EGU2020-20679
https://doi.org/10.5194/egusphere-egu2020-20679
EGU General Assembly 2020

High frequency water isotopes records during glacial/interglacial cycles on EPICA Dome C ice core.

antoine Grisart[1], Bo Vinther[2], vasileos Gkinis[2], Trevor Popp[2], Barbara Stenni[3], Katy Pol[1], Valerie Masson Delmotte[1], Jean Jouzel[1], Mathieu Casado[4], Thomas Laepple[4], Maria Horhold[4], Frederic Prie[1], Benedicte Minster[1], Elise Fourre[1], and Amaelle Landais[1]

[1]Laboratoire des Sciences du Climat et de l'Environnement, IPSL, UMR 8212, CEA-CNRS-UVSQ-UPS, Gif sur Yvette, France (antoine.grisart@gmail.com)

[2]Physics of Ice, Climate and Earth, Niels Bohr Institute, University of Copenhagen, Denmark

[3]Department of Geological, Environmental and Marine Sciences, University of Trieste, Via E. Weiss 2, 34127 Trieste, Italy

[4]Alfred-Wegener-Institut Helmholtz-Zentrum für Polar-und Meeresforschung, Research Unit Potsdam, Telegrafenberg A45, Germany

The iconic curve of □D in water showing the 8 glacial/interglacial cycles from the EPICA Dome C ice core is now a reference in paleoclimate. It shows past temperature variability back to 800 ka over the
3200 m deep ice core with a 55 cm resolution. However, the millennial and centennial scale variability gets more challenging to observe in the deepest part of the core. Indeed, the time resolution worsens when going deeper in the ice because of the ice thinning: it is larger than 200 years at 2500 m depth. Furthermore, isotopic diffusion affects the signal at the bottom of the ice core. Pol et al., (2010) have thus shown that the sub-millennial MIS (Marine Isotopic Stage) 19 signal
(3157-3181 m deep) is erased because of diffusion and high resolution doesn't add any further information at this depth. In this study we want to better characterize the increase of the isotopic diffusion with depth by providing new high resolution water isotopes at several intervals over the EPICA ice core (EDC).
We present here published high resolution (11 cm) d18O measurements over the EDC ice core as well as new records of high resolution (11 cm) □D over MIS 7;13 and 14). We use spectral analyses to
determine at which depth the isotopic diffusion erases the sub-millennial variability. We also show that cold periods exhibit a larger variability of water isotopes than interglacial periods.
The information obtained here is crucial for the new project Beyond EPICA oldest ice core, which has
the goal of analyzing a 1.5 Ma old ice core. In the deepest part, 1 m of ice core could represent 10 000 years of climate archive.