

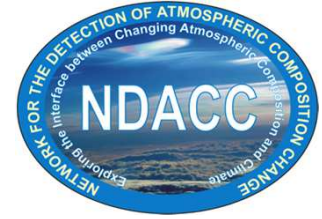
Network for the Detection of Atmospheric Composition Change

Exploring the Interface between Changing Atmospheric Composition and Climate change

Steering Committee Meeting 2014 Report to IRWG 2015

Thomas Blumenstock
Jim Hannigan

Outline

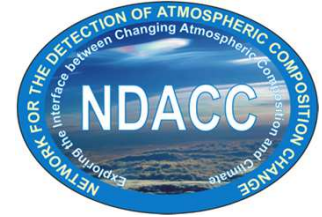


➤ Annual NDACC-SC Meeting

- Hosted by Martine De Maziere, BIRA
- BelSpo, Brussels, Nov., 2014
- Together with NORS final meeting
- Election of Anne M. Thompson as co-chair
- Science talks, WG reports
- Outreach, data archive etc.

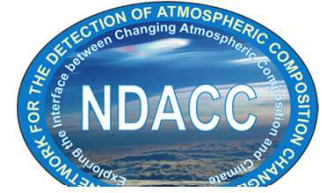
➤ Status of data archive (J. Wild)

Highlights from IRWG

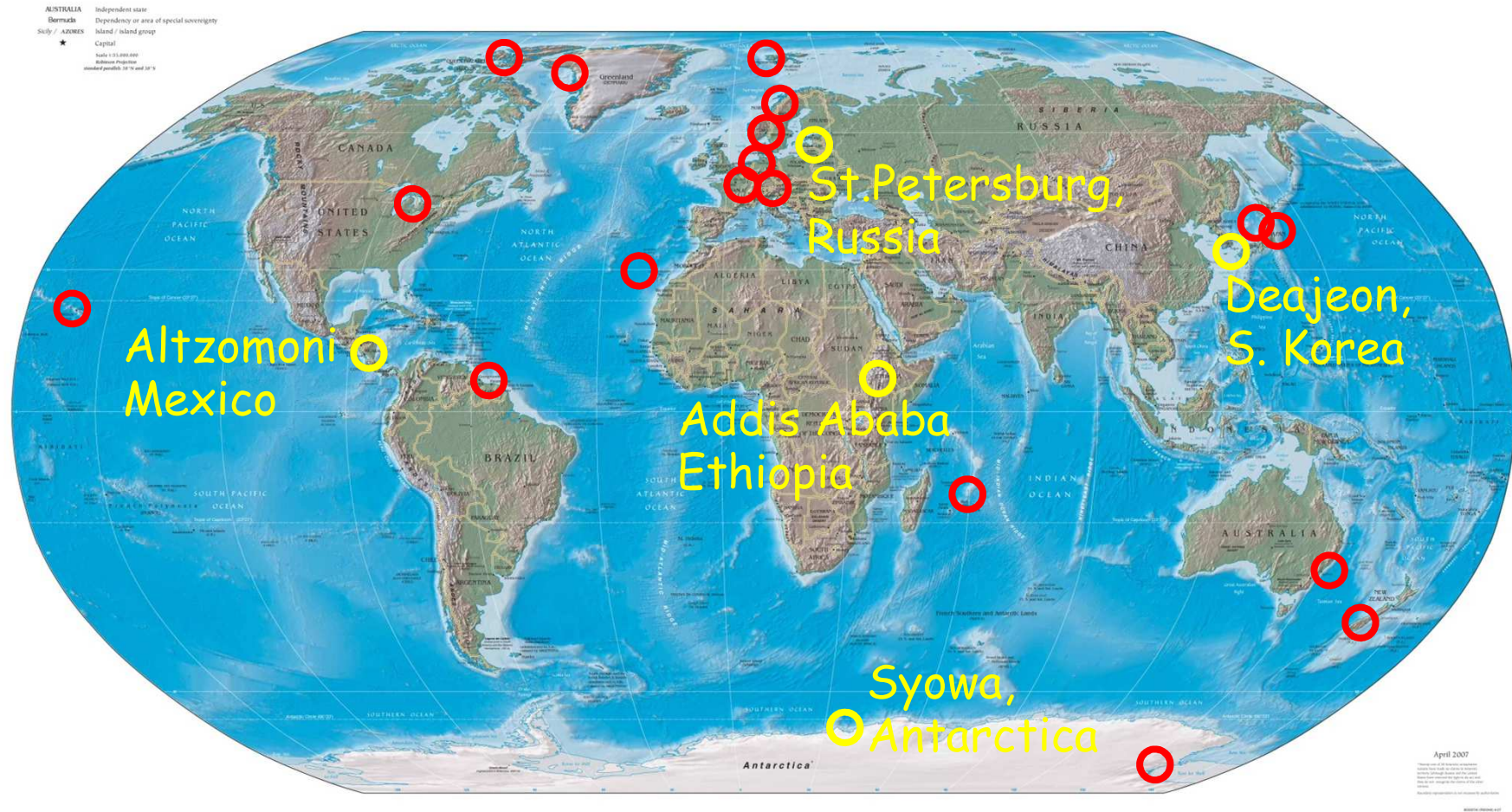


- New sites
- Ongoing MIR versus NIR comparison
 - CH₄ : Ostler, Sussmann et al 2014
 - CO : Christoph Petri (U Bremen)
 - CO₂: Buschmann (U Bremen)
 - H₂O, CO, N₂O: M. Kiel (KIT Karlsruhe)
- Status of projects
 - NORS: Validation data server, see NORS meeting on Wed.
 - MUSICA: data ready for archiving on NDACC data base
 - MUSICA: XCO₂ for quality control (S. Barthlott)
- Proposal for a new network by F. Hase: CO₂CCON
 - Collaborative Carbon Column Observing Network
 - Compact low-resolution FTIR for CO₂ & CH₄ total column

Highlights from IRWG: sites



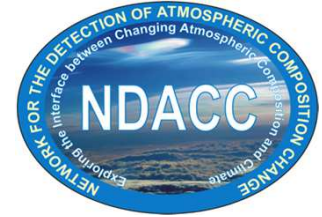
Physical Map of the World, April 2007



○ NDACC site

○ Future NDACC site?

Candidate / Future Stations

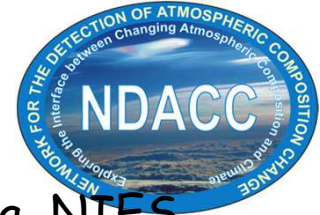


- Altzomoni, **Mexico** (19.11°N, 98.65°W, 4000m a.s.l.)
 - Instrument operable (Bruker 125HR)
 - Michel Grutter, UNAM
 - Certification in process, Referee : M. Coffey, NCAR
- Peterhof, nearby St. Petersburg, **Russia** (59.55°N, 30.15°E)
 - Instrument operational (Bruker 125HR)
 - Maria Makarova, St. Petersburg State University
 - Certification just started, Referee : M. Palm, Univ. Bremen
- Deajeon, **South Korea** (35.8°N, 127.9°E)
 - Instrument operable (Bruker 125 HR)
 - Jeongsoon Lee, KRISS, Deajeon
- Hefei, Anhui, **China**
 - Instrument Bruker 125HR
 - Youwen Sun, AIOFM-Hefei, Chinese Academy of Sciences

Certification completed

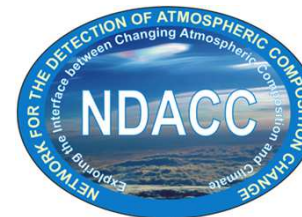
Certification
in progress

Stations Communicating with IRWG



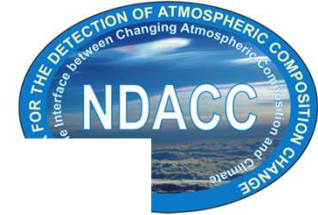
- Syowa Station, **Antarctica** (69.0°S, 39.6°E), Hideaki Nakajima, NIES
 - Instrument operable, intermittent observations
- Kourouka, **Russia** (57.0°N, 59.6°, 295m a.s.l.)
 - New instrument: Bruker 125M, primary TCCON, possibly NDACC
- Tomsk, **Russia** (56.50°N, 84.97°E)
 - Instrument originally for lab work (Bruker 125HR / 120M)
- Addis Ababa, **Ethiopia** (8°59'N, 38°48'E), Bruker 120M
 - PI (Dr. Gizaw Mengistu Tsidu) visited KIT for 1 year
- Dalhousie, Halifax, Nova Scotia, **Canada** (44.6N, 63.6W)
 - BOMEM DA-8, PI: Jonathan E. Franklin
- Porto Velho, **Brazil**, PI: M. De Maziere, BIRA
 - Bruker 125M, TCCON & NDACC ?
- Karlsruhe, **Germany** (49.1 N, 8.5 E), F. Hase, KIT
 - Bruker HR 125, in operation since 2009
 - TCCON & NDACC (InGaAs & InSb detector simultaneously)

