

Isotopic Geochemical Characteristics of the Doushantuo Formation of the Jiulongwan section in northern Yangtze

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Neoproterozoic strata are widely distributed in the Yangtze block. Paleoclimate in the Neoproterozoic has changed drastically. Information of paleoenvironment can be unveiled from the sedimentary rocks owning special textures, geochemical features to improve understanding in paleoenvironment and the evolution of life during Neoproterozoic.

We report geochemical and Sr-Nd-Pb isotopic composition of sedimentary rocks of the Doushantuo Formation exposed in the Jiulongwan section, the northern Yangtze block. The Doushantuo Formation, being upper Neoproterozoic strata overlying the glaciations of the Nantuo Formation, can be divided into four rock units, from bottom to top, carbonates, black shale and dolomite interbedding, dolomite and thin layer of limestone interbedding, black shale.

Analytical results shows that sedimentary rocks from the Doushantuo Formation have high initial Sr and low initial Nd isotopic composition, indicating a mature old upper crust as the provenance. T_{DM} values of the sedimentary rocks ranges from 1.5 to 2.3 Ga and initial ϵ_{Nd} (560 Ma) spans at -11.1 to -2.7, which are similar with the signature of sedimentary rocks of the Banxi Groups in the Yangtze block. Pb isotopic composition of the sedimentary rocks also indicates old crustal section as major material sources during the deposition. From bottom to top of the Doushantuo Formation, initial ϵ_{Nd} values of the sedimentary rocks gradually decrease and T_{DM} values increase, indicating change in crustal ages of the sources. Modal calculation using Sm-Nd composition shows that the Archean Kongling Complex has probably provided up to 60% material for black shales in the upper Doushantuo Formation.