

NORS Capacity Building

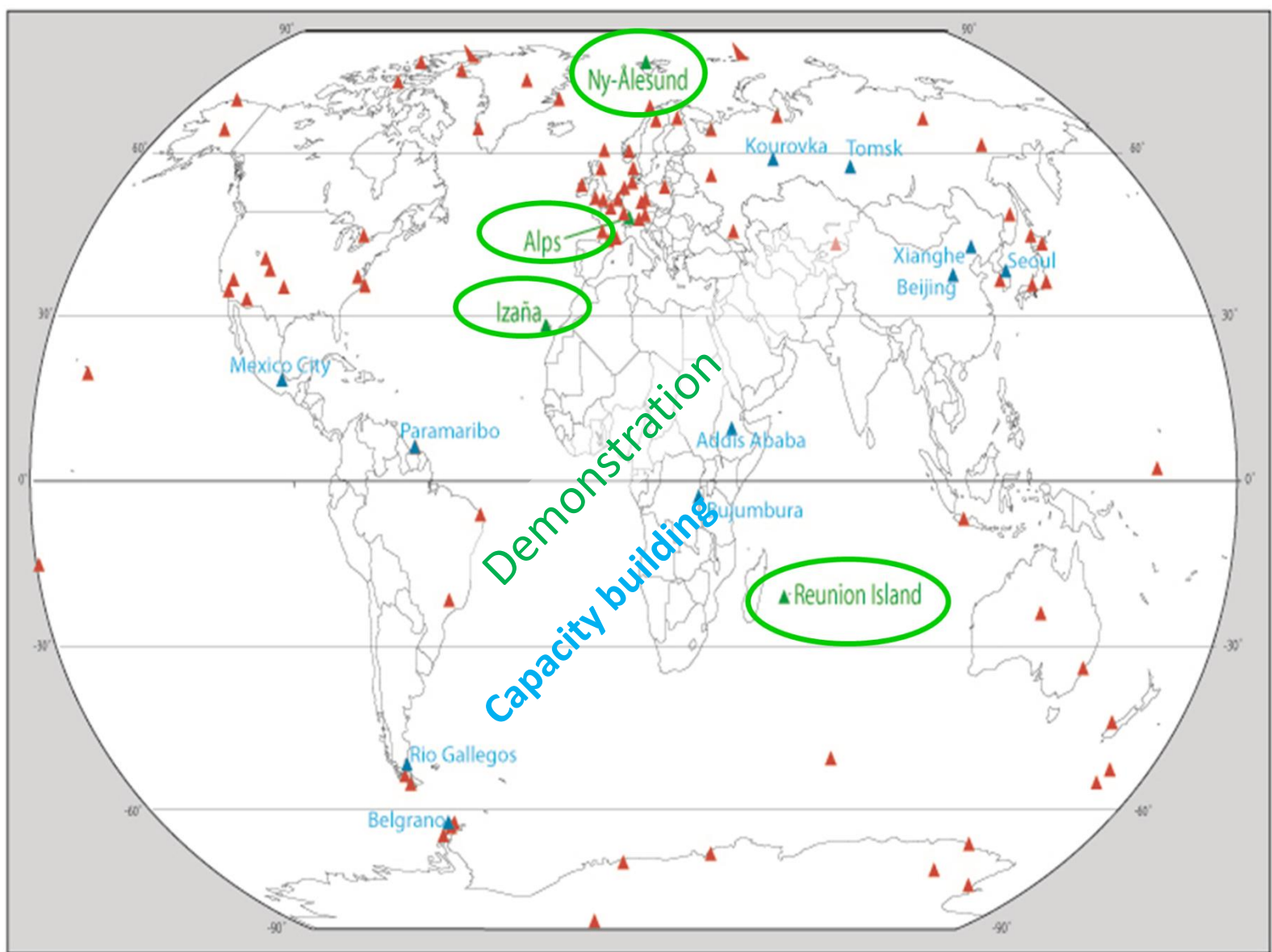
NORS

Demonstration Network Of ground-based
Remote Sensing Observations
in support of the Copernicus Atmospheric
Service

