Visean overprint of the Devonian-Early Carboniferous granites: result of Variscan collisional stage revealed by zircon SHRIMP dating (Tribeč Mts., Western Carpathians)

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Task for the West-Carpathian crystalline basement

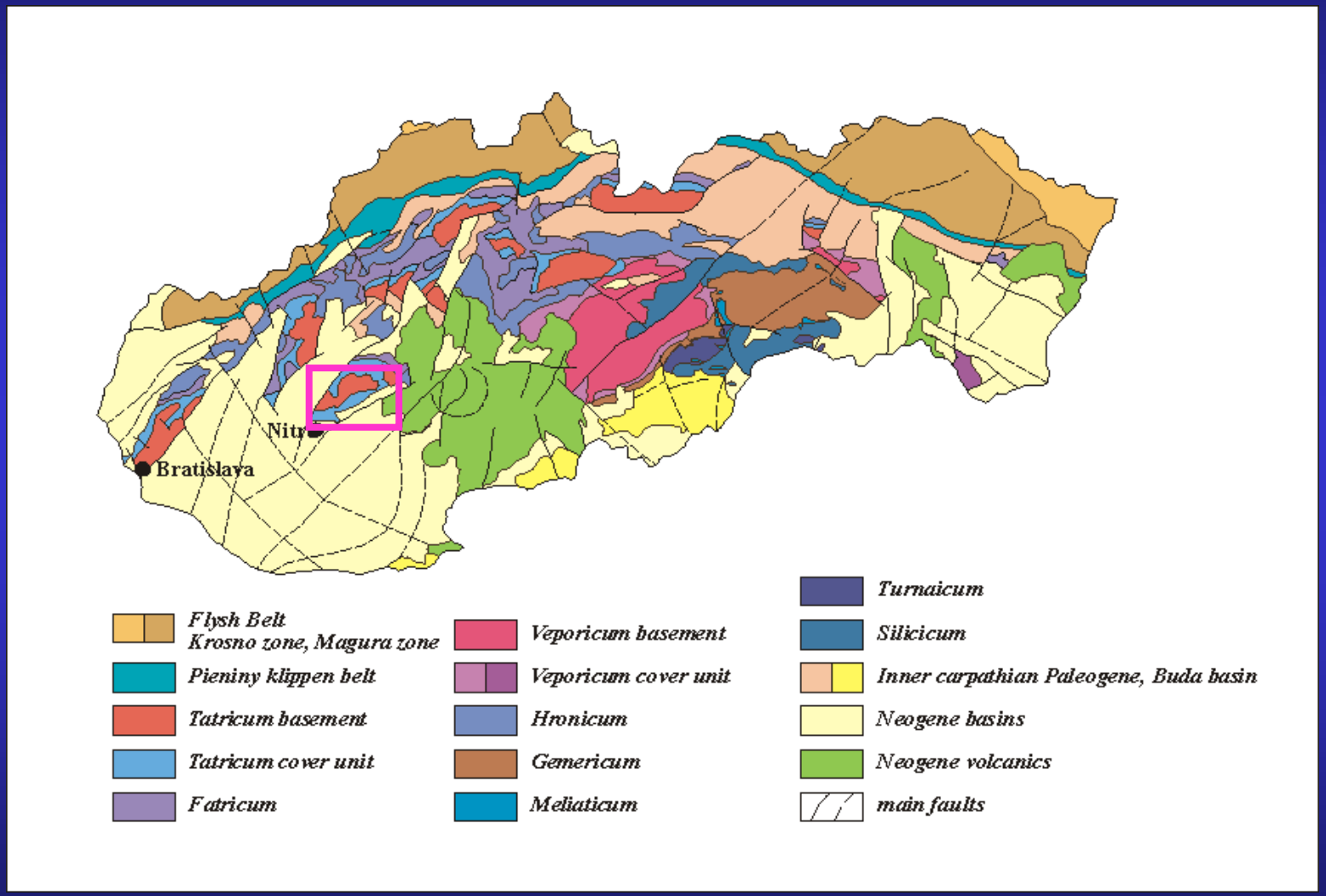
Introduction

1. For the first time determination of granite suites with I- and S-type affinity have been shown in the Tribeč Mts.
2. SHRIMP dating of granites with I-type affinity has been interpreted as the early subduction related granites and they show time span of origin ca 360- 358 Ma

Task

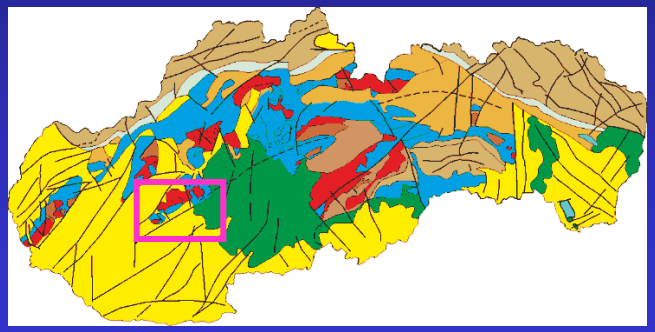
Presentation of new zircon SHRIMP data and relevant Hf isotopes from granites with S-type affinity in the Tribeč Mts.

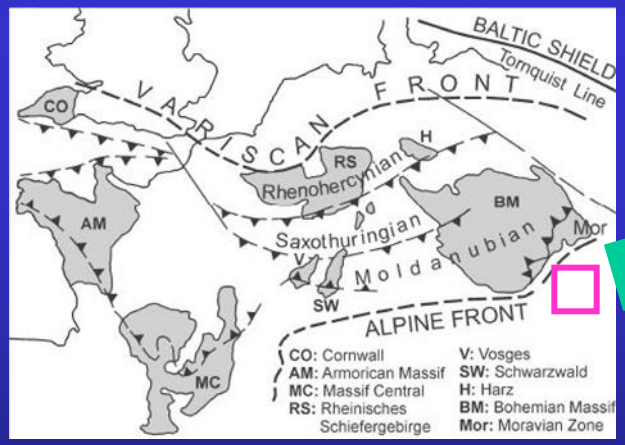
Variscan granites in Paleozoic fragments of the recent Western Carpathians and position of the Tribeč Mts.



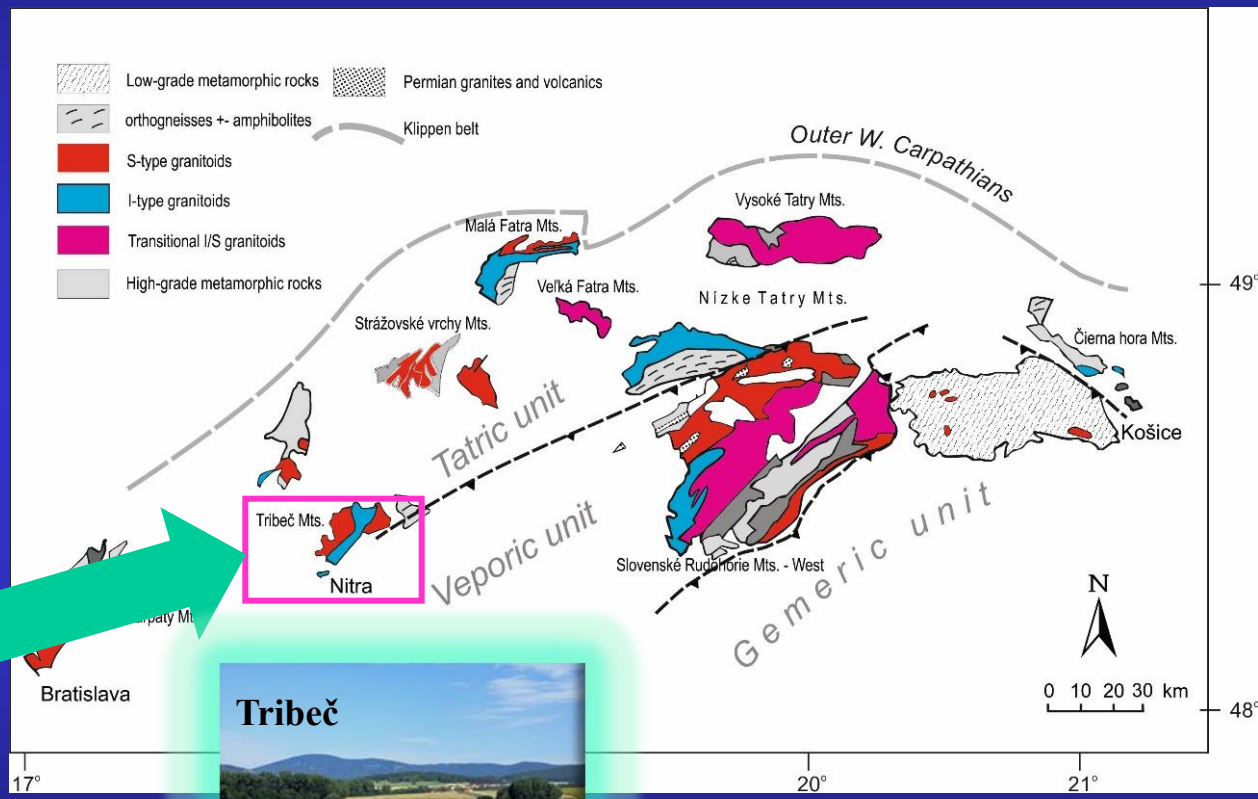
Granitoids in the Western Carpathians are marked by red colour; (te Tribeč Mts is in square)

Variscan granitoids (coloured) from Paleozoic fragments of the recent Western Carpathians with position of the Tribeč Mts.