Science Highlights (IRWG)



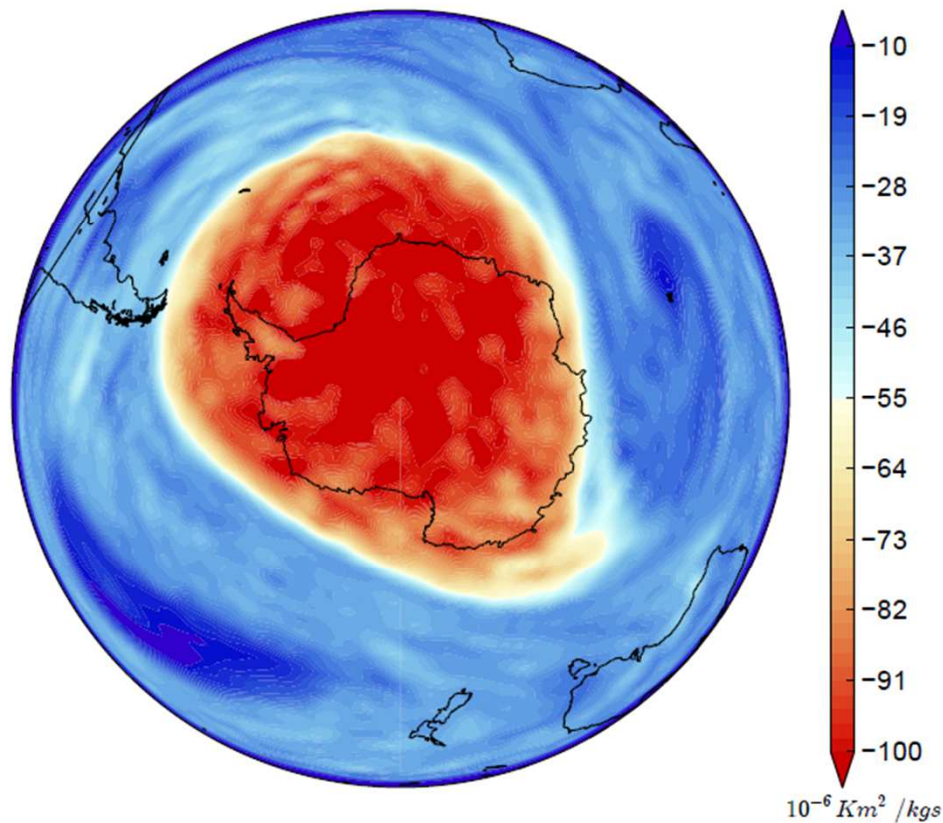
- Radiative closure experiment, Sussmann et al.
- MUSICA
 - XCO₂ as quality check, Barthlott et al., AMTD 7, 2014
 - IASI data validation, Wiegele et al., AMT 7, 2014
 - Validation of FTIR δD data with air- & g.-b. in-situ data, Schneider et al., AMTD 7, 2014
- Biomass burning products
 - Viatte et al., AMT 7, 2014
 - Viatte et al., ACPD 7, 2014
- CF₄ trends
 - E. Mahieu et al., AMT 7, 2014
- Stratospheric ozone trends
 - C. Vigouroux et al., ACPD 14, 2014
- Observations of recent HCl increase
 - E. Mahieu et al., Nature, November 6, 2014

Meteorological data available at NILU through the ESA funded EVDC project



Global analyses at T_{106} resolution

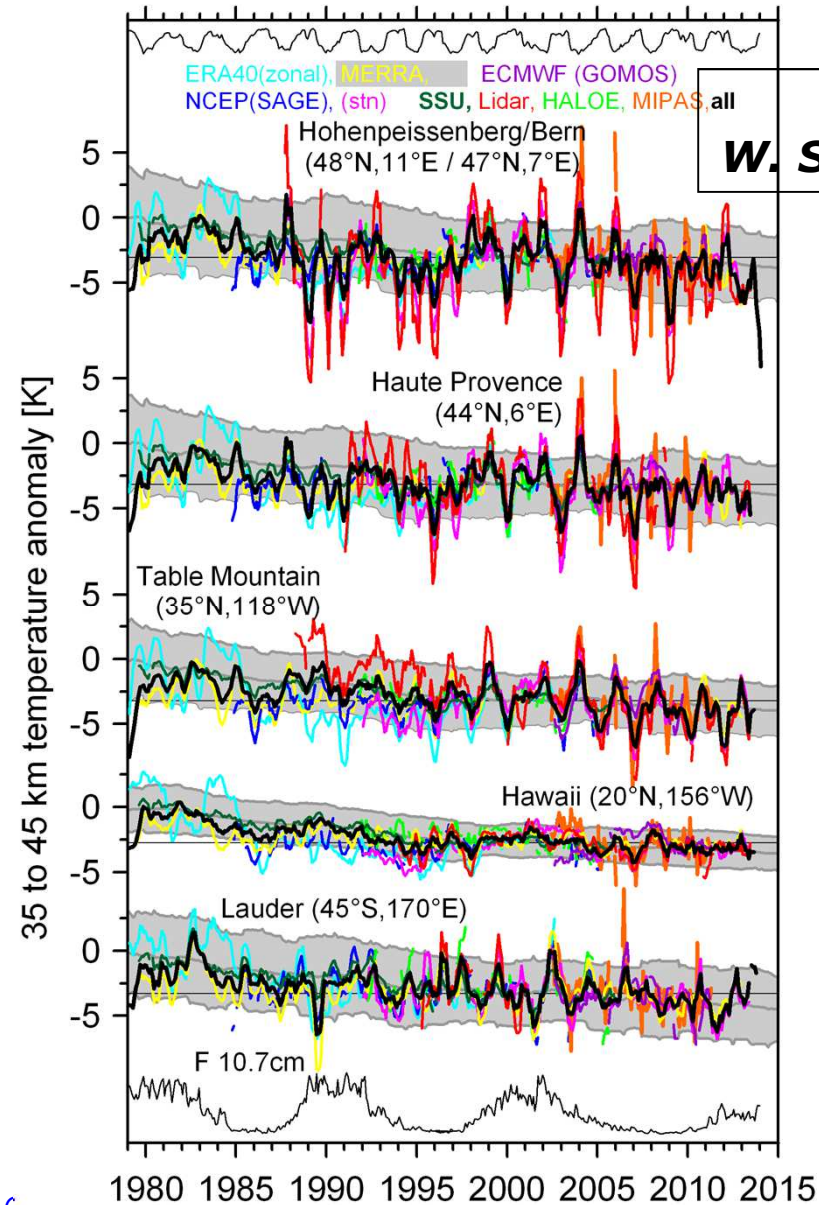
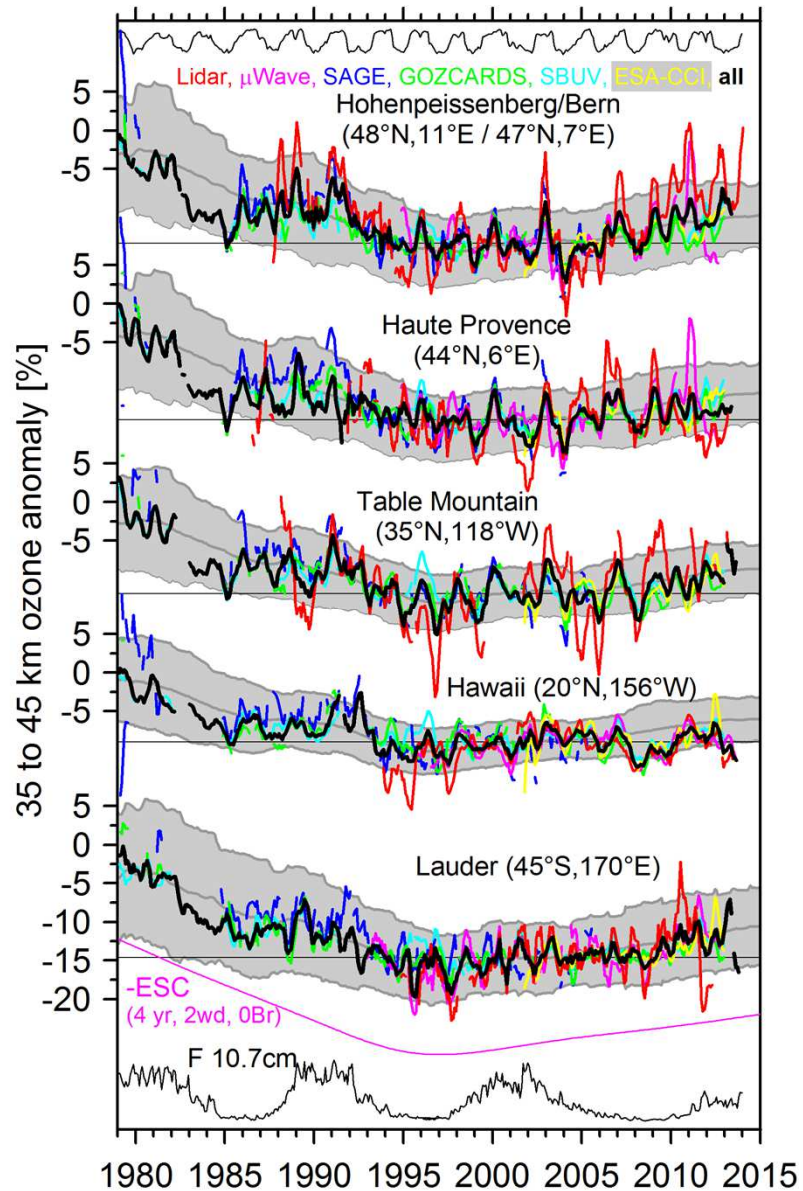
ECMWF analysis of PV at 550 K on 2014-10-01 at 12h



