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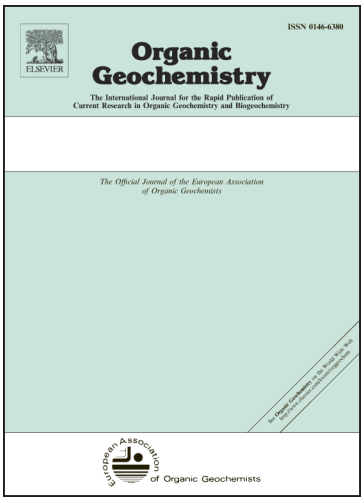

Choosing a suitable $\varepsilon_{w\text{-}p}$ by distinguishing the dominant plant sources in sediment records using a new Pta index and estimating the paleo-δD_p spatial distribution in China

Zheng Wang, Hu Liu, Yunning Cao

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Choosing a suitable $\varepsilon_{w\text{-}p}$ by distinguishing the dominant plant sources in sediment records using a new Pta index and estimating the paleo-δD_p spatial distribution in China

Zheng Wang[a]*, Hu Liu[a, b], Yunning Cao[a]

[a] *State Key Laboratory of Loess and Quaternary Geology, IEE, CAS, Xi'an 710075, China*
[b] *University of Chinese Academy of Sciences, Beijing 100049, China*

*Corresponding Author: Tel: 86-29-62336230.

E mail address: wangz@ieecas.cn (Zheng Wang).

ABSTRACT

The hydrogen isotopic composition of plant wax (δD_{wax}) inherits the isotopic values of the source water and isotopic fractionations that take place in lipid biosynthesis. The δD_{wax} values of *n*-alkanes or *n*-acids in sediment records are considered to be effective paleo-δD for precipitation proxies for different timescales. However, the vegetation effect also contributes substantially to the apparent fractionation values ($\varepsilon_{w\text{-}p}$) between the precipitation and plant. Therefore, a method for evaluating the dominant plant source in the sediment records is key for reconstructing a reliable paleo-δD_p record. In this study, based on field data from the extremely arid Qaidam Basin and the semi-arid central Chinese Loess Plateau (CLP), a plant type index (Pta), based on the traditional P_{aq} and *n*-alkane C_{31}/C_{29} index, was used to evaluate the dominant plant type that contributed to the sediments. In the arid and semi-arid region, the Pta values of the aquatic plants were < 90, while the shrub Pta ranged from 90 to 180 and the grass Pta was > 180. A test on contemporary soils and surface lake sediments also showed that the Pta index could estimate the regional vegetation distribution in modern environments. We also evaluated the dominant *n*-alkane source for four sediment records in China during the last millennium and reconstructed a regional paleo-δD_p by choosing a different $\varepsilon_{w\text{-}p}$. The estimated paleo-δD_p values showed a good correlation