Ransko massif (Czech Republic)

– update, accomplished work on the reference site

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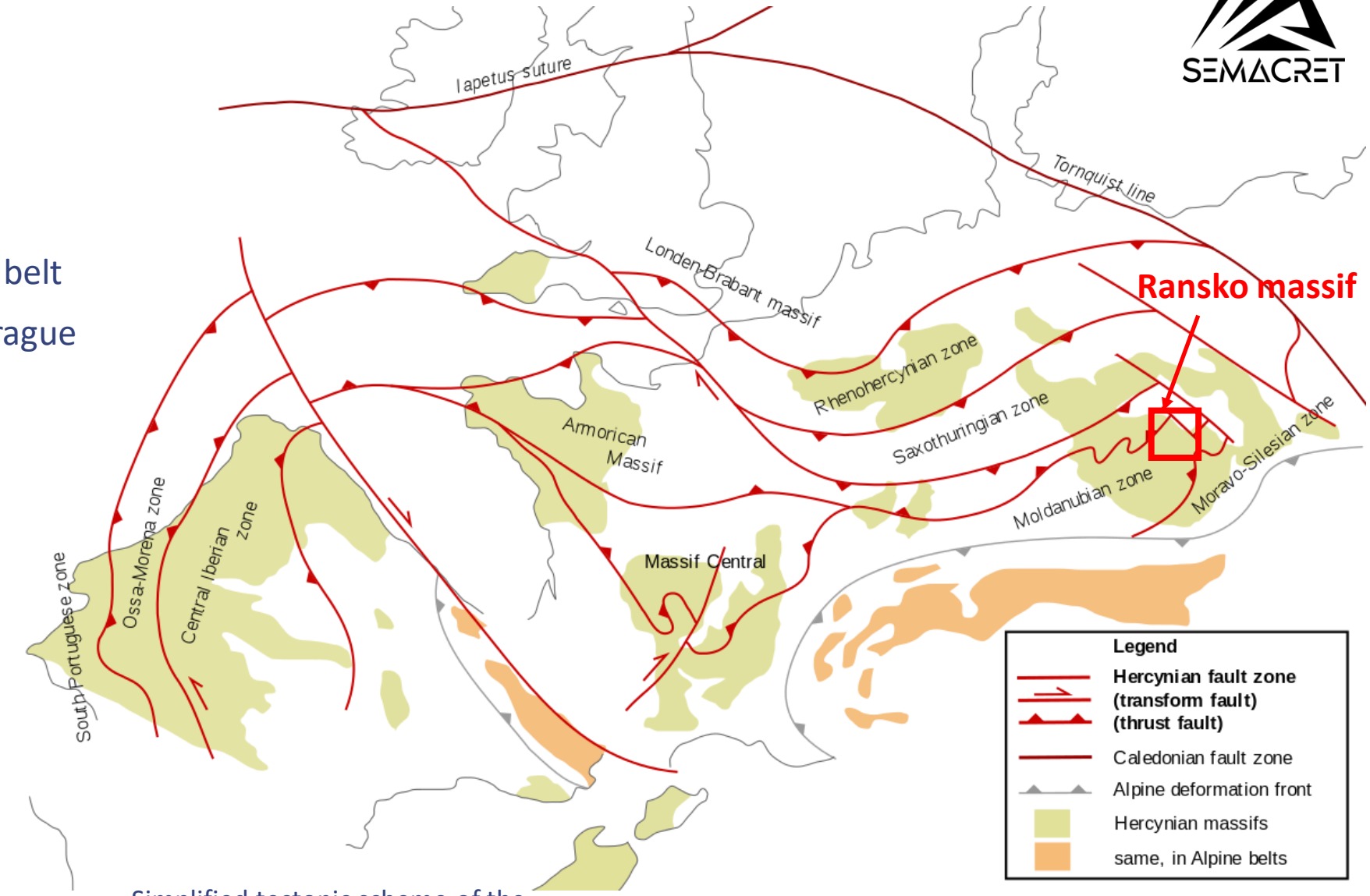
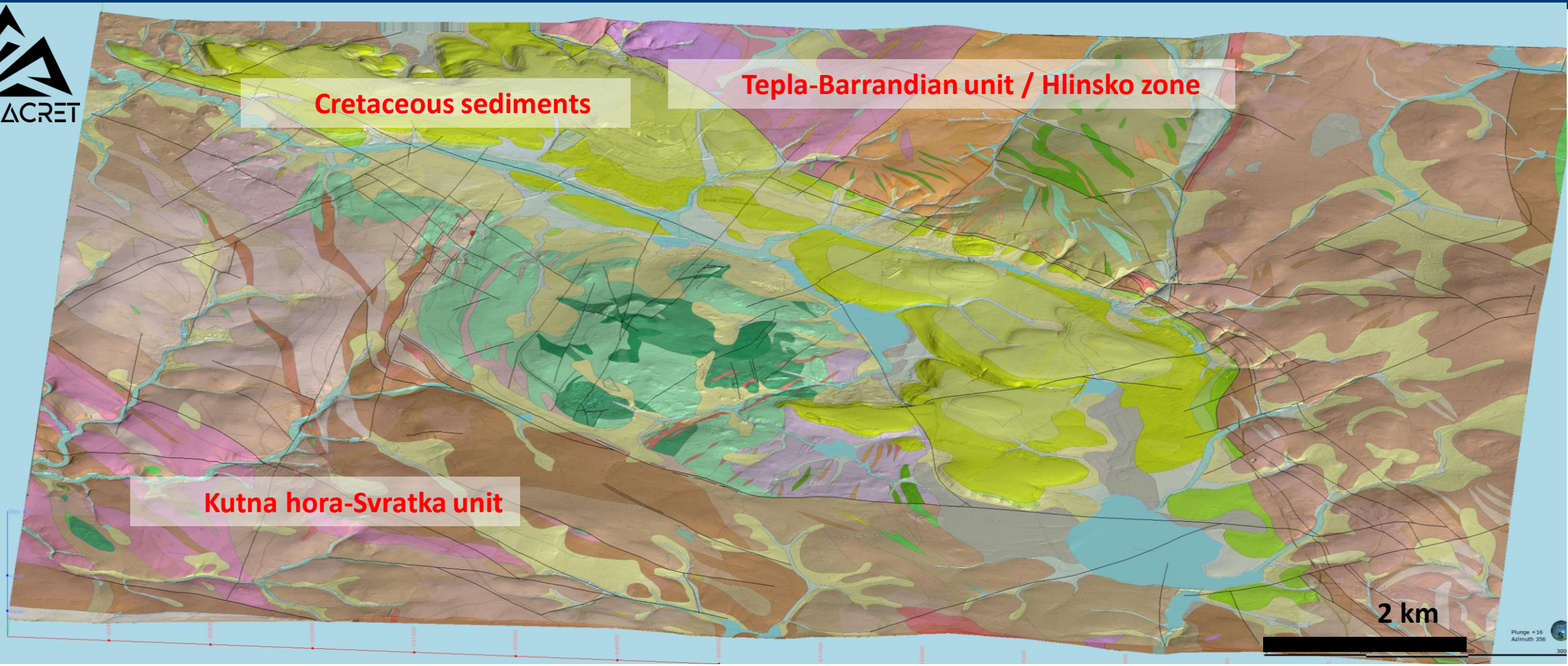
Introduction

