Mineral fingerprint & footprint database

DELIVERABLE D 4.3

WP4 MINERAL FINGERPRINTS AND FOOTPRINTS

Task 4.3 Reassessment of alluvial heavy minerals from old exploration surveys

April 2021 to November 2023

Predictive models for strategic metal rich, granite-related ore systems based on mineral and geochemical fingerprints and footprints

(FCT ERA-MIN/0005/2019 MOSTMEG)

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Contents

1 INTRODUCTION

The project *Predictive models for strategic metal rich, granite-related ore systems based on mineral and geochemical fingerprints and footprints* (MOSTMEG), intends understand and fill the existing knowledge gaps is fundamental to refine concepts and exploration strategies, involving the interconnection of mineral and geochemical criteria that can be used as pathfinders or vectors to mineralisation's in Segura-Argemela-Panasqueira-Góis (SAPG) strip. The Work-package 4 (WP4)-*Mineral Fingerprints and Footprints* includes the Task 4.3 *Reassessment of alluvial heavy minerals from old exploration survey* for which the main goal was the *Re-examination of alluvial heavy minerals from old exploration surveys to evaluate the spatial extent of some mineral fingerprints/footprints and their usefulness in regional exploration strategies.* The selection of minerals to study in greater detail fell on the alluvial W-Sn ore minerals isolated or in composite grains, i.e. cassiterite (+tourmaline/quartz), wolframite (+quartz) and scheelite, and mineral phases potential relevant to exploration of rare metal granite-related ore-systems, i.e., rutile, anatase, brookite and tourmaline (+phyllosilicates ± quartz), from Segura region (for localisation and geological setting see Fig. 1). Additionally, the presence of garnet, was highlighted during the study and, knowing its capabilities as an indicator mineral of geological environments, this mineral also had special attention. Therefore, this Deliverable D 4.3 from LNEG team aims to report the methodologies and results of the study of alluvial heavy minerals from Segura region.

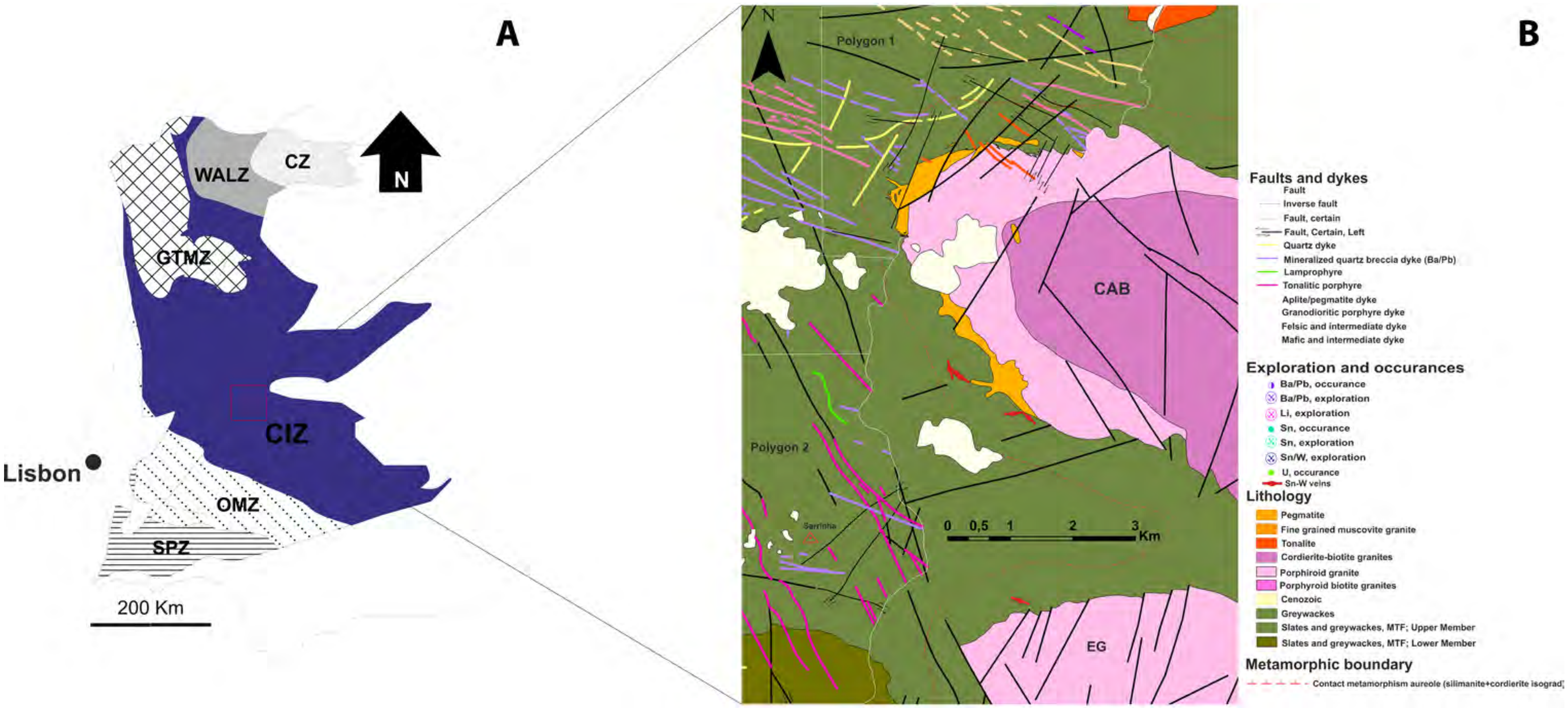

Fig. 1 - A. Geotectonic map of the Iberian Massif (adapted from Ribeiro et al., 1979 and Dias da Silva et al., 2021) with the study area location. CZ-Cantabrian Zone; WALZ-West Asturian-Leonese Zone; GTMZ-Galicia Trás-os-Montes Zone; CIZ-Central Iberian Zone; OMZ-Ossa Morena Zone; SPZ-South Portuguese Zone. B. Geological setting map of the study area (adapted from MOSTMEG geological map), particularly, Polygon 1: Segura mining region, and Polygon 2: Segura southern region. EG: Estorninos Granite; CAB: Cabeza de Araya Batholith.

2 METHODOLOGIES

2.1 Samples selection

From the old survey's samples, reassessed during MOSTMEG previous activities [WP1], 606 samples were selected, including samples from the study areas, i.e. Polygon 1 (Segura mining region) and 2 (Segura southern region) area (Fig. 2 A; Table A; Appendix I), for the refinement of alluvial cassiterite, wolframite and scheelite grains abundance maps. From this set of samples, selected according to the defined mineral grain anomalies, an attempt was made to choose samples collected in areas of highest and lowest cassiterite, wolframite and scheelite concentration in the best possible way, and in order to cover the area: 69 alluvial samples from Segura mining region and 35 from Segura southern region were chosen (Fig. 2 B, C); moreover, in cases, to reinforce the results robustness, there was an addiction of (42) extra alluvial samples data from Grácio (2020) (Fig. 2 B).

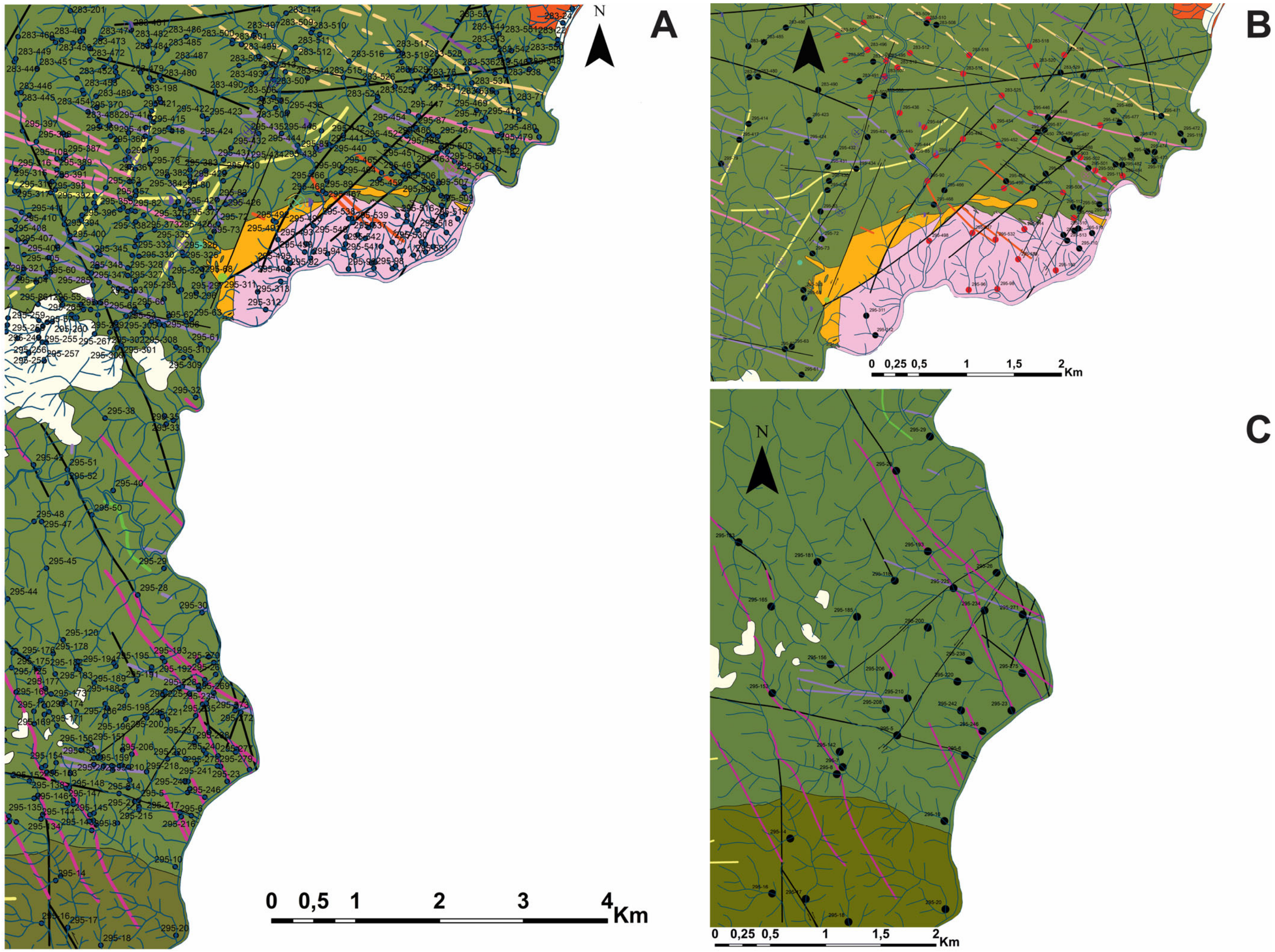

Fig. 2 - Localisation of samples reassessed under MOSTMEG project, projected on an extract of the MOSTMEG geological map (legend as Fig. 1 B): A. Sampling points of 606 alluvial samples (that includes samples from Polygon 1 and 2); B. Sampling points of the 69 alluvial samples from the Polygon 1: black dots; sampling points of the additional 42 alluvial samples from Grácio (2020): red dots. C. Sampling points of the 35 alluvial samples from the Polygon 2. Hydrographic network adapted from sheet n.º 283, Salvaterra do Extremo (Idanha-a-Nova) and 295, Segura (Idanha-a-Nova), Carta Topográfica de Portugal, scale: 1:25 0000 Série M888, Instituto Geográfico do Exército..

2.2 Samples preparation and mineralogical study

A collection of 606 HM concentrates covering the Segura region was selected from the regional sampling set stored at LNEG (Fig. 2 A; Table A, Appendix I). These HM concentrates were previously obtained from panned alluvial samples mostly collected in proximal tributary streams, with variable sampling density according to the local interest, and sieved (< 3mm). In laboratory, these mineral concentrates were separated by density (using bromoform; 2.89 g/cm3) and magnetic susceptibility (using a hand magnet with capability to attract magnetic and paramagnetic minerals; ≥ 10×10–6 C.G.S.M.E. units, see Parfenoff et al., 1970). The HM were then identified and (semi-)quantified under a binocular microscope, controlled by several methods, i.e., tinning test (adapted from Parfenoff et al., 1970) for cassiterite, UV lighting for scheelite, and in several cases, X-ray diffraction. When feasible, the cassiterite, wolframite and scheelite grains were counted; in presence of higher abundances, the total number of grains was estimated, subdividing the HM fraction in equivalent portions with a micro-splitter and counting the grains in one portion, afterwards multiplied by the number of portions. For the present study, the alluvial HM concentrates (here referred to as samples) were study for identification and (semi-) quantification of different mineral phases under binocular microscope (Fig. 3 A) with a polarizing filter coupled; microphotographs were taken with a digital camera coupled in a stereo-microscope. Additionally, an UV Lamp dual wavelength, in the short wavelength (254 nm) was used to easily allow the identification of the scheelite grains (Fig. 3 B). The same hand magnet mentioned above was also frequently used for confirmation or screening in the identification of grains of several mineral phases by their magnetic susceptibility (Fig. 3 C). To confirm cassiterite grain identification the tinning test mentioned above was used, after which, only the surface of the cassiterite grains present is covered with a metallic grey film (see Fig. 5). The discrimination of mineral grain populations among the cassiterite, wolframite, scheelite, rutile, anatase, brookite, tourmaline and garnet grains, was carried out using the physical mineral properties visible under binocular microscope. Therefore, similar mineral grains were handpicked and mineral and mineral populations standards to guide the study were produced. Moreover, the mineralogic study was controlled and refined by chemical analysis in part of the samples.

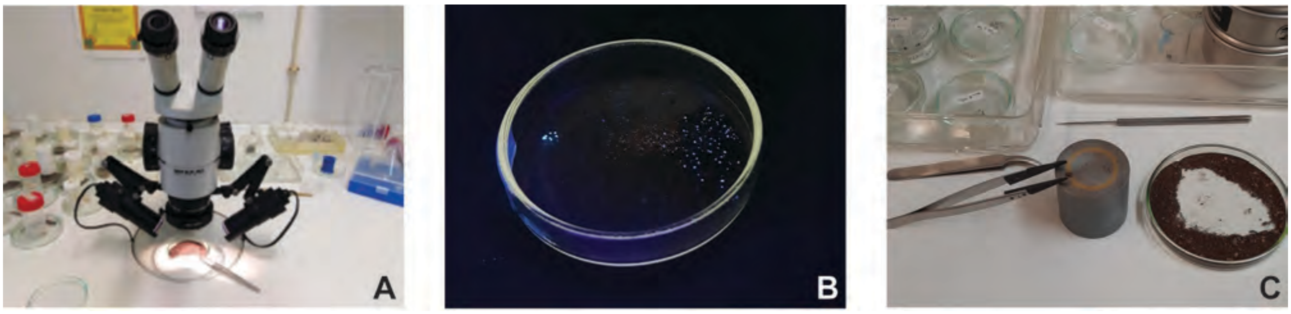

Fig. 3 - A. Analysis of alluvial heavy minerals sample (in petri dish) under binocular microscope. B. Alluvial sample under shortwave ultraviolet light (254 mμ), where scheelite grains fluorescence (glow in a bright sky-blues). C. Manual magnet with the ability to attract magnetic and paramagnetic minerals.

The semi-quantification of mineral grains was performed following the methodology adapted from Parfenoff et al. (1970), as in the previous studies, consisting of assigning a volume % range to each mineral (<1%, 1-5%, 5-25%, 25-50%, 50-75% and 75-100%) in relation to the volume of the respective mineral fraction (magnetic + paramagnetic: MGN or nonmagnetic: NM; which error is approximately 5 %). The relevant data collected for each mineral was introduced in an Excel spreadsheet [created by Rute Salgueiro - LNEG (see Table B and C, Appendix I)] and converted into numerical values for the more realistic point, that is the average point (e.g., for 25-50% = 37,5%). The height (cm) that the MGN or NM fills in its cylindrical container is also introduced in the Excel spreadsheet. To be able to relate all the minerals existing in a complete sample(s) (MGN+MN), their percentage values were weighted in relation the volume of the bulk sample(s) and normalised to obtain the value of their relative average abundance (Table D, E and F, Appendix I). In the case of the semi-quantification of cassiterite, rutile, anatase, brookite, tourmaline and garnet mineral grain populations, an experimental study applying the same method adapted from Parfenoff et al. (1970) was used, but in relation to each mineral phase relative average abundance, and the results are presented in Table G and H, Appendix I. Other relevant data on mineral populations, as the case of cassiterite±tourmaline and tourmaline+phylossilicates(± quartz) composite grains occurrence was also recorded (Table I, Appendix I). For cassiterite, wolframite and scheelite it was confirmed their total grains number (from old surveys studies data), and for 6 samples it was necessary to estimate the number of cassiterite grains; this estimation followed the methodology done in old surveys studies, mentioned above.

2.3 Handpicking and mounts preparation

After the study of the minerals under binocular microscope, the grains representing the different population of minerals were separated, handpicked and placed on an adhesive surface in different rows according to the type of mineral to be analysed, mostly placed in the same row and their relative grain size. After the epoxy resin drying, the next phase consisted in wearing and polishing the mount surface to expose the mineral grains surface and thus perform its chemical analysis. The 20 mounts produced with a total of 2017 grains, their description and organization are present in Appendix II (Tables A and B; Fig. 1 to Fig. 8).

2.4 GIS database and mineral maps

The Inverse Distance Weighted (IDW) interpolation maps were generated using the ArcGIS software to depict the spatial distribution of cassiterite, scheelite, and wolframite grains abundance in the study region (Table A, Appendix I; Fig. 4). The process involved inputting grain data points and applying IDW interpolation to estimate values at unsampled locations, providing a visual representation of the abundance patterns for each mineral. Using the presence of mineral population types and the values obtained for the average abundance of the minerals and minerals grain population types, as described in section 2.2, the data for each mineral was inserted in an ArcGIS software database and the respective maps were produced (Fig. 7 to Fig. 13); it was used the same interpolation tool of this software (IDW), to produce mineral distribution maps, adding 42 samples data from Grácio (2020), to reinforce the data of Segura mining region.

2.5 Contribute to Heavy Minerals Chemical Characterization

Processed chemical data was used to craft informative graphical representations, unveiling specific nuances within the trace element compositions of the preliminary cassiterite, rutile, anatase and tourmaline analysis, thus furnishing some insights to guide future research endeavours the mineralogic study. The results for tourmaline from west side of Segura mining region are presented in section 3.3.

3 RESULTS

3.1 Alluvial cassiterite, wolframite and scheelite grains abundance maps for Segura region

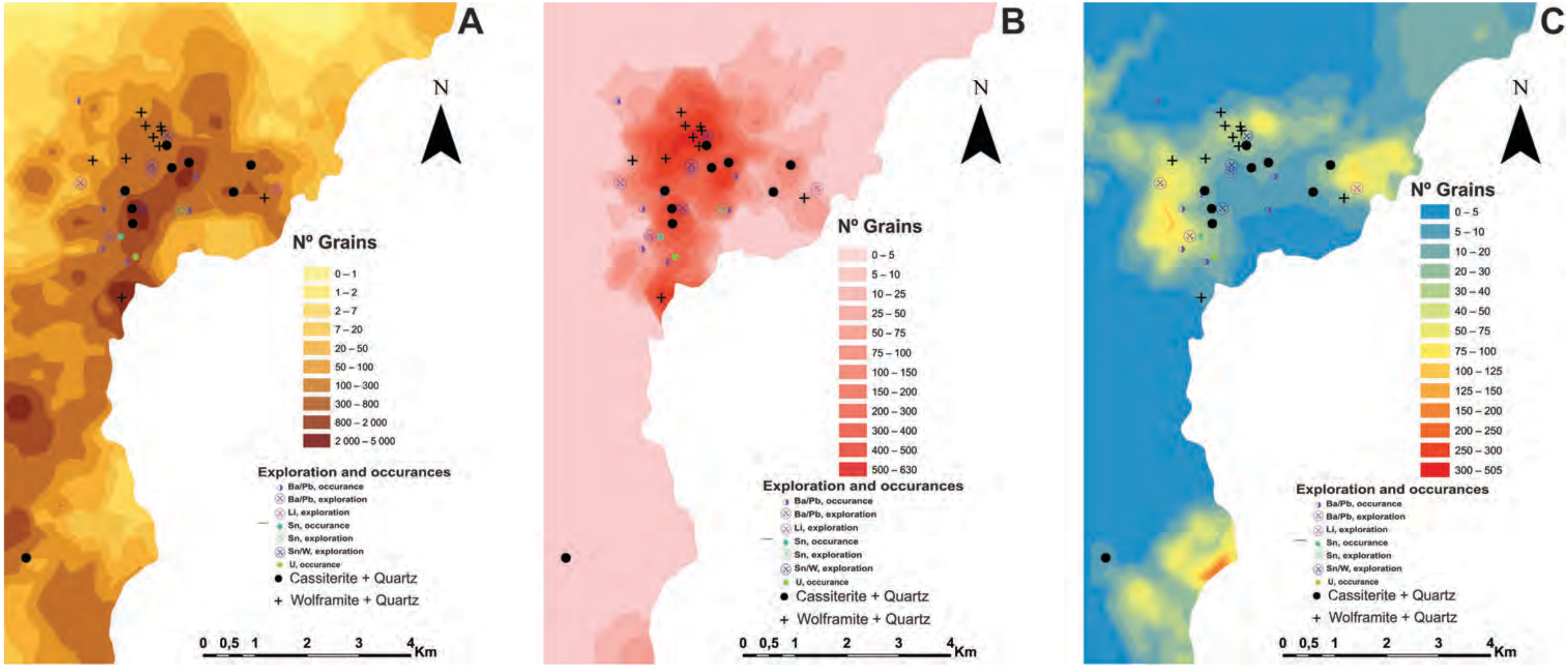

Fig. 4 - Number of grains abundance maps for alluvial: A. cassiterite and B. wolframite, showing concentric anomalies abundance halos around the endo- and/or exo-contacts of the Segura granite and overlying the areas of old Sn-W mining works; C. scheelite, showing concentric anomalies abundance halos nearby Segura Granite and Estorninos pluton (see Fig. 1), although displaying configurations distinct from those defined by cassiterite and wolframite; data of alluvial 606 samples from Segura region, selected from old exploration surveys and reassessed/updated and refined during MOSTMEG project [(after: Viegas et al., 1988, Inverno et al., 2007 and references therein); Table A, Appendix I]. In addition, it is also possible to see the distribution of cassiterite+quartz and wolframite+quartz composite grains mainly concentred near the old mining areas and encompassed by the higher abundance anomalies halos of cassiterite and wolframite, but not those of scheelite. In particular, the position of the main cluster of these grains on NW area is coincident with the position of the main group of Sn-W mineralised quartz lodes mapped by the old Serviço de Fomento Mineiro old surveys (see Antunes 2000 and Antunes et al., 2013).

