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Spatial analysis of geological structures favorability for the occurrence of Sn and W mineral deposits in Bejanca Mine (Viseu – Portugal)

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The geographic information systems (GIS) are very useful tools for compilation and management of information of different types and sources. These may be used to produce potential or predictivity maps for the definition of areas of high potential for occurrence, but that are not yet known deposits. The integration of different data in the same referential may allow a better understanding of the parameters that control the metallogeny of the region.
In order to better understand the structural influence in Bejanca Tin and Tungsten Ore Deposit, we chose to evaluate the spatial correlation between the known occurrences of tin and tungsten and fracturing. These correlations can be very useful in the future development of a predictability map for tin and tungsten deposits.
Bejanca Mine is located in the district of Viseu, more specifically in Queirã, Vouzela. This Mine begun cassiterite and wolframite exploitation in 1917.
This region consists of greisenized masses included by porphyritic two mica granite, with dominant biotite. Some quartz veins cut the greisen in different directions.
This granite contains tourmaline and is traversed by small greisenized veins, with NW-SE strike. Faults are often filled by quartz, cassiterite, wolframite and clay.
The mine area is crossed by a fault system N30 ^{0} W, there is a fault system oriented N20 ^{0} whose box failure is filled with clay, as well as other well-marked direction N55 ^{0} E and N70 ^{0} E.
The numerous Sn-W mineralization located in the study area are arranged roughly in the peripheral borders of granitic batholith (Viseu). It is envisaged that the transfer may have occurred from the region adjacent to batholith and was thermally induced by the granitic intrusion. Matter would be obtained from the leaching of the moscovitic-biotitic granites and eventual primary Sn-W mineralization that they contained.
The concentration of tin and tungsten occurrences are bounded laterally by two faults on the west by the failure of Ribama approximate NS direction and by a failure of this approximate direction NW-SE. These mineralizations are agglomerated in a region of dense fracturing.
For the spatial analysis of geological structures, we used the algebraic method to quantify the criteria associated with different classes of faults.
The spatial relations analysis between the fault and the known occurrences of tin and tungsten in the region revealed that, despite the most common fractures being N45^{0}-60 ° and N300^{0}-310^{0}, followed ordered in terms of frequency, N20 ^{0} -35 °; N335^{0}-355^{0} and N80 °-90 °, the fractures more favorable for Sn and W deposit occurrence are those having N130^{0}-160^{0}, N100^{0}-110^{0} and N0^{0}-10^{0} directions.
The results obtained by spatial analyses can result in great importance for future deposits unknown occurrences predictive analysis.