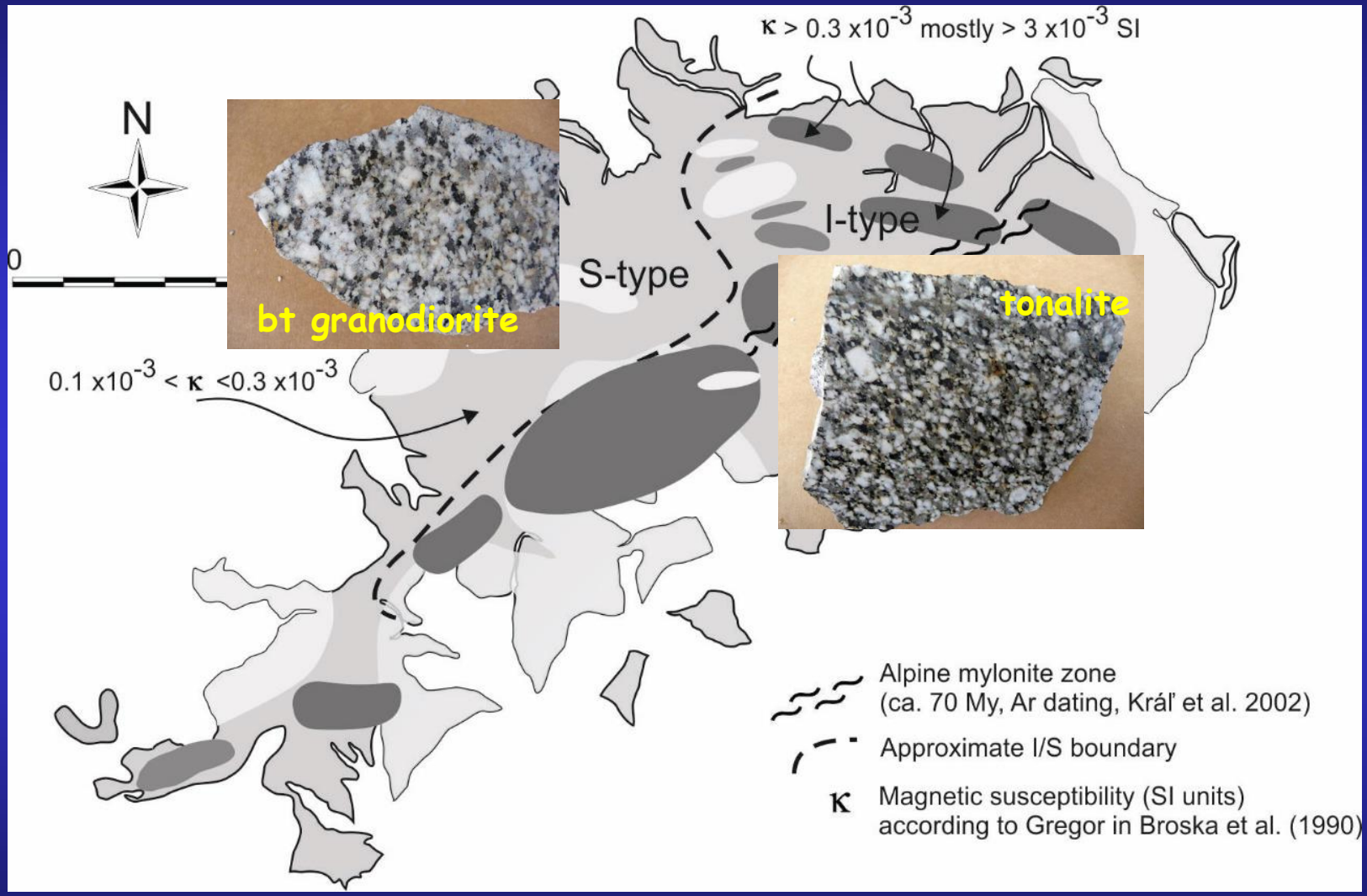


Variscides acc. to Karle Franke



I. Broska and P. Uher 2000

S- and I-type granites and magnetic susceptibility

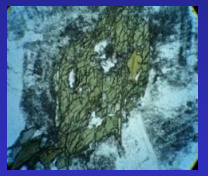


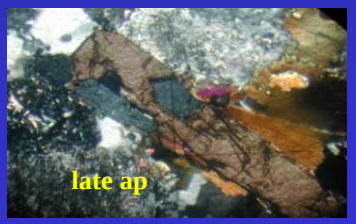
Magnetic susceptibility determines the position of the I- and S-type granites

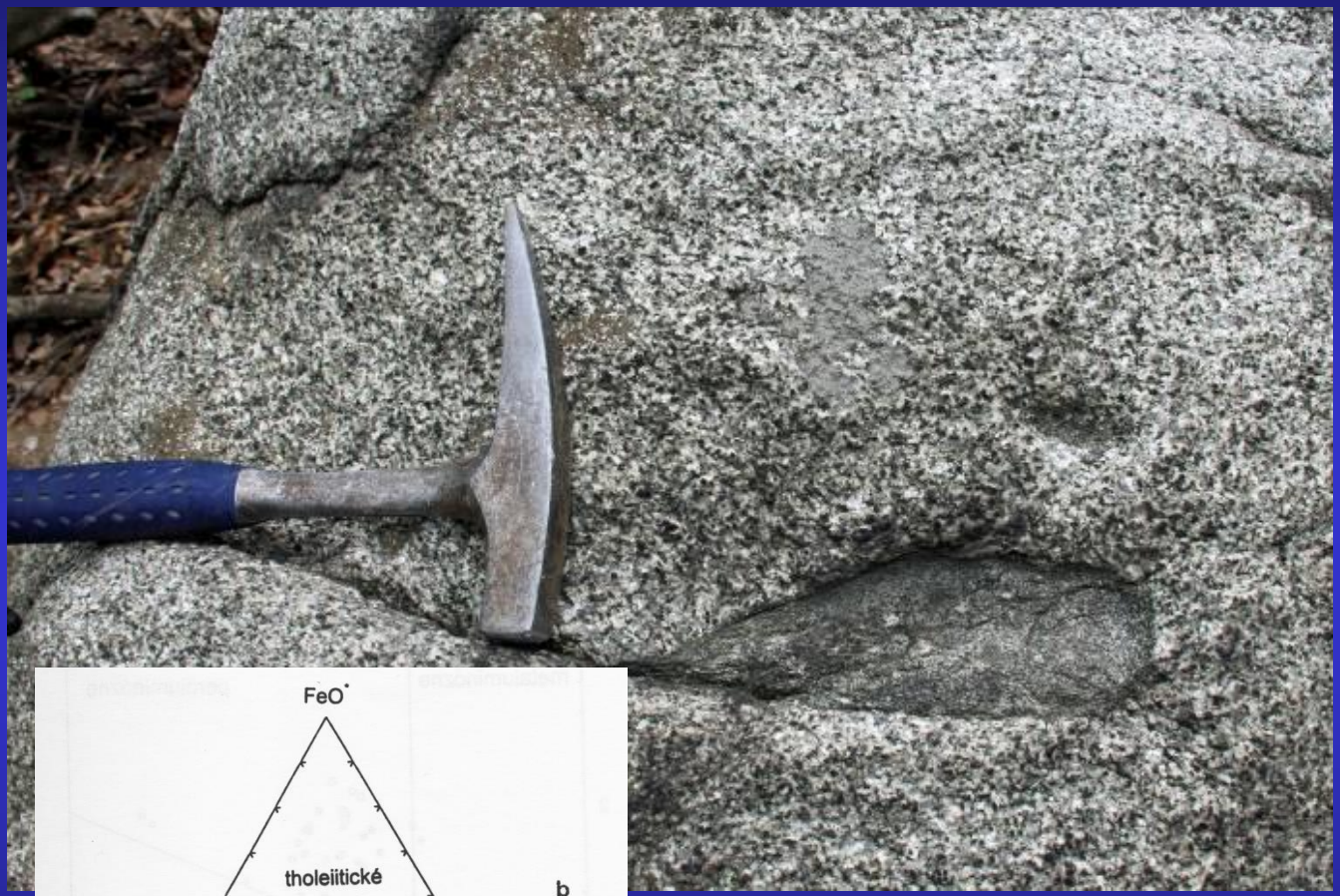
Isolines of magnetic susceptibility according to SI values

