



The New CARIBIC (Civil Aircraft for the Regular Investigation of the Atmosphere Based on an Instrumented Container) Airbus A340-600 Based Observational System

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An airfreight container equipped with automated analyzers was deployed onboard of a passenger Boeing 767 ER during regular long-distance flights. From November 1997 to the decommissioning of the aircraft in May 2002, 86 flights were carried out on routes to Southern India, the Caribbean, and Southern Africa providing data on distribution of O₃, CO, aerosols (nuclei > 4, 12, 18 nm) in the tropopause region from continuous measurements and of CO₂, H₂, CO, their isotopic composition, halocarbons, hydrocarbons, N₂O, CH₄, SF₆, and elemental aerosol composition from analyses of samples taken during the CARIBIC flights.

Based on this experience a totally new, more powerful CARIBIC system has been developed and put into operation, based on a sophisticated inlet system and a new instrument container with a largely extended instrumentation. The new CARIBIC system has been implemented on a new Lufthansa Airbus 340-600, and the first measurement flight took place in December 2004. This new CARIBIC system is planned to be operational for a period of 10 years. The current instrument package comprises analyzers for fast and slow ozone measurements, total and gaseous H₂O, NO and NO_y, CO, CO₂, O₂, Hg, and three condensation nuclei counters for particles larger than 4, 12, and 18 nm. A proton transfer mass spectrometer (PTR-MS) and an optical particle counter are installed to measure selected organic compounds and the particle size distributions, respectively. Samples of aerosol, of air (glass canisters) and of VOC and OVOC (adsorption tubes) are taken as well. This allows for a broad spectrum of accurate laboratory analyses.

The inlet system is designed for sampling of small aerosol particles. In addition it contains 3 separate probes to sample air for measurements of trace gases (heated and PFA coated), total and gaseous water (heated electropolished stainless steel). It also accommodates a mini differential optical absorption spectrometer (MAX-DOAS) with 3 telescopes, and a camera for information about clouds. Important aspects of the new CARIBIC system and first results will be presented.