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The Ortles ice cores: uncovering an extended climate archive from the Eastern Alps

Giuliano Dreossi (1), Carlo Barbante (1,2), Michele Bertò (1), Luca Carturan (3), Fabrizio De Blasi (3), Jacopo Gabrieli (2), Paolo Gabrielli (4), Roberto Seppi (5), Andrea Spolaor (1,2), Barbara Stenni (1), and Thomas Zanoner (6)

(1) Department of Environmental Sciences, Informatics and Statistics, Ca' Foscari University of Venice, Venezia Mestre, Italy (iodio9@yahoo.it), (2) National Research Council, Institute for the Dynamics of Environmental Processes (IDPA-CNR), Venezia Mestre, Italy,, (3) Department of Land, Environment, Agriculture and Forestry, University of Padova, Agripolis, Legnaro, 35020, Italy , (4) Byrd Polar and Climate Research Center, The Ohio State University, Columbus, Ohio, USA, (5) Department of Earth and Environmental Sciences, University of Pavia, Pavia, Italy , (6) Department of Geosciences, University of Padova, Padova, 35131, Italy

During the last half century, oxygen and hydrogen stable isotope content of ice cores has been extensively used for air temperature reconstructions. The most suitable glaciers of the Alpine area, most exclusively in the Western Alps, have been utilized for ice coring for more than four decades. The paleoclimatic potential of the Eastern Alps is still largely unexploited and was scarcely utilized in the past mainly because of the lower elevation (compared to Western Alps) and hence the difficulty to find glaciers in cold conditions. The warming temperature trend appears to be particularly pronounced in the Alps, threatening the preservation of the glaciated areas and creating a sense of urgency in retrieving climatic archives before it is too late.
In autumn 2011, four deep cores were drilled on Mt Ortles, South Tyrol, Italy, at 3859 m a.s.l. An extensive reconstructed temperature record for the Ortles summit, based on the surrounding meteorological station data, is available for the last 150 years, while an automatic weather station had been operating from 2011 to 2015 in proximity of the drilling site. The new ice core chronology, based on 210Pb, tritium, beta emissions analysis and 14C measurements of the particulate organic carbon, indicates that the bottom ice is 7000 years old, making it the second most extended glaciological archive ever retrieved in the Alps. The three equally long ice cores have been analyzed for oxygen and hydrogen stable isotopes throughout their length, and the goal is to create an Ortles stacked record for d18O and dD and compare the isotopic data to instrumental temperatures and to other Alpine records.
Since 2008, several snow pits were dug in proximity of the drilling site during summer, when the temperature can often exceed the melting point. The isotopic profiles of the 2015 snow pit, dug at the end of an exceptionally warm summer, show how the isotope signal is now affected by the post-depositional processes that have occurred during that summer.