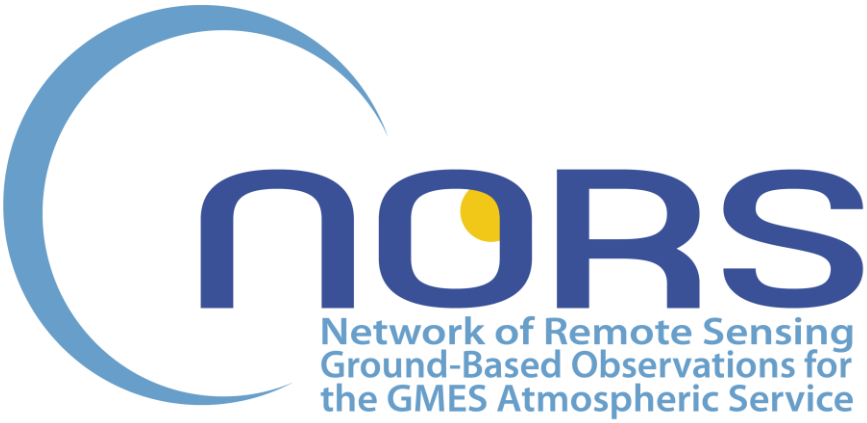

Milestone report covering MS 2, 3, 4, 5 & 6

Milestone date: 30/04/2012

Date of issue: 10/05/2012

Introduction

The milestone of the 30th of April 2012 (M6) concerns:

- MS2 Formats agreement
- MS3 Rapid data delivery system
- MS4 Selection of O3 data sets
- MS5 Agreement on comparison sites and periods
- MS6 Definition of validation server

At the same time two deliverables have been submitted:

- D4.1 Data format definitions
- D8.1 Validation server User Requirements Document (URD)

1. MS2 Formats agreement

Written by Emmanuel Mahieu, ULg.

We will adopt the GEOMS-compliant templates, for all techniques involved in NORS. They are similar to those used by the NDACC network. To be compatible with the NDACC DHF, we will stick to the hdf v4 format.

2. MS3 Rapid data delivery system

Written by Klemens Hocke, UBern.

The Rapid Data Delivery System (RDDS) has been established after a negotiation between NORS and NDACC. Roger Lin and Jeannette Wild from the NDACC headquarter and Martine de Maziere and Geir Braathen from NORS discussed the submission of NORS data files to the NDACC data center on April 19th, 2012 with the result that the NORS data files are now collected in the HDF file directories of each ground station at the NDACC data center.

In the time before April 2012, the NORS partners already prepared the generation of HDF4 files so that submission of GEOMS HDF4 sample files have been performed by 60 percent of the NORS partners within 1-2 weeks after the opening of the NDACC data center for the NORS files.
The rest of the NORS partners have minor, solvable problems with the file submission and acceptance of their files at the NDACC data center.

Two related problems were discussed by the NORS partners: 1) choice of the file version and 2) usage of the Data Qualifier of the GEOMS HDF4 files. Since the HDF file directories at NDACC are used for near-real-time (NRT) data files as well as for consolidated and validated data files, the data users have to pay more attention that they fetch the right files of the desired version out of the NDACC data center. Basically the rule is that the highest version number should be preferred by the data user. Further the data user can distinguish between NRT and consolidated data series by looking at the field Data Qualifier in the meta data of the HDF4 files. However it seems to be necessary to work out clearer instructions how the field Data Qualifier is used by the NORS partners. Further, communication with the data users should

be initiated by NORS in order to give them information about the meaning of the different file versions, e.g., by README files or by personal emails.

The main work tasks of the NORS partners for the work package RDDS remain the optimization of the generation and submission process of GEOMS HDF4 files. Further the improvement of the data quality of the NORS NRT-data files is an important task. Later, submission of consolidated and validated data series will be a RDDS activity.

Table 1: List of the NORS scientists who are responsible for submission of GEOMS HDF-4 files of the NORS instruments to NORS RDDS at NDACC.