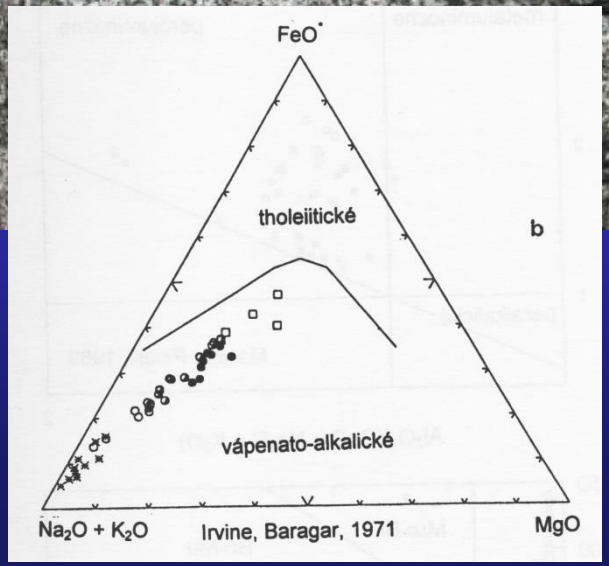
I-type Varican bt tonalite in the Tribeč Mts.

accessory mineral paragenesis:
aln, ap, mag, tnt, ep ± hbl

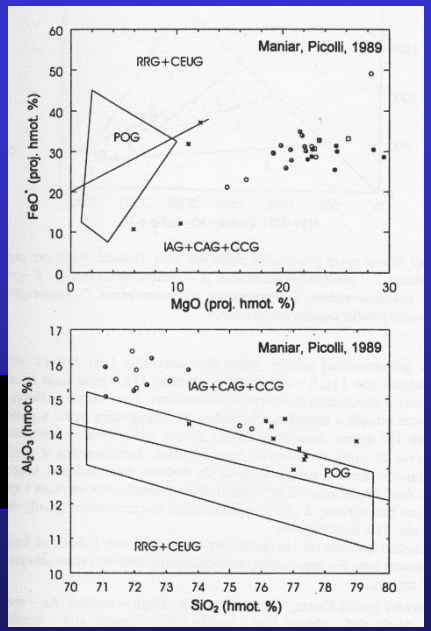








I-type tonalite-granodiorite (T > 800 °C, P 500 MPa) are locally wirh mafic microgranular enclaves;

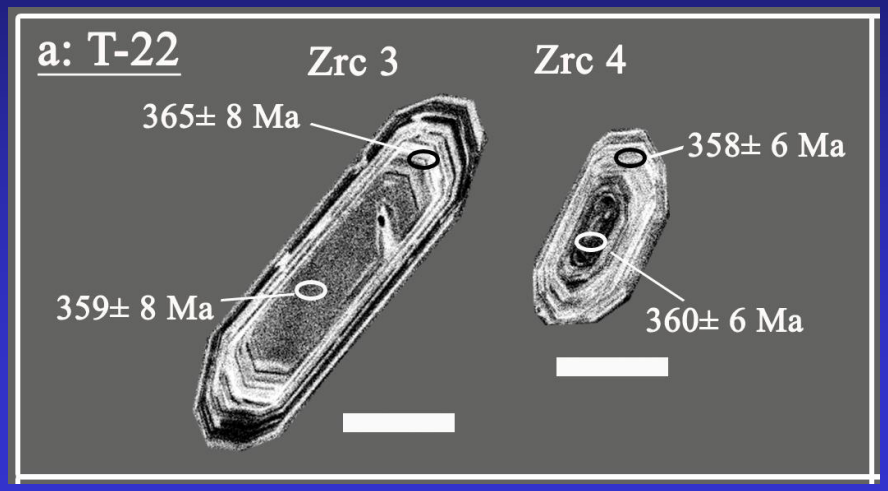


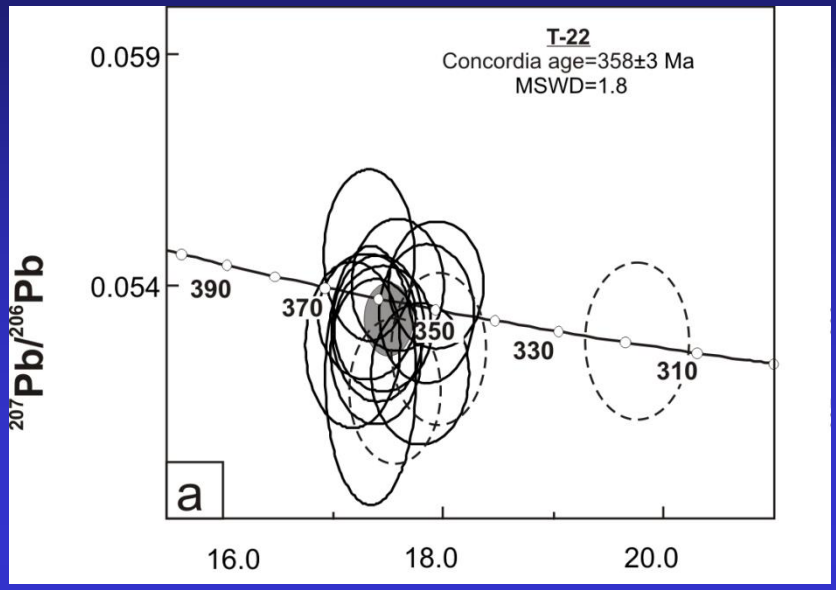
Calc-alkaline character of granites

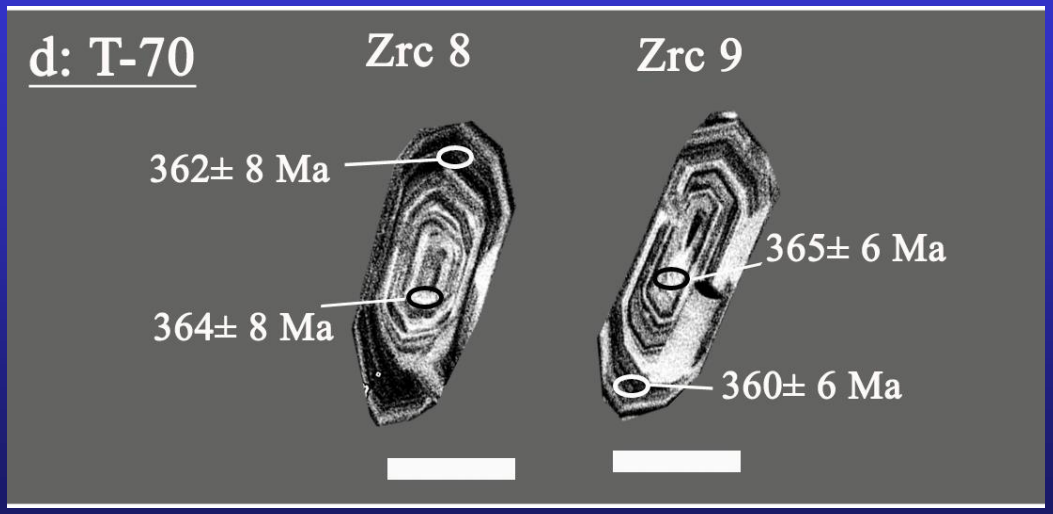
Ivanička et al. 1998

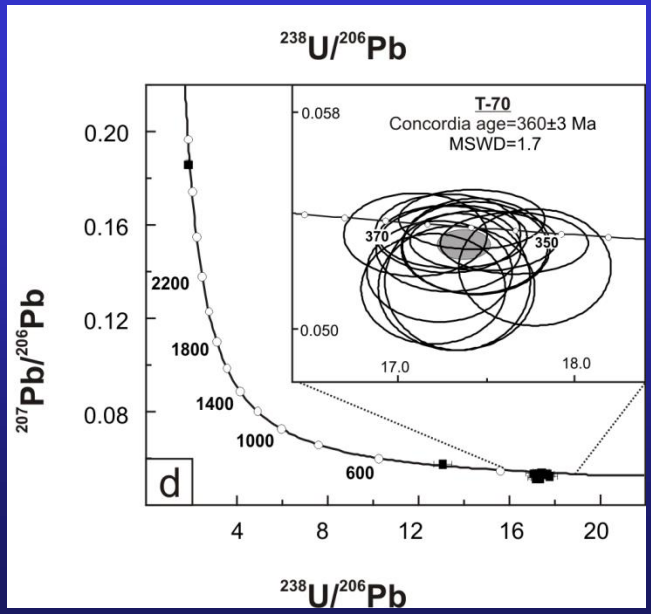
zircon SHRIMP dating of the I-type granites in Tribeč Mts.

