http://doi.org/10.54499/ERA-MIN/0005/2019
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https://mostmeg.rd.ciencias.ulisboa.pt/

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Decoding Sn-W mineralisations and tourmalinization events through key alluvial heavy minerals, in Segura: a stage of target generation.

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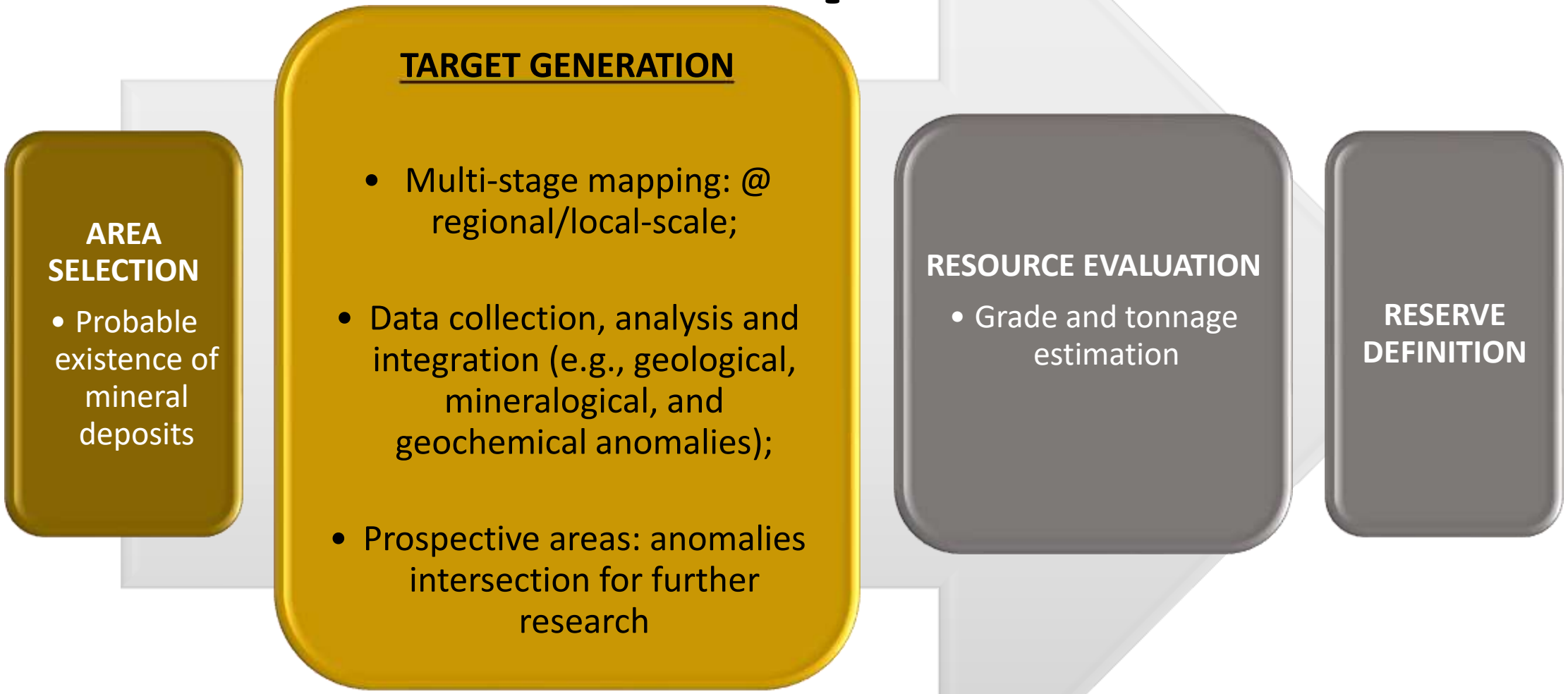
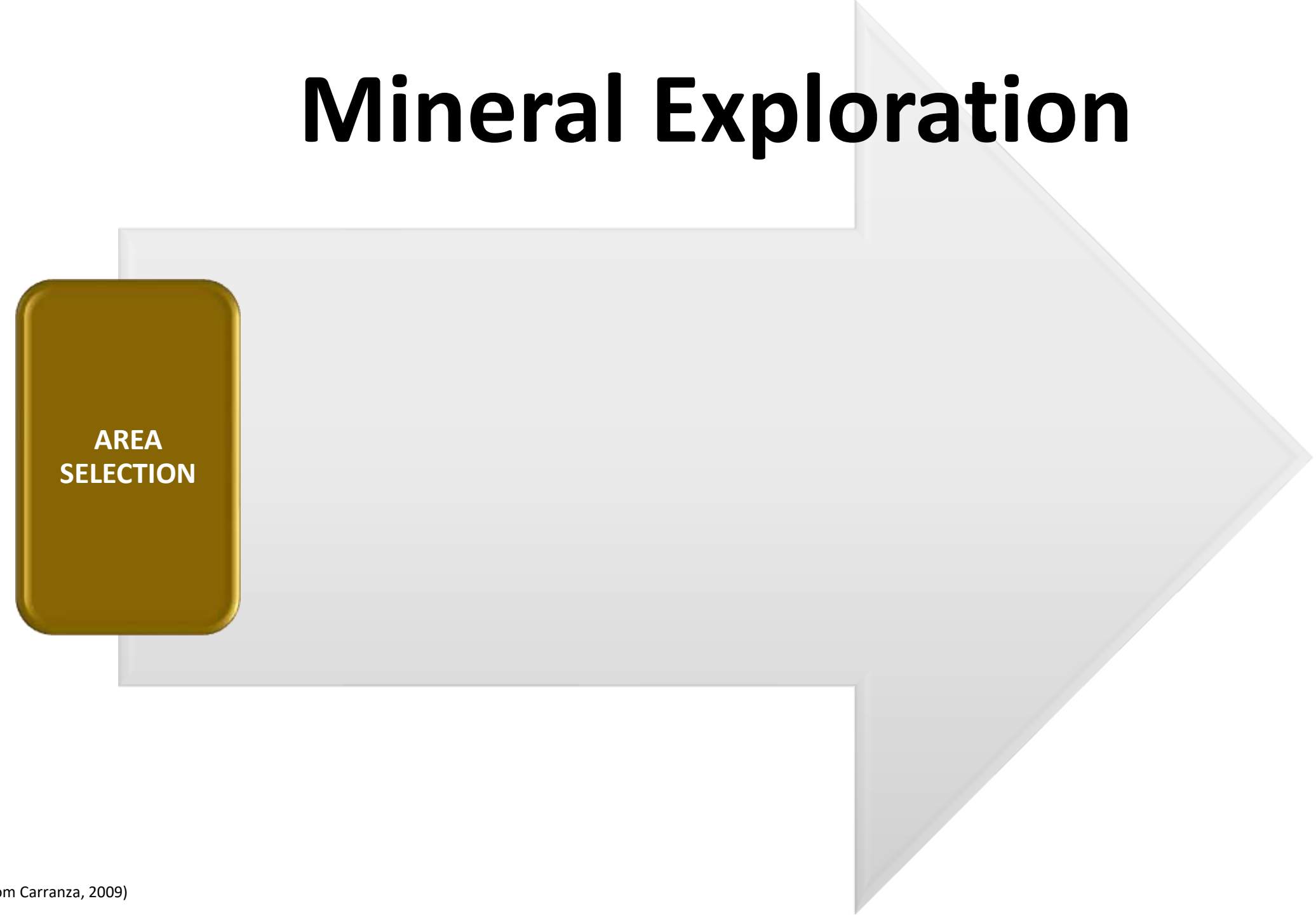
Mineral Exploration



(Adapted from Carranza, 2009)

Mineral Exploration



(Adapted from Carranza, 2009)

- Segura (Castelo Branco)