- Variscan Bohemian Massif
- Eastern part of Variscan orogenic belt
- About 100 km to the east from Prague
  - and 180 to the SSW from Wroclaw



Simplified tectonic scheme of the Variscan orogen (after Franke 2006)



- **Ransko massif** (igneous complex composed of gabbros, peridotites, troctolites)
- **Moldanubian Zone, Kutna-hora-Svratka unit** – highly metamorphosed rocks (gneises, migmatites,…) / **Tepla-Barrandian unit** – Proterozoic, lower Paleozoic rocks of Hlinsko zone + intrusive rocks of Zelezne hory plutonic complex
- Fault system control – Zelezne hory fault (NW-SE, The Elbe lineament), Pribyslav mylonite zone (NNE-SSW)
- Cretaceous transgression (max. up to 100 m of sediments)

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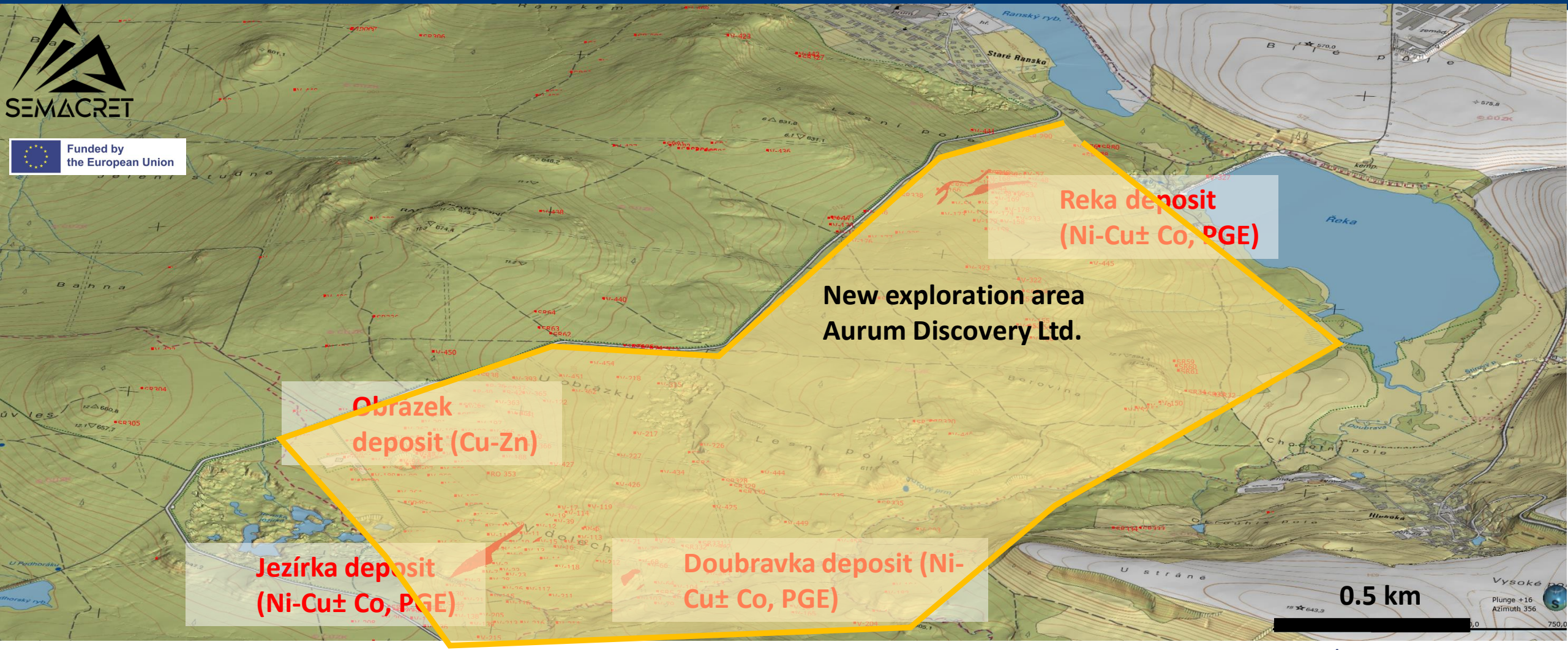

- **Exploration for Ni-Cu±Co** ores started in 1950s at Jezírka deposit. Drilling works (mostly 200-300 m, vertical/subvertical, several deeper holes up to 1000 m), exploration shafts, galleries and underground drilling on three main deposits – **Jezírka, Doubravka, Řeka -** considered as uneconomic in that time, ore bodies remained unextracted
- Unexpected discovery of **Obrázek Zn-Cu deposit** (VMS hydrothermally overprinted?, hosted by quartzite xenolithe bodies)
- Underground mining activates, extraction of Zn-Cu ore take place only at the Obrázek Zn-Cu deposit (till late 1980s)

