Geophysical Research Abstracts
Vol. 13, EGU2011-2901-1, 2011
EGU General Assembly 2011
© Author(s) 2011

CARIBIC observations of gaseous mercury in the lowermost stratosphere

Franz Slemr (1), Ralf Ebinghaus (2), Hans Kock (2), Carl Brenninkmeijer (1), Markus Hermann (3), Andreas Weigelt (3), Andreas Zahn (4), Peter van Velthoven (5), and Bengt Martinsson (6)

(1) Max-Planck-Institut für Chemie, Airchemistry, Mainz, Germany (franz.slemr@mpic.de), (2) GKSS-Research Centre, Institute for Coastal Research, Geesthacht, Germany, (3) Leibniz-Institut für Troposphärenforschung, Leipzig, Germany, (4) Institute for Meteorology and Climate Research, KIT, Karlsruhe, Germany, (5) Royal Netherlands Meteorological Institute (KNMI), de Bilt, The Netherlands, (6) University of Lund, Lund, Sweden

A unique set of gaseous mercury measurements in the upper troposphere and lower stratosphere (UT/LS) has been obtained during the monthly CARIBIC (www.caribic-atmospheric.com) flights since 2005. The passenger Airbus 340-600 of Lufthansa covered routes to the Far East, North America, India, and the southern hemisphere. The accompanying measurements of CO, O3, NO_y, H_2O, aerosols, SF6 and many other parameters as well as backward trajectories enable a detailed analysis of these measurements. The CARIBIC measurements represent a good approximation of total gaseous mercury (TGM) concentrations, thus including gaseous elemental mercury and the majority of reactive gaseous mercury (presumably Hg2+) compounds as speciation tests have shown. Tropospheric values are variable, and often correlate with CO. Above the tropopause a strong decline of mercury concentration with increasing PV and O3 is always observed. The systematic decrease of TGM in the stratosphere with altitude implies its conversion to particle bound mercury. The observation of lowest TGM concentrations at highest particle concentrations in the stratosphere provides evidence for such conversion. We will show how a seasonally dependent conversion rate could be derived using concomitantly measured SF6 mixing ratios as a timer. We also will discuss the implications for the atmospheric mercury budget.