Góis_Segura Sn-W metallogenetic Belt

Peribatholitic Sn-W mineralisations exploited in the past

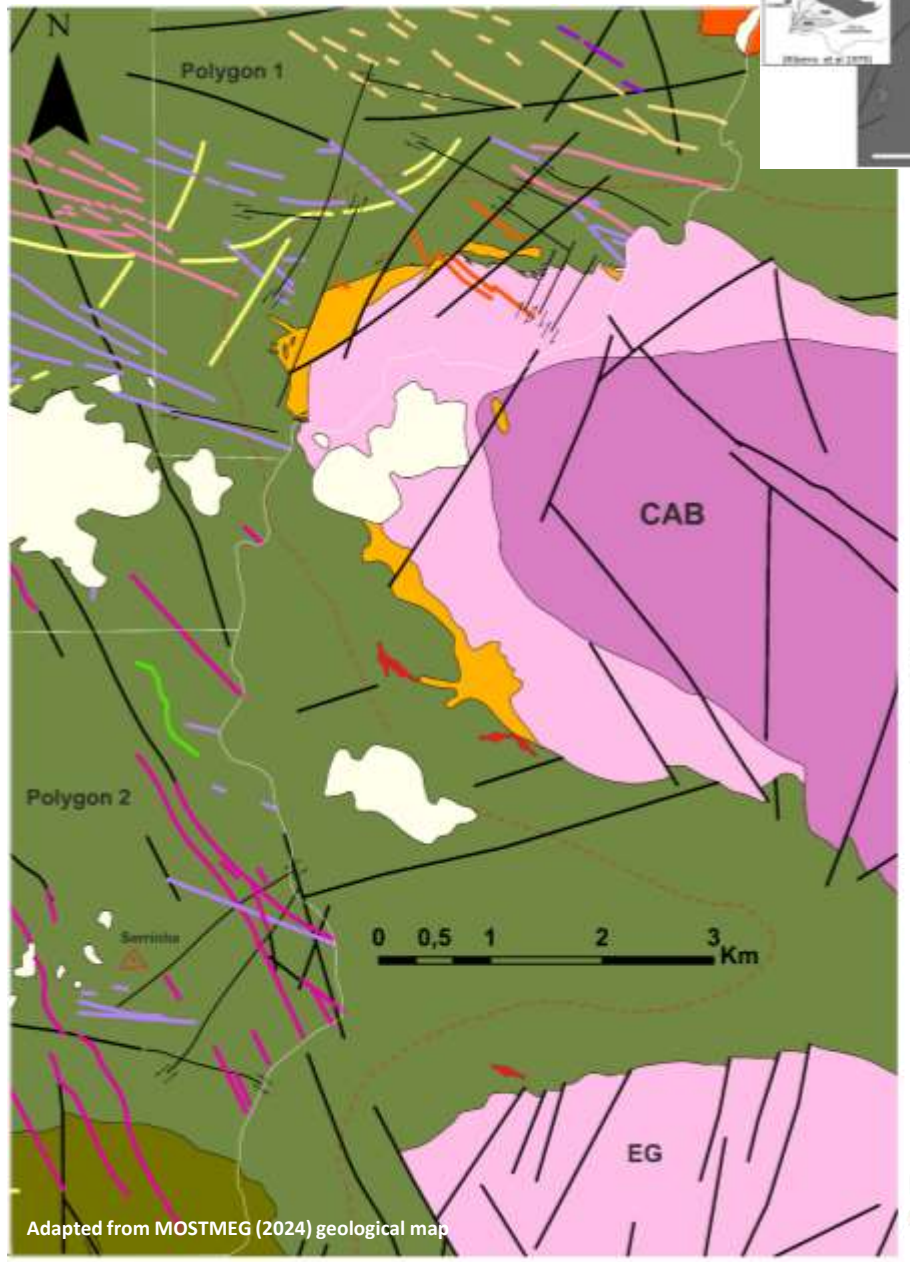
✓Sn-W quartz veins

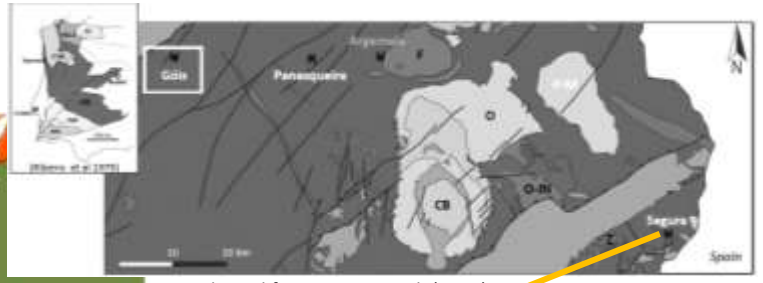
✓Sn-bearing aplites/quartz lodes

✓Li (-Sn) aplite-pegmatites

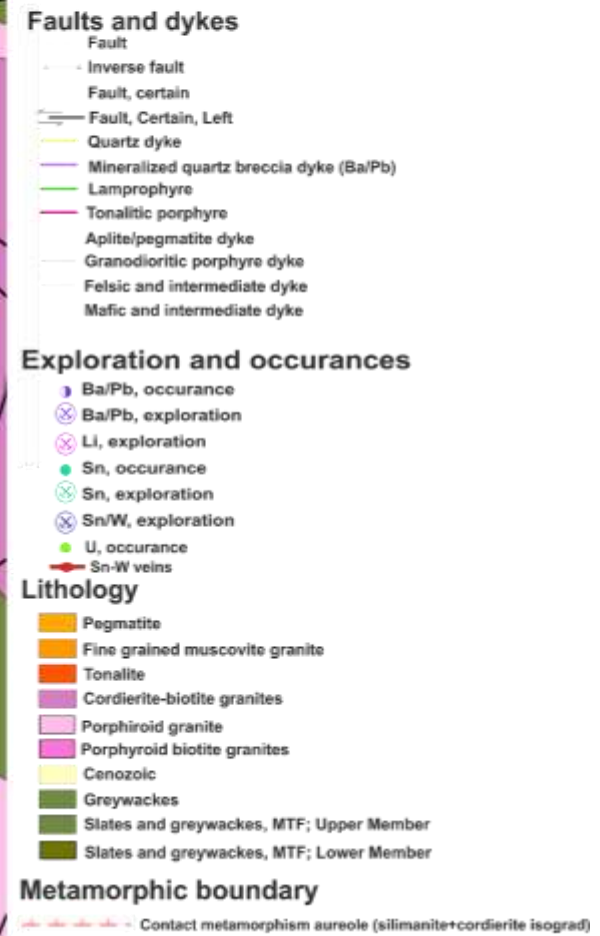
Hosted in metasediments

- Influence of the Estorninos granite; and its peri batholithic Sn quartz veins?





Adapted from Gaspar et al. (2022)



Mineral Exploration

TARGET GENERATION

- ✓ Mineralogical mapping:@ Regional/local-scale;
- ✓ Data collection, analysis and integration (i.e., mineralogical “anomalies”)

(Adapted from Carranza, 2009)

Alluvial Heavy Minerals

Alluvial samples
(sieved and panned)

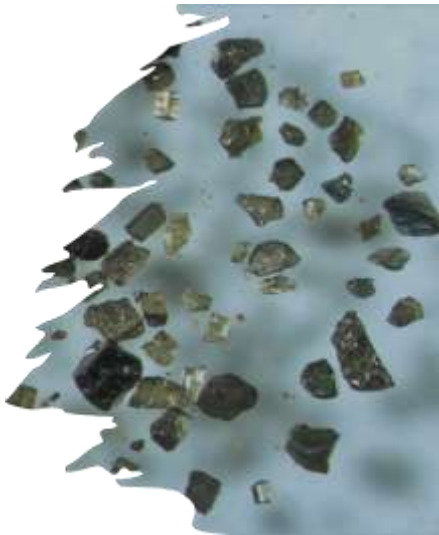
Heavy liquids separation

Magnetic susceptibility
separation

Mineral grains were identified, (semi-)quantified under binocular microscope
Results controlled and refined by chemical analysis, DFX, UV, chemical tests, EMPA, LA-ICPMS, etc
Mineral mapping

