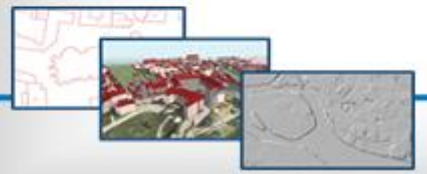
2025- east part of Poland



Problems with photogrammetric data acquisition

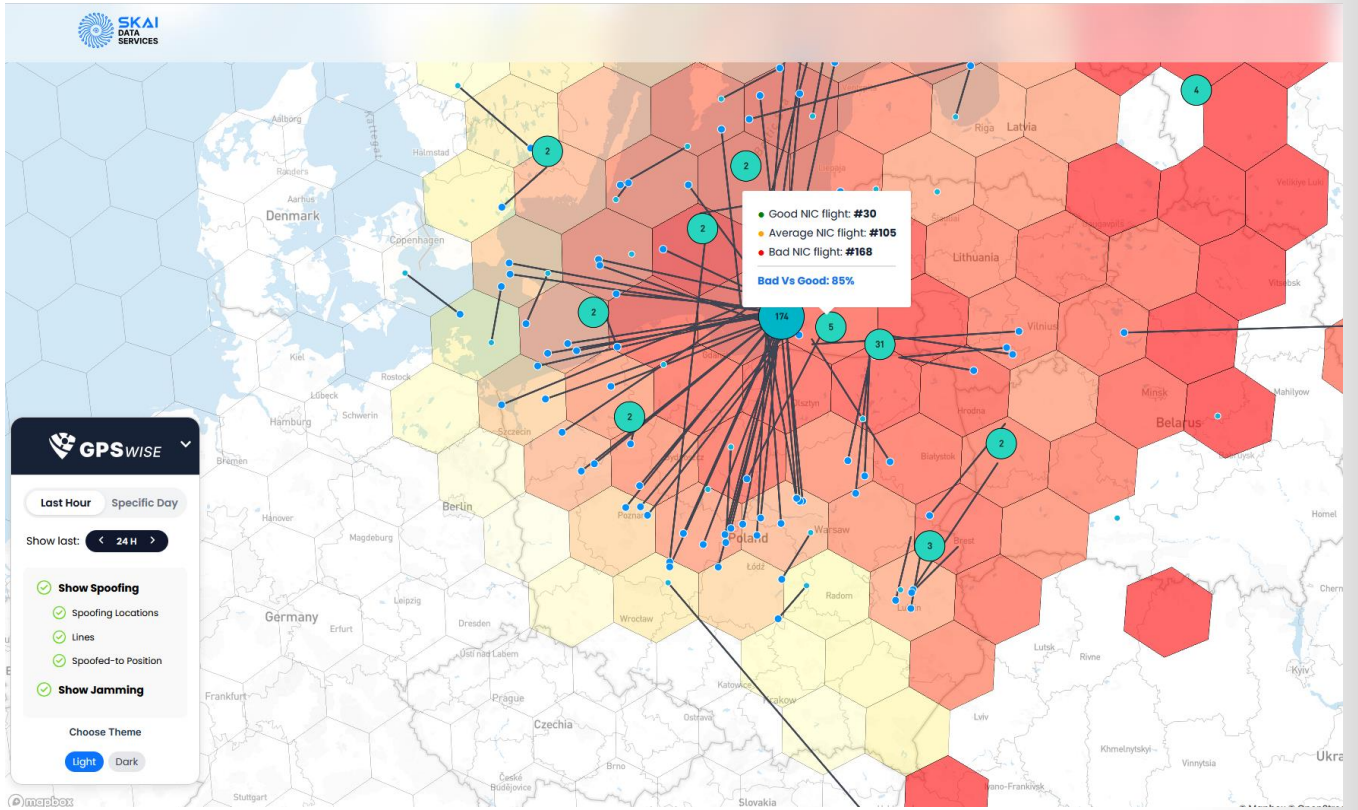
High level of GPS/GNSS Intentional and variable signal interference (jamming, spoofing)





