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Model-derived ice core chronology and non-climatic biases in the lower part of the EDML ice core

O. Rybak (1), P. Huybrechts (1, 2), F. Pattyn (3), D. Steinhage (1)

(1) Alfred-Wegener-Institut für Polar- und Meeresforschung, Postfach 120161, D-27515 Bremerhaven, Germany, (Oleg.Rybak, Philippe.Huybrechts, Daniel.Steinhage@awi.de / Fax: +49-471-48311149), (2) Departement Geografie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussels, Belgium, (3) Laboratoire de Glaciologie Polaire, Département des Sciences de la Terre et de l'Environment (DSTE), Universié Libre de Bruxelles, B-1050 Bruxelles, Belgium)

Deep drilling of the Antarctic ice sheet at Kohnen station (Dronning Maud Land, Antarctica) within the framework of the European Project for Ice Coring in Antarctica (EPICA) was finished in January 2006. The drilling aimed at obtaining high-resolution proxy records for the last glacial cycle. Dating of the EDML ice core was carried out by means of correlation with established ice-core chronologies using specific time markers. Independent ice-core dating was established by means of glaciological modelling using a 3-D nested Antarctic ice sheet model. Both methods yielded a fairly reliable depth-age scale for the upper $\sim$90% of the EDML ice core. Dating of the lower part of the core however requires additional modeling efforts because it crucially depends on the unknown geothermal heat flux, which exerts a strong control on basal temperature and the basal melting rate.

Using a value for the geothermal heat flux G = 54.6 mWm^{-2} in a 3-D ice-sheet model, we found that some basal melting below Kohnen was present for most of the past history but that it subsequently stopped nearly 7 kyr ago with a present-day basal temperature 0.3°C below pressure melting. The discovery of melt water in the drill hole however suggests a higher geothermal heat flux. Preliminary experiments show that the bottom ice chronology is very sensitive to even small increases of G. To further clarify this issue we carried out a series of numerical experiments with the nested model with G higher than the reference value by 5 to 30%. Alongside, we also calculated the advective and altitudinal elevation corrections for the δ^{18}O and corresponding tem-

perature record needed to extract the climatic part of the signal for the lowermost 10% of the ice core.