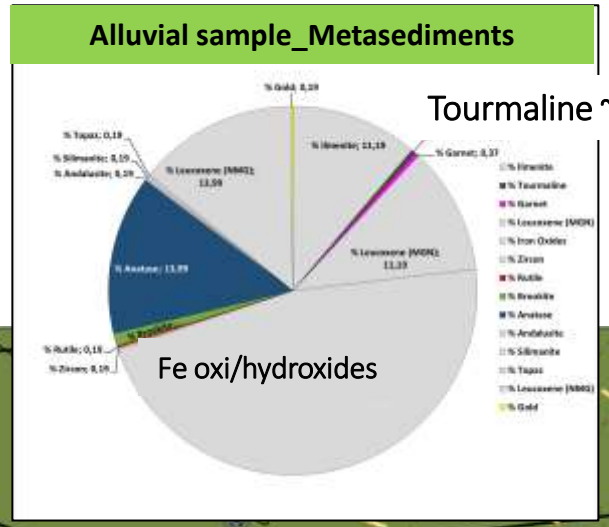
Tourmaline

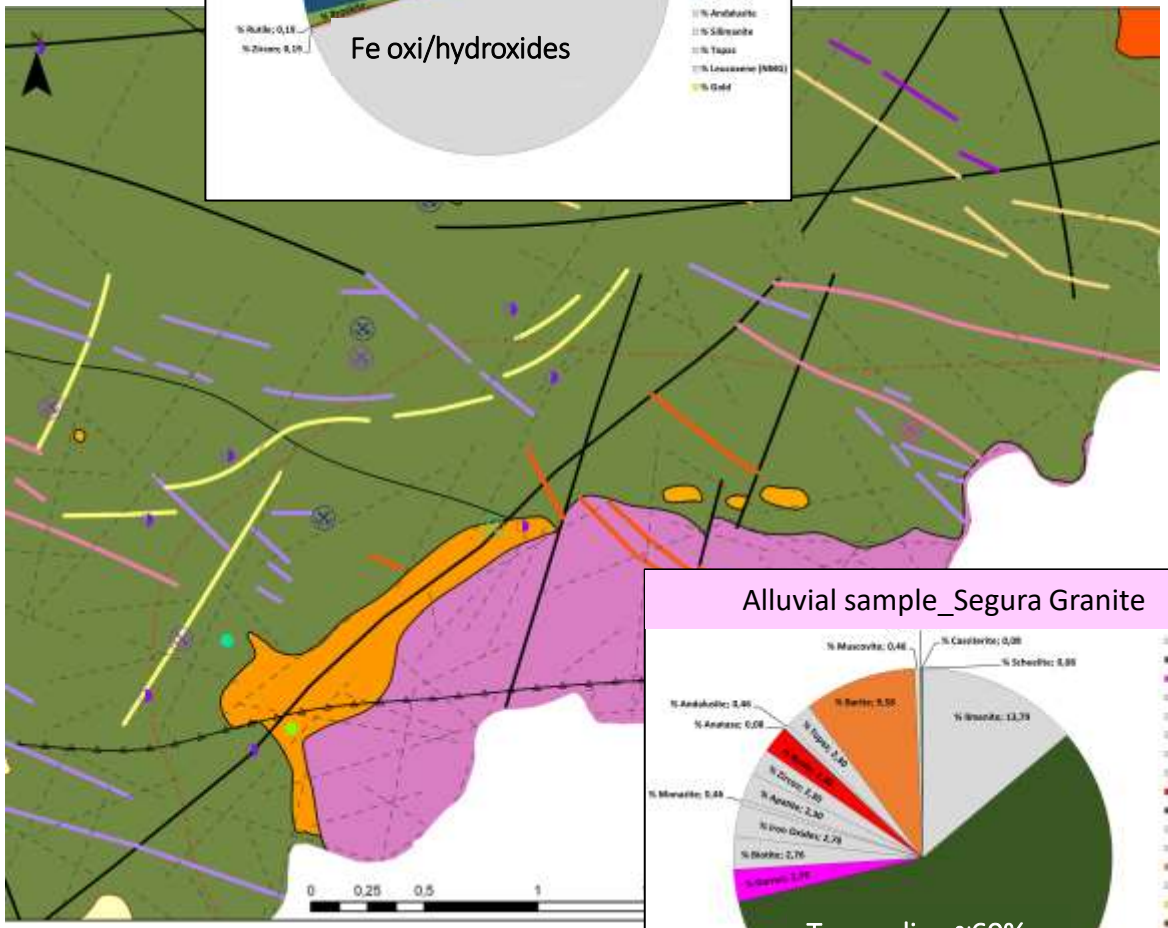
$(Na(Mg,Fe,Mn,Li,Al)_3\ Al_6\ [Si_6\ O_{18}](BO_3\ )_3\ (O,OH,F)_4)$

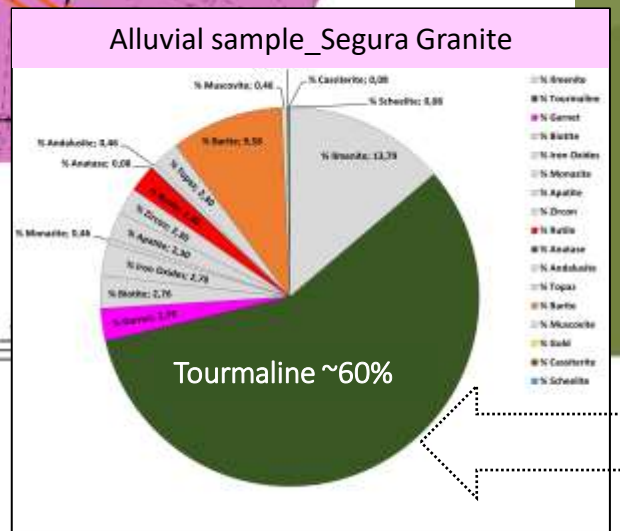


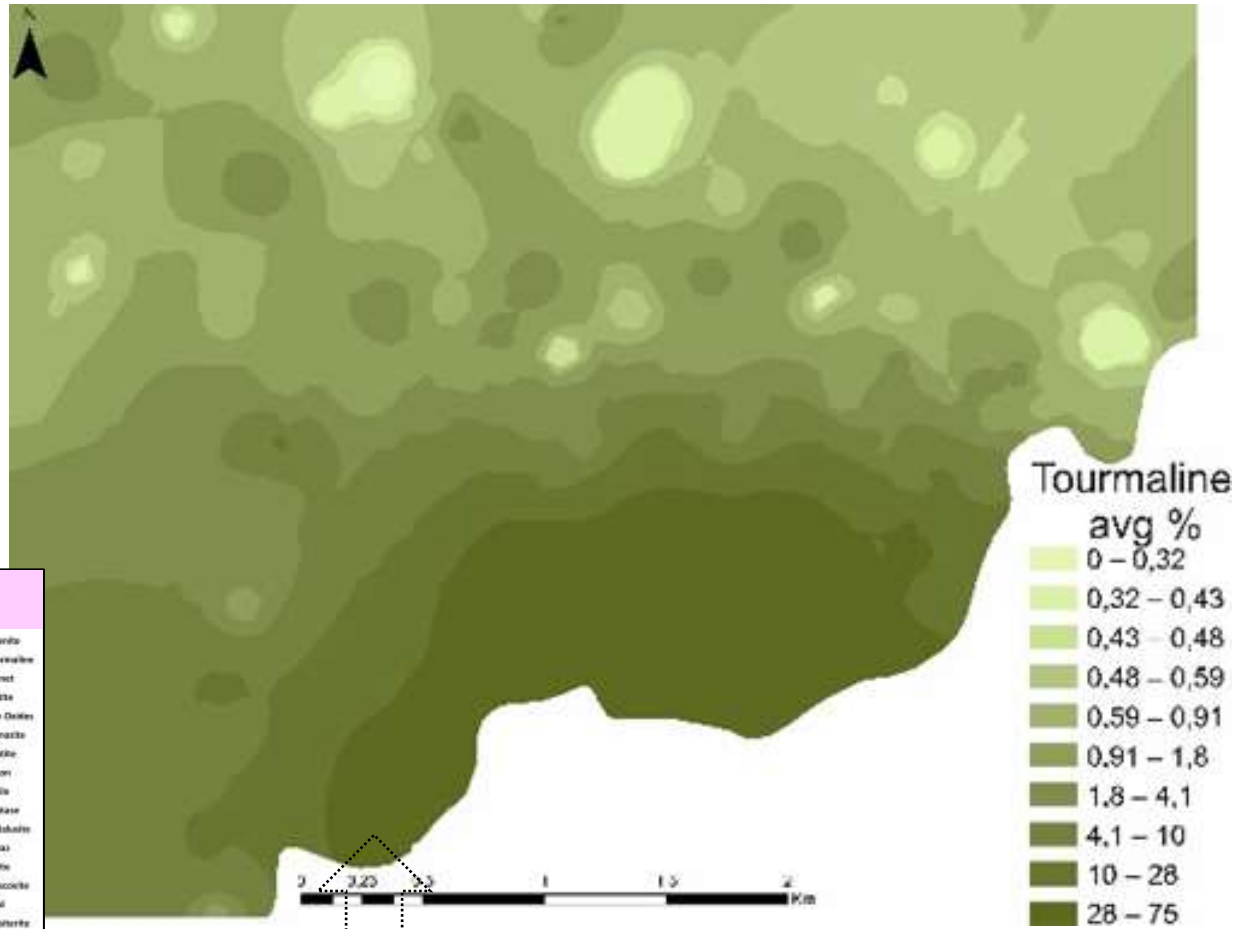
REGIONAL SCALE ANOMALY

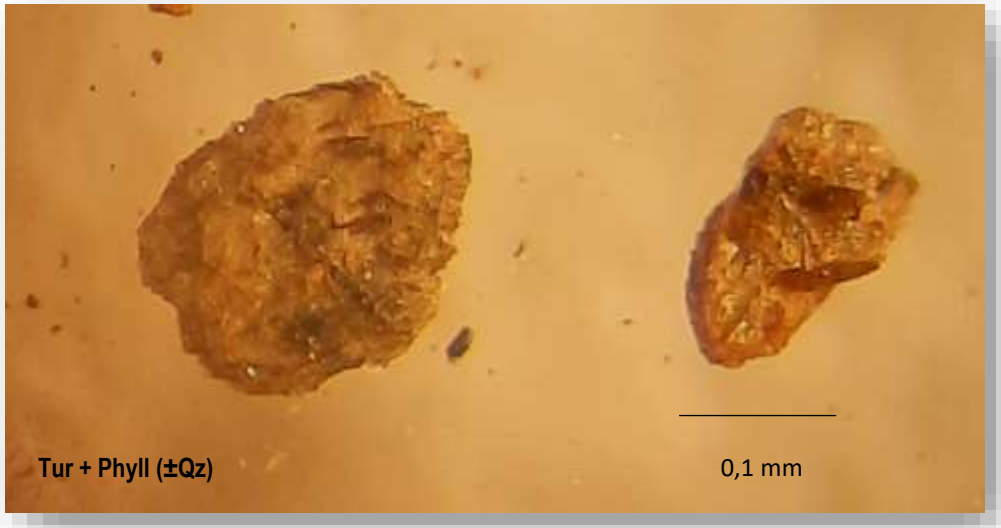
Tourmalinization events are linked with granitic intrusions in metapelitic host rocks, promoting a regional-scale anomaly