3.1.1 Mineral grains in detrital sediments sourced from Sn and W mineralisations

Table 1 - Summary of the mineralisations, ore minerals and their total grains number in heavy minerals concentrates from Góis and Segura region, interfluvial soils and alluvial deposits, respectively [(compiled from Viegas et al. (1988), Parra (1990), Inverno et al., (2007), Fernandes (2020), SIORMINP-LNEG data base and MOSTMEG project]. Except for scheelite, the order of magnitude is similar for the main ore minerals of the two regions; the predominance of the ore minerals in the mineralisations is preserved in the respective detrital sediments.

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

Table 2 - Scheelite and wolframite grains in alluvial sediments from Segura region and from stream sediments associated with W mineralisations from the Sission deposit (Canada) and western part of Central Anatolian massif (Turkey) reported by McClenaghan et al. (2013); the order of magnitude is similar for the main ore minerals of the different mineralisations. In Canadian and Turkish detrital sediments examples, is preserved the predominance of the ore minerals as in the mineralisation source. In Segura, scheelite and wolframite aren't sourced from the same W mineralisation type.

W Mineralizations / occurences	Detrital sediments	Pan/heavy minerals concentrates	
		Scheelite	Wolframite
Segura region	Proximal alluvial (average ~10-15kg)	up to 505	up to 630
Sisson W-Mo deposit: scheelite mineralised quartz lodes 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	-

3.2 Alluvial Heavy Minerals Analysis

3.2.1 Segura mining region

3.2.1.1 Identification, characterization and semi-quantification

(see Table B and I, Appendix I)

3.2.1.1.1 Cassiterite

Table 3 - Physical properties of the different cassiterite grain populations, based on the mineral population standards produced and supported by the knowledge acquired during the present study of Segura region alluvial samples.

Cassiterite	Colour / Diaphaneity /Pleochroism	Habit	Zoning	Lustre	Mineral inclusions/associated	Grain size
Type 1	Deep brown / Opaque	Mainly subhedral to anhedral grains		Greasy, adamantine	Tourmaline, quartz, black tabular mineral (probable wolframite), translucent bluish grain	Mainly medium to coarse (up to ≥ 3mm)
Type 1a	Brown / Opaque to semi-translucent	Mainly subhedral, but euhedral and anhedral grains are visible	Irregular dark/light sectors	Greasy, adamantine		Fine to medium (0.2 mm to 2 mm)
Type 1b	Brown / Semi-translucent to opaque	Mainly subhedral to anhedral irregular grains		Vitreous		Fine to medium (0.2 mm to 2 mm)
Type 2	Black / Opaque	Mainly subhedral to anhedral grains, some fine euhedral twinned and other round grains		Greasy to (sub)metallic	Tourmaline, quartz	Fine to coarse (up to ~3 mm)
Type 3	Beige, whitish, brown and grey / Opaque, some semi translucent	Mainly subhedral, but euhedral and anhedral (twinned) to round grains are visible	Irregular dark/light sectors; few with fine-scale dark-coloured bands (oscillatory zoning)	Greasy	Tourmaline; Some with very fine dark inclusions in light zones	Fine to very coarse (~0.5 to ~3 mm)
Type 4	Colourless, light grey, pale rose to cream/grey-brown translucent to semi-translucent grains (reddish pleochroism with variable intensity)	Subhedral/anhedral	Dark bands light bands	Greasy or adamantine	Some with very fine dark inclusions in light zones	Mainly very fine (0.2 mm to 2.5 mm)
Type 5	Black and yellow, light yellow or cream to orange, frequent banded grains; translucent, some with faint pleochroism	Subhedral to anhedral, some euhedral (i.e. bipyramid prisms)	Black and yellow/cream to orange bands	Greasy or adamantine	Very fine dark inclusions;	Mainly fine to medium (0.5 to ~2mm)
Type 6	Red, Reddish-dark brown / opaque (some with translucent parts)	Subhedral to anhedral (few euhedral)	Irregular dark and light bands not well developed	Greasy	Tourmaline	Fine to coarse <0.5 to >2 mm
Type 7	Reddish-yellow, reddish-dark Brown) / opaque	Round pebbles or fragments				Fine to medium (up to 2mm)

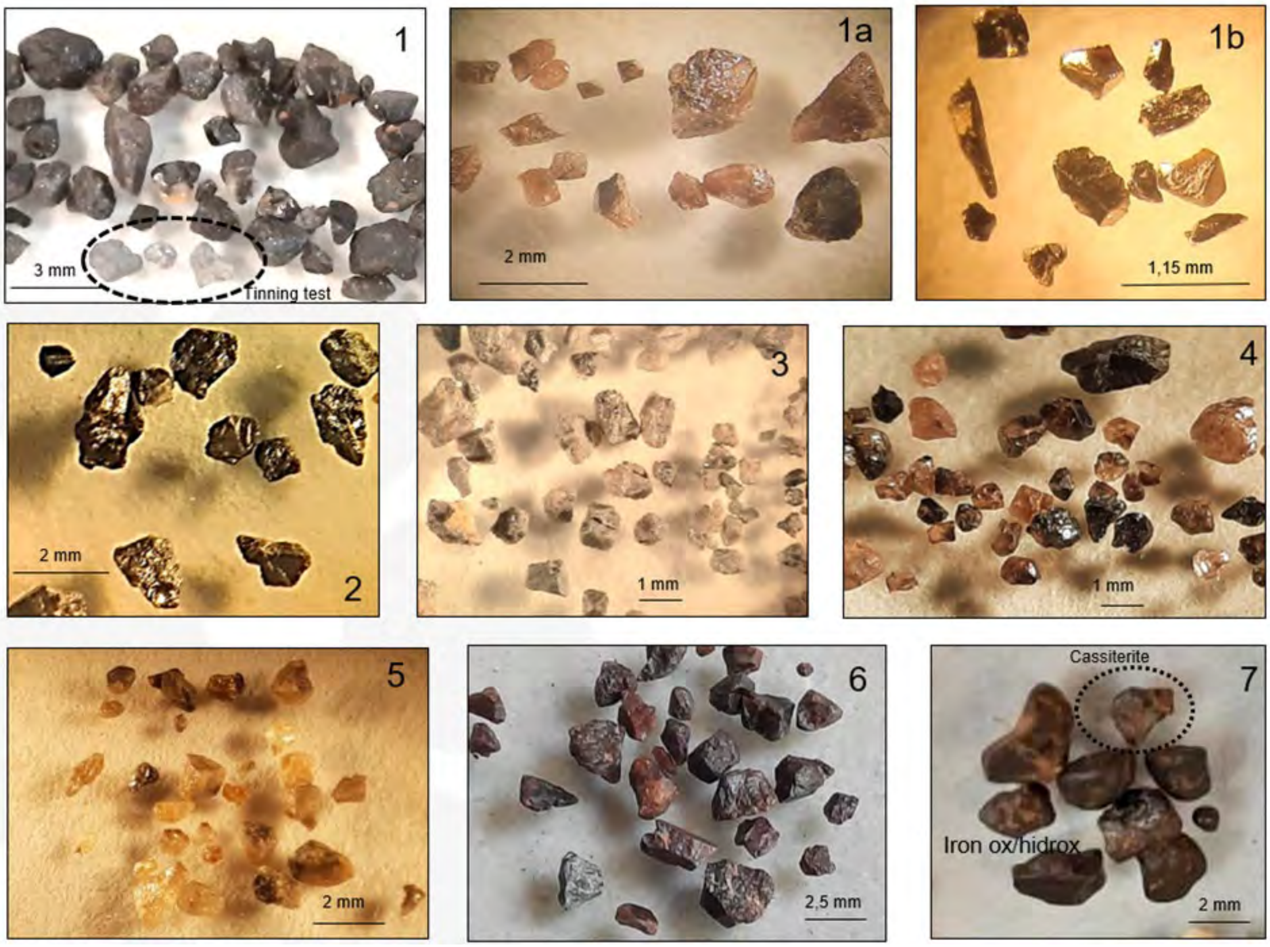

Fig. 5 - Alluvial cassiterite population types, classified according to their physical properties, mainly colour, diaphaneity and pleochroism, from Segura region (see Table 1). Numbers at top right in each image represent the population type: Type 1: Deep Brown, opaque; 3 grains after tinning test; Type 1a: Brown, opaque to semi-translucent; Type 1b: Brown, semi-translucent to opaque; Type 2: Black, opaque; Type 3: Beige/whitish/brown/grey, opaque; some semi-translucent; Type 4: Colourless, light grey, pale rose to cream/grey-brown translucent to semi-translucent grains (reddish pleochroism with variable intensity); Type 5: Black and yellow/light yellow or cream to orange banded grains; translucent to semi-translucent, some with faint pleochroism; Type 6: Red, Reddish-dark brown, opaque (some with translucent parts); Type 7: Reddish (yellow/dark brown: ochre), opaque.

3.2.1.1.2 TiO_2 polymorphs

Table 4 - Physical properties of the different groups of rutile grain populations, based on the mineral population standards produced and supported by the knowledge acquired during the present study of Segura region alluvial samples.

Rutile	Colour	Diaphaneity	Habit	Zoning	Grain size
Group A	(Type 1)-Black, (Type 3)-Red.	Transparent or translucent to opaque	Prismatic, sometimes with striations parallel to the main axis of the prism and/or elbow twinning		Fine (<0.3 mm) to coarse (>0.6 mm)
Group B	(Type 2)-Black, (Type 4)-Red, brownish red.	Transparent to opaque	Subhedral to anhedral. With irregular shape; sometimes rounded (these black rounded grains are very hard to distinguish from cassiterites type 2)	Hyaline grains, sometimes banded (lighter zone; red or brownish red; darker zone: black)	Fine (<0.2 mm) to coarse (> 0.5 mm)
Group C	(Type 5) Dark yellow, Brown reddish.	Translucent to opaque	Anhedral or acicular in polycrystalline, parallel, or meshed aggregates (similar to Sagenite)		Fine (<0.3 mm) to medium (>0.5 mm)
Group D	(Type 6) Black Brownish red, (Type 7) red	Translucent to opaque	Euhedral, Subhedral to anhedral (bipyramidal flattened grains and others)		Fine (<0.2 mm) to medium (>0.4 mm)

Table 5 - Physical properties of the two different populations of anatase grains, based on the mineral population standards produced and supported by the knowledge acquired during the present study of Segura region alluvial samples.

Anatase Type	Colour	Diaphaneity	Habit	Zoning	Grain size
Type 1	Blue, yellow, brown, grey, red	Transparent to opaque	Bipyramidal, with striations perpendicular to the main axis of the bipyramid	Geometric patterns in more transparent grains (between light and dark blue or light and dark brown)	Fine (<0.5 mm) to coarse (>0.9 mm)
Type 2	Blue, grey, brown	Translucent to opaque	Basal. Euhedral to subhedral		Fine (<0.15 mm) to medium (>0.35 mm)

Table 6 - Physical properties of the two different populations of brookite grains, based on the mineral population standards produced and supported by the knowledge acquired during the present study of Segura region alluvial samples.

Brookite Type	Colour	Diaphaneity	Habit	Zoning	Grain size
Type 1	Orange, brownish orange	Transparent to translucent. Rare opaque grains	Tabular, of variable thickness, angular anhedral, sometimes with striations.	Rare grains show zoning displaying slight pleochroism (light orange to dark orange)	Fine (<0.25 mm) to medium (>0.5 mm)
Type 2	Orange, greenish yellow	Transparent to translucent	Tabular, of variable thickness, angular anhedral, sometimes with striations.	Irregular zoning by orange- or blue-coloured spots. Identified a grain with possible black or dark blue mineral inclusion (likely biotite or ilmenite).	Fine (<0.25) to medium (>0.5 mm)

3.2.1.1.3 Tourmaline

Table 7 - Physical properties of the different populations of tourmaline grains, based on the mineral population standards produced and supported by the knowledge acquired during the present study of Segura region alluvial samples.

Tourmaline	Colour / Diaphaneity	Pleochroism	Habit	Inclusions	Zoning	Grain size
Type 1	Dark Brown, almost opaque to translucent or hyaline, some with red tone	Yellowish (some with red tone)/golden brown to dark brown. Pleochroism faint or null in the grains that are almost opaque	Euhedral to subhedral, fragmented grains		In cases, subtle to weak reddish-brown zones	Fine grained (some very fine needles associated with phyllosilicates or cassiterite, <0.28 mm); Medium (0.28 -1 mm) to coarse grained (>1 mm)
Type 2	Dry green / Almost opaque to translucent or hyaline	Light green to dark greenish or black. Pleochroism faint or null in the grains that are almost opaque	Euhedral, subhedral or anhedral. Very rare, rounded grains	Red and dark inclusions; very fine brown tourmaline prisms; in cases, complex textural relation with orange tourmaline (i.e. Type 4)	Irregular: blue, rose in cases reddish or subtle brown borders Blue, rose and in some cases reddish green	Fine (<0.32mm, some very fine needles associated with phyllosilicates) to medium grained (0.32 – 0.8 mm); some cases coarse (>0.8 mm)
Type 3	Includes tourmaline grains: A) Light bluish grey/colourless, hyaline; and B) bluish green almost opaque	Light bluish grey or colourless/dark bluish green or blue. Opaque grains with faint pleochroism.	Subhedral (most of the subtype A) to anhedral (most of the subtype B group)	Some with fine dark or orange (tourmaline Type 4) inclusions	In cases, moderate to subtle; irregular brown borders/zones	Fine-medium (0.28-0.68 mm) to coarse (>0.68mm)
Type 4	Orange to red, translucent	Orange to red/reddish brown	Euhedral, subhedral and anhedral	Red and dark inclusions; very fine brown tourmaline prisms	In cases, irregular and diffuse with green and brown domains; in cases, can be subtle or moderate	Fine-medium (0.2-0.8 mm)
Type 5	Milky light green	Light or dark green/colourless or yellowish	Euhedral, anhedral	Some with very fine dark inclusions	In cases, subtle to moderate: some grains with dark green core	Fine-medium (0.22-0.64 mm)
Type 6	Light rose to brownish pink / Hyaline	Light/dark rose	Euhedral, subhedral to anhedral			Fine (<0.52 mm)
Type 7	Turquoise or emerald green / translucent to opaque	Green to blue; some grains with null or faint pleochroism	Anhedral			Fine-medium (0.3-0.8 mm)

3.2.1.1.4 Garnet

Table 8 - Physical properties of the different populations of garnet grains, based on the mineral population standards produced and supported by the knowledge acquired during the present study of Segura region alluvial samples. Garnet of Type 3 identified by EMP analysis.

Garnet	Colour/Diaphaneity	Habit	Inclusions	Size
Type 1	White, grey, pink and orange	Euhedral or subhedral	Frequent, minute dark coloured	commonly < 1mm
Type 2	Pale rose to (rarely) very light orange rose colour / hyaline to translucent	Anhedral with very irregular outline promoted by multiple cracks and embayment's	In rare cases, very fine dark inclusions	up to ≈1mm)
Type 3	Under binocular microscope was not distinguished from Type 1; in cases, EMP analysis reveal garnet of Type 3 present in Type 1 core.			

3.2.1.2 Heavy Mineral Assemblage by lithological Source Influence

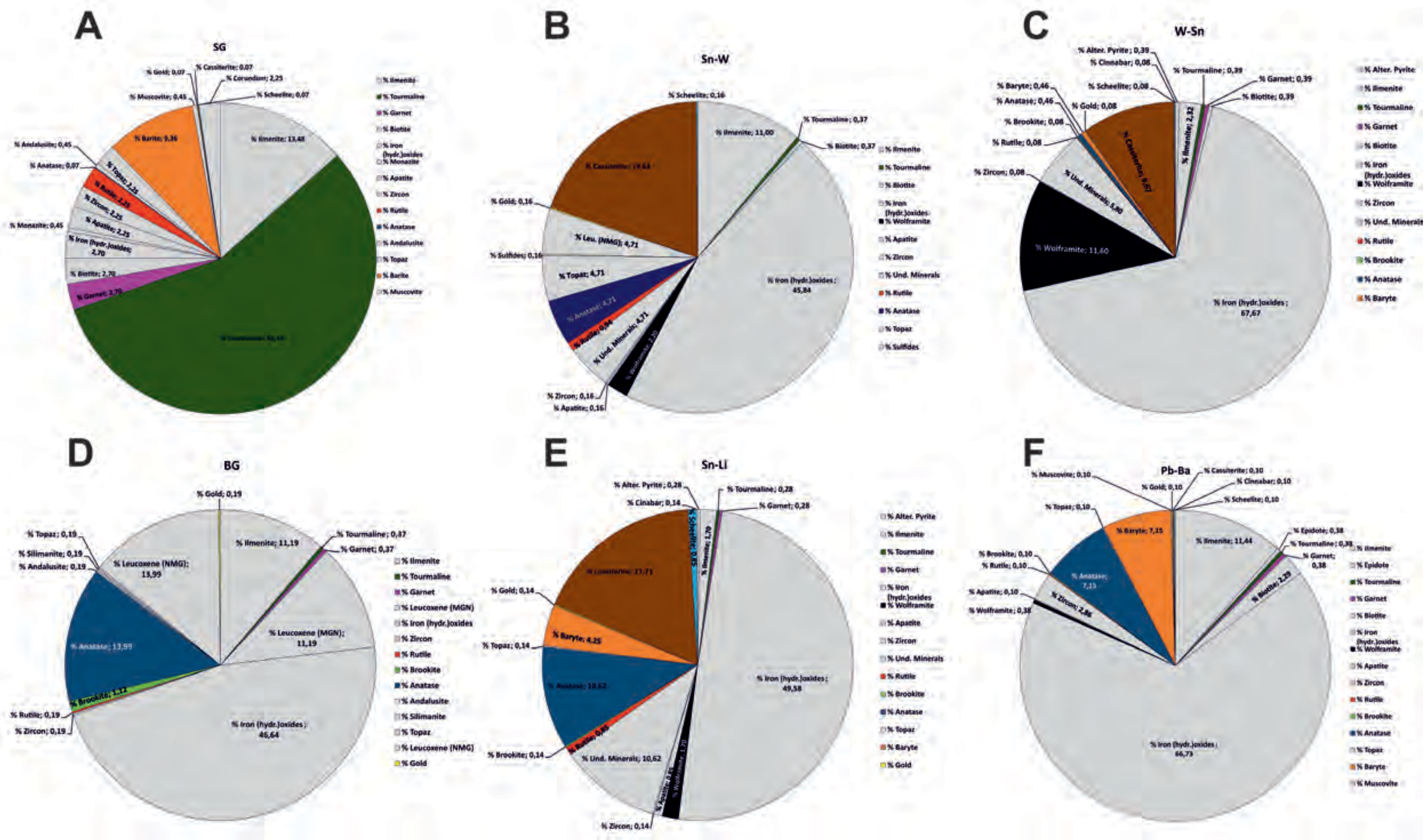

Fig. 6 - Pie charts of six samples from Segura mining region selected as examples of alluvial heavy minerals collected in areas under the influence of specific lithologies to alluvial deposits: A. Segura Granites (SG), showing predominance of tourmaline and minerals variability; B. Sn-W quartz lodes (relatively proximal to SG), showing predominance of cassiterite over wolframite; C. W-Sn quartz lodes (relatively distal to SG), showing predominance of wolframite over cassiterite; D) Beiras Group metasediments (BG), showing predominance of iron (hydr.)oxides; E. Sn-Li mineralised aplite-pegmatite veins; F. Ba-Pb mineralised quartz veins; B, C, E and F, showing the presence of ore minerals and predominance of iron (hydr.)oxides (Table D, Appendix I).

