Styles and stages of the Rudabánya base metal ore mineralization - HUngary

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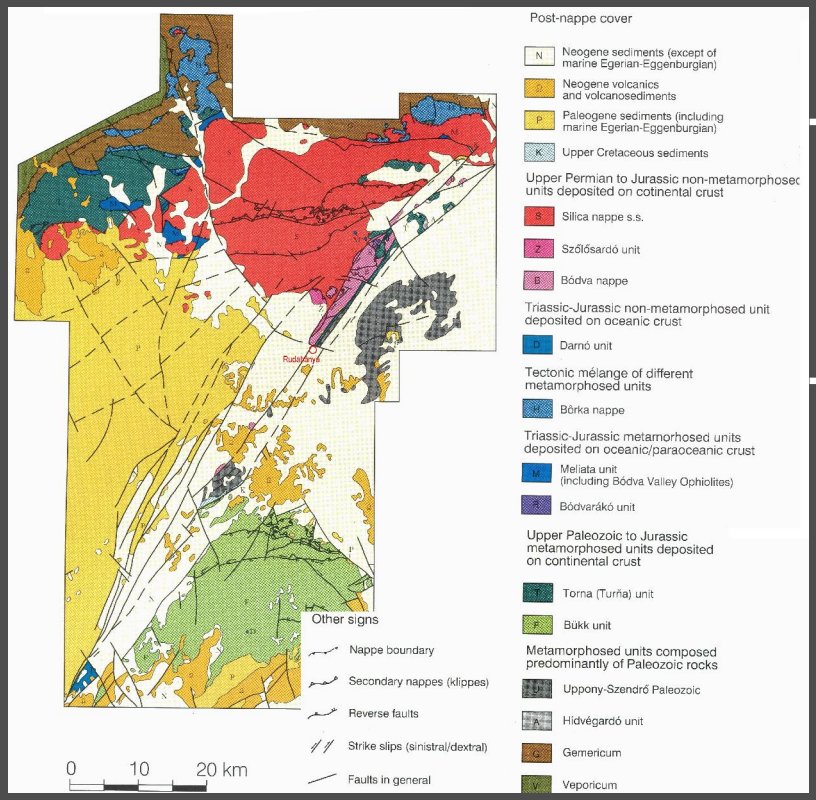
RUDABÁNYA

-Hungary, in a region which was traditional host of mining (ores, lignite, brown coal, non-metallics).

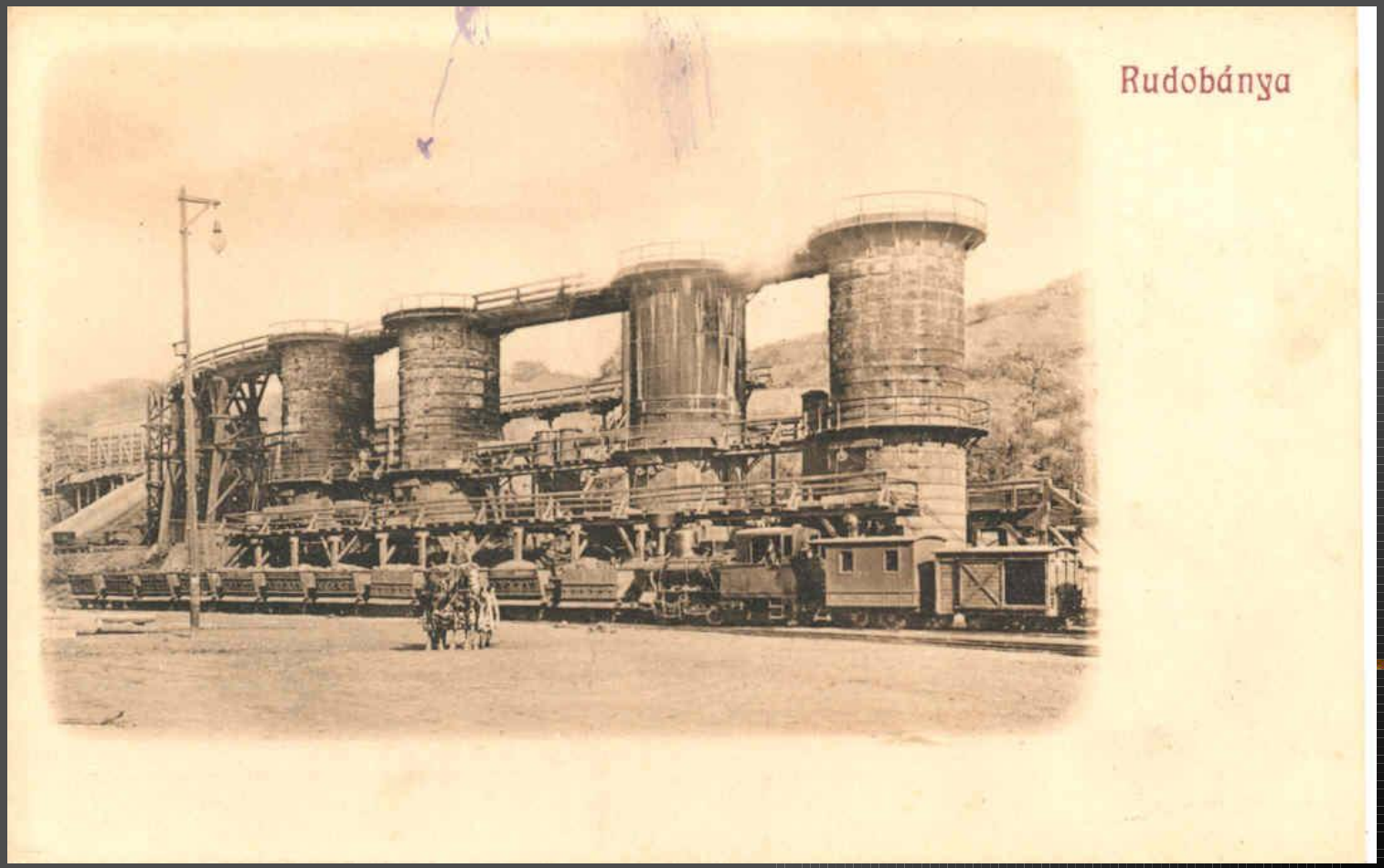
Its annual iron ore production peaked around 1 million tonne/year in the 1970s. In the last active years copper ore was found in small orebodies and mined .

