



AKADEMIA GÓRNICZO-HUTNICZA  
IM. STANISŁAWA STASZICA W KRAKOWIE

AGH UNIVERSITY OF SCIENCE  
AND TECHNOLOGY



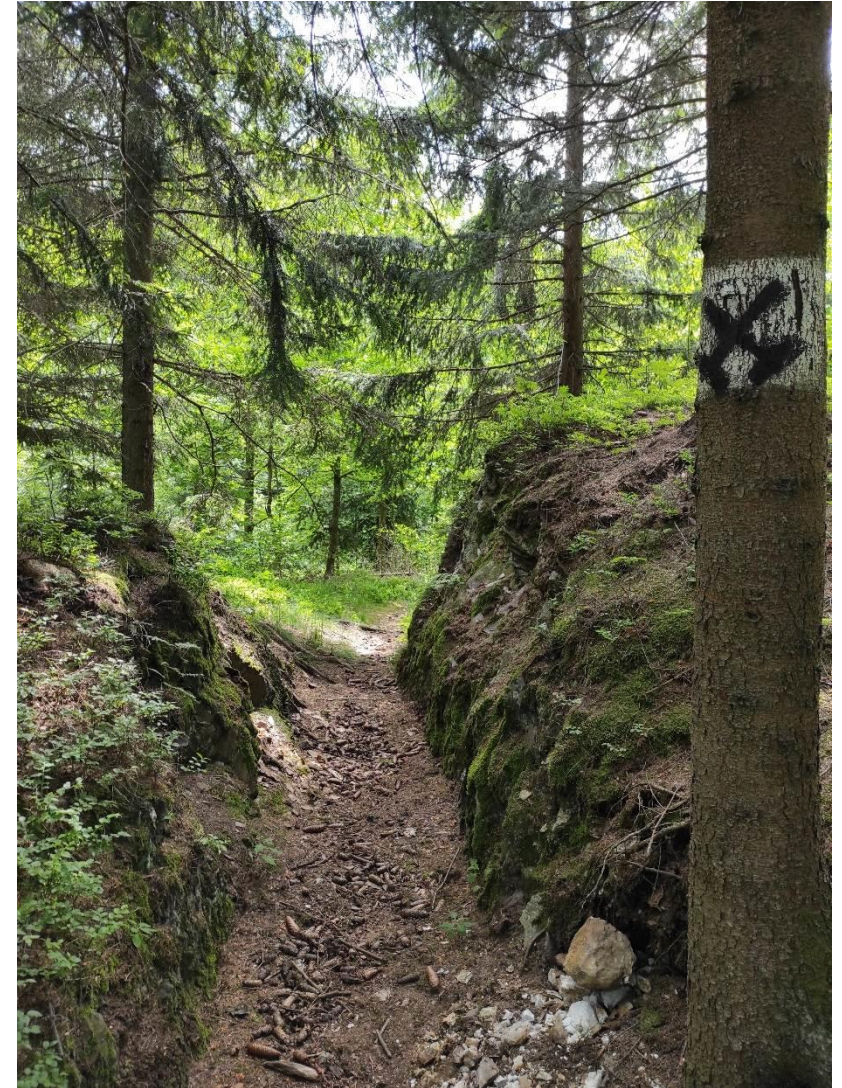
## **New data on polymetallic mineralization in the Gierczyn-Przecznica area, mineralogy, trace elements and geochronology, SW Poland**

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AGH-UST Kraków, Poland*

## Content

- History
- Geology
- Geochronology
- Trace elements

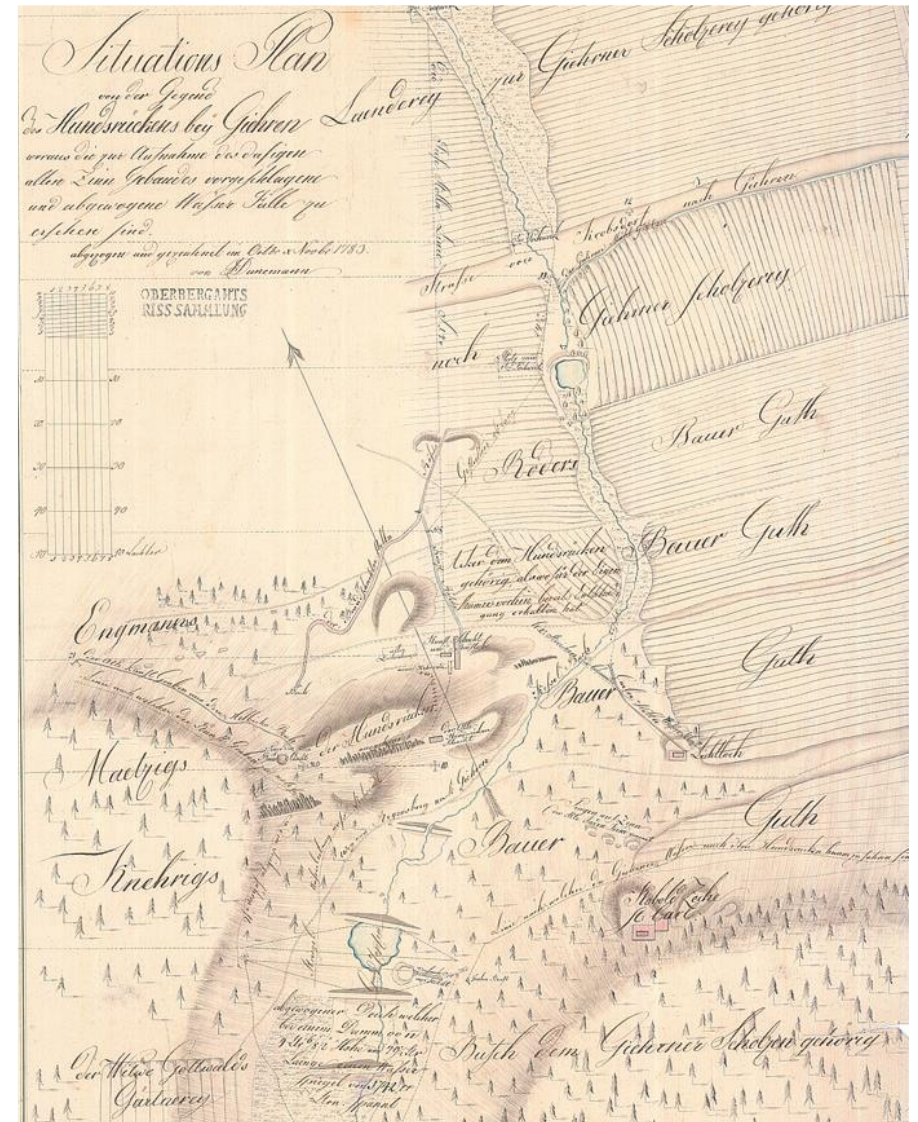


*Old mine workings in Gierczyn area*



# History

- Sn exploited from the 16<sup>th</sup> to 18<sup>th</sup> century
- Co exploited in 18<sup>th</sup> and 19<sup>th</sup> century
- renewed activity during WWII
- first detailed geological investigation in 1950s
- exploitation never started  
(2 deposits with 5.5 million tones @ 0.5% Sn)