3.2.1.3 Relative Mineral Average Abundance Regional Distribution

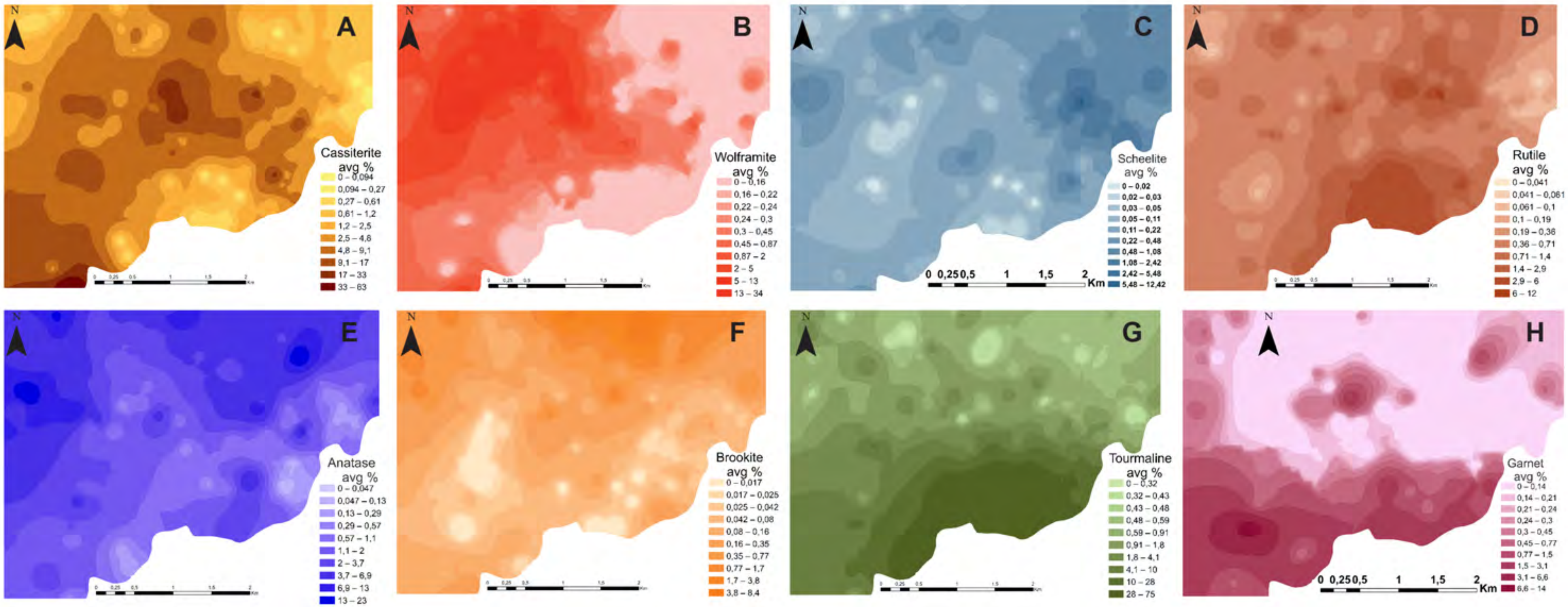

Fig. 7 - Relative mineral average abundance maps produced with MOSTMEG and Grácio (2020) alluvial samples data (total: 111 samples) from Segura mining region: A. cassiterite; B. wolframite; C. scheelite; D. rutile; E. anatase; F. brookite G. tourmaline; H. garnet. A, B and C showing higher abundances mainly in the exocontact around Segura Granite; D, G and H showing higher abundances mainly overlaying Segura Granite and its proximal exocontact (see Fig. 1).

3.2.1.4 Minerals and Mineral Populations Regional Distribution

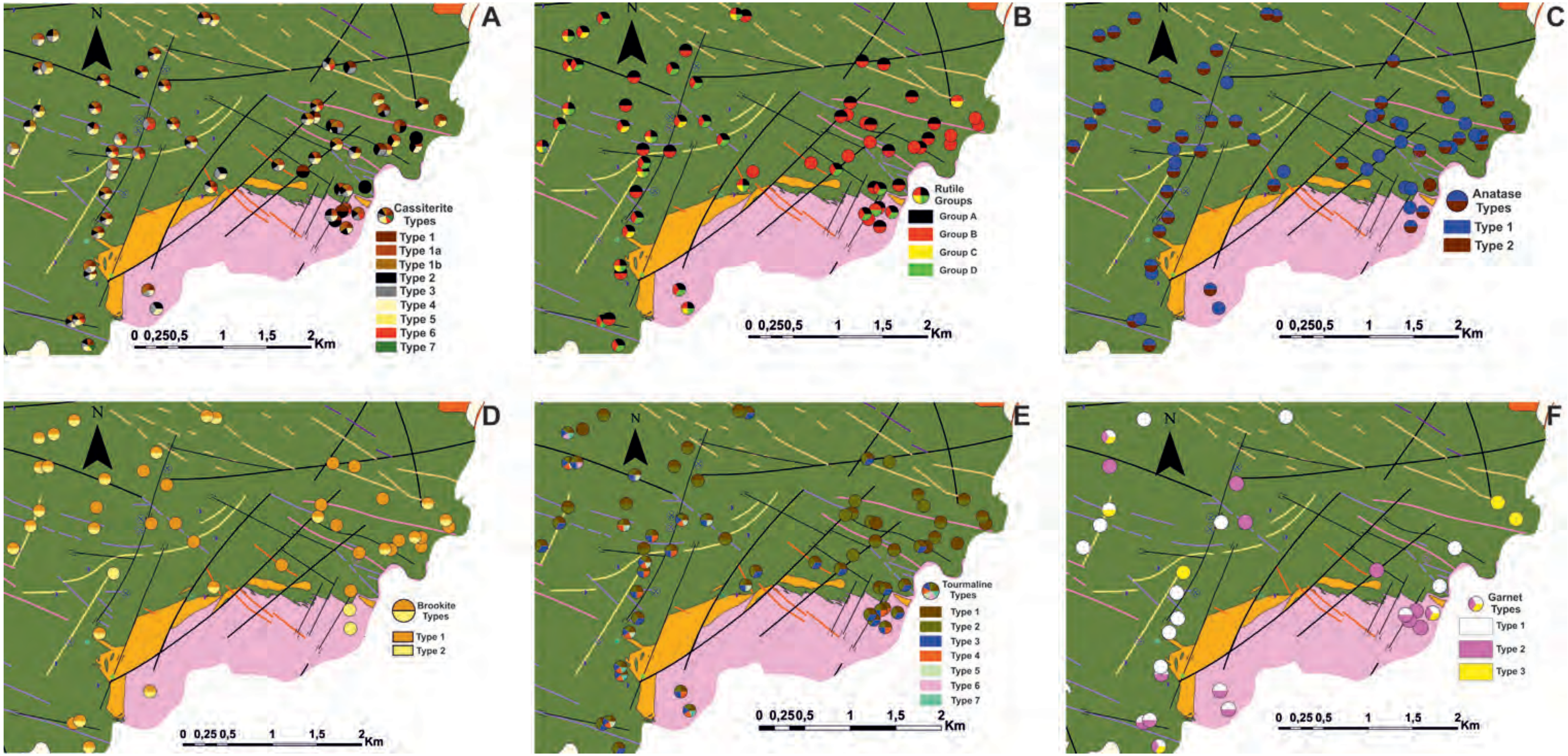

Fig. 8 - Regional distribution of the alluvial heavy mineral grain populations in Segura mining region (study of 69 alluvial samples), projected on an extract of the MOSTMEG geological map, showing major populations variability on the west side and around Segura Granite. Grain populations for: A. Cassiterite. B. Rutile, defined by habit (Group A: prismatic; Group B: anhedral; Group C: acicular polycrystalline aggregates; Group D: bipyramidal and others undifferentiated); C. Anatase, defined by habit (Type 1: bipyramidal; Type 2: basal); D. Brookite, defined by colour. E. Tourmaline, defined by colour; F. Garnet defined by habit and chemical composition (Type 1: spessartine; Type 2: almandine; Type 3 grossular); (see Table 3 to Table 8).

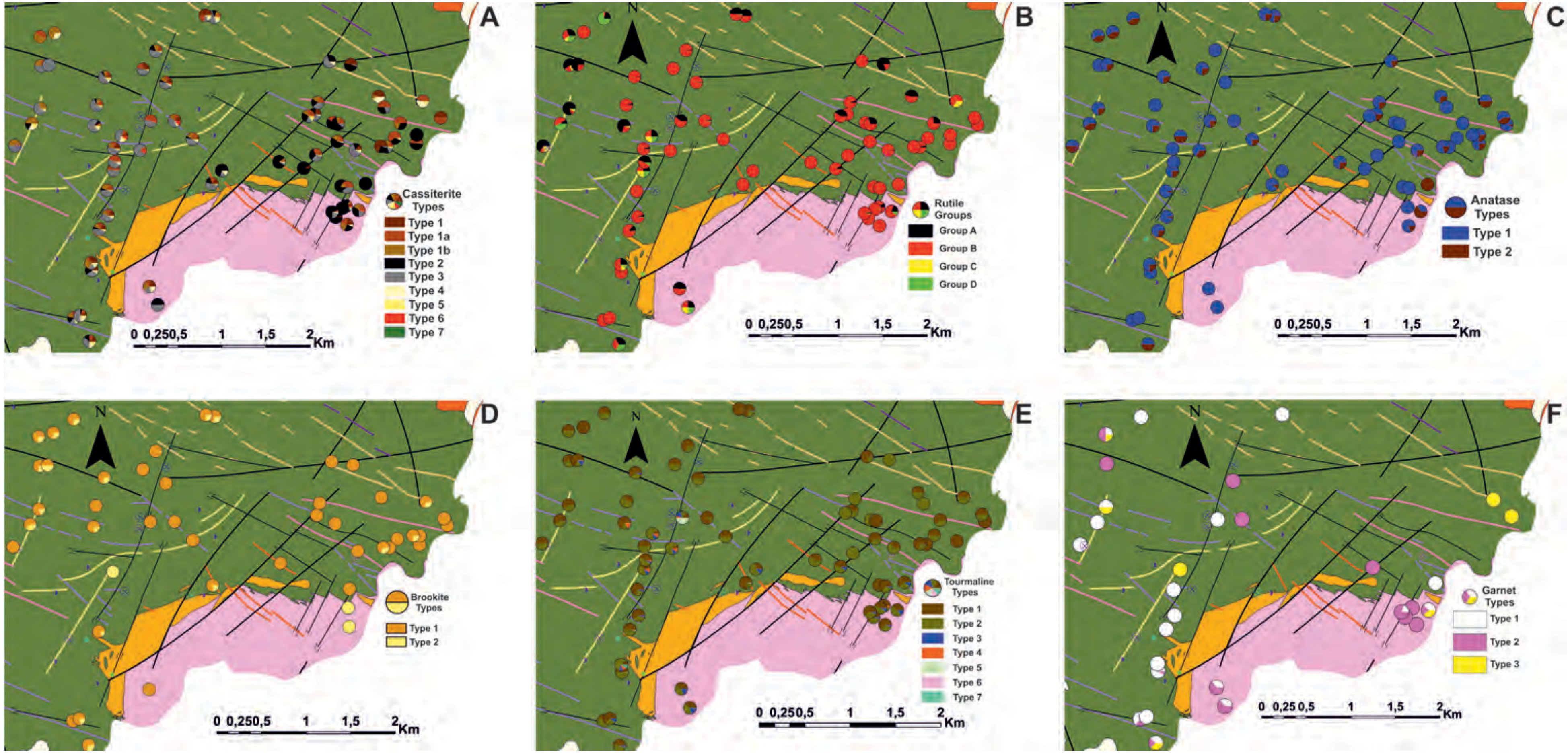

Fig. 9 - Regional distribution of the alluvial heavy mineral grain populations and its relative average abundance in Segura mining region, (study of 69 alluvial samples), projected on an extract of the MOSTMEG geological map, showing: A. preferential occurrence of cassiterite of Type 3 on the west side and Type 2 on the east side; B. predominant occurrence of rutile of Type B; C. predominant occurrence of anatase of Type 1; D. predominant occurrence of brookite of Type 1; E. predominant occurrence of tourmaline of Type 1 and Type 2; F. preferential occurrence of garnet of Type 1 on the west side, and Type 2 aligned NW-SE. Heavy mineral grain populations as in Fig. 8 (see Table 3 to Table 8).

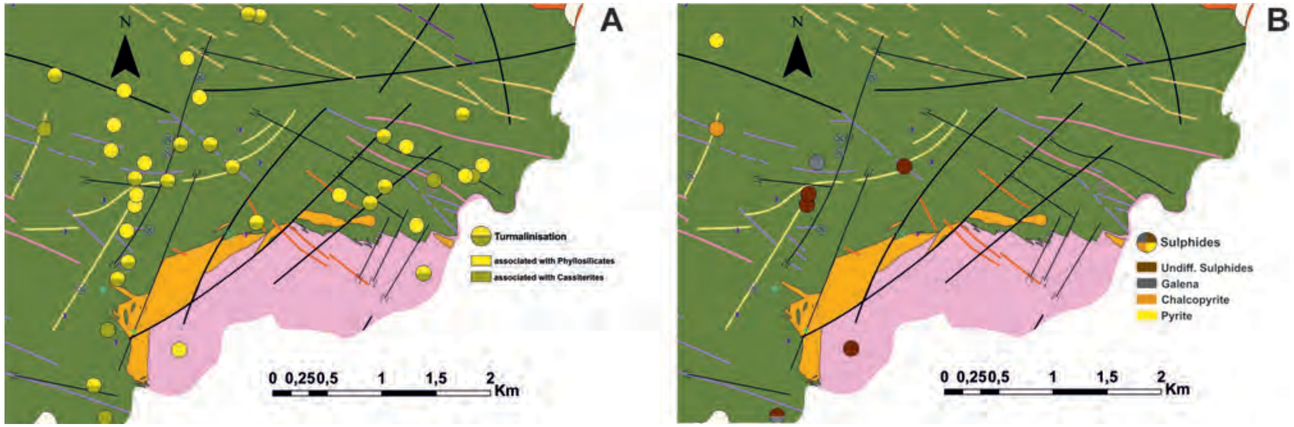

Fig. 10 - Maps of regional distribution produced for Segura mining region (study of 69 alluvial samples): A. tourmalinisation: composite grains of fine tourmaline aggregates associated with cassiterite or phyllosilicates (±quartz); B. fresh sulphide grains; projected on an extract of the MOSTMEG geological map.

3.2.2 Segura southern region

3.2.2.1 Identification, characterization and semi-quantification

(See: Table C and I, Appendix I; Table 3 to Table 8).

3.2.2.2 Relative Mineral average Abundance Regional Distribution

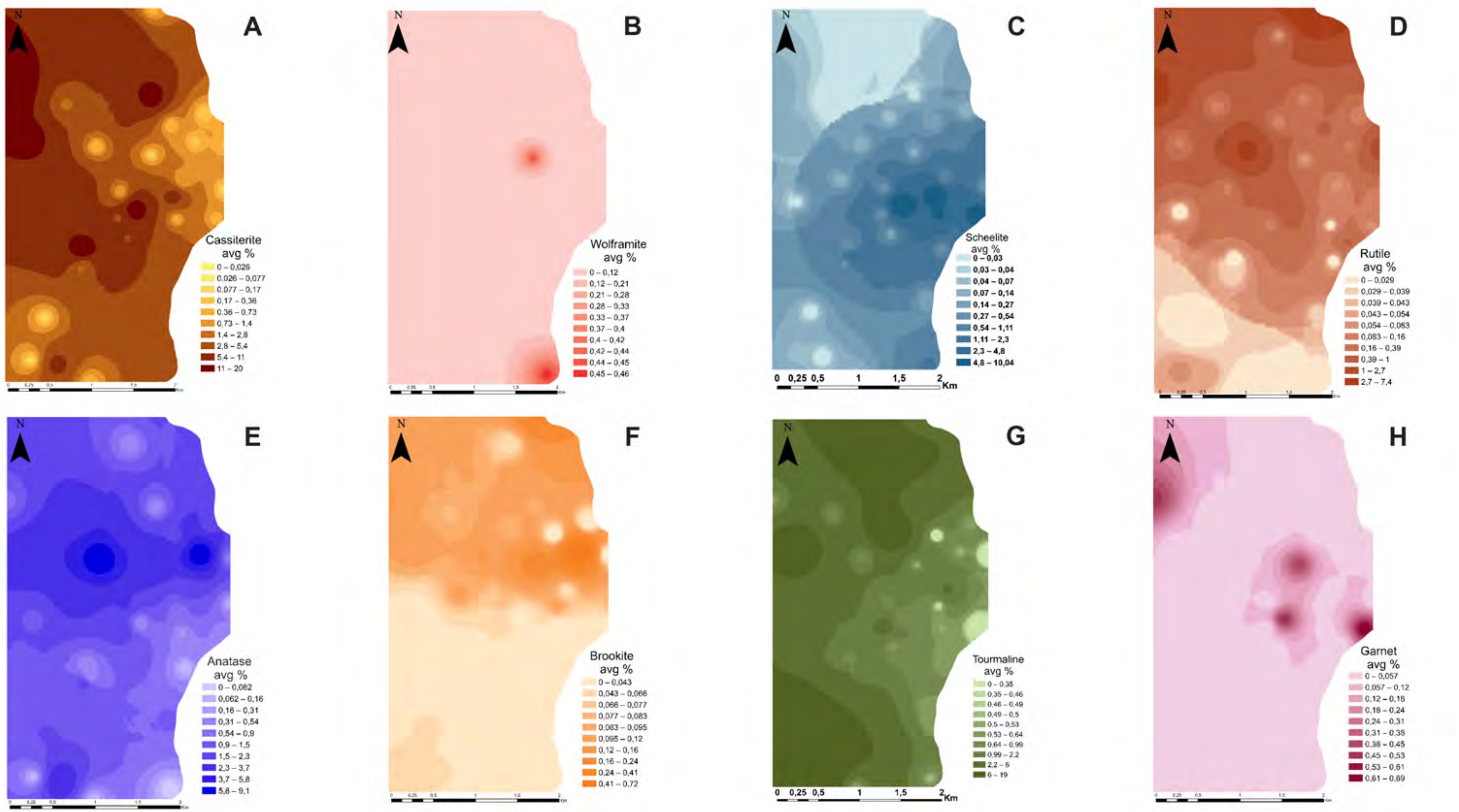

Fig. 11 - Relative mineral average abundance maps produced Segura Southern region (study of 35 samples): A. cassiterite; B. wolframite; C. scheelite; D. rutile; E. anatase; F. brookite; G. tourmaline; and H. garnet. Its noteworthy in C. the scheelite higher abundance concentric halos on the E-SE border, in front of Estorninos pluton (see Fig. 1).

3.2.2.3 Minerals and Mineral Populations Regional Distribution

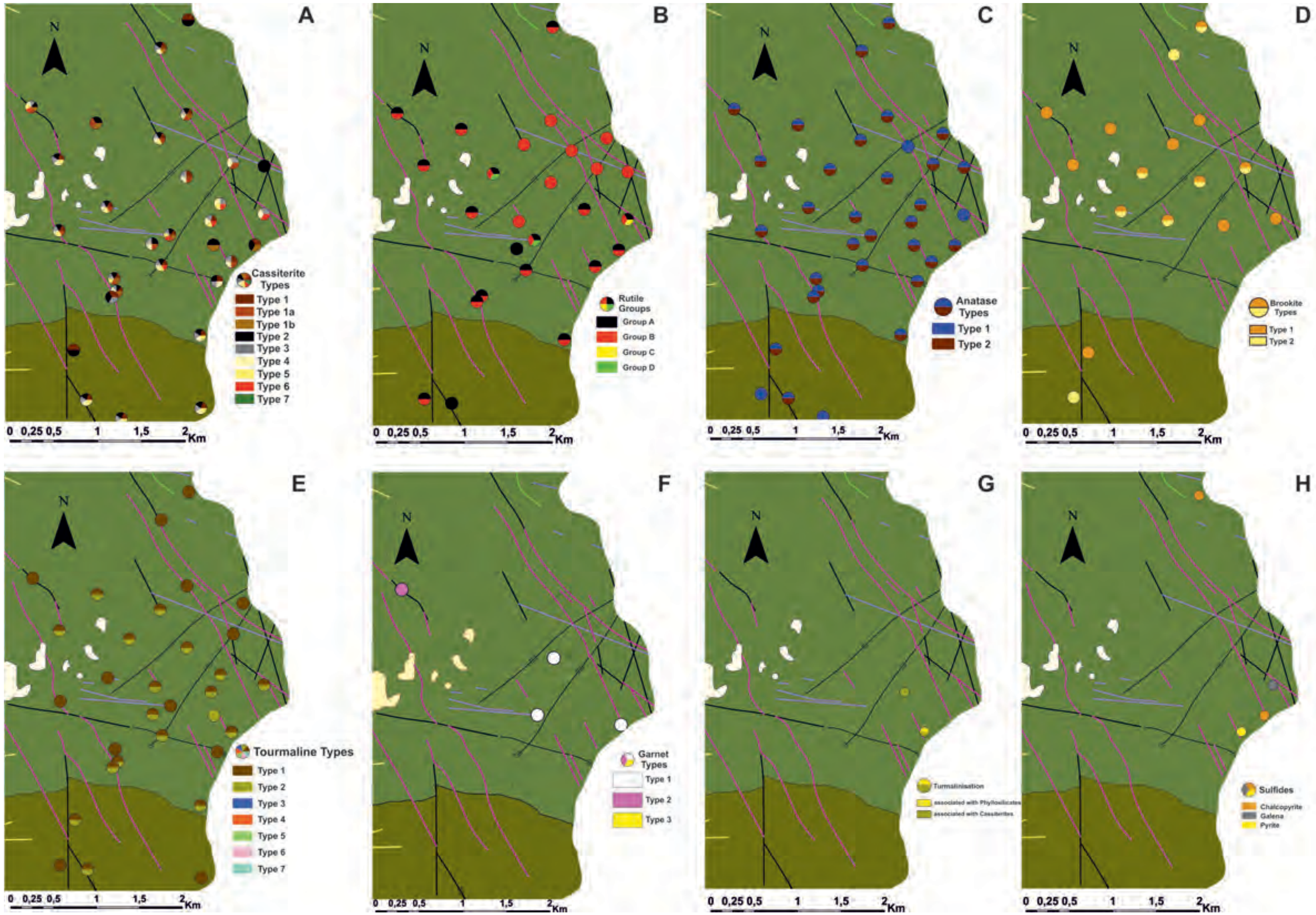

Fig. 12 - Regional distribution of the alluvial heavy mineral grain populations in Segura southern region (study of 35 alluvial samples) projected on an extract of the MOSTMEG geological map: A. cassiterite; B. rutile; C. anatase; D. brookite; E. tourmaline; and F. garnet; heavy mineral grain populations as in Table 3 to 8; and G. tourmalinisation: composite grains of fine tourmaline aggregates associated with cassiterite or phyllosilicates±quartz; and H. fresh sulphide grains.

