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A new inverse method to construct a common and optimal ice chronology for EPICA ice cores

B. Lemieux-Dudon (1), F. Parrenin (1), E. Blayo (2)

(1) Laboratoire de Glaciologie et de Géophysique de l'Environnement du CNRS, 54 rue Molière, 38402 Saint Martin d'Heres, France , (2) Laboratoire de Modélisation et Calcul, B.P. 53, 38041 Grenoble cedex 9, France, (lemieux@lgge.obs.ujf-grenoble.fr)

Ice-cores dating is an essential issue to analyse data measured on ice samples in order to contribute to Earth climate history decephering. Many informations can be used to produce accurate ice-core chronologies, modelling knowledge as well as measurements. Some informations are relevant for the top part of the core (e.g. annual layer counting), others apply on the whole core (e.g. orbital tuning) while some data are proper to produce absolute age markers (e.g. 10Be, ash layers). Besides, simplified ice-flow models used for dating purpose, bring a continuous ice age estimate but involve some poorly-known parameters. In order to gather this knowledge, some inverse methods have been used to estimate both the optimal depth-age relationship as well as the ice-flow model parameter values. However, the simplied ice-flow models used in this frame, do not meet some data constraints and fail to reproduce the evidence of ice-flow irregularities which can affect ice age. The aim of this study is to show how essential is the introduction of the ice-flow modelling error in the inversion process in order to use all the available information which is a requirement to estimate accurate chronologies. We present here the first results with this new inverse approach integrating the model error. It allows for instance to use stratigraphic links in order to construct a common and optimal age scale for two ice cores and to estimate the confidence intervals.