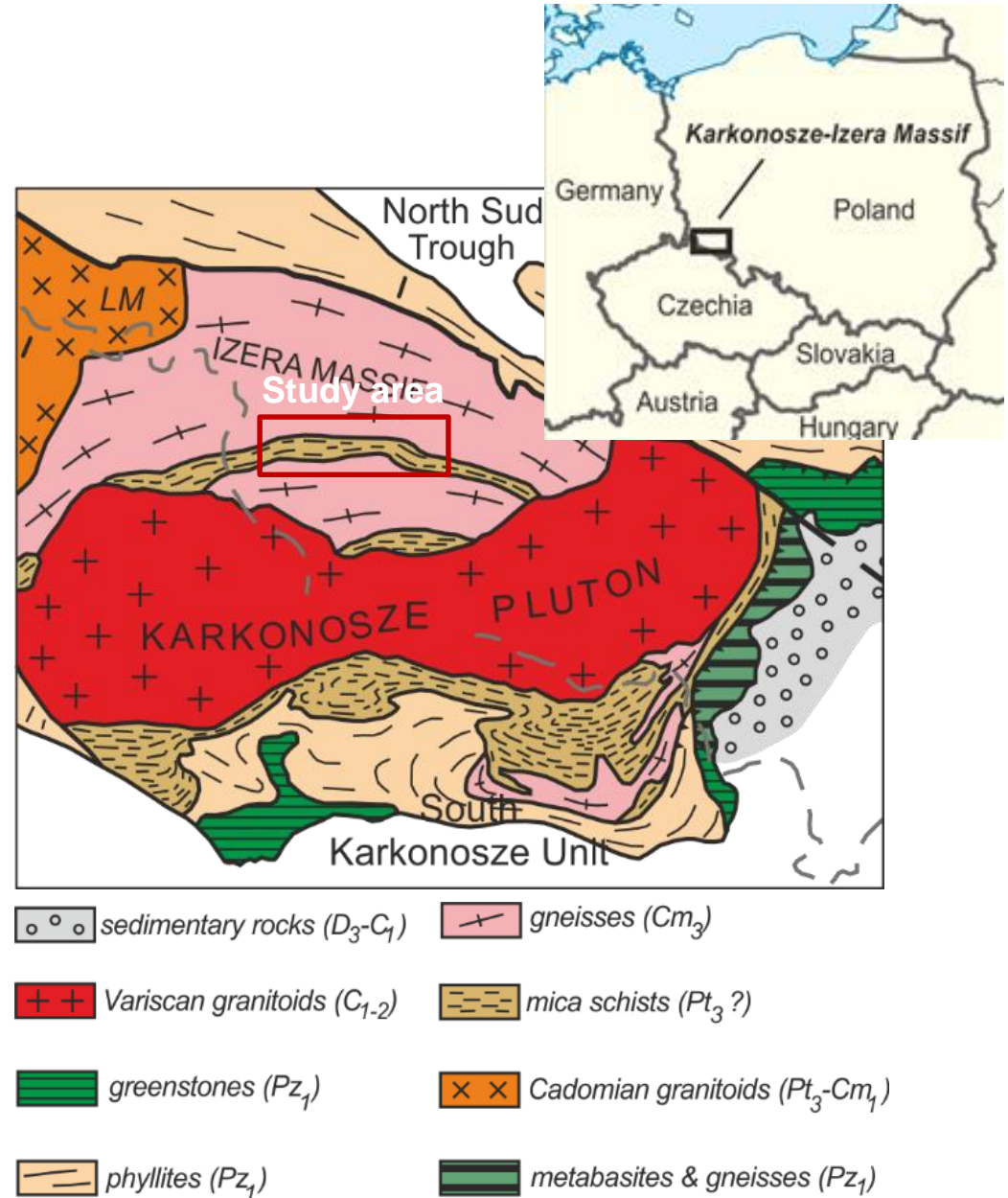


Surveying plan of mining area „Psi grzbiet”, 1783 (National Archive in Katowice)

# Regional settings

## Karkonosze-Izera Massif:

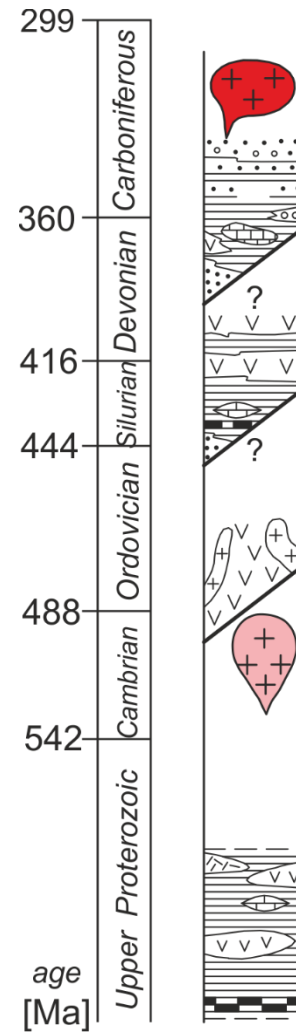
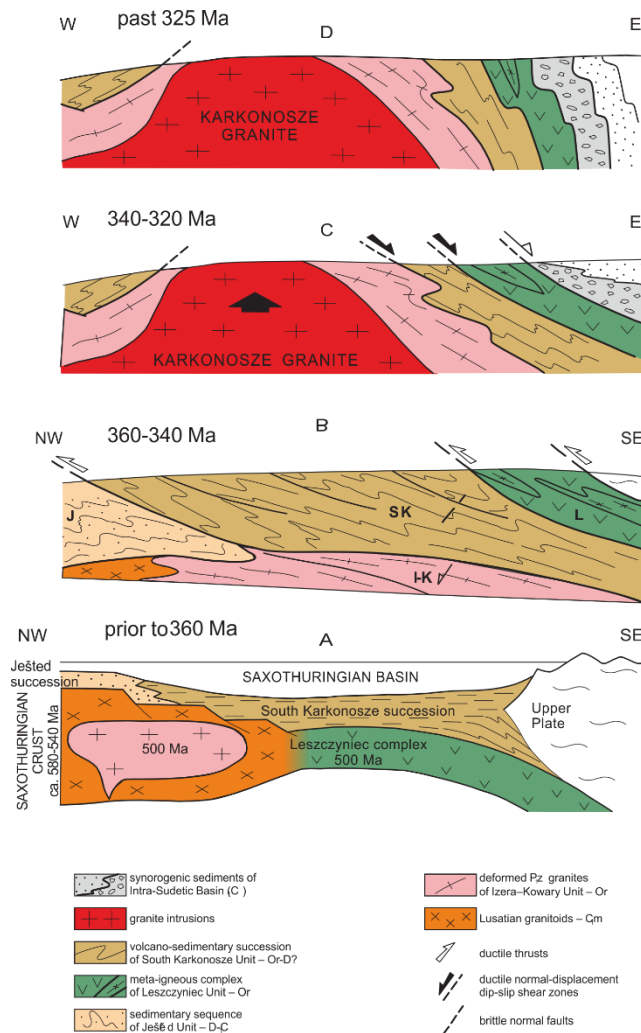
- Karkonosze Granite intrusion (312-309 Ma)
- metamorphic envelope:
  1. Izera-Kowary unit
  2. Ještěd Unit
  3. Southern Karkonosze Unit
  4. Leszczyniec Unit



modified after Aleksandrowski & Mazur 2002 & Kryza 2004

# Regional settings

## Karkonosze-Izera Massif evolution scheme



? Regional metamorphism ?