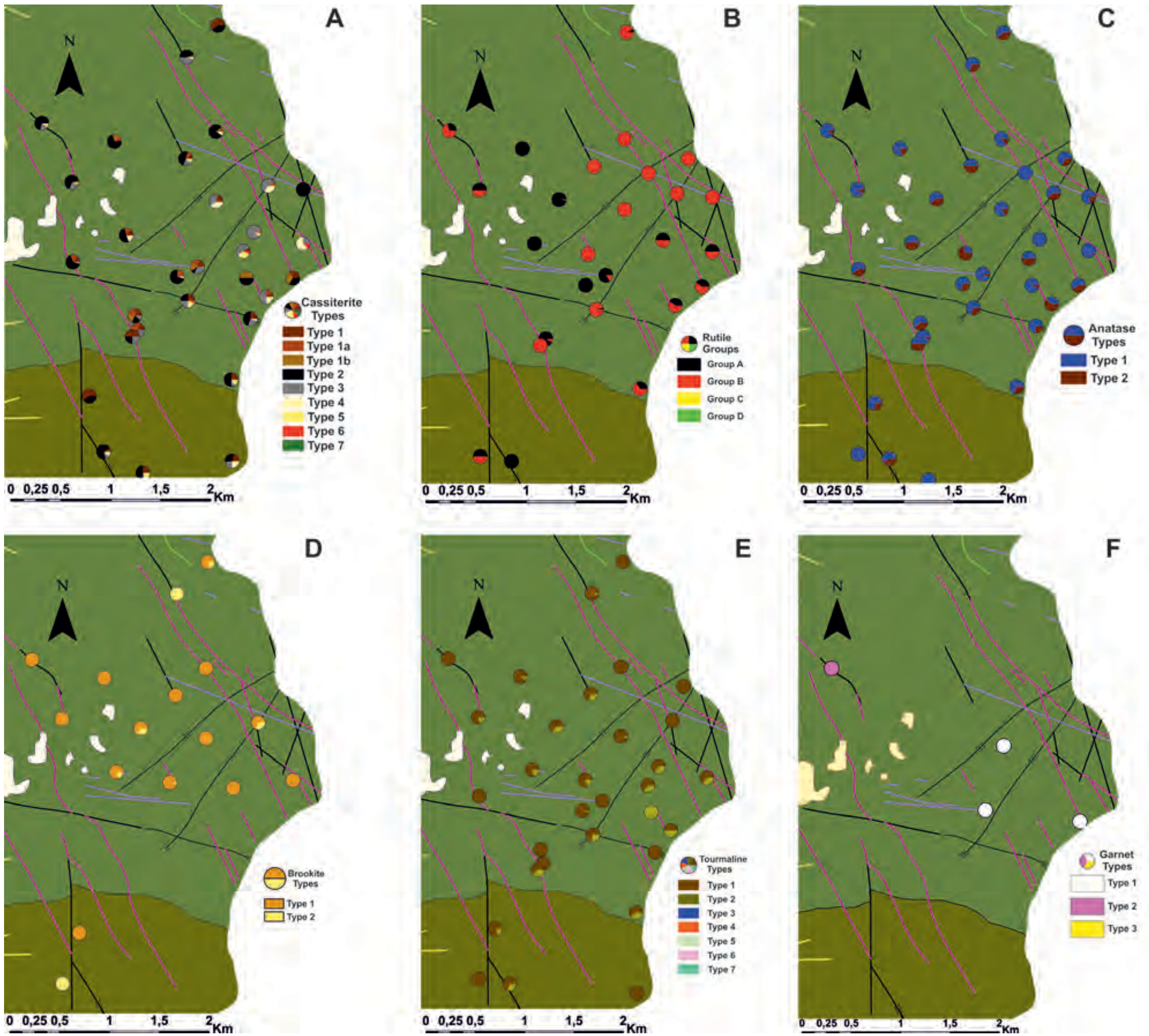

Fig. 13 - Regional distribution of the alluvial heavy mineral grain populations and its relative average abundance in Segura southern region (study of 35 alluvial samples) projected on an extract of the MOSTMEG geological map: A. cassiterite; B. predominance of rutile of Group B; C. predominance of anatase of Type 1; D. predominance brookite of Type 1; E. predominance of tourmaline of Type 1; and F. predominance of garnet of Type 1. Heavy mineral grains populations as in Table 3 to 8.

3.3 Contribute to Heavy Minerals Chemical Characterization

3.3.1 Tourmaline

Table 9 – Summary of the electron microprobe analysis data for FeO and MgO composition and FeO/(FeO+MgO) ratio of tourmaline population types (1, 2, 3 and 4) from west side of Segura mining region.

	wt%	Min	Max	Average	Median	STDEV
Type 1 (n=93)	FeO	5,27	15,45	12,75	13,60	2,17
	MgO	0,11	6,98	1,36	0,56	1,61
	FeO/(FeO+MgO)	0,43	0,99	0,90	0,96	0,13
Type 2 (n=137)	FeO	6,63	15,09	12,00	11,87	1,83
	MgO	0,10	6,27	1,88	1,85	1,32
	FeO/(FeO+MgO)	0,51	0,99	0,86	0,87	0,10
Type 3 (n=36)	FeO	4,77	14,68	12,36	13,00	2,00
	MgO	0,01	7,50	1,29	0,97	1,68
	FeO/(FeO+MgO)	0,39	1,00	0,90	0,93	0,13
Type 4 (n=9)	FeO	9,14	15,52	11,70	11,19	2,32
	MgO	0,22	3,69	2,32	2,69	1,29
	FeO/(FeO+MgO)	0,72	0,98	0,83	0,80	0,10

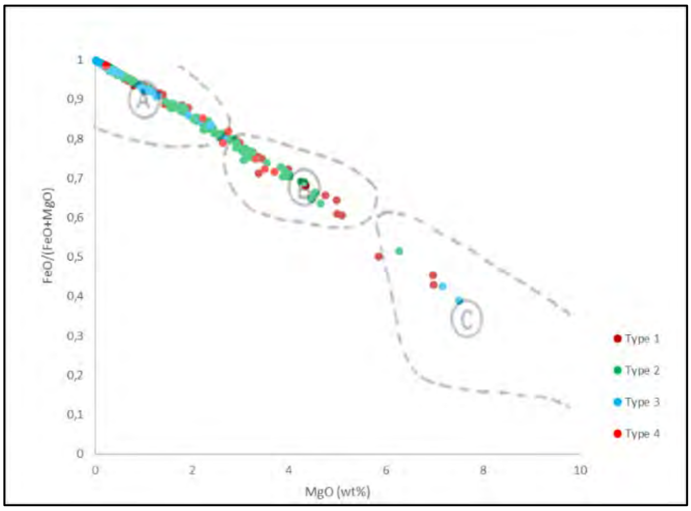

Fig. 14 - FeO/(FeO+MgO) versus MgO (wt%) diagram (adapted from Pirajno and Smithies, 1992) for tourmaline Type 1, 2, 3 and 4 from west side of Segura mining region (Table 7 and 9). that fall mainly over the field of Endogranitic to proximal deposits and Proximal to intermediate deposits tourmalines. A: Endogranitic to proximal deposits; B: Proximal to intermediate deposits; and C: Distal deposits. For tourmaline types see Table 7.

Table 10 - Resume of the LA-ICP-MS analysis data for Ti composition of tourmaline population Type 1, 2, 3 and 4 from west side of Segura mining region (data from LA ICP MS; n = 235).

Ti (ppm)	Min	Max	Average	Median	STDEV
Type 1 (n=104)	414,22	5006,81	1933,96	1961,97	859,24
Type 2 (n=91)	516,83	4585,53	2441,29	2388,47	1056,90
Type 3 (n=30)	65,57	1418,40	457,45	270,32	402,28
Type 4 (n=10)	1312,04	2780,92	2008,90	2180,80	482,22

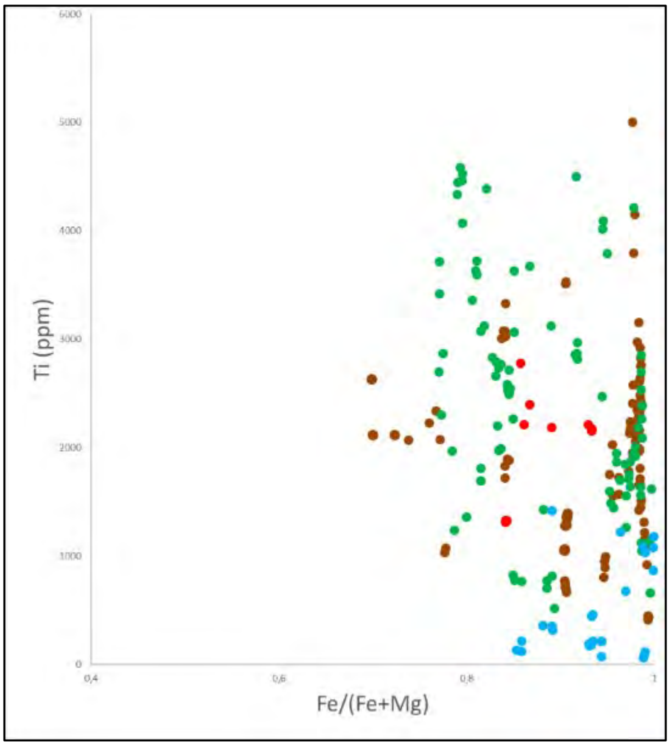

Fig. 15 - Compositional Ti (ppm) vs Fe/(Fe+Mg) diagram (adapted from Mlynarczyk and Williams-Jones, 2006) for tourmaline Type 1, 2, 3 and 4 from west side of Segura mining region (Table 7 and 10). Tourmaline of Type 1 and 2 (the most abundant and widespread in the region; see Fig. 8E and 9E) present higher variability of Fe/(Fe+Mg) ratios and Ti contents; the blue tourmaline has higher Fe/(Fe+Mg) ratios and lower Ti contents, suggesting a more restrict composition and genetic environment(s) source; red tourmalines have intermediate composition (tourmaline types as internal legend of Fig. 14 and Table 7).

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Project Partner Signature: Rui Salgueiro Date: 30 November 2023

APPENDIX I

Table A. Alluvial wolframite, scheelite and cassiterite grains in the 606 alluvial samples from Segura region (that enclose Segura mining and southern region). Data selected from old exploration surveys and updated during MOSTMEG project (after: Viegas et al., 1988, and Inverno et al., 2007 and refrences therein).

Sample	Wolframite	Scheelite	Cassiterite
283-22	0	12	0
283-24	0	20	0
283-65	0	0	0
283-71	0	0	0
283-76	0	0	0
283-141	0	0	0
283-144	0	4	0
283-198	0	10	0
283-201	0	0	0
283-445	0	17	0
283-446	0	8	10
283-447	0	20	0
283-448	0	60	0
283-449	0	5	0
283-450	0	0	7
283-451	0	15	5
283-452	0	60	1
283-453	0	40	0
283-454	0	35	0
283-455	0	0	10
283-456	0	0	0
283-457	4	10	2
283-458	0	0	10
283-459	0	2	11
283-460	0	2	1
283-461	0	1	5
283-462	0	6	3
283-463	0	34	15
283-464	0	5	10
283-465	0	17	3
283-466	0	44	20
283-467	0	5	12
283-468	0	18	7
283-469	0	0	0
283-470	0	0	56
283-471	0	3	61
283-472	0	2	2
283-473	0	3	7
283-474	0	0	2
283-475	0	9	5
283-476	0	2	31
283-477	0	8	409
283-478	42	8	40
283-479	0	5	10
283-480	10	10	34
283-481	0	0	30
283-482	10	6	205
283-483	0	0	17
283-484	0	2	10
283-485	0	5	20
283-486	0	0	0
283-487	0	1	8
283-488	0	25	30
283-489	0	21	25
283-490	181	20	265
283-491	380	27	253
283-492	164	33	140
283-493	101	45	109
283-494	10	20	64
283-495	444	51	265
283-496	113	27	90
283-497	0	0	8
283-498	204	21	302
283-499	0	15	130
283-500	6	4	10
283-501	6	0	117
283-502	165	92	142
283-503	140	45	360
283-504	0	3	18
283-505	20	30	86
283-506	630	49	640
283-507	100	7	43
283-508	0	3	100
283-509	9	1	185
283-510	9	3	278
283-511	180	2	0
283-512	0	215	0
283-513	0	35	30
283-514	0	15	12
283-515	0	0	15
283-516	24	25	549
283-517	0	8	26
283-518	0	20	5
283-519	0	70	6
283-520	0	65	35
283-521	1	8	10
283-522	0	2	0
283-523	0	1	20
283-524	1	3	31
283-525	12	8	100
283-526	0	32	150
283-527	0	0	5
283-528	0	0	0
283-529	15	61	22
283-530	0	11	0
283-531	0	10	6
283-532	0	0	3
283-533	0	2	0
283-534	1	48	35
283-535	0	61	5
283-536	0	21	0
283-537	0	0	0
283-538	0	4	15
283-539	0	4	51
283-540	0	7	0
283-541	0	0	0
283-542	0	0	0
283-543	0	0	25
283-544	0	25	0
283-545	0	0	0
283-546	0	13	5
283-548	0	2	40
283-549	0	1	89
283-550	0	10	51
283-551	0	2	10
295-5	0	11	200
295-6	0	60	345
295-7	0	170	900
295-8	0	15	50
295-10	0	20	145
295-13	0	0	50
295-14	0	0	10
295-16	0	2	0
295-17	0	0	63
295-20	10	45	170
295-23	0	505	125
295-26	0	0	0
295-28	0	0	160
295-29	0	0	0
295-30	0	0	0
295-32	0	10	320
295-33	0	0	110
295-34	0	0	50
295-35	0	3	30
295-38	0	0	10
295-40	0	5	5
295-42	0	0	50
295-44	0	0	10
295-45	0	0	407
295-47	0	0	675
295-48	0	1	2000
295-50	0	0	5
295-51	0	0	30
295-52	0	0	100
295-53	0	0	420
295-54	0	0	55
295-55	0	3	5
295-56	0	0	100
295-57	0	0	0
295-59	0	0	0
295-60	0	6	0
295-61	340	7	5000
295-62	0	6	37
295-63	60	19	575
295-65	0	4	410
295-66	50	102	1025
295-68	30	11	1500
295-72	80	6	855
295-73	20	10	220
295-78	40	15	65
295-79	20	16	10
295-80	25	6	44
295-82	10	4	0
295-83	300	3	750
295-85	300	8	1605
295-87	15	10	90
295-89	0	0	100
295-90	25	0	120
295-92	0	0	0
295-94	0	0	180
295-96	0	0	0
295-98	0	0	0
295-100	0	0	82
295-101	0	0	0
295-102	0	0	0
295-104	0	3	40
295-107	0	0	0
295-108	0	3	1200
295-110	0	6	284
295-112	15	7	320
295-113	0	5	50
295-115	0	12	25
295-116	0	10	0
295-118	0	0	65
295-120	0	0	180
295-123	0	0	1700
295-124	0	0	170
295-125	0	0	86
295-126	0	0	10
295-127	0	1	314
295-128	0	0	15
295-129	0	0	392
295-130	0	0	84
295-131	0	1	0
295-132	0	0	5
295-133	0	0	0
295-134	0	0	5
295-135	0	5	35
295-136	0	15	101
295-137	0	7	60
295-138	0	0	76
295-139	0	1	395
295-140	0	100	50
295-141	0	140	52

Table A. (continued)

Sample	Wolframite	Scheelite	Cassiterite
295-142	0	40	210
295-143	0	25	32
295-144	0	2	11
295-145	0	80	50
295-146	0	6	80
295-147	0	0	29
295-148	0	18	125
295-149	0	0	10
295-150	0	0	5
295-151	0	7	30
295-152	0	0	51
295-153	0	38	195
295-154	0	0	42
295-155	0	0	10
295-156	0	0	80
295-157	0	0	42
295-158	0	0	340
295-159	0	2	50
295-160	0	2	80
295-161	0	2	170
295-162	0	1	40
295-163	0	0	25
295-164	0	0	3000
295-165	0	0	117
295-166	0	0	140
295-167	0	30	10
295-168	0	0	36
295-169	0	0	66
295-170	0	0	349
295-171	0	0	335
295-172	0	4	10
295-173	0	0	50
295-174	0	0	30
295-175	0	0	30
295-176	0	0	121
295-177	0	0	100
295-178	0	0	175
295-179	0	0	110
295-180	0	0	20
295-181	0	0	50
295-182	0	0	4
295-183	0	0	213
295-184	0	0	5
295-185	0	0	0
295-186	0	0	5
295-187	0	0	15
295-188	0	0	3
295-189	0	0	5
295-190	0	3	72
295-191	0	0	5
295-192	0	0	0
295-193	0	0	66
295-194	0	0	15
295-195	0	0	10
295-196	0	0	0
295-197	0	1	5
295-198	0	0	0
295-199	0	0	0
295-200	6	17	7
295-201	0	3	300
295-202	0	1	100
295-203	0	0	50
295-204	0	3	30
295-205	0	5	52
295-206	0	15	0
295-207	0	4	0
295-208	0	1	100
295-209	0	23	120
295-210	0	154	173
295-211	0	0	106
295-212	0	12	70
295-213	0	10	52
295-214	0	0	105
295-215	0	41	233
295-216	0	1	30
295-217	0	55	88
295-218	0	0	0
295-219	0	155	50
295-220	0	36	37
295-221	0	25	50
295-222	0	0	5
295-223	0	0	27
295-224	0	1	0
295-225	0	1	0
295-226	0	39	0
295-227	0	5	0
295-228	0	24	5
295-229	0	0	0
295-230	0	22	0
295-231	0	0	0
295-232	0	2	0
295-233	0	92	24
295-234	0	13	0
295-235	0	40	20
295-236	0	91	0
295-237	0	11	0
295-238	0	7	10
295-239	0	3	0
295-240	0	2	4
295-241	0	60	0
295-242	0	90	15
295-243	0	26	20
295-244	0	70	20
295-245	0	82	15
295-246	0	113	20
295-247	0	1	13
295-248	0	0	10
295-249	0	2	100
295-250	0	0	0
295-251	0	0	17
295-252	0	0	25
295-253	0	0	150
295-254	0	0	50
295-255	0	0	530
295-256	0	0	240
295-257	0	0	80
295-258	0	0	244
295-259	0	0	15
295-260	0	0	0
295-261	0	2	21
295-262	0	0	110
295-263	0	0	83
295-264	0	0	100
295-265	0	0	114
295-266	0	4	125
295-267	0	0	15
295-268	0	0	166
295-269	0	1	0
295-270	0	1	2
295-271	0	45	0
295-272	0	25	11
295-273	0	35	10
295-274	0	55	0
295-275	0	7	5
295-276	0	79	10
295-277	0	0	106
295-278	0	125	25
295-279	0	28	0
295-280	0	0	30
295-281	0	0	0
295-282	0	15	15
295-283	0	6	3
295-284	0	0	318
295-285	0	10	25
295-286	0	15	175
295-287	0	16	209
295-288	0	2	133
295-289	0	3	151
295-290	0	88	224
295-291	44	75	140
295-292	1	2	209
295-293	1	15	50
295-294	0	47	43
295-295	0	10	70
295-296	0	12	305
295-297	0	2	22
295-298	0	7	5
295-299	0	0	35
295-300	0	0	128
295-301	0	0	100
295-302	0	0	170
295-303	0	2	258
295-304	0	12	177
295-305	0	0	201
295-306	0	1	138
295-307	0	0	126
295-308	0	0	156
295-309	0	1	89
295-310	0	3	195
295-311	0	2	20
295-312	0	2	17
295-313	0	0	4
295-314	0	3	5
295-315	0	67	0
295-316	0	0	0
295-317	0	0	0
295-318	0	8	0
295-319	0	0	0
295-320	0	0	0
295-321	0	2	0
295-322	0	0	7
295-323	0	55	25
295-324	0	23	206
295-325	0	11	21
295-326	0	78	250
295-327	0	53	50
295-328	0	16	0
295-329	0	101	6
295-330	0	43	5
295-331	0	125	10
295-332	0	38	8
295-333	0	210	100
295-334	2	80	118
295-335	0	180	148
295-336	0	10	47
295-337	3	197	3000
295-338	0	75	90
295-339	0	2	5
295-340	0	31	63
295-341	0	7	0
295-342	0	105	308
295-343	0	32	35
295-344	0	72	25
295-345	0	0	0

Table A. (continued)

Sample	Wolframite	Scheelite	Cassiterite
295-346	0	8	10
295-347	0	33	25
295-348	0	0	0
295-349	0	2	15
295-350	0	15	10
295-351	0	2	15
295-352	0	4	0
295-353	0	6	10
295-354	0	136	92
295-355	0	131	51
295-356	0	183	40
295-357	0	125	20
295-358	0	7	0
295-359	0	16	0
295-360	0	75	0
295-361	0	14	0
295-362	0	20	60
295-363	0	50	95
295-364	0	0	0
295-365	0	23	5
295-366	0	0	0
295-367	0	78	35
295-368	0	0	15
295-369	0	65	50
295-370	0	51	240
295-372	0	40	32
295-373	0	43	110
295-374	0	10	171
295-375	0	5	55
295-376	0	20	50
295-377	0	11	80
295-378	0	15	112
295-379	0	10	10
295-380	15	77	1180
295-381	0	33	107
295-382	0	40	300
295-383	0	50	20
295-384	0	84	88
295-385	0	6	15
295-386	0	0	10
295-387	0	2	26
295-388	0	0	20
295-389	0	0	10
295-390	0	0	50
295-391	0	0	40
295-392	0	6	100
295-393	0	3	5
295-394	0	0	10
295-395	0	2	9
295-396	0	0	0
295-397	0	0	0