De Mazière Martine & partners

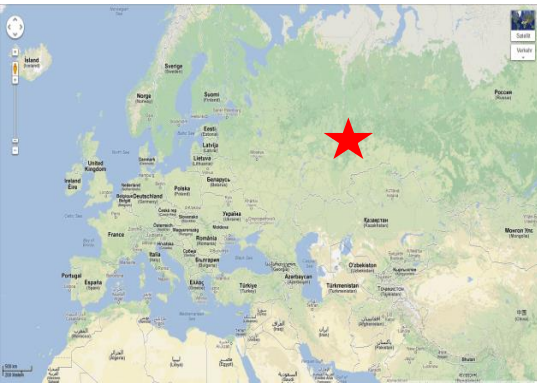
Task 10.1

Export NORS expertise to
candidate NDACC stations outside
western Europe.



- ▲ Operational NDACC stations
- ▲ NDACC stations selected as pilot stations in NORS
- ▲ Stations to be developed in NORS to potentially become NDACC stations

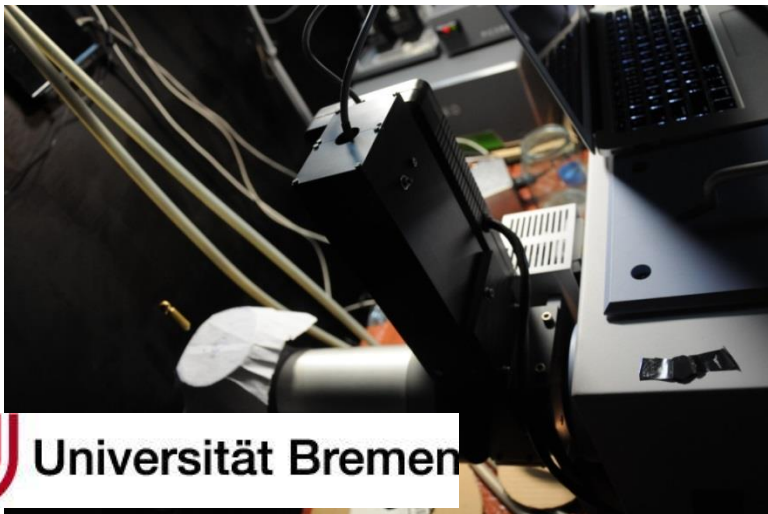
Kourovka / Univ. Yekaterinburg



Alignment of the 125M was verified with
HCl cell-measurement → alignment stable!

Solar-tracker and 4Q- Diode aligned →
now stable diode-tracking over the whole day.

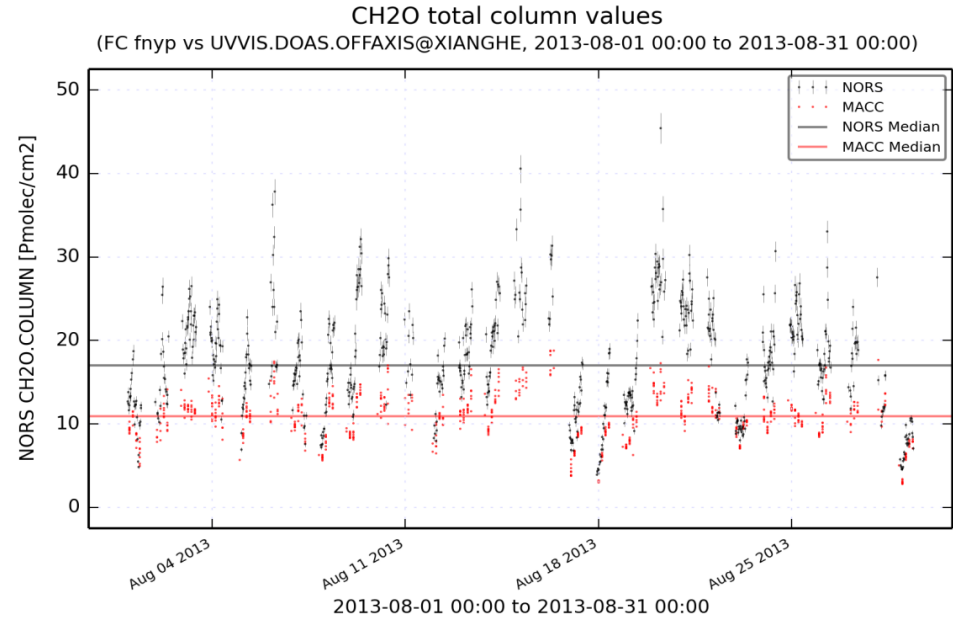
- Regularly remoted measurements from
Yekaterinburg since july 2012
- Liquid nitrogen is limiting NDACC measurements