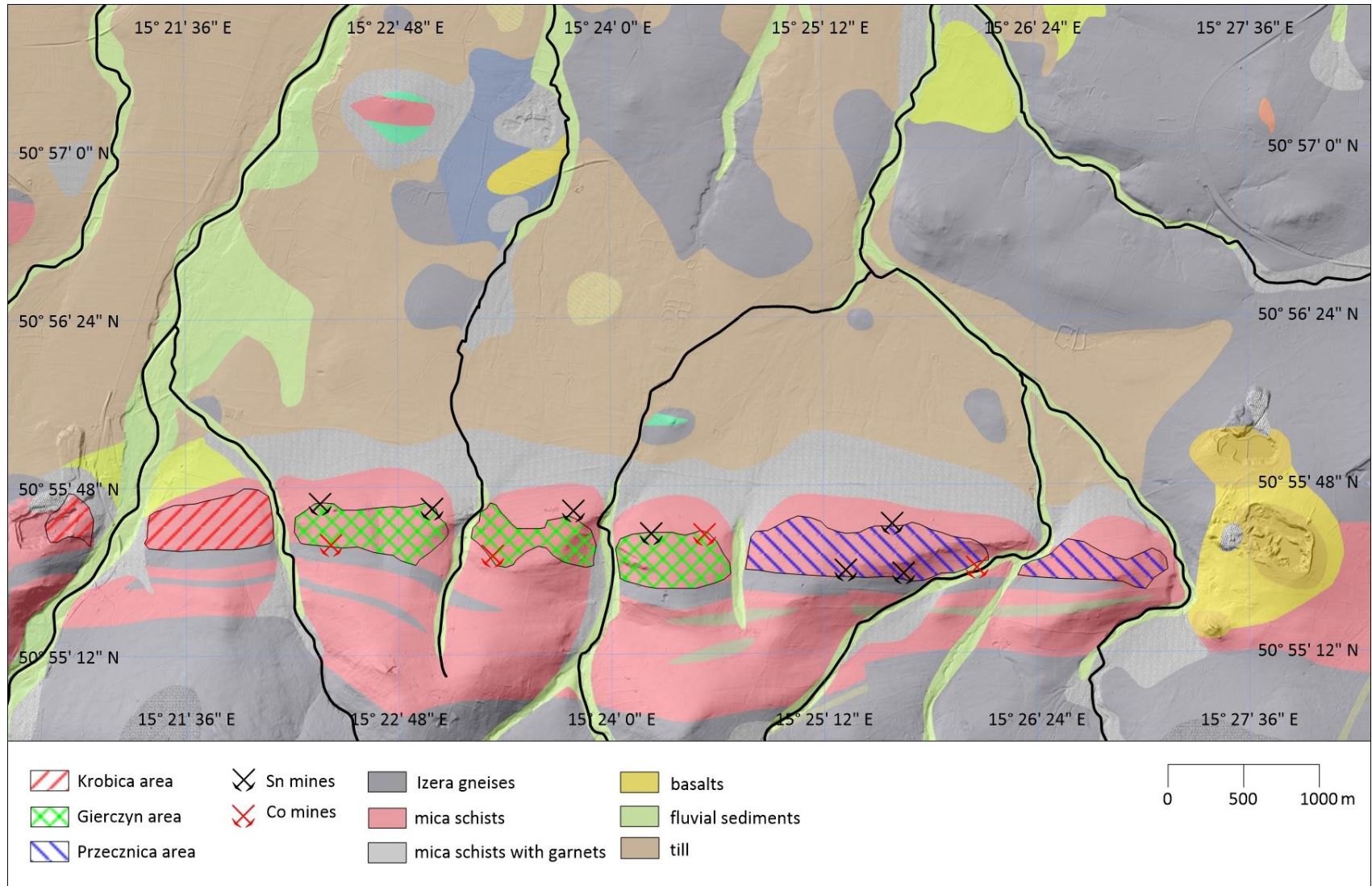
Age of mineralization not well established, multistage

Age of Izera orthogneiss protolith

modified after Aleksandrowski & Mazur 2002 & Kryza 2004



# Geology of the study area



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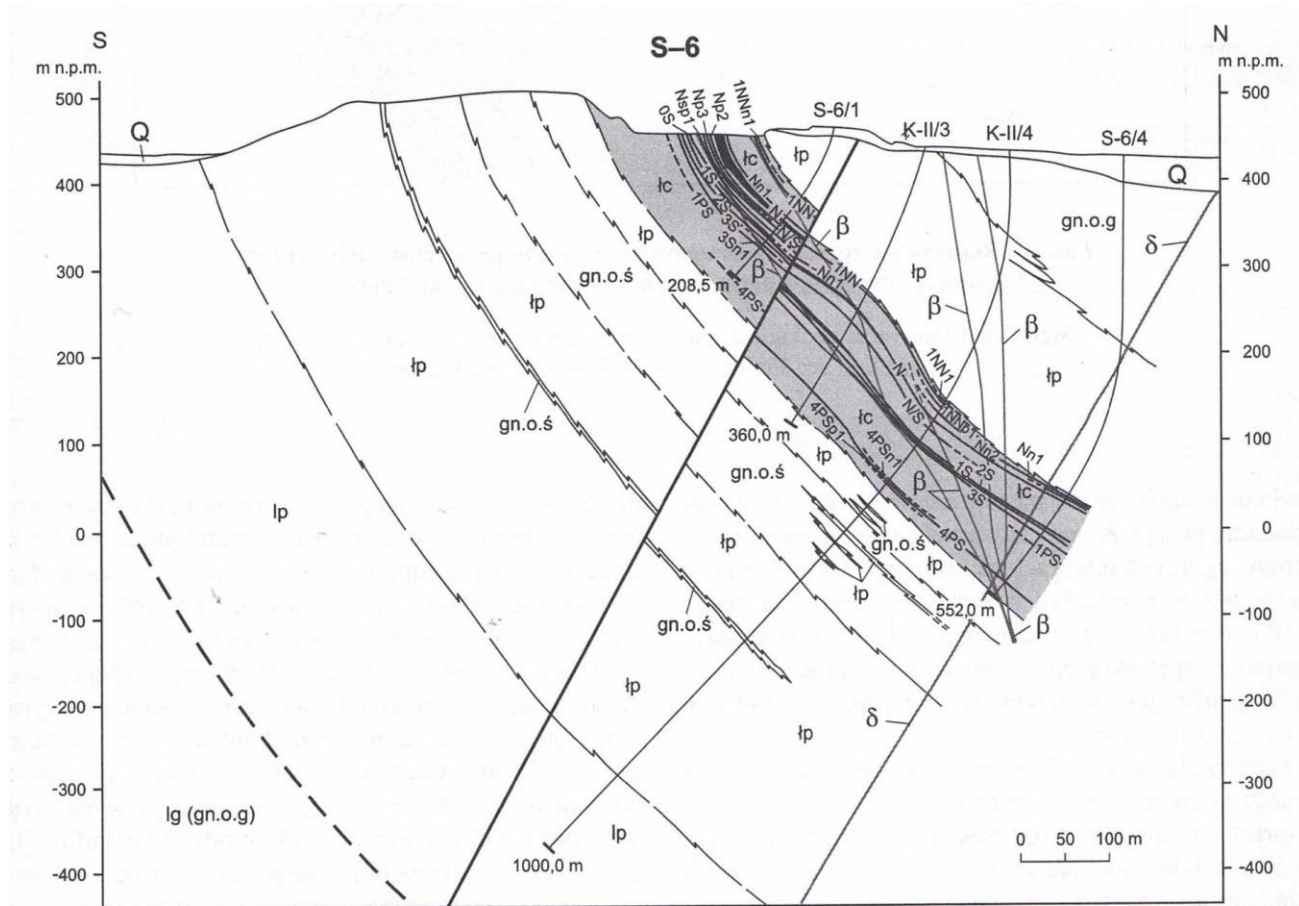
Host rocks:

- mica schists
- mica-garnets schists
- quartz-mica-chloride schists
- gneisses
- leukogranites

Ore minerals:

- Cassiterites
- Sulphides and sulphosalts:
  - Pyrrhotite
  - Sphalerite
  - Chalcopyrite
  - Cobaltite
  - Safflorite
  - Skutterudite

- Garnets
- Ilmenite
- Rutile
- Ghanite



Geological cross-section across Krobica deposit (Michniewicz et al. 2006)

## Methods

- Samples from drill holes, outcrops, old mines and dumps
- Reflected & transparent light microscopy
- SEM-EDS
- EMPA
- Micro-XRF
- LA-ICPMS (GEUS) (trace elements & geochronology of cassiterite)
- Pb isotopes (GTK in progress)



# Ore minerals

New data on the sulphides-sulphosalts mineralization collected from the outcrop near „Psi Grzbiet”:

chalcopyrite, pyrrhotite, native Bi

„freibergite”  $\text{Ag}_6[\text{Cu}_4\text{Fe}_2]\text{Sb}_4\text{S}_{12}$

ullmannite  $\text{NiSbS}$

galena (1% Ag)