Station	**instrument**	**scientist's name**	**scientist's address**	
Alps/Bern, UBern	micro wawe	Klemens Hocke	klemens.hocke@iap.unibe.ch	HDF-4
Alps/Jungfraujoch, BIRA	DOAS	Michel Van Roozendael	michel.vanroozendael@aeronomie.be francois.hendrick@aeronomie.be	HDF-4
Alps/Jungfraujoch, BIRA	MAXDOAS	Michel Van Roozendael	michel.vanroozendael@aeronomie.be francois.hendrick@aeronomie.be	HDF-4
Alps/OHP, CNRS	O3 lidar	Sophie Godin-Beekmann	sophie.godin-beekmann@latmos.ipsl.fr, maud.pastel@latmos.ipsl.fr	HDF-4
Alps/OHP/CNRS	DOAS	Andrea Pazmino	andrea.pazmino@latmos.ipsl.fr ariane.bazureau@latmos.ipsl.fr	HDF-4
Alps/Jungfraujoch/ULg	FTIR	Emmanuel Mahieu	Emmanuel.Mahieu@ulg.ac.be	HDF-4
La Reunion, BIRA	FTIR	Martine De Mazière	martine.demaziere@aeronomie.be bavo.langerock@aeronomie.be	HDF-4
La Reunion, CNRS	O3 lidar	Sophie Godin-Beekmann	sophie.godin-beekmann@latmos.ipsl.fr maud.pastel@latmos.ipsl.fr	HDF-4
La Reunion, CNRS	DOAS	Andrea Pazmino	andrea.pazmino@latmos.ipsl.fr ariane.bazureau@latmos.ipsl.fr	HDF-4
Ny Alesund	micro wave	Mathias Palm	mathias@iup.physik.uni-bremen.de	HDF-4
Ny Alesund	MAXDOAS	Folkard Wittrock	folkard@iup.physik.uni-bremen.de	
Ny Alesund	FTIR	Mathias Palm	mathias@iup.physik.uni-bremen.de	
Izana, KIT	FTIR	Thomas Blumenstock	thomas.blumenstock@kit.edu	HDF-4
Izana, INTA	MAXDOAS	Monica Navarro	navarrocm@inta.es	HDF-4

3. MS4 Selection of O3 data sets

Written by Maud Pastel, Sophie Godin-Beekmann, LATMOS.

The main objective of this work package is to develop a methodology for integrating ground-based data sources to provide consistent ozone vertical distribution time series as well as tropospheric and stratospheric ozone columns at 4 NDACC stations (NyAlesund, Alpine station (OHP), Izaña, La Réunion). In the table below, measurements to be used for the study are presented for the 4 stations

NDACC station	Instrument (location)	Measurement	Start	PI contact
Ny Alesund (79°N, 12°E)	FTIR (Ny Alesund)	O3 total column	92-	jnotholt@iup.physik.uni-bremen.de
		O3 profiles	92 -	
	LIDAR (Ny Alesund)	O3 profiles	91-	gathen@awi-potsdam.de
	Microwave (Ny Alesund)	O3 profiles	94-	jnotholt@iup.physik.uni-bremen.de
	Spectrometre UV VIS (Ny Alesund)	O3 total column	95-	burrows@iup.physik.uni-bremen.de
	Ozonesonde (Ny Alesund)	O3 profiles	92-	gathen@awi-potsdam.de
Alpine station (44°N, 6°E)	FTIR (Jungfraujoch 47°N,8°E)	O3 total column	95-	emmanuel.mahieu@ulg.ac.be
		O3 profiles	95 -	
	LIDAR (OHP)	O3 profiles	85-	Sophie.Godin-Beekmann@latmos.ipsl.fr
	Microwave (Bern 47°N, 7°E)	O3 profiles	94-	klemens.hocke@iap.unibe.ch
	Dobson (OHP)	O3 total column	83-	Robert.D.Evans@noaa.gov
	SAOZ (OHP)	O3 total column	92	Andrea.pazmino@latmos.ipsl.fr
	Ozonesonde (OHP)	O3 profiles	91-	Gérard.Ancellet@latmos.ipsl.fr Sophie.Godin-Beekmann@latmos.ipsl.fr
	FTIR	O3 total	99-	thomas.blumenstock

Izana (28°N, 16°W)	Izana	column		@imk.fzk.de
		O3 profiles	99 -	
	FTIR Mauna Loa (20N, 156W)	O3 total column	95	jamesw@ucar.edu
	LIDAR Mauna Loa (20N, 156W)	O3 profiles	85-	mcdermid@tmf.jpl.nasa.gov
	Microwave Mauna Loa (20N, 156W)	O3 profiles	95-	jamesw@ucar.edu
	Spectrometre UV VIS (Izana)	O3 total column	93-	gilm@inta.es
	Ozonesonde (Izana)	O3 profiles	91-	ecuevas@inm.es aredondas@inm.es

