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Editorial

Editorial for the Special Issue "Magmatic-Hydrothermal Fe Deposits and Affiliated Critical Metals"

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Steel is a foundation of national economic construction. Magnetite and hematite are the main minerals for the recovery of Fe to make steel. The main source of Fe deposits in most of the world is banded iron formation, but in China magmatic-hydrothermal Fe deposits are the main Fe-enriched (total Fe > 50%) type of deposit. Magmatic-hydrothermal Fe deposits include iron oxide-copper-gold, iron oxide-apatite (IOA), skarn Fe, and volcanic-hosted Fe deposits. In addition to iron resources, magmatic-hydrothermal Fe deposits also host economic resources of critical metals such as REE, Nb, Co, Ga, and Ge. In this special issue [1], a total of five papers are collected to better understand the genesis of magmatic-hydrothermal Fe deposits and are summarized below.

Xie et al. (Contribution 1) compiled trace element data of magnetite from different mineralization types of skarn deposits. They identified geochemical features for these mineralization types using the partial least squares-discriminant analysis. The complex data set can be used to constrain the factors controlling the different mineralization types.

Ye et al. (Contribution 2) constrained the genesis of the Mariela IOA deposit in the Peruvian Iron Belt, central Andes using magnetite textures and chemistry. Three types of magnetite were identified with different textures and chemical compositions: magnetite of magmatic or magmatic-hydrothermal origin, magnetite formed by hydrothermal processes due to evolved hydrothermal fluids and fluid replacement of the host rock. This study provides important evidence for that both magmatic and hydrothermal processes are involved in the formation of IOA deposits.

Guo et al. (Contribution 3) studied the role of evaporite layers in the formation of IOA deposits such as Luohe in China and El Laco in Chile using sulfur isotope composition of sulfide and sulfates. They concluded that two sulfur endmembers (magma and evaporite layers) contributed to the sulfur in the fluids. This study highlighted the importance of evaporite in the formation of IOA deposits.

Berdnikov et al. (Contribution 4) reported systematic petrographic, mineralogical, and geochemical data sets to constrain the origin of Fe-Mn deposits closely related to volcanic rocks in the Lesser Khingan Range of Russian Far East. Trace element and Sr-Nd isotope compositions were interpreted as associated hydrothermal processes. This study highlighted that pre-eruption magmatic processes are important for later hydrothermal processes responsible for Fe-Mn ore formation.

Tan et al. (Contribution 5) compiled published molybdenite laser ablation LA-ICP-MS trace element data and used partial least squares-discriminant analysis to discriminate types of porphyry deposits from other deposit types. The element assemblages of Au-Sb-Te-Pb-Bi can thus be used as a proxy for gold mineralization.

This special issue contributes to our understanding of the genesis of magmatic-hydrothermal Fe deposits. These papers demonstrate that additional studies of magmatic-hydrothermal Fe deposits are needed.

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List of Contributions

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