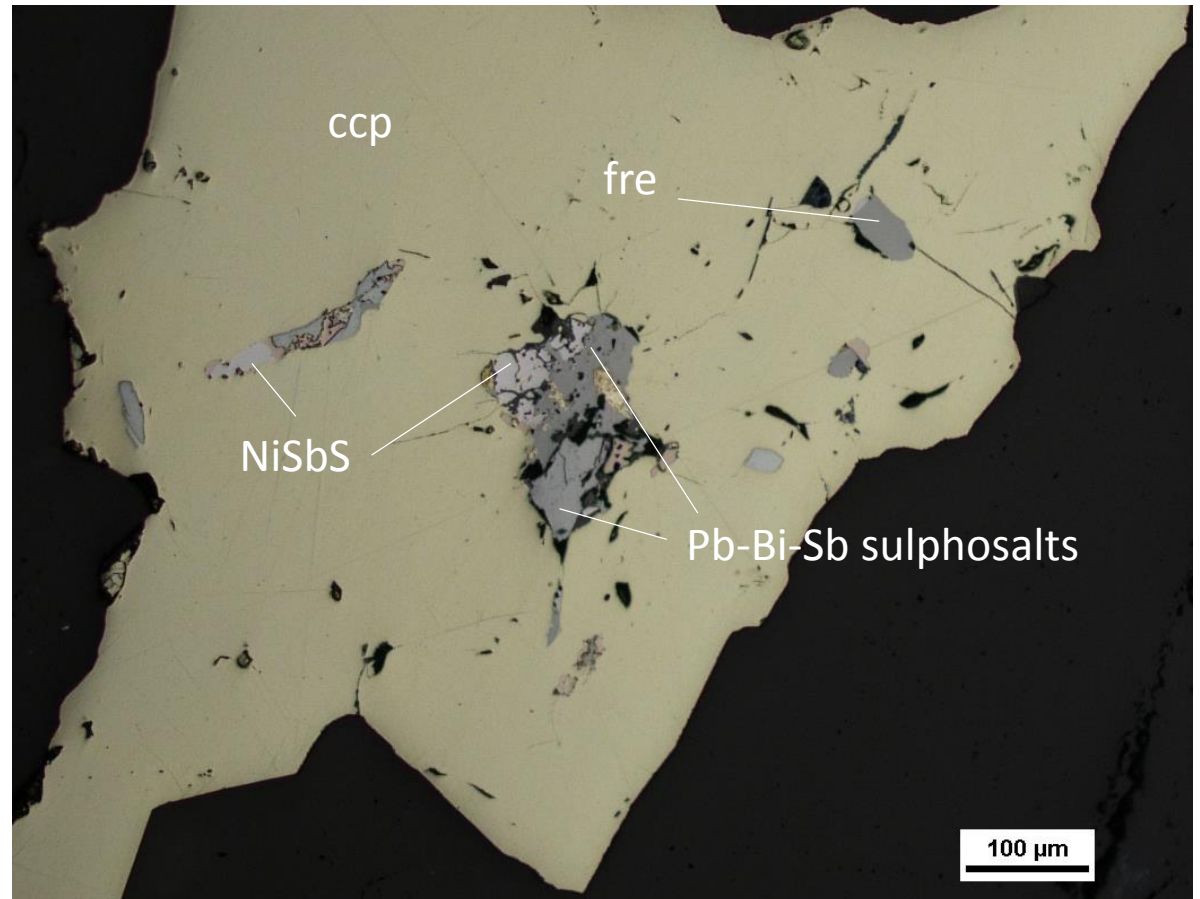
*Pb-Bi-Sb sulphosalts new identified:*

***Te-canfieldite  $\text{Ag}_8\text{Sn}(\text{S},\text{Te})_6$***

***Garavellite  $\text{FeSbBiS}_4$***

***Joseite-A  $\text{Bi}_4(\text{S},\text{Te})_3$***

***Hedleite  $\text{Bi}_7\text{Te}_3$***



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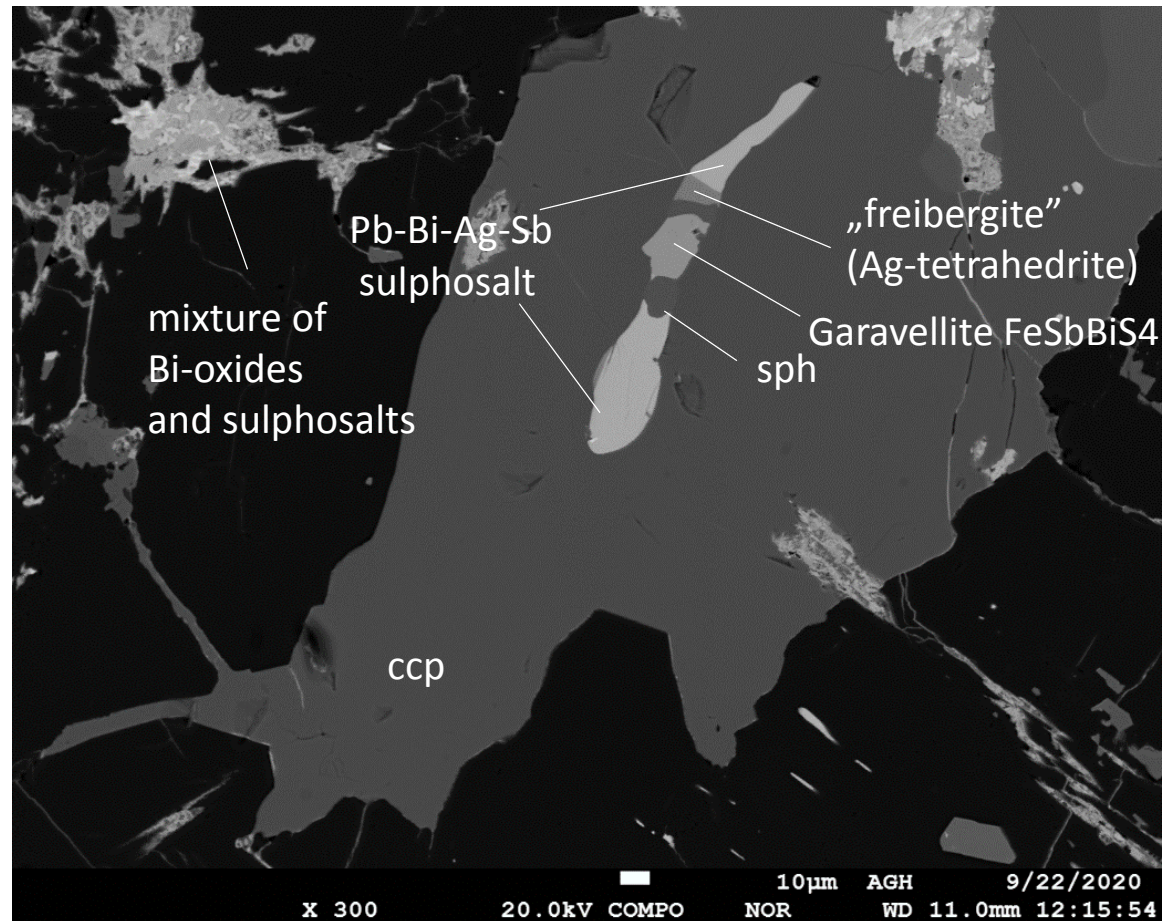
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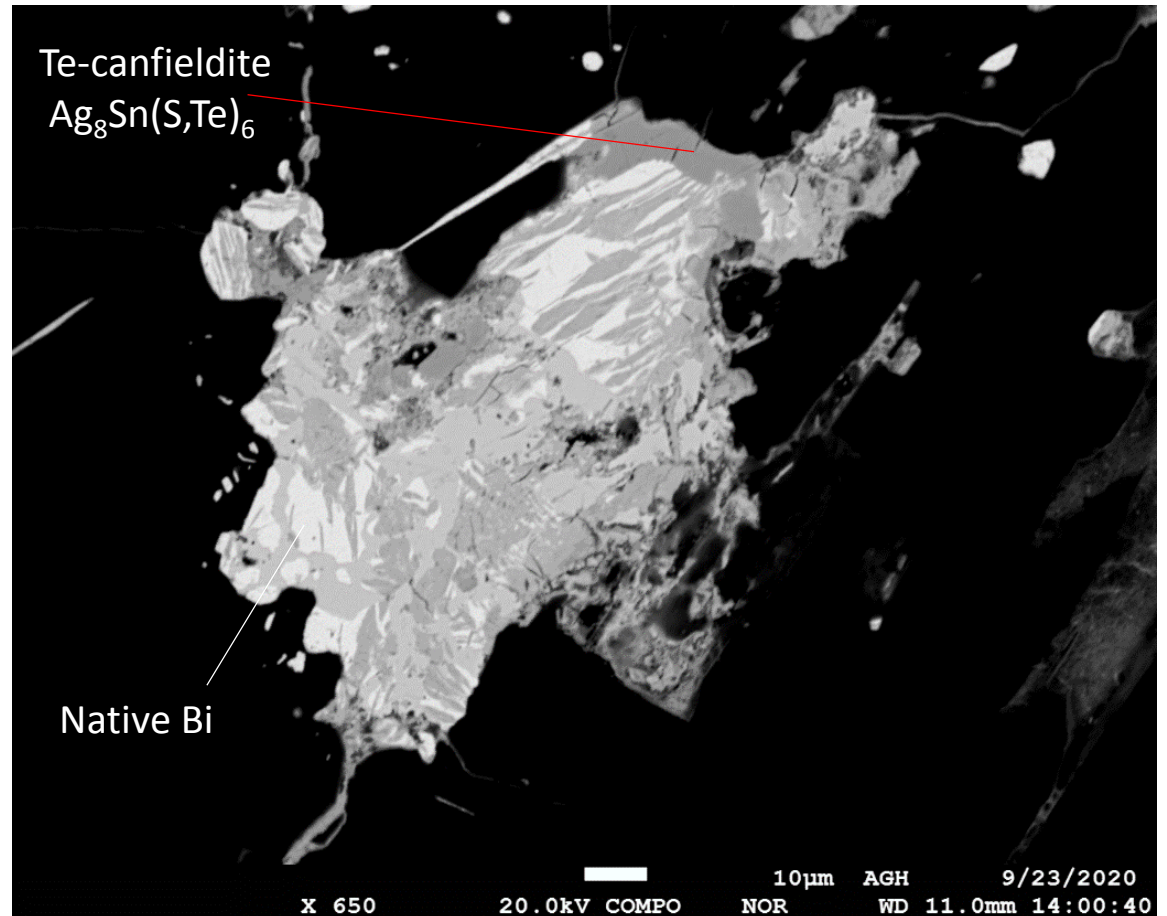
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# Ore minerals

