

Isotope geochemistry of rhizoliths from Badain Jaran Desert, China and environmental significance

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Defined as fossil remains of higher plants, rhizoliths are the best fingerpost for studying terrestrial ecosystems changes. Rhizoliths with their related features are also indicators of incidence of palaeosols and subaerial vadose environments in ancient successions. Because of the ability to provide important information on paleogeography, paleoclimate, and plant paleoecology, rhizoliths have important significance. In recent decades, the classification, genesis, geochemistry and significance of rhizoliths have been widely researched at environments such as loess, coastal zone and saline lake.

Rhizoliths are prevalent and exposed on the surface of Badain Jaran Desert. These cylindrical rhizoliths, with diameters between 0.6cm and 3.6cm and length from 1.8cm to 19.2cm, are mainly composed of calcite and quartz. The $\delta^{13}\text{C}$ values of rhizoliths range from -4.74‰ to -1.55‰, indicating that the carbon source for rhizoliths is certainly predominated by root and microbial respiration, rather than the oxidative decomposition of plant. The $\delta^{13}\text{C}$ values should reflect more C_3 plants as the main vegetation, which may be the bush-like plant. The oxygen isotopic compositions (-9.45‰~ -3.31‰) show that the rhizoliths are possibly formed in equilibrium with groundwater or lake water.

From our data, it is obvious that rhizoliths are excellent materials for studying the terrestrial ecosystem. The carbon and oxygen isotopic compositions of rhizoliths can be used to indicate information on carbon source, plant paleoecology, and formation mechanism.

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