



## **Transport of NMHCs and halocarbons observed by CARIBIC: A case study**

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The CARIBIC project (Civil Aircraft for the Regular Investigation of the Atmosphere Based on an Instrument Container) involves the monthly deployment of an instrument container equipped to make atmospheric measurements from onboard a long-range commercial airliner. Since December 2004, flights for the second phase of CARIBIC have been aboard a Lufthansa Airbus A340-600 traveling between Frankfurt, Germany and destinations in Asia, North America and South America. The instrument package housed in the container is fully automated and during each flight carries out a variety of real-time trace gas and aerosol measurements, and also collects 28 air samples, which are analyzed upon return to the laboratory. Routine measurements made from the sampling flasks include greenhouse gases, nonmethane hydrocarbons (NMHCs), and halocarbons; results of air sample analysis form the basis for the data discussed here.

While the majority of CARIBIC samples represent background free tropospheric air and air representative of the upper troposphere/lower stratosphere, the aircraft also, less frequently, encounters air parcels influenced by more recent emissions. Here we present a case study of a round-trip flight between Frankfurt and Toronto, Canada during September 2007. During this flight, different air masses of unique origin were encountered; a number of samples were influenced by transport from the Gulf of Mexico, while others had source regions in Central and Southeast Asia. Samples from the Gulf of Mexico exhibited enhancements in C3-C6 alkanes, as well as a number of halogenated compounds with oceanic sources, such as methyl iodide and bromoform, while Asian samples had enhanced levels of combustion products (CO, acetylene, benzene) and anthropogenic halocarbons (methylene chloride, chloroform, perchloroethylene). Additionally, a number of samples also showed stratospheric influence, and these samples were characterized by relatively depleted levels of many of the compounds measured. Characterization of the different air masses will be discussed, and these results will be compared to samples collected during other CARIBIC flights, which are representative of both background air and air masses influenced by similar source regions.