Sample	Wolframite	Scheelite	Cassiterite
295-398	0	3	10
295-399	0	5	0
295-400	0	0	0
295-401	0	0	10
295-402	0	0	20
295-403	0	1	7
295-404	0	0	10
295-405	0	0	47
295-406	0	0	0
295-407	0	5	20
295-408	0	0	0
295-409	0	0	0
295-410	0	0	5
295-411	0	0	10
295-412	0	95	15
295-413	0	10	0
295-414	2	41	150
295-415	2	45	51
295-416	0	25	50
295-417	0	62	50
295-418	20	43	31
295-419	0	152	50
295-420	0	151	35
295-421	1	155	90
295-422	2	10	47
295-423	360	17	161
295-424	261	42	267
295-425	153	55	782
295-426	5	21	5000
295-427	12	33	53
295-428	3	15	425
295-429	0	1	16
295-430	0	0	23
295-431	0	0	175
295-432	27	2	324
295-434	0	0	73
295-435	0	0	51
295-436	0	28	111
295-437	30	5	30
295-438	0	5	198
295-439	1	16	70
295-440	3	6	416
295-441	0	3	239
295-442	0	0	223
295-443	222	23	1930
295-444	5	27	400
295-445	0	5	110
295-447	0	4	30
295-448	0	25	170
295-449	17	45	758
295-450	27	57	387

Sample	Wolframite	Scheelite	Cassiterite
295-451	0	14	143
295-452	0	6	130
295-454	0	4	301
295-455	3	15	647
295-456	0	3	306
295-457	0	14	800
295-458	4	2	235
295-459	12	20	378
295-460	0	25	5
295-461	8	2	104
295-462	2	18	400
295-463	6	13	100
295-464	11	9	54
295-465	1	3	249
295-466	10	23	150
295-467	0	5	136
295-468	0	18	307
295-469	0	15	5
295-470	0	141	0
295-471	0	181	20
295-472	0	70	20
295-473	0	3	5
295-474	0	6	0
295-475	0	0	5
295-476	0	80	150
295-477	0	54	104
295-478	0	75	42
295-479	0	3	84
295-480	0	55	18
295-481	0	10	0
295-482	0	205	50
295-483	0	5	1
295-484	0	112	29
295-485	0	60	187
295-486	0	62	80
295-487	0	216	201
295-488	0	63	47
295-489	0	0	0
295-490	0	1	1
295-491	0	0	2
295-492	0	2	29
295-493	0	0	7
295-494	0	0	70
295-495	0	0	4
295-496	0	0	0
295-497	0	0	28
295-498	0	2	20
295-499	0	4	30
295-500	0	118	115
295-501	0	65	120
295-502	0	94	20

Sample	Wolframite	Scheelite	Cassiterite
295-503	0	65	50
295-504	0	16	209
295-505	3	13	335
295-506	0	25	96
295-507	3	0	0
295-508	0	2	106
295-509	0	0	120
295-510	21	35	443
295-511	0	0	12
295-512	10	16	135
295-513	0	0	0
295-514	0	0	0
295-515	0	4	0
295-516	0	0	0
295-517	0	0	0
295-518	0	0	0
295-519	0	0	28
295-520	0	1	56
295-521	0	0	0
295-522	0	3	76
295-523	0	0	0
295-524	0	3	0
295-525	0	0	0
295-526	0	0	0
295-527	0	0	0
295-528	0	0	0
295-529	0	0	0
295-530	0	0	0
295-531	0	0	0
295-532	0	0	0
295-533	0	0	1
295-534	0	0	17
295-535	0	0	0
295-536	0	0	0
295-537	0	0	0
295-538	0	0	5
295-539	0	1	0
295-540	0	0	20
295-541	0	5	80
295-542	0	0	0
295-543	0	0	3
294-59	0	0	0
294-741	0	0	150
294-790	0	0	0
294-791	0	2	0

Table B. Identification and semi-quantifications of alluvial heavy minerals under binocular microscope from Segura mining region samples (after Viegas et al., 1988 and Inverno et al., 2007). Identification of cassiterite, scheelite, wolframite, TiO_2 polymorphs, tourmaline and garnet controlled in part of the samples by chemical analysis. Scheelite controlled also by UV light.

Alluvial heavy minerals from Segura mining region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Corindum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
		R		R	P	P		V	M	V	V							V		MGN: 0.40 cm
283-478	P	V						V	Md	V	V				P			V		NM: Raso
	V	V	V	V	P	R		V	A		V	V	V							MGN: 0.40 cm
283-480	P	V						V	A						R					NM: Dim
	V	V	V		P	R		V	A	V	R		V							MGN: 0.30 cm
283-484	V			V		V		V	Md		V			Md				V	V	NM: Raso
	V			R	P	R		V	A		V									MGN: 0.40 cm
283-485	V	V		V				V	Md					Md	Md					NM: Raso
	V			V	P	R		V	A		V	V			P	V				MGN: 0.20 cm
283-486								V	Md		V				Md	V				NM: 0.10 cm
	V	R	V		P	R	V	R	A	R	V	R	R							MGN: 0.40 cm
283-490	A	V		V				R	Md					R						NM: Raso
	V	P		V	P	V			M		V	V	Md							MGN: 0.50 cm
283-491	A	R						V	R					R						NM: Raso
	V	R	V	R	P	V		V	M	V	V									MGN: 0.40 cm
283-493	P	V				V		V	P	V				A						NM: Raso
	V	P		V	R	V			M	V	V		R							MGN: 1.00 cm
283-506	A	V		V		V		V	R		V			Md						NM: 0.20 cm
	V	V	V	R	P	P		V	A		R	V								MGN: 0.20 cm
283-508	P	V		V		V		R	Md		V				Md					NM: 0.10 cm

Alluvial heavy minerals from Segura mining region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Corindum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
	R	V	V	R	P	P		V	A		V	V	V							MGN: 0.40 cm
283-510	Md	V				V		R	Md						Md					NM: 0.10 cm
		V	V	P	R	V			A		V		V							MGN: 0.20 cm
283-529	R	R		V		V		R	P					Md	V					NM: Raso
	V		V	R	V	R		V	M		V									MGN: 0.10 cm
283-531	V	V						R	A					P	P					NM: Raso
	V	P	V	V	Md	V	V	V	A	V	R	V	P							MGN: 0.30 cm
295-61	M	V	V	V		V	V	V	V	V	R				V				V	NM: 1.20 cm
			R	V	Md	V		R	Md		R	V	A							MGN: 0.30 cm
295-62	P	V		V		V		R	Md		V			P	V					NM: Dim
		V	Md	V	R	V		V	A	V	Md	R	A							MGN: 0.30 cm
295-63	Md	V				V		R	R	V	R			R						NM: 0.30 cm
	V	V	P	V	R			V	A	R	V	A	R							MGN: 0.30 cm
295-68	M	V				V		V	V	R				V			V			NM: Raso
		V	R		R				M	V	R	V	A							MGN: 0.80 cm
295-72	A					V		V	R	V	V			R	V		V			NM: 0.20 cm
	V	V	R	V	P	V		V	M		V	V	A							MGN: 0.30 cm
295-73	A	V						V	Md	V	V			R						NM: Raso
	V	V	V	P	P	V			M	R	V	V	Md						V	MGN: 0.20 cm
295-79	V	V		V				V	Md	V	V			V						NM: Raso

Table B. (continued)

Alluvial heavy minerals from Segura mining region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Coríndum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
	V	R	R		R				M	V	R	V	A							MGN: 0.60 cm
295-83	A	V						V	P		V									NM: 0.30 cm
	V	R	V	R	R	V		V	M	V	V	V	A							MGN: 0.60 cm
295-85	A	V		V		V	V	V	P	V				Md						NM: 0.20 cm
		V	V	V	R	V		V	M		V		R							MGN: 0.30 cm
295-87	P	V				V		R	M	V				P						NM: Dim
	V		R	R	Md	V		A	Md	R	P	V								MGN: 0.40 cm
295-110	Md	V				V		V	V	V	V			P						NM: Raso
	V	V	R		Md			P	Md		R	V		R						MGN: 0.50 cm
295-112	Md	V		V				V	V					R			V			NM: Raso
		V			P	V		Md	A		V									MGN: 0.60 cm
295-115	R	R						R	R						R					NM: Dim
	V			V	P	V		P	M	V	V									MGN: 0.40 cm
295-116		V						V	Md					Md						NM: Dim
			P	P	Md	V		R	P	R	Md	P	P							MGN: 0.60 cm
295-311	V	V		V		V	V	R	V	R	V	P								NM: 0.20 cm
	V		P	P	P			R	R	R	A	P	A							MGN: 0.30 cm
295-312	V	V						P	V	R	R	P	V							NM: Raso
			Md	V	P				Md	V	P	Md	P							MGN: 0.30 cm
295-323	P	V		V				R	P	V	P									NM: Raso

Alluvial heavy minerals from Segura mining region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Coríndum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
	V	V	V	R	P	R		V	A		V	V	V		R	V	V			MGN: 0.40 cm
295-414	P	R		V		V	V	R	A		V				P					NM: 0.20 cm
	V	V	V	R	P	V			A	V	V	V								MGN: 0.30 cm
295-417	R	R	V					R	P		V				P					NM: Raso
	V	P	V	V	Md	V			A		V	V								MGN: 0.50 cm
295-423	A	V		V				R	Md	V				Md						NM: Raso
	V	Md			R	V		V	Md		V		V							MGN: 0.50 cm
295-424	Md	V						R	Md	V										NM: 0.20 cm
		V	R	P	Md	V			Md		P	P	Md							MGN: 0.10 cm
295-429	R					V	V	V	P	V	V				R					NM: Dim
		V	P	P	P				A	V	R	P	P					V		MGN: 0.20 cm
295-430	R			V		V	V	P	P	V					R					NM: Dim
		V	V	V	P				M	V	V	R	V							MGN: 0.60 cm
295-431	A					V		V	R					P						NM: Raso
	V	R	V	V	P		V		A	V	V	P								MGN: 0.70 cm
295-432	A	V				V		R	P					P	P				V	NM: 0.30 cm
			V	V	Md				A		V	P	Md							MGN: 0.70 cm
295-434	P							V	V			V								NM: Raso
	V	V			Md	V			A	V	R	Md	P							MGN: 0.50 cm
295-435	Md			V		V		V	R	R	V	V								NM: Dim

Table B. (continued)

Alluvial heavy minerals from Segura mining region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Coríndum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
	V		V	V	P	V		V	M	V	V									MGN: 0.40 cm
295-445	A	V						V	R	V	V			P						NM: Raso
	R				R	V		V	A		V		V			V				MGN: 0.30 cm
295-448	P	R		V				R	P					Md	R					NM: Raso
	V	V	R		R				A		V		R							MGN: 0.20 cm
295-449	Md	V		V		V		P	R					P						NM: 0.30 cm
	V	V	R	V	R	V		R	M		R		V							MGN: 0.40 cm
295-455	A	V		V				V	V	V		V		P						NM: 0.20 cm
			A	V	R			V	M		P	R								MGN: 0.30 cm
295-460	V	V				V	P	R	V	V	V			Md						NM: 0.10 cm
	V	V	R		R				M		V									MGN: 0.70 cm
295-463	P	V		V				R	V					Md						NM: Raso
		V			V			V	A		V		P							MGN: 0.40 cm
295-466	P	R		V		R		V	V	V				P						NM: Raso
	V	V	P	V	V	V		V	M	V	P	R	A							MGN: 0.60 cm
295-468	Md	R						V	R	V				P	V		R			NM: 0.25 cm
	V		V	P	Md	R		V	A		V	V						V		MGN: 0.40 cm
295-469	V	V	V	V				R	P	V			V	Md	R					NM: Dim
		V		P	Md	P		V	Md		V	V			P					MGN: 0.50 cm
295-471	V	Md				V		V	P	V	V									NM: Dim

Alluvial heavy minerals from Segura mining region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Coríndum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
	V		V	P	Md	V		V	Md		R	V	P		P			V		MGN: 0.10 cm
295-472	V	R						V	P		V				Md	V				NM: Raso
			V		P	V		V	M	V										MGN: 1.00 cm
295-473	V	V						V	R					A	R					NM: Raso
	V		V	V	R	V		V	M											MGN: 0.30 cm
295-474		V							R	V				A	R	V				NM: Dim
	R		V		R				M		V									MGN: 0.70 cm
295-477	Md	P							V					Md						NM: Raso
	V			V	V				M		V	V								MGN: 0.50 cm
295-479	Md	V				V		R	V					Md						NM: Raso
			R	R	R	V			M		V									MGN: 0.80 cm
295-481	V	V						V	V	V				A	V					NM: Raso
	V		V		R	V			M		V									MGN: 0.70 cm
295-482	P	Md						R	V					A						NM: Raso
	V		V	R	P	R		R	M		R	V	R							MGN: 0.30 cm
295-483	R	V				V		R	P	V		V								NM: Dim
	V	V	V		R	V		V	A		V		R							MGN: 0.20 cm
295-486	R	R				V		V	R					A						NM: 0.10 cm
	V				P			V	A		V		V							MGN: 0.50 cm
295-487	Md	Md		V				P	V					P						NM: 0.20 cm

Table B. (continued)

Alluvial heavy minerals from Segura mining region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Corindum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
	V		P	V	V			V	M		R	R	P	V						MGN: 0.30 cm
295-490	V	V		V				P	V		V			P						NM: Dim
	V	R	R	V	R	V			M		V	V	P							MGN: 0.40 cm
295-501	A	R		V		V		R	Md					Md						NM: 0.20 cm
	V		V	V	P				M		R		V							MGN: 0.70 cm
295-503	P	R						V	V					P						NM: Raso
	V			V	P	V		V	M		P	V								MGN: 0.50 cm
295-508	P	V				V		R	V	V					Md					NM: Raso
	V	V	P	V	P	V		V	Md		P			V						MGN: 0.40 cm
295-510	P	V		V		V		R	V	V		V			Md					NM: 0.20 cm
			V	V	R				R	P	A		M							MGN: 0.20 cm
295-511	R			V				R		R	R	V		R						NM: Raso
	V	V		R	V			V	R	V	A		Md							MGN: 0.10 cm
295-512	Md	R		V		R		R		V	R			R						NM: 0.20 cm
			V	P	V			V	P	V	Md		A							MGN: Raso
295-513	V							P		V	R	R			V					NM: Dim
	V		P	R	P			V	A	R	P		R							MGN: 0.20 cm
295-519	P			V		V		R	V	V	R	V		V						NM: Dim

Table C. Identification and semi-quantifications of alluvial heavy minerals under binocular microscope from Segura southern region samples (after Viegas et al., 1988 and Inverno et al., 2007). The presence of cassiterite, scheelite, wolframite, TiO2 polymorphs, tourmaline and garnet controlled in part of the samples by chemical analysis. Scheelite controlled also by UV light.

Alluvial heavy minerals from Segura southern region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Coríndum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
	V			R	R			V	M		V									MGN: 0.30
295-5	A	V						R	P					R						NM: Dim
				V	R				M		V									MGN: 0.30
295-6	A	R							V					V						NM: Dim
	V			P	R			V	A		V									MGN: 1.00
295-7	A	Md				V		V	V					R						NM: Raso
	V			P	V			V	M		R									MGN: 0.50
295-8	Md	R				V		V	Md					R						NM: Dim
				V	V				M		V									MGN: 0.40
295-10	A	V				V		V	P											NM: Dim
	V			V	V	V		P	A		P									MGN: 0.30
295-14	V					R			P					R						NM: Dim
	V				V	V		V	M		P									MGN: 0.20
295-16		V				V		V	V					A						NM: Dim
				V	P	V		V	Md		P									MGN: 0.30
295-17	A					R		V	Md					R						NM: Dim
	V			Md	R			P	M											MGN: 0.20
295-18	R	V							V											NM: Dim
	V	V		P	Md				A		V									MGN: 0.30
295-20	A	P												V						NM: Dim

Alluvial heavy minerals from Segura southern region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Coríndum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
			V		R				A								V			MGN: 0.30 cm
295-23	R	A			V	V		V	R	V	V									NM: Dim
				R				P	M		V									MGN: 0.20 cm
295-26						V		V	P					A						NM: Dim
				V	V	V			A		P		V							MGN: 0.30 cm
295-28	M					V			R					R						NM: Dim
				Md	V	V		R	A		R						V			MGN: Raso
295-29	V					V		P	R					P						NM: Dim
	V			Md	P	V		V	Md		P									MGN: 0.20 cm
295-118	Md			V				V	P					R						NM: Dim
				R	P	V		V	A		V		V							MGN: 0.20 cm
295-123	M	V				V		P	R		V			V	V					NM: Raso
	V			P	V			V	A		V		V							MGN: 0.20 cm
295-142	A	V							V	V				R						NM: Raso
				Md	P			R	A		R									MGN: 0.10 cm
295-152	P					V			R					P						NM: Raso
				P	Md	V		V	A		R									MGN: 0.10 cm
295-156	Md							V	P					R						NM: Dim
				R	Md	V		V	Md		P		R							MGN: 0.20 cm
295-165	A	V				R		V	P					P	V					NM: Raso

Table C. (continued)

Alluvial heavy minerals from Segura southern region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Coríndum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
				Md	V	V		V	A		P		V							MGN: 0.20 cm
295-181	P					V		V	R					R	V					NM: Dim
				P	P	V			A	V	V	V	V							MGN: 0.20 cm
295-185				V		V		P	Md					P	P					NM: Raso
	V			V	P	V			A		R									MGN: 0.30 cm
295-193	M							V	V					R						NM: Raso
	V	V		Md	Md	R		V	A		V		Md							MGN: 0.30 cm
295-200	V	V				V		V	Md	V	V			V	V					NM: Dim
				Md	R	V			A		V		R							MGN: 0.20 cm
295-206		V		V		V		R	P					P						NM: Dim
				P	R	V		V	A		R				P					MGN: 0.20 cm
295-208	Md	V						V	P					R	R					NM: Dim
	V			V	R			V	A		V									MGN: 0.20 cm
295-210	A	Md						R	V		V			R						NM: Raso
	V			R	Md	V		V	A		V		P							MGN: 0.10 cm
295-220	Md	Md						V	R					P	V					NM: Dim
				R	P				A				R							MGN: 0.20 cm
295-225		V				V		R	P					A						NM: Dim
	V			Md	P	R			A		V		R			V				MGN: 0.10 cm
295-234	V	R				V		V	Md					P						NM: Dim

Alluvial heavy minerals from Segura southern region	Gold	Wolframite	Apatite	Zircon	Ilmenite	Brookite	Galena	Andalusite	Iron Ox.-Hydr.	Biotite	Tourmaline	Topaz	Baryte	Col. Tantalite	Leucox.(MGN)	Sillimanite	Chalcopyrite	Chlorite	Epidote	Volume % range to each mineral (V: < 1%; R: 1-5%; P: 5-25%; Md: 25-50%; A: 50-75%; and M: 75-100%); Adapted from Parfenoff et al. (1970).
Sample	Cassiterite	Scheelite	Xenotime	Cinnabar	Arsenopyrite	Alt. Pyrite	Undiff. Sulphides	Rutile	Anatase	Muscovite	Garnet	Coríndum	Monazite	Undiff. Minerals	Leucox. (NM)	Staurolite	Siderite	Kyanite	Pyrite	MGN: magnetic and paramagnetic mineral fraction; NM: non magnetic mineral fraction. The height that the mineral fraction occupies in the its cylindrical container; in cases, the sample is scarce, and it is impossible to measure this height, therefore 0.05 cm (Raso) and 0.025 cm (DIM) are given by default, according to the observation.
	V			A	A	V		V	Md	V	R		P							MGN: 0.20 cm
295-238	V	V						V	P					P						NM: Dim
				V	R				M		V									MGN: 0.30 cm
295-242	R	A				V			R					P						NM: Dim
	V			P	Md			V	Md		V	V	Md							MGN: 0.20 cm
295-246	P	P		V		V		R	R										V	NM: Dim
				R	P			V	A				V							MGN: 0.30 cm
295-271	R	P				V		P	R					Md	R					NM: Dim
				P	Md	V	R		Md		V	V	Md							MGN: 0.20 cm
295-275	V	V						V	V											NM: Dim

Table D. Relative average abundance of heavy minerals in the assemblage of six alluvial samples from Segura mining region, under the influence of the mineral contribution from specific lithological sources: 295-312, Segura Granite; 283-486, Beiras Group metasediments; 295-432, Sn-W Mineralised quartz lodes; 295-501, Sn-Li Mineralised aplite-pegmatite veins; 283-506, W-Sn Mineralised quartz lodes; 295-79, Ba-Pb mineralised quartz veins. Identification of minerals controlled as indicated in Table B.

