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Investigation of surface ozone variability over the Antractic Plateau by observations at the "Concordia" WMO/GAW contributing station

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Tropospheric ozone (O_3), is a greenhouse gas and a driver for atmosphere oxidative capacity. It has at least doubled since pre-industrial age but a comprehensive understanding of the global distribution and trends are difficult to achieve due to its reactivity. Measurements at Antarctic locations provide the opportunity to investigate O_3 variability without direct anthropogenic influence providing information on its background variability.
This work will focus on the investigation of the variability of surface tropospheric O_3 over the eastern Antarctic Plateau. In particular, we will analyze seven years (2006 – 2013) of continuous observations at the WMO/GAW Contributing Station Concordia (75.10ºS, 123.33ºE, 3233m a.s.l. m) with the purpose of shading light on specific atmospheric processes that need to be accurately taken into account for interpreting O_3 variability: (i) in-situ NO_x emissions and subsequent photochemical O_3 production during summer, (ii) long-range transport of air-masses enriched in O_3 by photochemical production over the surface of Antarctic Plateau, (iii) long-range transport of air-masses depleted in O_3 from coastal regions or open oceans. Moreover, even if their influence is expected to be limited, the possible influence of STE will be specifically investigated.
To this aims, in-situ O_3 variability will be analyzed as a function of 3D air-mass back-trajectories calculated by the HYSPLIT and FLEXTRA models. Co-variability with meteorological parameters and other atmospheric tracers (e.g. aerosol measurement as a function of key source and transport processes) will be also studied in order to provide a preliminary assessment of their impact on O_3 variability. The STEFLUX (Stratosphere-to-Troposphere Exchange Flux) tool will be used to investigate the influence of stratosphere-to-troposphere transport on ozone variability over eastern Antarctic Plateau.