La Réunion (22°S, 56°E)	FTIR (La Réunion)	O3 total column	95-	martine@oma.be
		O3 profiles	95 -	
	LIDAR (La Réunion)	O3 profiles	00-06	Sophie.Godin-Beekmann@latmos.ipsl.fr
	Microwave (La Réunion)	O3 profiles	07-	philippe.ricaud@aero.obs-mip.fr
	Spectrometre UV VIS (La Réunion)	O3 total column	93	Andrea.pazmino@latmos.ipsl.fr
	Ozonesonde (La Réunion)	O3 profiles	98-03	francoise.posny@univ-reunion.fr

First part of the work is to evaluate the validity domain of ozone profile data by using error assessment and vertical resolution of the various measurements. We started with the Alpine station, using the Lidar DIAL data at OHP, the Microwave data at Bern and the FTIR data at the Jungfrauchjoch station. Data from FTIR and Microwave spectrometers are being reprocessed and are not available yet. Nevertheless, a primary work has been done on what available.
In order to obtained coincident data, two criteria is used: first, the time of the measurement and second, the similarity of air masses observed. The latter is defined via the Equivalent latitude calculated from the Potential Vorticity fields computed from ECMWF Era interim data.

The delivery of our method is in November 2013.

4. MS5 Agreement on comparison sites and periods

Written by Stephan Henne, EMPA.

Based on the data availability and additional considerations (as detailed in Task 5.1 status report 2012-04-30) it was agreed to carry out the detailed inter-comparison for the sites Jungfraujoch and Izana for the period 2010 January to 2012 January. The selected period will cover 2 years of available FTIR (CO, CH4, O3), DOAS (NO2) and in-situ (CO, CH4, O3, NO2) data, while MAXDOAS (NO2, O3) data are only available from 2010 March onwards. If later during Task T5.2 it would become apparent that the inter-comparison at one of the selected sites proves more difficult than envisaged or even impossible it would still be possible to include the data from the NyAlesund site.

Data availability status

The following data (or meta data giving the timestamp of the sample) were obtained. Individual in-situ, MAXDOAS and DOAS sampling times were aggregated to hourly bins before comparing the data availability.

Most collocated data are available for the Jungfraujoch site, followed by Izana and NyAlesund. However, the figures below only represent those data for which concrete time stamps were already available. For Izana MAXDOAS measurements with sufficient data quality are available since 2010 March (email Rodriguez, 2012-04-23) while DOAS data are available since 2000.

Figure 1: Data availability for the site JFJ. The on the right indicate the number of collocated data from in-situ observations for each remote sensing device. The collocation criterion was simply the availability of in-situ data with a window of 6 and 2 hours around the remote sensing data for FTIR and MAXDOAS/DOAS, respectively.