Average (%) normalised	283-486	283-506	295-79	295-312	295-432	295-501
Arsenopyrite	0.00	0.00	0.00	0.00	0.00	0.00
Corundum	0.00	0.00	0.00	2.25	0.00	0.00
Xenotime	0.00	0.00	0.00	0.00	0.00	0.00
Altered Pyrite	0.00	0.39	0.00	0.00	0.00	0.28
Ilmenite	11.19	2.32	11.44	13.48	11.00	1.70
Epidote s.l.	0.00	0.00	0.38	0.00	0.00	0.00
Staurolite	0.00	0.00	0.00	0.00	0.00	0.00
Tourmaline	0.37	0.39	0.38	56.18	0.37	0.28
Garnet	0.37	0.39	0.38	2.70	0.00	0.00
Columbo-Tantalite	0.00	0.00	0.00	0.00	0.00	0.00
Leucoxene (MGN)	11.19	0.00	0.00	0.00	0.00	0.00
Chlorite	0.00	0.00	0.00	0.00	0.00	0.00
Biotite	0.00	0.39	2.29	2.70	0.37	0.00
Iron (hydr)oxides	46.64	67.67	66.73	2.70	45.84	49.58
Monazite	0.00	0.00	0.00	0.45	0.00	0.00
Wolframite	0.00	11.60	0.38	0.00	2.20	1.70
Apatite	0.00	0.00	0.10	2.25	0.16	0.85
Zircon	0.19	0.08	2.86	2.25	0.16	0.14
Galena	0.00	0.00	0.00	0.00	0.00	0.00
Calcopyrite	0.00	0.00	0.00	0.00	0.00	0.00
Undiffrentiated Minerals	0.00	5.80	0.00	0.00	4.71	10.62
Pyrite	0.00	0.00	0.00	0.00	0.00	0.00
Rutile	0.19	0.08	0.10	2.25	0.94	0.85
Brookite	1.12	0.08	0.10	0.00	0.00	0.14
Anatase	13.99	0.46	7.15	0.07	4.71	10.62
Andalusite	0.19	0.00	0.00	0.45	0.00	0.00
Kyanite	0.00	0.00	0.00	0.00	0.00	0.00
Sillimanite	0.19	0.00	0.00	0.00	0.00	0.00
Topaz	0.19	0.00	0.10	2.25	4.71	0.14
Baryte	0.00	0.46	7.15	9.36	0.00	4.25
Undiffrentiated Sulphides	0.00	0.00	0.00	0.00	0.16	0.00
Leucoxene (NM)	13.99	0.00	0.00	0.00	4.71	0.00
Muscovite	0.00	0.00	0.10	0.45	0.00	0.00
Gold	0.19	0.08	0.10	0.07	0.16	0.14
Cassiterite	0.00	9.67	0.10	0.07	19.64	17.71
Scheelite	0.00	0.08	0.10	0.07	0.16	0.85
Cinnabar	0.00	0.08	0.10	0.00	0.00	0.14
Siderite	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00

Table E. Relative average abundance of the selected minerals under study (i.e., cassiterite, rutile, anatase, brookite, tourmaline and garnet) and other of the most representative mineral phases (i.e., iron hydr./oxides and ilmenite) from the Segura mining region samples.

Average % (normalised)	283-478	283-480	283-484	283-485	283-486	283-490	283-491	283-493	283-506	283-508	283-510	283-529	283-531	295-61	295-62	295-63	295-68	295-72	295-73	295-79	295-83	295-85	295-87
Ilmenite	12.66	17.86	15.67	16.10	11.19	15.27	11.61	12.57	2.32	10.79	13.19	3.46	0.36	6.69	41.28	1.16	2.95	2.31	11.30	11.44	1.76	1.91	2.93
Tourmaline	0.42	0.60	3.13	0.54	0.37	3.05	0.39	0.42	0.39	2.16	0.44	0.58	0.36	0.54	3.30	14.45	2.95	2.31	0.38	0.38	1.76	0.32	0.49
Garnet	0.42	0.00	0.52	0.00	0.37	0.00	0.00	0.00	0.39	0.36	0.00	0.00	0.00	0.54	0.55	1.16	2.95	0.38	0.38	0.38	0.29	0.00	0.00
Iron (hydr.)oxides	73.84	74.43	65.27	67.07	46.64	63.61	67.75	73.30	67.67	44.96	54.95	72.15	62.28	11.15	41.28	24.08	61.42	67.31	65.91	66.73	51.47	55.79	85.33
Wolframite	2.53	0.60	0.52	0.00	0.00	3.05	11.61	2.51	11.60	0.36	0.44	0.58	0.00	2.68	0.00	0.19	0.49	0.38	0.38	0.38	1.76	1.91	0.49
Rutile	0.05	0.04	0.09	0.07	0.19	0.38	0.04	0.05	0.08	1.08	0.66	0.87	1.07	0.36	0.28	1.16	0.08	0.10	0.06	0.10	0.15	0.11	0.24
Brookite	1.58	0.22	0.52	0.40	1.12	0.38	0.04	0.05	0.08	5.40	3.30	0.14	1.07	0.36	0.05	0.19	0.00	0.00	0.06	0.10	0.00	0.11	0.04
Anatase	3.96	4.65	6.53	5.03	13.99	4.77	0.23	1.57	0.46	13.49	8.24	4.33	22.24	0.36	3.44	1.16	0.08	0.58	4.71	7.15	4.41	3.19	7.11
Cassiterite	1.58	1.12	0.09	0.07	0.00	7.95	4.84	1.57	9.67	5.40	8.24	0.87	0.18	62.44	1.38	14.45	14.33	12.02	7.85	0.10	18.38	13.28	1.22
Scheelite	0.05	0.04	0.00	0.07	0.00	0.06	0.23	0.05	0.08	0.18	0.11	0.87	0.18	0.36	0.05	0.19	0.08	0.00	0.06	0.10	0.15	0.11	0.04
Other heavy minerals	2.90	0.45	7.66	10.66	26.12	1.46	3.25	7.91	7.27	15.83	10.44	16.16	12.28	14.54	8.39	41.81	14.66	14.62	8.91	13.16	19.85	23.27	2.11
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Average % (normalised)	295-110	295-112	295-115	295-116	295-311	295-312	295-323	295-414	295-417	295-423	295-424	295-429	295-430	295-431	295-432	295-434	295-435	295-445	295-448	295-449	295-455	295-460	295-463
Ilmenite	34.23	42.54	18.59	13.79	30.49	13.48	14.45	10.95	17.18	28.86	2.71	32.79	15.93	13.44	11.00	35.55	34.11	13.09	3.77	1.63	2.17	2.10	3.13
Tourmaline	13.69	3.40	0.62	0.46	30.49	56.18	14.45	0.36	0.57	0.38	0.45	13.11	3.19	0.45	0.37	0.47	2.73	0.44	0.63	0.27	2.17	10.50	0.52
Garnet	0.46	0.00	0.00	0.00	0.41	2.70	14.45	0.36	0.57	0.00	0.00	0.44	0.00	0.00	0.00	0.00	0.45	0.44	0.00	0.00	0.00	0.35	0.00
Iron (hydr.)oxides	34.23	42.54	77.44	80.44	12.20	2.70	36.12	45.62	71.56	48.10	33.81	32.79	66.36	78.39	45.84	59.24	56.86	76.38	78.45	33.97	63.29	61.26	91.32
Wolframite	0.00	0.57	0.62	0.00	0.00	0.00	0.00	0.36	0.57	11.54	33.81	0.44	0.53	0.45	2.20	0.00	0.45	0.00	0.00	0.27	0.36	0.00	0.52
Rutile	0.06	0.06	0.15	0.03	0.81	2.25	0.48	1.09	0.57	0.23	1.08	0.11	1.99	0.04	0.94	0.03	0.02	0.05	0.63	12.23	0.18	0.70	0.22
Brookite	0.06	0.00	0.03	0.03	0.14	0.00	0.00	1.09	0.10	0.04	0.18	0.11	0.00	0.00	0.00	0.00	0.02	0.05	0.10	0.00	0.18	0.00	0.00
Anatase	0.06	0.06	0.15	2.15	0.14	0.07	2.41	22.81	2.86	2.89	13.53	3.28	1.99	0.22	4.71	0.03	0.14	0.33	3.14	2.45	0.18	0.12	0.04
Cassiterite	4.28	4.25	0.15	0.00	0.14	0.07	2.41	5.47	0.57	4.81	13.53	0.66	0.40	4.67	19.64	1.02	1.71	6.82	3.14	30.57	22.60	0.12	1.12
Scheelite	0.06	0.06	0.15	0.03	0.14	0.07	0.08	1.09	0.57	0.04	0.18	0.00	0.00	0.00	0.16	0.00	0.00	0.05	0.63	0.41	0.18	0.12	0.04
Other heavy minerals	12.89	6.52	2.09	3.07	25.07	22.47	15.17	10.77	4.87	3.12	0.72	16.28	9.62	2.35	15.14	3.66	3.50	2.35	9.52	18.21	8.68	24.74	3.09
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Average % (normalised)	295-466	295-468	295-469	295-471	295-472	295-473	295-474	295-477	295-479	295-481	295-482	295-483	295-486	295-487	295-490	295-501	295-503	295-508	295-510	295-511	295-512	295-513	295-519
Ilmenite	0.68	0.30	35.04	38.96	26.98	14.07	3.09	3.07	0.52	3.14	3.01	13.76	2.84	12.42	0.51	1.70	13.88	12.10	14.08	2.68	0.20	0.47	14.38
Tourmaline	0.68	9.02	0.47	0.52	2.16	0.00	0.00	0.51	0.52	0.52	0.50	2.75	0.47	0.41	3.08	0.28	2.78	12.10	14.08	55.87	25.00	35.55	14.38
Garnet	0.00	0.00	0.00	0.52	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	2.68	1.20	2.84	2.88
Iron (hydr.)oxides	85.25	52.59	58.39	38.96	26.98	82.10	90.21	89.55	90.16	91.62	87.88	80.28	59.24	51.74	89.71	49.58	80.96	70.59	35.21	2.68	1.20	14.22	59.92
Wolframite	0.68	0.30	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.00	1.70	0.00	0.00	0.47	0.00	0.20	0.00	0.00
Rutile	0.09	0.13	0.18	0.03	0.18	0.02	0.00	0.00	0.31	0.03	0.22	0.23	0.24	4.97	1.28	0.85	0.03	0.24	1.41	0.67	2.40	7.11	0.36
Brookite	0.00	0.13	0.18	0.78	0.18	0.02	0.04	0.00	0.00	0.03	0.04	0.23	0.24	0.00	0.00	0.14	0.00	0.04	0.23	0.00	0.00	0.00	0.00
Anatase	0.09	0.75	0.88	0.78	5.40	0.14	0.26	0.04	0.05	0.03	0.04	1.15	1.42	0.17	0.04	10.62	0.03	0.04	0.23	0.00	0.00	0.00	0.06
Cassiterite	2.56	9.39	0.03	0.03	0.18	0.02	0.00	2.74	3.86	0.03	1.08	0.23	1.42	12.42	0.04	17.71	0.99	1.21	7.04	0.67	30.00	0.24	1.80
Scheelite	0.51	0.75	0.03	1.95	1.08	0.02	0.04	1.10	0.05	0.03	2.69	0.04	1.42	12.42	0.04	0.85	0.20	0.04	0.23	0.00	2.40	0.00	0.00
Other heavy minerals	9.46	26.65	4.82	16.96	36.51	3.59	6.36	3.00	4.53	4.55	4.56	1.34	32.23	5.46	4.78	16.57	1.12	3.63	27.00	34.75	37.40	39.57	6.23
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table F. Relative average abundance of the selected minerals under study (i.e., cassiterite, rutile, anatase, brookite, tourmaline and garnet) and other of the most representative mineral phases (i.e., iron hydr./oxides and ilmenite) from the Segura southern region samples.

Average % (normalised)	295-5	295-6	295-7	295-8	295-10	295-14	295-16	295-17	295-18	295-20	295-23	295-26	295-28	295-29	295-118	295-123	295-142	295-152
Ilmenite	3.05	3.11	4.14	0.52	0.53	0.60	0.45	18.93	3.07	34.47	4.14	0.00	0.00	0.48	18.90	14.04	0.59	12.74
Tourmaline	0.51	0.52	0.69	3.11	0.53	17.87	13.43	18.93	0.00	0.46	0.00	0.50	17.46	2.88	18.90	0.47	0.59	2.55
Garnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.00	0.47	0.00	0.00
Iron (hydr)oxides	88.98	90.60	86.21	90.79	93.15	74.48	78.34	47.32	89.63	57.45	86.31	87.06	72.74	60.10	47.24	58.48	73.96	53.08
Wolframite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rutile	0.25	0.00	0.03	0.03	0.03	0.00	0.06	0.05	0.00	0.00	0.06	0.06	0.00	7.21	0.08	3.51	0.00	0.00
Brookite	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.05	0.00	0.00	0.00	0.00	0.05	0.24	0.08	0.12	0.00	0.00
Anatase	1.27	0.04	0.03	1.95	1.00	1.49	0.06	3.94	0.06	0.00	0.35	1.87	0.29	1.44	2.36	0.70	0.15	1.27
Cassiterite	5.30	5.39	4.31	1.95	4.16	0.05	0.00	6.57	0.38	4.79	0.35	0.00	8.49	0.24	5.91	20.47	18.49	6.37
Scheelite	0.04	0.26	2.59	0.16	0.03	0.00	0.06	0.00	0.06	1.15	7.19	0.00	0.00	0.00	0.00	0.12	0.15	0.00
Other heavy minerals	0.59	0.09	2.00	1.50	0.57	5.46	7.55	4.21	6.79	1.23	0.92	10.51	0.97	27.40	6.54	1.64	6.07	23.99
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Average % (normalised)	295-156	295-165	295-181	295-185	295-193	295-200	295-206	295-208	295-210	295-220	295-225	295-234	295-238	295-242	295-246	295-271	295-275
Ilmenite	30.99	31.71	3.87	14.46	15.63	33.49	3.95	3.23	3.21	29.10	16.88	14.46	53.28	3.05	42.77	17.71	45.28
Tourmaline	2.48	12.68	0.65	0.48	3.13	0.45	0.66	3.23	0.53	0.39	0.00	0.48	2.56	0.51	0.57	0.00	0.60
Garnet	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (hydr)oxides	51.65	31.71	80.71	60.24	65.10	55.82	82.37	67.25	66.84	48.50	70.32	60.24	31.97	88.83	42.77	73.78	45.28
Wolframite	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rutile	0.10	0.11	0.08	3.61	0.09	0.04	0.49	0.07	0.80	0.10	0.42	0.12	0.05	0.00	0.43	1.48	0.08
Brookite	0.10	0.11	0.08	0.12	0.09	0.22	0.08	0.07	0.00	0.10	0.00	0.72	0.05	0.00	0.00	0.00	0.08
Anatase	3.10	3.17	2.42	9.04	0.09	2.79	2.47	2.02	0.13	0.58	2.11	9.04	1.60	0.25	0.43	0.30	0.08
Cassiterite	7.75	13.21	2.42	0.00	15.19	0.04	0.00	5.04	16.71	7.27	0.00	0.12	0.05	0.25	2.14	0.30	0.08
Scheelite	0.00	0.11	0.00	0.00	0.00	0.04	0.08	0.07	10.03	7.27	0.07	0.72	0.05	5.29	2.14	1.48	0.08
Other heavy minerals	3.82	7.19	9.77	12.05	0.69	6.22	9.88	19.03	1.20	6.69	10.20	14.10	10.39	1.82	8.77	4.97	8.45
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table G. Relative average abundance of the different types of populations of cassiterite, rutile, anatase, brookite and garnet grains from the Segura mining region samples

Sample	Type 1 Cassiterite %	Type 1a Cassiterite %	Type 1b Cassiterite %	Type 2 Cassiterite %	Type 3 Cassiterite %	Type 4 Cassiterite %	Type 5 Cassiterite %	Type 6 Cassiterite %	Type 7 Cassiterite %	Group A Rutile %	Group B Rutile %	Group C Rutile %	Group D Rutile %
283-478	0.01	0.37	0.37	0.01	0.82	0.01	0.01	0.00	0.00	0.03	0.01	0.01	0.00
283-480	0.00	0.00	0.01	0.00	1.09	0.00	0.01	0.00	0.00	0.03	0.01	0.00	0.00
283-484	0.00	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.01	0.03
283-485	0.00	0.00	0.05	0.001	0.001	0.02	0.00	0.00	0.00	0.00	0.07	0.00	0.00
283-486	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.14
283-490	0.80	0.80	0.80	0.36	3.98	0.36	0.80	0.08	0.00	0.004	0.38	0.00	0.00
283-491	1.14	1.14	0.00	0.05	2.27	0.00	0.24	0.00	0.00	0.0004	0.04	0.00	0.0004
283-493	0.02	0.24	0.24	0.24	0.77	0.02	0.06	0.00	0.00	0.001	0.05	0.00	0.00
283-495	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-496	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-497	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-501	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-502	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-503	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-506	1.34	1.34	1.34	0.48	4.01	0.48	0.10	0.48	0.00	0.001	0.08	0.00	0.001
283-507	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-508	0.00	0.54	0.54	0.54	2.70	0.54	0.54	0.00	0.00	0.54	0.54	0.00	0.00
283-509	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-510	4.13	1.73	0.00	0.08	0.99	0.91	0.41	0.00	0.00	0.32	0.32	0.01	0.01
283-512	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-513	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-515	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-516	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-518	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-520	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-525	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-528	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-529	0.00	0.00	0.01	0.26	0.51	0.09	0.00	0.01	0.00	0.01	0.86	0.00	0.00
283-531	0.09	0.00	0.00	0.09	0.01	0.00	0.00	0.00	0.00	0.85	0.21	0.00	0.00
295-61	8.12	8.12	0.00	8.12	21.23	8.12	8.12	0.00	0.62	0.12	0.12	0.00	0.12
295-62	0.22	0.22	0.22	0.22	0.22	0.06	0.22	0.00	0.00	0.04	0.23	0.00	0.003
295-63	1.44	1.44	0.14	0.72	6.96	2.89	0.72	0.14	0.00	0.01	1.14	0.00	0.00
295-68	1.43	1.43	1.43	4.23	4.23	1.43	0.14	0.00	0.00	0.001	0.08	0.00	0.00
295-72	1.76	1.76	1.76	0.12	5.41	0.60	0.60	0.00	0.00	0.01	0.09	0.00	0.001
295-73	1.15	1.15	1.15	0.39	3.53	0.08	0.39	0.00	0.00	0.01	0.06	0.001	0.00
295-79	0.00	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.06	0.01	0.02	0.00
295-83	0.18	4.05	4.05	0.92	8.09	0.18	0.92	0.00	0.00	0.001	0.15	0.00	0.00
295-85	0.66	2.51	2.51	0.66	5.62	0.66	0.66	0.00	0.00	0.001	0.10	0.00	0.001
295-87	0.27	0.00	0.00	0.27	0.61	0.06	0.00	0.00	0.00	0.00	0.24	0.00	0.00
295-90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-110	1.00	1.00	1.00	1.00	0.00	0.28	0.00	0.00	0.00	0.00	0.06	0.00	0.00
295-112	0.00	0.04	0.00	4.17	0.04	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.00
295-113	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-115	0.00	0.07	0.00	0.07	0.00	0.002	0.00	0.00	0.00	0.00	0.15	0.00	0.00
295-116	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
295-311	0.03	0.03	0.03	0.00	0.03	0.03	0.00	0.00	0.00	0.40	0.40	0.00	0.02
295-312	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00	0.00	0.56	0.56	0.56	0.56
295-323	0.76	0.17	0.76	0.00	0.36	0.36	0.00	0.00	0.00	0.12	0.27	0.05	0.05
295-414	0.00	0.00	1.65	0.02	3.26	0.27	0.27	0.00	0.00	0.88	0.11	0.05	0.05
295-417	0.00	0.00	0.29	0.10	0.00	0.10	0.10	0.00	0.00	0.06	0.26	0.00	0.26
295-423	0.05	0.60	0.60	0.24	2.98	0.05	0.24	0.05	0.00	0.01	0.22	0.00	0.00
295-424	0.00	1.02	0.00	1.02	9.45	1.02	1.02	0.00	0.00	0.76	0.27	0.05	0.00
295-429	0.00	0.32	0.00	0.00	0.32	0.01	0.00	0.00	0.00	0.03	0.03	0.03	0.03

Table G. (continued)

Sample	Type 1 Cassiterite %	Type 1a Cassiterite %	Type 1b Cassiterite %	Type 2 Cassiterite %	Type 3 Cassiterite %	Type 4 Cassiterite %	Type 5 Cassiterite %	Type 6 Cassiterite %	Type 7 Cassiterite %	Group A Rutile %	Group B Rutile %	Group C Rutile %	Group D Rutile %
295-430	0.00	0.18	0.00	0.00	0.18	0.04	0.00	0.00	0.00	0.90	0.90	0.00	0.20
295-431	0.72	0.72	0.72	0.05	2.15	0.05	0.23	0.05	0.00	0.002	0.04	0.00	0.00
295-432	1.97	1.97	0.00	0.00	9.80	1.97	1.97	1.97	0.00	0.24	0.24	0.24	0.24
295-434	0.00	0.11	0.00	0.00	0.79	0.00	0.01	0.10	0.00	0.00	0.03	0.00	0.00
295-435	0.00	0.81	0.00	0.00	0.81	0.00	0.00	0.09	0.00	0.01	0.01	0.00	0.00
295-436	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-438	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-442	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-443	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-444	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-445	0.89	0.89	0.89	0.07	2.79	0.34	0.07	0.89	0.00	0.001	0.05	0.00	0.001
295-446	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-448	0.03	0.62	0.62	0.62	1.19	0.00	0.03	0.03	0.00	0.03	0.60	0.00	0.00
295-449	0.00	8.25	4.59	8.25	4.59	0.31	4.59	0.00	0.00	4.89	7.34	0.00	0.00
295-450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-452	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-454	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-455	0.00	1.13	1.13	18.08	1.13	1.13	0.00	0.00	0.00	0.00	0.00	0.18	0.00
295-456	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-460	0.01	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.06	0.63	0.00	0.01
295-463	0.01	0.35	0.00	0.35	0.35	0.01	0.04	0.00	0.00	0.00	0.22	0.00	0.00
295-466	0.00	0.00	0.00	1.79	0.38	0.38	0.00	0.00	0.00	0.00	0.09	0.00	0.00
295-468	1.41	1.41	0.00	1.41	4.70	0.09	0.28	0.09	0.00	0.001	0.12	0.001	0.001
295-469	0.01	0.0003	0.002	0.00	0.00	0.01	0.0003	0.00	0.00	0.08	0.09	0.00	0.00
295-471	0.0003	0.01	0.00	0.0003	0.00	0.01	0.002	0.00	0.00	0.00	0.02	0.01	0.00
295-472	0.09	0.09	0.00	0.00	0.00	0.00	0.002	0.00	0.00	0.00	0.18	0.00	0.00
295-473	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
295-474	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-476	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-477	0.03	1.31	0.03	0.82	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-479	0.04	1.85	0.81	1.16	0.00	0.00	0.00	0.00	0.00	0.08	0.23	0.00	0.00
295-481	0.00	0.02	0.00	0.01	0.00	0.00	0.002	0.00	0.00	0.0003	0.03	0.00	0.00
295-482	0.00	0.16	0.16	0.54	0.16	0.00	0.05	0.00	0.00	0.01	0.21	0.00	0.00
295-483	0.16	0.00	0.00	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00
295-484	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-486	0.00	0.57	0.00	0.71	0.00	0.14	0.00	0.00	0.00	0.00	0.24	0.00	0.00
295-487	0.00	2.48	1.24	7.45	1.24	0.00	0.00	0.00	0.00	1.49	3.48	0.00	0.00
295-488	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-490	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	1.28	0.00	0.00
295-498	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-501	2.65	0.00	0.00	2.65	10.59	0.88	0.88	0.00	0.00	0.00	0.85	0.00	0.00
295-502	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-503	0.00	0.20	0.20	0.53	0.00	0.05	0.01	0.00	0.00	0.00	0.03	0.00	0.00
295-506	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-508	0.00	0.48	0.12	0.12	0.48	0.01	0.00	0.00	0.00	0.00	0.24	0.00	0.002
295-509	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-510	0.35	0.35	0.35	4.93	0.35	0.35	0.00	0.35	0.00	0.14	1.27	0.00	0.00
295-511	0.01	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.01
295-512	0.00	1.50	0.00	21.00	6.00	1.50	0.00	0.00	0.00	0.06	2.28	0.00	0.06
295-513	0.01	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00
295-514	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-519	0.00	0.36	0.36	0.63	0.36	0.00	0.00	0.09	0.00	0.07	0.25	0.00	0.04
295-530	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-532	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-537	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table G. (continued)