Broska et al. 2013

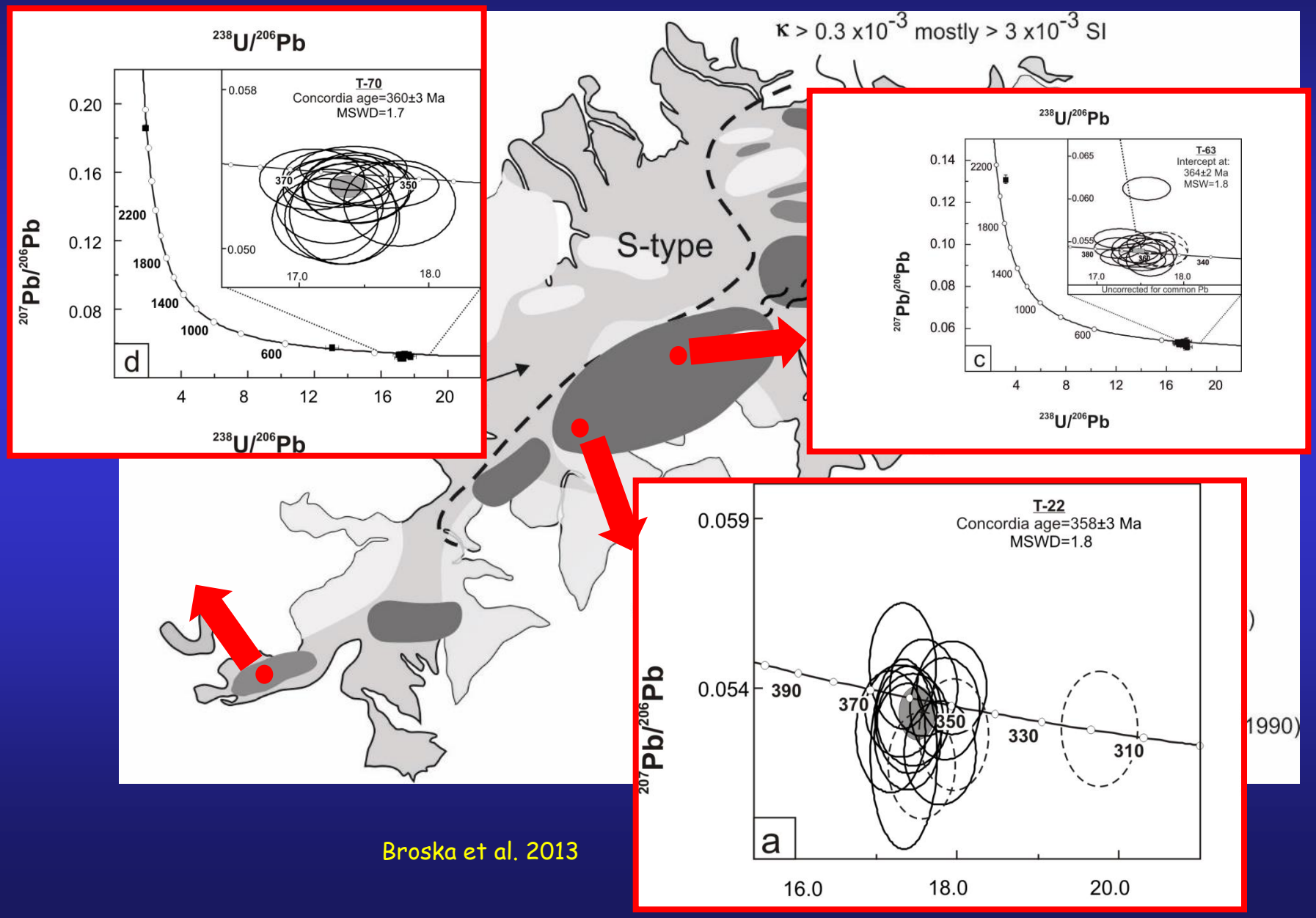








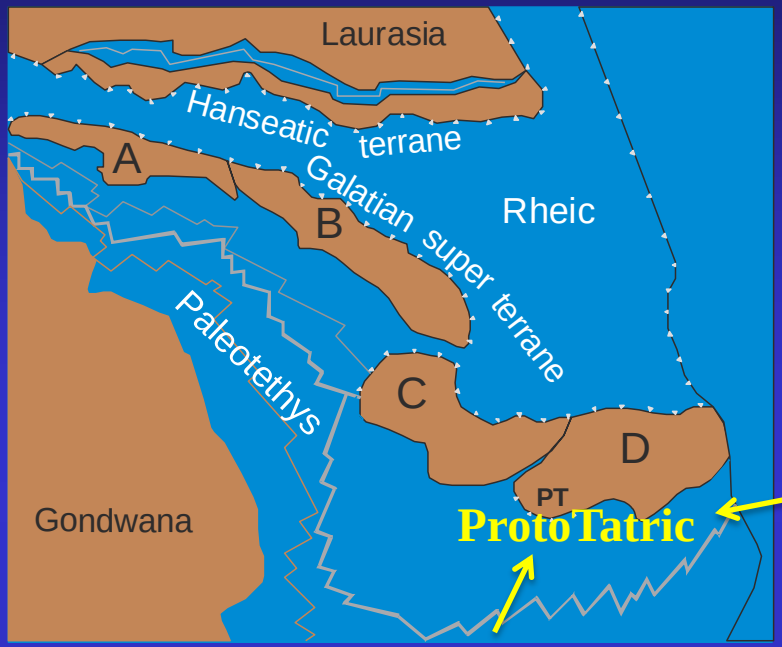
Location of dated I-type granites



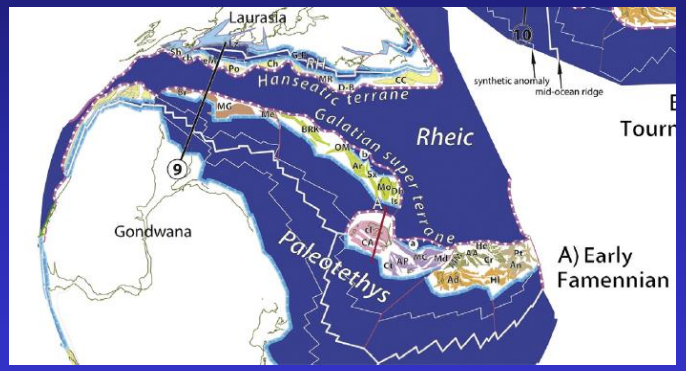
Broska et al. 2013

Hypotetic origin of the I- and S-type granites (ca 360 Ma)

Broska et al. 2013



Position of granite formation

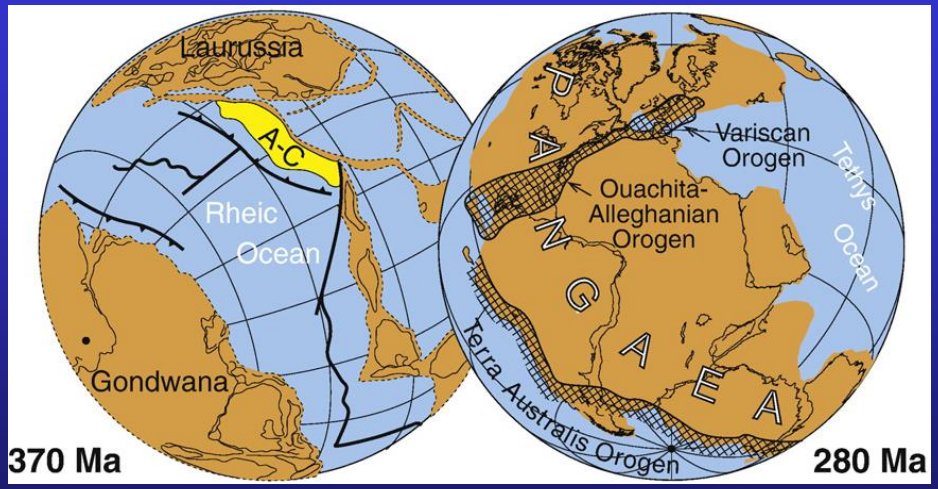


West-Carpathian I-type: metaluminous/peraluminous tonalites-granodiorites with microgranular mafic enclaves;