Geir Braathen, WMO
A.M. Fjaeraa, NILU



5 NDACC stations time series

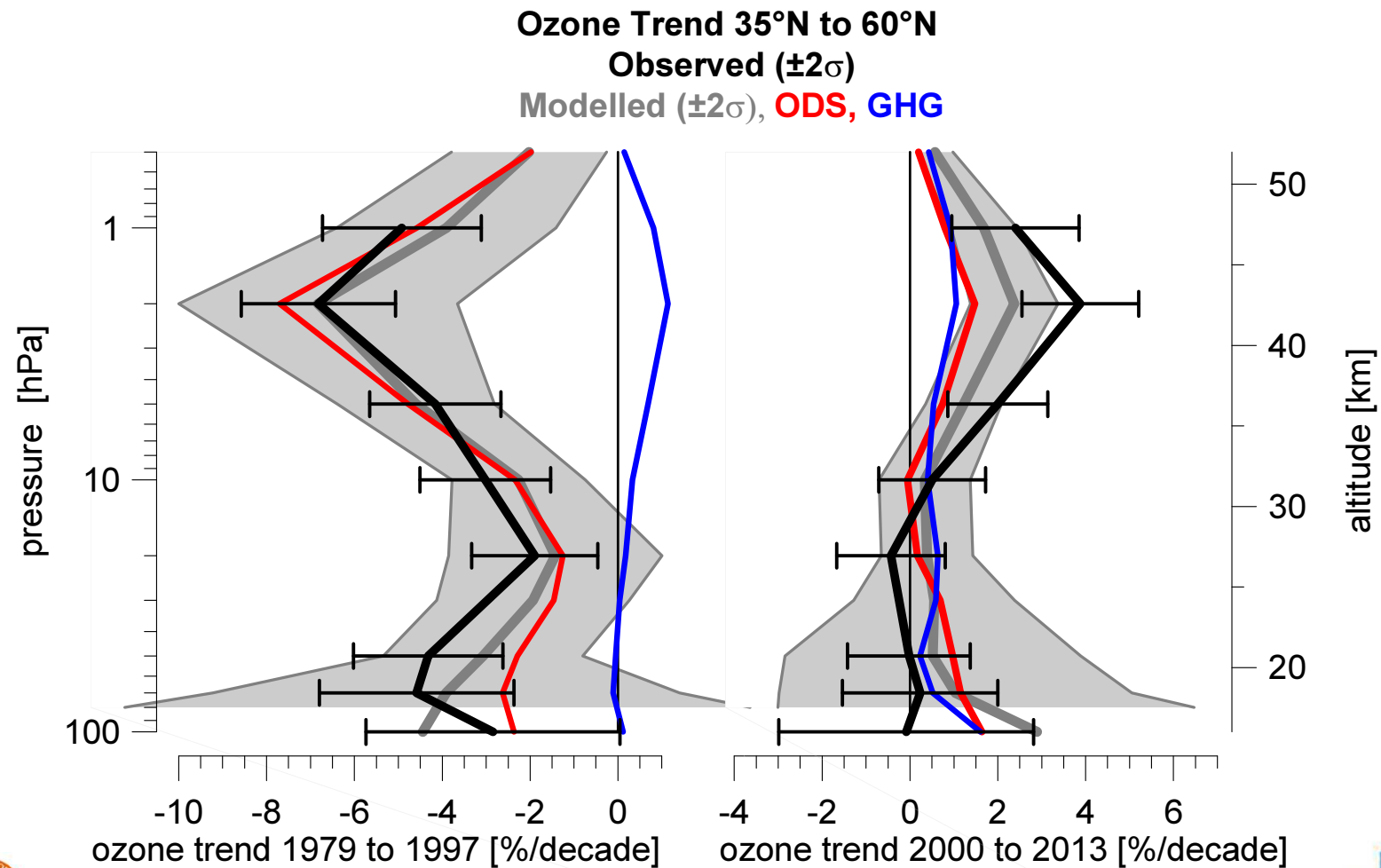


**From
W. Steinbrecht**



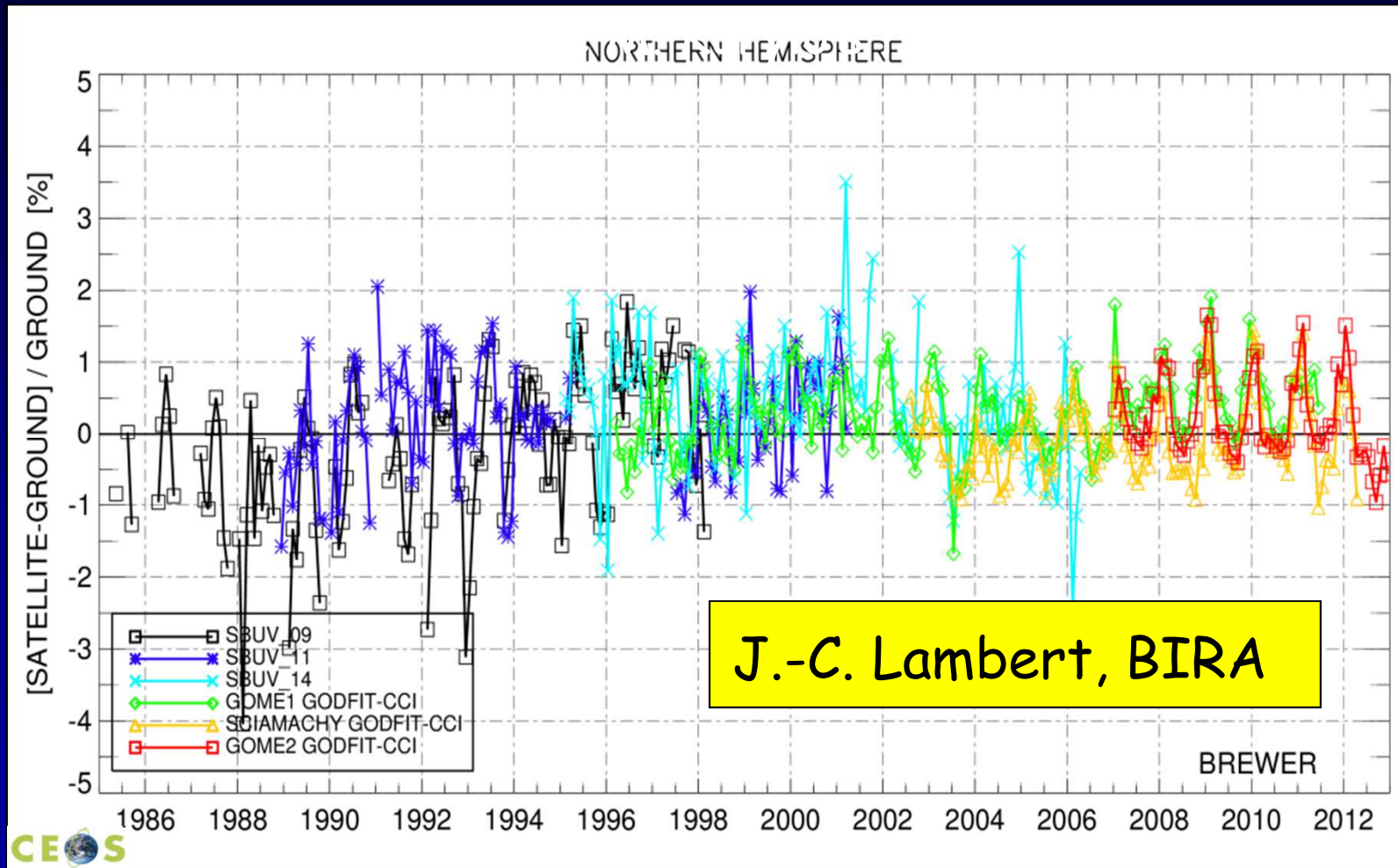
Observed & CCM simulated trends agree
simulations: $\frac{1}{2}$ ODS decline + $\frac{1}{2}$ cooling by increasing CO_2