REGIONAL & LOCAL SCALE ANOMALIES

- *Composite Grains of Tourmaline needles and Phyllosilicates (± Quartz)*

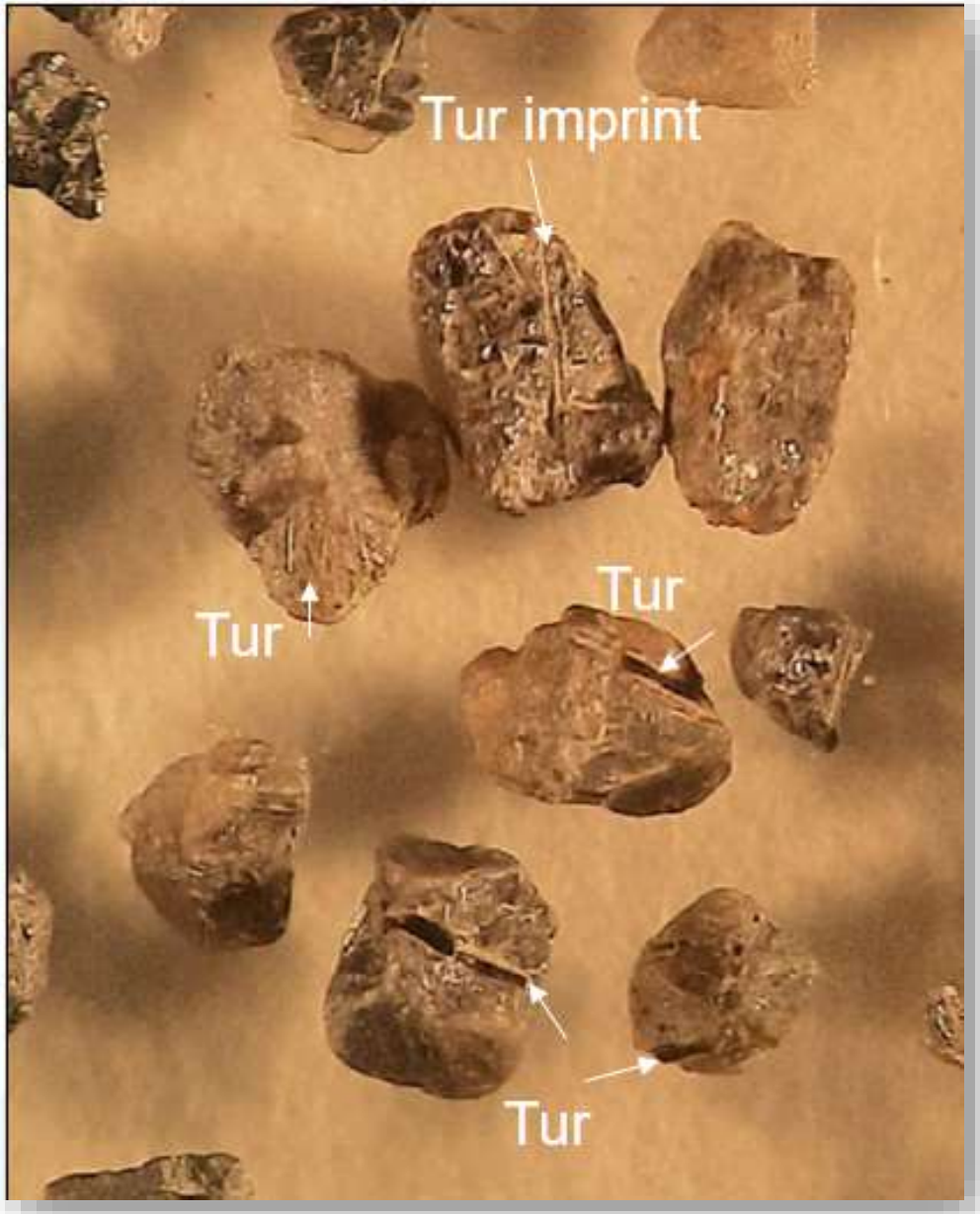
Tourmaline needles show different colours and pleochroism, some develop a preferential orientation; Probably represent different rocks affected by tourmalinization events with or without structural control;

- Additional information:

- Composite grains have relative low resistance to transport: very good proxies.
- Higher tourmaline concentration and grain size occurs in host rocks close to Sn-W mineralised veins in Segura (Silva, 2021) and, in general, close to pegmatites (London, 2016; Errandonea-Martin et al., 2022);

Local scale anomaly: Tourmalinization associated with mineralised quartz veins and aplite-pegmatites;

Regional scale anomaly: Tourmalinization associated with granitic intrusions; (hidden domes).



- *Composite Grains of Cassiterite and Tourmaline*

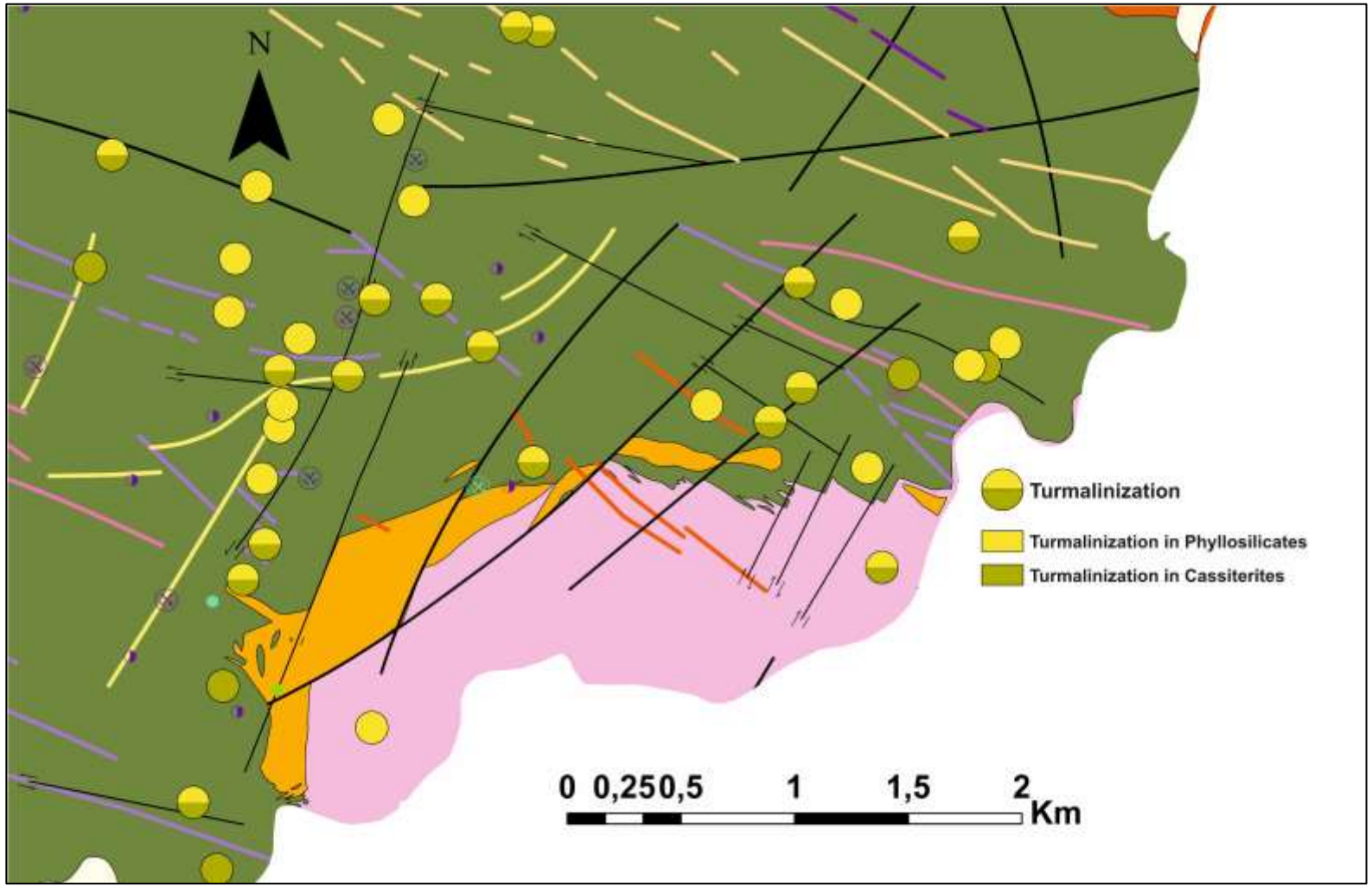
Different cassiterite grains with tourmaline needles: Proxies to mineralisation

- Additional information:

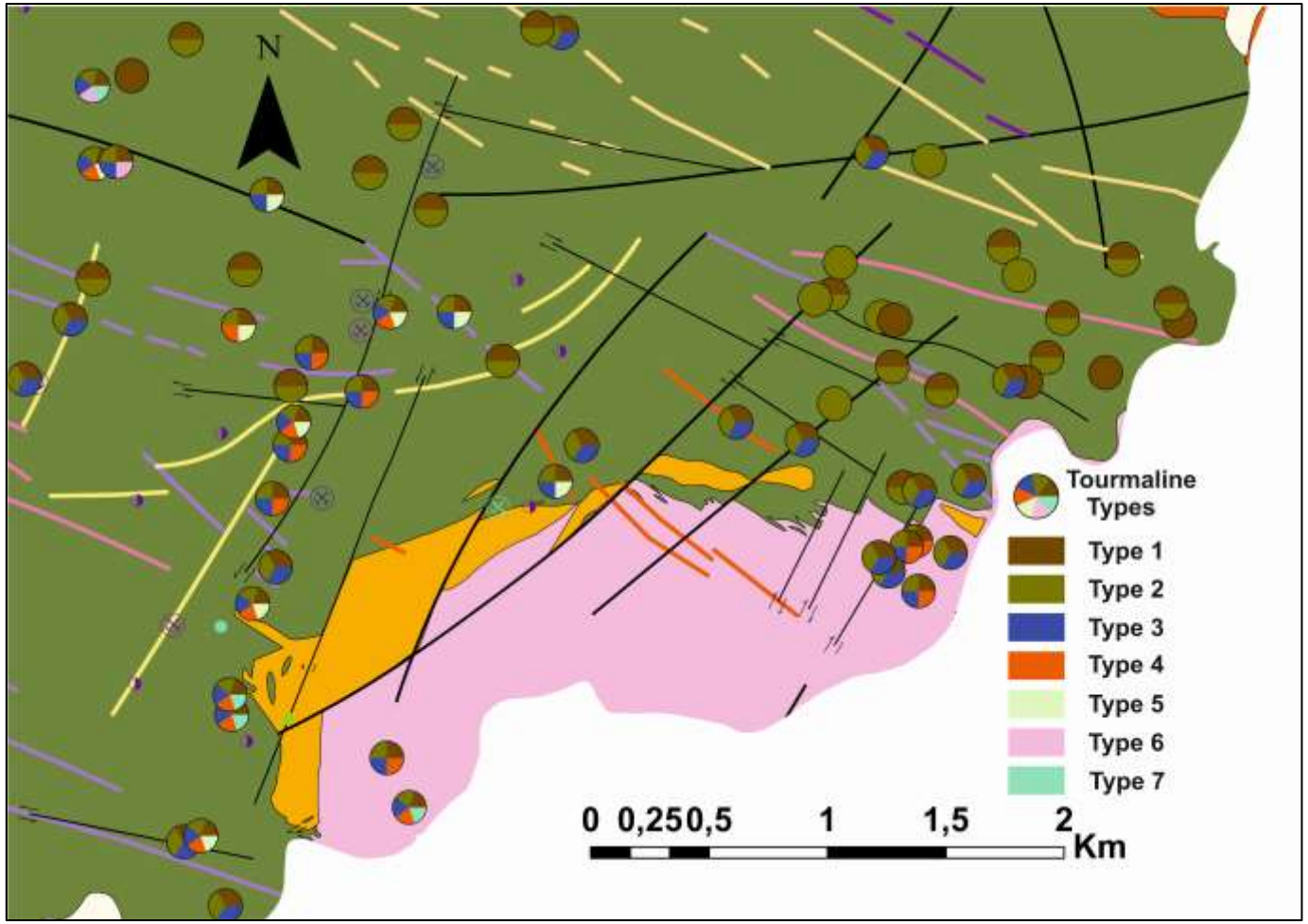
-Cassiterite was identified in the host metasedimentary rocks in the contact with the Sn-W mineralised quartz veins (Silva, 2021)

Local scale anomalies: Tourmalinization asociated with Sn-mineralisations (or very close host rocks)

REGIONAL & LOCAL SCALE ANOMALIES

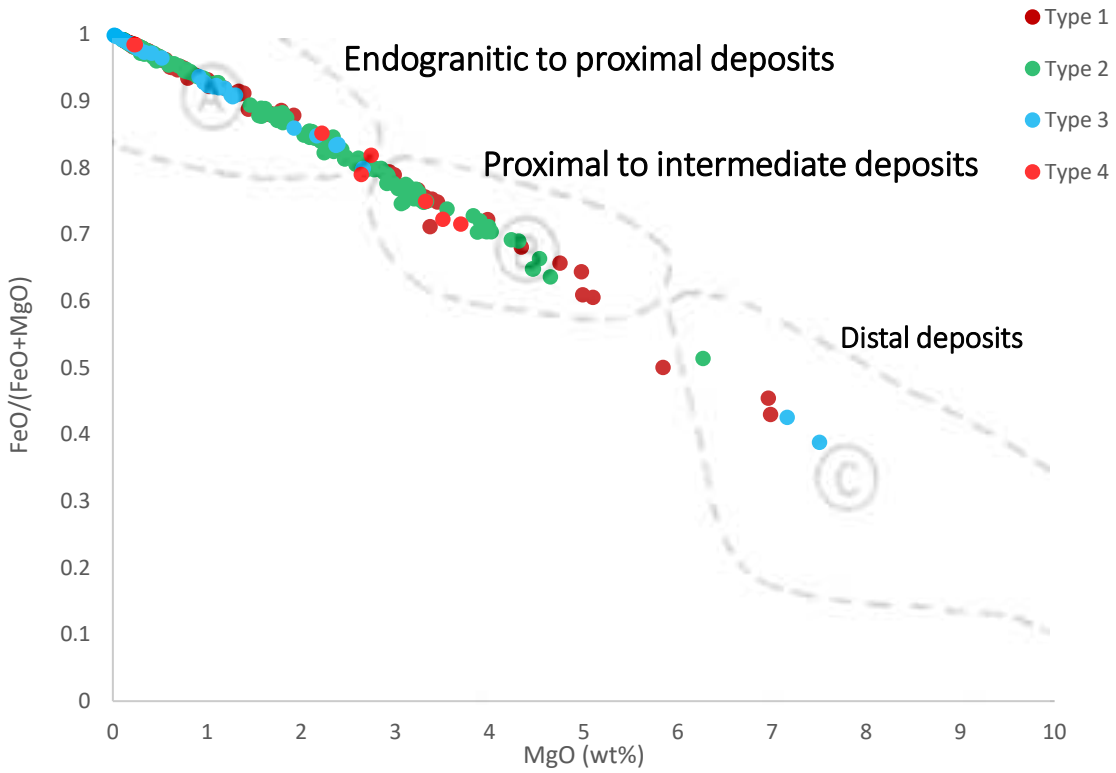


Tourmaline populations occurrence



Tourmaline	Colour / Diaphaneity
Type 1	Dark Brown, almost opaque to translucent or hyaline, some with red tone
Type 2	Dry green / Almost opaque to translucent or hyaline
Type 3	Light bluish grey/colourless, hyaline; or, bluish green almost opaque
Type 4	Orange to red, translucent
Type 5	Milky light green
Type 6	Light rose to brownish pink / Hyaline
Type 7	Turquoise or emerald green / translucent to opaque

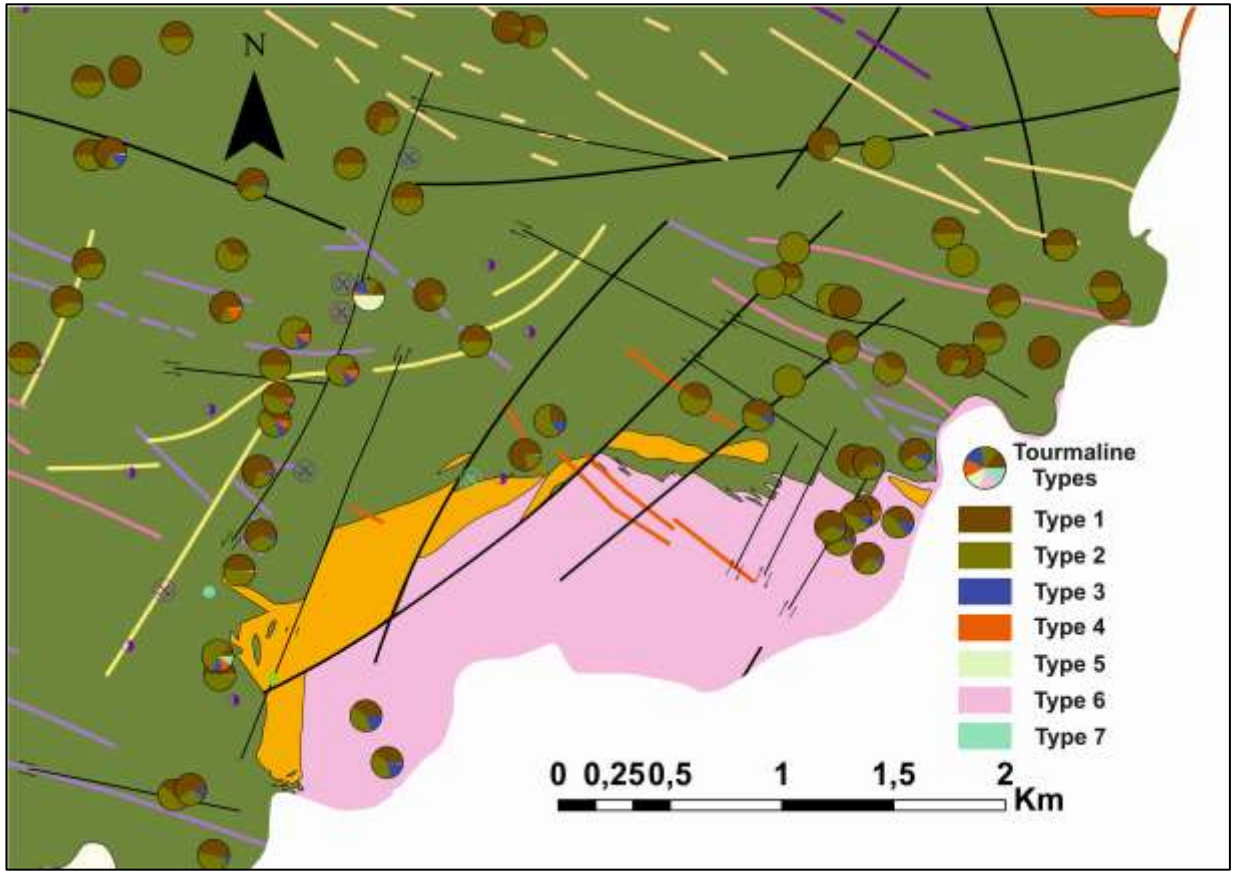
Alluvial tourmaline from Segura (west side)