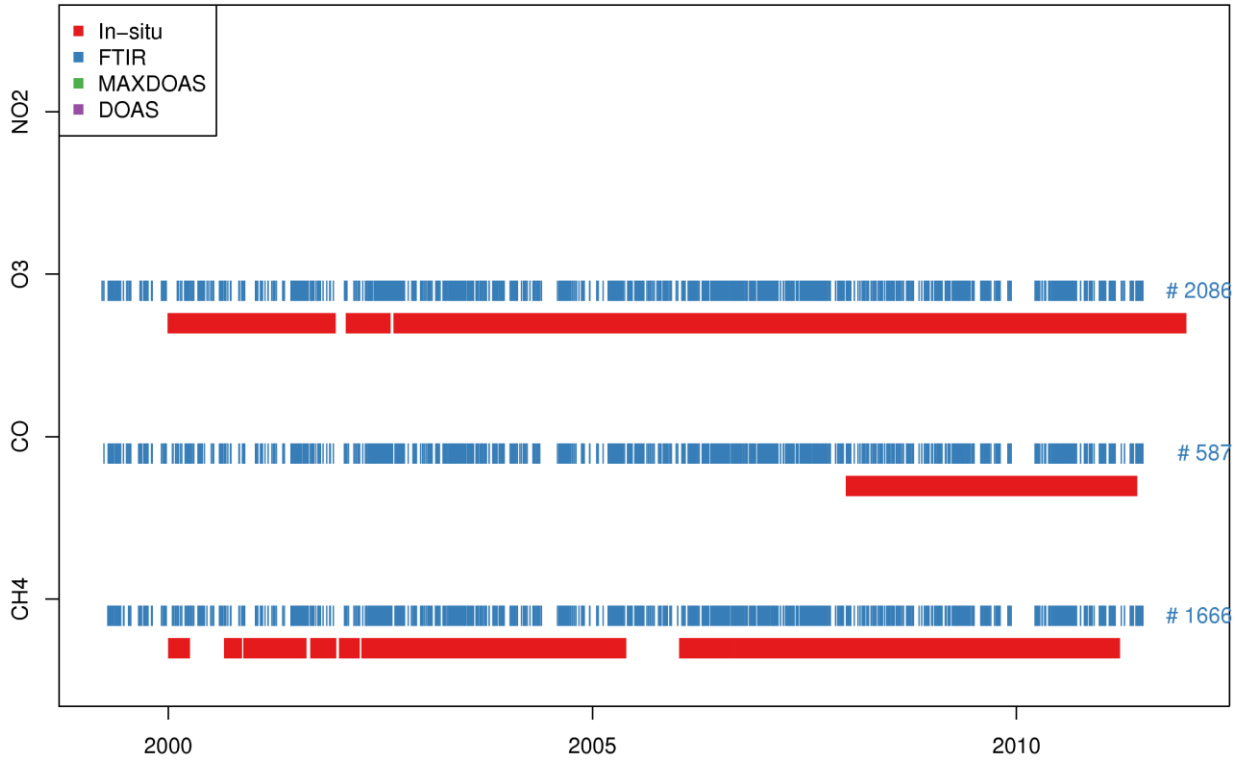

Figure 2: Same as Figure 1 but for station Izana.

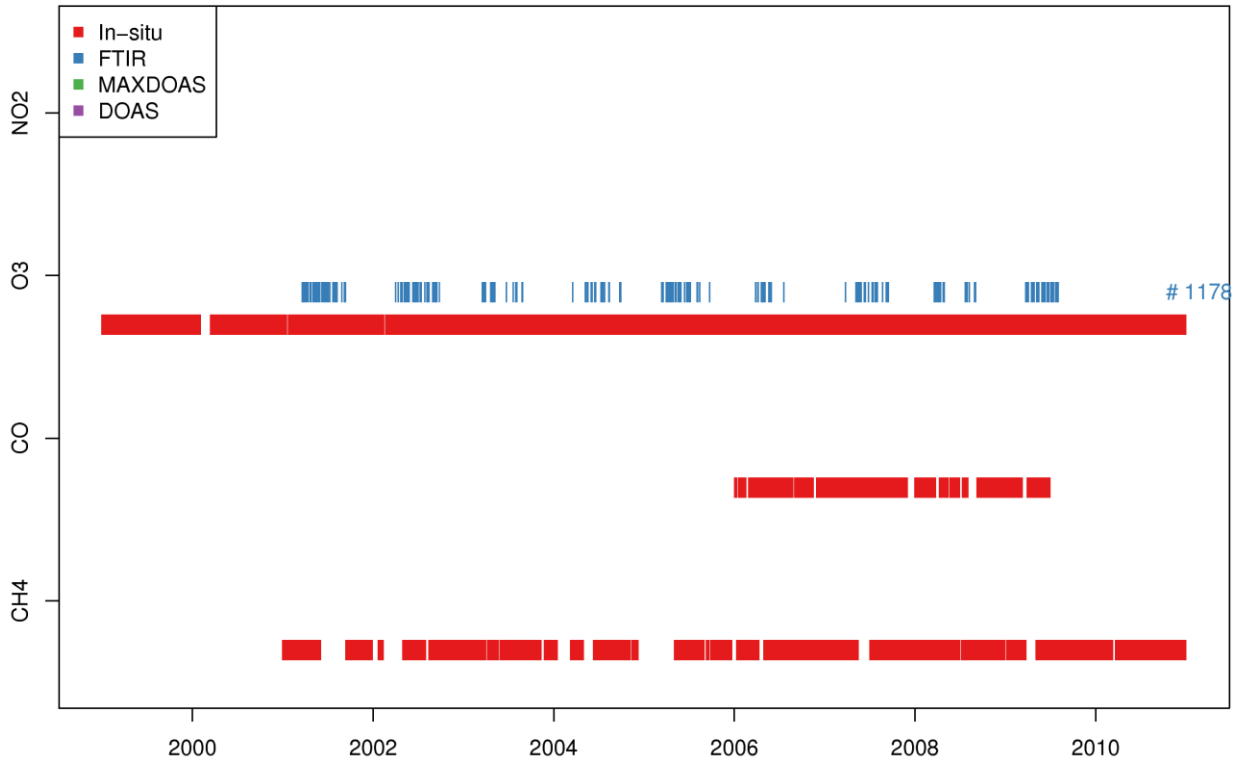

Figure 3: Same as Figure 1 but for station NyAlesund/Zeppelin.

