Geophysical Research Abstracts, Vol. 9, 10614, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10614

Simulated polar ozone loss rates compared with Match observations in recent Antarctic and Arctic winters

O. P. Tripathi (1,2), S. Godin-Beekmann (1), F. Lefèvre (1), A. Pazmiño (1), A. Hauchecorne (1), M. Chipperfield (3), W. Feng (3), G. Millard (4), M. Rex (5), M. Streibel (5), P. von der Gathen (5)

(1) Service d'Aéronomie, IPSL, CNRS - Université Pierre et Marie Curie, Paris, France, (2) Now at NASA – Jet Propulsion Laboratory, California Institute of Technology, CA, USA, (3) Institute for Atmospheric Science, University of Leeds, Leeds, United Kingdom, (4) Department of Earth Sciences, University of Cambridge, United Kingdom, (5) Alfred Wegener Institute for Polar and Marine Research, Potsdam, Germany (tripathi@tmf.jpl.nasa.org/ Fax: +1 760-249-5392).

Simulations of ozone loss rates using a 3-D chemical transport model and a box model during recent Antarctic and Arctic winters are compared with experimental loss rates. The study focuses on the Antarctic winter 2003 during which the first Antarctic Match campaign was organized and on Arctic winters 1999/2000, 2002/2003. The maximum ozone loss rates retrieved by the Match technique for the winters and levels studied reaches 6 ppbv/sunlit hour and both types of simulations could generally reproduce the observations within two sigma standard deviation. In some cases, e.g. for the Arctic winter 2002/2003 at 475 K level, an excellent agreement within 1 sigma standard deviation level is obtained. An overestimation is also found with the box model simulation at some isentropic levels for the Antarctic winter and the Arctic winter 1999/2000, indicating an overestimation of chlorine activation in the model. Loss rates in the Antarctic show signs of saturation in September, which have to be considered in the comparison. The study includes sensitivity tests performed with the box model in order to assess the impact of kinetic parameters of the ClO-Cl2O2 catalytic cycle and total bromine content on the ozone loss rate. These tests result in a maximum change in ozone loss rates of 1.2 ppbv/sunlit hour, generally in high solar zenith angle conditions. In some cases a better agreement is achieved with fastest photolysis of Cl2O2 and additional source of total inorganic bromine but at the expense of overestimation of smaller ozone loss rates derived later in the winter.