Geophysical Research Abstracts
Vol. 16, EGU2014-13317, 2014
EGU General Assembly 2014

Evaluating the potential of long chain n-alkanes and n-carboxylic acids as biomarkers for past vegetation

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Leaf waxes, such as long chain n-alkanes and n-carboxylic acids, may have a great potential for the reconstruction of past environmental and climate conditions (e.g. (Zech R. et al., 2013). While n-C27 and n-C29 alkanes often predominantly occur in trees and shrubs, n-C31 and n-C33 are more abundant in grasses and herbs. However, little is known about chain-length distributions of n-carboxylic acids, and very few studies have systematically investigated leaf waxes in top soils.
We analyzed n-alkanes and n-carboxylic acids in $\sim$100 litter and topsoil samples from Southern Germany to Sweden. Our results show that sites under deciduous trees often contain a lot of C27 n-alkanes and C28 n-carboxylic acids. Coniferous sites are characterized by dominance in n-alkanes C29 and C31 and have relatively high concentrations of n-carboxylic acids C22 and C24. Grass sites show a Cmax at C31 for n-alkanes and at C24 or C26 for n-carboxylic acids. Differences in homologue patterns are most pronounced in the litter samples, but are well preserved also in the topsoils (0-3 cm depth, a little less in the lower topsoils from 3-10 cm). Our results illustrate the potential of combining n-alkane and n-carboxylic acid analyses for paleo-vegetation reconstructions, yet indicate that the degree of degradation may have to be taken into consideration (Zech M. et al., 2013).

References:
Zech, M. et al. (2013) Quat. Int. 296, 108–116.
Zech, R. et al. (2013) Palaeo3, 387, 165-175.