Geophysical Research Abstracts
Vol. 20, EGU2018-13478-2, 2018
EGU General Assembly 2018

Mineralogical, geochemical and petrological studies in the old Fe mine ‘Schwarzer Crux’, Thüringer Wald, Germany - garnet-bearing fluorite-magnetite-skarn mineralization around the Suhl granite

Steven Zierold (1), Stefan Kiefer (2), and Thomas Seifert (1)

(1) Technische Universität Bergakademie Freiberg, Institute of Mineralogy, Division of Economic Geology and Petrology, Erfurt, Germany (stevenzierold@gmx.de), (2) Institute of Geosciences, Friedrich-Schiller-University, Jena, Germany

The southern part of Variscan Thüringer Wald metallogenic province is an old iron mining region. Near Suhl, mining and processing of Fe-ore is documented since the 10th century. The ore deposits were usually relatively small and became uneconomic in the 19th or 20th century. The object of our studies is the ‘Schwarzer Crux’ mine, one of the important Fe-mines around the town Suhl. Here the mining activities finished in 1924. Today a part of the ‘Schwarzer Crux’ is opened to the public as exhibition mine. It is located in the UNESCO Biosphere Reserve “Vessertal”.

The main ore mineral is magnetite, related with fluorite (F in bulk ore up to 18.10 wt%) and high contents of barite in contact to a granitic intrusion on the one hand and transition to a garnet skarn on the other hand. The skarn is enriched in Mn (up to 15 wt%). More than 13 mol% Mn where detected in calcite by electron microprobe analysis (EPMA). The grandite garnets are mostly manganous free, only a few contain less than 0,55 mol% Mn and plot as andradite-grossularite with different proportion of almandine. Garnet analyses plot in the range of tungsten skarns (Meinert, 1992). The magnetite-garnet skarn transition zone is characterized by a high content of light rare earth elements (LREE), e.g. 1025 ppm La and 737 ppm Ce. Especially the garnet skarn is enriched by molybdenum, with up to 78 ppm. The granite intrusion is probably related to the so-called ‘Thüringer Hauptgranit’ which intruded at 337 +/- 4 Ma (Zeh et al. 2000).

Former investigations tried to explain the formation of the magnetite deposit with a granitic intrusion related oxidation of a VMS deposit formed by black smoker activity in a Cambrian back arc basin (Bankwitz and Bau, 1997).

Our new analyses suggest a skarn mineralization related to a granitic intrusion probably into REE enriched meta-carbonate layers. There are more detailed mineralogical geochemical investigations on the REE rich ores in progress.

References:

Bankwitz, P., Bau, M. (1997). Aufbau und Genese der Magnetitlagerstaette Schwarze Crux bei Schmiedefeld am Rennsteig (Zone von Vesser, Thüringer Wald): Teil einer überregionalen geomagnetischen Anomalie in Mitteleuropa. Zeitschrift für geologische Wissensschaften 25: 341-362.

Meinert, L. D. (1992). Skarns and skarn deposits. Geoscience Canada, 19(4).

Zeh, A., Cosca, M. A., Brätz, H., Okrusch, M., & Tichomirowa, M. (2000). Simultaneous horst-basin formation and magmatism during Late Variscan transtension: evidence from 40Ar/39Ar and 207Pb/206Pb geochronology in the Ruhla Crystalline Complex. International Journal of Earth Sciences, 89(1), 52-71.