Sample	Type 1 Anatase %	Type 2 Anatase %	Type 1 Brookite %	Type 2 Brookite %	Type 1 Tourmaline %	Type 2 Tourmaline %	Type 3 Tourmaline %	Type 4 Tourmaline %	Type 5 Tourmaline %	Type 6 Tourmaline %	Type 7 Tourmaline %	Type 1 Garnet %	Type 2 Garnet %	Type 3 Garnet %
283-478	3.76	0.20	1.11	0.47	0.21	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00
283-480	3.49	1.16	0.11	0.11	0.42	0.09	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00
283-484	3.92	2.61	0.37	0.16	1.52	1.52	0.03	0.00	0.00	0.03	0.03	0.13	0.26	0.13
283-485	3.02	2.01	0.30	0.10	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-486	8.40	5.60	0.84	0.28	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00
283-490	3.58	1.19	0.27	0.11	1.83	1.04	0.15	0.00	0.03	0.00	0.00	0.00	0.00	0.00
283-491	0.17	0.06	0.04	0.00	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-493	1.55	0.02	0.05	0.00	0.29	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-495	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-496	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-497	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-501	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-502	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-503	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-506	0.46	0.00	0.08	0.00	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00
283-507	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-508	10.11	3.38	3.78	1.62	1.58	0.54	0.04	0.00	0.00	0.00	0.00	0.36	0.00	0.00
283-509	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-510	6.14	2.06	2.48	0.83	0.42	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-512	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-513	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-515	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-516	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-518	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-520	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-525	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-528	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-529	3.46	0.87	0.14	0.00	0.46	0.12	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283-531	0.00	0.00	1.07	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-61	0.18	0.18	0.25	0.11	0.26	0.26	0.03	0.00	0.00	0.00	0.00	0.20	0.13	0.20
295-62	3.10	0.34	0.05	0.00	1.29	1.84	0.17	0.00	0.00	0.00	0.00	0.36	0.19	0.00
295-63	1.16	0.00	0.15	0.04	8.67	4.05	1.45	0.14	0.14	0.00	0.00	1.14	0.01	0.00
295-68	0.08	0.00	0.00	0.00	1.43	1.43	0.03	0.03	0.00	0.00	0.03	2.65	0.29	0.00
295-72	0.55	0.03	0.00	0.00	1.38	0.81	0.12	0.00	0.00	0.00	0.00	0.39	0.00	0.00
295-73	3.53	1.18	0.06	0.01	0.18	0.18	0.004	0.00	0.004	0.00	0.00	0.38	0.00	0.00
295-79	3.57	3.57	0.09	0.00	0.19	0.19	0.004	0.00	0.00	0.00	0.00	0.38	0.00	0.00
295-83	4.19	0.22	0.00	0.00	1.24	0.42	0.09	0.02	0.00	0.00	0.00	0.29	0.00	0.00
295-85	2.39	0.80	0.11	0.00	0.16	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-87	5.34	1.77	0.04	0.00	0.32	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-110	0.04	0.01	0.00	0.06	8.76	4.11	0.68	0.14	0.00	0.00	0.00	0.00	0.46	0.00
295-112	0.06	0.00	0.00	0.00	2.38	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-113	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-115	0.12	0.04	0.03	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-116	2.05	0.11	0.03	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-311	0.14	0.00	0.14	0.00	12.20	12.20	5.79	0.30	0.00	0.00	0.00	0.15	0.26	0.00
295-312	0.08	0.00	0.00	0.00	21.78	21.78	11.49	0.57	0.00	0.00	0.57	0.97	1.73	0.00
295-323	1.81	0.60	0.00	0.00	1.45	8.67	1.45	1.45	0.00	0.00	1.45	14.45	0.00	0.00
295-414	17.10	5.71	0.88	0.22	0.22	0.15	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.19
295-417	1.72	1.15	0.06	0.04	0.34	0.22	0.01	0.00	0.00	0.00	0.00	0.57	0.00	0.00
295-423	2.89	0.00	0.04	0.00	0.13	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-424	10.14	3.39	0.14	0.04	0.32	0.07	0.00	0.07	0.005	0.00	0.00	0.00	0.00	0.00
295-429	2.46	0.82	0.00	0.11	5.25	5.25	1.31	1.31	0.00	0.00	0.00	0.00	0.00	0.44

Table G. (continued)

Sample	Type 1 Anatase %	Type 2 Anatase %	Type 1 Brookite %	Type 2 Brookite %	Type 1 Tourmaline %	Type 2 Tourmaline %	Type 3 Tourmaline %	Type 4 Tourmaline %	Type 5 Tourmaline %	Type 6 Tourmaline %	Type 7 Tourmaline %	Type 1 Garnet %	Type 2 Garnet %	Type 3 Garnet %
295-430	2.00	0.00	0.00	0.00	1.42	1.42	0.16	0.16	0.03	0.00	0.00	0.00	0.00	0.00
295-431	0.22	0.00	0.00	0.00	0.22	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-432	2.36	2.36	0.00	0.00	0.04	0.26	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00
295-434	0.02	0.01	0.00	0.00	0.05	0.33	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
295-435	0.10	0.03	0.02	0.00	0.41	0.41	0.41	0.14	1.36	0.00	0.00	0.46	0.00	0.00
295-436	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-438	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-442	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-443	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-444	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-445	0.32	0.00	0.05	0.00	0.37	0.06	0.004	0.00	0.004	0.00	0.00	0.00	0.44	0.00
295-446	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-448	2.35	0.78	0.10	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-449	2.46	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-452	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-454	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-455	0.14	0.05	0.18	0.00	0.85	1.30	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-456	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-460	0.12	0.00	0.00	0.00	4.73	4.73	1.05	0.00	0.00	0.00	0.00	0.00	0.35	0.00
295-463	0.04	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-466	0.09	0.00	0.00	0.00	0.17	0.41	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-468	0.68	0.08	0.10	0.03	7.22	1.62	0.09	0.00	0.09	0.00	0.00	0.00	0.00	0.00
295-469	0.66	0.22	0.18	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-471	0.39	0.39	0.55	0.23	0.26	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52
295-472	3.24	2.16	0.18	0.00	1.08	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
295-473	0.11	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-474	0.26	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-476	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-477	0.04	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-479	0.05	0.00	0.00	0.00	0.31	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-481	0.03	0.0003	0.03	0.00	0.26	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-482	0.04	0.00	0.04	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-483	0.91	0.23	0.16	0.07	1.92	0.79	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-484	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-486	1.07	0.36	0.24	0.00	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-487	0.17	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-488	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-490	0.00	0.04	0.00	0.00	1.85	0.92	0.31	0.00	0.00	0.00	0.00	0.51	0.00	0.00
295-498	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-501	7.94	2.65	0.14	0.00	0.10	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-502	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-503	0.03	0.00	0.00	0.00	1.67	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-506	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-508	0.04	0.00	0.04	0.00	7.25	4.24	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-509	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-510	0.24	0.00	0.00	0.24	4.80	8.43	0.14	0.71	0.00	0.00	0.00	0.00	0.00	0.00
295-511	0.00	0.00	0.00	0.00	25.14	25.14	5.03	0.56	0.00	0.00	0.00	0.00	2.68	0.00
295-512	0.00	0.00	0.00	0.00	15.00	8.75	1.25	0.00	0.00	0.00	0.00	0.24	0.96	0.00
295-513	0.00	0.00	0.00	0.00	22.13	12.62	1.80	0.00	0.00	0.00	0.00	0.00	2.84	0.00
295-514	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-519	0.02	0.04	0.00	0.00	5.76	6.47	2.16	0.00	0.00	0.00	0.00	1.08	0.72	1.08
295-530	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-532	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-537	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table H. Relative average abundance of the different types of populations of cassiterite, rutile, anatase, brookite and garnet grains from the Segura soutern region samples

Sample	Type 1 Cassiterite %	Type 1a Cassiterite %	Type 1b Cassiterite %	Type 2 Cassiterite %	Type 3 Cassiterite %	Type 4 Cassiterite %	Type 5 Cassiterite %	Type 6 Cassiterite %	Type 7 Cassiterite %	Group A Rutile %	Group B Rutile %	Group C Rutile %	Group D Rutile %
295-5	1.33	0.00	0.00	1.33	1.33	0.26	0.79	0.26	0.00	0.01	0.25	0.00	0.00
295-6	1.35	0.00	0.00	2.43	1.35	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-7	0.86	0.86	0.86	0.56	1.04	0.04	0.04	0.04	0.00	0.03	0.00	0.00	0.00
295-8	1.05	0.00	0.00	0.45	0.45	0.00	0.00	0.00	0.00	0.00001	0.02	0.00	0.00
295-10	1.04	0.00	0.00	2.08	0.42	0.21	0.42	0.00	0.00	0.01	0.02	0.00	0.00
295-14	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00
295-17	0.48	0.00	0.00	5.06	0.48	0.48	0.07	0.00	0.00	0.05	0.00	0.00	0.00
295-18	0.10	0.00	0.00	0.19	0.02	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00
295-20	1.05	0.00	0.00	1.44	1.05	1.05	0.19	0.00	0.00	0.00	0.00	0.00	0.00
295-23	0.12	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.00
295-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00
295-28	0.08	0.00	0.42	3.78	3.78	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-29	0.15	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.44	6.77	0.00	0.00
295-118	0.59	0.59	0.00	2.95	1.18	0.30	0.30	0.00	0.00	0.00	0.08	0.00	0.00
295-123	0.00	0.07	0.07	16.88	2.50	0.50	0.50	0.13	0.00	1.60	1.90	0.00	0.00
295-142	4.21	4.21	4.21	3.70	1.97	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00
295-152	0.75	0.75	0.00	4.57	0.20	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
295-156	1.16	1.16	0.00	3.87	0.08	1.16	0.31	0.00	0.00	0.10	0.001	0.00	0.00
295-165	0.66	0.00	0.00	8.46	3.30	0.13	0.66	0.00	0.00	0.05	0.05	0.00	0.00
295-181	0.00	0.25	0.25	1.91	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
295-185	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.58	0.00	0.00	0.04
295-193	0.15	0.63	0.63	12.52	0.13	1.13	0.00	0.00	0.00	0.00	0.09	0.00	0.00
295-200	0.01	0.0004	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.04	0.00	0.00
295-206	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00
295-208	0.00	1.26	0.00	3.48	0.05	0.25	0.00	0.00	0.00	0.07	0.00	0.00	0.00
295-210	3.34	3.34	3.34	1.34	5.01	0.00	0.17	0.17	0.00	0.68	0.12	0.00	0.00
295-220	0.73	0.00	0.00	0.00	3.63	0.55	1.82	0.55	0.00	0.00	0.00	0.00	0.00
295-225	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00
295-234	0.00	0.01	0.00	0.00	0.07	0.04	0.00	0.00	0.00	0.00	0.12	0.00	0.00
295-238	0.00	0.00	0.00	0.00	0.05	0.002	0.002	0.00	0.00	0.03	0.03	0.00	0.00
295-242	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-246	0.27	0.27	0.00	0.00	1.07	0.53	0.00	0.00	0.00	0.17	0.26	0.00	0.00
295-271	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	1.48	0.00	0.00
295-275	0.00	0.00	0.00	0.00	0.02	0.05	0.00	0.01	0.00	0.04	0.04	0.00	0.00

Table H. (continued)

Sample	Type 1 Anatase %	Type 2 Anatase %	Type 1 Brookite %	Type 2 Brookite %	Type 1 Tourmaline %	Type 2 Tourmaline %	Type 3 Tourmaline %	Type 4 Tourmaline %	Type 5 Tourmaline %	Type 6 Tourmaline %	Type 7 Tourmaline %	Type 1 Garnet %	Type 2 Garnet %	Type 3 Garnet %
295-5	0.89	0.38	0.00	0.00	0.36	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-6	0.03	0.01	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-7	0.03	0.002	0.00	0.00	0.65	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-8	0.98	0.98	0.00	0.00	1.87	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-10	0.70	0.30	0.00	0.00	0.32	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-14	1.18	0.29	0.05	0.00	14.29	3.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-16	0.06	0.00	0.00	0.06	13.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-17	2.37	1.58	0.00	0.00	13.25	5.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-18	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-20	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-23	0.21	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00
295-26	1.31	0.56	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-28	0.20	0.09	0.00	0.05	16.58	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-29	0.89	0.55	0.19	0.05	2.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-118	1.18	1.18	0.08	0.00	13.23	5.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-123	0.30	0.40	0.12	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.00
295-142	0.09	0.06	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-152	0.76	0.51	0.00	0.00	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-156	1.55	1.55	0.08	0.02	1.98	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-165	2.85	0.32	0.11	0.00	10.15	2.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-181	1.94	0.48	0.08	0.00	0.58	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-185	5.42	3.61	0.08	0.04	0.31	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-193	0.08	0.01	0.09	0.00	3.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-200	2.37	0.42	0.21	0.01	0.42	0.02	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00
295-206	0.74	1.73	0.08	0.00	0.53	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-208	1.41	0.60	0.00	0.00	3.06	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-210	0.13	0.01	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00
295-220	0.29	0.29	0.10	0.00	0.25	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-225	2.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-234	5.42	3.61	0.51	0.22	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-238	1.58	0.02	0.00	0.00	1.66	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-242	0.23	0.02	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-246	0.17	0.26	0.00	0.00	0.29	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-271	0.24	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295-275	0.08	0.00	0.08	0.00	0.39	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table I. Ocurrence of alluvial cassiterite+tourmaline and tourmaline+phylossilicates ± quartz composite grains in Segura mining and southern region. √ - YES; X - NO

Segura mining region	Cassiterite + tourmaline	Tourmaline + phyllosilicates ± quartz
283-480	√	√
283-490	√	X
283-493	√	X
283-506	√	X
283-508	√	√
283-510	√	√
295-61	X	√
295-63	√	√
295-68	X	√
295-72	√	√
295-73	√	√
295-83	√	X
295-85	√	√
295-87	√	√
295-110	√	√
295-112	√	X
295-311	√	X
295-414	X	√
295-423	√	X
295-424	√	X
295-429	√	X
295-430	√	X
295-431	√	√
295-432	√	X
295-434	√	√
295-435	√	√
295-445	√	√
295-455	√	X
295-460	√	√
295-463	√	√
295-468	√	√
295-469	√	√
295-481	√	X
295-482	X	√
295-483	√	X
295-486	√	X
295-501	X	√
Segura southern region	X	X
295-220	√	X
295-246	√	√

APPENDIX II

Table A. Mineral mounts with the samples from which the mineral grains were collected.

Mount	Samples
ANA1	283-478; 283-510; 295-62; 295-73; 295-85; 295-424; 295-468
ANA2	295-87; 295-116; 295-448; 295-463; 295-469; 295-472; 295-486; 295-501; 295-519
ANA3	295-8; 295-10; 295-14; 295-17; 295-118; 295-181; 295-185; 295-206; 295-234; 295-238; 295-246
CASS1	283-478; 283-510; 295-63; 295-85; 295-423; 295-431; 295-468
CASS2	283-485; 283-490; 283-506; 295-68; 295-83; 295-414; 295-445
CASS3	295-448; 295-455; 295-463; 295-477; 295-479; 295-482; 295-501
CASS4	295-87; 295-110; 295-115; 295-449; 295-471; 295-486; 295-503; 295-508; 295-510; 295-519
CASS5	295-7; 295-17; 295-28; 295-118; 295-123; 295-152; 295-156; 295-193; 295-210; 295-220
CASS6	283-491; 283-493; 295-5; 295-6; 295-10; 295-23; 295-220; 295-246
CASS7	283-491; 283-493; 295-5; 295-6; 295-10; 295-23; 295-220; 295-430; 295-246; 295-508
GRT1	283-484; 295-61; 295-63; 295-72; 295-311; 295-312; 295-323; 295-423; 295-429; 295-434; 295-435
GRT2	283-484; 295-61; 295-87; 295-110; 295-414; 295-429; 295-435; 295-460; 295-472; 295-472; 295-483; 295-490; 295-511; 295-513; 295-519
RUT1	283-478; 283-506; 295-79; 295-312; 295-323; 295-430; 295-435
RUT2	295-110; 295-448; 295-449; 295-460; 295-469; 295-471; 295-479; 295-490; 295-501; 295-508; 295-510
RUT3	295-5; 295-16; 295-29; 295-123; 295-156; 295-165; 295-185; 295-210; 295-225; 295-234; 295-246; 295-271
SCH1	283-491; 295-63; 295-115; 295-414; 295-448; 295-455; 295-466; 295-468; 295-471; 295-472; 295-477; 295-482; 295-501; 295-417; 295-510
SCH2	295-6; 295-7; 295-10; 295-20; 295-23; 295-210; 295-220; 295-246; 295-271
TUR1	283-484; 283-490; 283-508; 283-510; 295-63; 295-72; 295-83; 295-323; 295-430; 295-435; 295-468
TUR2	295-87; 295-460; 295-471; 295-472; 295-479; 295-483; 295-490; 295-503; 295-508; 295-511; 295-519
WLF1	283-478; 283-490; 283-493; 283-506; 283-510; 295-61; 295-73; 295-79; 295-83; 295-85; 295-424; 295-449; 295-463; 295-510

Table B. Mineral mounts with the samples from which the mineral grains were collected.

