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Title: METALLOGENESIS OF GRANITE-HOSTED ORE DEPOSITS OF MONGOLIA

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Abstract: Metallogenesis of granite-hosted ore deposits is closely linked to the nature of their associated granitoids. The major types of ore deposits in Mongolia associated with granitoids are porphyry Cu-Mo and Cu-Au, greisen and vein W-Sn, intrusion related vein Au, and intrusion-related Ag-Pb-Zn.

Intrusion-related Phanerozoic metallogenic provinces with porphyry Cu-Mo and porphyry Cu-Au deposits occur in northern, middle and south Mongolia. Porphyry Cu-Mo deposits and occurrences are associated with typical calc-alkaline, metaluminous, oxidized, I-type, magnetite series granitoids that are the dominant granitoid type in Mongolia. They host various Devonian-Carboniferous volcanic arc porphyry-Cu-Au deposits (Oyu Tolgoi, Tsagaan Suvarga in South Mongolia), and late Paleozoic and early Mesozoic continental arc porphyry Cu-Mo deposits (Bayan Uul, Erdenet). The ore-bearing porphyritic rocks form stocks or dikes, and are the youngest of calc-alkaline belts, developed that are tectonically linked to subduction zones.

W-Mo veins, greisen and vein Sn-W (Be) deposits are associated mainly with late Paleozoic, oxidized, slightly peraluminous leucocratic granites in the Mongolian Altai, and with early and late Mesozoic granites in eastern Mongolia. Within the metallogenic provinces with calc-alkaline granites, they occur in a continental margin setting for the more landward localities and in association with porphyry deposits. For the evolved Mesozoic granites, Ta-Nb deposits are characteristic and are associated with highly differentiated T3-J1 leucocratic granites (Janchivlan, Ongon Khairkhan) in central and eastern Mongolia. Ta and Nb deposits are concentrated in Li-F granites and subvolcanic ongonites. The granites are slightly to highly peraluminous, enriched in Li, F, Sn, Rb, Cs, and depleted in Sr and Ba.

Granitoid-related Au vein deposits are associated with Phanerozoic granites and subvolcanic rocks in Bayankhongor and North Khentei. The host calc-alkaline series granitoid plutons are mainly I type, oxidized, and sometimes are part of a bimodal gabbro-granite series.

Base metal Pb-Zn ± Ag + U vein deposits are hosted in late Mesozoic volcanic-plutonic latite complexes, are part of a high K calc-alkaline series, and are oxidized. The major deposits are Tsav, Ulaan and others in eastern Mongolia. Skarn Fe-Pb-Zn ± Sn deposits are hosted in high K granites that intrude Proterozoic sedimentary rocks in Central Mongolia. Sn skarn deposits occur at the contact of late Paleozoic granite plutons and carbonaceous-siliceous slates.

Ta-Nb-REE deposits are hosted in minor alkaline granite intrusions in the Mongolian Altai, northern Mongolia, and southern Mongolia. Nb-Zr-REE deposits are hosted in alkaline plutons, pegmatites, and metasomatites. The granites are interpreted as having formed in an intracontinental environment.