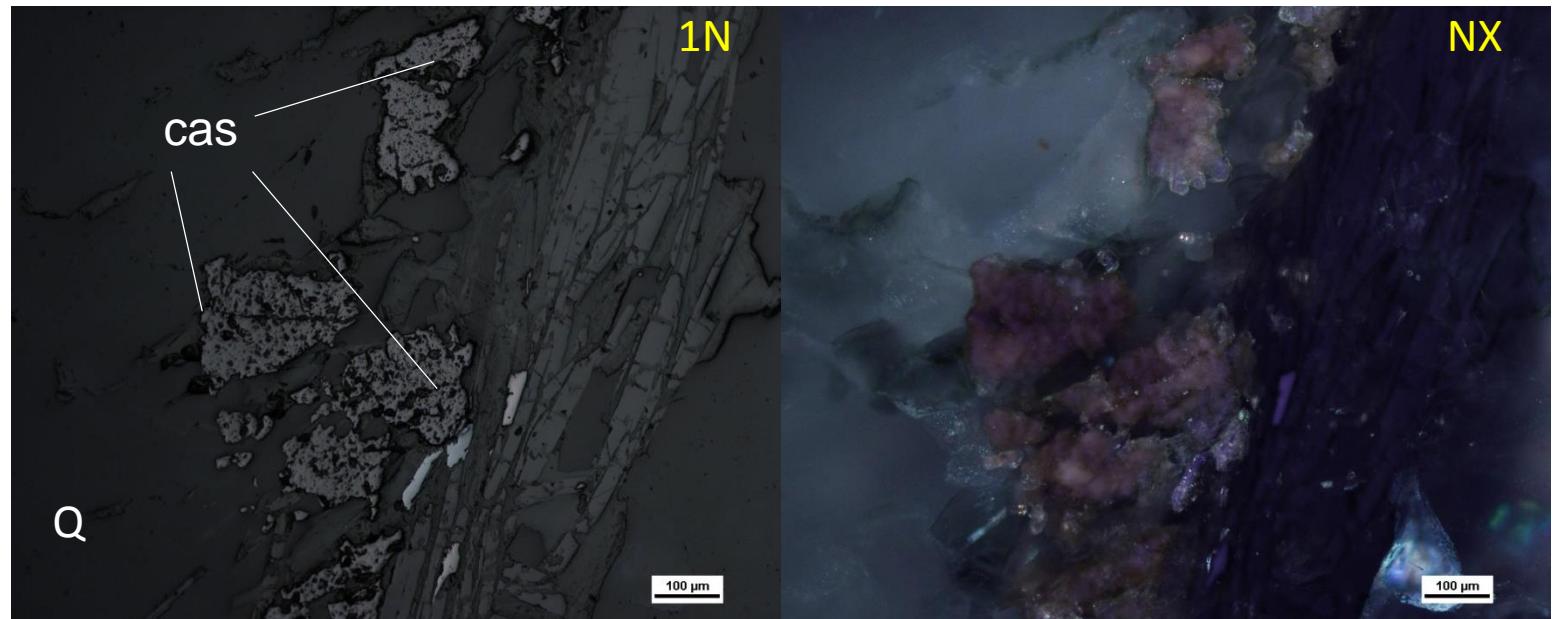
## Cassiterite:

2 major and 1 minor type of cassiterite described based on literature:

*Major: „brown”* (Cas I, patchy, spongy, interpreted as possible recrystallization of tin-wood) and *„transparent”* (Cas II, dominant, usually oval, grape-like grains).

*Minor: Cas III* (post-sulphide cassiterite formed by stannite decomposition)

