

NDACC status report

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1. Introduction

This deliverable called ‘NDACC status report’ (D10.2) reports about the progress of the Network for the Detection of Atmospheric Composition Change (NDACC) towards a network in support of the Copernicus Atmospheric Monitoring Service (CAMS).

Indeed, the commitment in NORS to support the quality assessment of CAMS was made only for the 4 pilot stations of Ny Alesund, the Alps (Bern, Jungfraujoch and Observatoire de Haute Provence), Izaña and Ile de La Réunion, and for the target products (Ozone, NO₂, CO, CH₄, HCHO and aerosol extinction (see Table 1 hereafter). Beyond these 4 stations and target products, there has been a commitment in NORS, in WP 10 entitled ‘Capacity building and sustainability’, to promote the achievements of NORS at additional NDACC stations and at new, potential NDACC stations. The latter capacity building at new potential NDACC stations is reported in D10.1 ‘NDACC capacity report’; the former capacity building is described in this report.

To contribute to the quality assessment of the CAMS products, the PI of an instrument at an NDACC station must satisfy two main requirements: (1) rapid delivery of the data within 1 month to the NDACC database, and (2) submission in the HDF format following the latest version of the GEOMS template. Therefore, the present report will look at the progress that was made in NDACC regarding these two aspects.

NDACC stations submitting in GEOMS HDF

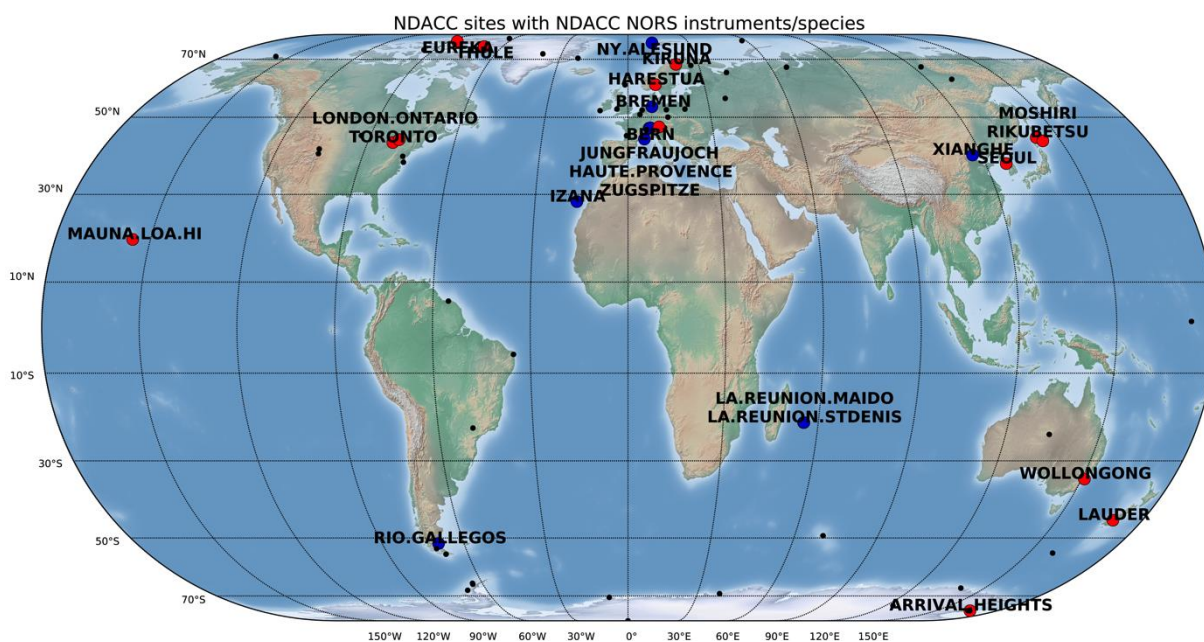


Figure 1. Overview of all NDACC station providing HDF data from FTIR, MWR, LIDAR and UVVIS measurements. Stations that contribute to NDACC in the Rapid Delivery (RD) section are shown in blue; stations that submit NORS target species data in GEOMS HDF are shown in red; other NDACC stations are shown in black.

At the start of the NORS project, the NDACC pilot stations were Izaña, Ile de La Réunion, the Alps including Bern, Jungfraujoch, and Observatoire de Haute Provence, and Ny Alesund (see Table 1).

All NORS pilot stations are submitting data to the rapid delivery (RD) section on the NDACC archive. Since the start of the NORS project, other stations started submitting to the RD section or directly to the consolidated database within a month after measurement: Rio Gallegos (UVVIS), Seoul (MWR H2O profile), Harestua (UVVIS), Bremen (FTIR).

Figure 1 shows all NDACC stations that report NORS targeted data from FTIR, LIDAR, MWR and UVVIS instruments (in blue if sent to the RD section, else in red). Depending on the submission rate (within a year, since the validation server works on a moving time window of one year) these additional NDACC stations will automatically contribute to the NORS validation server. At present, 14 stations are contributing to the NORS validation server.

Since the start of the NORS project, all active UVVIS stations started submitting their measurements in GEOMS HDF format: Izana, Harestua, Rio Gallegos, Jungfrauoch, Ny Alesund, Haute Provenc (OHP) and Réunion (see Table 2). Since the start of the NORS project, Lidar O₃ measurements have been converted to GEOMS at OHP and Réunion. And MWR O₃ was published in GEOMS format at Mauna Loa and Lauder. There are few MWR and Lidar NDACC stations that need to adopt the GEOMS format in order to be detected and used by the NORS validation server: e.g. Hogenpeissen, Mauna Loa, Table Mountain (Lidar) and Payerne (MWR).