**From
W. Steinbrecht**



Harmonization of ECV Data Records

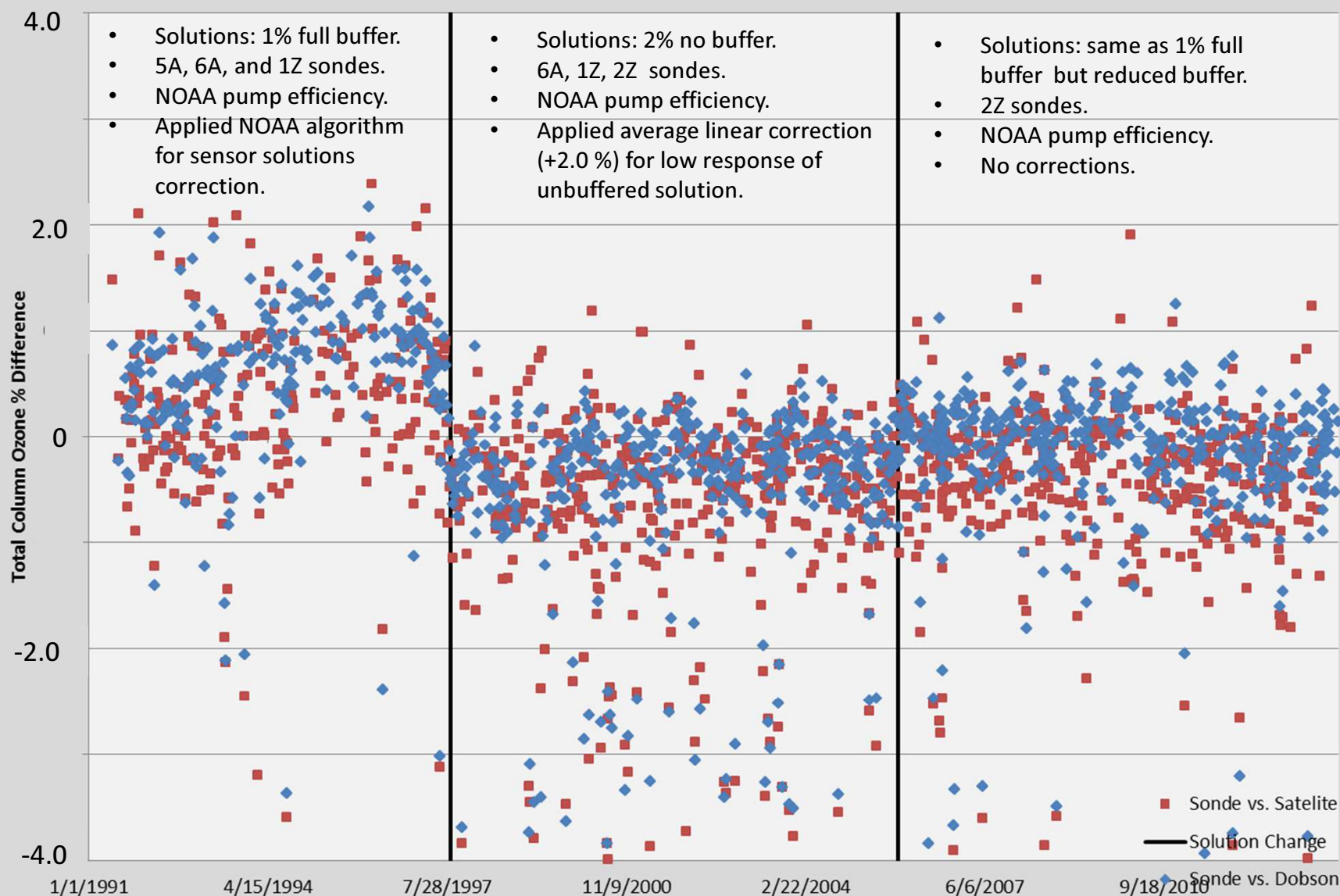
Various projects of ESA, EUMETSAT, NASA, NOAA,
SPARC...



Courtesy ML Koukouli et al., 2014, ESA Ozone_cci project

Before Fitting and Corrections Applied 1991-2013

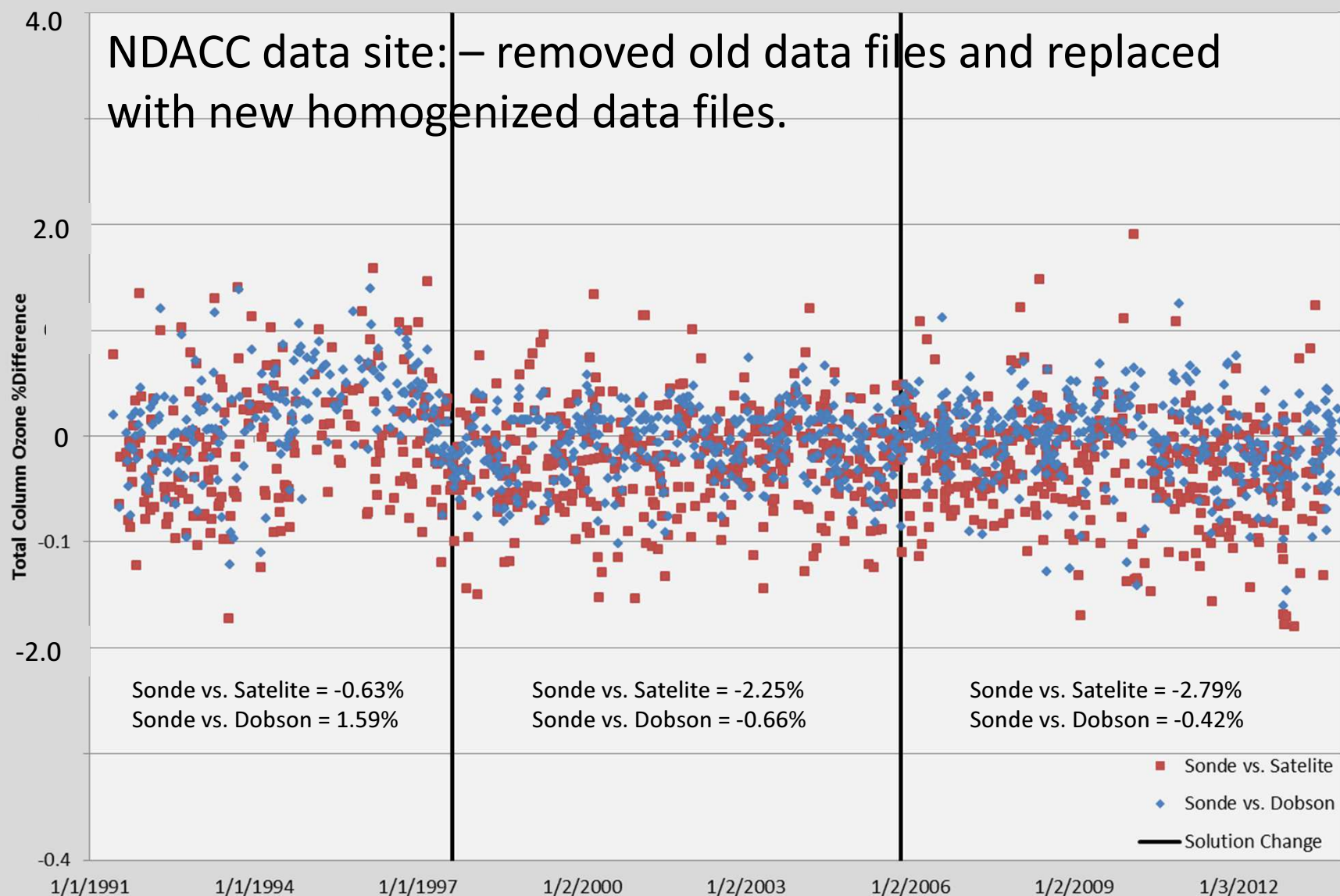
Boulder: Ozone sonde total column % difference vs Satellite (red) & Dobson (blue)



