Geophysical Research Abstracts,
Vol. 11, EGU2009-7740, 2009
EGU General Assembly 2009

Deuterium content of H2 measured on air samples from the CARIBIC project

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H_2 is present in the atmosphere at levels of ∼500 ppb; its largest sources are the oxidation of methane and other hydrocarbons and combustion processes. In the coming decades, H_2 levels are expected to rise due to use of hydrogen as an energy carrier. This may affect methane lifetimes and stratospheric ozone depletion. Unfortunately, large uncertainties still exist in the global H_2budget. The different sources and sinks of H_2 have very distinct isotopic signatures and fractionation coefficients, respectively. For this reason, measurements of isotopic composition are a promising tool to gain insight into H_2 source and sink processes and to constrain the terms in the global budget.

The CARIBIC project uses an automated instrument container on board of a commercial passenger aircraft to carry out in situ measurements of trace gases and aerosols and to collect air samples. The use of a commercial airliner results in samples mostly from the Upper Troposphere-Lower Stratosphere (UTLS) region. Although the UTLS region is considered to be an interesting part of the atmosphere, relatively few measurements have been made there before. The CARIBIC samples are routinely analyzed for various gases, including four important greenhouse gases.

In addition, air samples of 15 CARIBIC flights have now been analyzed for molecular hydrogen concentration (H_2) and H_2 deuterium content (δD-H_2) in the isotope laboratory of the Institute of Marine and Atmospheric Research Utrecht (IMAU). A GC-IRMS system (similar to *Rhee et al.* [2004]) is used to determine the concentration and deuterium content of atmospheric H2 precisely and routinely. This poster will present a selection of the first results.

For some flights, samples close to the takeoff and landing region show strong contamination signatures (high H_2 concentrations and low δD-H_2 values). With the exclusion of these samples, δD values correlate negatively with methane concentration, as observed previously by *Rahn et al.* [2003] and *Röckmann et al.* [2003]. Samples from the stratosphere tend to have lower methane concentrations and higher δD-H_2 values.

References

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