This demonstrates that the NDACC database already contributes to NORS-like validation activities in a much broader way than with the initial 4 NORS pilot stations and instruments, but that there are still some remaining stations that can contribute in the near-future, as soon as they adopt the HDF GEOMS standard.

Apart from being the required data format in the NORS Validation Server, the HDF GEOMS format enables easy data mining and retrieval in the NDACC database, which is required for dealing with the diversity of the NDACC data and for using them in a systematic way.

Table 1 List of NORS pilot station, sorted by instrument

Species	Instruments	Affiliation	Locations
O3.C (strato) NO2.C (tropo) NO2.P (strato)	UVVIS.DOAS	CNRS.LATMOS	HAUTE.PROVENCE
			LA.REUNION
		BIRA-IASB	JUNGFRAUJOCH
O3.C (strato) NO2.C (strato) NO2.P (tropo) HCHO.C AE.P	UVVIS.DOAS (MAXDOAS)	BIRA-IASB	JUNGFRAUJOCH
		INTA	IZANA
		IUP	NY.ALESUND
		BIRA-IASB	LA.REUNION
O3.P CO.P CH4.P	FTIR	KIT	IZANA
		IUP	NY.ALESUND
		ULg	JUNGFRAUJOCH
		CNRS.LATMOS	HAUTE.PROVENCE
O3.P (strato)	LIDAR	UREUNION.LACY	LA.REUNION
O3.P (strato)	MWR	UBERN	BERN
		IUP	NY.ALESUND

2. NDACC data: NORS Validation server acts as a permanent in depth format quality check of the reported data files

The NORS validation server detects in an automatic way all NDACC data that can be used for validation of the model data provided by the Copernicus Atmospheric Monitoring Service (CAMS) in the MACC-II/III projects. Presently these are FTIR, UVVIS, LIDAR and MWR measurements submitted in HDF-GEOMS format, and for the target species listed in Table 1.

The validation requires that NDACC data are ‘in good shape’. ‘In good shape’ refers to the following quality properties: (1) being well-documented, especially well-documented in terms of uncertainties, geolocation, representativeness, etc., and (2) in a suitable standard format including all the required metadata to describe the data. The latter requirement has been implemented in the NORS Validation Server through the HDF GEOMS data format and instrument-specific templates. These format definitions and templates have been optimized in the course of the NORS project, as much as possible in agreement with the NDACC Working Groups, and have been described in detail in the NORS deliverable D 4.1. The first quality requirement is the subject of continuous improvements, in the NDACC Working Groups and in particular, in WP4 of the NORS project (see deliverables D4.2 to D4.6).

The NDACC submission process performs a formal quality check on all submitted data. This verification guarantees that the submitted data – if they are submitted in the HDF format- are compliant with the GEOMS guidelines and the appropriate instrument-specific GEOMS template. The actual contents and quality of the retrieved data is not part of the standard quality check. Once a datafile has been successfully submitted to the database, the validation server ingests the data file, and reads the reported variables (averaging kernels, apriori pressure and temperature profiles, ...) from each data file and uses them in the validation process (algorithms). As such, the NORS validation server acts as an in depth formal quality check of the reported NDACC data files, metadata and associated variables.

In the course of the NORS project, template updates were required and NDACC datafiles had to be regenerated and resubmitted during the NORS project. Although the majority of the data is now in good formal (format) shape, it is immediate from the validation reports (nors-server.aeronomie.be) that still some sites require an update of their reported data. There is a permanent communication between the NORS responsables and the data originators to ensure that the NDACC data is of the necessary quality for use in NORS and, more generally, for validation purposes in general and in particular the EU Copernicus Atmosphere Monitoring Service (CAMS).

The NORS validation server is easily extendible in the sense that additional NDACC species (other than those specified in Table 1) can be used for model validation, provided that the validation procedure for these new targets coincides with one of the general algorithms described in Langerock et al., 2014. Such an extension of the validation server has already been done: the server now also detects NDACC FTIR NO₂ and MWR H₂O profile measurements and uses them in the validation of the model data.

3. NDACC data are used systematically in the MACC-II,III VAL (validation) subproject

The validation results produced by the NORS validation server are now systematically used in the six latest 3-monthly MACC ‘Validation reports covering the global NRT forecast and analysis system’, and the latest ‘Validation reports covering the MACC reanalysis for the years 2003-2012’.

(see http://copernicus-atmosphere.eu/services/aqac/global_verification/validation_reports, NORS is used since NRT#7, October 2013).

A NORS scientist having VIP access to the validation server, extracts from the server the reports that fit the purpose of the MACC Val reports, or, using the algorithms toolbox that is at the heart of the validation process in the server (Langerock et al., 2014), generates ad-hoc validation reports that satisfy specific MACC validation needs.

In the first NRT report, MWR O₃ data from the pilot station Ny Alesund and Bern were used. Since then, additional species were added to each new NRT VAL report. In the latest report (June 2014) the UVVIS H₂CO measurement from Xianghe, FTIR CO from La Reunion Maïdo and Jungfrauoch, FTIR O₃ from Jungfrauoch and Izaña and LIDAR O₃ from the Observatoire de Haute Provence were used.

