Contribution ID: **46** Type: **Oral presentation**

New dating experiments on EPICA Dome C (EDC) ice core over the last 800 kyrs using the Bayesian tool Paleochrono and new records of elemental and isotopic composition of air trapped in the ice

Tuesday 4 October 2022 11:00 (20 minutes)

To understand the phasing of external forcing (greenhouse gases, orbital parameters) and past climate change, well-dated paleoclimatic archives are required. Ice cores are unique archives because they provide a direct record of greenhouse gas concentration over the last 8 climatic cycles. But to date ice cores, we need to construct two separate chronologies: one for the ice and one for the younger air trapped in the ice. The coherent AICC2012 chronology was established for five ice cores: EPICA Dome C (EDC), EPICA Dronning Maud Land (EDML), North Greenland Ice core Project (NGRIP), Vostok (VK) and TALos Dome Ice CorE (TALDICE) using the following method. A sedimentation model is used to calculate background age scales from an initial scenario for variations of three parameters: accumulation of snow at the surface, ice thinning and Lock-In-Depth (LID). A Bayesian tool then improves the age scales with respect to chronological observations (dating constraints, stratigraphic links between cores, tephra layers···) and accordingly adjusts the evolution of the three parameters mentioned above. The AICC2012 chronology is associated with an uncertainty of 6 kyrs, mainly due to uncertainties related to the orbital tuning. Since the construction of AICC2012, many new data have been obtained and it is the right period to produce an updated coherent chronology which could be further extended to other ice cores.

Here, we present a first step toward the construction of the next coherent ice core chronology by including new constraints in the Paleochrono model from recent high-resolution data on the EDC ice core covering the last 800 kyrs: 1) air isotopes (δ18Oatm, δO2/N2, 40Ar, 81Kr) and total air content (TAC) used as dating constraints, 2) δ15N used to reconstruct the background scenario for LID. In addition, the East Asian speleothem δ18Ocalcite signal is used as an alternative synchronisation target for the δ18Oatm (Extier et al. 2018) and constraints resulting from volcanic synchronisation undertaken between Greenland and Antarctica are also considered (Svensson et al. 2020). This new dating experiment on EDC ice core aims to lower the uncertainty of the current chronology while providing a critical look on former hypotheses considered to establish AICC2012.

Author: BOUCHET, Marie (CNRS - LSCE)

Co-authors: GRISART, Antoine (LSCE, Gif-Sur-Yvette, France); Dr PARRENIN, Frédéric (IGE, Grenoble, France); Dr LANDAIS, Amaëlle (LSCE, Gif-sur-Yvette, France); PRIE, Frédéric (LSCE, Gif-sur-Yvette, France); Dr ORSI, Anaïs (LSCE, Gif-sur-Yvette, France); JACOB, Roxanne (LSCE, Gif-sur-Yvette, France); Dr CAPRON, Emilie (IGE, Grenoble, France); Dr RAYNAUD, Dominique (IGE, Grenoble, France); Dr LIPENKOV, Vladimir Ya (Arctic and Antarctic Research Institute, Russia); Dr EXTIER, Thomas (EPOC, University of Bordeaux, France); Dr SVENSSON, Anders (Niels Bohr Institute, Copenhagen, Denmark); Dr JIANG, Wei (University of Science and Technology of China, Hefei, China); Dr RITTERBUSCH, Florian (University of Science and Technology of China, Hefei, China); Dr LU, Zheng-Tian (University of Science and Technology of China, Hefei, China); Dr YANG, Guo-Min (University of Science and Technology of China, Hefei, China)

Presenter: BOUCHET, Marie (CNRS - LSCE)

Track Classification: Time scales and methods for ice dating