

Supplement information:

The supplement contains two pdf files called **Supplementary_Figures_Touzeau_GMD.pdf** and **Supplement_on_Methods.pdf**. The supplementary figures present secondary results of the simulations described in the main text. The method supplement describes in greater details how the attenuation is computed on ice-cores.

The supplement also contains 4 files useful for running simulations:

-a **FORCING.nc** file which contains atmospheric meteorological forcing for ten years (2001-2010), it should be added to your running directory. It contains 6 new variables describing isotopic composition in atmospheric vapor (VAPAIS) and in precipitation (SFALIS);

-a **OPTIONS.nam** file which indicates which options are active and which are not for running the simulation: for instance, for the simulation 2 in the manuscript, snowdrift option is inactive (F for false), isotope option is active (IS1), vapor transport is active (T) and option Dome C is active (T for true). It also contains the initial density/temperature profiles used to build the initial snowpack at the beginning of the pre-run (Jan. 2000) simulation. It should also be present in your running directory.

```
LSNOWDRIFT= F
LSNOWDRIFT_SUBLIM= F
LSNOW_ABS_ZENITH= F
CSNOWMETAMO='F06'
CSNOWRAD='B92'
CSNOWISO = 'IS1'
LSNOWVAPTRANS= T
LSNOWDC = T
```

-a **PREP.nc** file, which contains the conditions of the snowpack at the end of the pre-run (Jan. 2000 to Dec. 2000), and allows to start directly simulation 2 with command “OFFLINE”, without entering commands “PGD” and “PREP”. The pre-run was run with evolving temperature in the snowpack, but without vapor transport;

-a **GRAPH_simul2.py** script, which is derived from the usual snowtool script for plotting data. It uses the **PRO.nc** file generated at the end of the simulation to make a 2D plot displaying a chosen variable (temperature, delta18O) as color levels against time (horizontal axis) and snow heights (vertical axis). Note that if the **PRO.nc** file contains more than 500 points on the time axis, it is better to reduce it using ncks before making the plot. Since variable outputs are written for each day of the simulation, we recommend taking one point every 7 points (weekly).