Geophysical Research Abstracts,
Vol. 11, EGU2009-9518, 2009
EGU General Assembly 2009

Surface Ozone evolution in Coastal Continental Antarctica

M. Navarro-Comas (1), M. Yela (1), M. Gil (1), M.C. Parrondo (1), and H. Ochoa (2)

(1) INTA, Área de Investigación e Instrumentación Atmosférica, Madrid, Spain (navarrocm@inta.es, 34 915201317), (2) Dirección Nacional del Antártico, Buenos Aires, Argentina

Surface ozone measurements from two complete years (February 2007 to February 2009) at Belgrano station (Antarctica, 78ºS, 35ºW) are presented. Belgrano is a coastal station lying approximately 20 km from the Weddell Sea coast and located 256 m above sea level. A UV photometric ozone analyzer, model TEI 49C, was deployed with the double purpose of, in the first place, perform the quality control of ozonesounding before launching and, on second place, background ozone monitoring in a long term basis.

The two years data analysis shows an annual ozone cycle with one month lag on surface ozone data and the solstices. The ozone maximum is reached in mid-winter (in July), while the minimum is attained in summer (in January) in opposition of typical mid-latitude continental observatories, but in agreement with other coastal observatories in Antarctica. The daily mean maximum observed during the whole period peaks at 36.5 ppbv in July and the minimum value observed was found to be 6.9 ppbv, in December. The mean surface ozone concentration value calculated during the observational period was 24.3 ppbv with a standard deviation of 7.7 ppbv. The fast transition night to day that takes place in Belgrano does not correlate with the seasonal ozone distribution suggesting that distribution may be controlled by transport mechanisms with a minor contribution of the photochemistry.

It is also observed a higher day to day variation after the polar night, during the Antarctic spring and summer. Several depleted ozone events have been found along the observational period during the Austral spring (October-December) season, attributable to photochemical catalyzed ozone depletion from halogen chemistry. During those days, the ozone mixing ration drops until only a few ppbv in a short period of time (within a few hours). BrO observation from the satellite instrument SCIAMACHY shows large patterns of enhancements of BrO in the Weddell Sea during those days and calculated HYSPLIT trajectories show that air masses with low ozone come from an area of high BrO concentration. Occasional episodes with enhanced ozone are observed during November-January. During these periods, ozone increased by 7-10 ppbv over the seasonal background. These periods lasted several days.

A total of 94 ECC ozonesounding were launched at the same site along this two year reported period and the ozone analyzer surface ozone has been compared with data obtained from the ozonesoundings prior to its launching. In spite of systematic differences during the winter months, a good agreement is observed between both kinds of instruments. In particular, low ozone episodes are captured by both techniques showing the genuine character of the events. A mean difference of 4.5 ppbv with a standard deviation of 2.9 is calculated between sondes and ozone analyzer, being always greater the data obtained by the surface ozone analyzer.