



## **CO<sub>2</sub> isotopic composition in the upper troposphere: the project CARIBIC**

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The project CARIBIC (<http://caribic-atmospheric.com>), aims to study atmospheric chemistry and composition by measuring many compounds and species in the upper troposphere-lowermost stratosphere around the globe by using a commercial aircraft. CARIBIC has two phases, CARIBIC-1 and CARIBIC-2 (CARIBIC-LUFTHANSA). During CARIBIC-1 (flights from Germany to mainly India, South Africa and the Caribbean), large air samples of 250 l were taken. The CO<sub>2</sub> isotope composition was measured on cryogenic extracts from these samples. Despite of a scatter in d18O(CO<sub>2</sub>) at the beginning (CO<sub>2</sub>-water isotope exchange in the steel canisters) and the limited number of air samples (12 samples per flight), the approach to analyse CO<sub>2</sub> isotopes in the UTLS and free troposphere appears useful and measurements continued for CARIBIC-LUFTHANSA.

The new instrument container (15 experiments) of CARIBIC-LUFTHANSA operates onboard an A340-600 of Lufthansa (Frankfurt, Germany) absolving monthly flights from Frankfurt to China, South America, USA and Canada. 28 air samples are collected in glass containers (2.7 l volume, pressure ~3 bar), giving much better sampling resolution than for CARIBIC-1. A specially designed CO<sub>2</sub> extraction line was installed at IRMM (Geel, Belgium) and isotope measurements started in 2007. Particular focus is on the quality of d18O(CO<sub>2</sub>) data which give important information about CO<sub>2</sub> exchange with oceans, soils and biosphere, being a long-term indicator of

global changes in the CO<sub>2</sub> cycle as well as oceans' feedback.

Preliminary data for some CARIBIC-2 flights demonstrate a correlation between d<sup>13</sup>C(CO<sub>2</sub>) and inverse concentration of CO<sub>2</sub>, indicating mixing of similar air masses into background air along a sampling route. Some correlations are extremely compact thus also confirming a high quality of sampling and measurement. Due to use of glass containers a preservation of d<sup>18</sup>O(CO<sub>2</sub>) was expected and indeed a limited d<sup>18</sup>O(CO<sub>2</sub>) scatter and a similarity of d<sup>18</sup>O(CO<sub>2</sub>) for neighbouring samples basically confirms that. Data of the CARIBIC-2 record (the year 2007) will be presented at the meeting, aiming to assess d<sup>13</sup>C(CO<sub>2</sub>) variations in the UT-LMS region and compare d<sup>18</sup>O(CO<sub>2</sub>) with the reliable part of CARIBIC-1 record (October 2000-April 2002).