



## The March 2022 exceptional heatwave recorded in the isotopic composition of precipitation at Dome C, East Antarctica

Giuliano Dreossi<sup>1</sup>, Mauro Masiol<sup>1</sup>, Daniele Zannoni<sup>1</sup>, Claudio Scarchilli<sup>2</sup>, Virginia Ciardini<sup>2</sup>, Paolo Grigioni<sup>2</sup>, Massimo Del Guasta<sup>3</sup>, and **Barbara Stenni**<sup>1</sup>

<sup>1</sup>Ca' Foscari University of Venice, Dept. of Environmental Sciences, Informatics and Statistics, Venezia, Italy  
(barbara.stenni@unive.it)

<sup>2</sup>ENEA, Laboratory for Observations and Measures for the Environment and Climate, Rome, Italy

<sup>3</sup>Institute of Atmospheric Sciences and Climate, National Research Council of Italy (INO-CNR), Bologna, Italy

An exceptional heatwave impacted on East Antarctica between March 15 and 19, 2022, causing some of the highest temperature anomalies ever measured on Earth. The heat transport was associated to an atmospheric river bringing a moisture flux from lower latitudes to inner Antarctica. Several locations, from coastal sites to the high Antarctic Plateau, experienced record temperatures. The air temperature measured at Concordia Station by the automatic weather station of the Italian Antarctic national research program (PNRA) reached a maximum of -11.7°C.

The temperature signal is imprinted in the oxygen and hydrogen isotopic composition of precipitation: this is what allows paleoclimate reconstructions from the isotopic records in ice cores, although post-depositional processes such as the interactions between snow and atmosphere and within the snow column might affect the pristine isotopic signal.

Since 2008, precipitations have been collected daily at Concordia Station for  $\delta^{18}\text{O}$  and  $\delta\text{D}$  measurements; the activities have been carried out under the PNRA project WHETSTONE and will continue in the framework of the PNRA project AIR-FLOC. Isotopic values from 2008 to 2021 range between -82.63‰ and -26.97‰ for  $\delta^{18}\text{O}$  and between -595.1‰ and -223.0‰ for  $\delta\text{D}$ , while water stable isotope data from February to April 2022, show unprecedented high values ( $\delta^{18}\text{O} = -18.97\text{‰}$ ,  $\delta\text{D} = -147.9\text{‰}$ ), the highest recorded over the last 15 years, in correspondence to the exceptional temperatures and snow precipitations. Moreover, the daily snowfall collected during the same period reached a cumulative value of ~4.3 mm w.e. representing ~18% of the 2022 cumulative annual value (24.1 mm w.e.)