A novel climate pattern-spring downpour revealed by the hydrogen isotope of *n*-alkane, in Southeastern China, during H1 and YD

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Introduction

Asian monsoon system regulates the major rainfall budget over Eastern China, the major economic area of China. Therefore the dynamics underlying the Asian monsoon system has been attracting the attention of researchers. The last deglaciation characterized by intense millennial scale climatic fluctuation is the best period to elucidate the mechanism of the Asian monsoon system. During the Younger Dryas （YD） and the Heinrich Stadial 1 (H1 ）periods， the stalagmite oxygen isotope records from the central and the southwestern China indicate that Asian summer monsoon is weaker [1, 2, 3]. Interestingly, under the control of the westerly jet, which position adjusted by the North Atlantic cool events, the central part suffers great summer rainfall different with the north and the south part of Eastern China [4]. However, there is not high-detail knowledge of this precipitation spatial distribution and the mechanisms during H1 and YD, in Southeastern China.

In this study， we used the biomarker indexes of limnetic sediments of Dingnan (DN, N 24° 45′， E 115°02′), a intermountain basin, which located at the margin between the middle and south part of Eastern China, to reconstruct the paleohydrology of the last deglaciation. The main research content was the hydrogen isotopic composition of the n-alkanes ($\delta D_{n\text{-alkane}}$), supplemented by *n*-alkanes and total organic carbon isotopes ($\delta^{12}C_{n\text{-alkane}}$, $\delta^{12}C_{bulk}$), *n*-alkanes distribution characterization indexes (the average chain length (ACL), the carbon preference index (CPI), the proportion of aquatic plant (Paq)), and the total organic carbon (TOC).

Result

All data shows significant transformation responding the YD and H1.The high Paq， low ACL correspond to the H1 and YD, the carbon ratio indexes are positive during the H1, but negative during the YD. This could be caused by the flourish of aquatic plant and the Sphagnum, during the H1 and YD, respectively. This two kind plants have the same *n*-alkane distribution but the converse carbon isotope ratio [4]. During the H1 and the YD, the CPI and the TOC show low value with great correlation, the former reflect the serious decomposition of the organic matter, the later could be caused by lots of grit carried by strong runoff into the sediment. The correlation between the CPI and the TOC might be illustrated by the wetland organic matter preservation mechanisms that the high proportion of coarse grain in the sediments favours the decomposition of the organic matter [5]. During H1 and YD, the value of $\delta D_{n\text{-alkane}}$ is significant negative. The variation of $\delta D_{n\text{-alkane}}$ is antithetical to the stalagmite oxygen isotope recording the upstream signal [6] and corresponds well with the El Nino status [7]. According to the recent studies, the intension of the North Atlantic cold events arise the south movement of the westerly jet and consequently increase the seasonal ratio (spring/summer)[8], the El Nino enhances the spring precipitation of the Southeastern China[9].

Therefore, the $\delta D_{n\text{-alkane}}$ might indicate the Southeastern China suffer torrential rain in spring, during the H1 and the YD.

Conclusion

During the H1 and YD, the Southeastern China is wet as the central China, but the mainly precipitating season is the spring. The novel climate pattern-spring downpour is caused by the interaction of ENSO status, westerly jet position and the special geographical location.

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