Geophysical Research Abstracts,
Vol. 11, EGU2009-1830, 2009
EGU General Assembly 2009

Methyl ketones in high altitude Ecuadorian Andosols confirm excellent conservation of plant-specific n-alkane patterns

B. Jansen (1) and K.G.J. Nierop (2)

(1) University of Amsterdam, Institute for Biodiversity and Ecosystem Dynamics (IBED), Amsterdam, The Netherlands (b.jansen@uva.nl), (2) Utrecht University, Department of Earth Sciences - Geochemistry, Faculty of Geosciences, Utrecht, The Netherlands (k.nierop@geo.uu.nl)

Montane forest composition and specifically the position of the upper forest line (UFL) is very sensitive to climate change and human interference. As a consequence, reconstructions of past altitudinal UFL dynamics and forest species composition are crucial instruments to infer relationships between climate change and vegetation dynamics, and assess the impact of (pre)historic human settlement. One of the most detailed methods available to date to reconstruct past vegetation dynamics is the analysis of fossil pollen. Unfortunately, fossil pollen analysis does not distinguish beyond family or generic level in most cases, while its spatial resolution is limited amongst others by windblown dispersal of pollen, affecting the accuracy of pollen based reconstructions of UFL positions. To overcome these limitations, we developed a new method based on the analysis of plant-specific groups of biomarkers preserved in suitable archives, such as peat deposits, that are unravelled into the plant species of origin by the newly developed VERHIB model. In a study of UFL positions in the Northern Ecuadorian Andes we found longer chain-length n-alkanes, (C19-C35) to occur in plant-specific patterns in the dominant vegetation in the area as well as preliminary soil and peat samples. A crucial factor in determining the applicability of these n-alkanes as biomarkers for past vegetation is their preservation in soils and peat deposits. Therefore, we investigated the preservation of C19-C35 n-alkanes in a peat core and in five excavations along an altitudinal transect (3500-3860 m.a.s.l) in the study area. We were able to establish that n-methyl ketones are the main degradation product of the n-alkanes in question, while the degradation of the n-alkanes was the main source of the n-methyl ketones. This allowed us to use the relationship between the concentrations and carbon chain length patterns of n-alkanes and n-methyl ketones to assess possible (selective) degradation of the n-alkanes of interest, and thus their potential as biomarkers. With the exception of C33 n-alkane, we found degradation to be very limited and independent of carbon chain length in the soils and peat deposit under study. The latter means that even if the total concentrations of n-alkanes decrease over time, the characteristic pattern remains intact, conserving their potential as biomarker for past vegetation reconstructions in the area.