Metallogeny around the Pacific: East-west contrast

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Major mineral resources around the Pacific were derived from the ore deposits formed in relation to the Mesozoic-Cenozoic felsic magmatism. Cretaceous-Paleogene granitoid magmatism was important for the metallogeny in northeast Asia and western Cordillera of North America. The granitoids and mineralization show a remarkable contrast between the east and west sides of the Pacific Rim; the reduced-type granitoids and Sn mineralization are dominated in the Asian side, while the oxidized-type granitoids and porphyry Cu(-Mo) mineralization are dominated in the North American side (Kigai, 2006; Sato, 2006, Abst. 12th IAGOD).

Our studies on the metallogeny of granitoid affinity in the circum-Japan Sea region suggest that (1) the reduced-type granitoid magmas formed in sedimentary crust, while (2) the oxidized-type magmas formed in the regions of previous granitoid magmatism, due to the depletion of sedimentary carbonaceous materials. Thus, younger granitoids tend to be of the oxidized type (Sato et a., 2004, Trans. Royal Soc. Edinburgh, vol.95, 319-337). In this paper, these tectonic settings are named as SG (sedimentary to granite) and GG (granite to granite) types, respectively.

From this aspect, other regions of the Pacific Rim were examined. Southeastern China and southeastern Australia are classified into the SG type, while western margin of South America into the GG type. These regions are additional examples of the east-west contrast around the Pacific. In more details, however, both sides are not homogeneous. Western Cordillera, for example, includes local occurrences of the reduced-type granitoids. The reduced-type granitoids in the Peninsular Ranges and Idaho batholiths were emplaced in the sedimentary crust generated in a back-arc or rift basin; these cases are interpreted to be of the local SG type.

The east-west contrast is conspicuous, although some heterogeneity exists in each side, suggesting different geodynamic histories between them. The western margins of the American continents were the zones of subduction-related magmatism since the latest Paleozoic. On the other hand, the Asian side has more complicated histories including the collision and amalgamation of continental blocks, which may have provided favorable sites where sedimentary crust was involved in granitoid magmatism.