

## **C<sub>20</sub>-C<sub>32</sub> N-ALKAN-1-OL DISTRIBUTIONS AS MARKERS OF CONTRIBUTION FROM C<sub>4</sub> PLANTS IN MARINE SEDIMENTS**

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Climate in the eastern tropical Indian Ocean is strongly influenced by the semiannually reversed wind regime of the Asian-Australian monsoon, the migration of the Intertropical Convergence Zone (ITCZ) and the land-sea distribution. Since Indonesia is enclosed between the thin Sunda and Sahul Shelf seas, changes in sea level during glacial-interglacial cycles have a pronounced effect on the climate, especially in relation to precipitation. As a result, this area is characterised by extreme climate conditions which are recorded in the land vegetation. Accordingly, the study of the sedimentary composition of higher plant markers, namely long-chain *n*-alkanes and *n*-alkan-1-ols, provides information on the climate conditions of the area. In this respect, contents, distribution patterns and molecular stable carbon isotope composition of these compounds have been studied as markers of continental vegetation over the last 320 kyr in a set of samples from the tropical Indian Ocean core MD98-2165 (9°38'96S, 118°20'31E, 2100 m).

The concentration changes of these compounds show a general pattern dominated by the well defined glacial-interglacial oscillation. Eolian inputs were much stronger during the glacial periods. The *n*-alkanes range between C<sub>23</sub> and C<sub>33</sub> and are characterised by high odd-over-even carbon number preference and predominance of the C<sub>31</sub> *n*-alkane, whereas the *n*-alkanols range between C<sub>20</sub> and C<sub>32</sub> and are dominated by even-over-odd carbon numbers with maxima at C<sub>28</sub> or C<sub>32</sub> *n*-alkanol. In this respect, warmer and wetter conditions appear to favour deposition and preservation of the C<sub>30</sub> homologue and colder and drier conditions favour the C<sub>28</sub> *n*-alkanol. However, the C<sub>32</sub> *n*-alkanol becomes an additional major homologue during the glacial times, suggesting an expansion of C<sub>4</sub> plants during these arid conditions as reported by Rommerskirchen *et al.* (2006). The stable carbon isotope weighted mean average of the *n*-alkanes (*n*-C<sub>27</sub> to *n*-C<sub>33</sub>) fall in the range between -30.5 and -34.5‰, typical of leaf-wax *n*-alkanes biosynthesised by C<sub>3</sub> plants. The lower δ<sup>13</sup>C values are observed during warm and humid interglacial periods, when the estimated C<sub>4</sub> plants contribution decreased ~15 wt %. This is consistent with the negative relationship existent between δ<sup>13</sup>C of C<sub>3</sub> plants and water availability (Liu *et al.*, 2005; Miller *et al.*, 2001). The weighted mean average δ<sup>13</sup>C values of *n*-alkanols (C<sub>20</sub>-C<sub>32</sub>) fall in the range between -24.4 and -32.6‰, again with lower

$\delta^{13}\text{C}$  values during interglacials. Amazingly, the  $\delta^{13}\text{C}$  of  $\text{C}_{32}$   $n$ -alkanol reveals a clear  $\text{C}_4$  plant signature during cold and dry conditions (Fig. 1). These results demonstrate that  $n$ -alkanes and  $n$ -alkanols, but most particularly the  $\text{C}_{32}$   $n$ -alkanol, show a distinct pattern of contributions from  $\text{C}_4$  plants to marine sediments during arid conditions and therefore, they can be used as indirect proxy of continental climate conditions in the tropics.

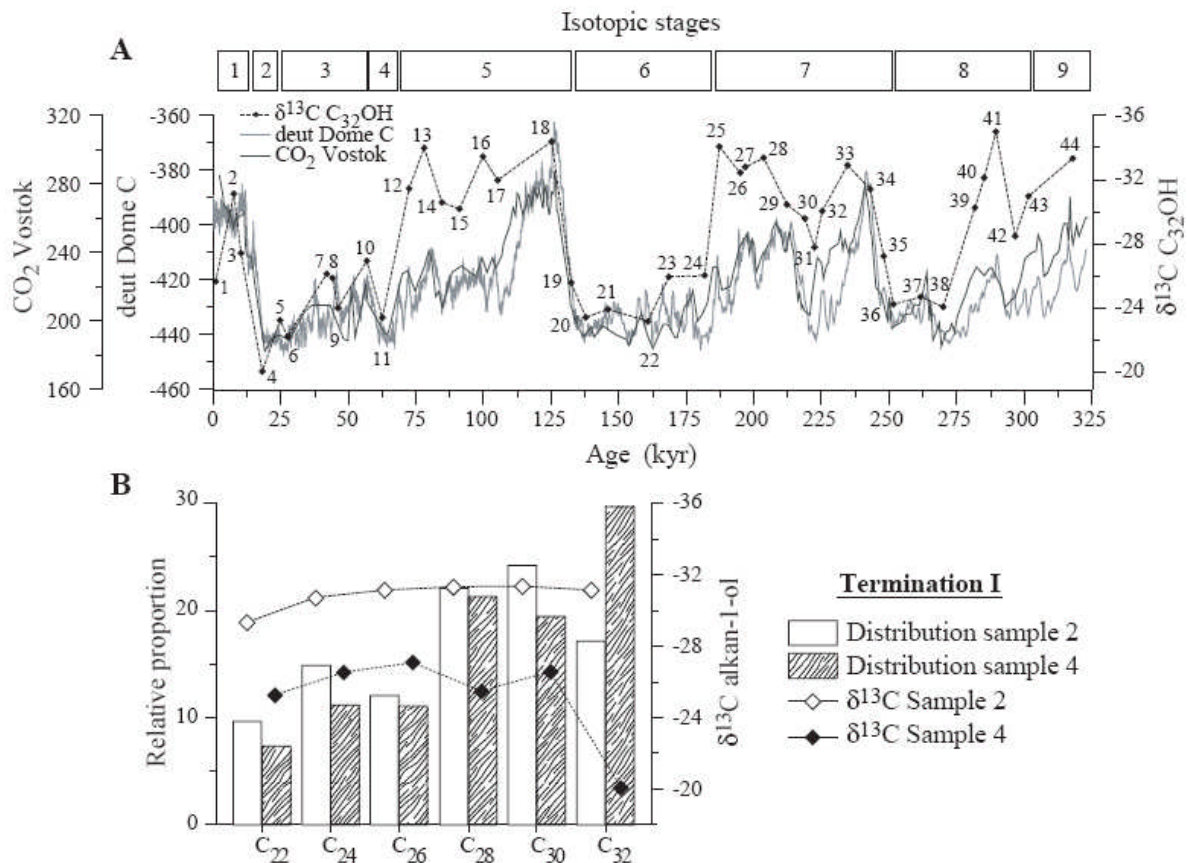


Figure 1. A.  $\delta^{13}\text{C}$  variation of  $\text{C}_{32}$   $n$ -alkanol along the last 320 kyr according to the  $\text{CO}_2$  record from Vostok and the deuterium record from Dome C. B. Carbon number distributions and molecular carbon isotope shifts of long chain  $n$ -alkanols along the last deglaciation. The white and dark symbols and bars belong to interglacial and glacial samples, respectively.

## REFERENCES

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