Sampling

- Two sources of samples for new analyses:
  - ČGS archive of drillhole samples (from 1960s exploration) – sampling done during summer 2022 (30 samples, all major rock types + mineralized samples).
  - Field sampling was done during autumn 2022 and spring 2023 (addition of rock types sampling – px-gabbros, anorthosites, granitic porphyries and mainly semi-massive and disseminated samples from Jezírka and Řeka deposits (heap from exploration shaft, surface outcrops)

Litho-geochemical modelling of the Ransko Ni-Cu-(PGE) sulfide deposits

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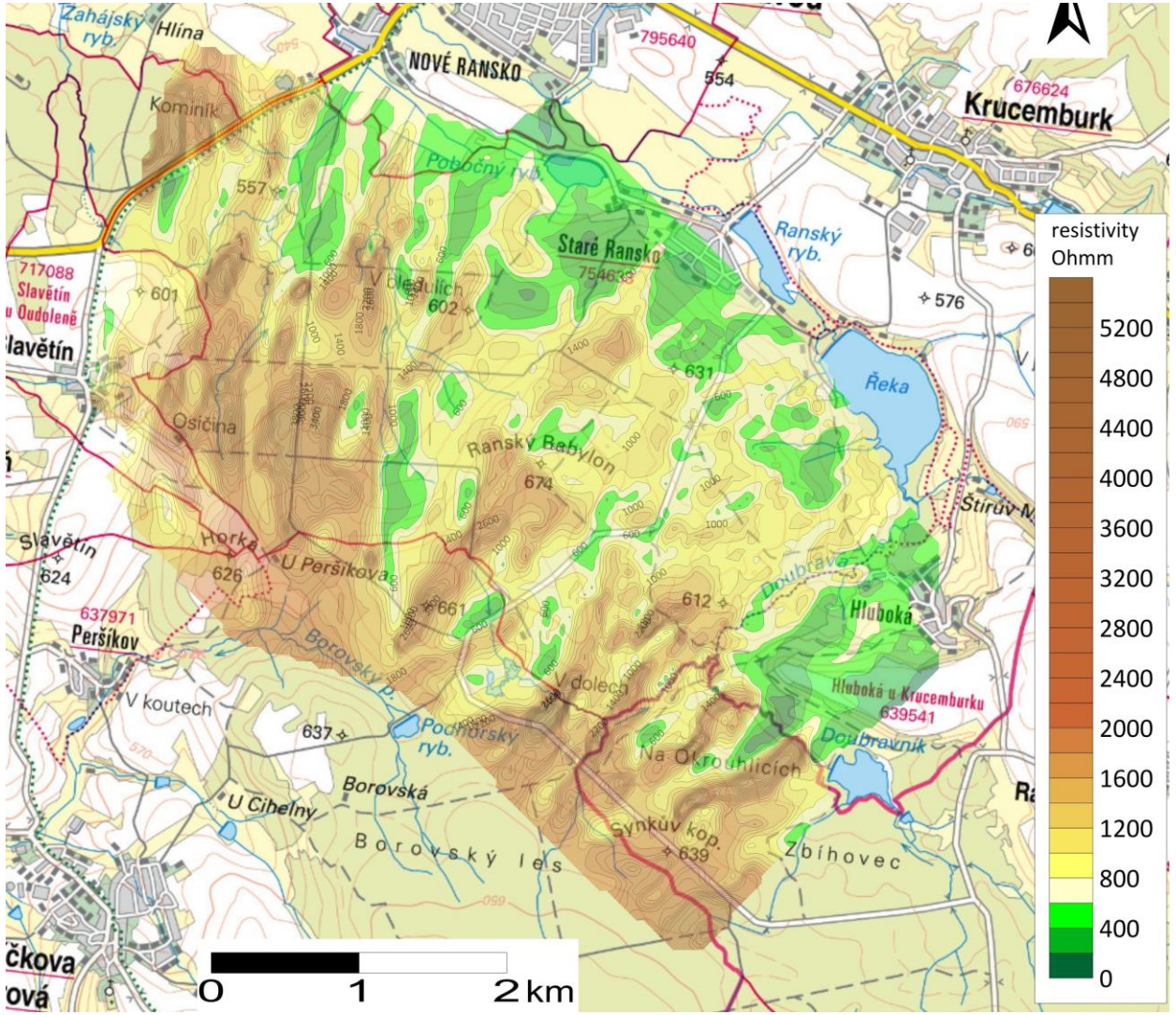
- Major oxides + trace elements chemistry for all samples
- Additional sample collection at the site focused on rocks possible suitable for Zrc U-Pb geochronology (anorthosite, porphyry) – based on a new geochemical analyses that indicate increased concentration of Zr in anorthosite sample
- **Sr-Nd-Pb** and δ^{18}**O** isotopic analyses of 15 selected samples representative for Ransko massif (barren as well as mineralized samples)
- Determination of **platinum-group** elements and **Re-Os** isotopic compositions of 15 samples (high-precision isotopic dilution technique) with special emphasize on mineralized samples (Ni-Cu, Cu-Ni and marginally Zn-Cu mineralization)
- FE–SEM scanning microscopy using Tescan Mira3 GMU + trace elements in sulfides by the LA-ICP-MS

