

The Granitoid Series and Related Mineralization in the Earth History

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Granitoids distributed in the Inner Zone of SW Japan were identified to have the accessory components of magnetite and ilmenite to the north, but only small amounts of ilmenite toward the south in 1971, then named later as "magnetite-series and ilmenite-series" granitoids. Associated ore deposits also show characteristic minerals. Native sulfur was mined nearly all from the Quaternary magnetite-series volcanic belts. Native Au-Ag (typically argentite Ag₂S) deposits occur in Neogene to Quaternary magnetite-series terranes. Cu (typically chalcopyrite CuFeS₂) -Pb (galena PbS) -Zn (sphalerite, ZnS) and Mo (molybdenite, MoS₂), occur also as sulfides in vein and skarn types of the late Cretaceous to Neogene magnetite-series igneous terranes. On the other hand, the ilmenite-series ores are characterized by none sulfide mineral commodities, such as cassiterite (SnO₂) and wolframite ((Fe,Mn)WO₄) and scheelite (CaWO₄). Therefore, distribution of sulfur in the magmatic stage is the key to the metallogeny of the two series.

Oxidation status of the earth surface has been changed in the earth history. The oldest foliated granitoids in the Greenland showed low Fe₂O₃/FeO ratios equivalent to the ilmenite series. In the Berberton region of South Africa, the Archean TTG suites appear to belong also to the ilmenite series, but pink granites younger than 3.0 Ga were found to be the first magnetite series.

In the western Australia, aeromagnetic map shows the Archean Pilbara craton of the ilmenite-series granitoids, but Proterozoic Yilgarn craton is composed dominantly of the magnetite-series.

Au-mineralized sheared zones are hosted in the green stones, with the Au-mineralizing systems: a broadly uniform, low to moderate salinity, mixed aqueous-carbonic fluid capable of carrying Au, but limited capacity to transport base metals. The oldest Sn deposits are known to occur together with biotite and aplitic granites of 1.8 - 1.6 Ga (Rb-Sr), within the Bushveld ultramafic to mafic body. These granitic magmas were found partial melting products of the middle crust by heat brought-up by the Bushveld ultramafic magmas. The oldest Li-mica pegmatite-bearing dikes (age: 2.5 Ga) have been mined in the western Australia.

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