Further representativeness considerations

Besides data availability, there are several arguments against the selection of Ny Alesund and in favor of Izana:

1. the observation period for FTIR is limited to the polar summer in Ny Alesund
2. the remote location of Ny Alesund should be accompanied by rather small horizontal concentration gradients, which may turn a detailed estimation of measurement representativeness unnecessary
3. though also at a remote location Izana may receive considerable pollution loadings from Europe, North America and Africa.

First direct comparisons

Where possible, a first direct comparison of the collected raw data was undertaken to demonstrate the availability of collocated data. For the comparison FTIR data up to 2 km above the instrument altitude were aggregated. No correction for dry air versus moist air observations were applied. Some of the presented FTIR data will be reprocessed during NORS.

Jungfraujoch

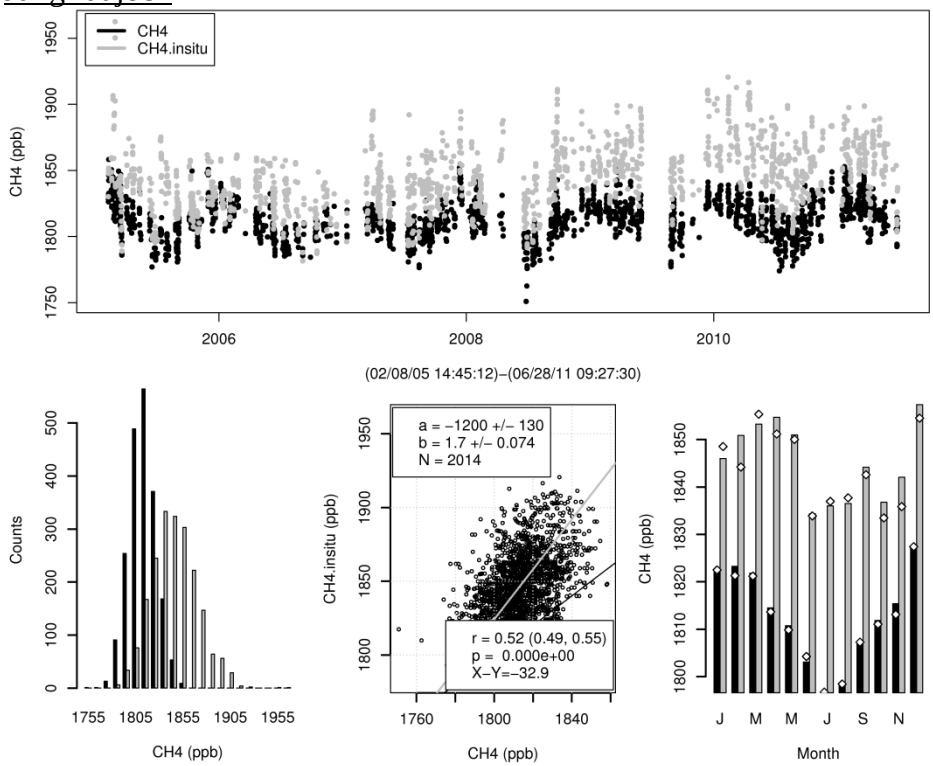

Figure 4: Raw data comparison of CH4 observations at JFJ: (black) FTIR, (gray) in-situ. (top) time series, (bottom left) pdf, (bottom centre) linear regression, (bottom right) annual cycle.

