



Current information from geodesy, cartography and cadastre in Slovakia

38. Fachtagung der Vermessungsverwaltungen von Friaul-Julisch Venetien, Kroatien, Österreich, Slowakei, Slowenien, Südtirol, Trentino, der Tschechischen republik und Ungarn

24 - 26 Mai 2023

Martina Behuliaková, Michal Leitman, Dušan Hanus

Content of the presentation

- General information about our organization
- The Chamber of Surveyors and Cartographers
- Project VKMi
- Cadastral services and data – statistics
- Geodesy and Cartography – Map client ZB GIS, Ortofotomosaic, Laserscan
- Metrological Centre of Geodesy – new calibration baseline

State administration structure

Central state administration

- Government
- Ministries (14)
- Central state administration bodies (10)



- **Geodesy, Cartography and Cadastre Authority (GCCA)**



- Statistical Office
- Nuclear Regulatory Authority
- The Industrial Property Office
- Telecommunications Office
- Etc.

Local state administration

- **72 district offices**
- Cadastral department
- Land and Forest department
- Environmental department
- Department of Construction and Housing Policy
- Department of Road Transports and Roads
- etc.

Organisational structure



Direct management in the field of geodesy, cartography and technical activities

Geodesy, Cartography and Cadastre Authority of the Slovak Republic

75 employees

Management of state administration in the field of real estate cadastre

Geodetic and Cartographic Institute Bratislava

140 employees

Research Institute of Geodesy and Cartography

20 employees

Ministry of Interior

72 offices

ca 1 800 employees

GCCA Main tasks

- Reference Systems, Geodetic Control, Metrology
- Real Estate Cadastre
- Topographical Database
- State Maps
- Standardization of Geonames
- Central Map Archive

Úrad geodézie, kartografie a katastra Slovenskej republiky
VÝPIS Z KATASTRA NEHNUTEJNOSTÍ

Okres: 108 Sereč Dátum vyhotovenia: 24.3.2022
Okraj: 507038 Právo pri Dopr. Čas vyhotovenia: 9.38.32
Katastrálne listy: 821208 Forma: Účel plánu k: 23.3.2022 16.00.00

Výpis je nepoužiteľný na právne účinky

VÝPIS Z LISTU VLASTNÍCTVA č. 2076

ČASŤ A: MAJETKOVÁ PODSTATA

Parcely regiónu „C“ evidované na katastrálnej mape

Parcelné číslo	Výmera v m ²	Druh pozemku	Spôsob využitia pozemku	Druh obrnenej kultúry	Spôsob odvodňovania	Umiestnenie pozemku	Druh prístupnej väzby	Príčet parcel: 3
65487	324	Zastavaná plocha a nádvoria	18			1	1	
Nálež: Bez zápisu								
654277	310	Záhrada	4			1	1	
Nálež: Bez zápisu								
654877	164	Zastavaná plocha a nádvoria	15			1	1	
Príloha: Príloha k stavebnej súčasti číslo 1017 evidovanej na pozemku parcelné číslo 654477								
Nálež: Bez zápisu								

Legenda

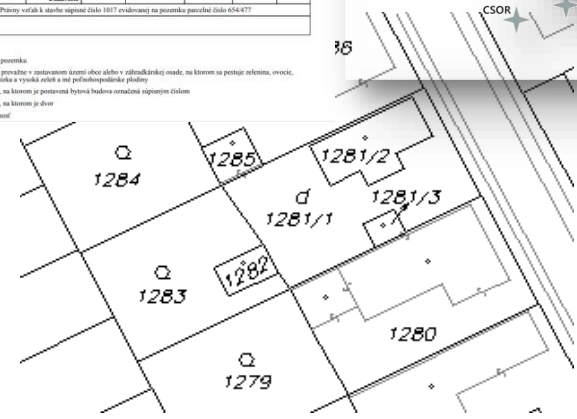
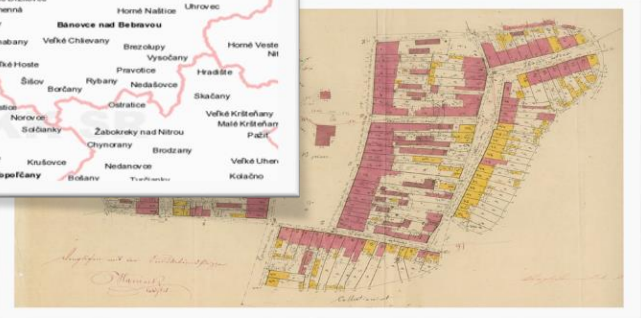
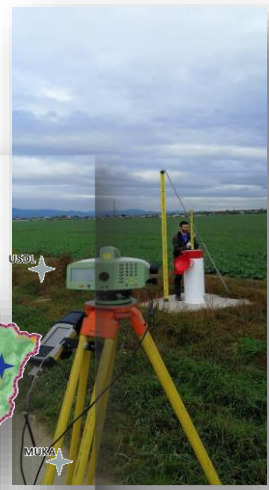
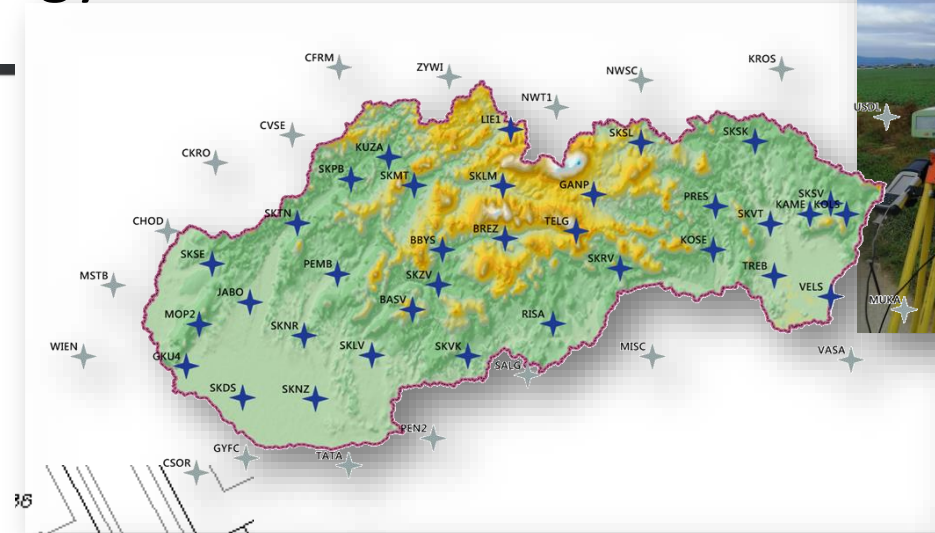
Spôsob využitia pozemku:

4 Pozemok prevzatý v zariadenom štádiu alebo v záhradníckej mape, na ktorom sa pestujú rebratky, ovocie, okrasná záhrada a vlnitá záhrada a nie preľadovateľná záhrada

15 Pozemok, na ktorom je postavená bytová budova osadená súpravným číslom

18 Pozemok, na ktorom je dvor

Spôsob odvodňovania:



Member of

- **FIG** (International Federation of Surveyors)
- **CLGE** (Council of European Geodetic Surveyors)



- **The Chamber is a legal entity**
- The seat of the Chamber is in Bratislava
- Established in **1996**
- The Chamber is a **self-governing professional organization** that brings together authorized surveyors and cartographers who authorize selected surveying and cartographic activities
- 676 members (of the total number of 2123 private surveyors in Slovakia)
- New modern **Act on Chamber of Surveyors and Cartographers**

Nr. 487/2021 Coll.

- is fully in line with the legislation of the European Union
- meets the needs of authorised surveyors and cartographers
- replaced the old act from 1995

Tasks

- maintain a list of authorised surveyors and cartographers
- represents, defends and promotes the professional, social and economic interests of its members
- cooperates with the central body of state administration of geodesy, cartography and cadastre in the development of generally binding legal regulations in this field, etc.

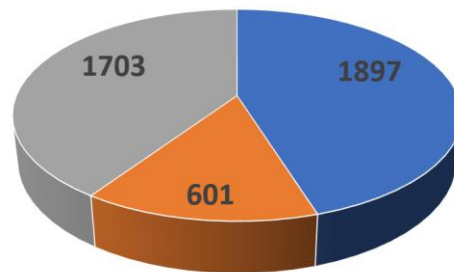
Project VKMi – vector cadastral map „implemented“

Creation of implemented cadastral maps – start in 2013

Cadastral maps where local numerical results - individual measurements are incorporated directly into the maps, which were created by other than numerical methods and the surroundings are connected to these data

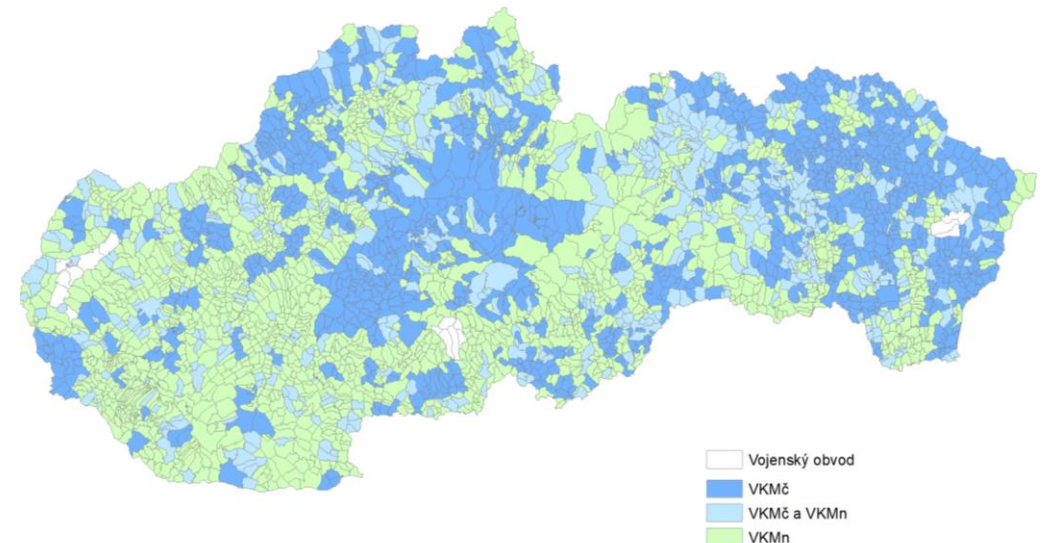
- 3559 cadastral districts (17 military areas) / 4201 cadastral maps – different quality and the way there were originated (two or three maps of different type in one area)
- 601 vector cadastral maps implemented 13,3%

