Home
Online Library ACP
- Recent Final Revised Papers
- Volumes and Issues
- Special Issues
- Library Search
- Title and Author Search

Online Library ACPD
Alerts & RSS Feeds
General Information
Submission
Review
Production
Subscription
Comment on a Paper

Impact Factor 4.865
ISI indexed
ARCHIVED IN PORTICO

Volumes and Issues   Contents of Issue 2   Special Issue

Atmos. Chem. Phys., 9, 383-411, 2009
www.atmos-chem-phys.net/9/383/2009/

Effects of regional-scale and convective transports on tropospheric ozone chemistry revealed by aircraft observations during the wet season of the AMMA campaign

G. Ancellet[1], J. Leclair de Bellevue[1], C. Mari[2], P. Nedelec[2], A. Kukui[1], A. Borbon[3], and P. Perros[3]

[1]Service d'Aéronomie, Université Paris 6, Université Versailles-St-Quentin, CNRS, France

[2]Université de Toulouse, CNRS, LA (Laboratoire d'Aérologie), France

[3]Laboratoire Interuniversitaire des Systèmes Atmosphériques, Université Paris 12, CNRS, France

Abstract. The African Monsoon Multidisciplinary Analyses (AMMA) fourth airborne campaign was conducted in July–August 2006 to study the chemical composition of the middle and upper troposphere in West Africa with the major objective to better understand the processing of chemical emissions by the West African Monsoon (WAM) and its associated regional-scale and vertical transports. In particular, the french airborne experiment was organized around two goals. The first was to characterize the impact of Mesoscale Convective Systems (MCSs) on the ozone budget in the upper troposphere and the evolution of the chemical composition of these convective plumes as they move westward toward the Atlantic Ocean. The second objective was to discriminate the impact of remote sources of pollution over West Africa, including transport from the middle east, Europe, Asia and from southern hemispheric fires. Observations of O_3, CO, NO_x, H_2O and hydroperoxide above West Africa along repeated meridional transects were coupled with transport analysis based on the FLEXPART lagrangian model. The cross analysis of trace gas concentrations and transport pathways revealed 5 types of air masses: convective uplift of industrial and urban emissions, convective uplift of biogenic emissions, slow advection from Cotonou polluted plumes near the coast, meridional transport of upper tropospheric air from the subtropical barrier region, and meridional transport of Southern Hemisphere (SH) biomass burning emissions. O_3/CO correlation plots and the correlation plots of H_2O_2 with a OH proxy revealed not only a control of the trace gas variability by transport processes but also significant photochemical reactivity in the mid- and upper troposphere. The study of four MCSs outflow showed contrasted chemical composition and air mass origins depending on the MCSs lifetime and latitudinal position. Favorables conditions for ozone production were found for MCSs with increased MCS lifetime (>1.5 days), which allowed for more H_2O_2 formation, and with trajectories crossing the 10° N latitude, which increased CO transport to the upper troposphere. The upper tropospheric concentrations sampled in the MCS outflow regions showed mixed origins including local vertical convective transport, and uplifting of air from the low troposphere over the middle-east related to the summer Asian low pressure system or from the southern hemispheric

Copernicus Publications
The Innovative Open Access Publisher

Search ACP
Library Search
Author Search

News
- Sister Journals AMT & GMD
- Financial Support for Authors
- Journal Impact Factor
- Public Relations & Background Information

Recent Papers
01 | ACPD, 12 Mar 2009: A new insight on tropospheric methane in the Tropics – first year from IASI hyperspectral infrared observations

02 | ACPD, 11 Mar 2009: Comparison of analytical methods for HULIS measurements in atmospheric particles

03 | ACPD, 11 Mar 2009: Vertical distribution of aerosols in Mexico City during MILAGRO-2006 campaign

fires.

Final Revised Paper (PDF, 20452 KB)   Discussion Paper (ACPD)

Citation: Ancellet, G., Leclair de Bellevue, J., Mari, C., Nedelec, P., Kukui, A., Borbon, A., and Perros, P.: Effects of regional-scale and convective transports on tropospheric ozone chemistry revealed by aircraft observations during the wet season of the AMMA campaign, Atmos. Chem. Phys., 9, 383-411, 2009.   Bibtex   EndNote   Reference Manager