S-type: peraluminous granodiorites, granites with xenolithes

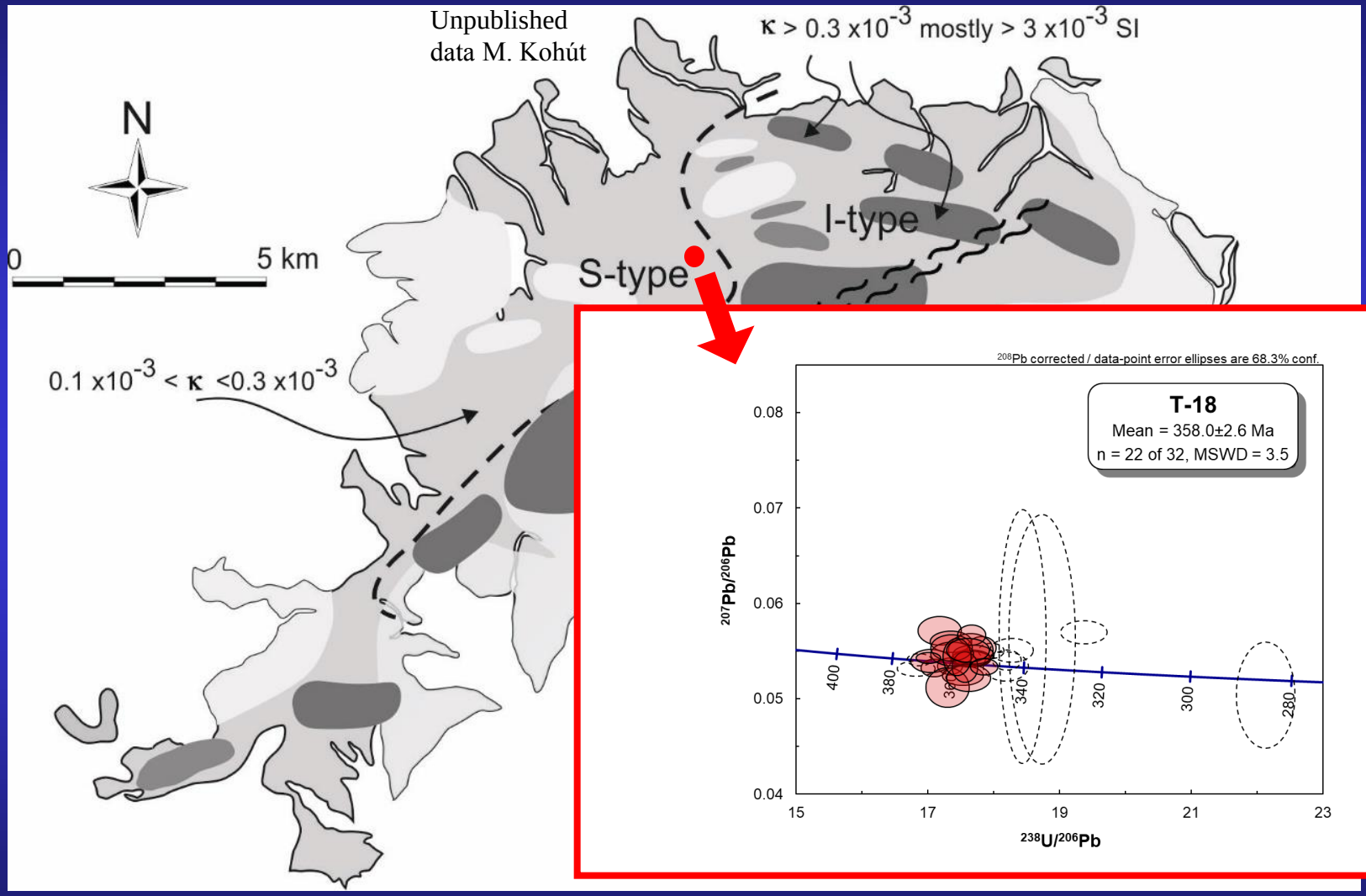
Paleogeography acc to Stampfli and Borel 2002, Stampfi et al (2011);

A- Meguna terrane;
B – Armorica terrane;
C- Ibero-Ligurian terrane;
D – Intra-Alpine terrane



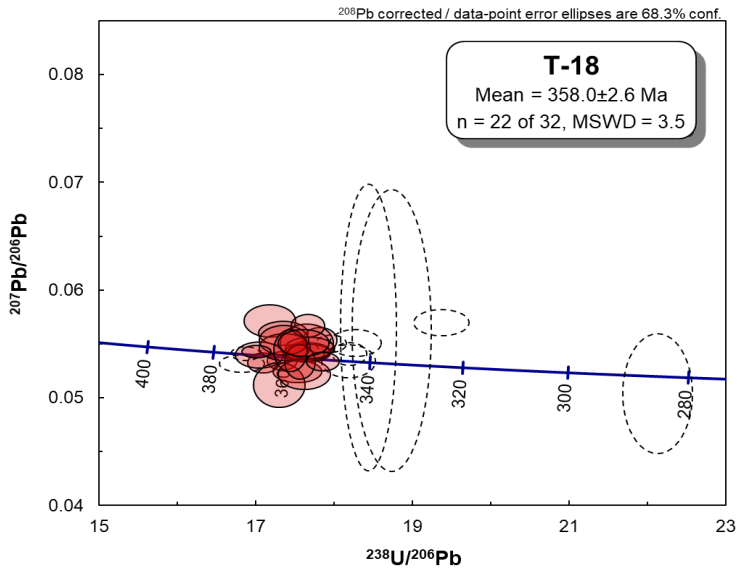
Nance et al. 2010

low kalium S-type granites show age ca 358 Ma (SHRIMP)

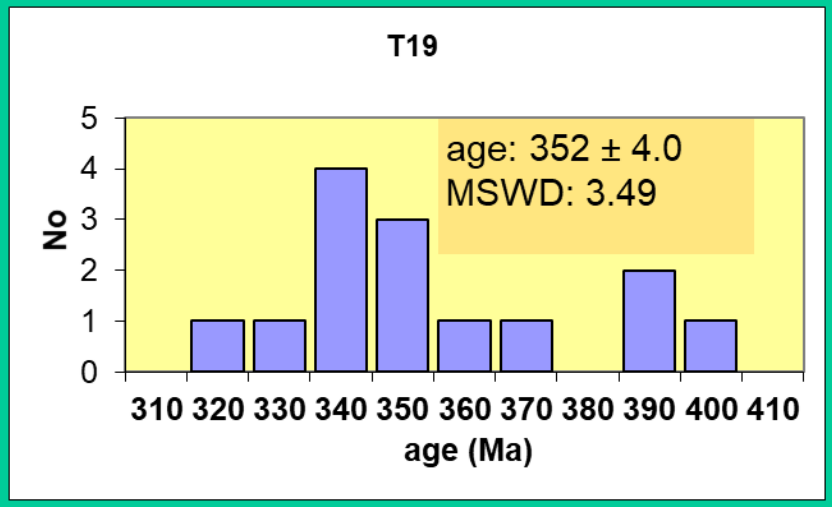


Magnetic susceptibility discriminates the I and S-type granites in the Tribeč Mts

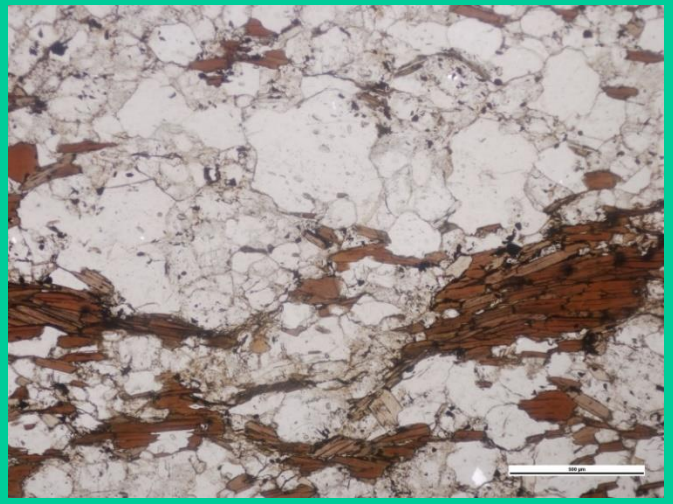
low kalium S-type granite shows age 358 Ma (SHRIMP)



S-type; biotite granodiorite T-18

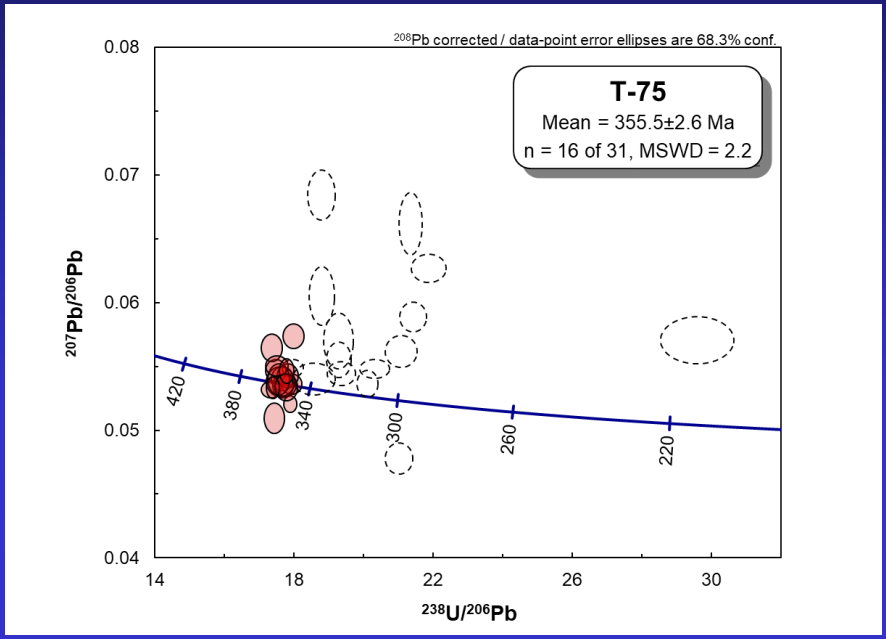


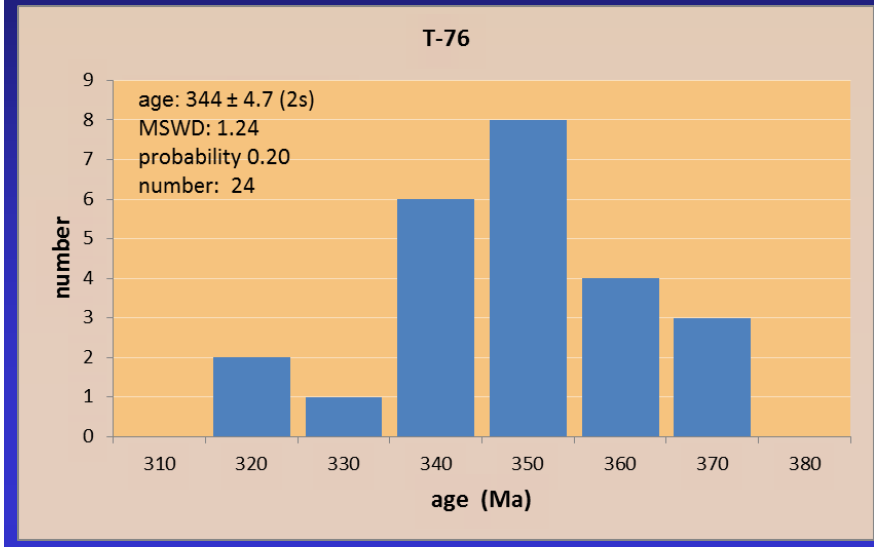
metapelite on contact with S-type granite (mnz CHIME dating)