Kvantifikácia katastrálnych máp
31.3.2023



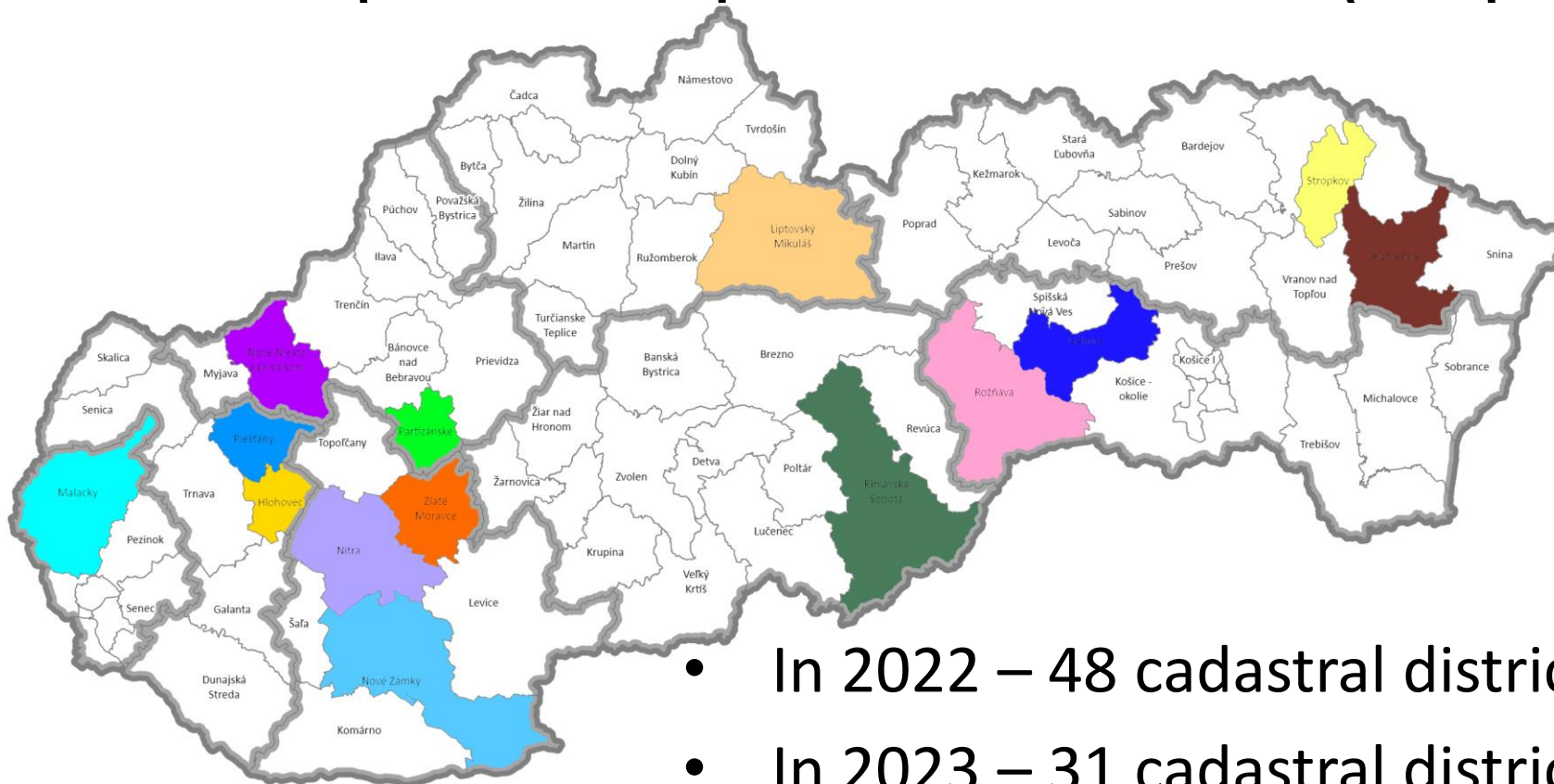
Status at 31st
of March 2023

■ VKM číselné ■ VKMi (implementovaná) ■ VKMt (transformovaná)



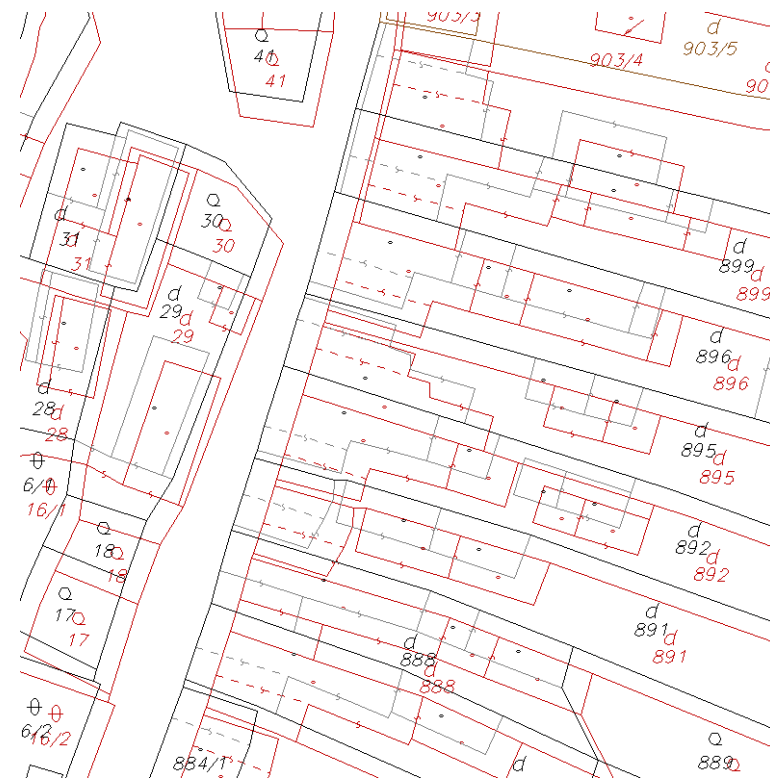
VKMi – vector cadastral map „implemented“

