Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03028, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03028
EGU General Assembly 2008

The record of d18O and 17O-excess in ice from Vostok Antarctica during the last 150,000 years

A. Landais (1,2), E. Barkan (1), B. Luz (2)

(1) The Institute of Earth Sciences, The Hebrew University of Jerusalem, (2) IPSL/LSCE, 91191 Gif sur Yvette, France (amaelle.landais@lsce.ipsl.fr)

The strong links between climate changes and variations of the hydrological cycle have been evidenced using isotopic measurements of water in deep Antarctic and Greenland ice cores. Indeed, because the different mass-dependent fractionation processes (equilibrium and kinetic) affect differently the relationship between dD and d18O at each phase transition (evaporation, condensation, sublimation), the combined measurements of dD and d18O in the so-called d-excess (dD -8*d18O) provide information on the hydrological cycle. However, despite a great effort in measurements and in isotopic modelling, it is still difficult to infer quantitative information from d-excess. Measurements of d17O in ice cores can provide additional information on conditions over evaporative regions because the equilibrium and kinetic fractionation processes will influence differently the ratios d17O/d18O and dD/d18O. Recent analytical capabilities have made possible the high precision measurements of d17O in water. We therefore measured d17O and d18O in recent Antarctic snow and down the Vostok ice core (East Antarctica). Similarly to the d-excess parameter, we defined and calculated the excess of 17O (17O-excess). The magnitude of the 17O-excess in the Holocene and the last interglacial is 40 per meg, and it remains constant in a transect from the coast to the continental interior. We show that this excess is a robust indicator of evaporation conditions over the ocean and not of temperature at the vapor source or at the deposition site. Such properties of 17O-excess make it a potentially simpler parameter than the d-excess. Our Vostok record shows that there are significant shifts in 17O-excess from low values in glacial to high values in interglacial times. We interpret these observed shifts in 17O-excess as higher normalized relative humidity and/or

wind speeds over the source oceanic regions in glacial times.