Services for interference monitoring

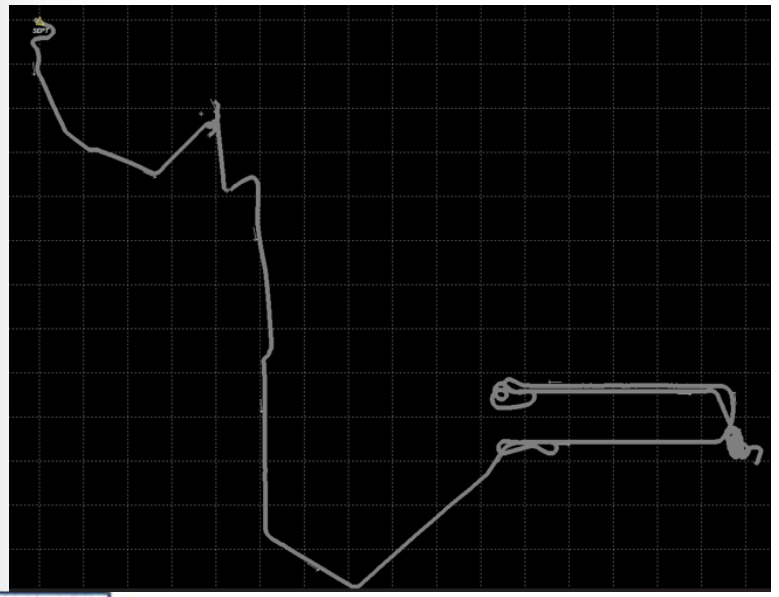
- **SKAI Data Services - GPSWise**
- Visualization of jammed regions in clasters
- Additional information about spoofing – real/spoofed position
- Statistical information – how many aircrafts were analyzed/affected
- **https://spoofing.skai-data-services.com/**



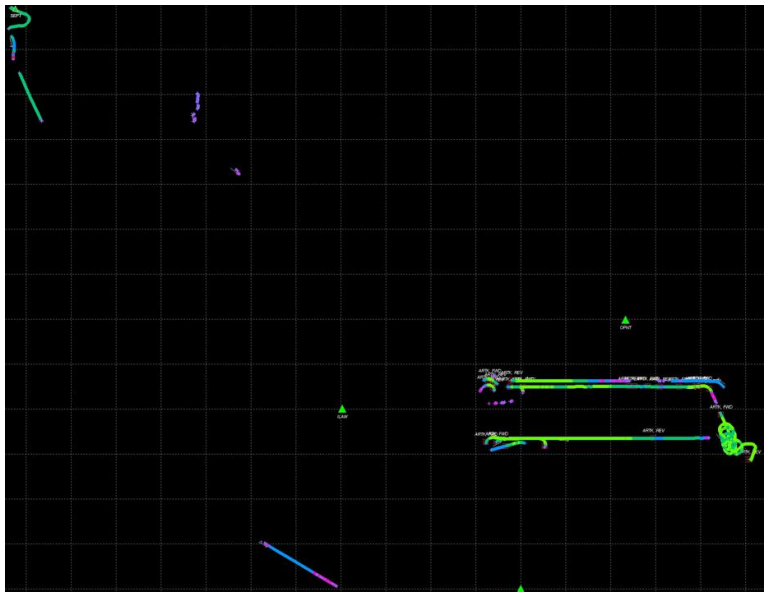
Interferences in photogrametric campaigns

- **Affected region: Northern-east part of Poland**
- **Missing tracking of GNSS signals**
- **Possible jamming**

