VERTICAL TRANSPORT OF OZONE IN THE UPPER AND LOWER TROPOSPHERE DURING INDOEX: RADIATIVE EFFECTS OF AEROSOLS AND DYNAMIC PROCESSES

J. Burkert (1), M.D. Andres-Hernandez (1), R.R. Dickerson (2), H. Smit (3), F. Wittrock (1), A. Richter (1), and J.P. Burrows (1)

(1) Institute of Environmental Physics, Uni-Bremen, (2) Departement of Meteorology, University of Maryland, (3) Forschungszentrum Juelich, (burkert@iup.physik.uni-bremen.de)

The variations of different meteorological parameters and trace gas mixing ratios (rel. Hum., Temp., O3) in the lower troposphere over the Indian Ocean have been analysed. The measurements were performed in February-April 1999 during a ship cruise as a part of the Indian Ocean Experiment (INDOEX). During the campaign air parcels from the surrounding areas of the Bay of Bengal were encountered corresponding with a clearly structured vertical distribution of O3 in the lower troposphere (20 ppbv O3 at sea level, 80 ppbv O3 between 2 and 3 km). The remarkable vertical O3 structure vanished due to the moist convection associated to a 24 hours rain event and re-established directly afterwards. The responsible processes for the strong stability of the lower troposphere will be discussed, with special regards to the absorption of solar radiation by aerosols. Therefore, a radiative transfer model (SCIATRAN) has been used to calculate warming rates caused by the absorption of aerosols.

Furthermore, the role of macro- and meso-scale processes on the vertical and horizontal distribution of O3 has been qualitatively investigated by using back trajectories, O3 soundings, and tropospheric columns of O3, NO2, and HCHO derived from satellite based measurements.

Possible sources of O3 above the southern hemispheric Indian Ocean will be discussed. In addition, some questions concerning the stability of the atmosphere over the ocean will be raised.