Apart from the NRT reports, the VAL subproject in MACC provides validation reports on the MACC reanalysis model covering a period of 10 years. NORS validation results contributed to the stratospheric O₃ validation in the latest reanalysis report (2003-2013) using data from FTIR measurements at Izaña, MWR at Ny Alesund and LIDAR from the Observatoire de Haute Provence.

4. Conclusions

The NORS project has given a strong push to the NDACC community for using more widely the hierarchical data format (HDF) and GEOMS templates, providing harmonised, self-explaining and searchable measurement data. Moreover, NORS has been supporting the evolution towards a more homogeneous NDACC database populated with correctly formatted and harmonised data files.

The fact that the NDACC data contribute now systematically to the validation reports produced in the MACC projects, that are the precursors of CAMS, demonstrates that NDACC has evolved firmly towards an indispensable contribution to the in-situ component supporting the quality assessment of CAMS.

At the same time, thanks to the NORS project, NDACC is evolving towards a more operational network – which is useful not only for the quality assessment of CAMS, but also for providing well-characterised monitoring data to the scientific community, the public and the policy makers.

Table 2 List of all NDACC stations with all instruments, including an indication of the data submission format (ames.(technique).(species) for NASA AMES format and DATA_SOURCE file attribute for HDF GEOMS format). The last column indicates the date of the latest available data in the database). DHF = Data Handling Facility; RD = Rapid delivery (within 1 month) after data acquisition.

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of latest measurement
aberdeen			
	ames.uv/vis.totalcol	ABERDEEN	28/02/94
	ames.ftir.totalcol	ABERDEEN	07/05/94
aberyst			
	ames.uv/vis.totalcol	ABERYSTWYTH	31/03/10
	ames.o3sonde.ozone	ABERYSTWYTH	13/01/00
alert			
	ames.bksonde.aerosol_bks	ALERT.NWT	09/01/89
	ames.o3sonde.ozone	ALERT.NWT	05/12/08
alicespr			
	ames.uv/spect.uv	ALICE.SPR	30/09/12
andoya			
	ames.lidar.temp	ANDOYA	27/01/95
	ames.lidar.ozone	ANDOYA	01/03/11
arkhan			
	ames.bksonde.aerosol_bks	ARKHANGEL'SK	24/11/93
arosa			
	ames.dobson.totalcol	AROSA	28/09/13
arrival			
	ames.dobson.totalcol	ARRIVAL.HGTS	31/10/13
	ames.uv/vis.totalcol	ARRIVAL.HGTS	24/10/12
	ames.uv/spect.uv	ARRIVAL.HGTS	31/12/12
	ames.ftir.totalcol	ARRIVAL.HGTS	31/12/09
	ftir.clono2_niwa003	ARRIVAL.HEIGHTS	30/12/13
	ftir.hf_niwa003	ARRIVAL.HEIGHTS	10/12/13
	ftir.hcn_niwa003	ARRIVAL.HEIGHTS	30/12/13
	ftir.o3_niwa003	ARRIVAL.HEIGHTS	30/12/13
	ftir.hcl_niwa003	ARRIVAL.HEIGHTS	30/12/13
	ftir.ch4_niwa003	ARRIVAL.HEIGHTS	30/12/13
	ftir.hno3_niwa003	ARRIVAL.HEIGHTS	30/12/13
	ftir.n2o_niwa003	ARRIVAL.HEIGHTS	30/12/13
	ftir.c2h6_niwa003	ARRIVAL.HEIGHTS	30/12/13
	ftir.co_niwa003	ARRIVAL.HEIGHTS	30/12/13
bandung			
	ames.uv/vis.totalcol	BANDUNG	31/08/94
barrow			
	ames.uv/spect.uv	BARROW	31/10/12
bauru			
	ames.uv/vis.totalcol	BAURU	30/11/99
bern			
	ames.mwave.ozone	BERN	31/08/12
	ames.mwave.watervapor	BERN	31/10/14
	mwr.o3_ubern001	BERN	RD
	mwr.h2o_ubern001	BERN	RD
bordeaux			

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of lastest measurement
	ames.dobson.totalcol	BORDEAUX	30/11/03
	ames.mwave.ozone	BORDEAUX	05/05/03
boulder			
	ames.dobson.totalcol	BOULDER	30/06/14
	ames.o3sonde.ozone	BOULDER	17/10/14
	ames.uv/spect.uv	BOULDER	01/10/12
	ames.lidar.aerosol	BOULDER	30/06/09
bremen			
	ames.ftir.totalcol	BREMEN	31/05/10
	ftir.co_iup001	BREMEN	RD
	ftir.o3_iup001	BREMEN	RD
	ftir.ch4_iup001	BREMEN	RD
	ftir.c2h6_iup001	BREMEN	10/06/14
	ftir.hcl_iup001	BREMEN	16/05/14
briancon			
	ames.uv/spect.uv	BRIANCON	31/08/05
debilt			
	ames.o3sonde.ozone	DE.BILT	04/12/13
	ames.brewer.totalcol	DE.BILT	31/10/13
dome			
	ames.uv/vis.totalcol	DOME.C	31/12/13
dumont			
	ames.uv/vis.totalcol	DUMONT.D'URV	30/11/99
	ames.o3sonde.ozone	DUMONT.D'URV	23/11/14
	ames.lidar.ozone	DUMONT.D'URV	03/02/13
	ames.lidar.aerosol	DUMONT.D'URV	26/09/14
enzersdorf			
	ames.uv/spect.uv	ENZERSDORF	31/12/12
eureka			
	ames.uv/vis.totalcol	EUREKA	27/03/12
	ames.lidar.temp	EUREKA	28/02/98
	ames.lidar.ozone	EUREKA	28/02/98
	ames.lidar.aerosol	EUREKA	31/12/93
	ames.o3sonde.ozone	EUREKA	11/03/11
	ames.ftir.totalcol	EUREKA	31/12/10
	ftir.clono2_utoronto001	EUREKA	02/04/13
	ftir.hno3_utoronto001	EUREKA	02/04/13
	ftir.co_utoronto001	EUREKA	02/04/13
	ftir.hcl_utoronto001	EUREKA	02/04/13
	ftir.n2o_utoronto001	EUREKA	02/04/13
	ftir.hcn_utoronto001	EUREKA	02/04/13
	ftir.o3_utoronto001	EUREKA	02/04/13
	ftir.hf_utoronto001	EUREKA	02/04/13
	ftir.c2h6_utoronto001	EUREKA	02/04/13
faraday			
	ames.uv/vis.ozone	FARADAY	31/12/90
gallegos			
	ames.uv/vis.totalcol	RIO.GALLEGOS	31/10/13
	ames.lidar.ozone	RIO.GALLEGOS	26/10/12
	uvvis.doas.zenith.no2_cnrs.latmos026	RIO.GALLEGOS	RD