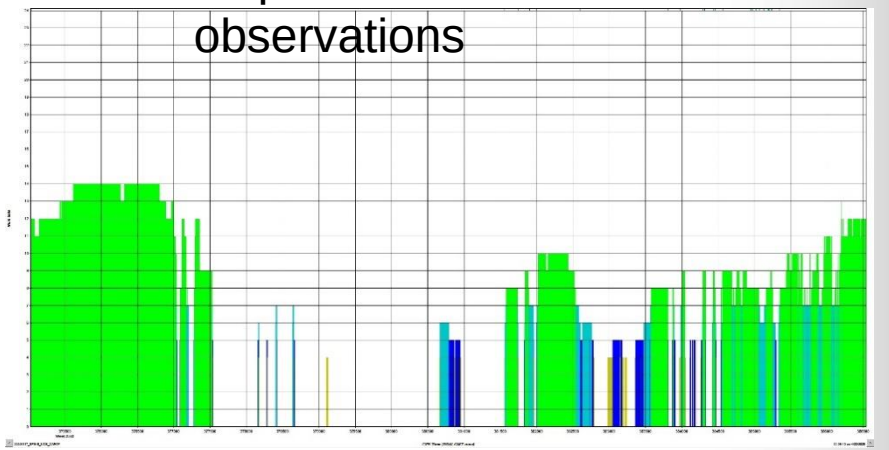
Navigation position



Precise position



Gaps in GNSS observations

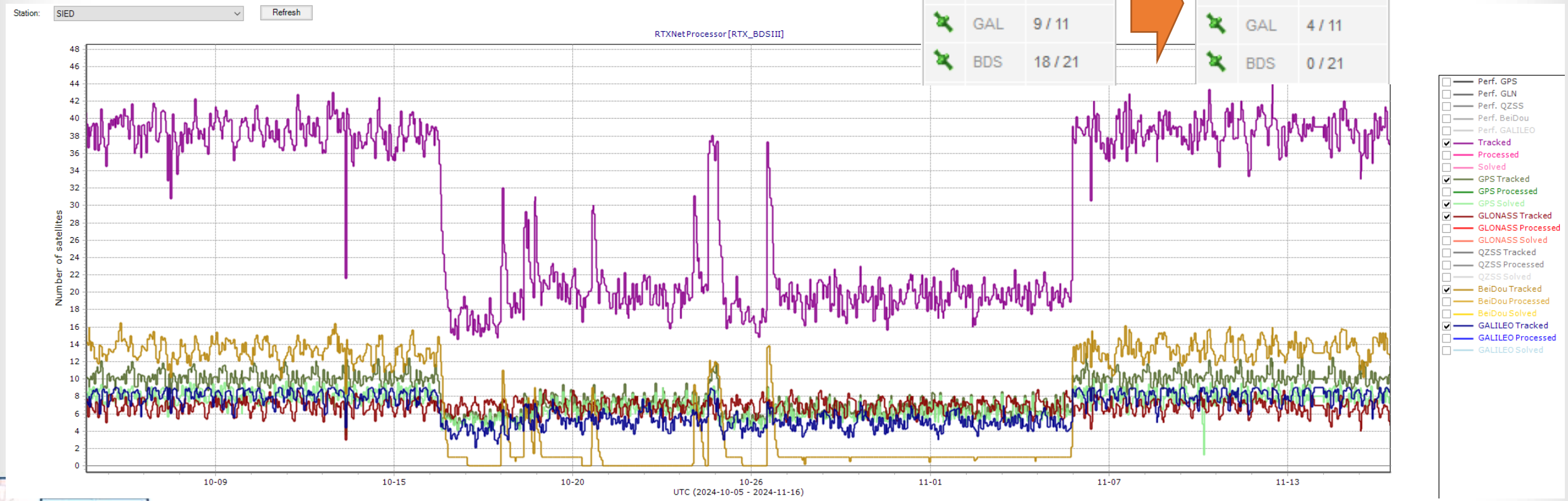


Local temporary interferences

- **Example no. 1** (SIED) – Nov 2024
- After 3 weeks interference disappeared

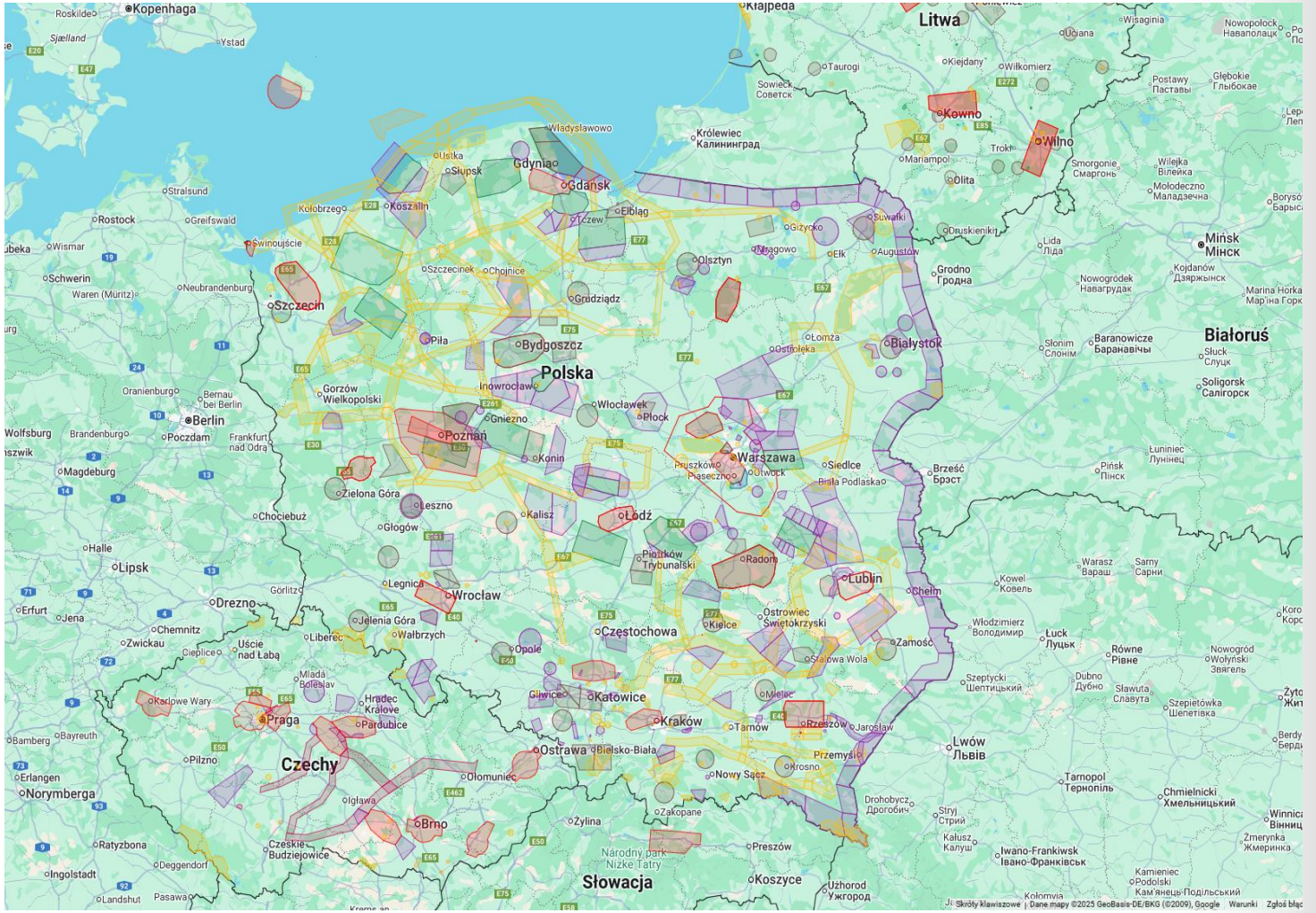
Tracking	
Navigated	
GPS	11 / 12
GLO	9 / 9
GAL	9 / 11
BDS	18 / 21

Tracking	
Navigated	
GPS	6 / 12
GLO	9 / 9
GAL	4 / 11
BDS	0 / 21



No fly zones

- **Permanent and temporary excluded zones**
- **Requesting for permission**
- **Long lasting procedures**



source: www.lotnik.org

How to avoid?

