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Setup of an interface for operation of IAGOS (In-service Aircraft Global Observing System) CORE instruments onboard the IAGOS CARIBIC platform.

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mhchem The European Research Infrastructure IAGOS (In-service Aircraft for a Global Observing System; www.iagos.orgwww.iagos.org) responds to the increasing requests for long-term, routine in-situ observational data by using commercial passenger aircraft as measurement platforms. The infrastructure is built from two complementary approaches: The “CORE” component comprises the implementation and operation of autonomous instruments installed on up to 20 long-range aircraft of international airlines for continuous measurements of important reactive gases and greenhouse gases, as well as aerosol particles, dust and cloud particles. The fully automated instruments are designed for operation aboard the aircraft in unattended mode for several months and the data are transmitted automatically. The complementary “CARIBIC” component consists of the monthly deployment of a cargo container equipped with instrumentation for a larger suite of components. The CARIBIC container has equipment for measuring ozone, carbon monoxide, nitrogen oxides, water vapor and airborne particles. Furthermore the container is equipped with a system for collecting air samples. These air samples are analyzed in the laboratory. For each sample measurements for more than 40 trace gases including CFC’s prohibited by the Montreal protocol, and all greenhouse gases are performed.

The Interface described in this work is designed to host one of IAGOS CORE (Package2) instruments. Available are:

- P2a, P2b, measuring NO_y and NO_x
- P2c, measuring the aerosol size-distribution (0.25 μm. . . 2.5μm), the total- and the non-volatile particle core number concentration
- P2d, greenhouse gases CO_2,CO H_2O and CH_4
- P2e, aerosol optical properties and size-distribution (0.25 μm. . .2.5μm)

The Interface has provisions for gas supply, butanol working liquid, connections to the chemical- and an aerosol inlet line as well as provides the connectivity to the CARIBIC master computer defining the different measurement phases.

Introducing the IAGOS CORE interface in the CARIBIC container will allow closure studies between both suits of in-situ instruments in the near future,thus generating excellent opportunities for QA/QC studies. Up to now the only way to compare these instruments outside the lab is to find occasional events with time and spatial colocations of the IAGOS CARIBIC aircraft with the IAGOS CORE fleet.

Within the certification documents of the interface an envelope is defined for operating optinal P2-instruments. The instruments have to fulfill certain criteria like EMI- and vibration tests as well as power consumption and weight. The CARIBIC platform will be ideal for first airborne tests for future P2-instruments until they are certified under the very restrictive rules for IAGOS CORE operation. The interface was integrated in November 2016 in the CARIBIC container. The certification is under way as part of the next CARIBIC container revisions scheduled in late spring 2017.