Geophysical Research Abstracts
Vol. 14, EGU2012-4783-1, 2012
EGU General Assembly 2012

Nitrous Acid at Concordia (Inland Site) and Dumont d'Urville (Costal Site), East Antarctica

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One of the most recent important finding made in Antarctica after the discovery of the appearance of the Antarctic ozone hole in the early 80's was the discovery of a very oxidizing canopy over the South Pole region in relation with unexpected high levels of NO. There is a strong need however to extend investigations of the oxidation capacity of the lower atmosphere at the scale of the whole Antarctic continent, and in particular, over East Antarctica. That motivated the OPALE (Oxidant Production over Antarctic Land and its Export) project. Indeed the limited data gained by using aircraft sampling during ANTCI 2003 suggest that over the East Antarctic plateau even higher NO emissions persist. Among several not yet resolved questions related to the high level of oxidants over Antarctica is the role of nitrous acid (HONO).

During the austral summer 2010/2011 the levels of nitrous acid (HONO) were for the first time investigated at Concordia (75°06'S, 123°33'E) and Dumont D'Urville (66°40'S, 140°01'E), two stations located in East Antarctica. Also for the first time in Antarctica, HONO was measured by deploying a long path absorption photometer (LOPAP). At Concordia, from the end of December 2010 to mid January 2011 HONO mixing ratios at 1 m above the snow surface ranged between 5 and 60 pptv. Diurnal cycles were observed with levels peaking in the morning (06:30 to 07:30) and the evening (19:00 to 20:00). At Dumont d'Urville, background mixing ratios close to 2 pptv were observed in February 2011. No clear diurnal cycles were observed at that site but several events of air masses export from inland Antarctica were encountered with enhanced HONO levels reaching 10 pptv at night. These first HONO data gained in East Antarctica are discussed in terms of sources and sinks along with synoptic weather conditions.