Project for GNSS monitoring

- In cooperation with National Institute of Telecommunication application to ESA – NAVISP programme for monitoring of GNSS signals interferences.
- Pilot coverage is planned for most affected region northern-east part of Poland.
- In case of interference alerts will be sent to registered users.
- Project has started in Nov 2024 and will be finished in May 2026.
- Budget is 305 000 EUR

RTGMS

038 - REAL-TIME GNSS MONITORING SYSTEM FOR POLAND (RTGMS)

Status: On Going

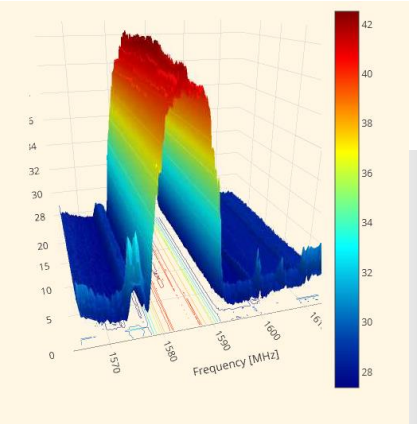
Activity Code: NAVISP-EL3-038

Start date: 21/10/2024

Duration: 18 Months

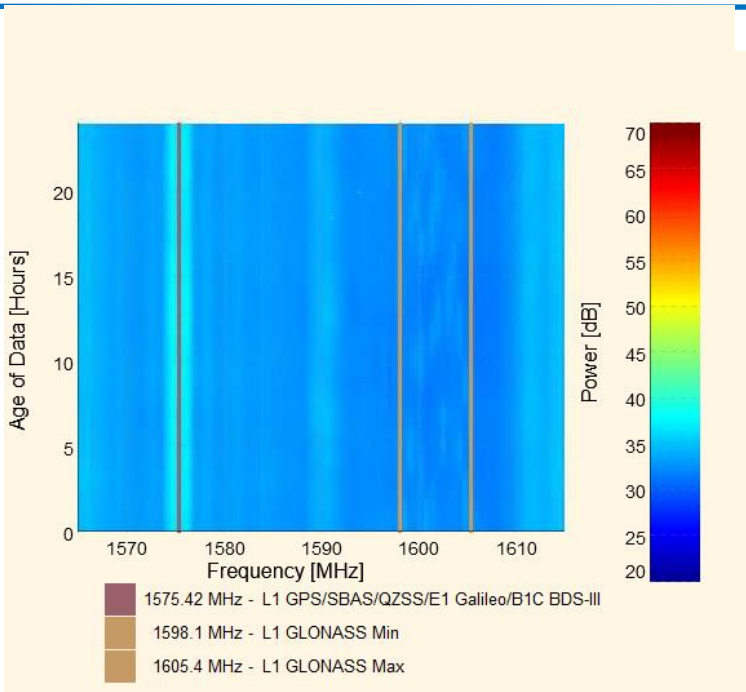
Reliable and uninterrupted access to satellite navigation data is nowadays a key element for v
same time, GNSS systems are not 100% reliable and the issue of interference (both unintentic
becoming more and more significant – especially in current geo-political situation. That is wh
interference is so important.

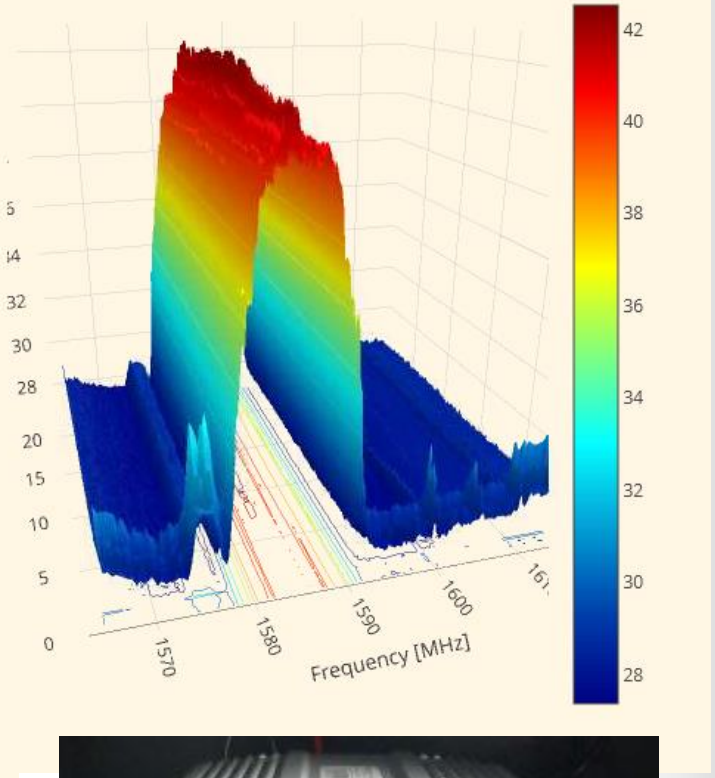
National Institute of Telecommunications

