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Non-climatic biases and chronology of the EDML ice core derived from a nested Antarctic ice sheet model

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A correct dating and interpretation of the EPICA deep ice core which is currently being drilled at Kohnen Station in Dronning Maud Land requires to reconstruct the regional flow and ice sheet geometry over the whole time period covered by the core. That is because the temperature record is biased by non-climatic effects caused by local variations of surface altitude of the drill site through time, and by the fact that the drill site is in a flank position so that deeper ice in the core was deposited further inland at a progressively higher elevation. We have used a high-resolution higher-order flow model of Dronning Maud Land nested into a comprehensive 3D thermomechanical model of the Antarctic ice sheet to reconstruct the flow history over the last few glacial cycles. The flow field from the forward experiment is then employed in a Lagrangian back-tracing algorithm to provide particle paths back to their time and place of deposition, which directly provides the age of the particle and a suite of relevant information such as original annual layer thickness. The procedure fully accounts for time-dependent changes in ice thickness, flow direction, flow velocity, accumulation rate, basal conditions, etc... The poster will discuss the main results obtained from this exercise. This includes variables such as the ice core chronology, the non-climatic corrections needed to extract the climatic part of the signal, the thinning function, the accumulation rate at the time and place of origin, and the details of the flow as well as the deformation regime in the region. Whereas some of the main results such as the advective and altitudinal elevation corrections are believed to be robust against parameter uncertainties, other model output such as the ice core chronology may depend more on the assumptions made for determining palaeo-accumulation rates and

the flow law, especially in the deepest parts.