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of latest measurement
	uvvis.doas.zenith.o3_cnrs.latmos026	RIO.GALLEGOS	RD
garmisch			
	ames.uv/spect.uv	GARMISCH	30/04/94
	ames.lidar.aerosol	GARMISCH	25/11/10
gsfc			
	ames.lidar.tgas	GSFC	30/04/93
	ames.lidar.tgas2	GSFC	31/07/07
harestua			
	ames.uv/vis.totalcol	HARESTUA	28/02/13
	ames.ftir.totalcol	HARESTUA	31/12/12
	uvvis.doas.zenith.no2_bira.iasb001	HARESTUA	20/04/13
	uvvis.doas.zenith.no2_bira.iasb002	HARESTUA	31/08/14
	uvvis.doas.zenith.bro_bira.iasb002	HARESTUA	30/06/14
	uvvis.doas.zenith.bro_bira.iasb001	HARESTUA	30/10/12
	uvvis.doas.zenith.o3_bira.iasb002	HARESTUA	31/08/14
	uvvis.doas.zenith.o3_bira.iasb001	HARESTUA	20/04/13
heiss			
	ames.bksonde.aerosol_bks	HEISS.ISL	25/01/89
hilo			
	ames.o3sonde.ozone	HILO	20/10/14
hohenpei			
	ames.lidar.temp	HOHENPEISSEN	31/10/14
	ames.lidar.tgas	HOHENPEISSEN	31/10/05
	ames.lidar.ozone	HOHENPEISSEN	31/10/14
	ames.dobson.totalcol	HOHENPEISSEN	31/07/14
	ames.o3sonde.ozone	HOHENPEISSEN	29/10/14
	ames.brewer.totalcol	HOHENPEISSEN	31/07/14
issykkul			
	ames.uv/vis.totalcol	ISSYK-KUL	30/09/14
izana			
	ames.uv/vis.totalcol	IZANA	31/07/13
	ames.ftir.totalcol	IZANA	31/12/07
	ames.o3sonde.ozone	IZANA	07/11/12
	ames.uv/spect.uv	IZANA	11/07/05
	ames.brewer.totalcol	IZANA	30/11/12
	uvvis.doas.zenith.no2_inta001	IZANA	09/11/14
	uvvis.doas.zenith.o3_inta001	IZANA	09/11/14
	uvvis.doas.offaxis.no2_inta001	IZANA	25/08/14
	uvvis.doas.offaxis.o3_inta001	IZANA	25/08/14
	uvvis.doas.no2_inta001	IZANA	RD
	uvvis.doas.o3_inta001	IZANA	RD
	ftir.ch4_kit002	IZANA	RD
	ftir.ch4_fzk002	IZANA	24/10/12
	ftir.no2_kit002	IZANA	RD
	ftir.hcl_fzk002	IZANA	24/10/12
	ftir.no_fzk002	IZANA	24/10/12
	ftir.co_fzk002	IZANA	24/10/12
	ftir.cof2_fzk002	IZANA	24/10/12
	ftir.no2_fzk002	IZANA	24/10/12
	ftir.o3_kit002	IZANA	RD