Cas I:  
„brown”  
spongy



# Ore minerals

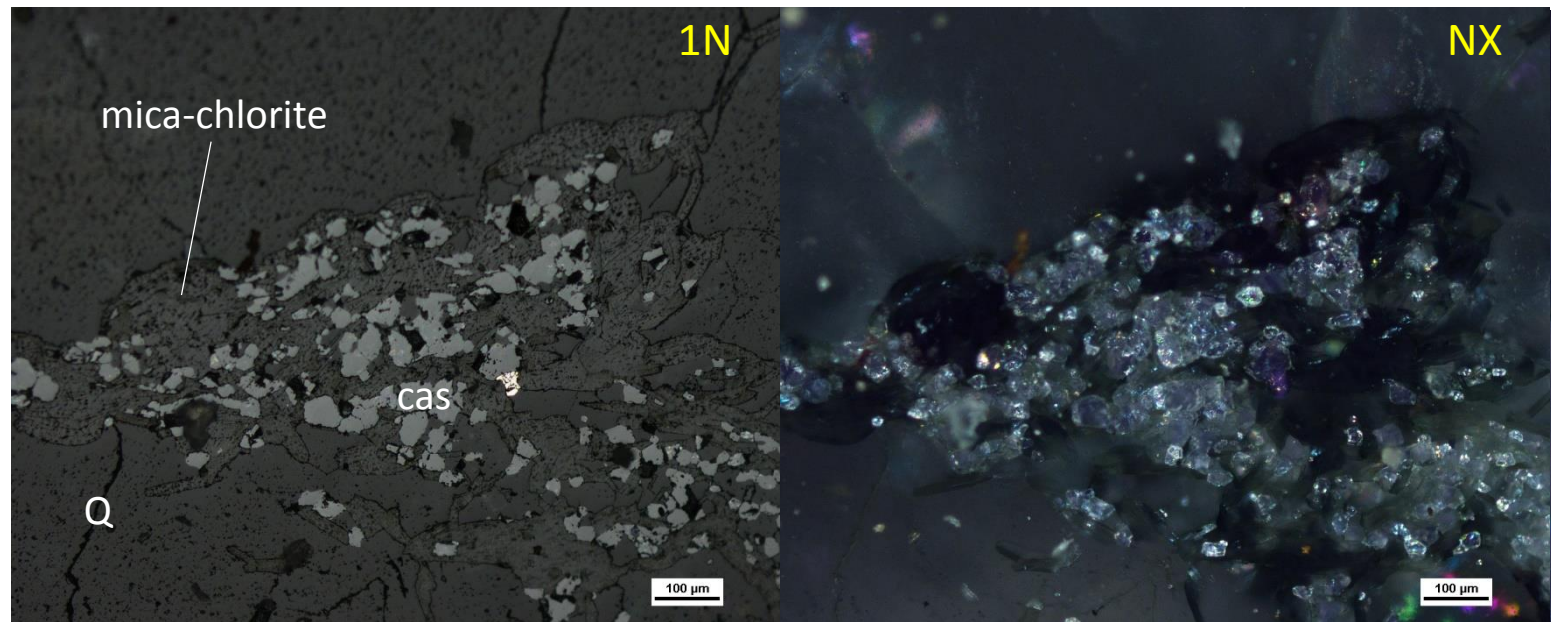
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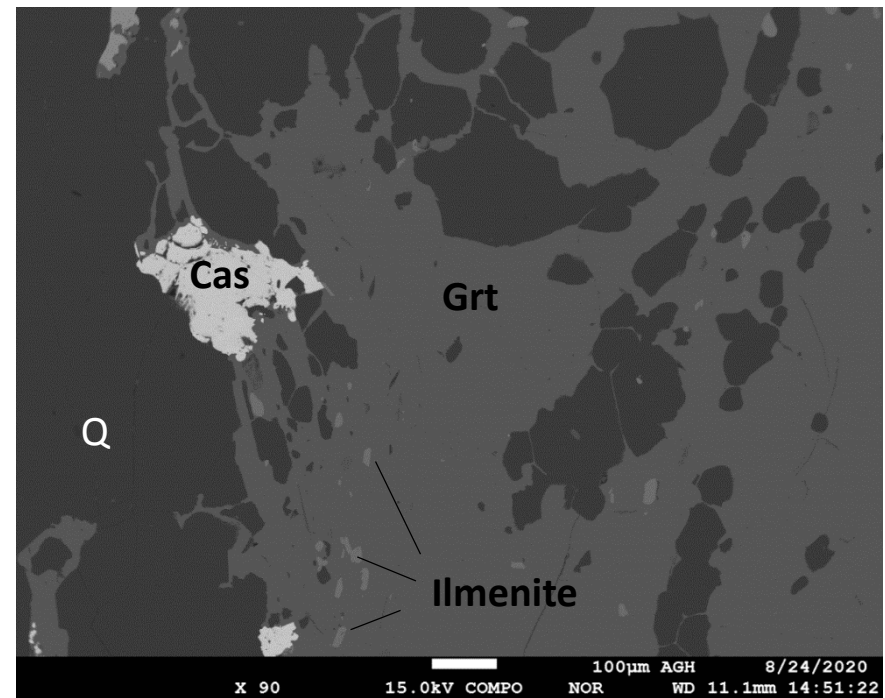
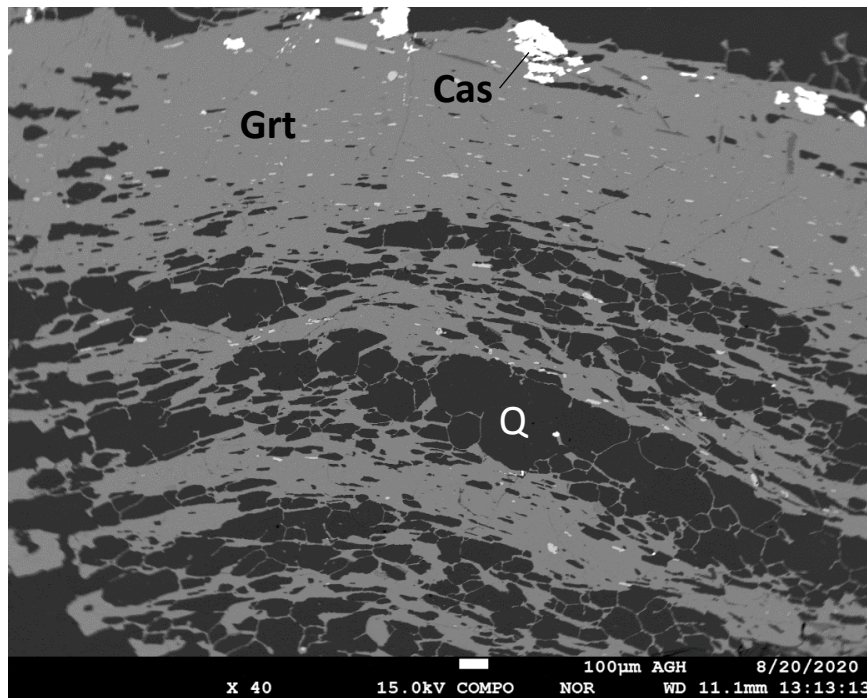
Cas II -  
„transparent”  
& grape-like  
shape