Rudabánya

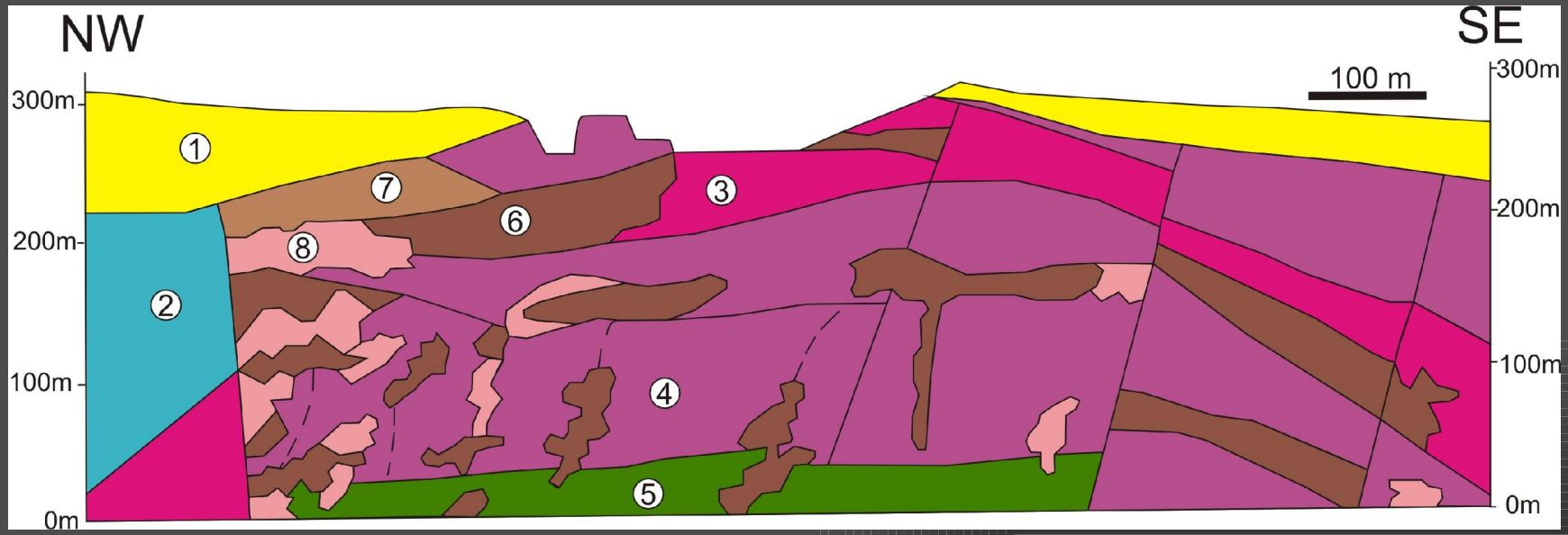
- The deposit is hosted in a major shear zone, formed in Triassic dolomites and siltstones, the NNE-SSW Darnó zone.
- The iron ore is dominantly siderite origined from the metasomatic alteration of dolomites, with extensive limonites in the oxidized cap.
- The base metal ores are partly stratiform in sediments, partly superimposed and younger than the siderite mineralization.



History of mining and exploration: 2000 years
Cu > Ag > Fe > Ba > Au > Ag > Cu



Earlier model (Hernyák 1977)



Irregular bodies in tectonic position

In the central anticline zone

Sulphide mineralization overprints siderite ores

New data for base and precious metal mineralizations

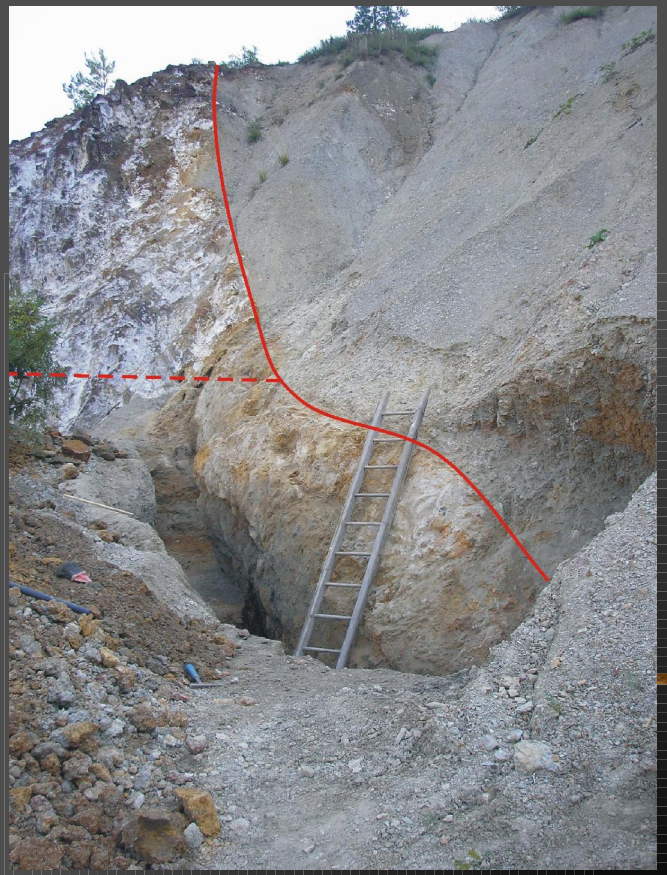
- 1999: USGS and MÁFI joint study Carlin type ore mineralizations in Hungary: Rudabánya ranks No1 as potential host for sediment hosted gold mineralization (Korpás et al 1999)
- 2000: USGS stable isotope geocehmistry: definite MVT style base metal mineralization geocehmical fingerprint (Hofstra et al 2000)

