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CHEMICAL AND ISOTOPIC CHARACTERIZATION OF THE HÄMMERLEIN TIN-SKARN DEPOSIT, WESTERN ERZGEBIRGE, GERMANY

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The Hämmerlein Sn-skarn deposit of the Western Erzgebirge is associated with schists and gneisses that reached peak metamorphic conditions at 340 Ma. The skarns formed around 320-325 Ma, when the Eibenstock granite was emplaced and magmatic fluids migrating along the contacts of different lithological units induced decarbonation of the marble layers, resulting in the development of a series of contrasting skarn types. The different units of the deposit are magnetite skarn, garnet skarn, pyroxene skarn, sulphide skarn and amphibole skarn with intercalated layers of gneiss and schist. Cassiterite is the major ore mineral. In the schists, it typically forms coarse grains (up to 1 mm) and in the various skarns ranging from fine-grained (< 100 µm) and fine disseminated to coarse > 1 mm grains and agglomerates. Relatively high content of In has been found in exsolutions of Cu-Zn-Fe sulfides in chalcopyrite patches within the magnetite skarn and in the Fe-rich sphalerite layer beneath the magnetite skarn.

Fluids inducing the skarn-forming reactions enriched the rocks in Sn, W, In, Cd, Sb and F. The enhanced contents of As, Bi, and U in the skarn, however, are likely to be related to later events, as there is important *ca.* 180 Ma old U mineralization in the region and this U mineralization typically shows multiple later redistributions with addition of As and Bi. REE seem to have been largely immobile and to be inherited from the protoliths, as indicated by the REE pattern and the Nd isotopic composition. All skarns are characterized by similar flat UCC-normalized REE pattern with a positive Eu anomaly, whereas, the schists and gneisses do not have a positive Eu anomaly and their patterns show slightly higher LREE contents. The REE pattern of cassiterite-bearing schists is the same as the one of unmineralized schists. The εNd values of skarns and schists overlaps correspond to those of the unmetamorphosed sediments and are markedly lower than those of the granite. The distribution of Sn and In within different skarn units is heterogeneous, indicating that mineralization is not controlled by fluid-flow alone, but also by precipitation at reaction fronts with selective mineralogically controlled scavenging of ore elements and the reaction history of the fluid, in particular whether the fluid had lost its metal content during earlier fluid-induced reactions.