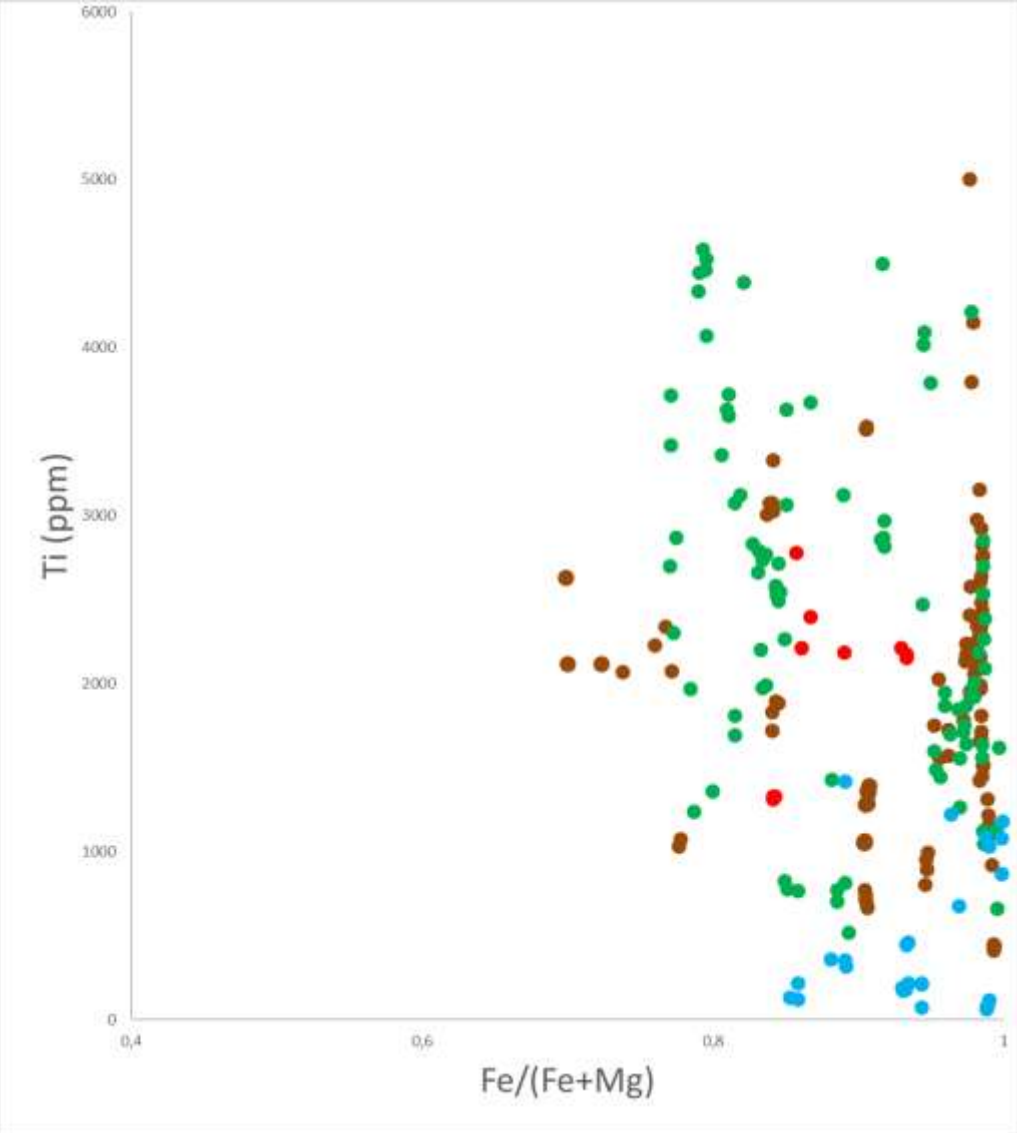
Spatial variations in granite-related hydrothermal mineral deposits (adapted from Pirajno, 1992)

Tourmaline from granitic environments is typically enriched in iron (Henry and Guidotti, 1985)

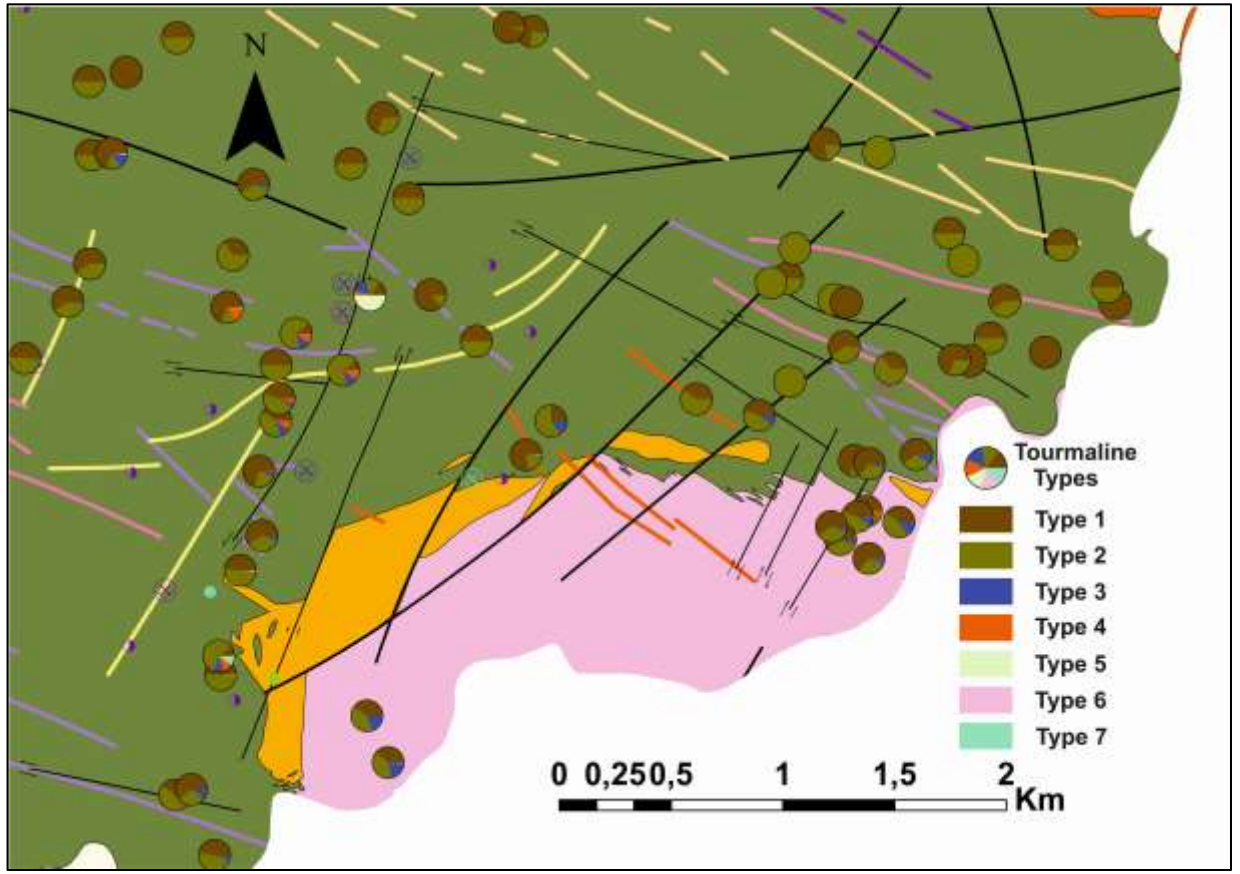
Tourmaline populations: relative average abundance



Alluvial tourmaline from Segura (west area)