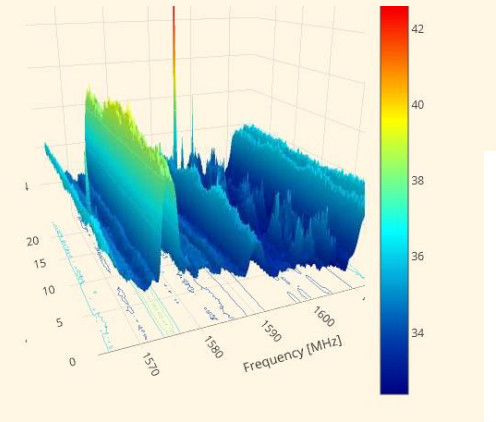


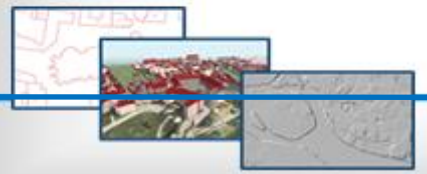
Project for GNSS monitoring

- Trimble Alloy receivers will be included into RTGMS
- Spectrum data and RTCM/NMEA will be analyzed
- First tests are positive
- Detection algorithm is under preparation by Institute of Telecommunication





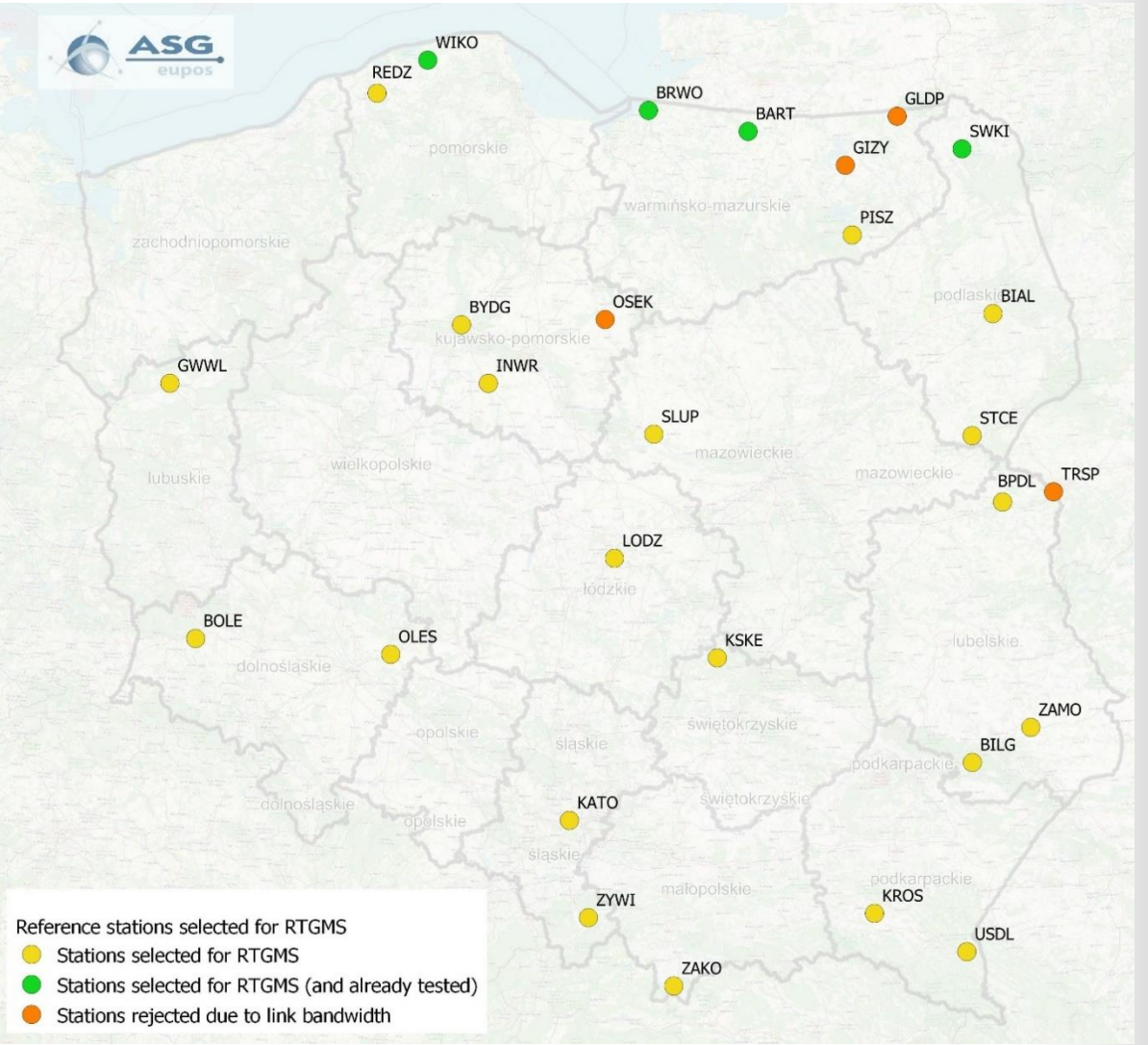




geoportal.gov.pl

RTGMS Project – main goals

- Use of all Trimble Alloy receivers working in the ASG-EUPOS system
- 28 stations will be switched on in full monitoring range
- Additional stations can be monitored in High and Medium levels (optional functionality)



Project for GNSS monitoring

