



IAGOS - CARIBIC trace gas measurements at KIT

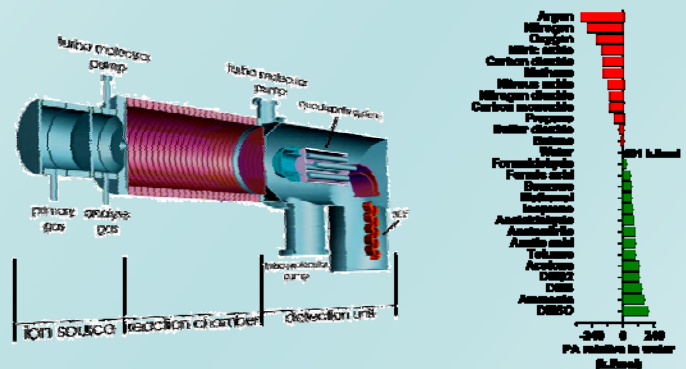


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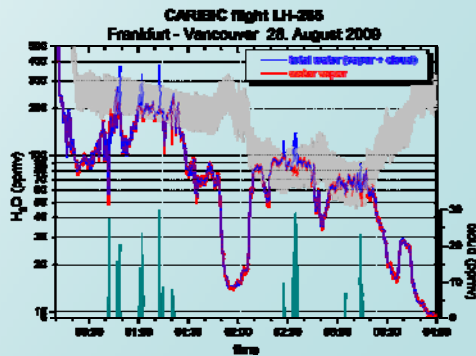
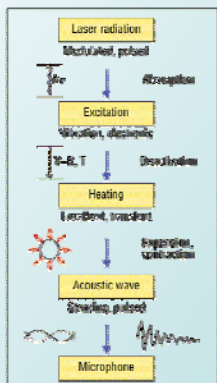
The Institute of Meteorology and Climate Research (IMK) at the Karlsruhe Institute of Technology (KIT) provides five trace gas instruments in CARIBIC.

Instrument / Technique	Measured species
UV - photometer	Ozone (4s, very accurate)
Chemiluminescence sensor	Ozone (10 Hz, very precise)
Frostpoint Hygrometer	H ₂ O total (vapour and cloud)
2-channel photoacoustic laser spectrometer	H ₂ O total, H ₂ O vapour
Proton-Transfer-Reaction-Massspectrometer	volatile organic compounds (acetone, acetonitrile, methanol, acetaldehyde, ...)
Tunable diode laser spectrometer	D/H, ¹⁸ O/ ¹⁶ O in H ₂ O total
Integrated cavity output spectrometer	CO ₂ , CH ₄

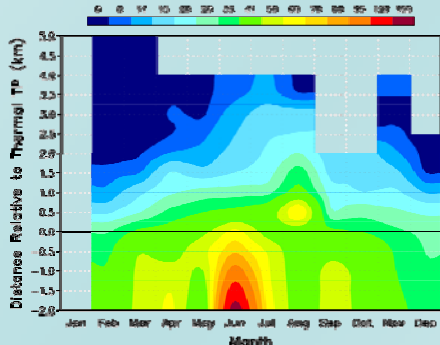
Proton-Transfer-Reaction Mass-Spectrometer



2-channel photoacoustic laser spectrometer



Total water (blue), water vapor (red), and cloud water/ice (green) during a flight to Vancouver (Canada) at 10-12 km.



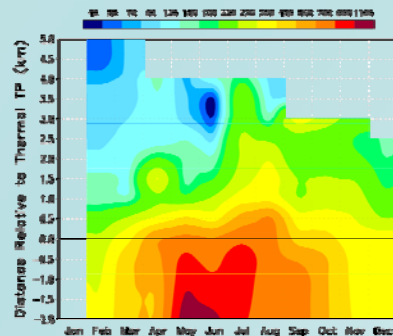
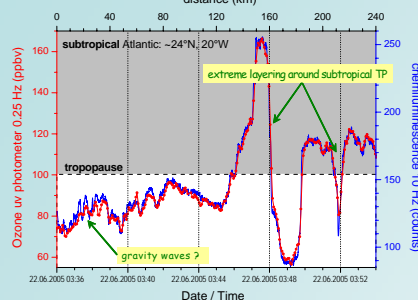
Seasonal variation of H₂O (in ppmv) relative to the tropopause (-11 km) measured between 2005 and 2009.

2-sensor ozone instrument

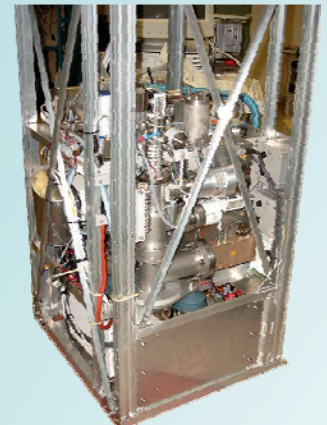
The ozone instrument contains two home-made detectors, a UV photometer and a chemiluminescence sensor. It shows very high accuracy (< 0.3 ppbv) and measurement speed (10 Hz).

Cross section of ozone at 24°N, 20°W, around the tropopause of ~12 km, measured with the UV photometer (red) and the chemiluminescence sensor (blue).

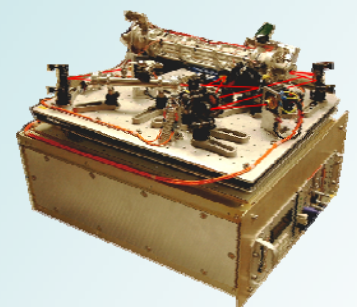
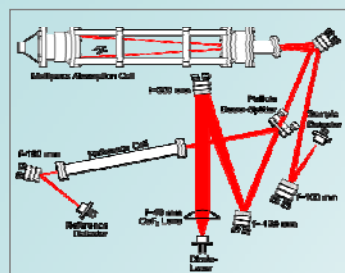
Extremely strong gradients are resolved, see e.g. at 3:48 and 3:52.



Seasonal variation of acetone (in pptv) relative to the tropopause (-11 km) measured between March 2005 and October 2008.

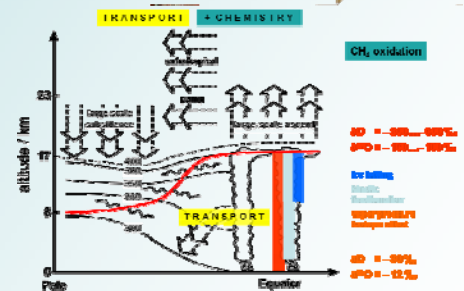


Tunable diode laser spectrometer



The isotopic composition of H₂O is a very powerful tracer that contains information on the hydrological cycle of the atmosphere, e.g. the condensation history of the sampled air (latitude of evaporation, ratio of convection and slow ascent), and cloud processes.

CARIBIC will provide the first regular monitoring of the H₂O isotopic composition.



- IAGOS-CARIBIC provides maps of ~100 trace gases and aerosol properties in the upper troposphere / lower stratosphere, just where the natural greenhouse effect is generated.
- IAGOS-CARIBIC provides a (worldwide) unique dataset, particularly valuable for model evaluation, comparisons with satellite observations, and trend analyses.
- IAGOS-CARIBIC is a flexible platform which allows the installation of new instruments showing up.