R. Stübi, MeteoSwiss

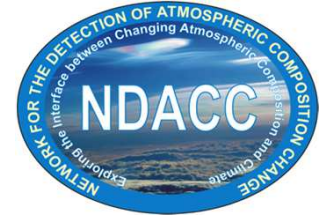
After Editing and Corrections Applied 1991-2013

Boulder: Ozone sonde total column % difference vs Satellite (red) & Dobson (blue)



R. Stübi, MeteoSwiss

NDACC Theory and Analysis Group



Overview



- Expanded Theory and Analysis Working Group
 - Getting a larger group involved [AI Theory-1]
 - Strengthen links with Chemistry Climate Modelling Initiative (CCMI)
 - There are groups beyond CCMI that we should try to include
 - Foster exchange between model and observational data
- New NDACC Theory Web Site [AIs Web-3, Web-6]
- Science: Some slides from my presentation at the CCMI Workshop May 2014 [AI Theory-2]

2

02.06.2015

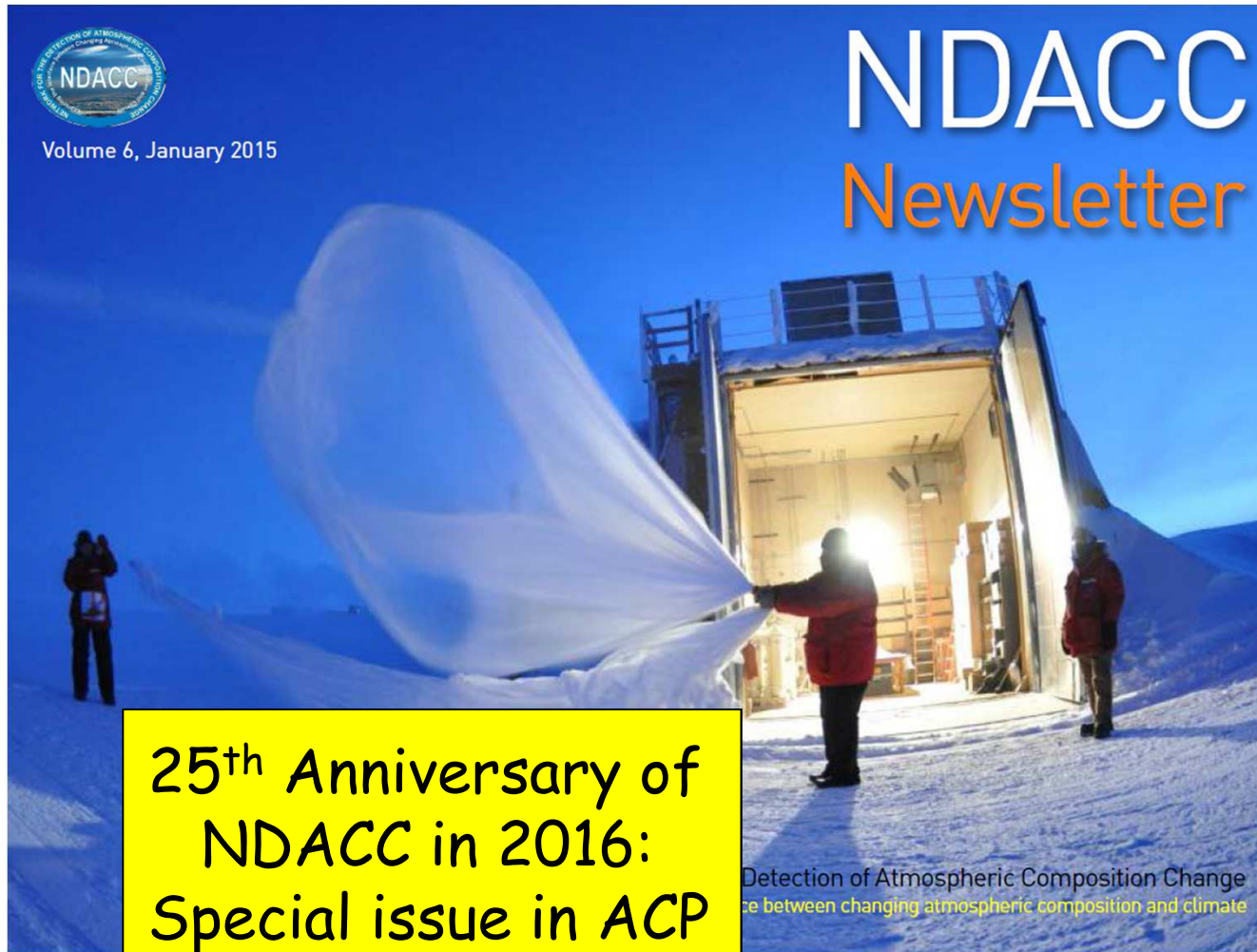
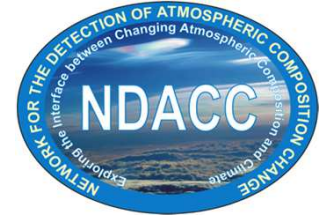
B.-M. Sinnhuber, NDACC SSC Brussels 2014

Institute for Meteorology and Climate Research

Björn-Martin
Sinnhuber and
Susan Strahan:

Theory group
offers to put model
data on the NDACC
data archive.

NDACC Newsletter



IRWG Articles:

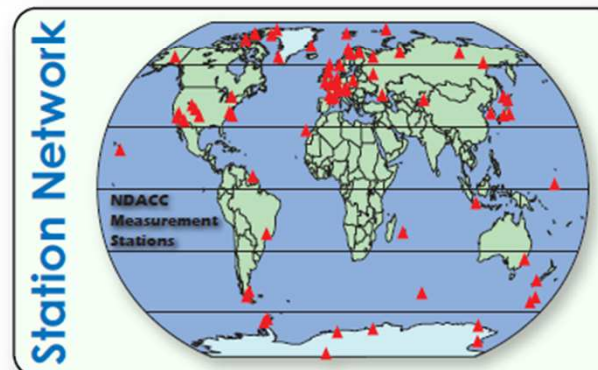
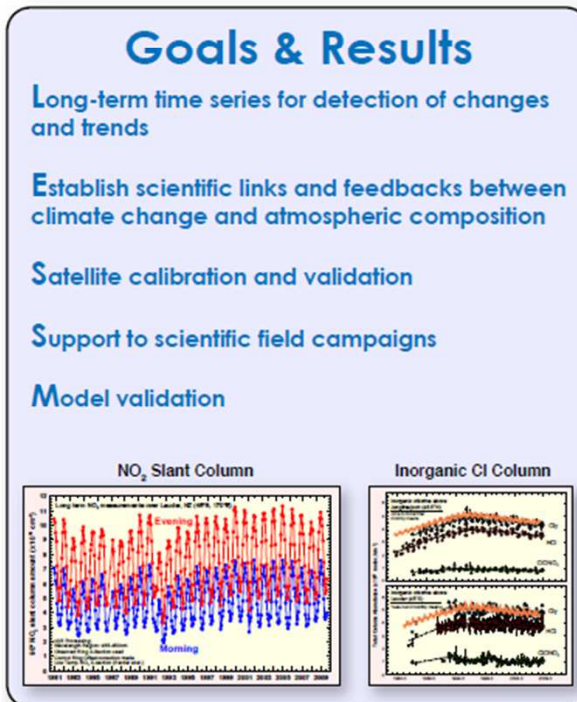
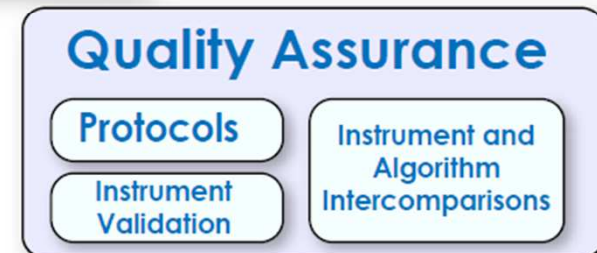
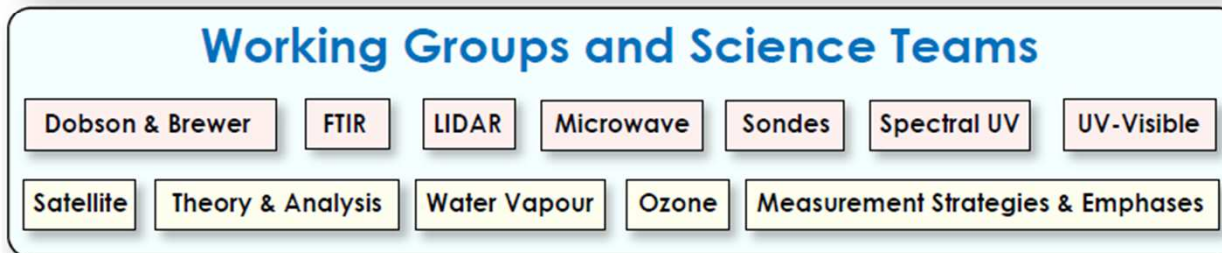
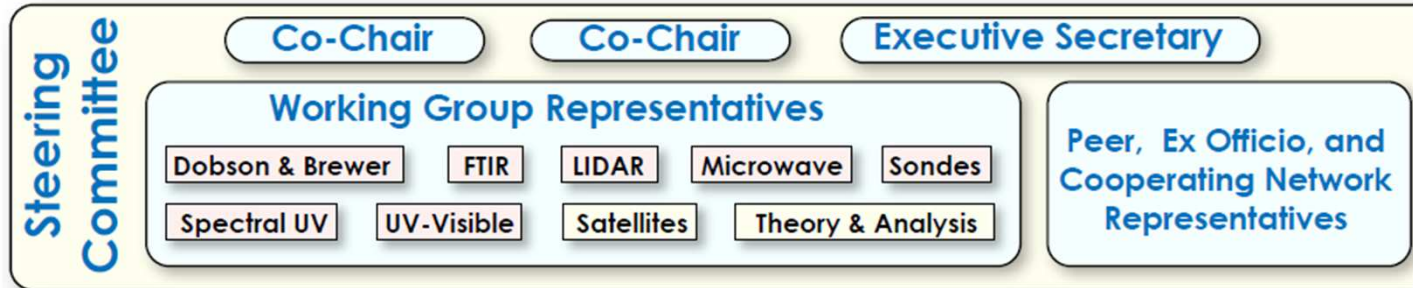
- HCl increase in the N.H.- Manu Mahieu et al.
- Biomass burning in the Arctic - Camille Viatte & Jim Hannigan