Tourmaline populations: relative average abundance

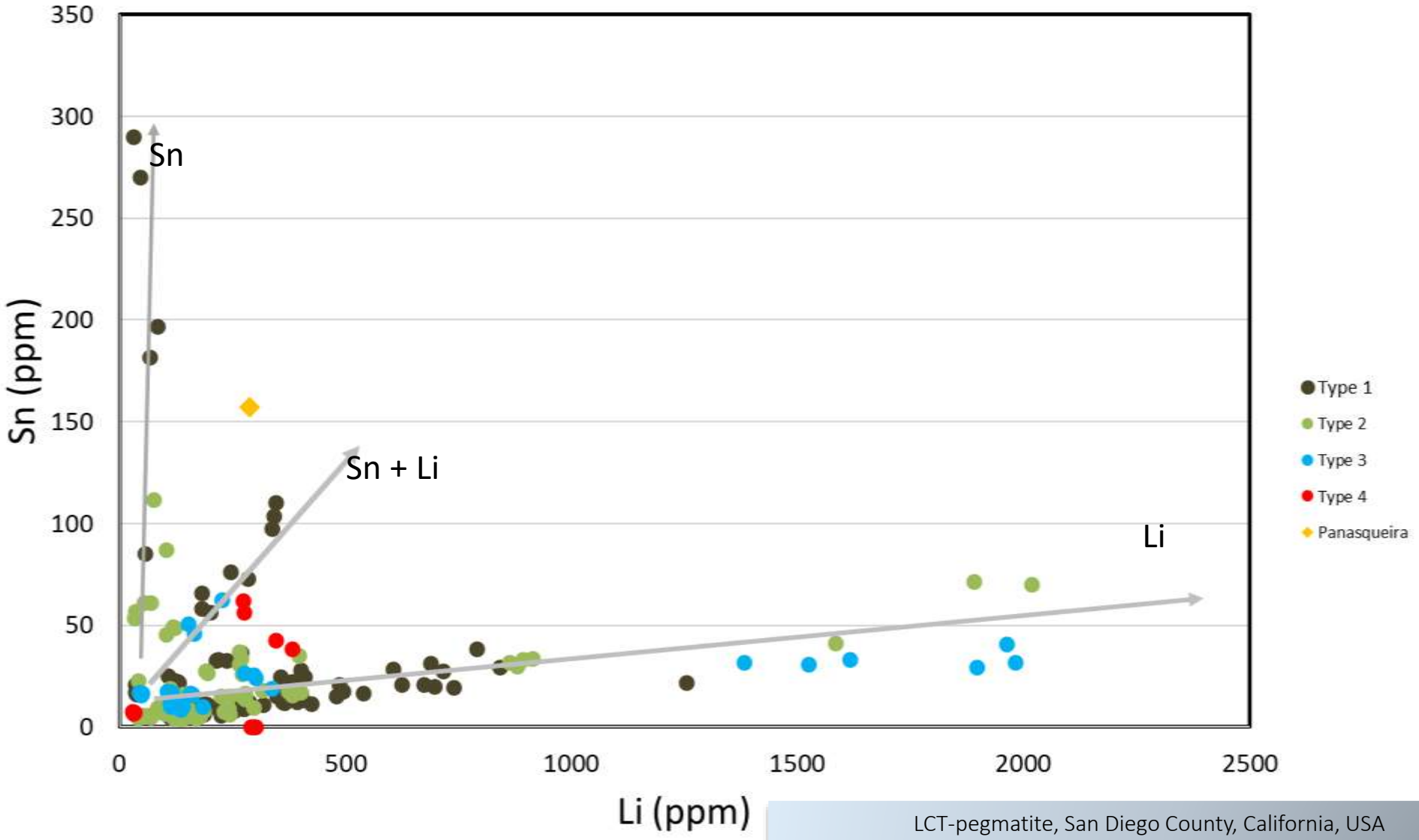


Panasqueira quartz veins
Syn-Ore Tourmaline:

Up to 157 ppm Sn
Up to 288 ppm Li

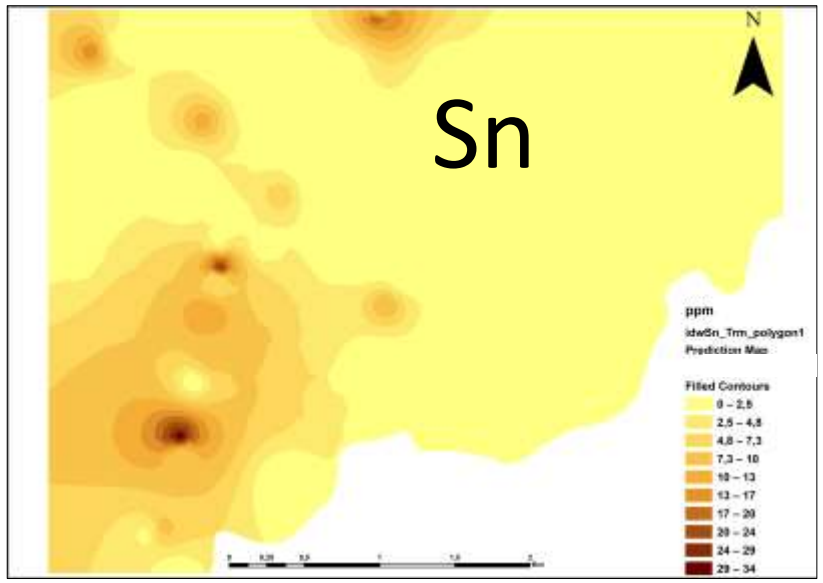
(Carocci et al., 2020)

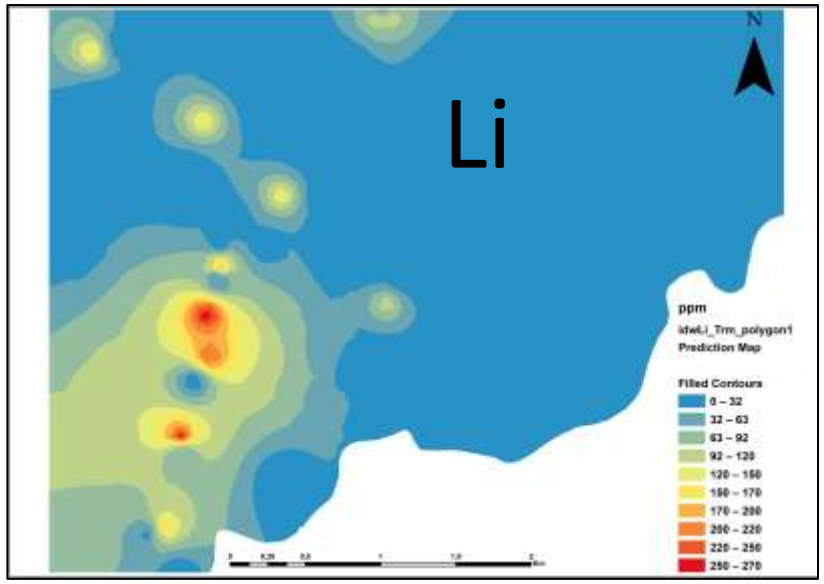
Alluvial tourmaline from Segura (west side)



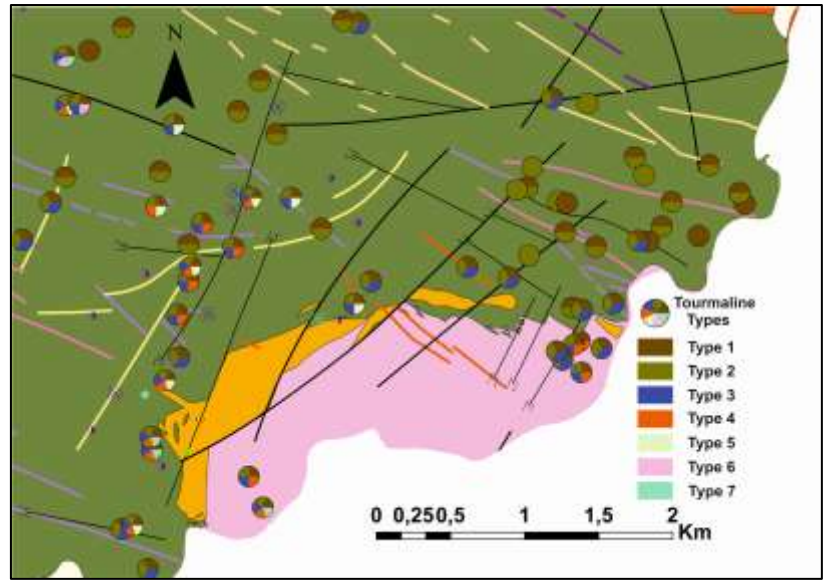
LCT-pegmatite, San Diego County, California, USA
Core zones and pockets Tourmaline:
>100 - 5075 ppm Li
(Maloney et al., 2008)

Alluvial tourmaline Sn and Li contents
from Segura (west side) samples





Tourmaline populations occurrence



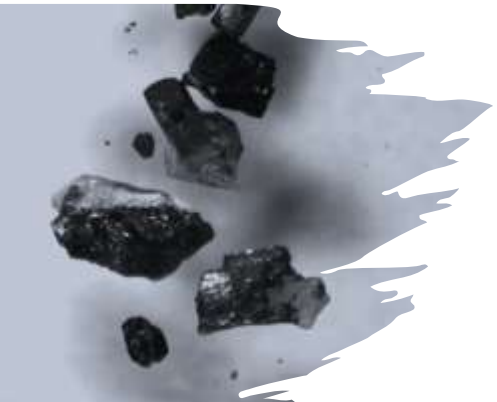
Sn and Li in tourmaline as proxies for mineralizing fluids
in ore deposits
(For further research)

