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EPICA Dronning Maud Land: Methane synchronisation and dating

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The global CH_4 record closely follows rapid climate variations seen in Greenland and large portions of the northern hemisphere. We present the high-resolution CH_4 record jointly obtained by LGGE and Bern on the Dronning Maud Land ice core, focussing on the last 60 kyr. This record is compared to the Dome C CH_4 record (EDC3_beta chronology) and to the North Grip deuterium record (GICC05 chronology). The scientific interest of such records is two-fold:

- Firstly, rapid CH_4 variations can be used as a proxy of North Atlantic climate shifts being recorded in Antarctic ice. Once the gas-ice delta-age is established, this allows to directly determining the succession of northern hemispheric climate changes versus Antarctic climate changes recorded in the same ice core.
- Secondly, because the DML and Dome C CH_4 records must be synchronous, they provide a test of the consistency of climatic parameterization used as inputs to the firn densification model used to calculate the delta-ages. Indeed temperature and accumulation rate changes remain relatively poorly constrained parameters on the Antarctic plateau. In addition to the close-off density and the thinning function of annual layers, they directly affect the delta-depth (and thus

delta-age) of contemporaneous events in the gas and in the ice.

Calculating Δage on EDML we put the CH_4 gas record on a common time scale with parameters representing the climate in Antarctica. Hereby we present the timing of climate change of Antarctica versus Greenland.

Since the EDML and EDC ice cores have been synchronised in the ice matrix using common volcanic layers we need to find pairs of delta-ages for EDML and EDC to provide synchrony also in the gas records. We discuss different sets of parameters tested with the firn densification model with the aim of finding consistent gas chronologies for EDML and EDC based on the new EDC3/EDML1 timescale