

# **Critical metal elements enrichment mechanism of Late Carboniferous karst bauxite deposits in North China Craton**

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Karst bauxite resources are widespread in North China Craton (NCC), which are hosted in the lower member of the Carboniferous Benxi Formation. Karst bauxite deposits have many critical metal elements in the bauxite-bearing sequences as an important source of strategically critical metals. The contents of Li, V, Cr, Sr, Zr and rare earth elements (REEs) in bauxite of North China are relatively high, and some deposits are enriched in Boron (0.58-2633ppm) (Songqi, southwestern Henan). The Chondrites-normalized REE distribution patterns for the karst bauxite show high enrichment of LREEs and right-inclined REE patterns. Normal or slightly V-shaped negative Eu anomalies can be seen. The contents of REEs for most of sections gradually increased from the top toward the bottom, such as Tianqiaoze section in Shaanxi Province and Palougou section in Shanxi Province. The distribution of critical metal elements in karst bauxite deposits is mainly affected by provenance, paleoclimate and sea level changes. Two main separate provenances for Late Carboniferous karst bauxite deposits in North China Craton are the North Qinling orogenic belt and the northern margin of the craton. The content of REEs in the central part is obvious higher than that in the southern part of NCC, while the content of Boron behaves in the contrary. The difference contribution of the two main separate provenances may result in the difference distribution of critical metal elements, especially for the contents of B, La and Ce. During the deposition of primary bauxite materials, the sea level changes lead to pH changes of the depositional environment, the higher continuous fluctuation also led to the difference of the critical metal elements concentrations for most of section, resulting in the mobility and migration distance of critical metal elements. The high enrichment of REEs may lead to the formation rare earth independent minerals, which are found in West of Henan Province (the southern part of NCC). Intensity of sea level fluctuations of the southern part is higher than the central part of NCC, indicating an obvious decline of the concentrations of REEs in the section of the southern part of NCC.