Wolframite

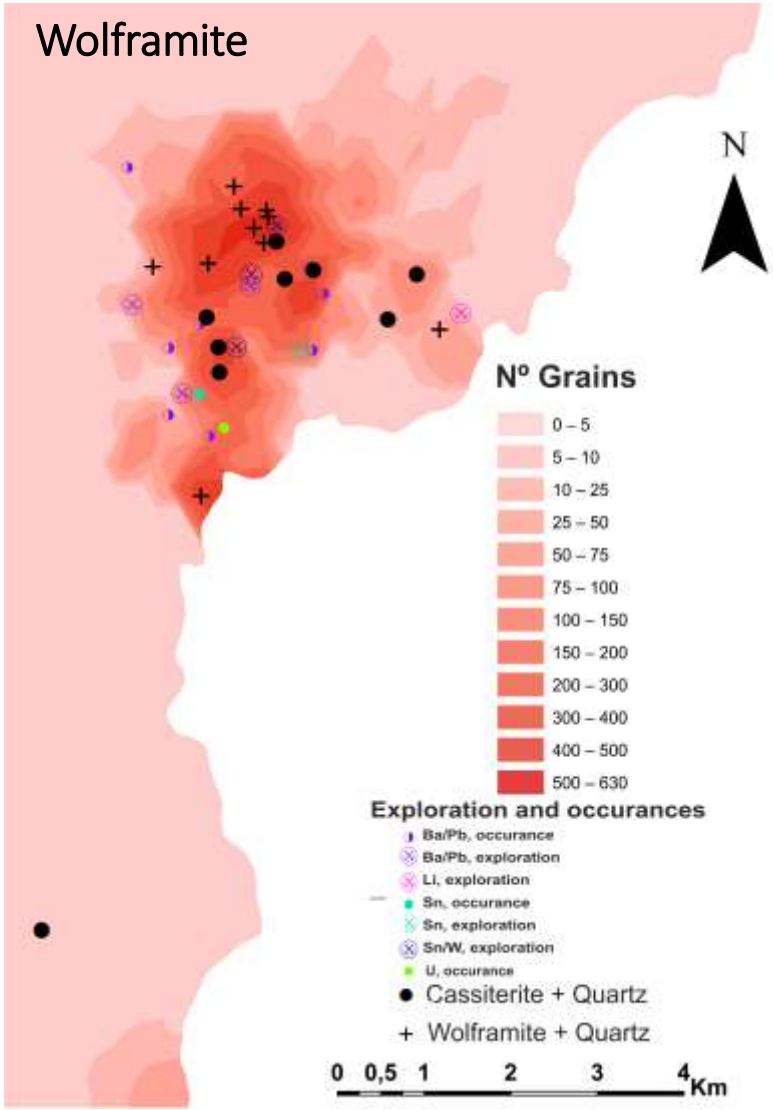
$(Fe,Mn)WO_4$

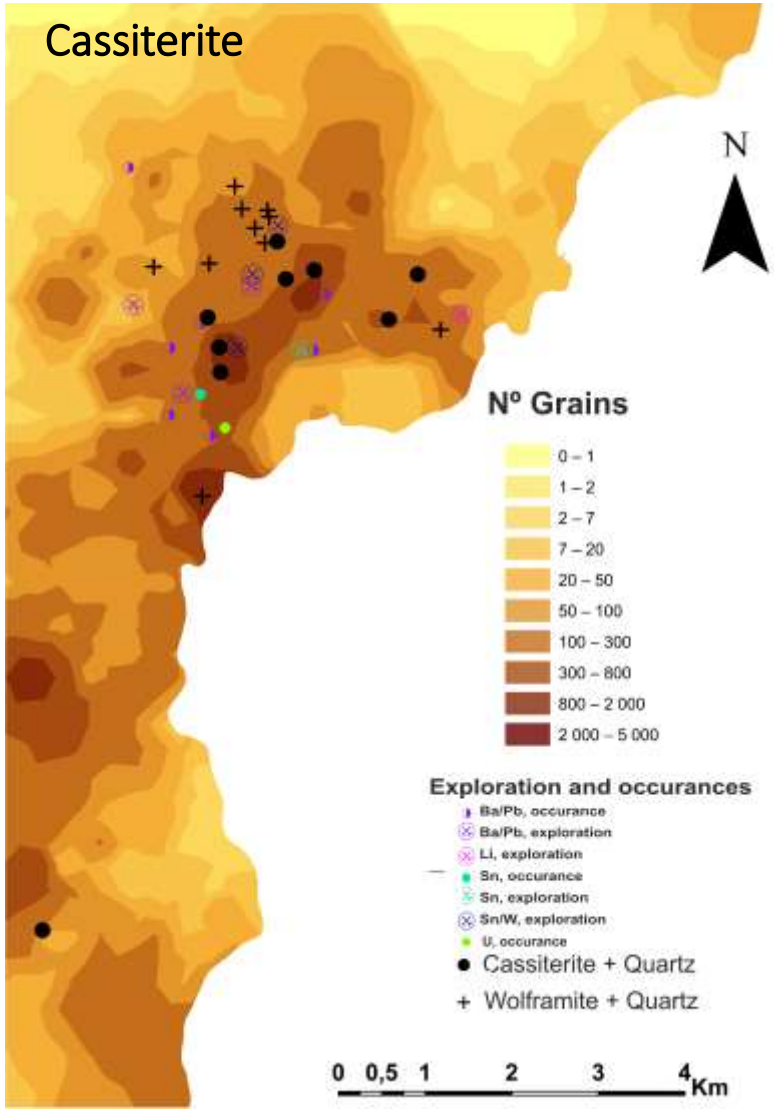
Cassiterite

(SnO_2)



REGIONAL & LOCAL SCALE ANOMALIES





Maps of the abundance by the total number of grains of : scheelite, wolframite and cassiterite; 606 samples data from SFM old surveys. reassessed under the MOSTMEG project

Frame the anomalies halos of alluvial cassiterite and wolframite from Segura

Góis-Segura Tin-Tungsten Belt	Main Mineralisations	Main Ore Minerals	Heavy minerals concentrates (max. number of grains)
Segura (~26km^2)	Sn-W/W-Sn quartz veins	Cassiterite, Wolframite	**Alluvial deposits**: Cassiterite: 5000; Wolframite: 630; Scheelite: 505
	Sn bearing aplite-pegmatites	Cassiterite	
Góis (30 km^2)	Sn -brecia and quartz veins	Cassiterite	**Interfluvial soils**: Wolframite: 2276; Cassiterite: 251; Scheelite: 70
	W quartz veins	Wolframite	
	W quartz veins	Wolframite	
	W -Sn quartz veins	Cassiterite, Wolframite	
	Sn-W brecia, stockworks and aplite	Cassiterite, Wolframite (Scheelite)	
	Sn-W- quartz veins	Cassiterite, Wolframite	

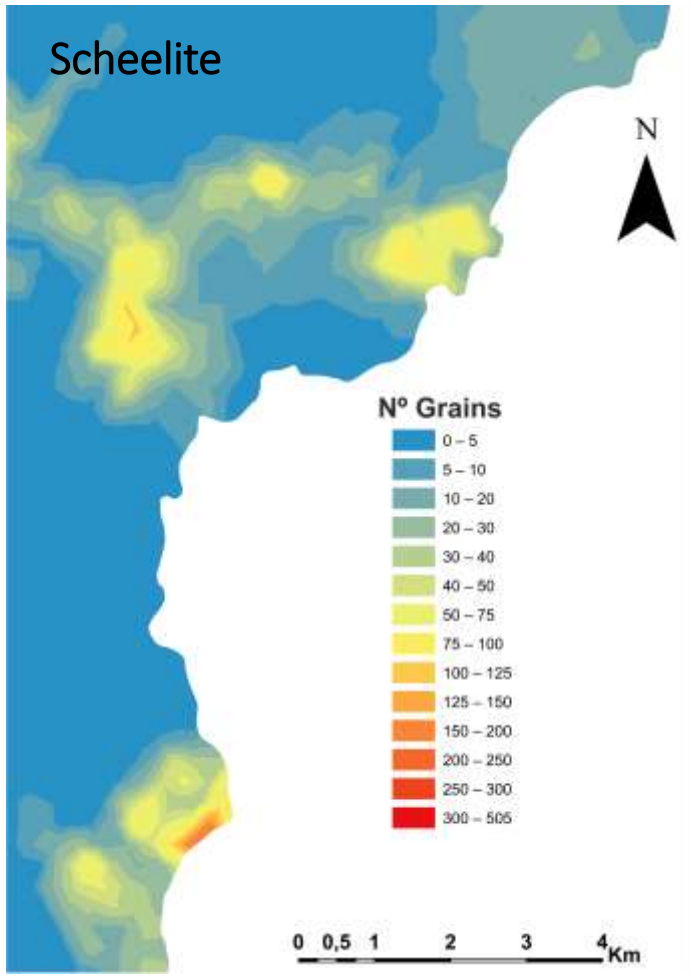
Compiled from Viegas et al. (1988), Parra (1990), Inverno et al., (2007), Fernandes (2020), SIORMINP-LNEG data base and MOSTMEG].

Scheelite

($CaWO_4$)

REGIONAL & LOCAL SCALE ANOMALIES

Frame the anomalies halos of alluvial scheelite from Segura region



Map of the abundance by the total number of grains of : scheelite; 606 samples data from SFM old surveys. reassessed under the MOSTMEG project

Scheelite (and wolframite) grains in detrital sediments associated with W mineralisations/occurences			
		Pan/heavy minerals concentrates	
W Mineralizations / occurences	Detrital sediments	Scheelite	Wolframite
Segura region	Proximal alluvial (average ~10-15kg)	up to 505	up to 630
Sisson W-Mo deposit: scheelite mineralised quartz veins and fracture-controlled zones (Canada) [from McClenaghan et al. (2013)]	Stream sediments overlaying the mineralisation and proximal downstream (15kg)	50-500	2
Silicified zones and quartz veins with scheelite, western part of the Central Anatolian massif (Turkey) [from McClenaghan et al. (2013)]	Stream sediments overlaying the mineralisation; < 1.0 mm fraction	up to >250	-

✓ **Alluvial tourmaline and Sn-W ore minerals in target generation stage**

- Minerals physical/chemical properties and concentration (anomalies) maps:

Constitute a baseline to further research on the metallogenetic systems of Segura; and if complemented and integrated with other geological data can

Help to define prospective areas

Thank You