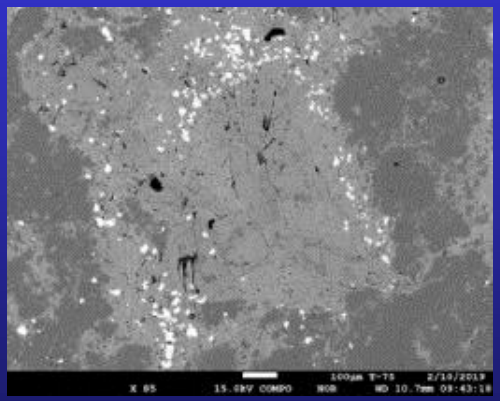
granite in age 355 Ma greisenised in age ca 344 Ma

SHRIMP dating

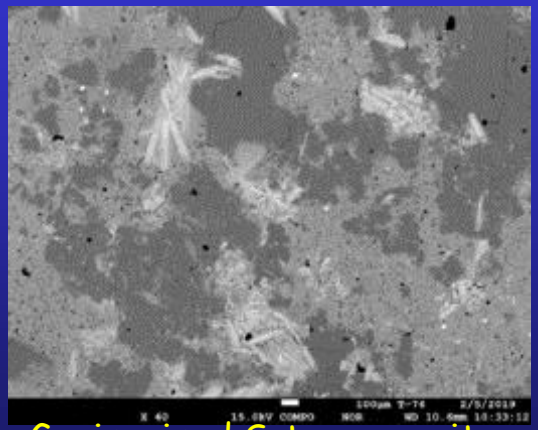




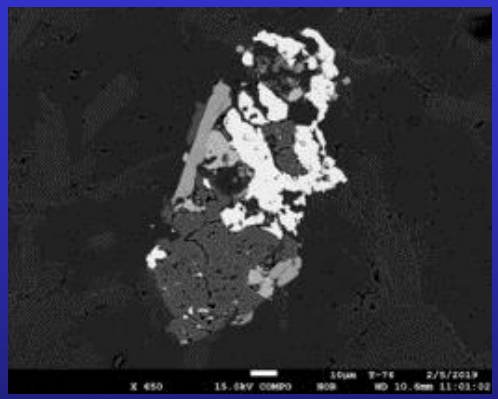
Mnz probe dating



secondary tiny apatite indicates fluid influence on granite system

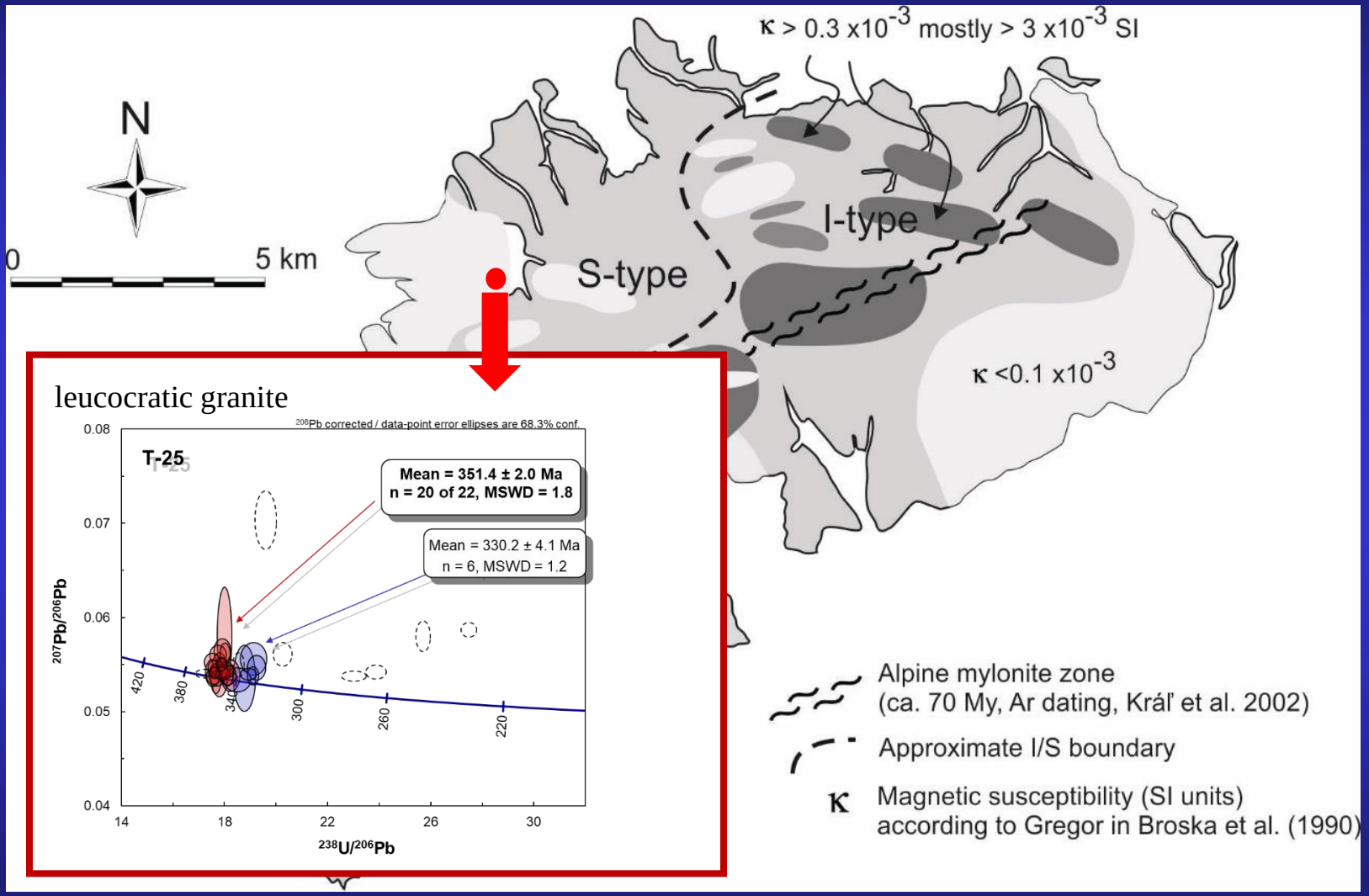


Greisenised S-type granite; (quartz, white mica, accesories)



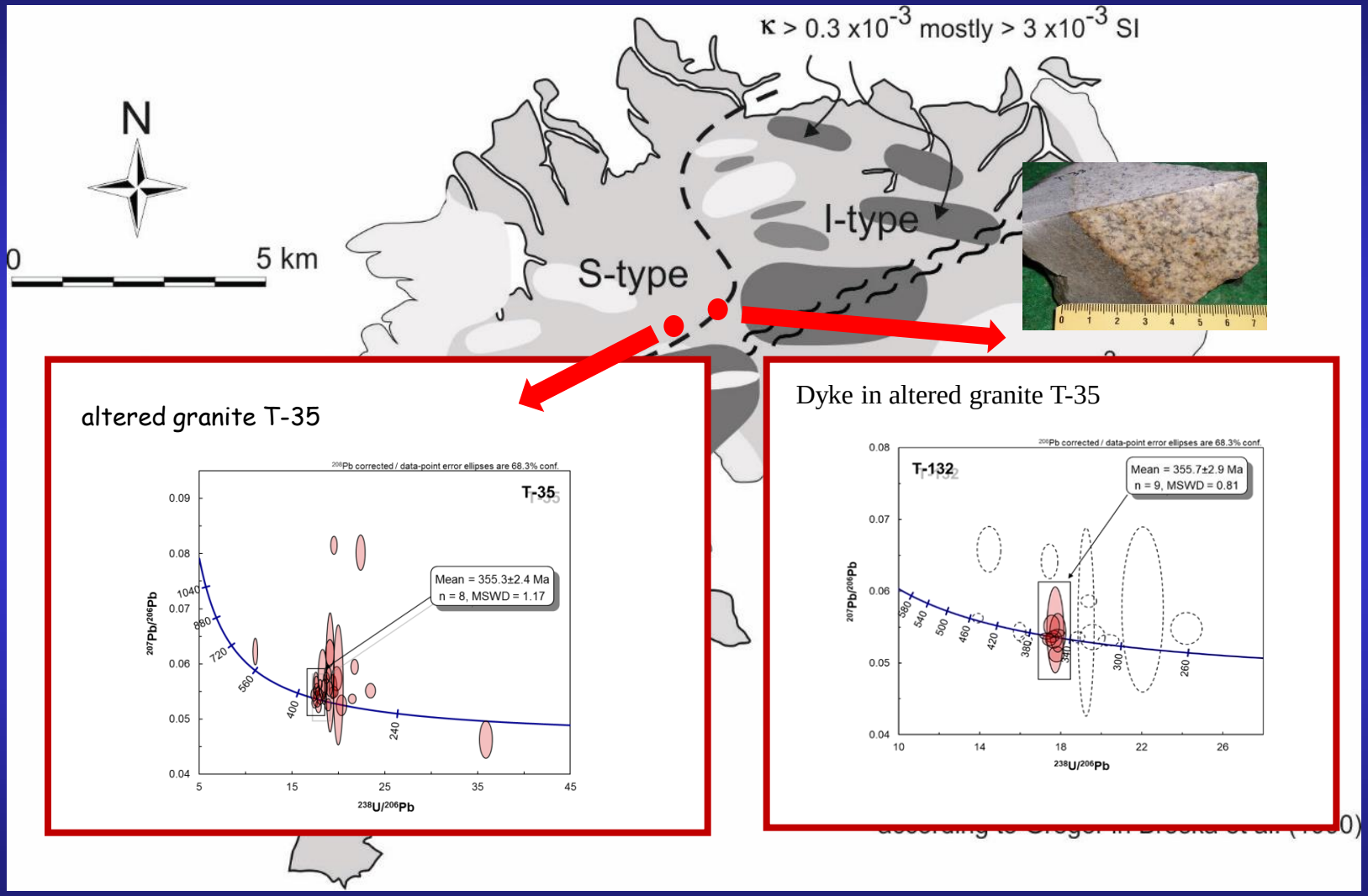
Overprint of apatite form new monazite (bright parts)