Known resources

- **Mineral resources (from inferred to measured):**
  - 2 million tonnes oxidized iron ore
  - 13 Million t siderite iron ore,
  - 1,5 Million tonnes 0.6 % Cu ore,
  - 0,5 Million tonnes 1 % Pb + 105 mg/kg Ag ore

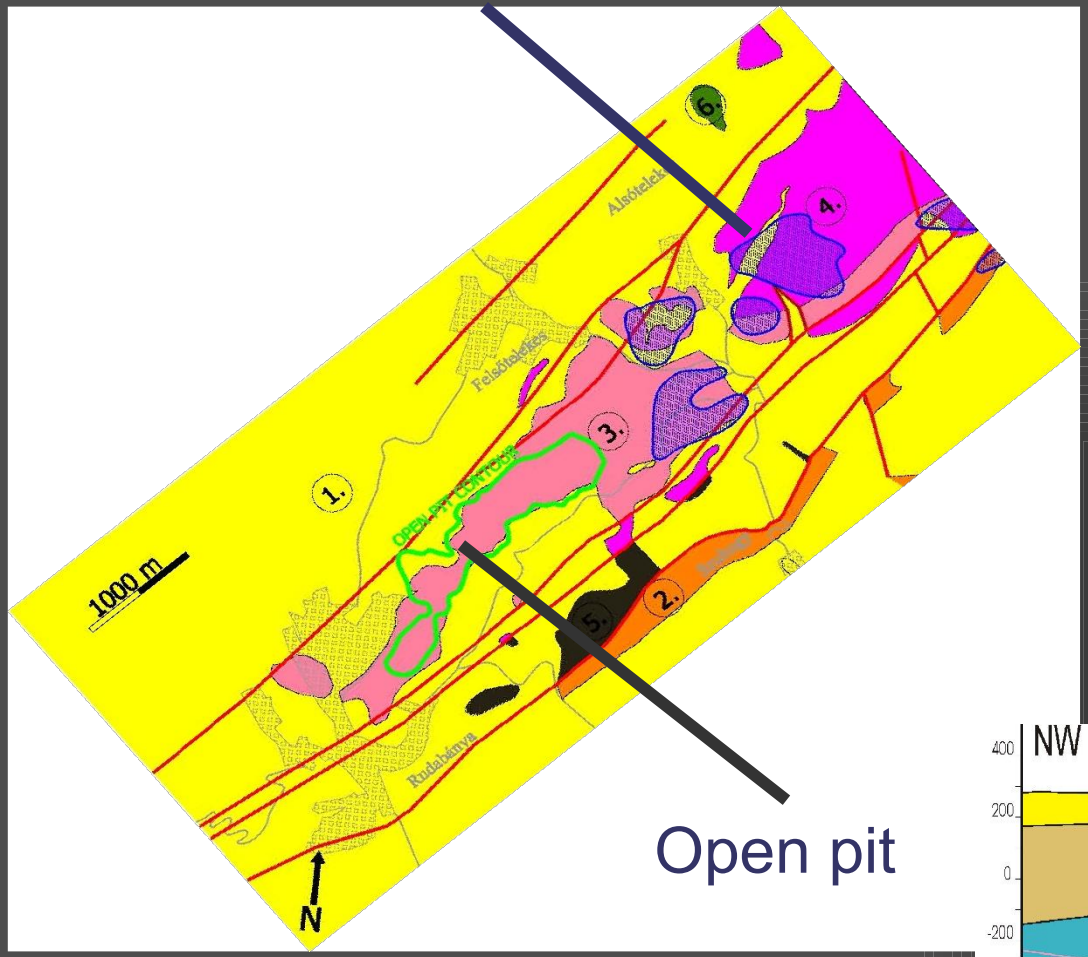
Exploration works

-
  - Archive data processing
  - Surface geochemistry
  - Surface and underground mapping
  - Trenching
  - Reconnaissance drilling



New geological map

Pb-Zn-Ag soil anomalies



Open pit

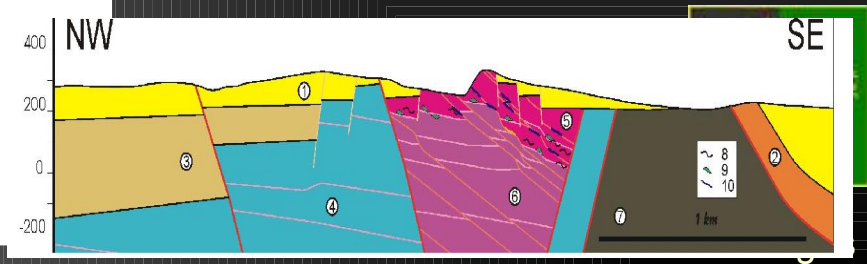
Conclusions: folding, overthrusting precedes major shear zone hosted positive flower structure.

Stratabound mineralization predates folding.

Siderite postdates overthrusting.