- **Planned work 2nd half of 2023**
- Mineral separation and Sm-Nd and Lu-Hf geochronology (mineral-whole-rock isochrons) of 3 mafic members (gabbro, troctolite) and U-Pb Zrc geochronology if possible → completion of primary dataset
- EMP analyses of rock-forming minerals → mineral modal composition of the major rock types
- Evaluation of all geochronological and geochemical data → deciphering the petrogenesis of parental magmas, understand the role and extent of fractional crystallization and crustal assimilation. Confirmation of the age of the Ransko massif.
- Further analyses of sulfides (sulphur isotopic analyses, automated mineralogy system analysis, mass-balance)

Digitalization, re-processing of archive geophysical data

- Re-processing and digitalisation of geophysical data – surface geophysical survey (1960s exploration campagin), more regional airborne geophysical survey (1980s, 1990s) – can be used for tasks of WP2 and WP3
  - Surface magnetometry and resistivity (induced polarization measurement)
  - Regional Airborne survey:
    - Aeromagnetic anomaly ΔT
    - Bouguer anomaly
    - Horizontal gradient of gravity
    - Density boundaries in Bouguer anomaly map
    - Residual anomaly and regional field
  - Uploaded to MS Teams



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Digitalization, re-processing of archive drillhole data, maps, 3D model