Creation of implemented maps – overview of districts (time period 2018 - 2023)



- In 2022 – 48 cadastral districts -budget 900 000,-€
- In 2023 – 31 cadastral districts – budget 500 000,-€
- Cooperation of local cadastral offices
and the contractors - private surveyors

VKMi – vector cadastral map „implemented“



New state VKMi ———
Previous state VKMt ———

The positional accuracy of the cadastral map

- before the optimization $\pm 5\text{m}$
- after optimization up to $\pm 2\text{m}$

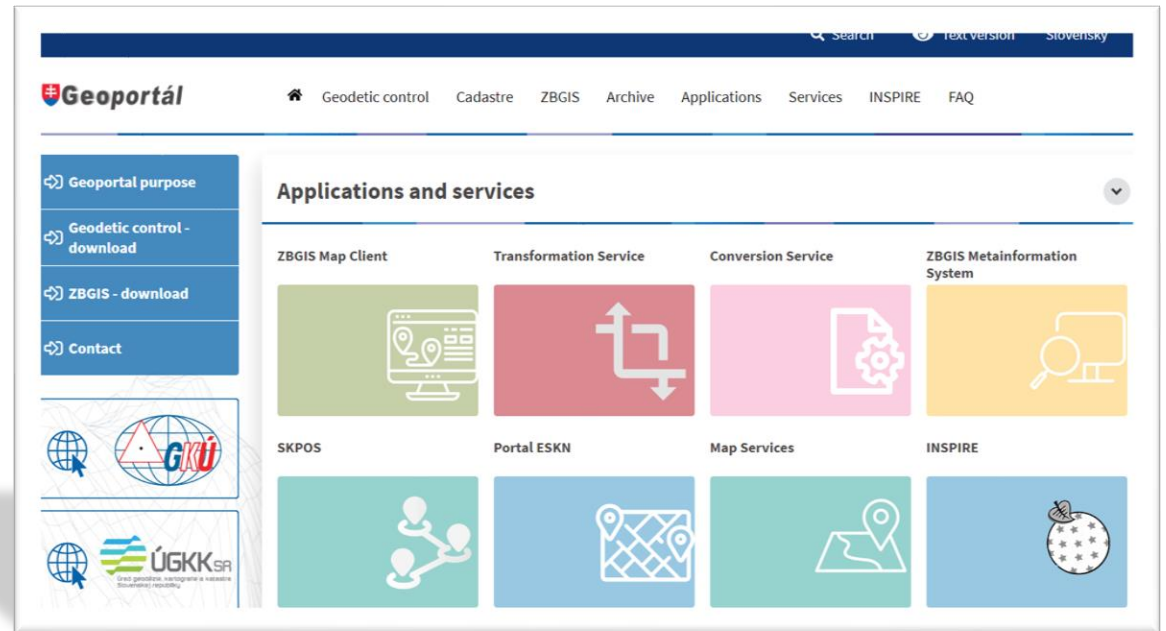
Advantages

- better administration of the cadastral system and easier updating.

Web Applications and Map Services

All spatial data is available through electronic services. The data is processed using digital cartography to ensure image clarity and legibility. The **Geoportal** provides access to map services and **freely accessible** web applications:

- **ZBGIS**[®] Portal (Map Client)
- Transformation service
- Conversion service
- ZBGIS Metainformation system
- Metadata editor
- **SKPOS**[®]
- Portal ESKN (cadastral services)



Web Map Services are provided according to the OGC standards:

- WMS
- WFS
- WMTS
- WCS

Cadastral services – electronic way

Provision of electronic cadastral services -

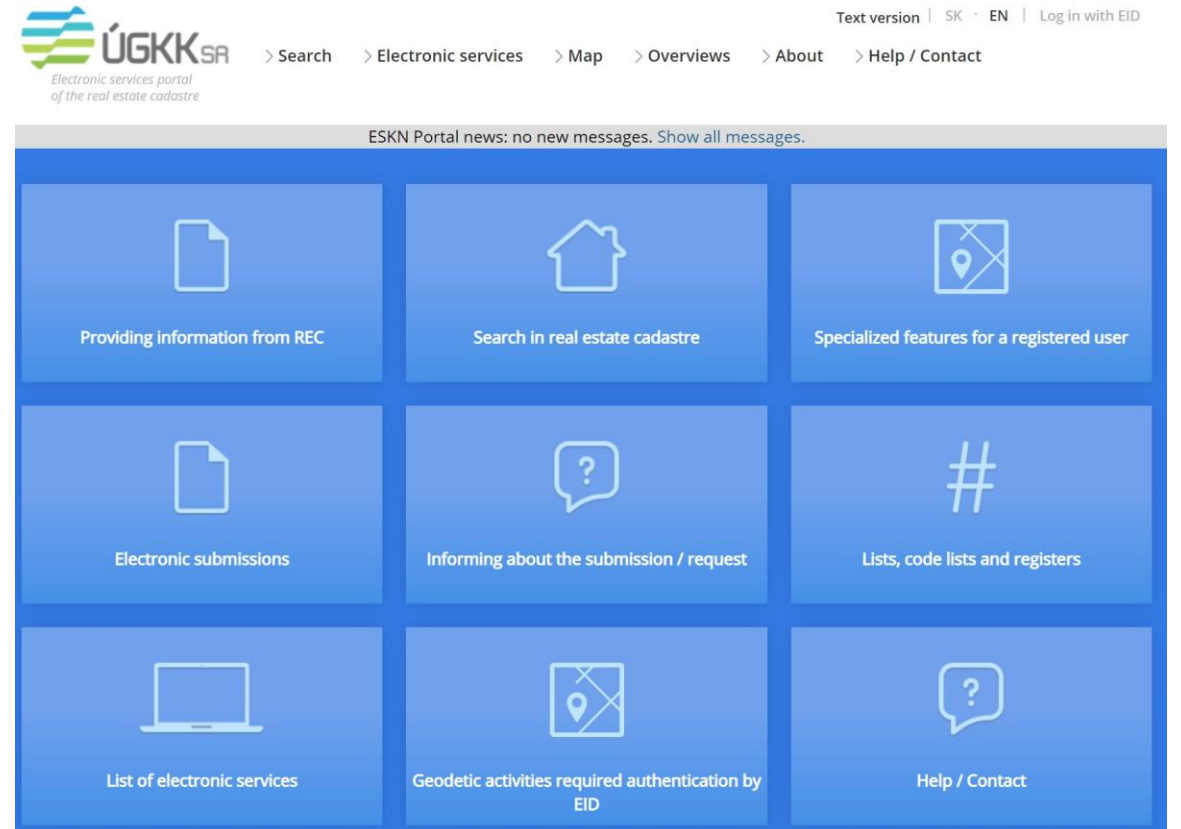
Portal ESKN

<https://kataster.skgeodesy.sk/eskn-portal/>

- In operation from 2015
- free of charge service, daily updated
- Selected services with log in via eID

Users

- public, banks, notaries, executors, solicitors,
state administration
- professionals – surveyors
- official verifiers of geometric plans
in cadastral offices



Cadastral services – electronic way for cadastral professionals

Portal ESKN - in 2022

- 72 000 electronic submissions and applications
- surveyors carried out **270 000 controls of documents for geometric plans (xml + vgi)**
- **74 000 geometric plans verified** official verifiers at cadastral offices
- nr. of verifiers in cadastral offices - 202

- GCCA – manages – **the Central Register of Surveyors**
 - entitles surveyors to enter to the state cadastral documentation + electronic services
- Since 2021 - new electronic service of sending notification before expiry of the validity of the surveyor's licence (email and sms)
- Geometric plan verified by qualified electronic signature KEP still not in operation

The screenshot shows the ÚGKK SR portal interface. At the top, there is a navigation menu with options: Search, Services, Map, About, Contact, and Help. Below the navigation, there is a green banner with the text "Services for geodetic activities". Underneath, there are three links: "Electronic documents for GP", "Verification of electronic documents", and "Quality of acreage of parcel in SPI". The main content area features two buttons: "Verify XML" and "Verify XML+VGI". Below these buttons is a table with the following columns: "Run time", "State", "Cadastral district", "ZPMZ", and "Verification type". The table contains five rows of data, each with a "Run time" and "State" column, and two columns for "Acreage report" and "Protocol" with download icons.

Run time	State	Cadastral district	ZPMZ	Verification type	Acreage report	Protocol
9/3/2020 11:46:18 AM	Bez závažných chýb	k.ú. Poprad (848174)	5157	XML+VGI	↓ Acreage report	↓ Protocol
9/3/2020 10:08:17 AM	So závažnými chybami	k.ú. Poprad (848174)	5150	XML+VGI	↓ Acreage report	↓ Protocol
9/3/2020 10:02:09 AM	Bez závažných chýb	k.ú. Poprad (848174)	5164	XML+VGI	↓ Acreage report	↓ Protocol
9/3/2020 10:00:31 AM	Bez závažných chýb	k.ú. Poprad (848174)	5164	XML+VGI	↓ Acreage report	↓ Protocol
9/3/2020 9:01:57 AM	So závažnými chybami	k.ú. Poprad (848174)	5150	XML+VGI	↓ Acreage report	↓ Protocol



Cadastral data and services – other form of provision

Provision of cadastral data - electronic way - mass volume data

- Specialised services - on the basis of the contract according to the law
 - **Only selected consumers** - according to the law, the authorisation for the processing of cadastral data for the performance of tasks under the law !
 - **36 contracts** – subscribers – banks, The Chamber of Notaries, Slovak Chamber of Executors Social Insurance Office, Police, Slovak Telekom, Ministries, municipalities, etc.
- Possibilities of the provision - **Provision of database / Non-visual services**
 - **Data update and data validity** - data provided by non-visual services is limited to the previous working day
 - **Technical details of data provision** - data is provided over an encrypted dedicated channel between the Provider's server and the Consumer's server (HTTPS, SSL certificates both ways, IP filter on the Provider's side, etc.)
 - The protocol used for service calls is REST (Representational State Transfer), the response is provided in JSON (JavaScript Object Notation) format
 - **In 2022 - 100 million requests for data by 250 supported selected calls** - search by cadastral data – ownership document Nr., surname name, parcel number, etc.

