Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03177, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03177
EGU General Assembly 2008

A high precision GC-P-irmMS technique to analyse δD(CH_4) in air entrapped in polar ice cores

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Bubble enclosures in polar ice cores represent the only direct paleoatmospheric archive. To constrain past methane sources the isotopic composition (^{13}C and D) of CH_4 in high temporal resolution and with high precision is needed. δD(CH_4) is of special interest in order to constrain the origin of additional atmospheric methane during rapid warming events (Dansgaard/Oeschger events).

We developed an online gas chromatography isotope ratio monitoring mass spectrometry technique (GC-irmMS) based on developments by Merritt et al. (1995) and Rice et al. (2001). The method includes gas extraction from ice, preconcentration, chromatographic separation and pyrolysis (P) of methane. Internal isotopic calibration is implemented using pure methane and synthetic air. The current status concerning the reproducibility of these standards and results of first test measurements on ice samples as well as the required (glacial) ice volume are discussed.