

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



[Volumes and Issues](#) [Contents of Issue 7](#)

Atmos. Chem. Phys., 8, 1989-2005, 2008

www.atmos-chem-phys.net/8/1989/2008/

© Author(s) 2008. This work is distributed under the Creative Commons Attribution 3.0 License.

## Continental outflow from the US to the upper troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign

S. Y. Kim<sup>1</sup>, R. Talbot<sup>1</sup>, H. Mao<sup>1</sup>, D. Blake<sup>2</sup>, S. Vay<sup>3</sup>, and H. Fuelberg<sup>4</sup>

<sup>1</sup>Climate Change Research Center, Institute for the Study of Earth, Oceans, and Space, University of New Hampshire, Durham, NH 03824, USA

<sup>2</sup>Department of Chemistry, University of California – Irvine, Irvine, CA 92697, USA

<sup>3</sup>Chemistry and Dynamics Branch, NASA Langley Research Center, Hampton, VA 23681, USA

<sup>4</sup>Department of Meteorology, Florida State University, Tallahassee, FL 32306, USA

**Abstract.** A case of continental outflow from the United States (US) was examined using airborne measurements from NASA DC-8 flight 13 during the Intercontinental Chemical Transport Experiment – North America (INTEX-NA). Mixing ratios of methane (CH<sub>4</sub>) and carbon monoxide (CO) at 8–11 km altitude over the North Atlantic were elevated to 1843 ppbv and 134 ppbv respectively, while those of carbon dioxide (CO<sub>2</sub>) and carbonyl sulfide (COS) were reduced to 372.4 ppmv and 411 pptv respectively. In this region, urban and industrial influences were evidenced by elevated mixing ratios and good linear relationships between urban and industrial tracers compared to North Atlantic background air. Moreover, low mixing ratios and a good correlation between COS and CO<sub>2</sub> showed a fingerprint of terrestrial uptake and minimal dilution during rapid transport over a 1–2 day time period. Analysis of synoptic conditions, backward trajectories, and photochemical aging estimates based on C<sub>3</sub>H<sub>8</sub>/C<sub>2</sub>H<sub>6</sub> strongly suggested that elevated anthropogenic tracers in the upper troposphere of the flight region were the result of transport via convection and warm conveyor belt (WCB) uplifting of boundary layer air over the southeastern US. This mechanism is supported by the similar slope values of linear correlations between long-lived (months) anthropogenic tracers (e.g., C<sub>2</sub>Cl<sub>4</sub> and CHCl<sub>3</sub>) from the flight region and the planetary boundary layer in the southeastern US. In addition, the aircraft measurements suggest that outflow from the US augmented the entire tropospheric column at mid-latitudes over the North Atlantic. Overall, the flight 13 data demonstrate a pervasive impact of US anthropogenic emissions on the troposphere over the North Atlantic.

[Final Revised Paper](#) (PDF, 3755 KB) [Discussion Paper](#) (ACPD)

Citation: Kim, S. Y., Talbot, R., Mao, H., Blake, D., Vay, S., and Fuelberg, H.: Continental outflow from the US to the upper troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign, Atmos. Chem. Phys., 8, 1989-2005, 2008. [Bibtex](#) [EndNote](#) [Reference Manager](#)

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, 04 Nov 2008: HOCl chemistry in the Antarctic stratospheric vortex 2002, as observed with the Michelson Interferometer for Passive Atmospheric Sounding (MIPAS)

02 | ACPD, 03 Nov 2008: Diurnal evolution of cloud base heights in convective cloud fields from MSG/SEVIRI data

03 | ACPD, 03 Nov 2008: Anthropogenic influence on SOA and the resulting radiative forcing