Copper-barite ores follow siderite

Last epithermal overprint (Cu-Ag-Hg) postdates late brittle faults



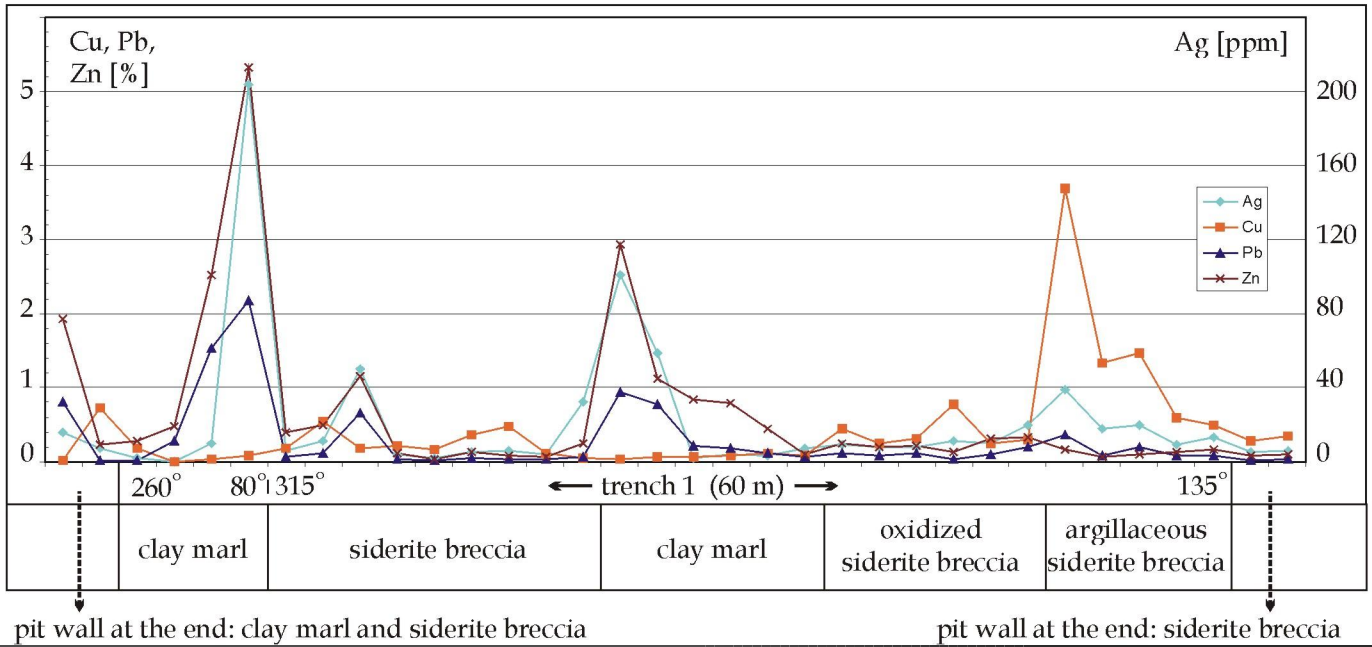
Best Pb intervals from historic boreholes

Sample id -from	Sample id -to	Hole nr	Interval _from (m)	Interval _to (m)	**Thickness (m)**	Fe_%	BaSO4 %	Cu %	**Pb_%**
11667	11674	RBB 215711	31,6	43,6	**12,0**	32,93		0,10	**7,67**
11629	11634	RBB 215710	12,6	29,4	**16,8**	16,52		0,20	**3,16**
11581	11593	RBB 21553	2,8	23,0	**20,2**	12,31		0,10	**2,05**
7195	7209	RBB 14964	1,0	25,1	**24,1**	20,30		0,12	**1,54**
11999	12002	RBB 20701	39,2	45,9	**6,7**	9,29		0,00	**4,85**
12073	12075	RBB 26263	2,7	7,8	**5,1**	10,71	30,20	0,09	**6,33**
11469	11483	RBB 19556	21,0	49,8	**28,8**	21,04		0,17	**1,04**
11801	11803	RBB 21368	0,0	3,2	**3,2**	14,37		0,20	**9,14**
11173	11179	RBB 17411	21,7	31,4	**9,7**	13,55		0,37	**2,77**
849	854	RBB 1350	0,0	14,1	**14,1**	10,82		0,00	**1,91**

Best Cu intervals from historic boreholes

Sample id -from	Sample id -to	Hole nr	Interval _from (m)	Interval _to (m)	**Thickness (m)**	Fe_%	BaSO4 %	**Cu %**	Pb_%
6488	6544	RBB 14656	0,0	28,3	**28,3**	28,62	1,89	**4,66**	
6581	6619	RB 1465	0,0	7,9	**7,9**	13,96	3,55	**7,24**	
6235	6303	RBB 14652	0,0	16,0	**16,0**	14,03	0,50	**3,55**	
6325	6382	RBB 14654	0,0	21,6	**21,6**	19,14	0,05	**2,47**	
12205	12213	RBB 26281	11,7	25,0	**13,3**	14,53	9,39	**2,10**	0,06
5764	5790	RBB 14522	10,6	20,3	**9,7**	17,70	0,45	**2,60**	0,01
12291	12295	RBB 26303	23,3	31,2	**7,9**	8,91	26,00	**2,99**	0,07
11384	11387	RBB 1784	47,0	55,0	**8,0**	7,05		**2,89**	
9274	9290	RBB 1670C	0,0	18,9	**18,9**	17,30	3,36	**1,21**	0,01
5868	5908	RBB 14524	7,2	20,7	**13,5**	14,43	3,01	**1,58**	