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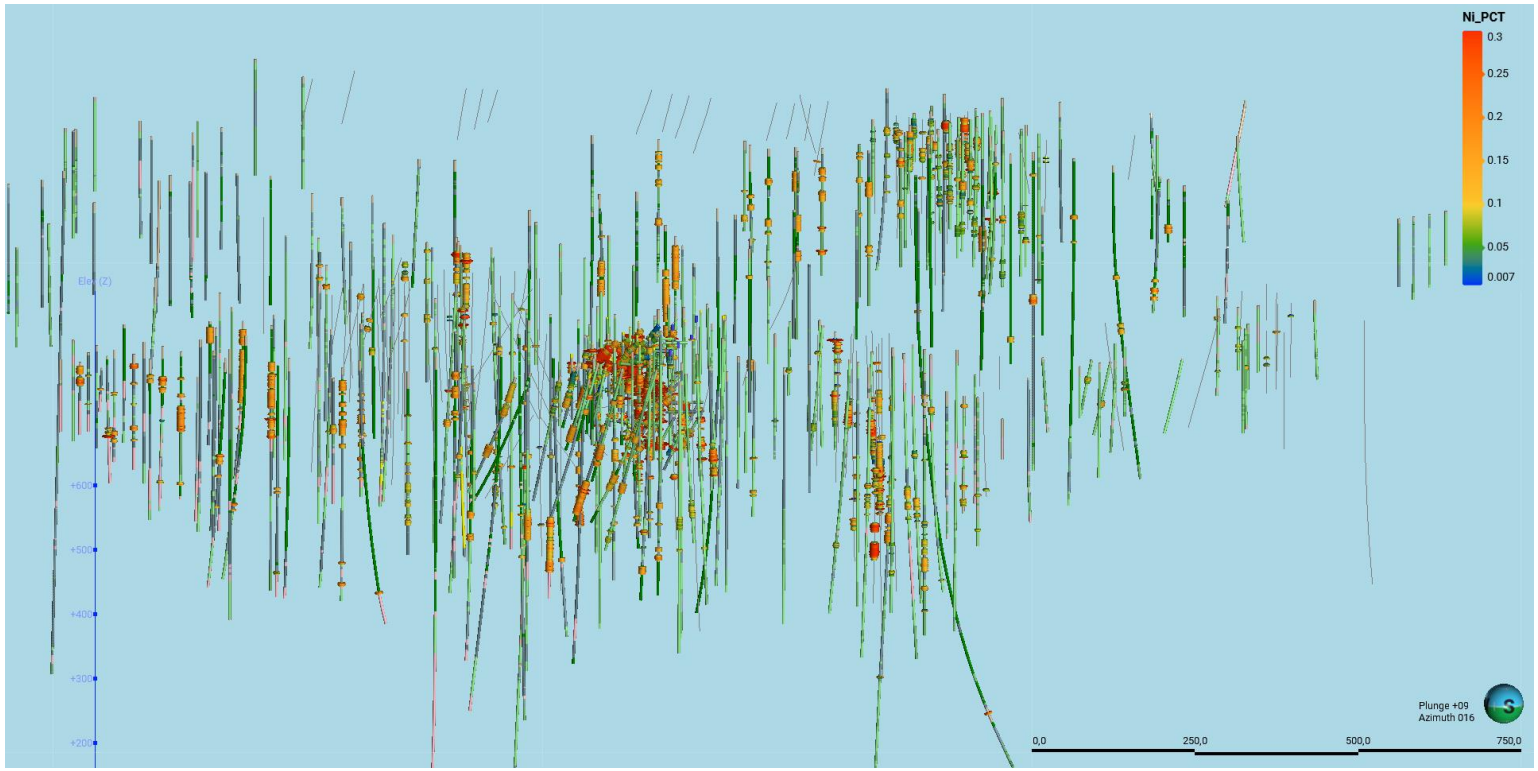
- Cooperation with the Aurum Discovery Ltd.
- Sharing digitised data
- More than 1000 drillholes are digitalized
- More than 8000 interval assays (Ni, Cu, Co, S), interval mostly 1 or 2 meters, old analyses

- We started work on geological model and concept for WP3 – 3D MPM – more in the presentation of John Carranza



