

## REE Deposits in China

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China is the world's leading rare earth element (REE) producer and is responsible for more than 95% of the world's REE production. As of year end 2011, the REE resource in China was about 136 million tons (Mt), in addition, yttrium (Y) reserves in China are 0.22 Mt, which represents more than one-third of the world's Y reserve of 0.54 Mt. REE deposit types in China include carbonatite-related, ion-adsorbed clays (IAR), placers, and beach placers, and pegmatite-hosted, as well as by-product production from clay, bauxite, and U deposits. The carbonatite-related deposits define the largest LREE resources, accounting for 98.40% of the total resource in China, and the IAR (iron absorption REE) deposits provide the most important HREE resources in China with estimated total REE resource of more than 1.3 Mt or about 0.97% of the total REE resource of China. Placer and beach placer REE deposits contribute very minor amounts of REE to China's overall total resource, with a combined resource of 0.12 Mt, accounting for 0.09% of the total REE resource of China. Other REE resources in China include those in pegmatites, alkaline granites, and hydrothermal veins, with an additional combined REE resource of 0.24 Mt or 0.18% of the total REE resource of China. Some resources are also defined as by-products in the mining of phosphate, bauxite, uranium, and kaolinite deposits, which have a reported combined REO resource of 0.5 Mt, accounting for 0.37% of the total REE resource of China.

The major LREE deposits in China occur within four metallogenic areas, including the Langshan-Bayan Obo belt along the northern margin of North China craton, Weishan-Laiwu-Zibo belt along the eastern margin of North China block, Mianning-Dechang belt in the western margin of Yangtze block, and the Miaoya deposit in the southern margin of North China block. The margins to the Precambrian cratonic blocks define the first-order structural control for the major LREE deposits in China. Almost all the hypogene REE deposits in China occur along margins of Precambrian blocks that are reactivated cratonic fragments. The ores are associated with continental rift zones and strike-slip faults, which comprise major lithosphere discontinuities. Long-term subduction from Late Archean to Phanerozoic contributed REE-rich pelagic sediment to the underlying mantle and developed REE-rich mantle lithosphere reservoirs below much of the North China and South China blocks. Reactivation of the block margins allowed the ascent of REE-rich mantle magmas upward within the deep fault zones.

The IAR deposits in China occur mainly in the weathering profile of granitoids that vary in age from Mesoproterozoic to Cenozoic in the South China block. Minor IAR deposits also occur in the weathering profile of lamprophyre, basalt, and tuff. In addition to the REE enrichment associated with the supergene weathering process, earlier hypogene REE concentration during hydrothermal alteration caused enrichment in granitic parent rock. The wide range of parent rock compositions, magma sources, ages associated with the ion adsorbed deposits, and the spatial distribution of these deposits implies that REE-enriched mantle and major structures were important for the significant HREE resources.