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of lastest measurement
	ftir.clono2_fzk002	IZANA	24/10/12
	ftir.ocs_fzk002	IZANA	24/10/12
	ftir.hf_kit002	IZANA	24/10/12
	ftir.o3_fzk002	IZANA	24/10/12
	ftir.hcn_fzk002	IZANA	24/10/12
	ftir.c2h6_fzk002	IZANA	24/10/12
	ftir.co_kit002	IZANA	RD
	ftir.n2o_fzk002	IZANA	24/10/12
	ftir.hno3_fzk002	IZANA	24/10/12
jungfrau			
	ames.uv/vis.totalcol	JUNGFRAUJOCH	30/09/99
	ames.ftir.totalcol	JUNGFRAUJOCH	01/12/12
	uvvis.doas.zenith.no2_bira.iasb001	JUNGFRAUJOCH	RD
	uvvis.doas.zenith.o3_bira.iasb002	JUNGFRAUJOCH	RD
	uvvis.doas.zenith.o3_bira.iasb001	JUNGFRAUJOCH	RD
	uvvis.doas.zenith.no2_bira.iasb002	JUNGFRAUJOCH	RD
	ftir.ch4_ulg002	JUNGFRAUJOCH	RD
	ftir.clono2_ulg002	JUNGFRAUJOCH	27/09/14
	ftir.h2o_ulg002	JUNGFRAUJOCH	31/10/14
	ftir.hno3_ulg002	JUNGFRAUJOCH	31/12/13
	ftir.no2_ulg002	JUNGFRAUJOCH	RD
	ftir.c2h2_ulg002	JUNGFRAUJOCH	31/05/14
	ftir.co_ulg002	JUNGFRAUJOCH	RD
	ftir.hcl_ulg002	JUNGFRAUJOCH	01/12/12
	ftir.hcn_ulg002	JUNGFRAUJOCH	28/08/14
	ftir.o3_ulg002	JUNGFRAUJOCH	RD
kerguele			
	ames.uv/vis.totalcol	KERGUELEN	30/11/99
kiruna			
	ames.bksonde.aerosol_bks	KIRUNA	03/12/02
	ames.uv/vis.totalcol	KIRUNA	04/03/10
	ames.ftir.totalcol	KIRUNA	30/09/07
	ftir.hcl_fzk001	KIRUNA	08/11/12
	ftir.ch4_fzk001	KIRUNA	08/11/12
	ftir.cof2_fzk001	KIRUNA	19/11/12
	ftir.hno3_fzk001	KIRUNA	19/11/12
	ftir.co_fzk001	KIRUNA	08/11/12
	ftir.no_fzk001	KIRUNA	08/11/12
	ftir.no2_fzk001	KIRUNA	08/11/12
	ftir.ocs_fzk001	KIRUNA	08/11/12
	ftir.clono2_fzk001	KIRUNA	19/11/12
	ftir.o3_fzk001	KIRUNA	19/11/12
	ftir.hf_kit001	KIRUNA	22/10/12
	ftir.c2h6_fzk001	KIRUNA	08/11/12
	ftir.hcn_fzk001	KIRUNA	08/11/12
	ftir.n2o_fzk001	KIRUNA	08/11/12
kiso			
	ames.uv/vis.totalcol	KISO	31/01/95
kittpeak			
	ames.ftir.totalcol	KITT.PEAK	29/12/00

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of latest measurement
lannemez			
	ames.dobson.totalcol	LANNEMEZAN	31/12/13
laramie			
	ames.dustsonde.aerosol_opc	LARAMIE	07/08/86
	ames.bksonde.aerosol_bks	LARAMIE	08/09/00
lauder			
	ames.bksonde.aerosol_bks	LAUDER	02/03/00
	ames.dobson.totalcol	LAUDER	30/04/14
	ames.ftir.totalcol	LAUDER	23/12/09
	ames.mwave.ozone	LAUDER	31/03/14
	ames.mwave.watervapor	LAUDER	31/08/14
	ames.uv/spect.uv	LAUDER	30/09/12
	ames.o3sonde.ozone	LAUDER	16/09/14
	ames.lidar.tgas	LAUDER	30/06/11
	ames.lidar.ozone	LAUDER	30/06/11
	ames.lidar.aerosol	LAUDER	30/06/08
	ames.uv/vis.totalcol	LAUDER	31/12/13
	ftir.clono2_niwa001	LAUDER	27/12/13
	ftir.hcn_niwa001	LAUDER	27/12/13
	ftir.hcl_niwa001	LAUDER	28/12/13
	ftir.o3_niwa001	LAUDER	28/12/13
	ftir.hf_niwa001	LAUDER	28/12/13
	ftir.ch4_niwa001	LAUDER	28/12/13
	ftir.n2o_niwa001	LAUDER	28/12/13
	ftir.hno3_niwa001	LAUDER	27/12/13
	ftir.c2h6_niwa001	LAUDER	28/12/13
	ftir.co_niwa001	LAUDER	27/12/13
	mwr.o3_umass001	LAUDER	05/05/14
legionow			
	ames.o3sonde.ozone	LEGIONOWO	28/11/12
lerwick			
	ames.uv/vis.totalcol	LERWICK	30/11/91
lindenbg			
	ames.lidar.aerosol	LINDENBERG	24/04/03
londonca			
	lidar.temperature_uwo001	LONDON.ONTARIO	07/03/10
macquari			
	ames.uv/vis.totalcol	MACQUARIE	31/12/11
maunakea			
	ames.mwave.chlorine	MAUNA.KEA	29/04/96
maunaloa			
	ames.dobson.totalcol	MAUNA.LOA	31/12/13
	ames.ftir.totalcol	MAUNA.LOA	30/11/07
	ames.lidar.temp	MAUNA.LOA	31/05/14
	ames.lidar.tgas	MAUNA.LOA	31/08/13
	ames.lidar.ozone	MAUNA.LOA	31/05/14
	ames.lidar.aerosol	MAUNA.LOA	30/11/13
	ames.lidar.aerosol353	MAUNA.LOA	30/07/93
	ames.lidar.aerosol355	MAUNA.LOA	31/05/14
	ames.uv/spect.uv	MAUNA.LOA	28/09/12