Cadastral data and services – paper form



Provision of cadastral data and services – paper form

By personal visit of

- district Cadastral offices
- Client centres of selected district offices
- Slovak post offices provides IOMO - closer to the citizens (600 places)
 - IOMO - Integrated Citizen's Service Point
 - IOMO offers access to the electronic services of the state in one assisted place
 - By personal visit IOMO office handle the following in one place
 - Criminal record extract
 - **the Certificate of Ownership**
 - Extract from the Commercial Register
 - Guaranteed conversion from electronic form to paper form/from paper form to electronic form



Cadastral – cadastral proceedings

- Slovak cadastre - **cadastral maps, ownership documents, title deeds**
- **Annual report for the Government** – numbers of activities for updating of the cadastre
- Specially monitored tasks in the field of cadastre from Act on Real Estate Cadastre - number of submissions
- **Reecording of public deeds and other deeds by entry into the cadastre**
 - in 2021 - 508 522 / in 2022 - 469 835 - **decrease of 7,6%**
- **Registration of entries of deeds and contracts**
 - in 2021 - 391 836 / in 2022 - 385 492 – **decrease of 1,6%** 
- Cadastral proceedings can be carried out **electronically**
 - via special portals – cadastral Portal ESKN or government Portal slovensko.sk
 - in 2021 - 57 347 - 14,6% from all registrations
 - in 2022 - 71 865 - 18,6% from all registrations - increase in percentage of submissions of 4% 

ZBGIS® Map Client

- in operation since 2017
- free of charge service

Layers

- Topographical map
- Cadastre (map and ownership)
- Terrain
- Geodetic Controls
- Archive
- Geographical Names

Basemaps

- Topographical map
- Orthophoto
- Satellite images
- Digital Terrain model DTM
- Freemap



ZBGIS® Map Client

- Since 2019 - Application on mobile phones
- Identification of cadastral parcel via GNSS
- In 2022 - **50,000 users/day**



Parcela registra C

310 m²

654/277
k.ú. Farná (821438), obec Ivanka pri Dunajove

Druh pozemku
Záhrada

Príslušnosť k PF alebo LF
Pozemok nezariadený do pôdneho fondu

Úrad geodézie, kartografie a katastra Slovenskej republiky
VÝPIS Z KATASTRA NEHODNOTENOSTÍ

Územie: 108 Selo; Dátum vyhotovenia: 24.5.2022
Obec: 307038 Ivanka pri Dunaji; Čís vyhotovenia: 93632
Katastrálne územie: 821438 Farná; Účaj plánár: 23.5.2022 18:00:00

Výpis je nepozitívny na právne účinky

VÝPIS Z LISTU VLASTNÍCTVA č. 2076

ČASŤ A: MAJETKOVÁ PODSTATA

Prvky registra „C“ evidované na katastrálnej mape

Parcelné číslo	Výmera v m ²	Druh pozemku	Spôsob využitia pozemku	Druh obrátený nehmotný	Spôsob nehmotný	Umiestnenie pozemku	Druh právneho vzťahu
65497	324	Zastavaná plocha a nádvoria	18		1	1	
654277	310	Záhrada	4		1	1	
654477	164	Zastavaná plocha a nádvoria	15		1	1	

Legenda
Spôsob využitia pozemku
4 Pozemok prevzatý v zariadenom teréne alebo v záhradníckej oáde, na ktorom sa nachádza reštaura, ovocná, skleníková alebo výtvarná oáza a iné prírodnoparkové prvky
15 Pozemok, na ktorom je postavená bytová budova označená územným plánom
18 Pozemok, na ktorom je dŕav
Spôsob nehmotný



Basemaps

- Topographical map
- Orthophoto
- Satellite images
- Digital Terrain model DTM
- Freemap

<https://zbgis.skgeodesy.sk/mkzbgis>

Ortophotomosaic of the Slovakia

2020 - 1.st production cycle of the orthophotomosaic was completed

2020 - 2023 – **2.nd production cycle** of the orthophotomosaic was completed

- Orthophotomosaic is **available for free download**
(cloud, Map Client ZBGIS) or via WMS a WMTS services

Parameters (2nd cycle)