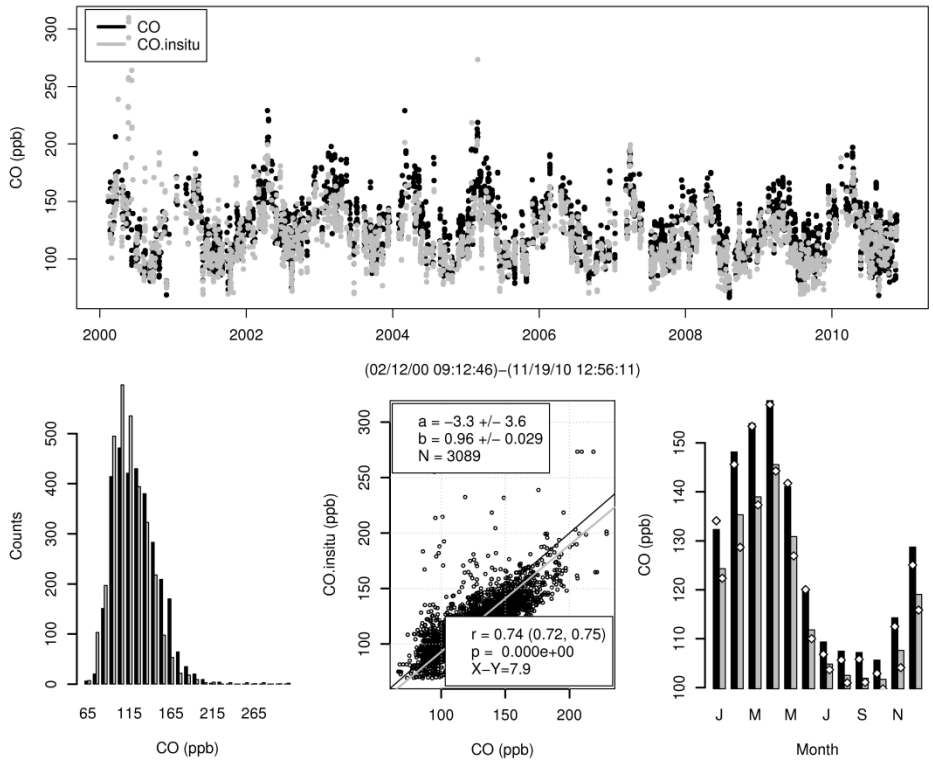

Figure 5: Same as Figure 4 but for CO at JFJ.

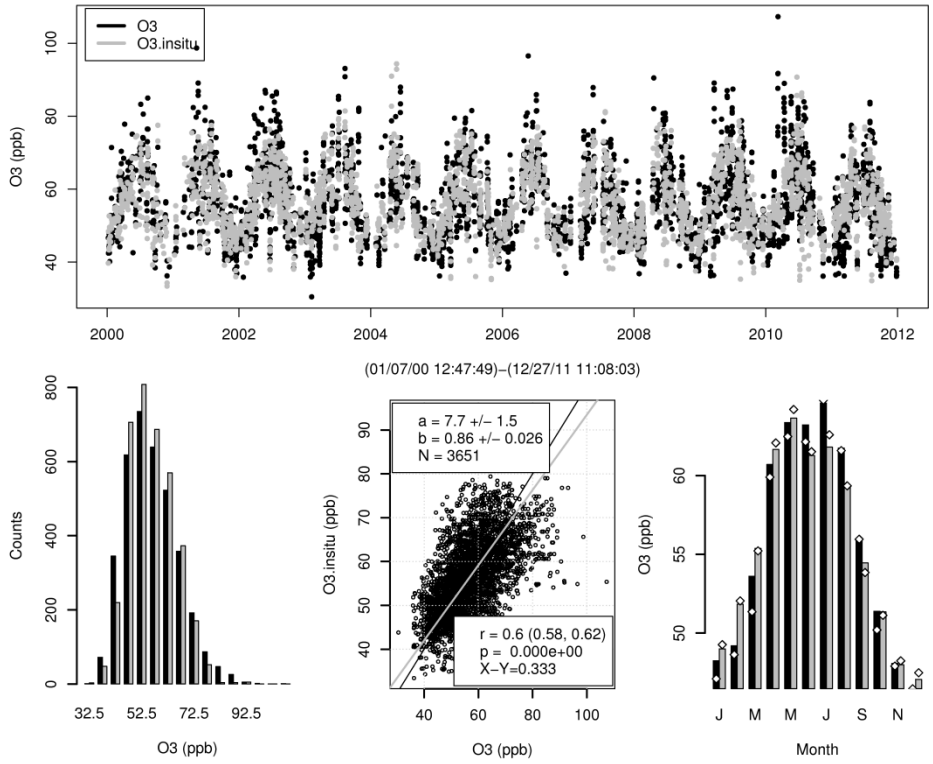

Figure 6: Same as Figure 4 but for O3 at JFJ.