high kalium leucocratic S-type granites: primary age ca. 351 Ma, age of overprint ca 330 Ma

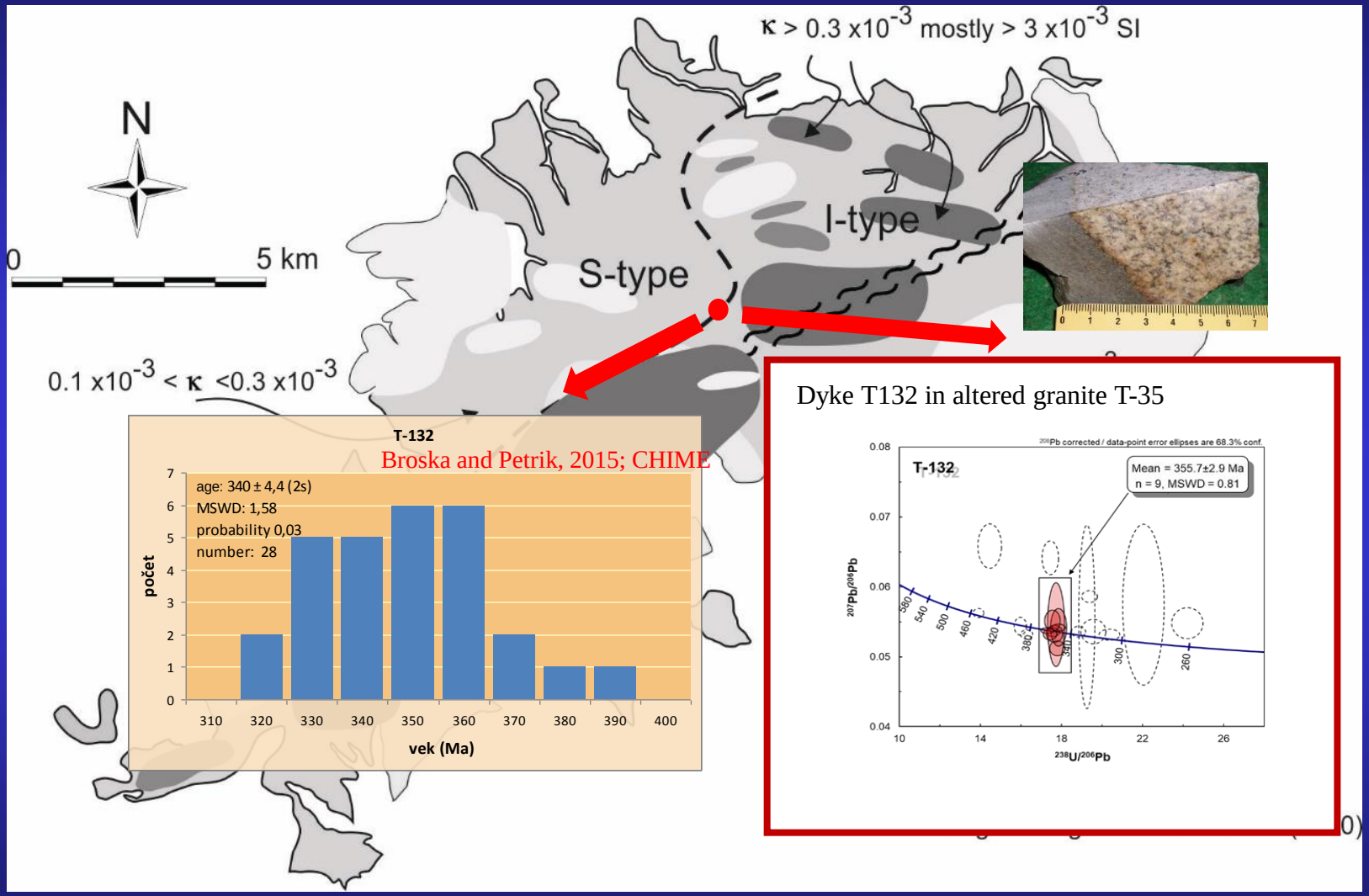


SHRIMP dating

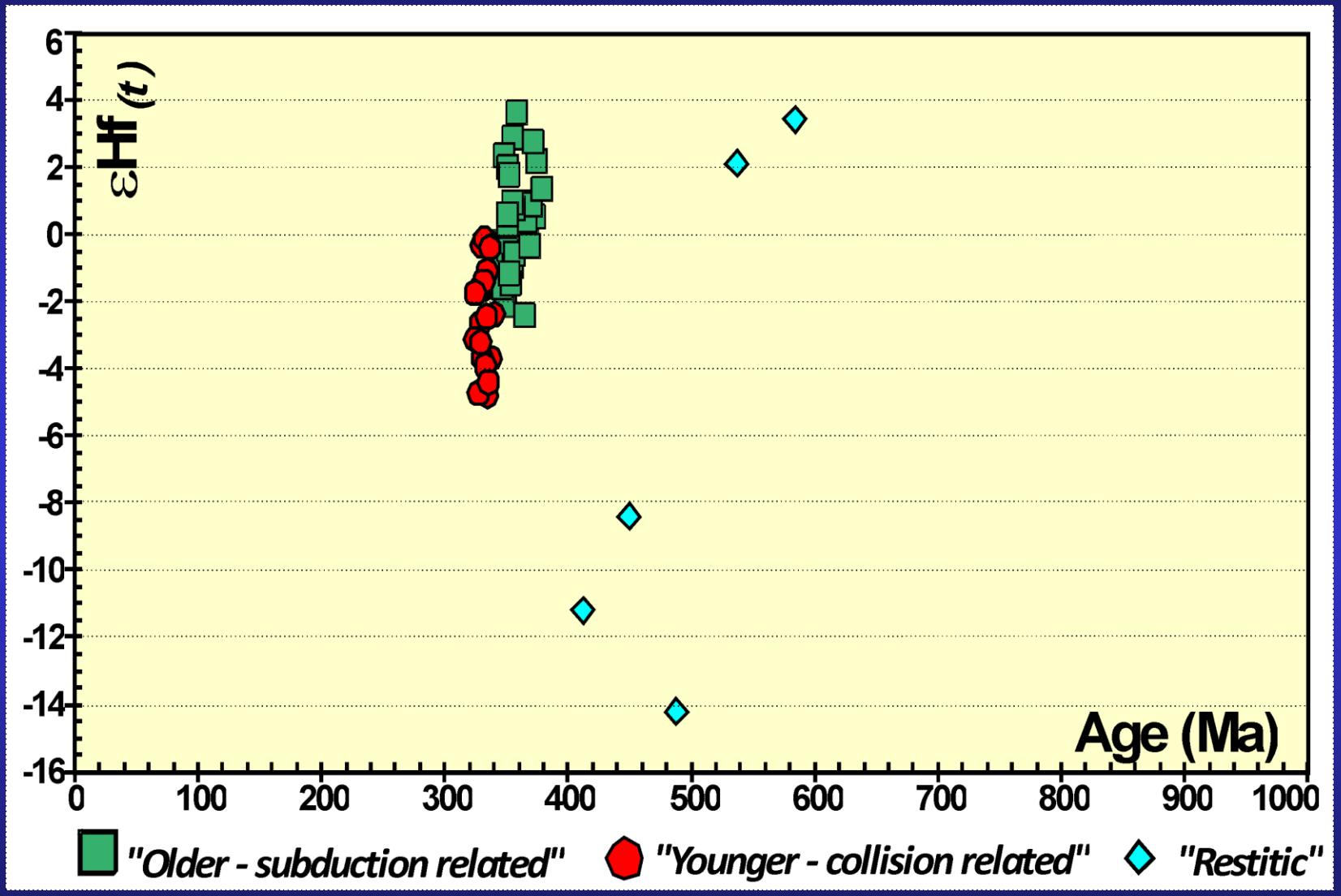
S-type granites are tectonically above location of samples T-18, 25, 75 show age ca 355 Ma (SHRIMP)



