Geophysical Research Abstracts, Vol. 6, 03716, 2004
SRef-ID: 1607-7962/gra/EGU04-A-03716

STABLE CARBON ISOTOPES OF PLANT-WAX LIPIDS IN DUST AND SEDIMENTS FROM THE CENTRAL EAST-ATLANTIC

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Plant-wax lipids in dust and sediments are derived from the epicuticular wax coating of terrestrial plant leaves. These lipids are easily removed from the leaf surface by rain or wind, especially during dust storms. Their compound-specific stable carbon isotopic composition depends on the utilized pathway of photosynthetic carbon fixation. This allows discrimination of rainforest-derived (C3 plant) from grassland-derived (C4 plants) plant waxes. In contrast to C3 plants, C4-plants are adapted to dry, warm and low CO2 conditions. We investigated the compound-specific stable carbon isotope compositions of plant waxes in 25 atmospheric dust samples collected along the West African coast. The d13C values of the plant waxes indicate that only regions with predominant C4 type vegetation, i.e. the Sahara, the Sahel and the southern African savannas, supply significant amounts of C4 plant-derived lipids to dust. The stable carbon isotopic signature of leaf waxes in aerosols mainly reflects the modern vegetation type along their transport pathway. This is supported by backward trajectory calculations, showing the main atmospheric transport in the low-level trade-wind layer, except off SW-Africa, where long-range transport in higher levels occurred. Stable carbon isotopic compositions of plant-wax lipids in surface sediments correlate well with the dust-transported signal. Elevated C4-plant contributions are found below the trajectories of the major African dust plumes, originating either from the Sahara or from the dry areas of southern Africa. A C3-plant dominated signal is detected along the coast and off large rivers. The eolian-transported isotopic signal is unambiguously imprinted on deep-sea sediments.
ODP Site 1077 is located below the southern African dust plume, and an ideal recorder of past vegetation changes in its dust-source region. We investigated plant-wax accu-

mulations and their stable carbon isotopic compositions for the mid-Pleistocene period, when global ice-volume variations increased and changed from a 41- to a 100-kyr cyclicity. The eolian transport of plant waxes was amplified by an intensification of the atmospheric circulation during the more severe ice ages. The relative abundance changes of C4-plants indicate substantial vegetation changes in tropical and subtropical Africa. A strong coupling to the sea-surface temperature development in the tropical Atlantic Ocean is detected. Apparently, the tropical evaporation-precipitation balance controlled continental aridity in equatorial Africa, which determines large-scale African vegetation changes on the long-term.