# Ore minerals

## Cassiterite:

Rare – cassiterite in garnets







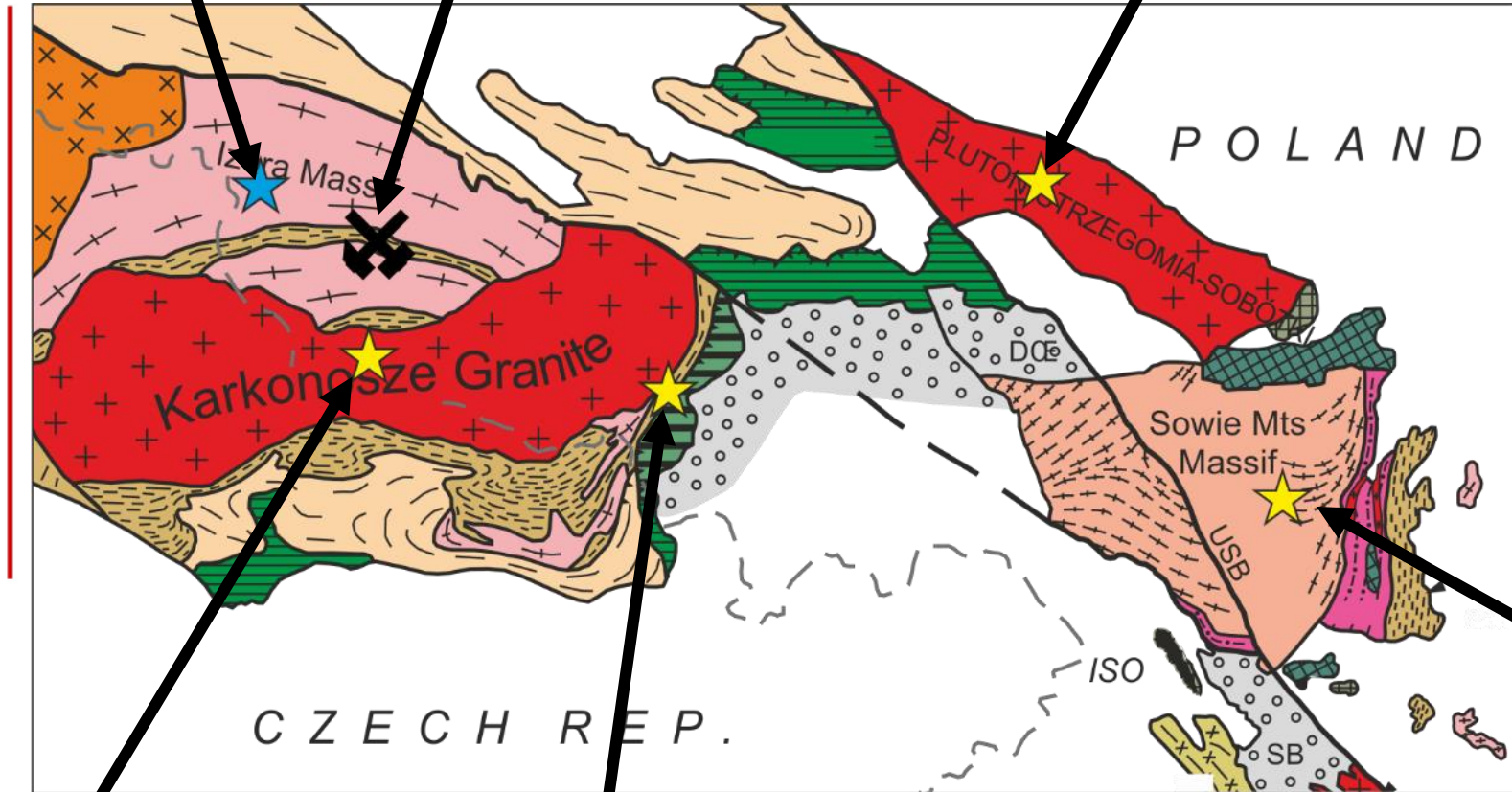
AGH

# Cassiterite – regional comparison, geochronology

Gierczyn  $360 \pm 5$  – “grapes like” – ore  
Przeznica  $353 \pm 14$  – “grapes like” – ore  
Przeznica  $318 \pm 6$  – “spongy”

Wyrwak  
greisen - ???

Żółkiewka, Strzegom Granite, 304-294 Ma

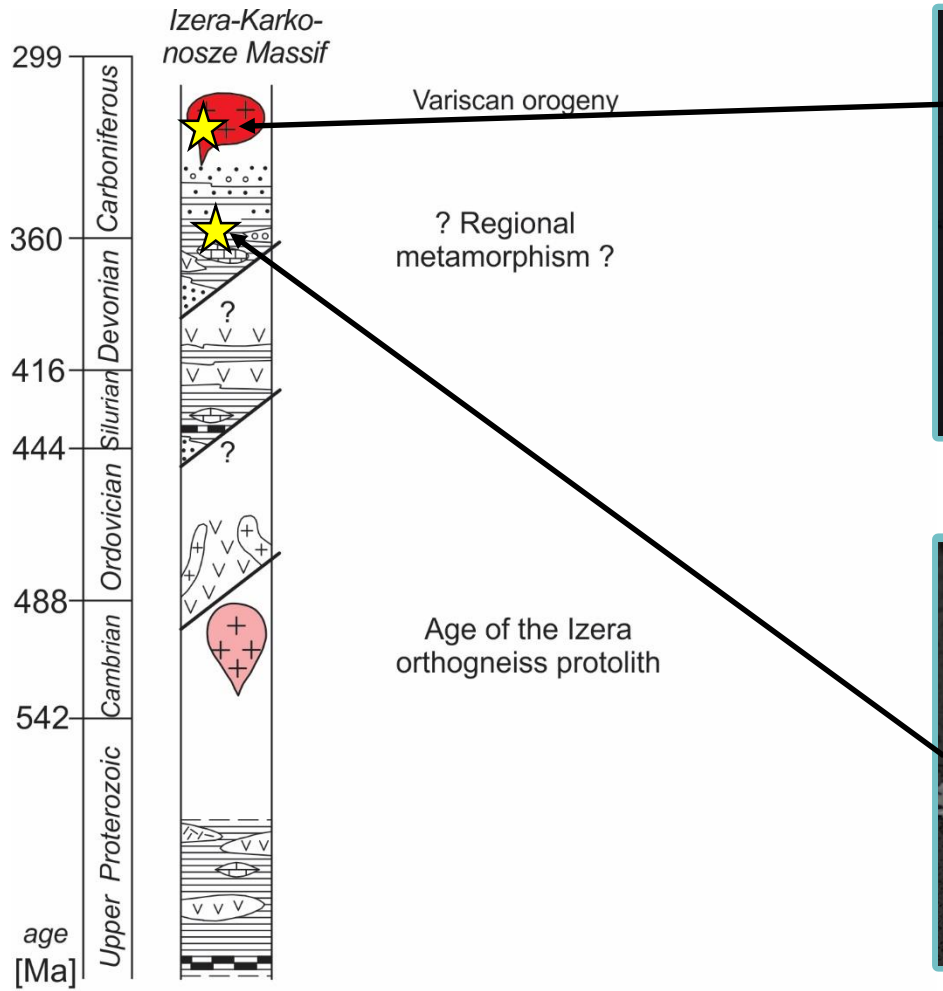













Piława Górna,  
granitic pegmatites  
(NYF + LCT),  
380-370 Ma  
 **$404 \pm 1$  Ma**

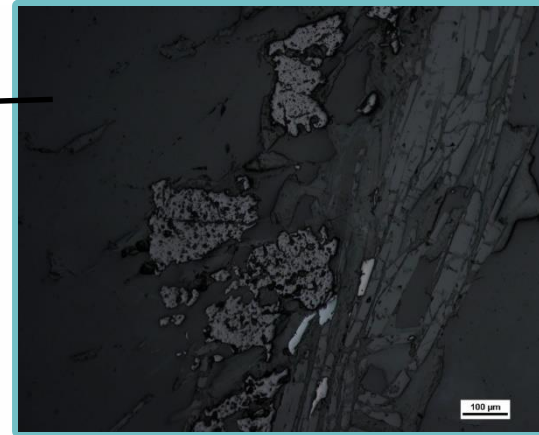
Karkonosze Granite,  
312-309 Ma

Czarnów, polymetallic vein-type ore (As-Au),  
310 Ma  
 **$332 \pm 1$  Ma**

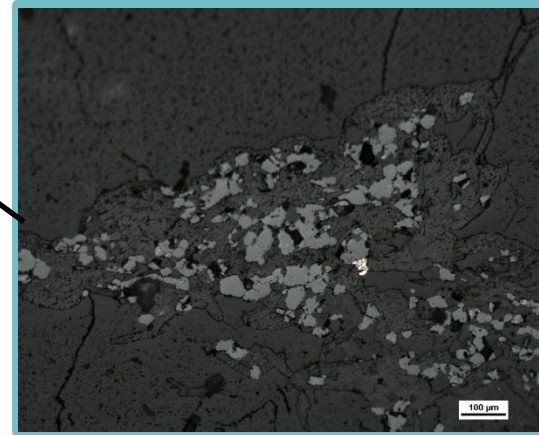
# Cassiterite – geochronology



- |   |   |  |
|---|---|--|
|  conglomerates         |  clay-siliceous shales |  carbonates               |
|  sandstones            |  chert                 |  volcanics, mostly basic  |
|  granitoids            |  flysch & greywackes   |  volcanics, mostly acidic |
|  mudstones, siltstones |  melanges              |  |