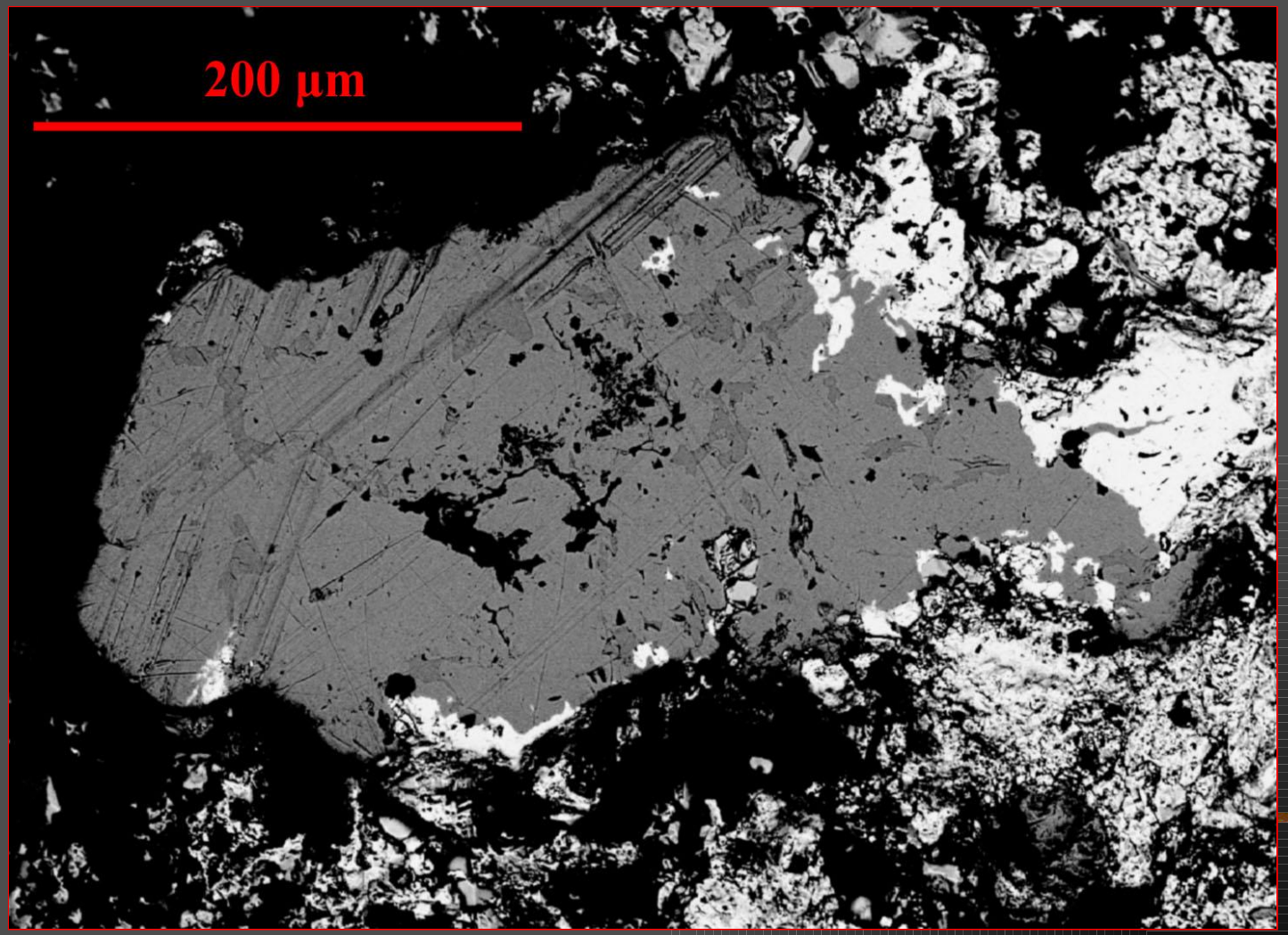
Recsnt trenching, Cu, Pb, Zn Ag values



First new drillhole data

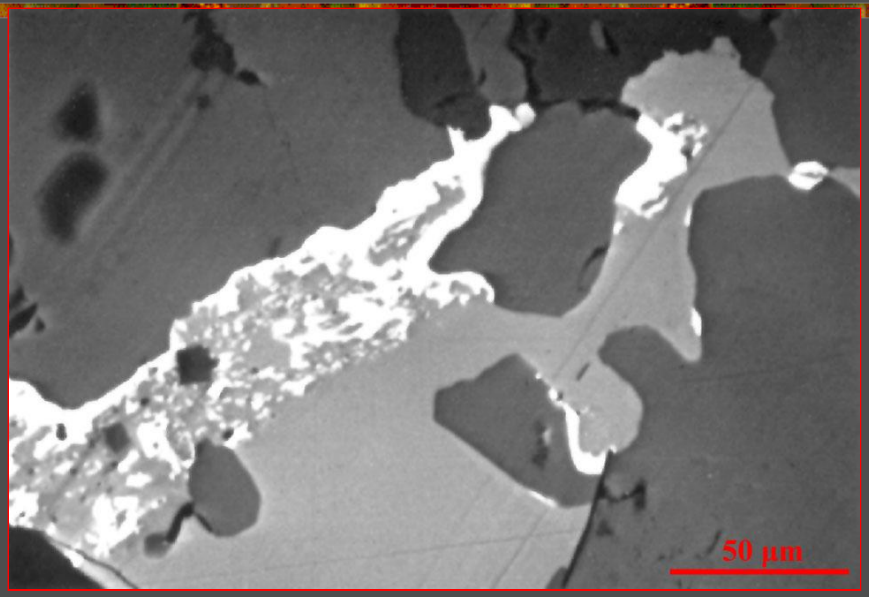
Ore type	Hole nr	Interval (m)	Ag mg/kg	Cu %	Pb %	Zn %
Gossan Pb-Zn	U1	0,0-3,0	257	0,31	3,33	7,50
Gossan Cu	U1	7,0-9,5	10	0,41	0,05	0,34
Sulphide Pb-Zn	U2	55,1-58,2	13	0,00	0,58	4,25
Sulphide Cu	U2	44,8-48,3	7	0,60	0,00	0,02

