MARINE *N*-ALKANE RECORD FOR CLIMATE AND VEGETATION VARIATIONS OVER THE LAST 30 KA FROM A SEDIMENT CORE IN THE NORTH OF SCS

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Introduction

The South China Sea (SCS) is a large marginal sea between the Asian continent and the Pacific Ocean and rimmed by a broad continental shelf. Sea level in the SCS was about 100-120 m below present at the last Glacial Maximum. As a result, the ratio of land (in the form of exposed continental shelf) to sea was greater than present, leading to enhanced continentality of climate in the region and expansion of the area covered by terrestrial vegetation. However, previous studies were mainly based on pollen analysis and have generated inconsistent information about the form and composition of vegetation on land including exposed continental shelf around the northern SCS, and much detail about climatic and environmental variation during the last glacial in northern SCS remains to be settled.

Molecular analyses of *n*-alkanes extracted from ocean and lake sediments have been widely used for the reconstruction of paleovegetation and associated paleoclimate history. Therefore, we choose a drilling core ZSQD289 (20º52.03'N, 119º52.31'E) in deep-sea basin from the northern SCS for molecular and compound-specific isotopic analyses of *n*-alkanes. The objective is to understand the paleovegetation and paleoclimate changes on adjacent land areas and the possible provenance of organic matter in sediment since the last glaciation, as well as the linkage between marine climate records and climate changes in continental regions.

Results and conclusions

The sediment core ZSQD289 (with length 847 cm) is at a water depth of 3605 m. The core has a relatively uniform lithology and steady deposition which is composed of gray and dark gray siliceous and calcareous clay with thin sand-silt interbed. Its age frame was established by linear interpolation method according to the oxygen isotope curve of planktonic foraminifera *G. rubber* shells and the ^{14}C-AMS data of *G. rubber* shells and organic matters. The top age of the core is about 1ka and the bottom age is about 30 ka. A total of 51 core samples were analyzed for the content of *n*-alkanes and their compound-specific stable carbon isotopes, which has been investigated concerning their organic matter composition, terrigenous sources and paleoclimatic changes since 30 ka.

Alkane proxies of L_{23-}/H_{24+} and C_{31}/C_{17} ratios (Fig. 1) indicated that the sediment organics were contributed from mixed marine and terrestrial sources dominated by the marine contribution over the past 30 ka. The L_{23-}/H_{24+} ratios decreased while C_{31}/C_{17} increased obviously during glacial period. The average total content of long-chain *n*-alkane (C_{25}~C_{33}), representing terrestrial high plants contribution, were higher by around 0.17ug/g in glacial period than those in interglacial period. In addition, the past C_3/C_4 plants composition of terrestrial contribution was reconstructed using compound-specific stable carbon isotopes of long-chain *n*-alkanes combined with some other appraisal proxies (eg. C_{31}/C_{27}, ACL, and pollen data). The weighted mean $\delta^{13}C$ ($Wm\delta^{13}C$) of C_{27}, C_{29}, C_{31} and C_{33} *n*-alkanes in marine sediment has been used to reconstruct the relative abundance of C_3 and C_4 plants (Zhou et al. 2012). The proportion of C_3 and C_4 can be calculated using a binary end-member model. In this study, end-member values of -36‰ and -21‰ were chosen for C_3 plants and C_4 plants, respectively (Collister et al., 1994). The calculated results from the equation $[C_4\times(-21‰)+(100\%-C_4)\times(-36‰)=Wm\delta^{13}C_{27-33}]$ showed that the C_4% contribution ranges from 29.78% to 52.58%, and the average C_4% in glacial and interglacial period is 42.59±3.73% and 36.66±4.22%, respectively. Obviously the vegetation composition of the provenance of core ZSQD289 was dominated by C_3 plants throughout the past 30 ka, which indicated that the provenance (the southern Taiwan Island) was not dry even during the last glacial period as the temperature was low, which may be the result of the regional climatic variation.

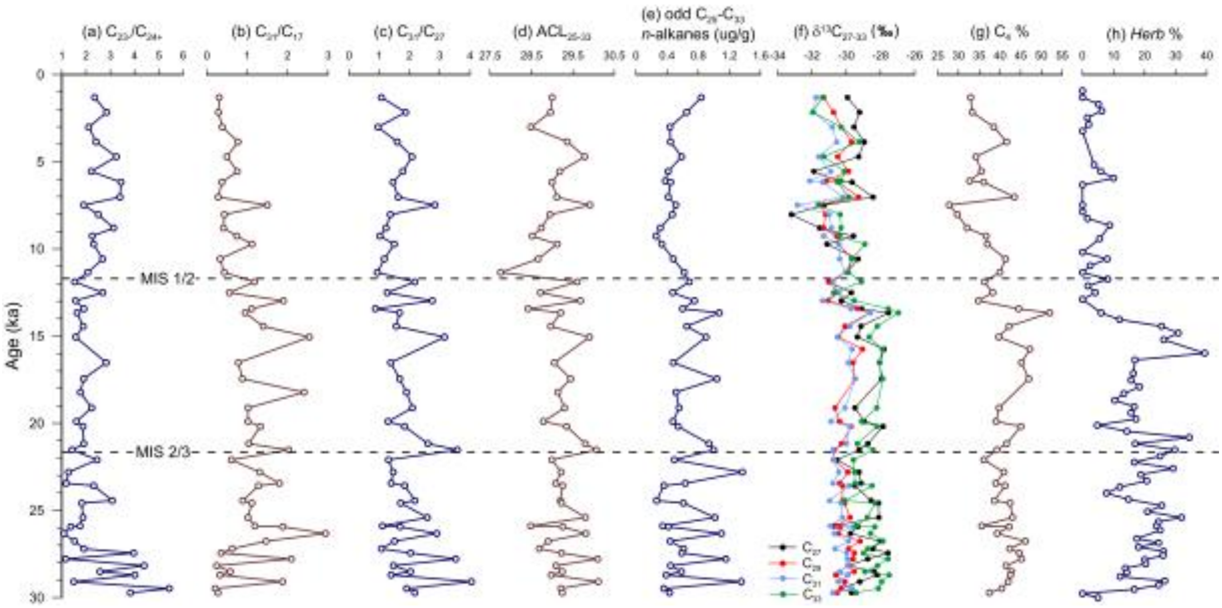

Figure 1 *Down core profiles of (a) C_{23}-/C_{24+} (b) C_{31}/C_{17}, (c) C_{31}/C_{27}, (d) ACL_{25-33}, (e) odd C_{25}-C_{33} n-alkanes, (f) $\delta^{13}C_{27-33}$, (g) C_4 % and (h) Herb pollen content (herb %) in the core ZSQD289 over the past 30 ka. $ACL=(25[C_{25}]+27[C_{27}]+29[C_{29}]+31[C_{31}]+33[C_{33}])/([C_{25}]+[C_{27}]+[C_{29}]+[C_{31}]+[C_{33}])$.*

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