EPICA ice core Dronning Maud Land: Results from stable isotope measurements back to the LGM

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**Introduction**

The European Project for Ice Coring in Antarctica (EPICA) focuses on the drilling of two deep ice cores, the first at Dome C in the Indian/Pacific sector, and the second in Dronning Maud Land in the Atlantic sector of Antarctica. We focus on Dronning Maud Land and the isotope record from the EPICA Dronning Maud Land (EDML) ice core drilled there. The drilling of EDML started in the 2001/2002 season at Kohnen station (75°00’S, 00°04’E, 2882 m a.s.l.) and reached in the 2002/2003 season a depth of 1564 m recovering approx. 55,000 year old ice.

**3δ18O profiles for two core sections (123-164m and 529-569m):** 5 cm samples were available. In the upper profile the annual layer thickness corresponds to ca. 6.5 cm, in the lower profile to ca. 3.3 cm. The lower profiles originates from the time around the “8.2 kyr” event. An exact dating of the EDML is still missing.

**δ18O and DEP high resolution profiles:** δ18O values along the EDML core down to the depth of 1564 m. Shown are values measured at 50cm samples (single values grey, 10-m running mean thick red line) and at 4cm samples with a spacing of 10 m (red circles connected by lines). The blue lines are 10-m averages of DEP measurements, showing good correlation with the isotope values. The dating of the core is still under discussion. The isotope profile available so far shows a decreasing trend from around 270 m to the surface (cf. Figure above), a clear cooling event is indicated by the composite isotope profile. The dust/ash zone is steeper than known from the Dome C, Dome F or GRIP cores (Watanabe et al., 2003) (cf. Figure right). The dust/ash layers in the Dome F core at a depth of 505.8 m (Watanabe et al., 2003) (cf. Figure right).

**The near surface snow and its isotopic composition:** Cross-correlations between the δ18O content and the d values in the snow cover at S50203, sampled 18.12.2002. To perform the correlation, the profile data were converted to monthly resolved time series using δ18O stratigraphy for dating and assuming equal accumulation rates throughout the year.

**Times series of δ18O contents (10-year means):** Times series of δ18O contents (10-year means) deduced from the ice cores B32 and EDML, which were drilled at slightly different positions and supplement each other. The smoothed curve (thick line) has been calculated using Gaussian low-pass filter over 300 years. Generally, the stable isotope profiles (δ18O, δD) are characterized by Holocene stable climate and show only low variability. But, in the last 4000 years (based on a preliminary time scale) the δ18O values decrease continuously and the deuterium excess values d increase in the same time by about 0.5 ‰. Both trends could indicate climate cooling in this part of Antarctica. The depth section of the EDML core (123-173m) for which higher resolution measurements are available is marked by arrows and a yellow bar.

**References**

Pepin, N. et al. (1998) Thigh past ice cores from the Dome Fuji (Antarctic) deep ice core. Am. Geol. 29, 120-139.