Marine nitrogen cycle and redox variations during the Ediacaran-Cambrian transition of Yangtze sea in South China

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The Ediacaran–Cambrian transition is a crucial interval, involving significant marine environment perturbations and biological innovations. Nitrogen isotopic composition in the ancient sediments provide clues for understanding the co-evolution of the Earth's environment and life.

We report bulk nitrogen and organic carbon isotopic compositions for a shelf marginal drill core section (Sancha in Hunan Province) and two deep basinal outcrop sections (Yuanjia in Hunan Province and Yanjia in Zhejiang Province), South China. Then we combined $\delta^{15}N_{bulk}$ data from this study and previous studies both on the Yangtze basin in order to understand the regional and global nitrogen cycle, marine redox environment and biological evolutions. The $\delta^{15}N_{bulk}$ values in the Yangtze basin during most of late Ediacaran – early Cambrian period ($\delta^{15}N_{bulk}$ = +2‰ ~ +6‰) are similar to those of modern sediments, reflecting that NO_3^- and O_2 was stable as in the modern ocean, which could be the reason for the radiation of Ediacaran and early Cambrian biota. Two negative $\delta^{15}N_{bulk}$ shifts ($\delta^{15}N_{bulk}$ < 0‰) coincided with two global negative carbon isotope excursions (BACE and SHICE [1]) in the latest Ediacaran and late Cambrian Stage 2 respectively, indicating two short-lived photic zone anoxia events associated with mass extinction of Ediacaran biota and some small shelly fossil (SSF) secreting organisms. Later $\delta^{15}N_{bulk}$ values decreased below 0‰ again in the late Cambrian Stage 3, suggesting that anoxic condition has re-built up, and the marine system in the early Cambrian was not that stable as much as that in the modern ocean.

[1] Zhu, M.Y., Babcock, L.E., Peng, S.C., *Palaeoworld*. **15**(**3-4**), 217-222.