SGA 2023

Mineral Resources in a Changing World

17th SGA Biennial Meeting

🗓 28th August - 1st September 2023

📍 The Hönggerberg campus, downtown Zürich

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Thank you for the attention

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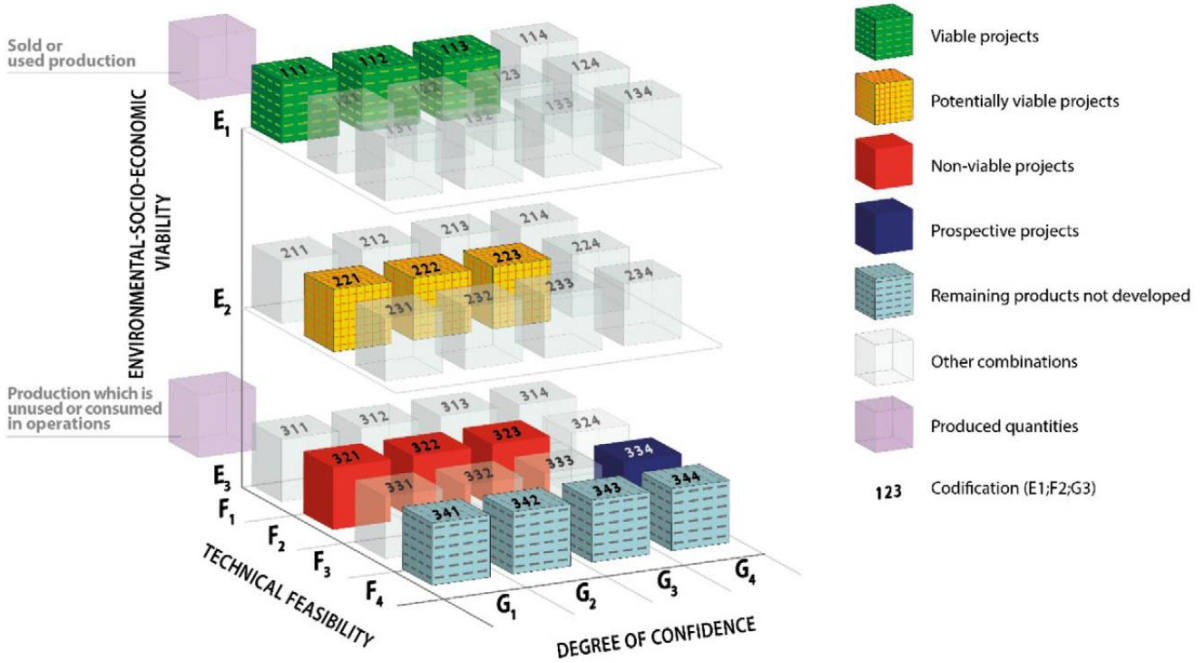
Mineral resource survey of magmatic ore hosted metals, UNFC code

Vojtěch Wertich, Petr Rambousek,
Blažena Wertichová



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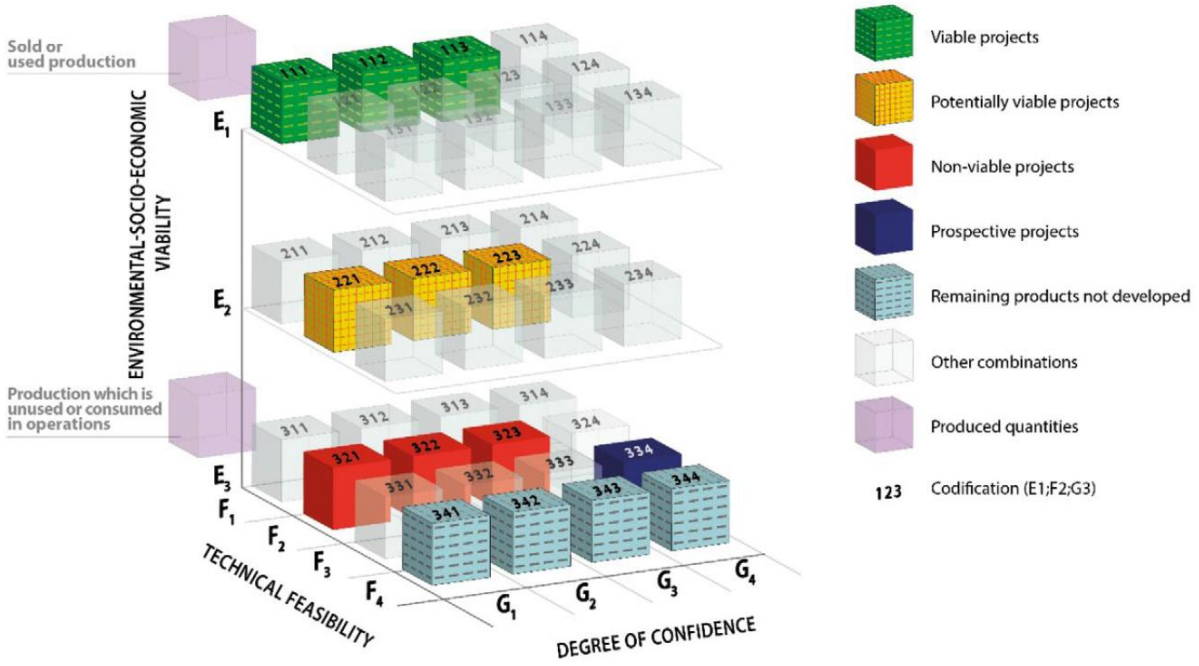
Content

