

## CARBON ISOTOPE ANALYSIS OF *N*-ALKANES IN RECENT LAKE SEDIMENTS FROM TIBET

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Since the Tibetan Plateau has an essential influence on atmospheric circulations, it is important for our understanding of the dynamics of global changes and therefore interesting for paleoecological research (Lehmkuhl and Owen, 2005). Sedimentary organic matter is an excellent recorder of environmental conditions. Different *n*-alkane patterns have been assigned to different sources of organic matter.  $\delta^{13}\text{C}$  of aquatic macrophytes is usually in the range of C3 plants, however limited  $\text{CO}_2$  availability due to high pH or alkalinity or due to high respiration at dense plant stands, can lead to  $\text{HCO}_3^-$  assimilation and hence to a shift towards more positive  $\delta^{13}\text{C}$  values (Allen and Spence, 1981).

To test correlations between environmental and sedimentary organic matter parameters, recent sediments of 50 Tibetan lakes (1500 – 5300 m a.s.l.) were analysed for amounts of *n*-alkanes, bulk organic  $\delta^{13}\text{C}$  and compound-specific  $\delta^{13}\text{C}$  values of *n*-alkanes. Furthermore, bulk  $\delta^{13}\text{C}$  of the dominant aquatic macrophyte species *Potamogeton pectinatus* (*L*) was measured.

The sediments can be separated into three groups by hierarchical cluster analysis according to their *n*-alkane patterns. Some samples show a remarkable terrestrial influence of long- and mid-chain *n*-alkanes with a strong odd-over-even predominance (type I) while others are dominated primarily by mid-chain *n*-alkanes derived from aquatic macrophytes with no odd-over even predominance (type II). Type III sediments are similar to type II, but contain also a strong terrestrial component (high relative amounts of  $\text{C}_{29}$ ,  $\text{C}_{31}$  and  $\text{C}_{33}$  *n*-alkanes). Short-chain *n*-alkanes of algal origin are scarce in most of the lake sediments (Figure 1).

$\delta^{13}\text{C}$  values of *Potamogeton* bulk biomass and of bulk organic matter ranges from -6.0 to -21.4‰ and -18.4 to -28.1‰, respectively.  $\delta^{13}\text{C}$  values of long-chain *n*-alkanes ( $\text{C}_{29}$ - $\text{C}_{31}$ ) show relatively little variations between -29 and -34‰. However, in some samples a shift towards more positive values, up to -21‰, is visible in mid-chain *n*-alkanes. Generally, odd-numbered *n*-alkanes are more enriched in  $^{13}\text{C}$  than even-numbered ones (Figure 1).

In our lake sample set, pHs of the lake waters are varying from 7.1 to 10.5. Comparing bulk  $\delta^{13}\text{C}$  values of sediments and plants with pHs, a trend to more positive values at high

pHs is visible. The correlation between  $\delta^{13}\text{C}$  of *Potamogeton* biomass and of mid-chain *n*-alkanes (C<sub>20</sub>-C<sub>26</sub>) is weak in all samples, but rather good in type II sediments ( $R^2$ : 0.35 - 0.72). There is also a good correlation between bulk  $\delta^{13}\text{C}$  values of sediments and plant organic matter ( $R^2 = 0.71$ ). We conclude that limited CO<sub>2</sub> availability at high pHs can be one explanation for a positive shift of  $\delta^{13}\text{C}$  values of mid-chain *n*-alkanes in macrophyte dominated lakes, a fact which can be applied for the interpretation of  $\delta^{13}\text{C}$  values of *n*-alkanes in sediment cores.