June 2015

NDACC IRWG Meeting

Geir Braathen, WMO

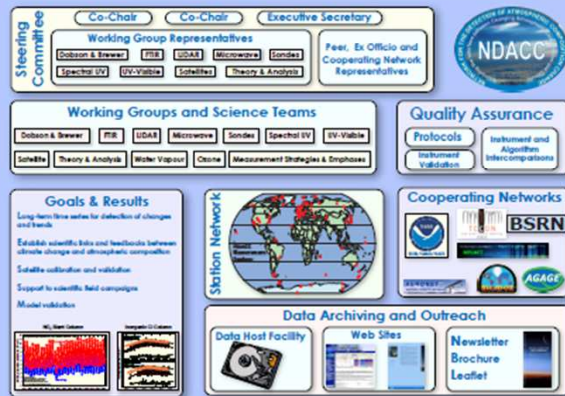
NDACC organizing chart





G. Braathen, World Meteorological Organization, Geneva, Switzerland; Stuart McDermid, NASA JPL, Wrightwood, California, Martine de Mazière, BISA, Uccle, Belgium, Michael Kurylo, Univ. of Maryland

Process Studies



HCl column above Jungfraujoch, CH

6e+25
4e+25
2e+25
0e+25

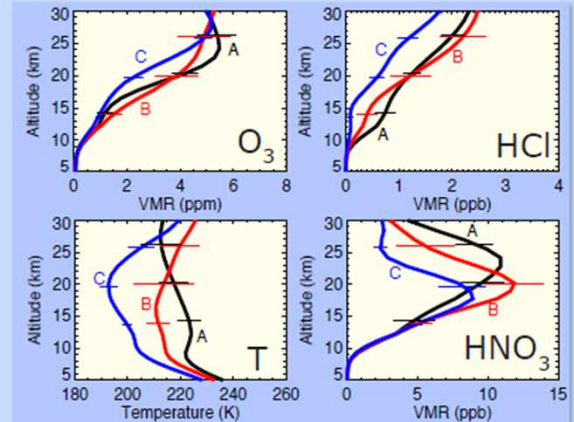
11 years:
 $-1.0 \pm 0.2 \text{ \%/yr}$

5 years:
 $+1.4 \pm 0.5 \text{ \%/yr}$

○ Daily means

1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

Thanks to the Montreal Protocol, the amount of HCl in the stratosphere has dropped from the maximum reached at the end of the 1990s. However, the last five years we have seen a new increase in HCl. The reason for this is still a matter of debate. This shows the importance of long term monitoring of Protocol gases.



FTIR data from Thule, Greenland during the unusual Arctic winter of 2010-11. The black curves (denoted A) in each panel represent March averages over the 2000-2010 time period for days when the station was outside the polar vortex. The red curves (denoted B) in each panel represent March averages over the 2000-2010 time period for days when the station was inside the polar vortex. The blue curves (denoted C) in each panel represent March averages for 2011 (all inside the polar vortex).

[illegible]

The NORS project

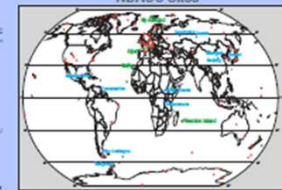
The Demonstration Network Of ground-based Remote Sensing observations in support of the GMES Atmospheric Service (NORS) is a EU Framework 7 R&D project (November 1, 2011 - July 31, 2014).

The project is built around

- 4 ADEC pig stations:
 - Arctic: Ny-Ålesund,
 - Alpine stations (Berch, Jungfraujoch, and Observatoire de Haute-Provence),
 - Sub-tropics: Izona
 - Tropics: Reunion Island

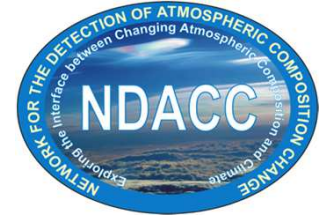
- microwave,
- differential laser
- infrared
- UV/Visible differential optical absorption spectrometry.

A specific objective of NORS
Rapid Data delivery ('RD') to the NOACE database : maximum delay of one month. Results are accessible to all users, NOACE, NOCE, the Member States.



- Operational MWT systems
- MWT systems selected as pilot systems in 1995
- System to be developed in 1999 is substantially better MWT system

NDACC Data Host Facility



Jeanette Wild

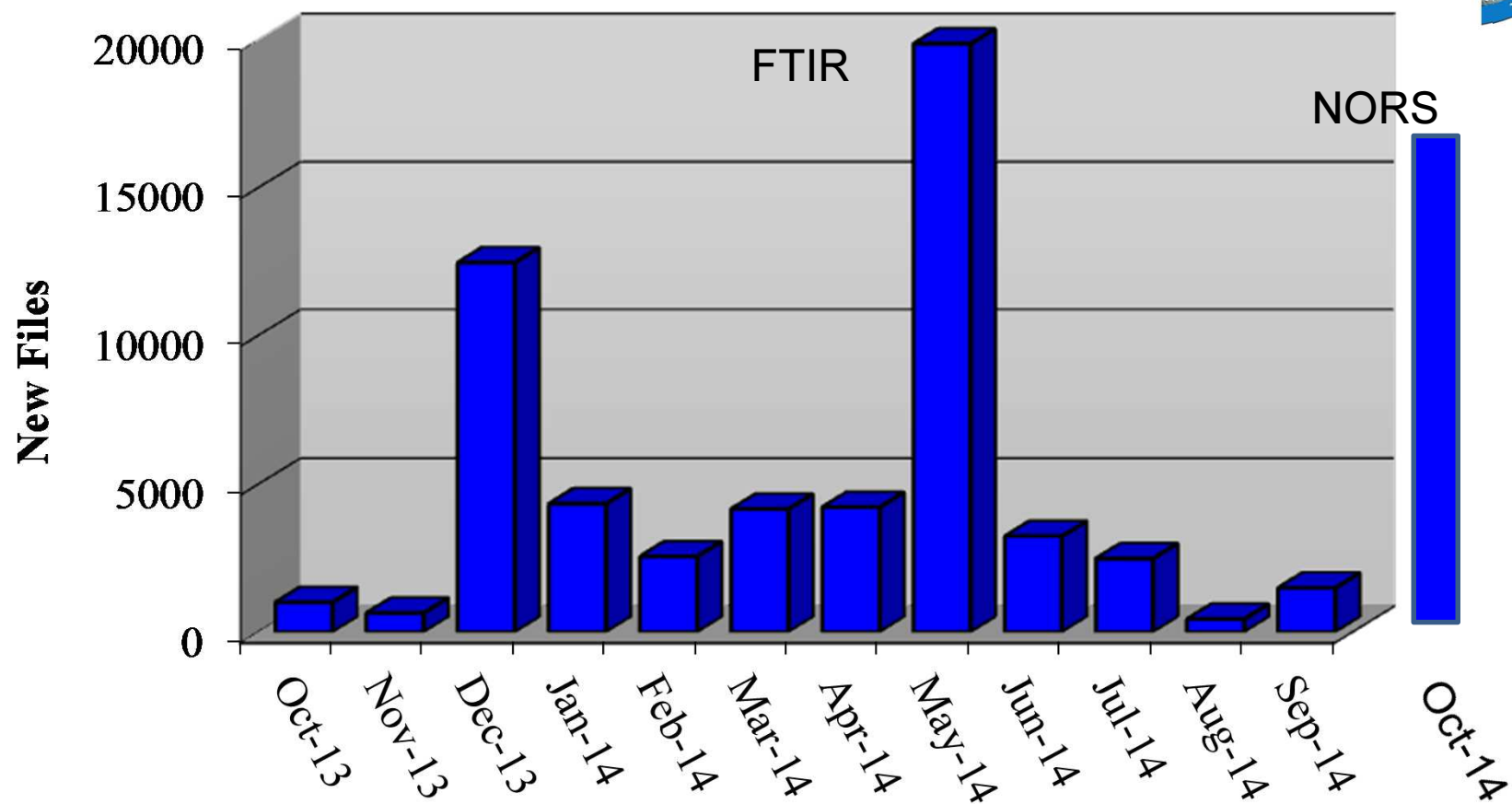
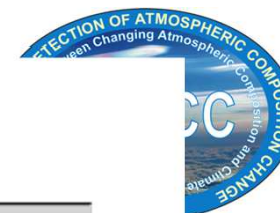
- Data submission status
- Data versioning concerns in HDF files
- FTIR metadata file status
- Hot News