GSD (Ground Sampling Distance 20): 20 cm/pixel

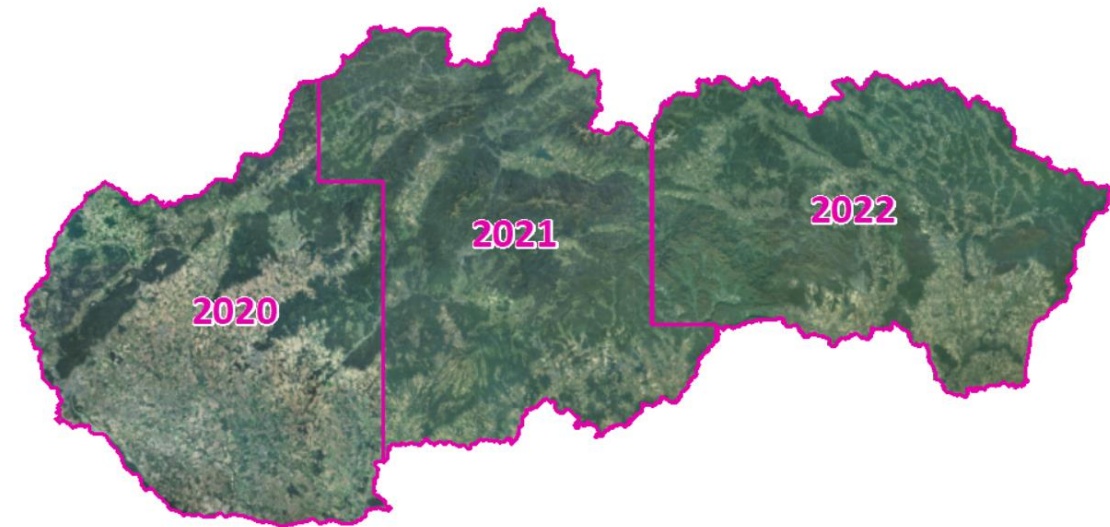
Format: TIFF + TFW

Number of channels: 4 (RGB-NIR, 8-bit)

Coordinate reference system: S-JTSK(JTSK) (EPSG code:5514)

Position accuracy of the 2nd cycle

Root mean square error: $RMSE_{xy} = 0,21$ m



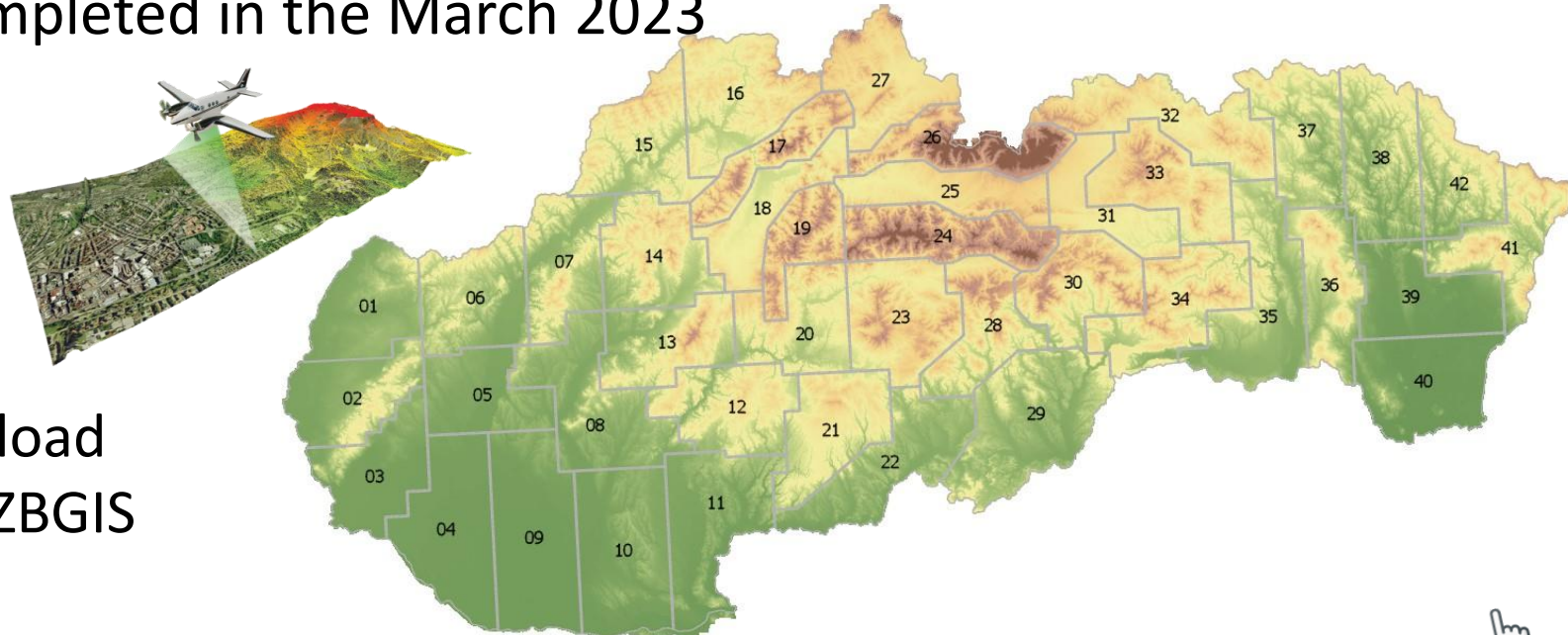
<https://www.geoportal.sk/en/zbgis/orthophotomosaic/>



Airborne Laser Scanning and DTM

- A project for creating a new Digital Terrain Model (DTM) from the data (point clouds) of airborne laser scanning (ALS) was launched in 2017
- Territory of the Slovakia was divided into 42 localities, which were scanned separately
- Contractors provide the final ALS products - classified point clouds, DTM 5.0 and Digital Surface Model (DMP 1.0)
- Project was successfully completed in the March 2023

