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Alluvial Sn and W minerals mapping for mineral resources exploration and research in Segura mining region (Portugal)

Mapeamento de minerais aluvionares de Sn e W para a prospeção e investigação de recursos minerais na região mineira de Segura (Portugal)

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Sumário: Com base em amostras aluvionares em arquivo no LNEG, foi possível conceber mapas de concentração de grãos de cassiterite, volframite e scheelite, para a região mineira de Segura (Castelo Branco) enquadrada na Faixa metalogenética estanho-tungstanífera de Góis-Segura. O padrão de distribuição da concentração de grãos destes minerais de minério de Sn e W, materializa-se em halos concêntricos distintos, em torno do endo/exo-contacto do granito de Segura; estes padrões podem ser correlacionados com distintos eventos metalogenéticos que ocorreram na região, sob controlo estrutural, litológico ou magmático-hidrotermal e em fases distintas, possivelmente com maior sobreposição na parte oeste da mesma. Deste modo, o mapeamento da cassiterite, volframite e scheelite, à escala regional, provou ser útil para ser aplicado à investigação e prospeção de recursos minerais, podendo contribuir para traçar vetores neste tipo de mineralizações de Sn e W.

Palavras-chave: minerais aluvionares de Sn-W, mapeamento mineral, prospeção mineral, mineralizações de Sn-W, região mineira de Segura

Keywords: alluvial Sn-W minerals, mineral mapping, mineral exploration, Sn-W mineralizations, Segura Mining region

Introduction

Placers/alluviums are natural concentrations of heavy minerals (HM; 2.8-2.9 g/cm³; Morton, 1978), whose mineralogical composition depends on the inherited mineralogy of the primary sources, their stability and migration capability (e.g., Patyk-Kara et al., 2001). When dispersion factors prevent significant transport, alluvial HM assemblages are proximal to their sources and should mirror the surface geology, including existing orebodies, as it has been demonstrated in the Segura region (Viegas et al., 1988; Gaspar, et al., 2022). Cassiterite (Cass), wolframite (Wolf), and scheelite (Sch) are HM, and good indicator minerals for Sn-W deposits, therefore suitable for targeting mineralization in such proximal environments.

Grain concentration maps of Cass, Wolf, and Sch for the Segura region were produced, based on data extracted from alluvial samples collected during previous surveys, meant to be used as a mineral exploration tool at the regional scale. This work has been conducted under the thematic research line *mineral pathfinders and fingerprints of the MOSTMEG project* and aimed to improve our regional understanding on Sn and W metallogenetic systems.

Geological setting

The Segura mining field, in Central-Iberian Zone (Fig.1), is part of the Góis-Segura Sn-W metallogenetic belt. The region is dominated by the Slate-Greywacke Complex (SGC; pre-Ordovician) and the Variscan Segura Massif. Mineralization comprises exo-granitic Sn-W quartz veins (filling late/post tectonic faults) and Li-(Sn) Cass-bearing aplite-pegmatites (genetically related with granites). Cass is the dominant ore mineral of most Sn-W veins containing minor Wolf, except in a few Wolf>Cass lodes that occur further away from the granites. Scheelite was never reported in regional rocks or mineralized bodies; Ba-Pb-Zn quartz veins intersect both SGC and granites (Antunes, 2000).

Methodology

The Cass, Wolf, and Sch are part of the alluvial samples from old surveys that were collected in 2nd or 3rd order streams, panned, sieved (<3mm), subjected to heavy liquids (2.89g/cm³) and magnetic separation; their grains were counted or estimated, under the binocular microscope, or UV light for Sch. For the present study 446 samples were selected, and data for their respective Cass, Sch and Wolf number of grains compiled; in 4 of these samples, the amount of Cass grains was estimated. Mineral distribution maps

were created with ArcGIS software using the inverse distance weighted interpolation method (IDW).

Results and discussion

Cass, Wolf and Sch distribution patterns define concentric halos around the endo/exo-contacts of the Segura granite with marked anomalies associated with major orebodies (Fig. 1). It is notorious that the highest abundance of Cass (up to ≥ 5000 grains) and Wolf (>300 for grains) are confined to the western (and northern) part of the halo overlying the exploited Sn-W mineralised quartz veins. The contribution of these sources to Cass and Wolf in the alluviums must have been more significant than the one related to the smaller Sn-W quartz veins, and the Li-Sn aplite-pegmatite bodies that define a minor Cass anomaly overlying the Cass anomalous halo in the eastern part. The Cass halo is wider than that of Wolf and Sch denoting a Sn $>$ W mineralizing system. The Wolf/Cass ratio tends to increase away from the Segura granite, following the metallogenic zoning proposed for the region (e.g., Antunes, 2000).

Regarding alluvial Sch, its higher abundance (up to >500 grains) defines a marked yet more discreet and distal anomalous halo relative to Cass and Wolf ones, as it can be clearly seen in the east near the Spanish border (Fig. 1).

Conclusions

The alluvial Cass, Wolf, and Sch anomalies and pattern halos can be correlated with distinct W-Sn metallogenetic events, interpreted as having different origins and controlling factors (structural, lithologic, magmatic/hydrothermal, timing), and likely locally overlapping, especially to the west. The absence of reported Sch in the mineralized bodies and the well-defined halo around the Segura Massif suggests a metasomatic contact origin by remobilization of W from the metasediments.

The Segura regional-scale alluvial Cass, Wolf and Sch maps complement and reinforce previous studies, proving to be a useful mineral exploration tool in other Sn-W systems.

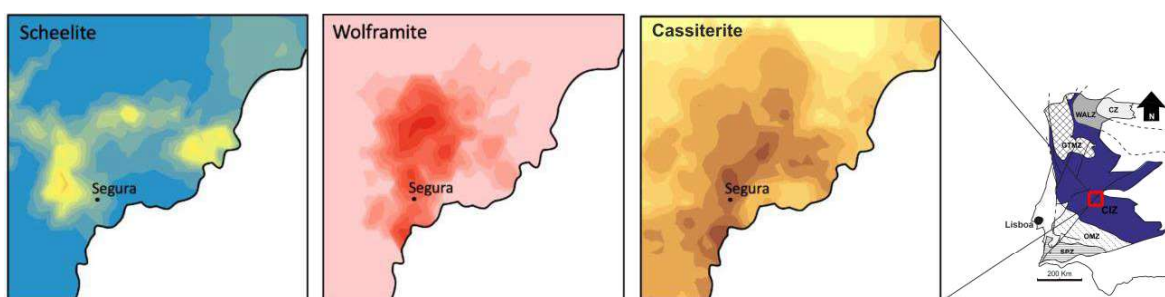


Fig. 1. Alluvial cassiterite, wolframite and scheelite grains abundance maps for the Segura mining region.

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