Outline of Metallogenic Features of China

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The China continent, located in the intersection of ancient Asia, circum-west-Pacific and Tethys-Himalayan tectonic domain, underwent a long geohistory with very complicated geotectonics Many metallogenic province (belts) and lots of metallogenic systems were formed through many types of geological, geophysical, geochemical movements. The complexity and diversity of geological mineralization were fully displayed. According to geotectonic evolution and regional lithospheric features, the authors proposed six metallogenic domains in China (Fig. 1, Tab.1): ① Tianshan-Xingmeng metallogenic domain, ②Tarim-North China metallogenic domain, ③ Qinling-Qilian-Kunlun metallogenic domain, ④ Yangtze metallogenic domain, ⑤ South China metallogenic domain, ⑥ Himalayan-Sanjiang metallogenic domain. In this paper, the authors also discuss, on the basis of geotectonic background and metallogenic evolutionary history, some metallogenic features of China: ①Large percentage of ore formation occurred in paleo-continental margins, including continental marginal rift, continental marginal accreationary orogenic belt. Majority of main mineral deposits is discovered in continental margins. ②Superimposition of mineralization is significant. It favored the making up of giant and large mineral deposits, but often made the mineral deposits more complex in composition (associated components), morphology and structure. ③Mineralization of crust-derived anatectic granite is intensive and especially concentrated in the South China metallogenic domain. Mineralizations, including W, Sn and REE are the products of long and ripe development of W-Sn-polymetal-rich Earth-crust in the metamorphic basement of South China Caledonian fold belt. ④Epithermal ore-forming system is well developed in the Southwest part of Yangtze Continental Block. Ore deposits of Hg, Sb, As, Au, Ag and U densely occurred in sedimentary strata of late Paleozoic to Triassic. Ge, Tl, Te can also constitute independent ore deposits. ⑤Ore formation caused by tectonic dynamic activities is striking. Small-scale continental blocks of China display intensive activities, which played widespread and diverse role in ore control. Junctions of faults, synchronous faults, shear zone structure and metamorphic core complex are main ore-control structures. ⑥The gold mineralization is complex and diversified. The greenstone type gold ores in China was emplaced in Mesozoic Yanshanian epoch after repeated mineralization and enrichment. As a result, the by-product gold constituted 32% of the gold output of China. ⑦The mineralization is characterized by multiple stages and heterogeneity .The metallogenic epoch of China almost covers all geological periods. The general trend is the intensity increase with time and culminates in Mesozoic-Cenozoic era, and so do the varieties of ores and types of mineral deposits. ⑧Ore mineralization culminated in continental margin at Mesozoic, especially in Yanshanian Orogeny in the eastern part of China, resulting in diversity of ores and intensive mineralization.

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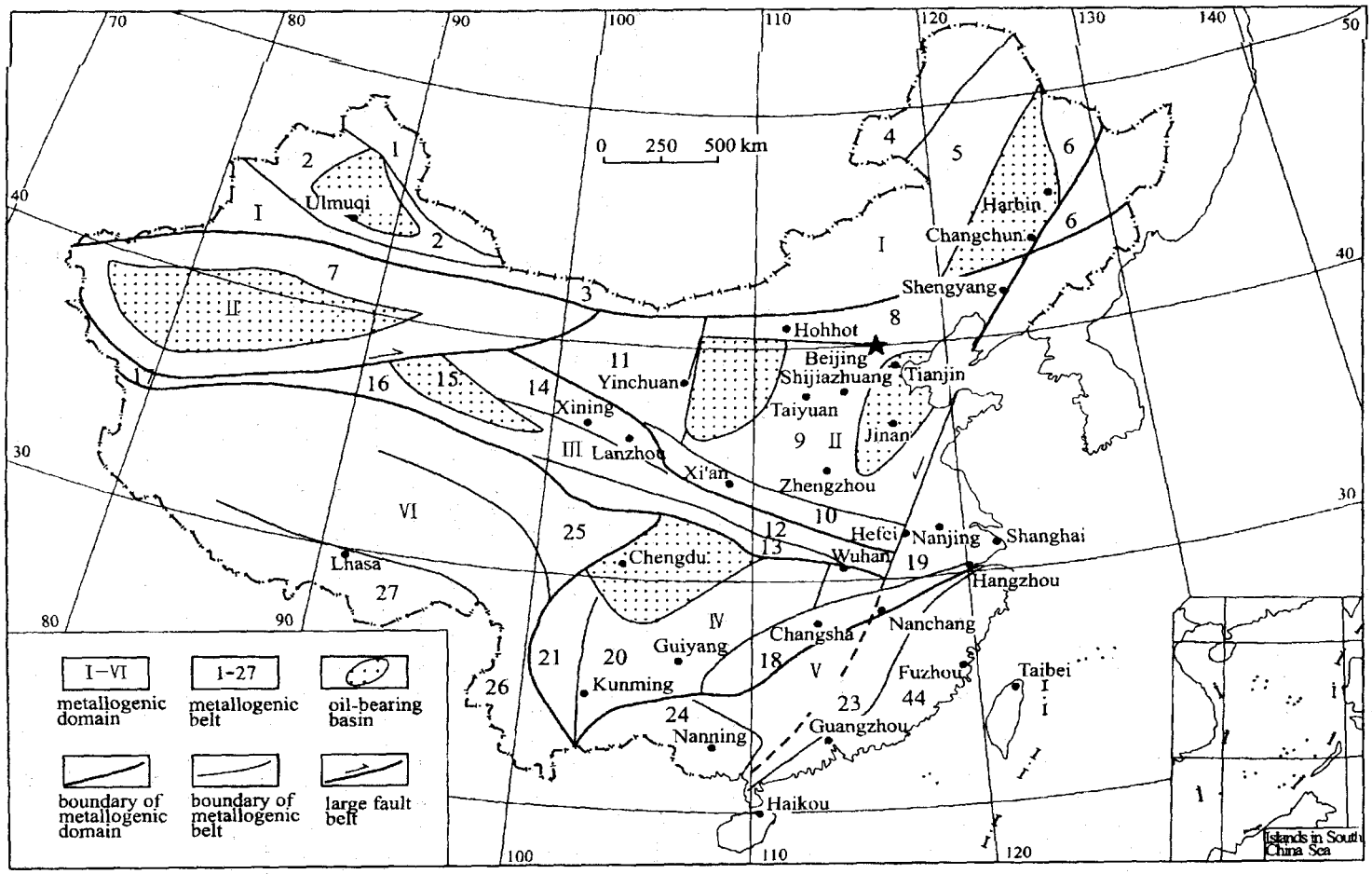

