



## Supplement of

## Sub-millennial climate variability from high-resolution water isotopes in the EPICA Dome C ice core

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Figure S1: Evolution of the diffusion length  $\sigma_z$  calculated from Ramseier (1697) ice diffusion and two values of  $\sigma_{firn}$ : a constant firm diffusion length  $\sigma_{firn}$  (7 cm, blue) and a variable  $\sigma_{firn}$  (7.5 cm during interglacial periods and 6.5 cm during glacial periods, violet). The evolution of thinning from AICC2012 chronology (Bazin et al., 2013; light blue) and borehole temperature (green) (Buizert et al. 2021) over the EDC ice core are also shown on a depth scale over the EDC ice core.



Figure S2: (first panel) Evolution with depth of low (55 cm) resolution  $\delta^{18}$ O measurements over the EDC ice core performed between 2002 and 2007 by the H<sub>2</sub>O-CO<sub>2</sub> equilibration method (Landais et al., 2021) (blue) and the average over each 55 cm bag of  $\delta^{18}$ O measured on 11 cm resolution samples (red, see also Figure S3). (bottom panel) Difference between the  $\delta^{18}$ O values in low resolution and the average of 11 cm resolution samples over each 55 cm bag.



Figure S3: Details of the  $\delta^{18}$ O comparison between low resolution (55 cm, blue), high resolution (11 cm, red) and average of 11 cm resolution samples over each 55 cm bag (grey).



Figure S4: Density of probability for the difference between the low resolution  $\delta^{18}$ O measurements and the average of  $\delta^{18}$ O measurements of 11 cm resolution samples over each 55 cm bag displayed on figure S2. A gaussian curve (red) is fitted to the data. A gaussian curve (green) is displayed with a standard deviation equal to the 1  $\sigma$  uncertainty of  $\delta^{18}$ O (0.2 ‰).



40 Figure S5 : (a) Evolution with depth of  $\delta^{18}$ O measurements over Termination 6 performed by the University of Copenhaguen (blue) and  $\delta^{18}$ O measurements performed in 2019 by CRDS at LSCE (red). (b) Difference between the  $\delta^{18}$ O values measured before 2010 and in 2019. A statistical test was made on the correlation between the absolute value of  $\delta^{18}$ O and the  $\delta^{18}$ O difference between the two series of measurements leading to a Pearson coefficient of -0.1477 and a p-value of 0.0025.

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Figure S6 : Probability Density Function for the difference between the old (University of Copenhaguen) and the new (LSCE)  $\delta^{18}$ O measurements. A gaussian curve (red) is fitted to the data. A gaussian curve (green) is displayed with the standard deviation equal to the classically displayed 1 $\sigma$  uncertainty of  $\delta^{18}$ O measurements by CRDS at LSCE (1 $\sigma$  = 0.2‰).