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of latest measurement
	ames.mwave.ozone	MAUNA.LOA	31/05/14
	ames.mwave.watervapor	MAUNA.LOA	31/07/14
	ames.uv/vis.totalcol	MAUNA.LOA	29/02/08
	ftir.o3_ncar002	MAUNA.LOA.HI	30/12/12
	ftir.n2o_ncar002	MAUNA.LOA.HI	30/12/12
	ftir.c2h6_ncar002	MAUNA.LOA.HI	30/12/12
	ftir.hf_ncar002	MAUNA.LOA.HI	30/12/12
	ftir.co_ncar002	MAUNA.LOA.HI	30/12/12
	ftir.ch4_ncar002	MAUNA.LOA.HI	30/12/12
	ftir.hcl_ncar002	MAUNA.LOA.HI	30/12/12
	ftir.hcn_ncar002	MAUNA.LOA.HI	30/12/12
	ftir.hno3_ncar002	MAUNA.LOA.HI	30/12/12
	mwr.o3_umass002	MAUNA.LOA.HI	31/05/14
mcmurdo			
	ames.dustsonde.aerosol_opc	MCMURDO	14/01/77
	ames.uv/vis.totalcol	MCMURDO	31/03/93
	ames.mwave.n2o	MCMURDO	30/09/94
	ames.mwave.chlorine	MCMURDO	30/09/92
	ames.o3sonde.ozone	MCMURDO	29/10/10
	ames.lidar.aerosol	MCMURDO	30/07/10
mildura			
	ames.dustsonde.aerosol_opc	MILDURA	17/08/80
minneapolis			
	ames.dustsonde.aerosol_opc	MINNEAPOLIS	11/01/64
moshiri			
	ames.uv/vis.totalcol	MOSHIRI	31/12/98
	ames.ftir.totalcol	MOSHIRI	27/12/02
	ftir.o3_unagoya001	MOSHIRI	28/03/07
	ftir.hcl_unagoya001	MOSHIRI	28/03/07
	ftir.hf_unagoya001	MOSHIRI	28/03/07
	ftir.hno3_unagoya001	MOSHIRI	28/03/07
natal			
	ames.bksonde.aerosol_bks	NATAL	18/02/03
	ames.o3sonde.ozone	NATAL	13/04/07
neumayer			
	ames.uv/vis.totalcol	NEUMAYER	29/02/12
	ames.o3sonde.ozone	NEUMAYER	12/09/14
nyalsund			
	ames.bksonde.aerosol_bks	NY-ALESUND	16/01/03
	ames.ftir.totalcol	NY-ALESUND	30/09/08
	ames.mwave.ozone	NY-ALESUND	09/06/11
	ames.mwave.chlorine	NY-ALESUND	01/04/00
	ames.o3sonde.ozone	NY-ALESUND	31/01/14
	ames.lidar.temp	NY-ALESUND	25/02/98
	ames.lidar.tgas	NY-ALESUND	30/09/97
	ames.lidar.ozone	NY-ALESUND	08/02/11
	ames.lidar.aerosol	NY-ALESUND	28/12/12
	ames.uv/vis.totalcol	NY-ALESUND	31/08/99
	ftir.ch4_awi001	NY.ALESUND	RD
	ftir.co_awi001	NY.ALESUND	RD

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of latest measurement
	ftir.hf_awi001	NY.ALESUND	21/09/11
	ftir.hcn_awi001	NY.ALESUND	30/03/11
	ftir.c2h6_awi001	NY.ALESUND	21/09/11
	ftir.hcl_awi001	NY.ALESUND	21/09/13
	ftir.o3_awi001	NY.ALESUND	19/09/13
	ftir.hno3_awi001	NY.ALESUND	21/09/12
	mwr.o3_iup001	NY.ALESUND	RD
	uvvis.doas.zenith.no2_iup003	NY.ALESUND	11/10/14
	uvvis.doas.zenith.o3_iup003	NY.ALESUND	11/10/14
ohp			
	ames.uv/vis.totalcol	OHP	31/10/99
	ames.dobson.totalcol	OHP	31/03/14
	ames.o3sonde.ozone	OHP	25/09/14
	ames.lidar.tropozone	OHP	29/11/99
	ames.lidar.temp	OHP	31/05/13
	ames.lidar.tgas	OHP	31/07/92
	ames.lidar.ozone	OHP	26/02/14
	ames.lidar.aerosol	OHP	14/06/13
	uvvis.doas.zenith.no2_cnrs.latmos013	HAUTE.PROVENCE	RD
	uvvis.doas.o3_cnrs.latmos013	HAUTE.PROVENCE	RD
	uvvis.doas.no2_cnrs.latmos013	HAUTE.PROVENCE	RD
	uvvis.doas.zenith.o3_cnrs.latmos013	HAUTE.PROVENCE	RD
	lidar.o3_cnrs.latmos001	HAUTE.PROVENCE	29/04/14
	lidar.o3_cnrs.latmos002	HAUTE.PROVENCE	RD
onsala			
	ames.mwave.watervapor	ONSALA	21/05/14
palmer			
	ames.uv/spect.uv	PALMER	31/12/12
paramari			
	ames.lidar.aerosol	PARAMARIBO	28/11/06
	ames.o3sonde.ozone	PARAMARIBO	06/12/13
	ames.brewer.totalcol	PARAMARIBO	31/10/13
payerne			
	ames.o3sonde.ozone	PAYERNE	27/12/13
	ames.mwave.ozone	PAYERNE	01/09/14
praha			
	ames.o3sonde.ozone	PRAHA	29/04/14
punta			
	ames.lidar.aerosol	PUNTA.ARENAS	12/04/00
resolute			
	ames.bksonde.aerosol_bks	RESOLUTE	10/10/91
reunion_maido			
	lidar.o3_ureunion.lacy001	LA.REUNION.MAIDO	RD
	ftir.no2_bira.iasb003	LA.REUNION.MAIDO	RD
	ftir.o3_bira.iasb003	LA.REUNION.MAIDO	RD
	ftir.hno3_bira.iasb003	LA.REUNION.MAIDO	RD
	ftir.hf_bira.iasb003	LA.REUNION.MAIDO	RD
	ftir.co_bira.iasb003	LA.REUNION.MAIDO	RD
	ftir.hcl_bira.iasb003	LA.REUNION.MAIDO	RD
	ftir.ch4_bira.iasb003	LA.REUNION.MAIDO	RD