Izaña

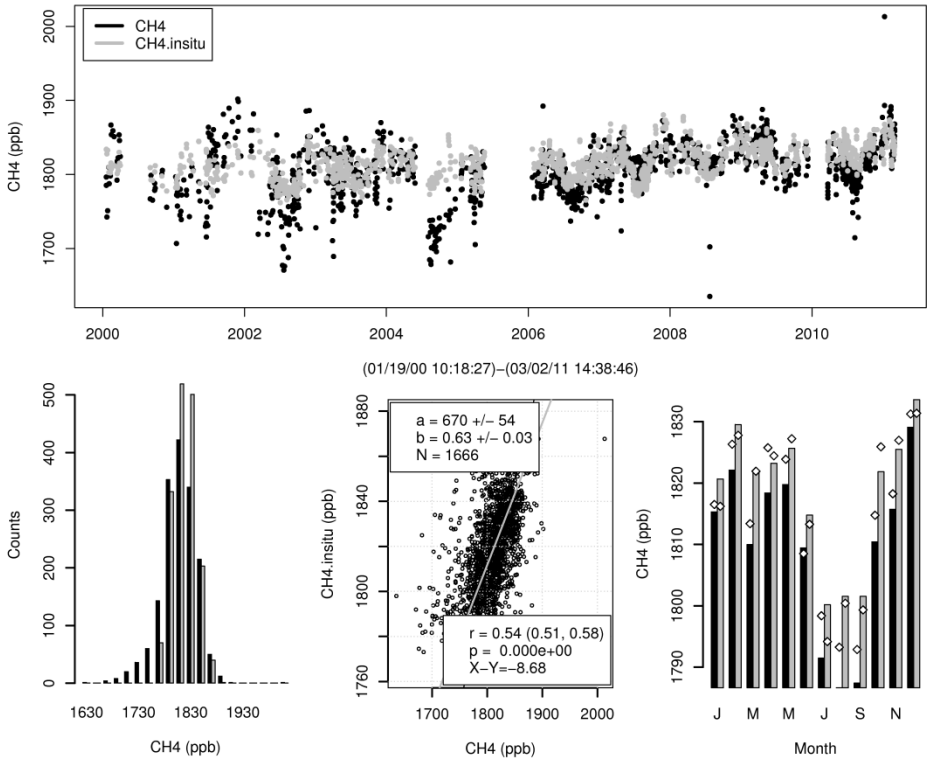

Figure 7: Same as Figure 4 but for CH4 at IZO.