- Vertical accuracy of DTM
0,02 – 0,10 m
(according to locality)
- DTM, DSM and point clouds
are available for free download
via application Map Client ZBGIS
or offline by order

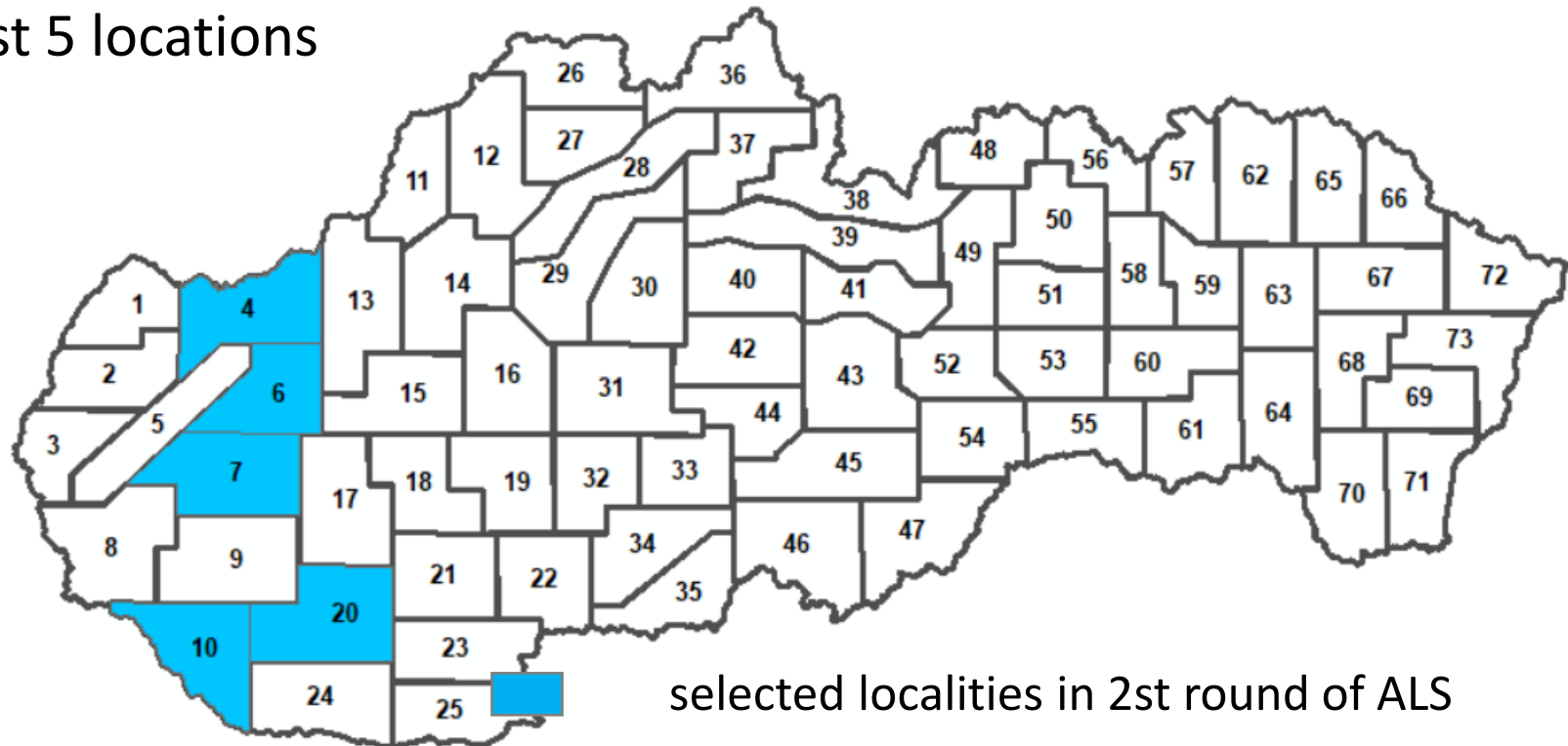


Airborne Laser Scanning and DTM

2nd cycle of ALS

- 2nd cycle of ALS and creation of a new DTM of Slovakia began in 2022
- Territory of the Slovakia is divided into 73 localities
- ALS will take place in selected locations -> about 1/10 of the territory of Slovakia per year
- ALS was finished in the first 5 locations

In 2023 GCCA plans to contract additional sites under the 2nd cycle of the ALS project - products DTR 6.0 a DMP 2.0





Calibration Centre for Geodesy (CCG) - operated by VÚGK

(Research institute for geodesy and cartography in Bratislava)

- **New calibration baseline** for electronic distance measurement instruments
 - location - Viničné, Slovakia
 - 2020 built
 - 7 pillars with deep stabilization
 - 2023 parameters defined

Tasks in 2022 - Reference measurements at the baseline - continuous testing the capabilities

of the Leica At403 measurement system

- **Height monitoring**

monthly (7/2022 - present)
precise levelling

- **Position monitoring**

72 hours GNSS campaign (9/2022)
laser tracker (10/2022)

- **Length monitoring**

Mekometer (10/2022)





Any questions?

Thank you for your attention

martina.behuliakova@skgeodesy.sk

michal.leitman@skgeodesy.sk

dusan.hanus@skgeodesy.sk