S-type granites tectonically above granites T-18, 25, 75 show age ca 355 Ma

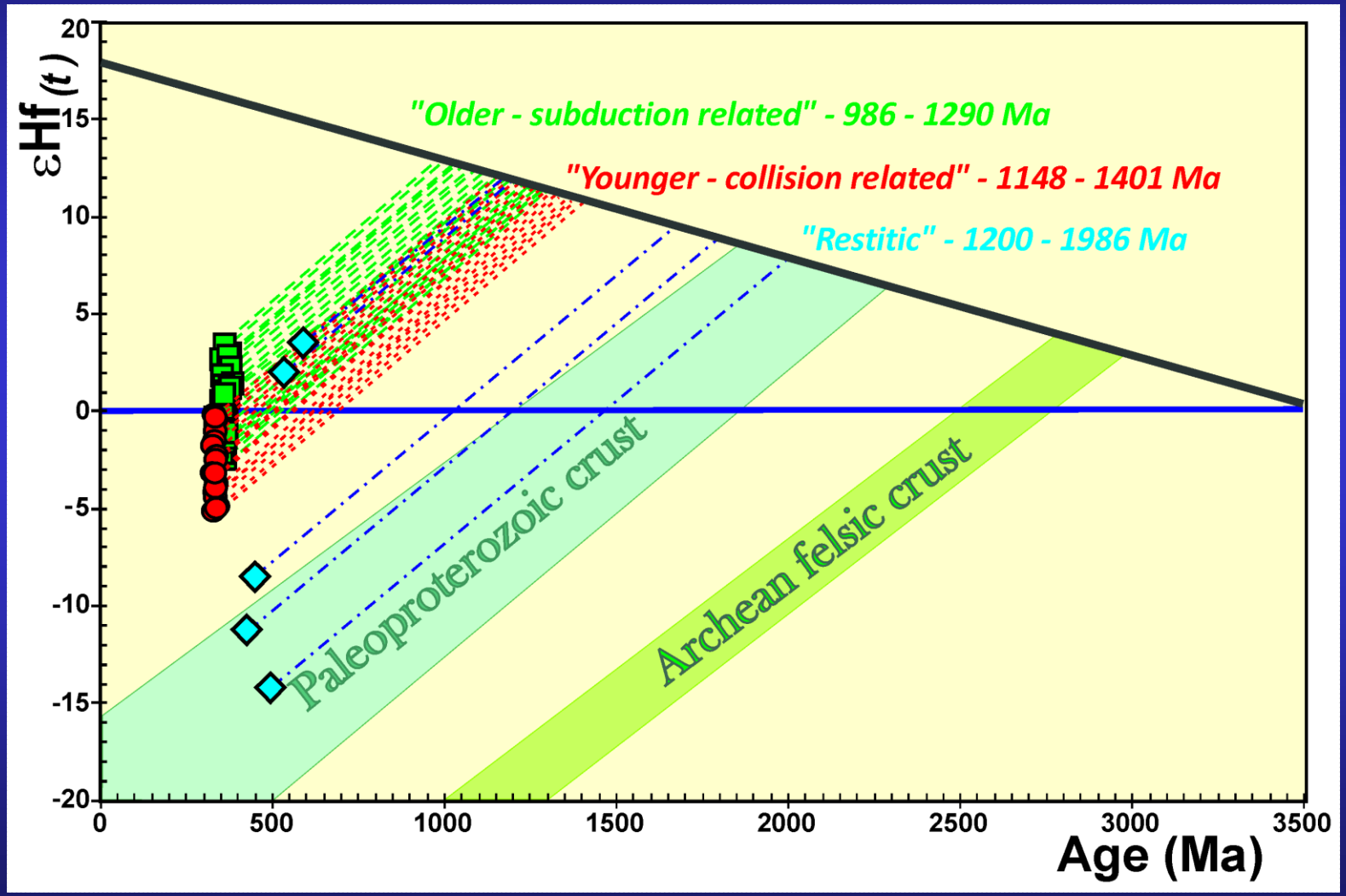


Difference in epsilon Hf from zircons within two S-type granite types

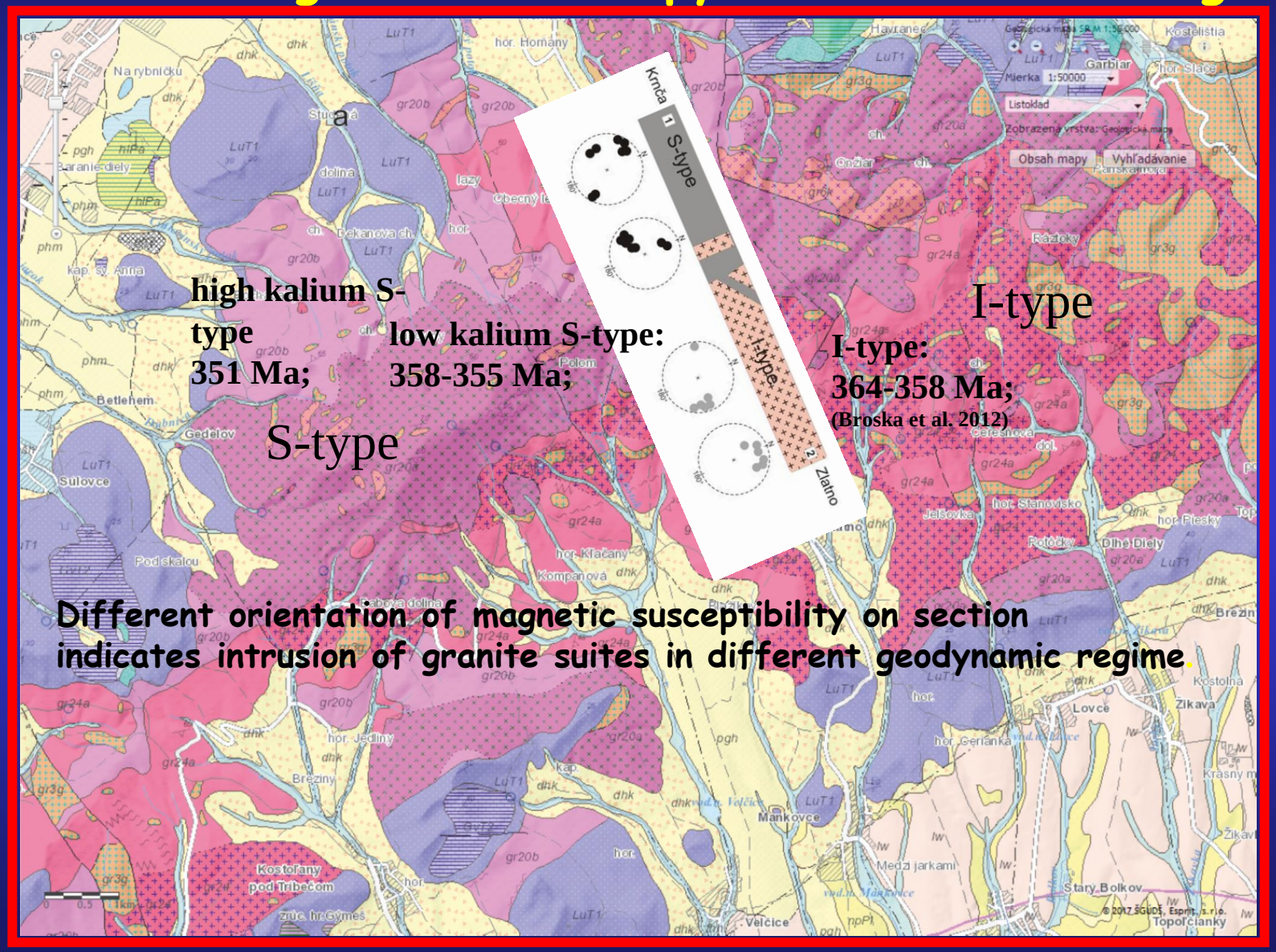


Data taken from the samples T-18, T-25, T-35, T-75

Differences in crustal residence (Hf model ages from zircons)



Dated section in the Tribeč Mts. and related magnetic anisotropy of the I- and S- granites



Conclusions

Devonian/Carboniferous calc-alkaline subduction related

I- and S-type tonalite/granodiorite from the Tribeč basement is in following time range:

I-type granites 364-358 Ma

S-type granites 358-355 Ma, late differentiarte 351 Ma

New SHRIMP dating shows continuation of magmatic process from I-type to S-type granite

Time of granite alteration indicated by monazite and zircons datings are Visean in age or in range 340 -330 Ma probably as a result of Variscan collisional activity

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