EGU21-12390, updated on 26 May 2022
https://doi.org/10.5194/egusphere-egu21-12390
EGU General Assembly 2021

Unravelling the relationship between mafic magmatism and Sb mineralization through dolerite geochemistry (Central Iberian Zone, Spain)

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This work presents the preliminary results of geochemistry of mafic intrusions (diabase dykes) and their relationship with antimony mineralization in the Central-Iberian Zone (Variscan Belt). Two different areas were studied, the Almadén (Al) and the San Antonio (SA) areas.

Both macroscopic and microscopic observations show that mafic dykes are mainly composed by clinopyroxene, plagioclase, Fe-Ti oxides and to a lesser extent of calcite and sulphides (pyrite, chalcopyrite and pyrrhotite). These samples are altered presenting chlorite and epidote as alteration minerals. Pyroxene is sometimes altered to amphibole.

Whole rock geochemistry analyses from 20 samples show a difference between SA and Al dolerites. The first fall into the classical basalt field whereas the second fall into the alkali basalt field according to the Zr/TiO2 vs Nb/Y diagram. The tectonic setting for the SA samples coincides with the volcanic arc setting whereas the samples from Al fall into the within plate magmatism.

Primitive mantle normalized diagrams display high negative anomalies in Rb, K, with small negative anomalies in Nb and Ta for both SA and Al. High positive anomalies for both areas in Cs, Pb (especially for SA) and Li accompanied by small positive anomalies in P and Ti can be observed. Dolerites from Al are more enriched in Ba, Th, U, Nb, Ba, La, Ce, Sr, P, Nd, Sn, Zr, Hf than SA. All samples are depleted in HREE and enriched in LREE. Anomalies in Rb, Nb, Ta and Li may be related with crustal contamination. Pb anomalies could be associated with assimilation of country rocks, especially marine sediments, this anomaly is also related to subduction processes. Positive P and Ti anomalies of some samples is due to the apatite and ilmenite enrichment respectively. Negative anomalies in K could be associated with presence of phlogopite in the source. Rare Earth Elements contents are compatible with the presence of garnet in the source and low degree of partial melting, this is consistent with the correlation between La/Sm vs Gd/Yb and La/Sm vs Rb. Trace element ratios such as Th/La (0,10 for SA) and (0,09 for Al) suggest an enriched mantle source.

Some of these mafic intrusions were collected near antimony mineralization whereas the other are located at distance but in the same swarm of mafic dykes. A spatial and genetic link between

Sb mineralization and mafic magmatism has been proposed in other parts of the Variscan Belt, especially in the Armorican Massif.

The source of these Sb mineralization could be related to an enriched mantle with crustal contamination. The geochemical link between mafic magmatism and Sb mineralization and their source in the Central Iberian Zone is still a matter of study.

Acknowledgments

This work was funded by the ANR (ANR-19-MIN2-0002-01), the AEI (MICIU/AEI/REF.: PCI2019-103779) and author's institutions in the framework of the ERA-MIN2 AUREOLE project, as well as by Project SBPLY/17/180501/000273, Consejería de Educación, Regional Government of Castilla-La Mancha, Spain.