Xianghe



- MAXDOAS instrument
- NO_2 , CH_2O , and AOD data routinely used by the NORS validation server:



- Good collaboration between BIRA-IASB and IAP/CAS (Prof. P. Wang)
- MAX-DOAS data at Xianghe included in several papers:
 - NO_2 , HONO, and aerosols (Hendrick et al., ACP, 2014)
 - SO_2 and aerosols (Wang et al., ACP, 2014)
 - Aerosols/cloud screening (Gielen et al., AMT, 2014)
 - NO_2 , CH_2O , and aerosols (Vlemmix et al., AMTD, 2014)

Seoul



SWARA: Seoul Water Vapor Radiometer

passive microwave radiometer

H₂O line at 22.235 GHz

water vapor profiles (z≈30-75 km)

operated since 2006

by Prof. J.J. Oh, Dr. S. Ka

Sookmyung Women's University, Seoul,
South Korea



SORAS: Stratospheric Ozone Radiometer in Seoul

passive microwave radiometer

O₃ line at 110.8 GHz

ozone profiles (z≈20-65 km)

operated since 2008 (with FFTS)

by Prof. J.J. Oh, Dr. S. Ka

u^b

Addis Abeba

Addis Ababa
University
(Since 1950)



Gizaw Mengistu Tsidu, Samuel Takele, Gezahegn Sufa, Milkessa Gebeyehu, Addis Ababa University, Addis Ababa, Ethiopia

T. Blumenstock, F. Hase, KIT Karlsruhe, GER



Measurements since 2009
Bruker 120/5M, InSb only
Dr. Gizaw Mengistu Tsidu visited KIT for 1 year (funded by Georg Forster-stipendium; Humboldt foundation)

