Geophysical Research Abstracts, Vol. 7, 04200, 2005
SRef-ID: 1607-7962/gra/EGU05-A-04200

Lagrangian analysis of processes influencing long-range transport of pollutants across the North Atlantic

E. Real (1), K. Law (1), H. Schlager (2), H. Huntrieser (2), A.Stohl (3,4), D. Parrish (3), T. Ryserson (3), S. Arnold (5), C. Reeves (6) and the ACSOE team

(1) Service dAéronomie/IPSL, Université Pierre et Marie Curie/CNRS, Paris, France, (2) Institut für Physik der Atmosphäre, DLR-Oberpfaffenhofen, Germany, (3) NOAA Aeronomy Laboratory, Boulder, USA, (4) NILU, Oslo, Norway, (5) Environment Centre, University of Leeds, UK, (6) University of East Anglia, Norwich, UK, (elsa.real@aero.jussieu.fr / Fax: +33-1-44273776, Tel: +33-1-44274838

A Lagrangian approach has been used to study the processes influencing ozone levels in polluted air masses during intercontinental transport over the North Atlantic. Two aircraft campaigns have been analysed: the NARE/ACSOE campaign conducted in September 1997 and the recent IGAC Lagrangian 2k4/ European Intercontinental Transport of Ozone and Precursors (ITOP) campaign conducted in summer 2004. In both cases results from the Lagrangian dispersion model FLEXPART and trajectory analysis were used to identify cases where the same air masses were sampled on more than one occasion by one or more aircraft during transport across the North Atlantic. The more interesting cases were then analysed using a Lagrangian photochemical model, CiTTyCAT. The model was initialised with chemical data from the first sampled air mass, run along appropriate trajectories and then compared to chemical data collected downwind. A rather clear case of Lagrangian transport was observed during the NARE/ACSOE campaign where polluted air masses with high levels of ozone and precursors were sampled in the mid-troposphere first by the NOAA-P3 over North East America and then downwind by the UK C-130 aircraft flying out of the Azores. Analysis of this case shows that photochemical production of ozone is important and that mixing with air masses of upper tropospheric origin may also play a role. First results from the analysis of the ITOP campaign show that different features were observed during July/August 2004 when most of the potential cases of Lagrangian pollutant transport over the Atlantic were observed in the lower troposphere. Levels of pollutants, such as CO, measured downwind by the DLR Falcon over the eastern At-

lantic (e.g. off the coast of Ireland) did not show very elevated concentrations except in forest fire plumes. In the case of pollutant plumes transported from the north-east USA (sampled by the NOAA-P3) it seems that physical removal process and dilution/mixing with other air masses (e.g marine air, European polluted air or forest fire plumes) were important factors influencing ozone levels.