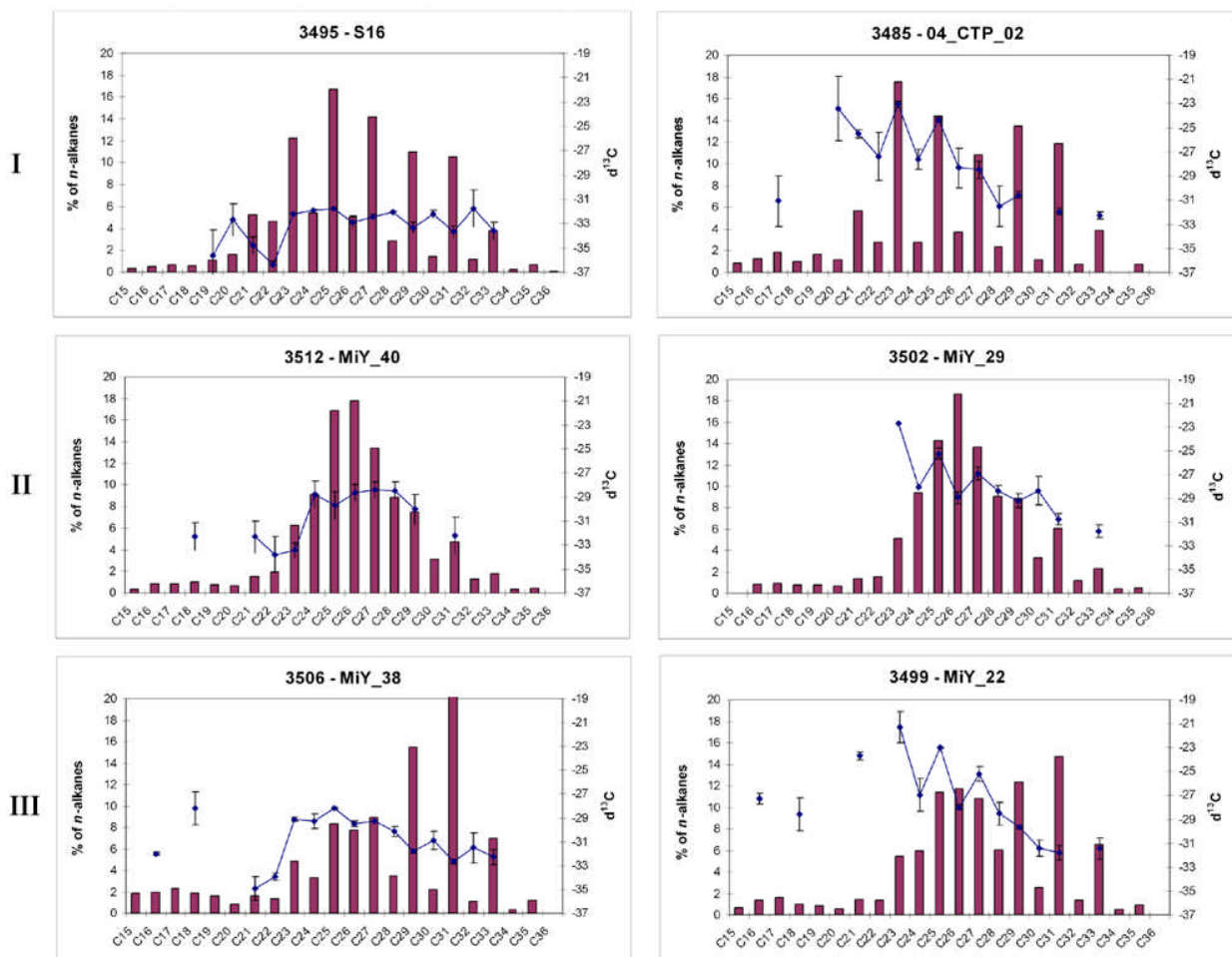


Figure 1. *n*-Alkane patterns I, II and III, with non-enriched (left side) and enriched (right side)  $\delta^{13}\text{C}$ -values at mid-chain *n*-alkanes (missing values due to too low signal)

## REFERENCES

- Lehmkuhl, F. and Owen, L.A., 2005. Late quaternary glaciation of Tibet and the bordering mountains: a review. *Boreas* 34, 87-100
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