Geophysical Research Abstracts
Vol. 20, EGU2018-8083, 2018
EGU General Assembly 2018

Chemical composition of atmospheric aerosol and surface snow at Dome C (East Antarctic Ice Sheet): an overview from 10-yr long records

Rita Traversi (1), Silvia Becagli (1), Laura Caiazzo (1), Maurizio Busetto (2), Pierfrancesco Calzolari (2), Paolo Cristofanelli (2), Boyan Petkov (2), and Mirko Severi (1)

(1) University of Florence, Chemistry Dept., Sesto F.no (Florence), Italy (rita.traversi@unifi.it), (2) ISAC-CNR (Institute of Atmospheric Sciences and Climate – National Research Council of Italy), Bologna (Italy)

The knowledge of aerosol chemical composition in the Antarctic plateau is basic to achieve information on the main natural inputs, tropospheric transformation and long-range transport processes of the aerosol components. Moreover, chemical and physical processes occurring at the atmosphere-snow interface are yet not fully understood and further work is needed to assess the impact of atmospheric chemistry on snow composition and to better interpret ice core records there retrieved.
Station Concordia, located on the top of Dome C (East-Antarctica, 75° 06' S, 123° 20' E, 3233 m a.s.l.) was chosen as one of the two drilling site in the EPICA (European Project for Ice Coring in Antarctica) project, yielding a 900 kyr long climatic and environmental record. But paleoclimatic and paleoenvironmental studies require to understand the present-day load and composition of atmospheric aerosol and gases at the same site and the processes occurring at the atmosphere/snow interface (such as wet and dry deposition, gas-adsorption, post-depositional re-emission or transformation, and migration or diffusion in the firn and ice layers of chemical species).
To achieve such information, a continuous all year-round sampling of atmospheric aerosol (bulk and size-segregated) and surface snow was carried out at Dome C continuously all year-round over the 2004-2013 period.
Aerosol and snow samples were analyzed for main and trace ion markers, which can be used as markers of environmental conditions (e.g.: hydrological conditions in the dust source area, sea level, sea ice extent, continental and marine biological activity, volcanic activity, atmospheric and oceanic circulation). A continuous high resolution record of those parameters allows studying the extent and timing of main aerosol sources as sea salt (open ocean/frost flowers/blowing snow), biogenic production, crustal input, as well as transport (e.g. free troposphere, stratosphere-troposphere exchange) and atmospheric reaction processes (such as neutralization, chemical fractionation).
A comparison with ozone and solar irradiance measurements, carried out continuously over the same time period, is also attempted to better understand the atmospheric processes involving the atmosphere-snow exchanges of N-cycle species.
In addition, preliminary results achieved in the framework of a PNRA project (LTCPAA), started in 2016 and prosecuting the previous 10-yr long sampling and direct measurement activity, are also presented.