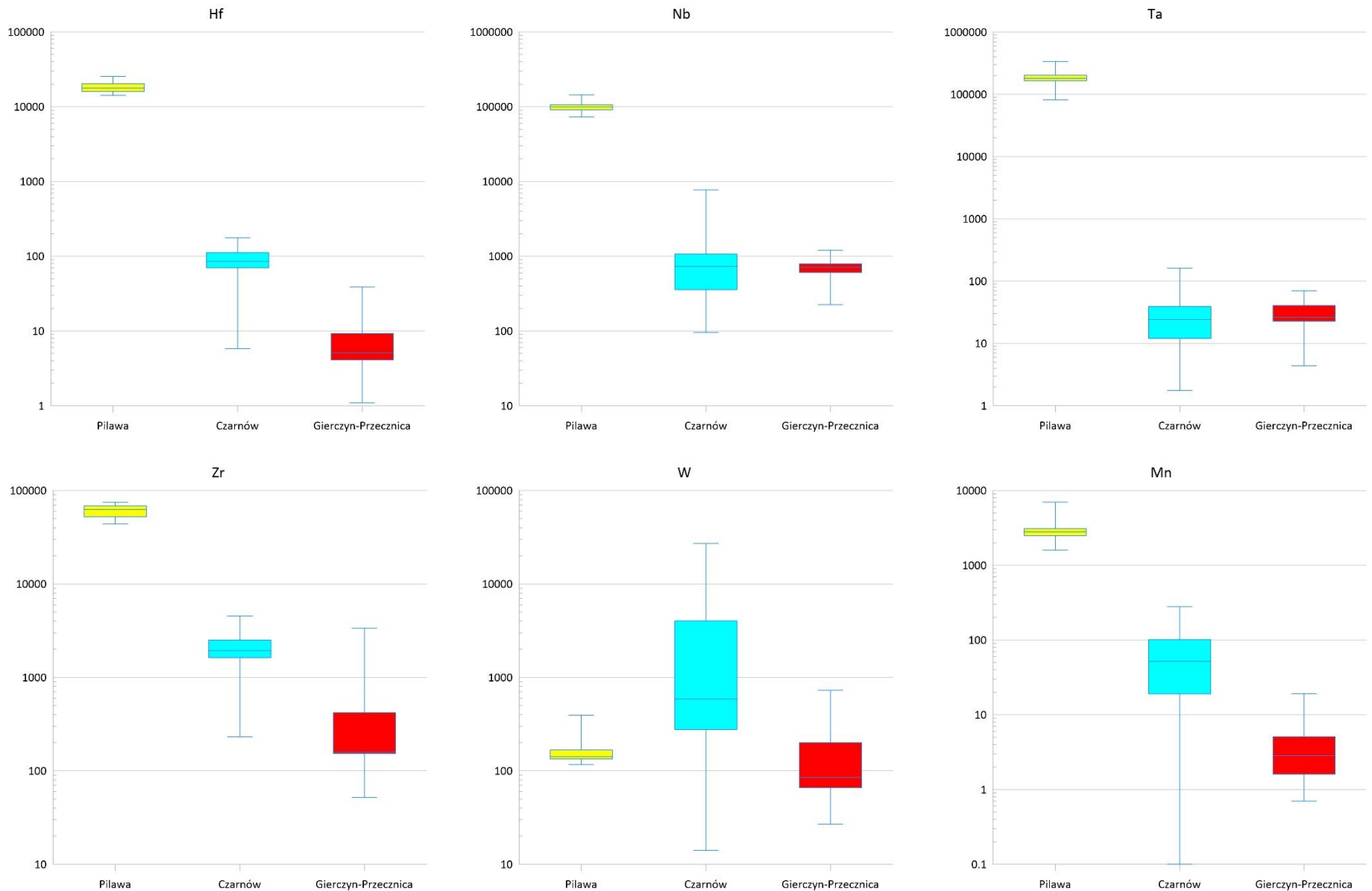


Cas I:  
„brown”  
Spongy  
**~318 Ma**



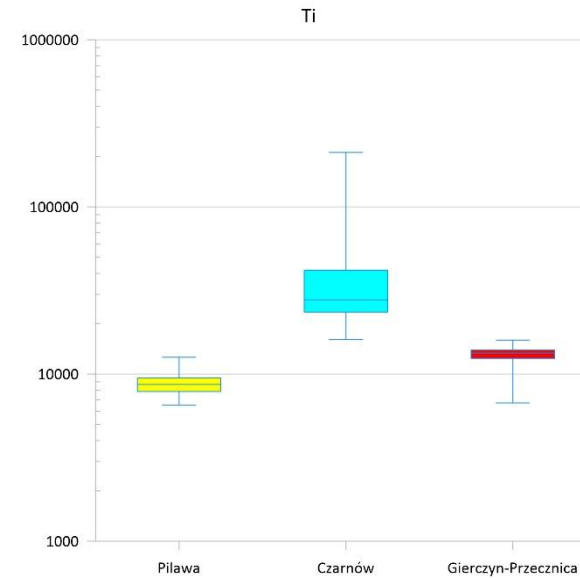
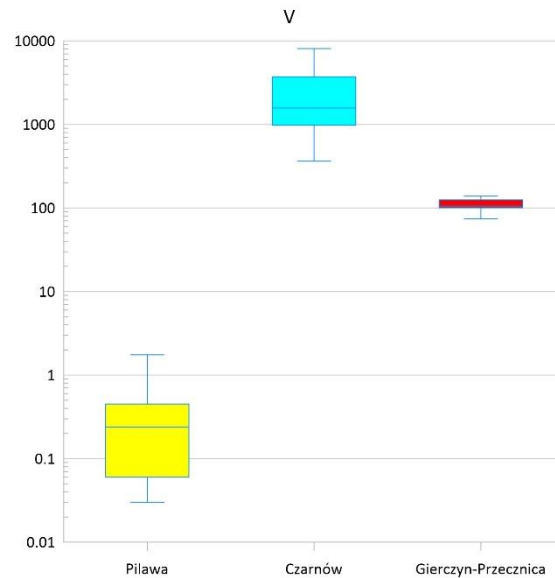
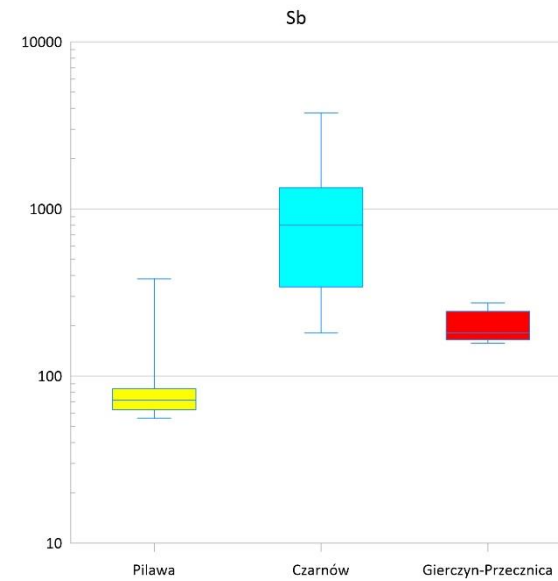
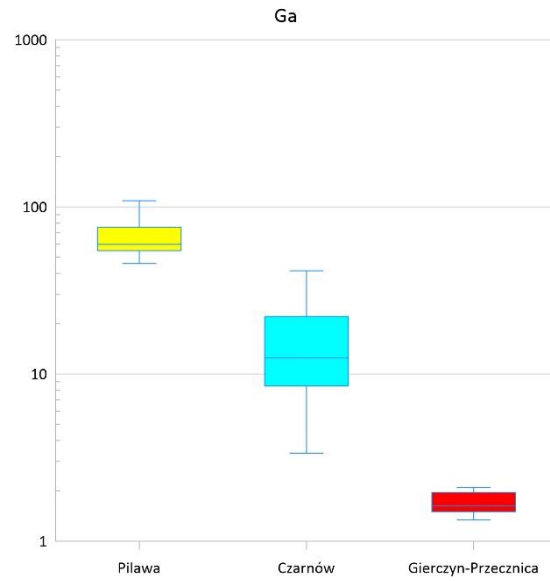
Cas II -  
„transparent”  
& grape-like  
shape - ore  
**~360 Ma**

# Cassiterite – trace elements





# Cassiterite – trace elements



## Summary

- New minerals described for the first time in the area related to polymetallic mineralization
- Petrographic studies of sulphides and cassiterite indicate the mineralization was subjected to regional metamorphism
- The first U-Pb dating of cassiterite corroborate relationship between mineralization and metamorphism (360-350 Ma peak metamorphism)
- Trace elements geochemistry can help to discriminate what type of primary cassiterite mineralization is the source of cassiterite.

# Thank you !

