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Antarctic climate variability from ice core records over the last two millennia

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The climate of the past can be successfully investigated through the study of polar ice sheets. Paleotemperature reconstructions from Antarctic ice cores are based on water isotope profiles, thanks to the existing relationship between δ18O (or δD) and the temperature at the site.
Here we present the climate record of the past 2000 years resulting from the stable isotope analysis of the ice core drilled at Talos Dome in East Antarctica from 2003 to 2007 in the framework of the European TALDICE (TALos Dome Ice CorE) project. Talos Dome (72°49'S, 159°11'E; 2315 m; -41°C) is an ice dome on the edge of the East Antarctic plateau. The snow accumulation rate of the site (80 kg m-2 yr-1) allows extracting high-resolution data for the past millennia. The main moisture sources of snow precipitation at this near-coastal site are located in the Indian Ocean and the Ross Sea.
Isotopic analyses of TALDICE detailed (10 cm) samples have been performed in the framework of the ESF-HOLOCLIP project, whose main objective is to integrate the ice core, the marine core and the modeling data to investigate the climate variability of the high latitude southern hemisphere over the Holocene.
The isotopic record obtained from the TALDICE ice core is here compared with a shallow firn core (89 m long) previously drilled at Talos Dome, at a 5 km distance, and covering the past 800 years. The two isotopic records are stacked to reduce the stratigraphic noise and compared with other available isotopic records from Antarctica to highlight common trends and regional variability in the climatic signal over the past two millennia. We compare the data with a simulation performed with a three-dimensional earth system model of intermediate complexity (LOVECLIM) with and without data assimilation.
Considering the δ18O profile from the TALDICE ice core and comparing it with the ones from the other available records we can observe common negative isotopic anomalies in the period from about 1450 to 1850 AD preceded by several positive and negative anomalies on centennial scale.