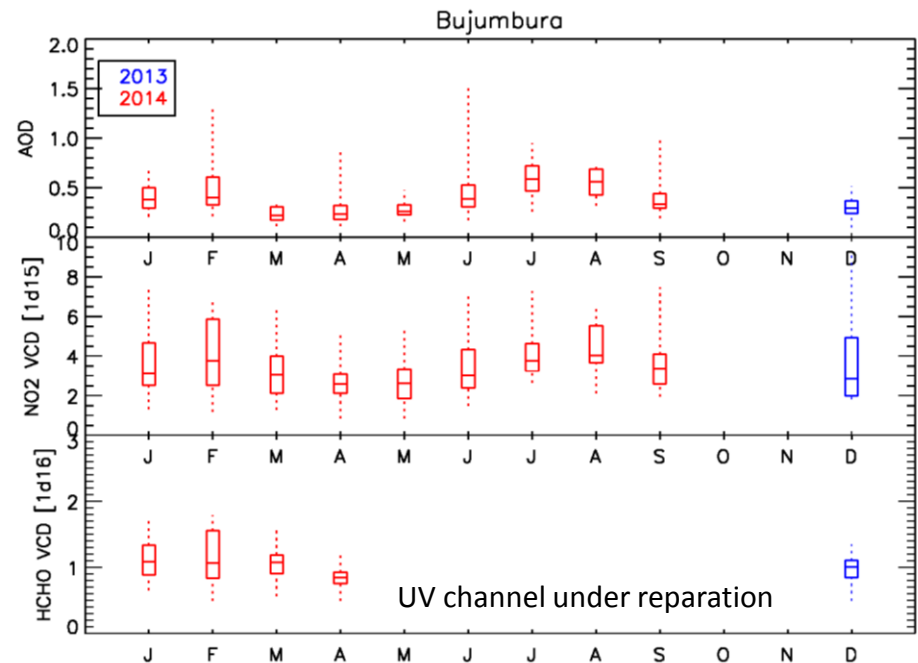
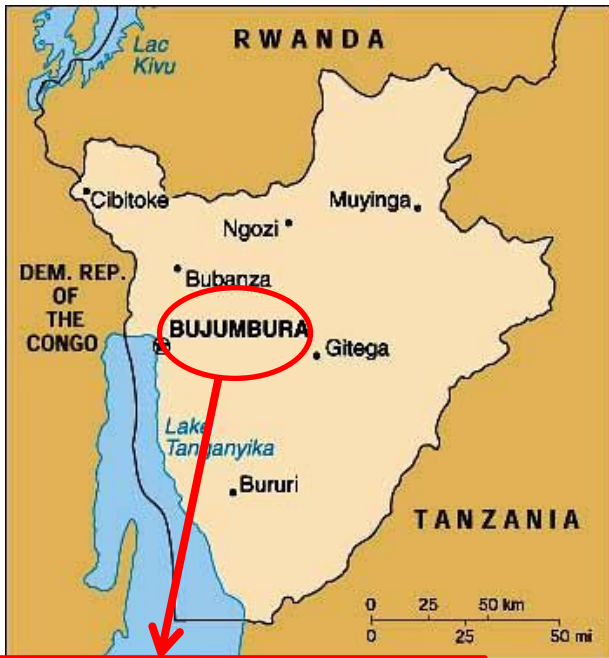
Proposal for NDACC affiliation is envisaged.

G. Mengistu Tsidu, T. Blumenstock, and F. Hase, Observations of precipitable water vapour over complex topography of Ethiopia from ground-based GPS, FTIR, radiosonde and ERA-interim re-analysis, AMTD, 20147, 9869-9915, 2014



Bujumbura

- MAX-DOAS and CIMEL sunphotometer installed at University of Bujumbura in November 2013
- Optimisation of retrieval settings currently under progress



- Good collaboration between BIRA-IASB and the University of Burundi (Prof. P. Nzohabonayo)

Paramaribo

MAX-DOAS Measurements at Paramaribo, Suriname

- Long-term MAX-DOAS measurements at Paramaribo, Suriname, operated in collaboration with the Meteorological Service of Suriname (MDS) since 2001.
- Visit of the MDS in November 2011:
 - Maintenance and update of the instrument
 - Additional training of local staff for operation and maintenance of the instrument
- Implementation of current NDACC recommendations in the analysis algorithm for the Paramaribo measurements is in progress.



The MAX-DOAS telescope unit in Paramaribo, Suriname



Paramaribo



FTIR Measurements at Paramaribo, Suriname

- Container with upgraded 120/5M was installed in March 2013.
- Side-by-side measurements have been performed in November 2013.
- Two campaigns in 2014 with the upgraded instrument.
- Personnel has been trained to perform measurements all over the year.
- The availability of liquid nitrogen is a limiting factor for NDACC measurements (has to be imported from the USA).