Early stratabound ores

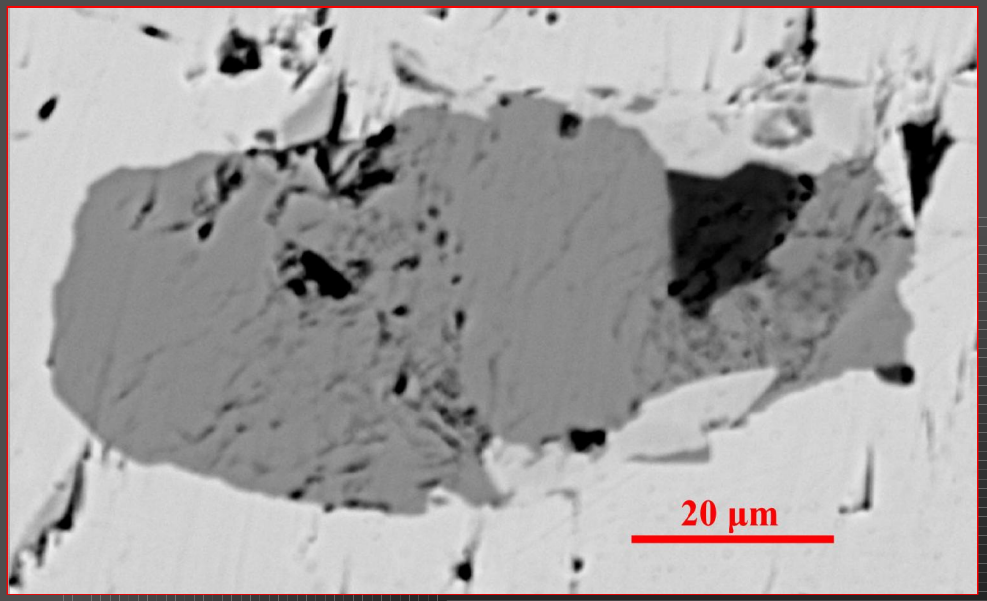


Acanthite (grey), galena (white) and sphalerite (light grey)