Mount	Main Minerals	Nº samples	Nº grains
ANA1	Anatase	7	103
ANA2	Anatase	9	91
ANA3	Anatase	11	106
CASS1	Cassiterite (Rutile)	7	81(6)
CASS2	Cassiterite (Rutile)	7	103 (2)
CASS3	Cassiterite (Rutile?)	7	71
CASS4	Cassiterite (Rutile?)	10	72
CASS5	Cassiterite	10	101
CASS6	Cassiterite	8	127
CASS7	Cassiterite	10	95
GRT1	Garnet (+ Ilmenite)	11	118
GRT2	Garnet	15	100
RUT1	Rutile	7	105
RUT2	Rutile	11	84
RUT3	Rutile	12	116
SCH1	Scheelite	15	97
SCH2	Scheelite	9	89
TUR1	Tourmaline	11	142
TUR2	Tourmaline	11	107
WLF1	Wolframite	14	101
TOTAL			**2017**

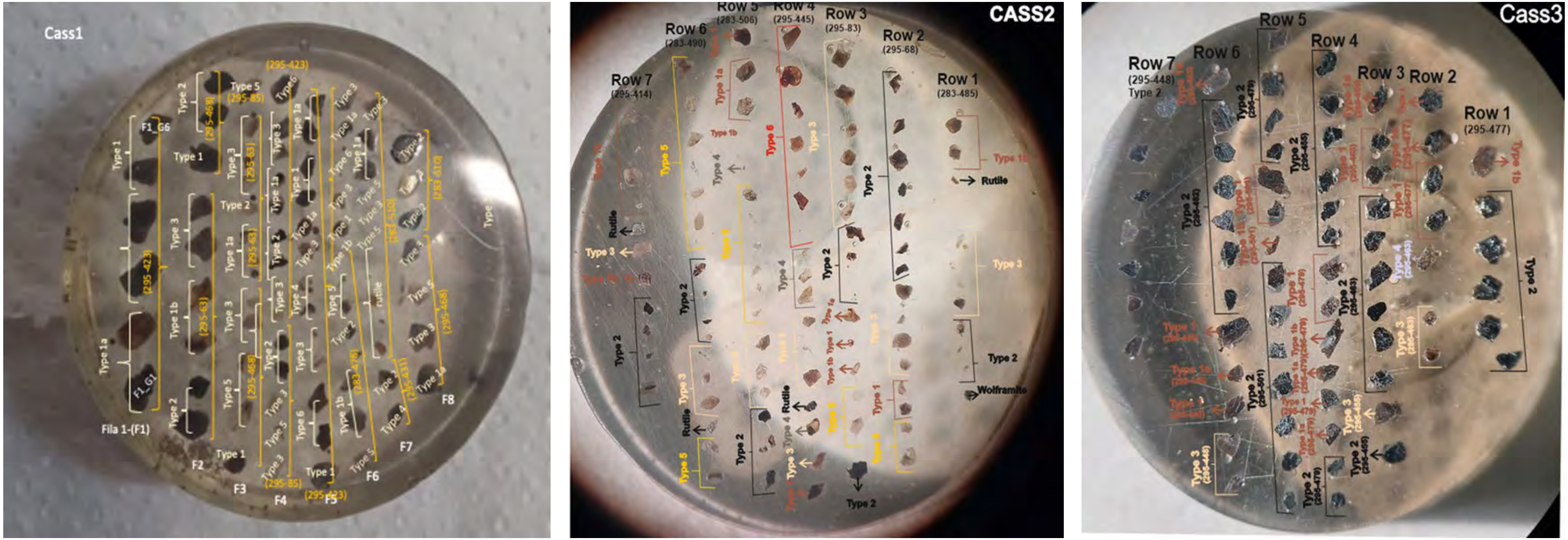

Fig. 1 Mineral mounts: CASS1, CASS 2 and CASS 3

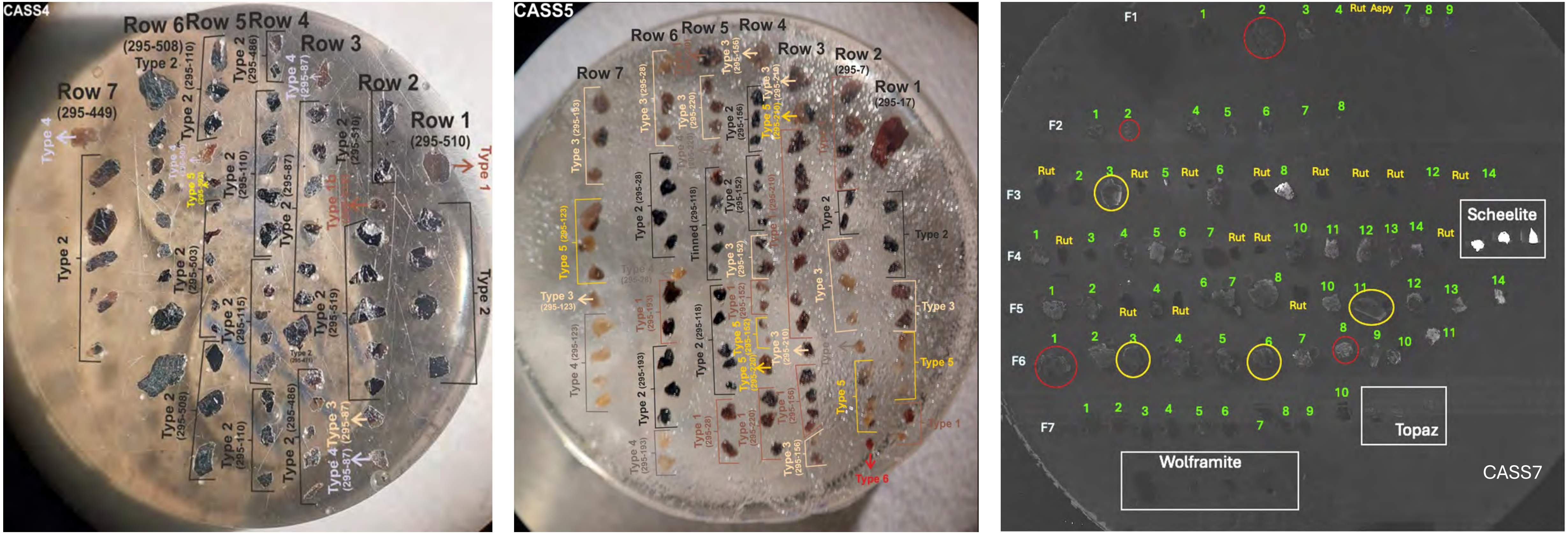

Fig. 2 Mineral mounts: CASS4, CASS5 and CASS7

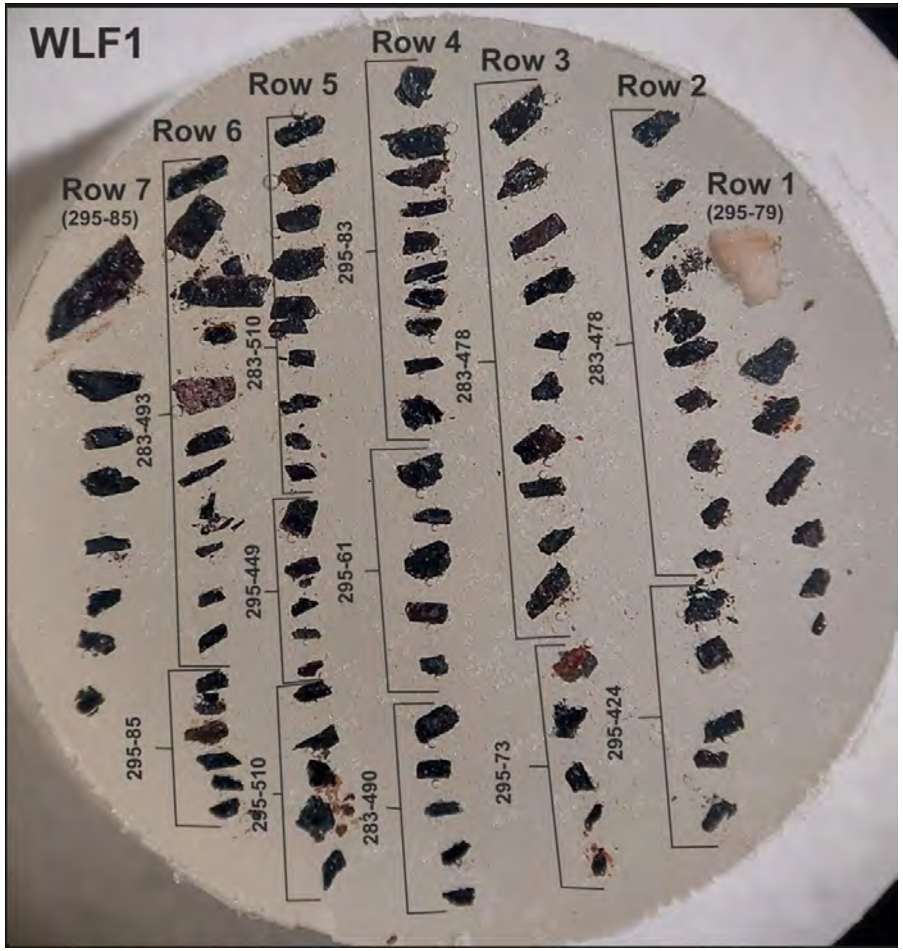

Fig. 3 Mineral mount WLF1

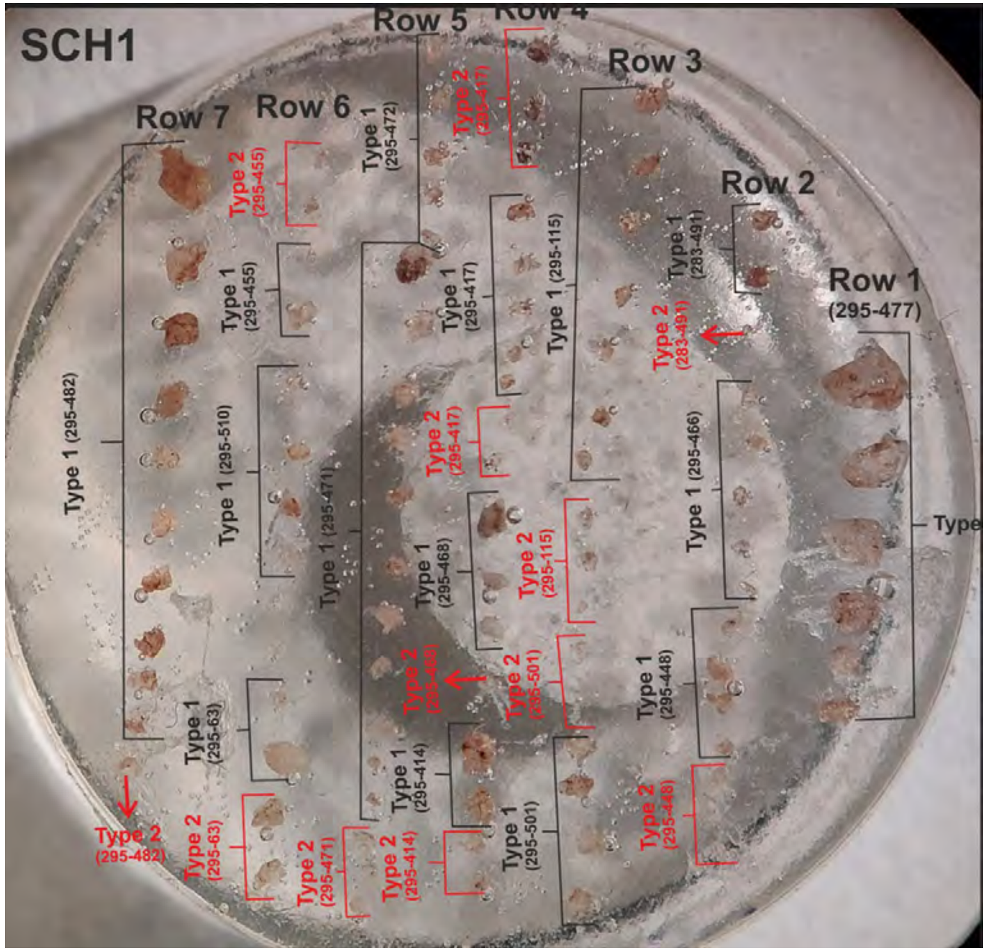

Fig. 4 Mineral mounts: SCH1 and SCH2

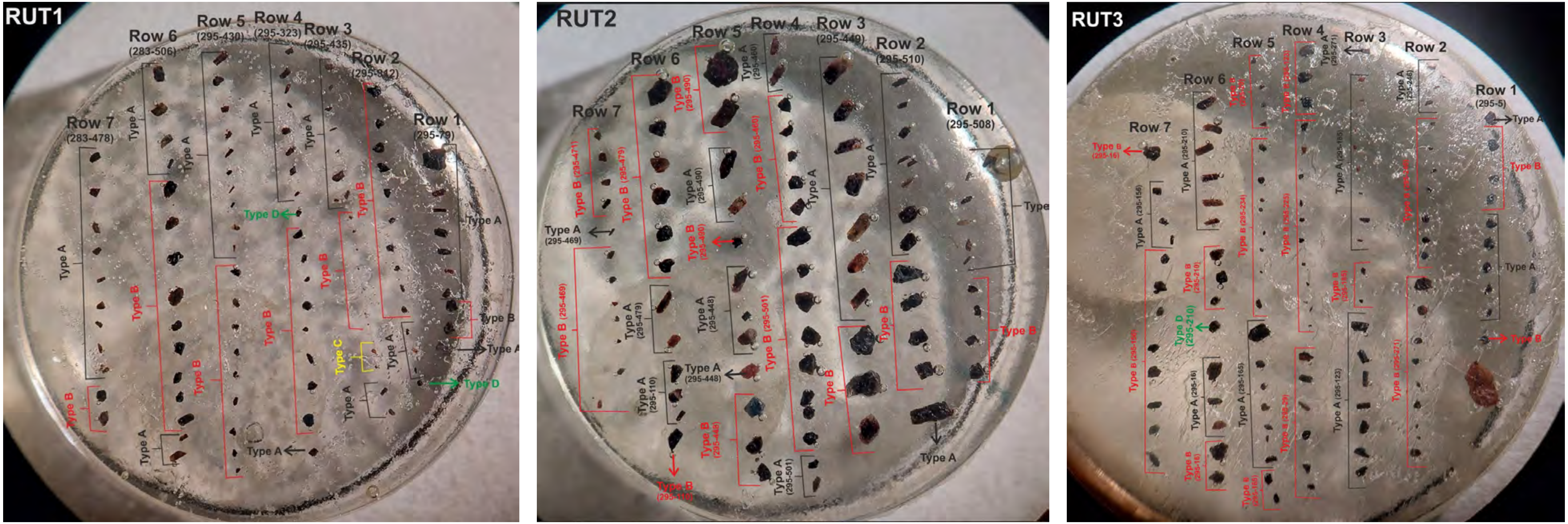

Fig. 5 Mineral mounts: RUT1, RUT2 and RUT3

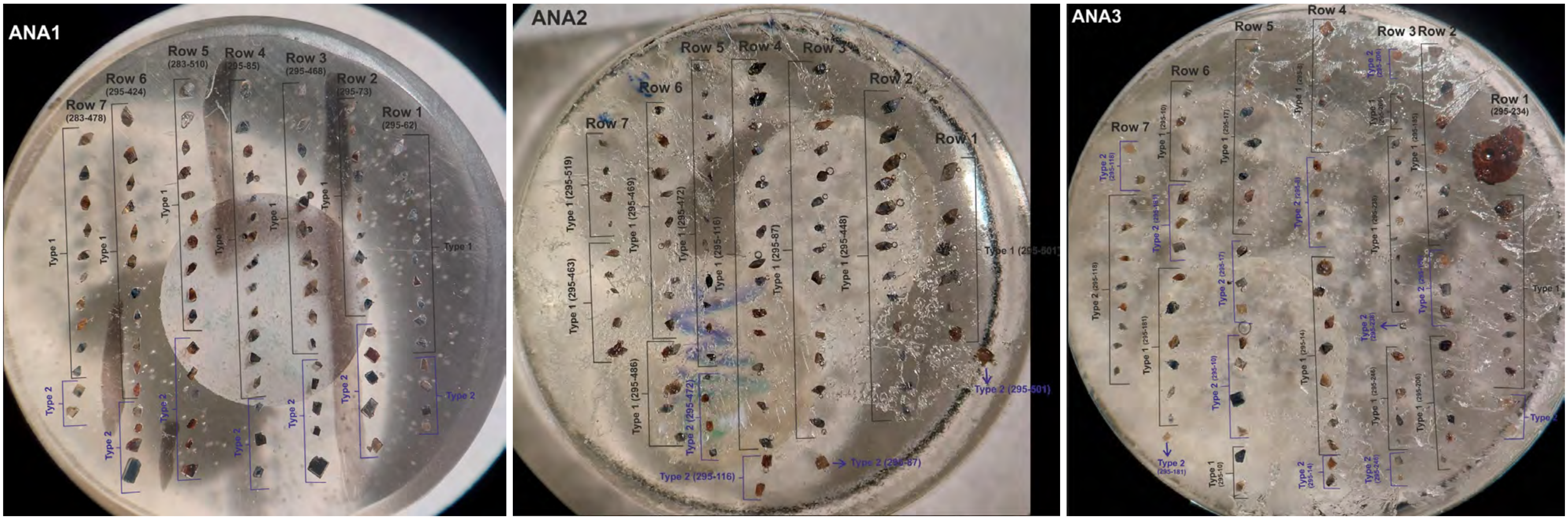

Fig. 6 Mineral mounts: ANA 1, ANA2 and ANA 3

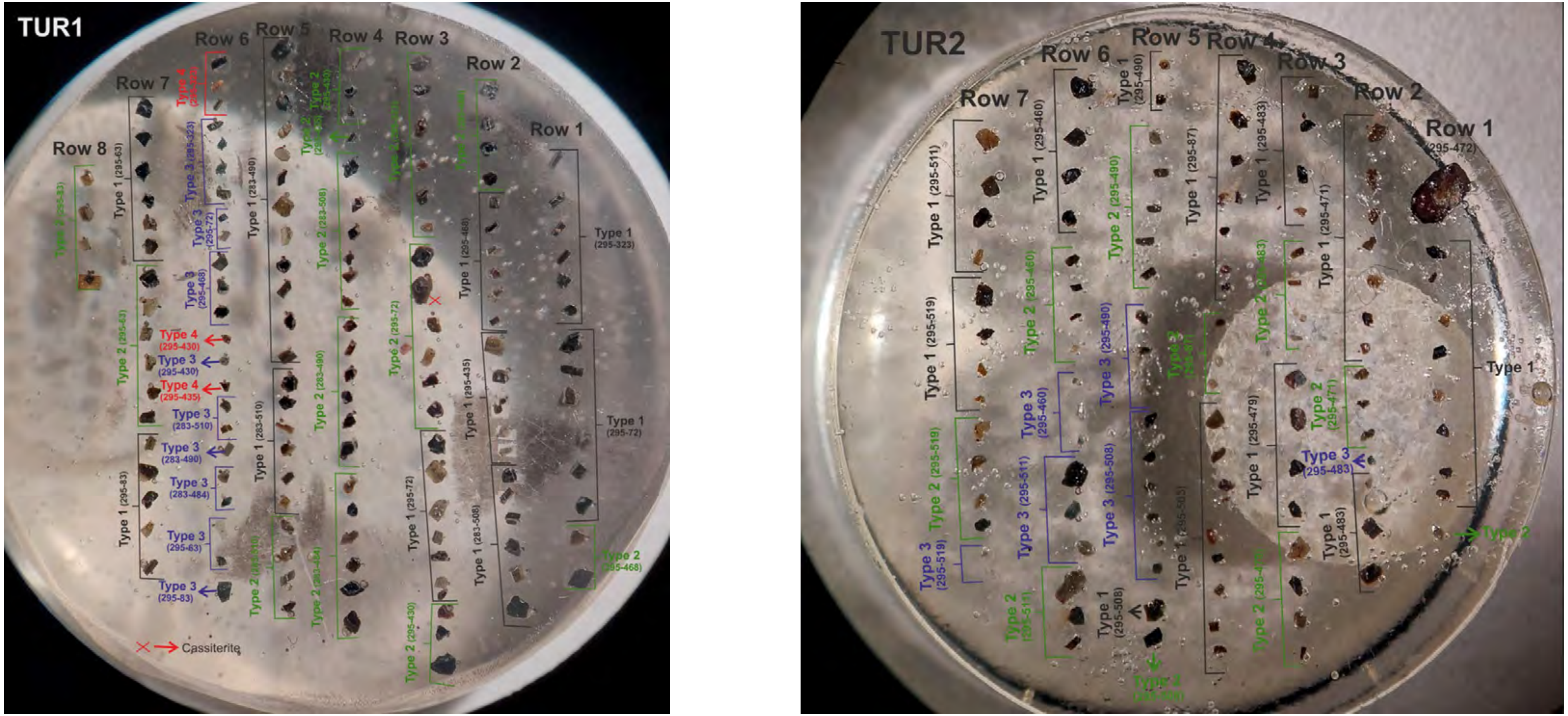

Fig. 7 Mineral mounts: TUR1 and TUR2

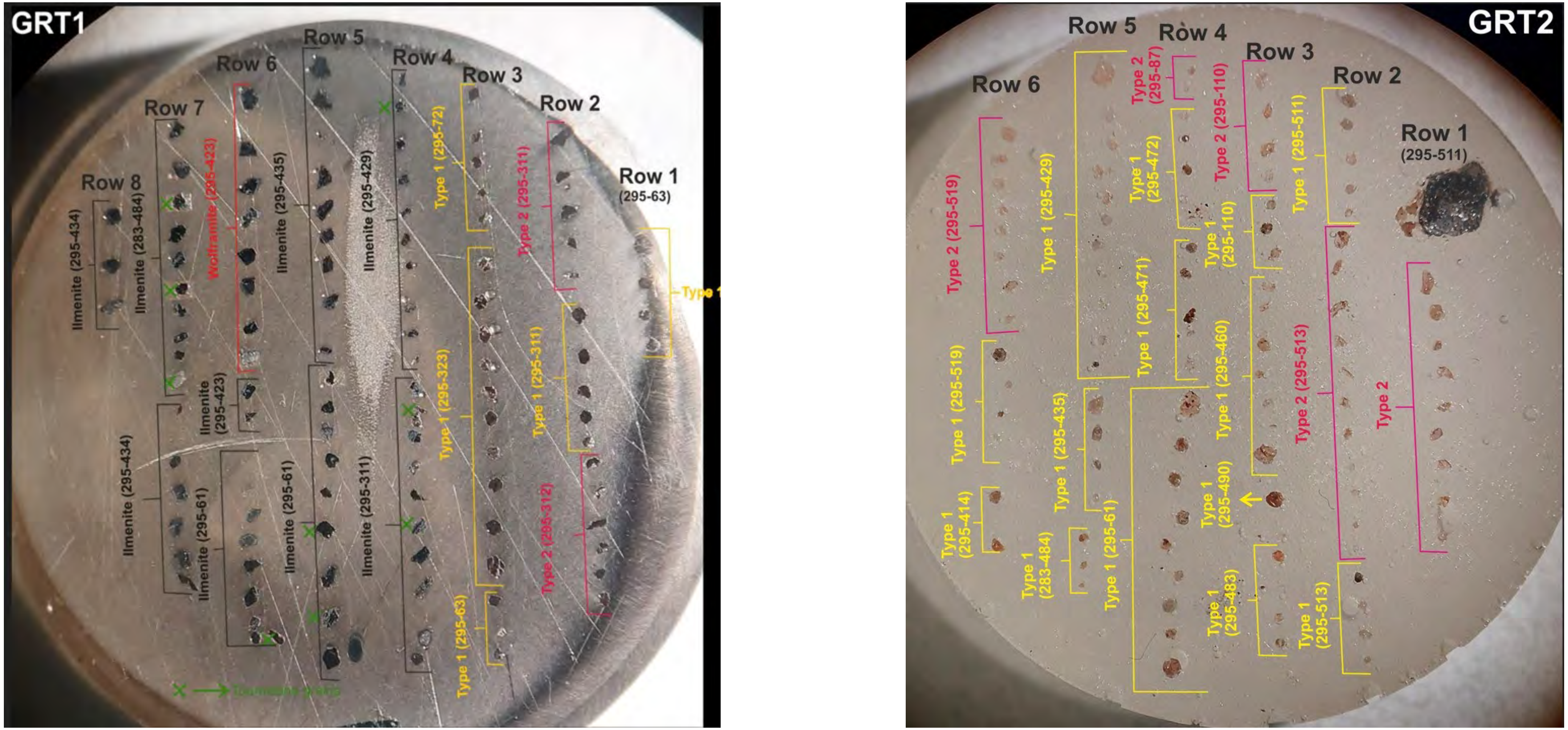

Fig. 8 Mineral mounts: GRT1 and GRT2