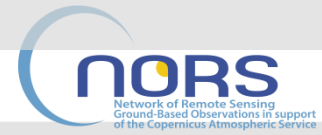
Altzomoni, Mexico



M. Grutter*,
W. Stremme*,
E. Francis
Medina*
F. Hase,
T. Blumenstock

NDACC proposal submitted
certification in progress

- Altzomoni, Mexico, 19.1N, 98.7W, 4000m a.s.l
- 60 km out of Mexico City
- Close to Popocatepetl
- Bruker 120/5 HR
- Camtracker
- Remotely controlled
- Setup in spring 2012
- Operational in Oct. 2012
- Operated by UNAM, Mexico City (*)



OAPA Site

Rio Gallegos NDACC station



SAOZ



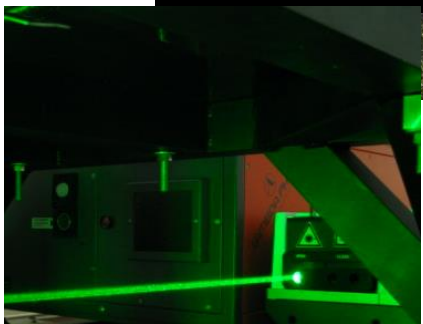
Meteorological Data



Radiometers
UV - Visible



Brewer
Planned to February 2016



Temperature- Rayleigh Lidar



Ozone DIAL



AERONET Sunphotometer



Belgrano



EVA 430-450 nm
Scanning Spec.
(NO₂)

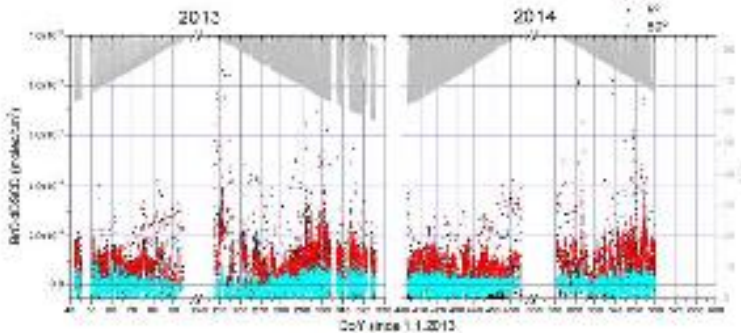
1995

NOW

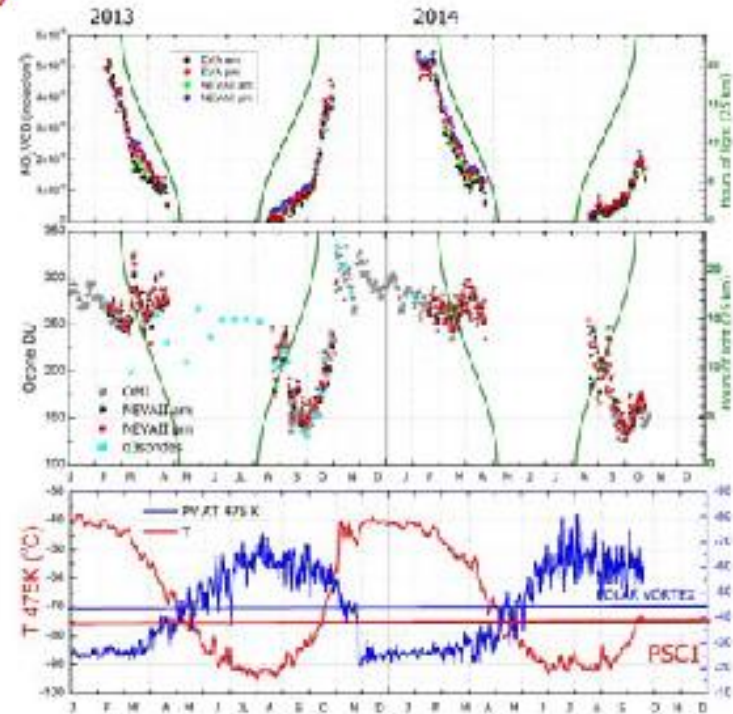
MAX DOAS NEVA II Vis 415-543 nm CCD (O₃, IO and NO₂)

2011

MAX DOAS NEVA II UV 319-415 nm CCD (BrO and OClO)



Tropospheric BrO from MAXDOAS measurements. To eliminate stratospheric contribution from DSCD at different instrument elevation as much as possible, dDSCD were calculated by subtracting to each elevation the corresponding DSCD taken at elevation 90°.



