

THE NEOPROTEROZOIC QUANJI GROUP IN CHAIDAM BASIN, NORTHWEST CHINA:  
EVIDENCE FOR POST-GLACIAL STRATIFIED OCEAN

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The Neoproterozoic Quanji Group in the Chaidam Basin, Northwest China consists of, in ascending order, the Mahuanggou, Kubaimu, Shiyingliang, Hongzaoshan, Heitupo, Hongtiegou and Zhoujieshan formations. Diamictite occurs in the Hongtiegou Formation and underlies a 4-m-thick carbonate unit of the Zhoujieshan Formation. Our field investigation confirms the glacial origin of the Hongtiegou diamictite. And the overlying Zhoujieshan carbonate unit represents a cap carbonate to the Hongtiegou diamictite. This diamictite-cap carbonate couple is probably of Ediacaran age. The Zhoujieshan cap carbonate is characterized by positive  $\delta^{13}\text{C}$  values, ranging from 0 to +2‰. More interestingly, sulfur isotopes of carbonate associated sulfate ( $\delta^{34}\text{S}_{\text{CAS}}$ ) are decoupled from those of pyrite ( $\delta^{34}\text{S}_{\text{pyrite}}$ ).  $\delta^{34}\text{S}_{\text{CAS}}$  shows rapid variation between +14 to 24‰ in the lowermost 2.5 meter of the Zhoujieshan cap carbonate, but decreases by 10‰ in the upper part of the section.  $\delta^{34}\text{S}_{\text{pyrite}}$ , on the other hand, increases from +12 to 27‰. The decoupled  $\delta^{34}\text{S}_{\text{CAS}}$  and  $\delta^{34}\text{S}_{\text{pyrite}}$  values, as well as positive  $\delta^{13}\text{C}$  values, suggest that the Zhoujieshan cap carbonate may have been deposited within a stratified ocean. The rapid shift in  $\delta^{34}\text{S}_{\text{CAS}}$  indicates a low initial  $\text{SO}_4^{2-}$  concentration in the surface water that was susceptible to disturbance by terrestrial input. The stratification might have been induced by a large meltwater plume. The isotopic evidence, together with sedimentological and biostratigraphic evidence, also implies that the Zhoujieshan cap carbonate was deposited in a restricted basin during an Ediacaran glaciation that was smaller in magnitude than the Marinoan glaciation.

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