Geophysical Research Abstracts, Vol. 7, 03632, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03632

Annual trace gas variations in Halley firn: Effects of diffusion and advection on a multi-proxy data set

K. Weiler (1), J. Schwander (1), M. Leuenberger (1), P. Nyfeler (1), F. Valentino (1), R. Spahni (1), R. Mulvaney (2), P. Anderson (2), R. Salmon (2), J. Severinghaus (3)

(1) Climate and Environmental Physics, Physics Institute, University of Bern, Switzerland, (2) British Antarctic Survey, Cambridge, UK, (3) Scripps Institution of Oceanography, University of California, San Diego, USA

A complete set of air samples was collected from a shallow firn column (20m) at Halley Bay through the year 2003 with a temporal resolution of two months. Analysis of the samples for their isotopic composition (d15N, d18O, d36Ar), element ratios (dO2/N2, dAr/N2) and CO2 and CH4 concentrations show that seasonal temperature gradients and concentration variations in the atmosphere are preserved in the firn and lead to fractionation effects due to thermodiffusion and ordinary diffusion. Particular attention is focused on the influence of advection processes occurring in the surface layers. The latter process is important for the calculation of the gravitational enrichment, which is a measure for the diffusive column height.