Mean vertical columns (VCD) of NO₂ (upper panel) and ozone (middle panel) derived from the morning and afternoon measurements (between 88° and 91° sza) of the zenith sky viewing direction obtained for Vis-MAX DOAS instrument (NEVAII) and the scanning one (EVA) installed in 1995. Both instruments have been operating simultaneously during 2013 and 2014 and settings used follow NDACC recommendations

In addition

Transportable, compact microwave radiometers for intercomparison and research at NORS stations



Developed and operated by IAP-Bern
Prof. Niklaus Kämpfer

Campaign at
Maïdo, La Réunion, 2014:

1. MIAWARA-C: 22 GHz microwave radiometer
-water vapor profile (h=30-80km)

2. GROMOS-C: 108 GHz microwave radiometer
-ozone profile
(h=25-75km)

3. WIRA: 142 GHz
Wind radiometer
(Doppler shift of ozone line,
u and v profile, h=30-70km)

Kiruna site (67.84N, 20.41E)

Myojeong Gu¹, Carl-Fredrik Enell², Uwe Raffalski³, Thomas Wagner¹

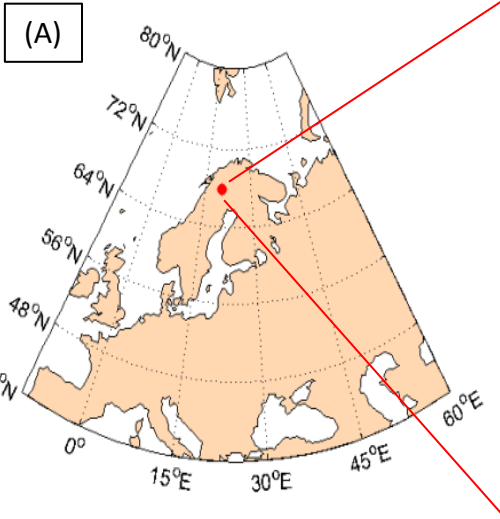
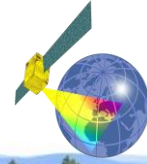
¹Max -Planck Institute for Chemistry, Mainz, Germany

²EISCAT Scientific Association, Kiruna, Sweden

³Swedish Institute of Space Physics, Kiruna, Sweden



MAX-PLANCK-INSTITUT
FÜR CHEMIE



(A) Location map of the Zenith Sky DOAS set up. Red dot indicates measurement site (Kiruna, Sweden: 68.84°N, 20.41°E).

- Kiruna is a good place to study the polar stratospheric chemistry. It is located in the arctic circle and is often situated under the polar vortex. This site is also located on the east side of the Scandinavian mountains which is an area where mountain wave induced Polar Stratospheric Clouds (PSCs) develop.

(B) Installation of Zenith Sky DOAS

- The instrument was installed on the roof of the IRF building in December of 1996 and since then performed automatic measurements up to now. The wavelength range reaches from 300nm to 400nm, thus suitable for the monitoring of stratospheric trace gases, such as O₃, NO₂, OClO, and BrO.
- This instrument records spectra of scattered sunlight in zenith direction. The observation of stratospheric trace gases is possible during each twilight period, in which the sensitivity of the Zenith sky DOAS is enhanced as a result of a long light path in stratosphere.