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of latest measurement
reunion_stdenis			
	ames.o3sonde.ozone	REUNION.ISL	17/12/13
	ames.lidar.temp	REUNION.ISL	17/08/09
	ames.lidar.ozone	REUNION.ISL	15/06/06
	ames.uv/vis.totalcol	REUNION.ST	31/12/99
	lidar.o3_ureunion.lacy001	LA.REUNION.STDENIS	04/02/05
	uvvis.doas.zenith.o3_cnrs.latmos015	LA.REUNION.STDENIS	RD
	uvvis.doas.no2_cnrs.latmos015	LA.REUNION	RD
	uvvis.doas.zenith.no2_cnrs.latmos015	LA.REUNION.STDENIS	RD
	uvvis.doas.o3_cnrs.latmos015	LA.REUNION	RD
	ftir.hf_bira.iasb001	LA.REUNION.STDENIS	11/11/11
	ftir.no2_bira.iasb002	LA.REUNION.STDENIS	02/10/13
	ftir.no2_bira.iasb001	LA.REUNION.STDENIS	11/11/11
	ftir.o3_bira.iasb001	LA.REUNION.STDENIS	15/11/11
	ftir.hno3_bira.iasb001	LA.REUNION.STDENIS	15/11/11
	ftir.co_bira.iasb001	LA.REUNION.STDENIS	11/11/11
	ftir.hf_bira.iasb002	LA.REUNION.STDENIS	02/10/13
	ftir.co_bira.iasb002	LA.REUNION.STDENIS	30/09/13
	ftir.ch4_bira.iasb001	LA.REUNION.STDENIS	11/11/11
	ftir.hcl_bira.iasb002	LA.REUNION.STDENIS	02/10/13
	ftir.hcl_bira.iasb001	LA.REUNION.STDENIS	11/11/11
	ftir.ch4_bira.iasb002	LA.REUNION.STDENIS	02/10/13
rikubets			
	ames.uv/vis.totalcol	RIKUBETSU	30/11/95
	ames.ftir.totalcol	RIKUBETSU	20/12/02
	ftir.o3_unagoya001	RIKUBETSU	18/12/09
	ftir.hcl_unagoya001	RIKUBETSU	18/12/09
	ftir.hf_unagoya001	RIKUBETSU	18/12/09
	ftir.hno3_unagoya001	RIKUBETSU	18/12/09
rothera			
	ames.uv/vis.ozone	ROTHERA	31/12/00
salekhar			
	ames.bksonde.aerosol_bks	SALEKHARD	15/01/00
	ames.uv/vis.totalcol	SALEKHARD	31/10/09
	ames.o3sonde.ozone	SALEKHARD	26/02/12
samoa			
	ames.dobson.totalcol	SAMOA	31/05/14
	ames.o3sonde.ozone	SAMOA	01/10/14
scoresby			
	ames.bksonde.aerosol_bks	SCORESBYSUND	28/10/94
	ames.uv/vis.totalcol	SCORESBYSUND	30/09/99
	ames.o3sonde.ozone	SCORESBYSUND	30/10/14
scott			
	ames.mwave.chlorine	SCOTT.BASE	29/09/97
seoul			
	mwr.h2o_smwu001	SEOUL	30/09/14
sodanky			
	ames.bksonde.aerosol_bks	SODANKYLA	05/11/02
	ames.uv/vis.totalcol	SODANKYLA	31/10/99
	ames.lidar.tgas	SODANKYLA	30/04/06

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of latest measurement
	ames.o3sonde.ozone	SODANKYLA	29/12/10
	ames.brewer.totalcol	SODANKYLA	30/09/99
sonnblick			
	ames.uv/spect.uv	SONNBLICK	31/12/12
spole			
	ames.dustsonde.aerosol_opc	SOUTH.POLE	22/01/80
	ames.dobson.totalcol	SOUTH.POLE	31/10/13
	ames.o3sonde.ozone	SOUTH.POLE	21/10/14
	ames.uv/spect.uv	SOUTH.POLE	31/12/12
	ames.mwave.ozone	SOUTH.POLE	25/11/95
	ames.mwave.n2o	SOUTH.POLE	23/02/93
	ames.mwave.hno3	SOUTH.POLE	28/04/93
sstromf			
	ames.bksonde.aerosol_bks	S.STROMFJORD	09/01/95
	ames.ftir.totalcol	S.STROMFJORD	22/11/94
	ames.lidar.temp	S.STROMFJORD	19/12/13
	ames.brewer.totalcol	S.STROMFJORD	31/08/14
summit			
	ames.uv/spect.uv	SUMMIT	22/11/12
	ames.o3sonde.ozone	SUMMIT	16/10/14
syowa			
	ames.uv/vis.totalcol	SYOWA.BASE	31/03/90
tarawa			
	ames.uv/vis.totalcol	TARAWA	31/12/99
thule			
	ames.bksonde.aerosol_bks	THULE	17/01/92
	ames.ftir.totalcol	THULE	02/10/06
	ames.mwave.ozone	THULE	31/01/12
	ames.mwave.n2o	THULE	28/02/92
	ames.mwave.hno3	THULE	31/03/12
	ames.mwave.co	THULE	31/01/02
	ames.mwave.chlorine	THULE	10/02/92
	ames.o3sonde.ozone	THULE	23/12/13
	ames.lidar.temp	THULE	31/03/11
	ames.lidar.aerosol	THULE	30/09/91
	ames.uv/vis.totalcol	THULE	30/09/12
	ftir.clono2_ncar001	THULE	08/10/13
	ftir.o3_ncar001	THULE	08/10/13
	ftir.hno3_ncar001	THULE	08/10/13
	ftir.c2h6_ncar001	THULE	08/10/13
	ftir.n2o_ncar001	THULE	08/10/13
	ftir.hf_ncar001	THULE	08/10/13
	ftir.co_ncar001	THULE	08/10/13
	ftir.hcl_ncar001	THULE	08/10/13
	ftir.ch4_ncar001	THULE	08/10/13
	ftir.hcn_ncar001	THULE	08/10/13
tmo			
	ames.mwave.ozone	TABLE.MTN	31/08/89
	ames.mwave.watervapor	TABLE.MTN	23/07/14
	ames.lidar.tropozone	TABLE.MTN	29/05/14