- **In Poland are several projects focused on monitoring of GNSS signals:**
- RTGMS – Real Time GNSS Monitoring For Poland – GUGiK+NIT
- GNSS Signal Interference Monitoring System – Polish Space Agency
- GNSS Monitoring systems - Ministry of National Defense

  (based on offshore wind turbines)

Ministry of National Defence
Republic of Poland

Wojskowa Akademia Techniczna
cloudowski
citask
UNIWERSYTET MIKOŁAJA KOPERNIKA W TORUNIU
Wydział Fizyki, Astronomii i Informatyki Stosowanej

RTGMS

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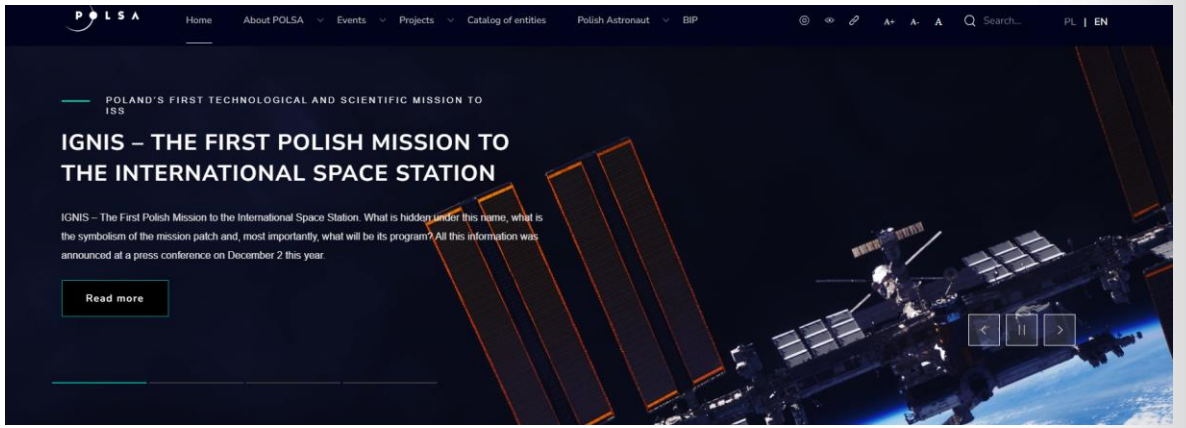
Status: On Going
Activity Code: NAVISP-EL3-038
Start date: 21/10/2024
Duration: 18 Months