Task 10.2

Promote the achievements of
NORS in NDACC and CEOS WGCV

- NORS activities are presented at NDACC Working Group meetings and NDACC annual Steering Committee meetings
- NORS rapid delivery was announced on NDACC Webpages 'Hot News' between January 2012 and May 2012;
- The NDACC Web pages 'NDACC data' announces the Rapid Delivery directory and explains its role.
- The 2013 NDACC Newsletter includes an article about NORS; The 2014 NDACC newsletter will include an article about the final achievements of NORS and a report about the Final Workshop
- NORS documentation is available on the NDACC Webpages.

- Increase of data submission in HDF format
 - Since October 1, 2013:
10126 Ames and 64059 HDF files have been cataloged.
 - Last year's numbers are:
4305 Ames and 14324 HDF

Remember: data in HDF (of last year) are ingested automatically in NORS Validation Server and used for validation of MACC products

⇒ See deliverable D10.2

- ✓ Almost all FTIR instruments are submitting in HDF-
- ✓ UVVIS will follow (soon ?)
- ✓ LIDAR and MICROWAVE should follow
- ✓ Dobson/Brewer and O3 sondes not yet prepared cf. plead by Bavo during workshop (they were not part of NORS)

- Almost all (from 90% of investigators) NDACC data are public
- Enhanced quality assurance of the NDACC database
- Room for rapid delivery of not yet fully certified NDACC data
- More rapid delivery data
- The validation reports provide immediate feedback to the data providers

Database status

- 16 stations have archived data in GEOMS HDF for the past year
- Among which 10 stations / 14 investigators have submitted data in RD mode

Bern	MWR	O3	RD
Bremen	FTIR	O3, CH4, CO	RD
Gallegos	UVVIS	O3, NO2	RD
Izana	FTIR	O3, NO2, CH4, CO	RD
	UVVIS	O3, NO2	RD
Jungfraujoch	FTIR	O3, NO2, CH4, CO	RD
	UVVIS	O3, NO2	RD
NyAlesund	MWR	O3	RD
	(FTIR)		
	(UVVIS)		
OHP	LIDAR	O3	RD
	UVVIS	O3, NO2	RD
Reunion_Maido	FTIR	O3, NO2, CH4, CO + more	RD
	LIDAR	O3	RD
Reunion_StDenis	UVVIS	O3, NO2	RD
Xianghe	UVVIS	NO2, aerosol	RD

- CEOS has been kept informed about the NORS activities and results, in particular at CEOS WGCV-37 (Feb. 2014).
 - NORS was also presented at the ESA Cal/Val Infrastructure meeting in Dec. 2013
- ⇒ esp. ESA shows interest in providing support for developing generic calibration/validation systems for satellite data, based on the NORS achievements – *to be pursued.*

The Final Workshop was organised in conjunction with the NDACC Steering Committee meeting and many NDACC members attended the workshop; CEOS was represented at the Workshop by J.C. Lambert; ESA was represented by C. Zehner and T. Fehr; NASA was represented by K. Jucks (and M. Kurylo); Copernicus was represented by M. Rohn

Task 10.3

Meetings with EEA to ensure integration of NORS in the EEA structure of the in-situ component of CAMS, and to ensure compliance of NORS with CAMS data policies and metadata standards

- Initially, **contacts with EEA** via
 - the Steering Committee of NORS
 - Participation to GISC Workshop 'Monitoring Matters' in Copenhagen, April 10-11, 2013 (NORS demonstration)

Later on, directly via the subproject OBS in MACC-II (-III) which coordinates in-situ data streams.

NORS/NDACC is well positioned to be included in the in-situ component of CAMS

- Compliance with CAMS data policies and metadata
 - ✓ NORS data are public
 - ✓ GEOMS HDF is a metadata standard, among many others that are accepted in the air quality and atmospheric composition communities.
 - ✓ It appears to be compliant with INSPIRE
 - ✓ The mapping to netCDF-CF (another metadata standard used in the climate and atmospheric modelling and satellite communities) seems rather straightforward

Further work is required in CAMS

Backup slides

Tomsk

Beijing