Figure 1. Main metallogenic domains of China. Ⅰ. Tianshan-Xingmeng metallogenic domain; Ⅱ. Tarim-North China metallogenic domain; Ⅲ. Qinling-Qilian-Kunlun metallogenic domain; Ⅳ. Yangtze metallogenic domain; Ⅴ. South China metallogenic domain; Ⅵ. Himalayan-Sanjiang metallogenic domain.

Table 1. Basic characteristics of six major metallogenic domains in China

Name of meta-llogenic domains	Geotectonic background	Ore-forming tectonic setting	Metallogenic epoch	Main ore species	Main ore deposit types	Petrologenic-metallogenic features
Tianshan-Xingmeng metallo-genic domain	Phanerozoic oregenic belt between Siberian plate and Tarim-North China, with Junggar etc. microblocks scattered in. Its west part belongs to ancient Asia metallogenic domain and its east part was superimposed by circum-Pacific metallogenic domain.	Taphrogenic trough, grani-tic dome, continental vo-canic rock belt, deep fault, large ductile shear zone	Pz_2, Pz_1 and Yan-shanian in east part	Cu, Au, Ni, Pb, Zn, Sn, Ag	VMS, SEDEX, magmatic type, porphyry type, continental vocanic type	Alkali-rich intrusive rocks was well developed. Cu-Ni ore deposits in North Xinjiang occurred in Phanerozoic orogenic belt. Many associated ore deposits occurred in Xingmeng area. Sn, W and Mo ore deposits are rather small.
Tarim-North China metallo-genic domain	Cratons and their active margins, active belts among microblocks	Rift, taphrogenic trough, deep fault, metamorphic complex core, epeiric sea, large ductile shear zone	Ar_3-Pt_1, Pt_2, Mz, Pz_2	Fe, Au, Mo, REE, Al, Pb, Zn, Ni, (Cu), diamond, magnesite	BIF, greenstone type Au deposit, porphyry type, skarn type, continental vocanic type, SEDEX, marine sedimentary type, VMS	Mineralization in continental margins is salient. Mineralizations in Mesozoic are quite different in its east and west part. Mineralization zoning is obvious both in continent and in its margin.
Qinling-Qilian-Kunlun metallo-genic domain	Polycycle complex orogenic belt, with several small blocks in it. It have undergone three times of "open" and "close" since Pt_1	Rift, active collision oregenic belt, continental ductile shear zone	Pt_3-Pz_1, Pz_2, Mz	Pb, Zn, Mo, Ag, Au, Cu, Hg, Sb, W	VMS, SEDEX, shear zone type, porphyry type, skarn type, salt lake in continent	Au deposits are of many types and have strong potential. It has characteristics of both South and North China metallogenic domains.
Yangtze metallo-genic domain	Platform with large area of late Precambrian strata. Accreted from its center—central Sichuan block, it was pressed by different plates from east and west.	Fault-uplift area, fault-depression area, epeiric sea, taphrogenic trough, shallow-surface level brittle structural zone	Pt_1, Pz_1, Pz_2, Mz	Cu, Fe, Ti, Hg, Sb, Pb, Zn, Au, P, Mn	VMS, magmatic type, epithermal type, karlin type, skarn type, stratabound type, SEDEX, marine sedimentary type, metamorphic clastic rock type.	Epithermal metallogenic systems and super-imposed and transformed metallogenic systems were widely developed
South China metallogenic domain	Caledonian polycycle oregenic belt with complex structures	Granitic dome, platformal trough, continental voca-nic belt, large ductile shear zone, fault-depre-ssion area, large d é colle-ment structure	Mz, Pz_2	W, Sn, REE, Pb, Zn, Ag, Au, Al, Sb, U, Mn	Magmatic hydrothermal type, porphyry type, skarn type, shear zone type, stratabound type, MVT, VMS, karlin type, continental vocanic type	W and Sn mineralized in large scope (Mz). Granitic petrologenic-metallogeny migrated from west to east with time. It is the conjunction of Tethys and circum-Pacific tectonic belt. So large-superlarge ore deposits were pretty centralized and superimposed metallogenic systems were well developed
Himalayan-San-jiang metallo-genic domain	Strong orogenic belt in Mesozoic. Microblocks alternate with continental matching belts, locating on the joint belt of Indian plate and Eurasian plate.	Rift, trench-arc-basin sys-tem, large strike-slip fault zone, ophiolite mé lange belt, fault basin	Mz, Kz	Cu, Pb, Zn, Ag, Sn, Hg, (Cr), Ni, Ag	Karlin type, epithermal type, magmatic type, VMS, continental clastic rock type, porphyry type, shear zone type	Strong mineralization in Tertiary and lots of large superlarge ore deposits