Reliable and uninterrupted access to satellite navigation data is nowadays a key element for various branches of economy, security and safety. At the same time, GNSS systems are not 100% reliable and the issue of interference (both unintentional and intentional) affecting their operation is becoming more and more significant – especially in current geo-political situation. That is why a constant monitoring of GNSS signals and detection of interference is so important.



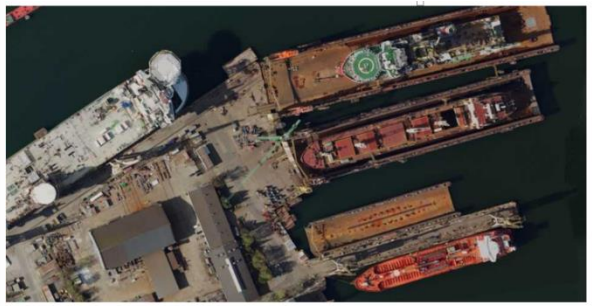
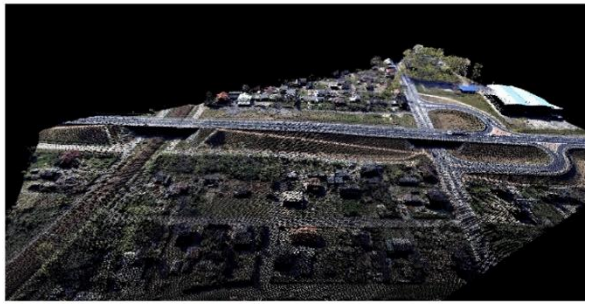
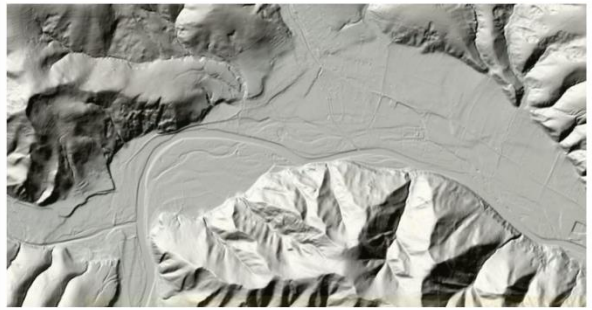
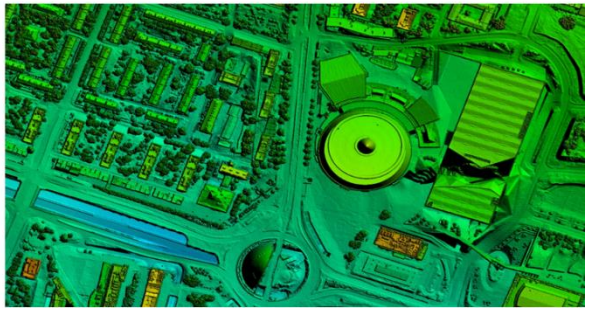
Attempts to solve problems with photogrammetric data acquisition

- We hold conversations with other public institutions, such as: Ministry of National Defense, Border Guard. Polish Space Agency

- Our contractors together with producers of sensors and flight management systems and also Polish Air Navigation Agency try to:

  - increase resistance of used systems to GPS/GNSS signal disruptions,
  - develop and integrate additional and technical components, such as: aerials, recorders,
  - improve software for registration and processing of fligh trajectories

Thank you for Your attention

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