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of latest measurement
	ames.lidar.temp	TABLE.MTN	29/08/13
	ames.lidar.tgas	TABLE.MTN	31/03/11
	ames.lidar.ozone	TABLE.MTN	29/08/13
	ames.lidar.aerosol	TABLE.MTN	27/02/97
	ames.lidar.tgas2	TABLE.MTN	30/06/05
	ames.lidar.aerosol353	TABLE.MTN	31/01/89
	ames.lidar.aerosol355	TABLE.MTN	29/08/13
toronto			
	ames.lidar.temp	TORONTO	28/05/97
	ames.lidar.ozone	TORONTO	23/07/96
	ames.lidar.aerosol	TORONTO	24/06/91
	ames.ftir.totalcol	TORONTO	31/12/07
	ftir.ch4_utoronto001	TORONTO	21/06/13
	ftir.co_utoronto001	TORONTO	21/06/13
	ftir.hcl_utoronto001	TORONTO	21/06/13
	ftir.n2o_utoronto001	TORONTO	21/06/13
	ftir.hcn_utoronto001	TORONTO	21/06/13
	ftir.o3_utoronto001	TORONTO	14/06/13
	ftir.hf_utoronto001	TORONTO	21/06/13
	ftir.c2h6_utoronto001	TORONTO	21/06/13
tsukuba			
	ames.lidar.ozone	TSUKUBA	24/02/10
uccele			
	ames.dobson.totalcol	UCCLE	30/04/09
	ames.o3sonde.ozone	UCCLE	07/12/12
	ames.brewer.totalcol	UCCLE	31/10/12
ushuaia			
	ames.uv/spect.uv	USHUAIA	13/03/91
valentia			
	ames.brewer.totalcol	VALENTIA	30/11/14
vdascq			
	ames.uv/spect.uv	V.D'ASCQ	31/08/08
wallops			
	ames.dobson.totalcol	WALLOPS.ISL	30/04/14
	ames.o3sonde.ozone	WALLOPS.ISL	03/03/10
wollongong			
	ftir.o3_uow002	WOLLONGONG	20/09/12
	ftir.o3_uow001	WOLLONGONG	22/10/07
xianghe			
	uvvis.doas.offaxis.no2_bira.iasb001	XIANGHE	RD
	uvvis.doas.offaxis.h2co_bira.iasb001	XIANGHE	RD
	uvvis.doas.offaxis.aerosol_bira.iasb001	XIANGHE	RD
yakutsk			
	ames.bksonde.aerosol_bks	YAKUTSK	23/03/03
	ames.o3sonde.ozone	YAKUTSK	08/03/05
zhigansk			
	ames.uv/vis.totalcol	ZHIGANSK	31/10/12
zugspitz			
	ames.uv/spect.uv	ZUGSPITZE	31/05/07
	ames.ftir.totalcol	ZUGSPITZE	31/12/95

Station name in the NDACC DHF	Instruments/species reported	Station name as reported in the data file	Date of latest measurement
	ftir.hcl_imk.ifu001	ZUGSPITZE	28/12/11
	ftir.clono2_kit.imk.ifu001	ZUGSPITZE	13/07/13
	ftir.hf_kit.imk.ifu001	ZUGSPITZE	18/09/14
	ftir.hno3_kit.imk.ifu001	ZUGSPITZE	22/08/13
	ftir.o3_kit.imk.ifu001	ZUGSPITZE	06/09/13
	ftir.n2o_kit.imk.ifu001	ZUGSPITZE	06/09/13
	ftir.hcl_kit.imk.ifu001	ZUGSPITZE	18/09/14
	ftir.c2h6_kit.imk.ifu001	ZUGSPITZE	25/04/14
	ftir.ch4_kit.imk.ifu001	ZUGSPITZE	25/04/14
	ftir.hf_imk.ifu001	ZUGSPITZE	28/12/11
	ftir.clono2_imk.ifu001	ZUGSPITZE	09/12/11
	ftir.co_kit.imk.ifu001	ZUGSPITZE	18/09/14
zvenigor			
	ames.uv/vis.totalcol	ZVENIGOROD	20/12/13

5. References

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