AOGS 2005

Tectono-magmatic and Metallogenic Episodes of the Western Edge of the Khorat Plateau, Thailand

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Abstract

The north-trending metallogenic zone (1,000 km long and up to 150 km wide) is located at the western edge of the Khorat Plateau in the Indochina tectonic block. This mineralization zone (called herein as WKP) is investigated based on field, petrological, geochemical, geophysical, geochronogical, and paleontological results. Igneous rocks and their associated mineralization in the WKP are both altered and mineralized volcanic and plutonic affinities with ages ranging from Late Paleozoic to Neogene and with minority of hypabyssal rocks.

The oldest rocks are exposed in the northernmost part (Loei area) and likely to extend northward to Lao PDR. Field and petrochemical investigations reveal that these igneous rocks are mainly dismembered ophiolite suites with sparsely distributed chromite and nicklipferrous deposits. The latter in some places are interbedded with Devonian radiolarian ribbon chert. The second episode is the Carboniferous WKP magmatism is characterized by basaltic to andesitic rocks in Loei arer. These rocks with weak Cu-Fe-Ba whick mineralization occurred in the ocean-floor tectonic environment. The third episode of the WKP magmatism took place in Permo-Triassic time. Volcanic rocks are mainly calc-alkaline in composition, and are mostly associated with Pb-Zu±Cu and Au mineralization. These volcanic are voluminous and widely exposed and extend from Loei in the north, Petchabun and Lopburi in the Centarl and Sra Kaew-Chantaburi-Ko Chang areas, constituting the main WKP volcanic belt. This rocks long belt is considered to occur as a result of eastward ocenic slab subduction beneath the Indochina block. Continue subduction of the oceanic crust may have caused the fourth episode of WKP magmatism during early Triassic time. Partial melting of the oceanic slab may have been responsible for generation of I-type felsic plutonic rocks with Cu-Fe±Au mineralization. The altered and mineralized plutonic rocks are sparsely distributed throughout the WKP with large granitoid emplacement in Loei Phetchabun Saraburi areas. It is considered that prolonged and resumed subduction beneath Indochina may have triggered partial melting of the oceanic slab to produce Early Jurassic I-type and magmas of mineralized the fifth episode, particularly in the southern WKP belt (Chantaburi-Nakorn Ratchasima). Stibnik cend epithermal gold deposits may have been associated with the granite of this episode. Continue eastward subduction of the oceanic plate may have caused sporadic andsitic volcanic and dyke rocks in the southern (Ko Chang) and central (Chaiyaphum) WKP during Late Jurassic. The last episode (7-24 Ma) of WKP magmatism mainly in the central part (Lumnarai-Lopburi areas) are petrochemically characterized by bimodal volcanism of continental rifting tectonics associated temporally and spatially with gem mineralization.

The overall result reveals that the WKP mineralization belt may have taken place as a result of rifting (extensional) tectonic setting during (Middle-) Late Paleozoic, prolonged subduction in compressive tectonic setting during Permo-Triasssic to Late Jurassic and rifting (or extension) tectonic setting during Tertiary time.