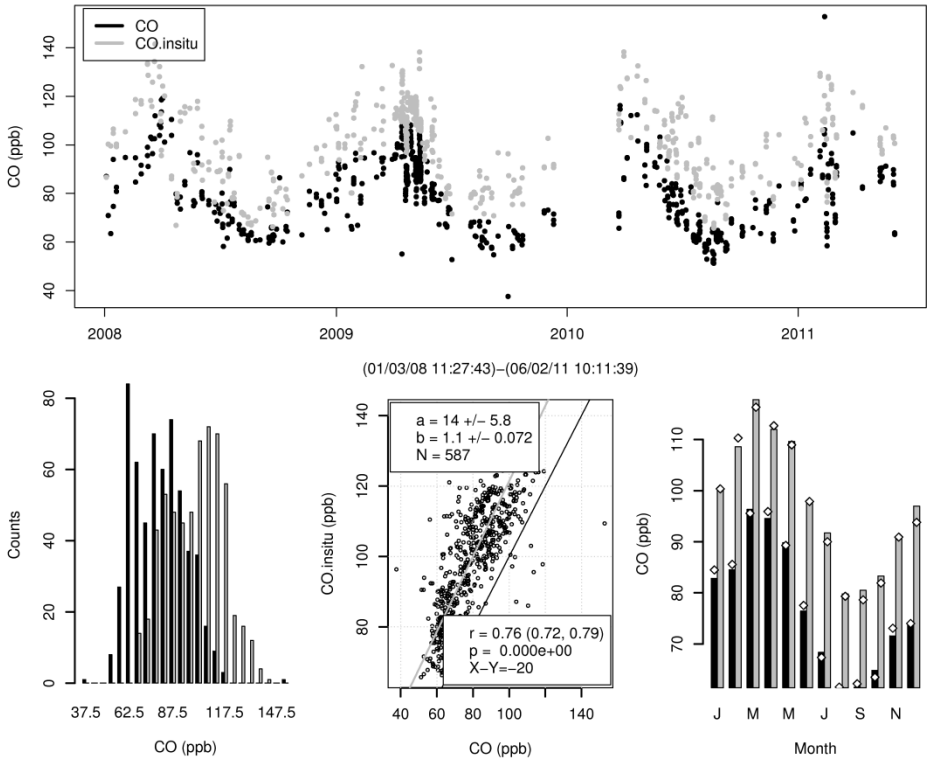

Figure 8: Same as Figure 4 but for CO at IZO.

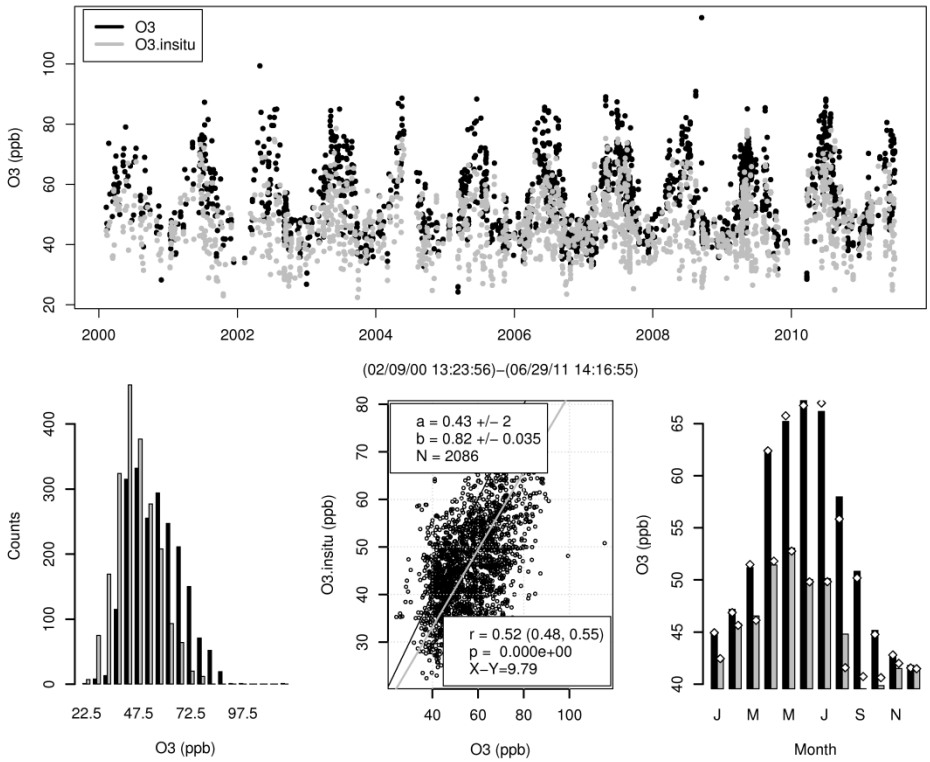

Figure 9: Same as Figure 4 but for O3 at IZO.

NyAlesund/Zeppelin

FTIR data were not yet available for CO, CH4.

Open issues

IZO:

- Official permission to use the in-situ data and support to obtain higher temporal resolution data.
- Time stamps of MAXDOAS scans.

ZEP:

- Official permission to use the in-situ data and support to obtain higher temporal resolution data.
- Clarification of available MAXDOAS/DOAS products.

5. MS6 Definition of validation server

Written by Bavo Langerock, BIRA-IASB.

The service that the validation server should provide is described in the User Requirement Document (URD) in deliverable D8.1. This document was created in close collaboration with the different partners involved: the NORS members and steering committee, the MACC-II data providers, the MACC-II VAL subproject members and the project responsibles at S&T. At March 14, a preliminary version was distributed among this group and due to the high response rate, an updated version was sent out for revision at the end of April. All partners have collaborated on the definition of the concept and purpose of the NORS validation server. Some technical details still require further investigation and clarification. Due to their

technical nature, these will be developed alongside the implementation of the validation server system (task 8.2) between months 6 en 18, i.e. before the test-phase of the validation server starts. This will not obstruct further progress in WP8.