Geophysical Research Abstracts
Vol. 17, EGU2015-2022-2, 2015
EGU General Assembly 2015

$^{2}H/^{1}H$ composition of soil n-alkanes along two altitudinal transects in East Africa

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Long chains n-alkanes are components of terrestrial plant leaf waxes that are ubiquitously found in geological archives. They have been extensively used to track environmental and ecological variations in the past, notably changes in vegetation communities. Recent analytical developments led to the possibility of measuring their deuterium to hydrogen isotopic ratio (δ^2Hwax). This parameter is suggested to be linked to hydrogen isotope ratio of precipitations (δ^2Hp). In 2008, Jia et al. proposed to use soil derived δ^2 Hwax as a paleoelevation proxy since precipitations are known to get more depleted in deuterium with altitude. They found a linear correlation (R^2 0.73) between δ^2Hwax in surface soils and altitude along Mt. Gongga (China). Since then, the correlation between δ^2Hwax and δ^2Hp was shown for several other altitudinal transects. Contrary to these previous observations, however, no trend with altitude was observed in East Africa along an altitudinal gradient in Mt. Kilimanjaro (North eastern, Tanzania, Peterse et al., 2009 and Zech et al., 2014). What is the reason for this absence of trend? Is it because of a difference between African and Asian soils? Or is it specific to Mt. Kilimanjaro?

To get an insight into this problem, we determined δ^2Hwax in 41 surface soils sampled along two altitudinal transects: from 500 to 2800 m in Mt. Rungwe (South-western Tanzania) and from 1897 to 3268 m in Mt. Kenya (Central Kenya). The goal of the study was to further investigate the conditions of applicability of this proxy in East Africa. A correlation between soil derived δ^2Hwax and altitude was observed along Mt. Kenya (δ^2Hwax=20.2*ALT-88.0, R^2=0.51) but not along Mt. Rungwe - similarly to Mt. Kilimanjaro (Peterse et al., 2009; Zech et al., 2014). This contrast between Mt. Kenya on one hand and Mts. Rungwe and Kilimanjaro on the other hand may be explained by differences in topography. These results highlight the complexity of the signal recorded by δ^2H, and particularly soil δ^2Hwax with regard to its use as a paleoelevation proxy.

References:
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