- Overview of WP5 - Mineral resource mapping (EU and globally)
  - **T5.1 - mineral resource mapping** (database creation)
  - **T5.2 - convert mineral resource to UNFC** (approach to conversion of data on mineral resources and reserves into UNFC)

  - UNFC – United Nations Framework Classification for Resources
    - Classification adopted by EC to harmonize resource reporting in the EU countries
    - Current main purpose is for policy implications, not for banks, stock exchanges, financing the exploration and mining projects
    - 3D, 3 axes (Degree of confidence, Technical Feasibility, Environmental-socio-economic viability



Overview of WP5

- This WP will conduct resource mapping of orthomagmatic rocks related to critical mineral resource exploration and production potential across the EU and global, including Ni, Cu, PGE, V, Ti, Co, Cr. The aim is to classify the different mineral resource categories of orthomagmatic ore deposits, following the UNFC code and UNRMS system.
- T5.1 - Survey of primary and secondary resource, and refinement capacity
  - We will conduct a survey of **primary and secondary mineral potential of exploration and production-related to orthomagmatic mineral systems in the EU and globally** from published journal articles, company reports, geological survey reports, mineral commodity summaries published by the governments of individual countries, Raw Material Information System (RIMS) or other databases created within previous EU funded projects (e.g. MINTELL4EU). Beside the database of Ni, Cu, PGE, V, Ti, Co, Cr resources we will use also GIS based tools for the results visualization. *Also, a portal to update new discoveries of orthomagmatic ore deposits will be implemented on the project website.*
- T5.2 - Resource convert to UNFC
  - Mineral resources estimations, exploration potential or production capacity are reported in different ways across the EU and other countries. Many countries are not using reporting standards based on the worldwide recognized standards like JORC code, but the national reporting standards. As an example, countries of the Eastern and partially also Central Europe, where is/was used reporting methods based on post-soviet reporting standards. Main goal and challenge of the task will **be unifying the mineral resources estimation, exploration (or production) potential done within the T5.1, supplemented by newly gathered data from individual reference sites, to reporting standards following UNFC classification system** and UNRMS system.

T5.1 - Resource mapping - Ni, Cu, PGE, V, Ti, Co, Cr

- T5.1 public report (Deliverable M27) *Survey of primary and secondary resource, and refinement capacity*
  - **Main objective** – creation of a database and data collection on resources and reserves
  - Databases from EU (RMIS – Raw Material Information System), BGS, USGS mineral commodity yearbooks, national databases, company reports, economic studies etc. Aggregated data vs. deposit type/confidentiality in the active projects
  - Data needed for T5.2 will be considered and collected (conversion of resources to UNFC), resources, project status
- **Main outputs** – besides the database, also visualizations and maps (GIS) will be created (production maps, distribution of reserves/resources), EU import, sourcing for individual commodities, etc.
- Partners involvement and capacities will be discussed individually based on the indication of PMs in the WP5, e.g. help with data collection, distribution of efforts based on geography, experience, language etc.)

- Online meetings, workshop planned for the Autumn meeting

T5.2 - Resource convert to UNFC

- T5.2 report (Deliverable M33)
- Main objective – conversion of mineral resources and reserves into UNFC
- Database collected within T5.1 – closely interconnected Generally – partly in statistical form assessment of global resources of Ni, Cu, PGE, V, Ti, Co, Cr (in style of Horn et al.? – BUT probably not exhausted list – depending on the scope and approach to data collection in T5.1
- Development of approach to „conversion“/ harmonisation? of dataset on resources and reserves with UNFC
- Case studies on SEMACRET reference sites (for UNFC conversion)
- Main outputs – 1) Methodological approach (specification for our dataset), 2) Detailed assessment of SEMACRET reference sites using UNFC + 3) general assessment of global resources harmonized with UNFC

- More discussion on the Autumn meeting

Thank you for the attention