FTIR WG meeting - June 2015



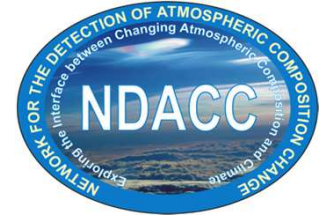
Monthly File Ingest 2014



November 2014 – Brussels, Belgium



FTIR Data Submission Status



In following two slides note:

- Data significantly out of date shows the **entire line in red**.
- Data needing a few years updated shows the **final year in red**.
- Data sets that **have submitted data this year** shows the **update in green**
- Data with **no additions since June 2013** shows the entire line in black
- Note most PIs are no longer submitting Ames.



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FTIR Data Submission Status



PI	Site	Ames	HDF	Comments
Strong	Eureka	96 – 11	06 – 13	Last archive 10/13
Notholt	Ny Alesund	92 – 09	92 – 14	
Coffey/Hannigan	Thule	99 – 07	99 – 13	
Blumenstock	Kiruna	96 – 07	96 – 12	No data submitted since 3/13. More data?
Mellqvist	Harestua	94 – 12	?	No data submitted since 9/13. More data?
Notholt	Bremen	02 – 11	03 – 14	
Sussmann	Zugspitze	95 – 05	95 – 14	
Mahieu/Zander	Jungfrauoch	89 – 13	92 – 14	
DeMoulin	Jungfrauoch		89 – 08	Ended
Nagahama	Moshiri	96 – 04	96 – 07	Resumed?
Strong	Toronto	01 – 09	02 – 13	Last archive 3/14



FTIR WG meeting – June 2015



FTIR Data Submission Status



PI	Site	Ames	HDF	Comments
Nagahama	Rikubetsu	95 – 04	95 – 09	Need Archival Plans
Rinsland	Kitt Peak	78 – 05		Ended
Blumenstock	Izana	99 – 07	99 – 14	
Coffey/Hannigan	Mauna Loa	95 – 07	95 – 12	
Murcray (Bomem)	Mauna Loa	91 – 95		Ended
De Maziere	Reunion(SD)		02 – 13	Moved
De Maziere	Reunion(M)		13 – 14	
Jones/Griffith	Wollongong		96 – 13	
Smale	Lauder	90 – 09	90 – 15	
Smale (Bomem)	Arrival Hghts	91 – 96		Ended
Smale (Bruker)	Arrival Hghts	97 – 09	96 – 14	
Toon	Mt Barcroft etc	85 – 14		



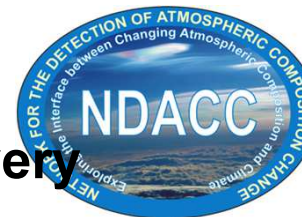
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RD Versioning Pitfalls

What should happen:

From the NORS “Preliminary documentation of data delivery system” found on the NORS website.



“RDDS (Rapid Data Delivery System) provides the ground-based remote sensing data within 1 month after the measurement. “ ...

“Another aspect of RDDS is the consolidation of the ground station data.”

...

“After consolidation of the data sets of RDDS, the data will be transferred into the root NDACC data center which sets higher standards in terms of accuracy and long-term stability of the measurement series. “ (Note the RD data is in <ftp.cpc.ncep.noaa.gov/RD>)

From the NDACC RD_readme.txt:

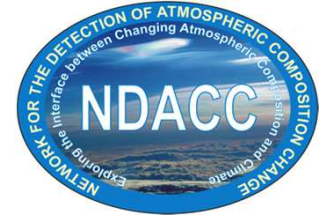
“As soon as the PI has submitted the consolidated version of these ‘rapid delivery’ data, the RD data will be removed from the database and the consolidated data will be found in the usual station directory on <ftp.cpc.ncep.noaa.gov/ndacc>.”



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RD Versioning Pitfalls



Which really means:

NDACC vetted data and RD data are visible in **separate directories** on the public ftp site.

NDACC data are **quality controlled**, RD data might not be.

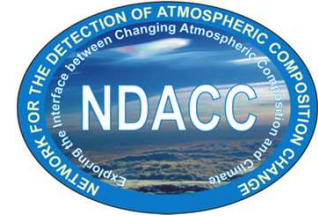
NDACC data files often contain a **longer time period**. (1 year in a file, hence the term 'consolidated'.)



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RD Versioning Pitfalls



What sometimes happens:

- 1) Some use same version number for RD and 'Consolidated'. Some use different.

NDACC
Version 006

82	groundbased_ftir.co_niwa001_lauder_20130117t184026z_20131227t195028z_006.hdf	2014-01-21	view/download
83	groundbased_ftir.co_niwa001_lauder_20140113t183012z_20141223t063309z_006.hdf	2015-01-11	view/download

RD
Version 006

1	groundbased_ftir.co_niwa001_lauder_20150331t014103z_20150424t040856z_006.hdf	2015-05-12	view/download
2	groundbased_ftir.co_niwa001_lauder_20150430t235326z_20150529t022423z_006.hdf	2015-06-03	view/download

Only difference is perhaps the file size (1 yr vs monthly)

NDACC
Version 001

1	groundbased_ftir.c2h6_iup001_bremen_20040604t092503z_20041221t093212z_001.hdf	2014-10-03	view/download
2	groundbased_ftir.c2h6_iup001_bremen_20050126t090523z_20051018t142338z_001.hdf	2014-10-03	view/download

RD
Version 003

1	groundbased_ftir.ch4_iup001_bremen_20140723t134925z_20140828t125556z_003.hdf	2014-09-10	view/download
2	groundbased_ftir.ch4_iup001_bremen_20140916t082656z_20140923t093752z_003.hdf	2014-09-29	view/download

Should version be larger or smaller in RD?



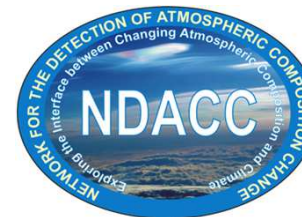
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L
A
U
D
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R

B
R
E
M
E
N

RD Versioning Pitfalls



What sometimes happens:

**2) Some data files with same version number have overlapping dates.
Are the data the same? If so: why two files? If not which is best?**

25	groundbased_ftir.ch4_awi001_ny.alesund_19980330t115401z_19980923t095445z_001.hdf	2014-07-31	view/download
26	groundbased_ftir.ch4_awi001_ny.alesund_19980330t120458z_19980923t095415z_001.hdf	2012-12-14	view/download

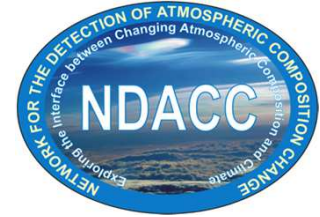
Note: Slightly different start and end date. Same version number.
Different archive date (7/31/14 and 12/14/12)



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RD Versioning Pitfalls



What sometimes happens:

3) Some data sets have two files with different versions for the same dates.