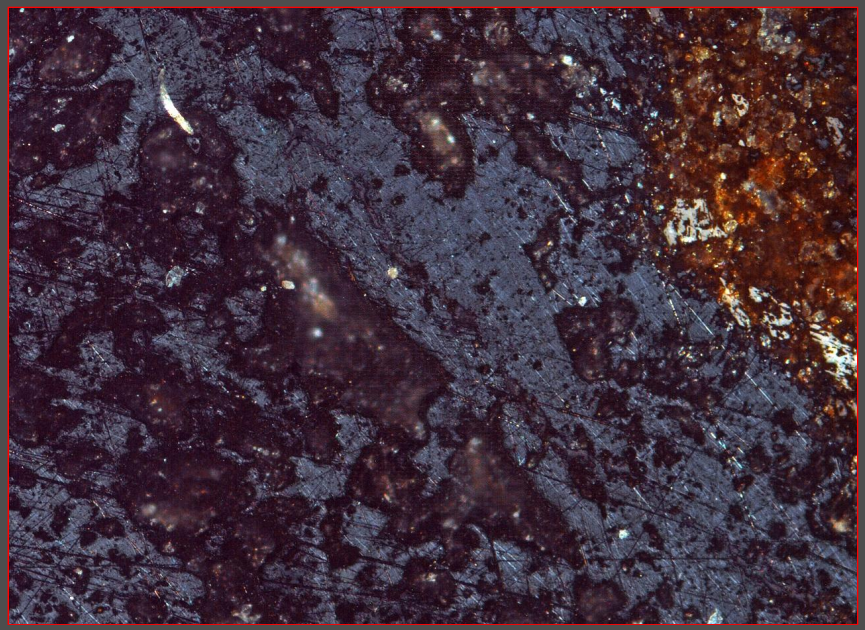
Pb-Zn-Cu-Ba mineralization



Pyrargirite and galena



Acanthite in galne



Acanthite

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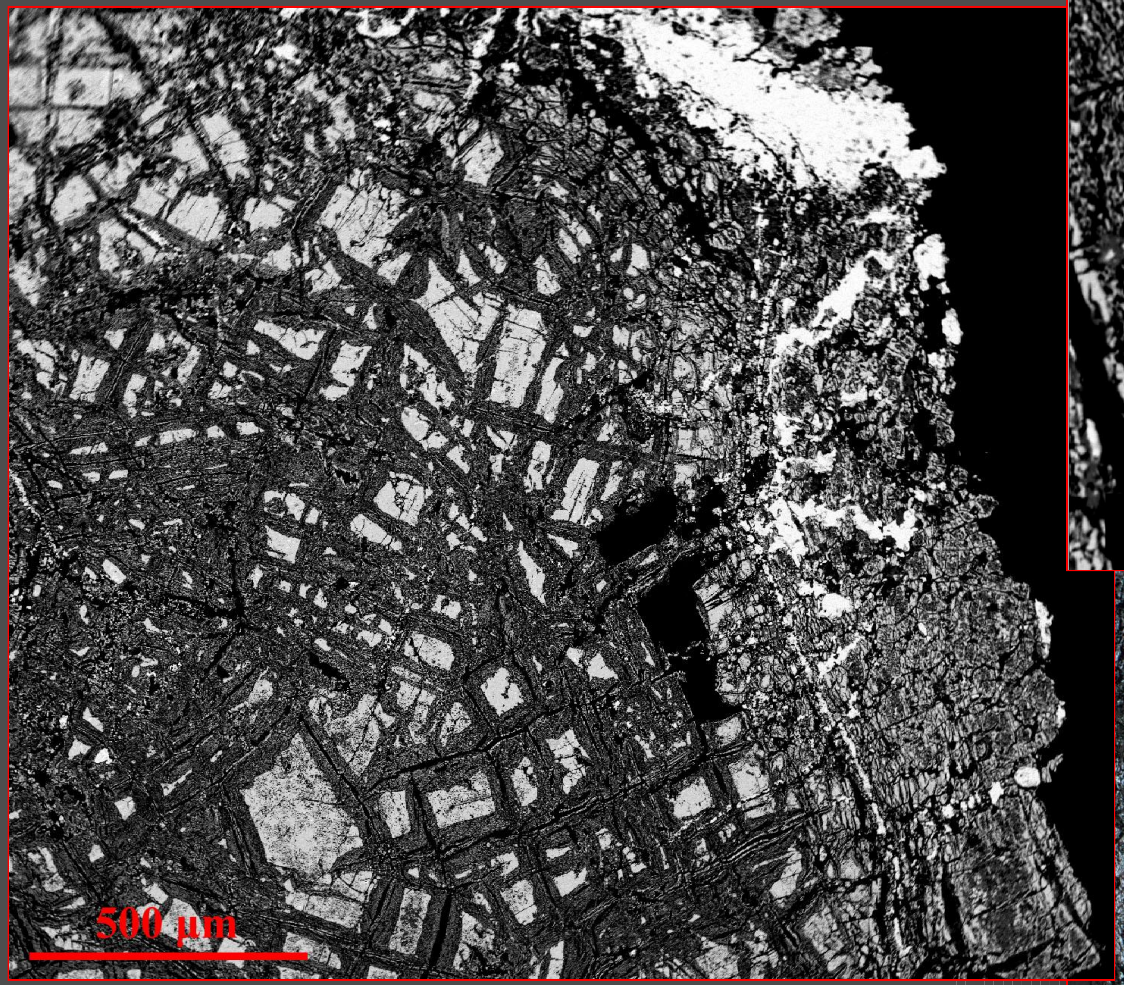
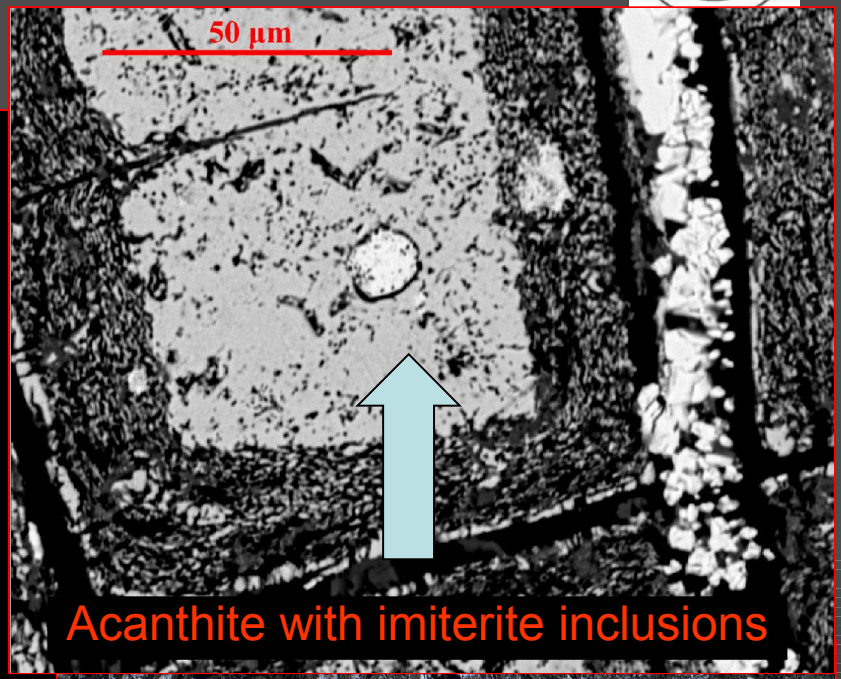
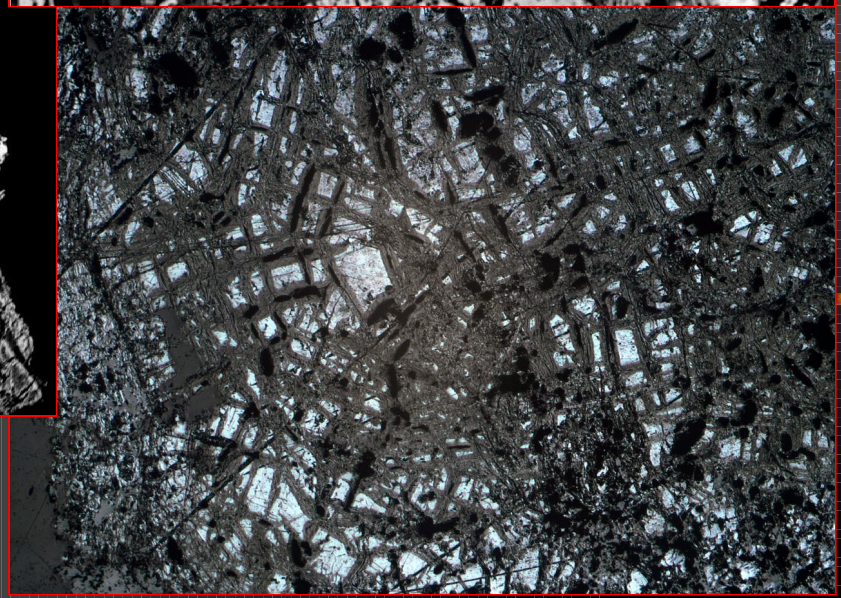
Base metal gossan

