

The post Sturtian cap carbonate in northwestern Hunan province of China

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Cap carbonate is a distinct lithological unit that formed in the aftermath of the widespread Neoproterozoic glaciations and characterized by its low carbonate carbon isotopic values. Although the post-Marinoan (635Ma; Condon et al., 2005) cap carbonates are widely distributed in south China, the post-Sturtian cap (720Ma; Fanning and Link, 2004) have never been reported. Here, we report the post-Sturtian cap carbonate from south China based on sedimentological features, geochemical profiles and reconsideration of the reported zircon U-Pb ages.

We investigated in Yangjiaping, northwestern of Hunan Province of China. This section corresponds to outer shelf setting of the Yangtze block (Dobrzinski and Bahlburg, 2007) and exposes the sedimentary rocks deposited since Midproterozoic. We studied a 300-m-thick section of the Cryogenian age (750-600Ma; Zhou et al., 2004) and divided into the Xieshuihe Formation of sandstone and black shale, the Dongshanfeng Formation mainly consisting of ca. 75-m-thick diamictite, the Datangpo Formation of carbonate, sandstone and shale, and the Marinoan tillite of the Nantuo Formation, in an ascending order. We collected rock samples from 23 horizons from the section. For each sample, thin section was made, and mineral, elemental, and carbonate carbon isotopic compositions were measured.

Because of a sharp boundary with the underlying sandstone layer and liner scars recognized in the clasts, the diamictite of the Dongshanfeng Formation was possibly a tillite. The zircon U-Pb ages reported from this section and Guizhou Province (Yin et al., 2003; Zhou et al., 2004) support that the diamictite corresponded to the Sturtian glaciation.

The low carbon isotopic values (around -5 permil) were obtained from four horizons of the uppermost Dongshanfeng and the lowermost Datangpo Formation. Then, the values increased to +4.6 permil in the middle Datangpo Formation, and gradually up to +6 permil in the upper Datangpo Formation. These results represent a similar trend to that reported from the other post-Sturtian sections in Namibia (Hoffman and Schrag, 2002) and Canada (Halverson et al., 2005).

The ca. 50-cm-thick dolostone of the lowermost Datangpo Formation is micritic and present a striped pattern consisting of darker and lighter layers of mm orders. The darker layers contain an abundance of organic matter, whereas the lighter layers are mainly of dolomite crystals containing high Mn and Fe in the carbonate component. These features were commonly found in the post-Sturtian cap carbonate (Corsetti and Lorentz, 2006; Roy, 2006) reported from other regions.

From these results, we concluded that the dolostone of the lowermost Datangpo Formation is the post-Sturtian cap carbonate. Scarcity of the post-Sturtian cap carbonate in south China is possibly related to re-sedimentation, subaerial exposure, and erosion.

References

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