		Date	
1	groundbased_ftir.ch4_bira.iasb003_la.reunion.maido_20130305t072114z_20131230t050448z_002.hdf	2014-06-21	view/download
2	groundbased_ftir.ch4_bira.iasb003_la.reunion.maido_20130317t061830z_20131230t050448z_001.hdf	2014-03-01	view/download
		2014	

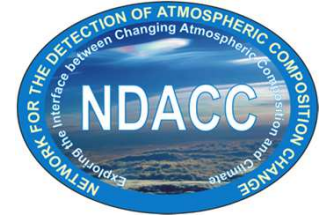
Version 1 was archived in March 2014. Version 2 was archived in June 2014, so the higher number version seems to be the more recent/likely preferred. In the previous case, the lower version number seemed preferred.



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RD Versioning Pitfalls



Lessons to remember:

- **Look at your own data** on the website.
(www.ndsc.ncep.noaa.gov/pi)
 - Be sure the versioning makes sense to you.
 - Be sure only the files you want there remain there.
- Ask to have **old versions removed**.
- Define **what you mean** by increasing version number. Should this be a IRWG **standard**?
- **Document, document, document.**

Put yourself in the mindset of the user.



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FTIR Metadata File Status

Document, document, document



In following three slides note:

- The first two characters of the filename indicate the PI of record when the file was submitted. So files with mismatched PI names likely need revision.
- Files more than 5 years old need updating and are marked **in red**.
- Files submitted data this year are marked **in green**.
- Lines in black should be updated, but are not critically out of date.
- Some datasets have no documentation file.

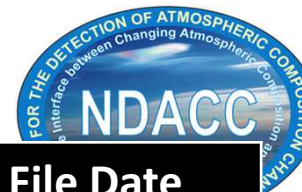


Submit a new file via email to jeannette.wild@noaa.gov

FTIR WG meeting – June 2015



FTIR Metadata Status



PI	Site	Filename	File Date
Strong	Eureka	ks_eureka_ftir_20131016.txt	3/21/14
Notholt	Ny Alesund	jn_nyalesund_ftir.txt	3/5/09
Hannigan	Thule	jh_thule_ftir.txt	1/23/15
Blumenstock	Kiruna	tb_kiruna_ftir.txt	12/9/09
Mellqvist/Galle	Harestua		
Notholt	Bremen	jn_bremen_ftir.txt	4/26/05
Sussmann	Zugspitze	rs_zugspitze_ftir.txt	7/5/06
Mahieu/Zander	Jungfrauoch	rz_Jungfrauoch_ftir.txt	11/22/02
DeMoulin	Jungfrauoch		
Nagahama	Moshiri	yk_multi_ftir.txt	6/5/01
Strong	Toronto	ks_toronto_ftir_20131016.tx	3/21/14



FTIR WG meeting - June 2015



FTIR Metadata Status



PI	Site	Filename	File Date
Nagahama	Rikubetsu	yk_multi_ftir.txt	6/5/01
Rinsland	Kitt Peak	kr_kittpeak_ftir.txt	9/17/04
Blumenstock	Izana	tb_izana_ftir.txt	12/9/09
Coffey/Hannigan	Mauna Loa		
De Maziere	Reunion		
Jones/Griffith	Wollongong	dg_wollongong_ftir.txt	9/21/99
Smale	Lauder	ds_lauder_ftir_20140115.txt	10/1/14
Smale	Arrival Hghts	ds_arrival_ftir_20140115.txt	10/1/14



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FTIR Metadata Status – Campaign Data



PI	Site	Filename	File Date	Data date
Toon	Multiple	gt_multi_ftir.txt	8/25/03	5/31/13
Notholt	Polarstern	jn_polarstern_ftir.txt	4/26/05	4/28/05
Mankin	Sondrestrom	wm_sondrestrom_ftir.txt	5/10/01	11/9/00

Polarstern and Sondrestrom files may not need updating if no further data are expected.

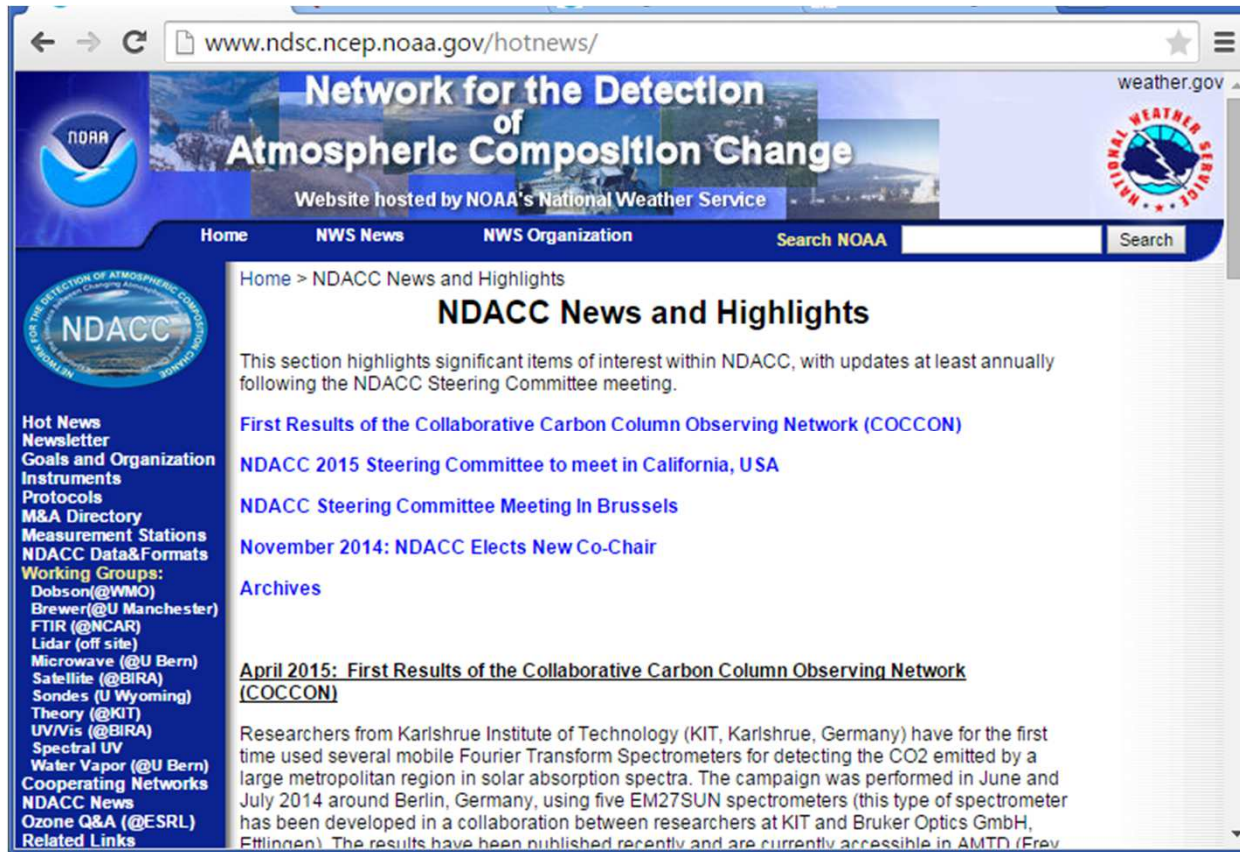
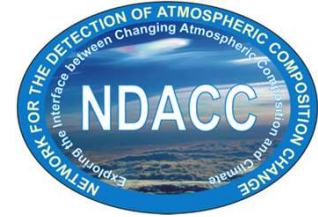


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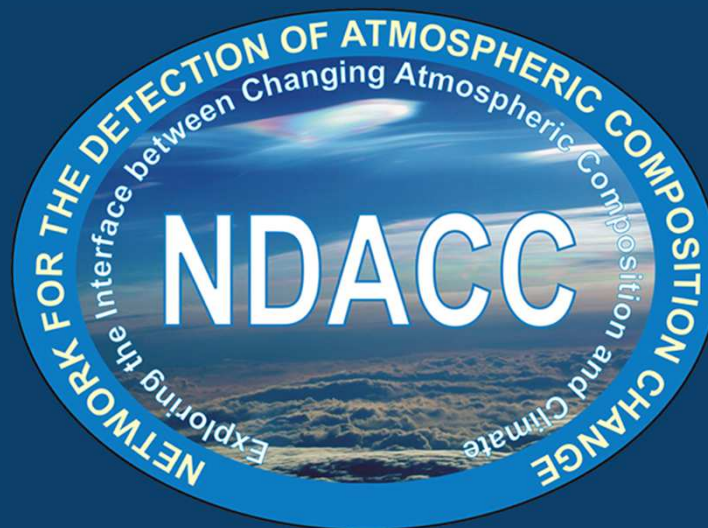


HOT NEWS: Let us know of anything you would like posted here.



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Thank you for your attention!