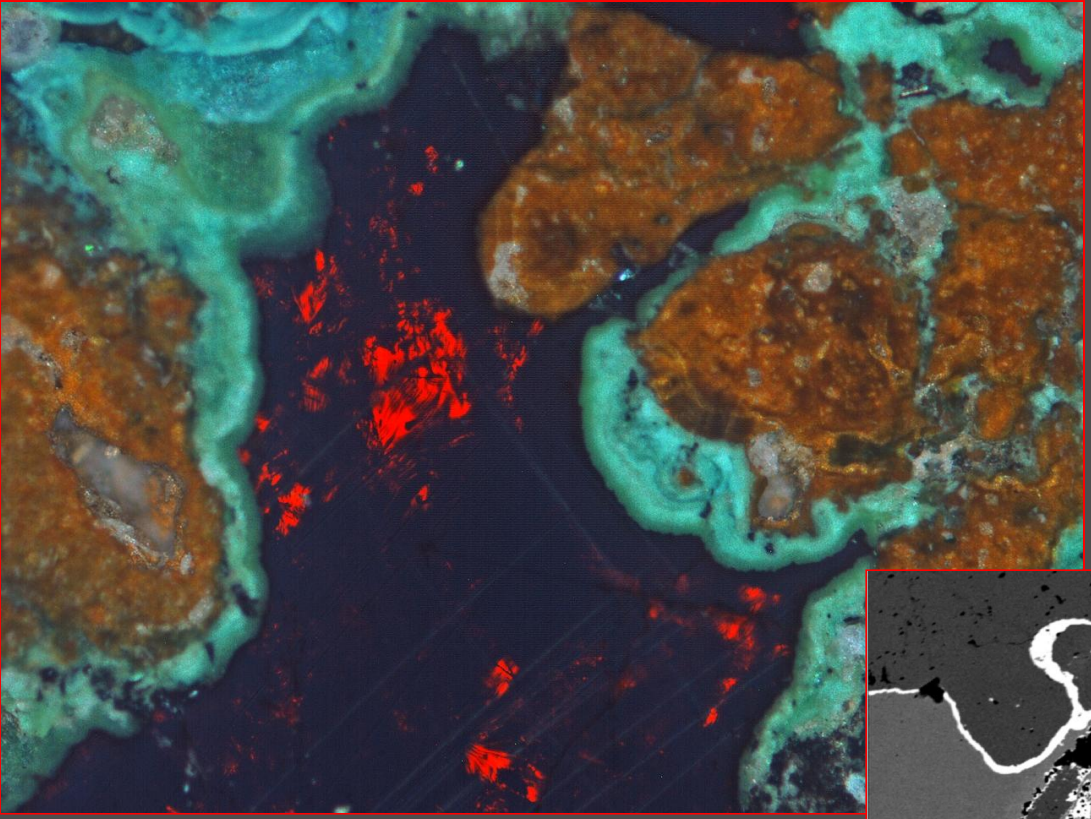


Acanthite with cerussite veinlets (white)

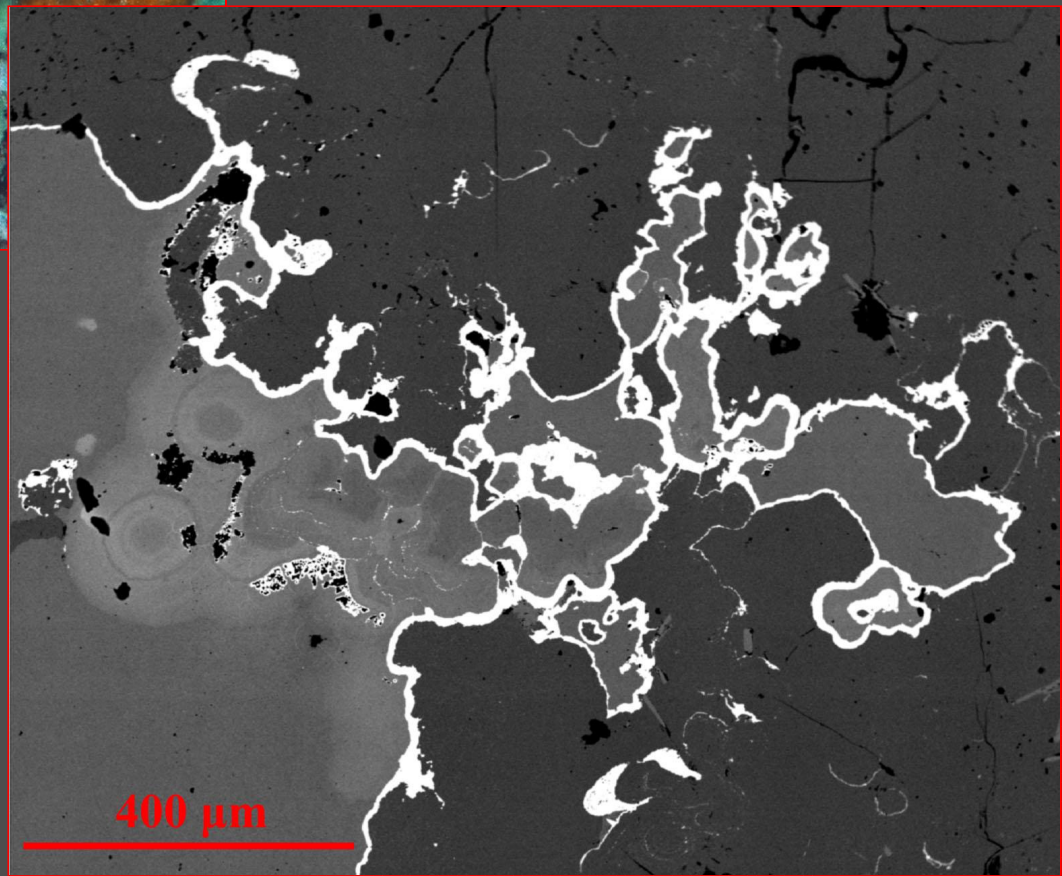




Base metal gossan



Cuprite and native copper with malachite rim



Copper and Hg amalgams at the interface of cuprite and native copper

What next?

- Drilling – target definition
- Supergene mineralization
- Non-sulphide base metals – do they form deposit?
- Gold – promised, though not found yet
- Environmental baseline
- Metallurgy
- Extensions under Pliocene cover

See you in Rudabánya