Jungfraujoch site report

NDACC IRWG Meeting
Wanaka, New Zealand
May 2019

E. Mahieu and
the Liège team

Overview

- Status and perspective (projects, funding status)
- SFIT-4 implemented
- HDF (re-)submission status
- HBr cell spectra
- Publications
- and more…

Current team composition

- Scientists (FTEs):
  - Permanent staff (2): Christian Servais and Manu Mahieu
  - Phd students (1.5): Maxime Prignon and Rodriguez Yombo Phaka
  - Researcher (1): Arpita Verma
- Computing engineer (0.5): Olivier Flock
- Support from retired people: Ginette Roland
- People who recently left: Whitney Bader

Ongoing projects and funding status

- 1 Swiss operational project (MeteoSwiss, 2018-2021)
- 1 Belgian research project (FRS-FNRS; 10/2016-9/2020): *impact of circulation changes on the trends of HF, N_2O and CH_4*
- 1 Belgian demonstration project (BELSPO-BRAIN-be; 12/2016-9/2019): *source attribution of CH_4 using IASI observations and GEOS-Chem model simulations*
- 1 research project in collaboration with the University of Kinshasa (Belgian funding, 1/2019-12/2022): *modeling of biogenic emissions in the Congo basin and impact on air quality in central Africa*

- Support for instrumental development and maintenance warranted for 2019 and 2020 (FRS-FNRS)

⇒ 4 running projects, 1 ending in September 2018
⇒ no proposal currently submitted or under evaluation

DFG* project

- Just accepted (PI Justus Notholt)
- Objectives:
  - Digitization and post-processing of all the 1950-1951 paper roll infrared atmospheric spectra recorded at Jungfraujoch by Pr M. Migeotte (~2.8-23.7µm; 0.12-0.4 cm^{-1}) => they will be preserved for posterity!
  - Systematic cataloging and exploitation of the spectra (a suite of medium to strong absorbers are targeted for retrievals)
  - Data interpretation with support of models (M.P. Chipperfield)
  - Publication of the results and archiving of the digitized spectra
- A PhD or post-doc researcher will be hired (based at UBremen, with regular stays at ULeeds and ULiège)

* Deutsche Forschungsgemeinschaft

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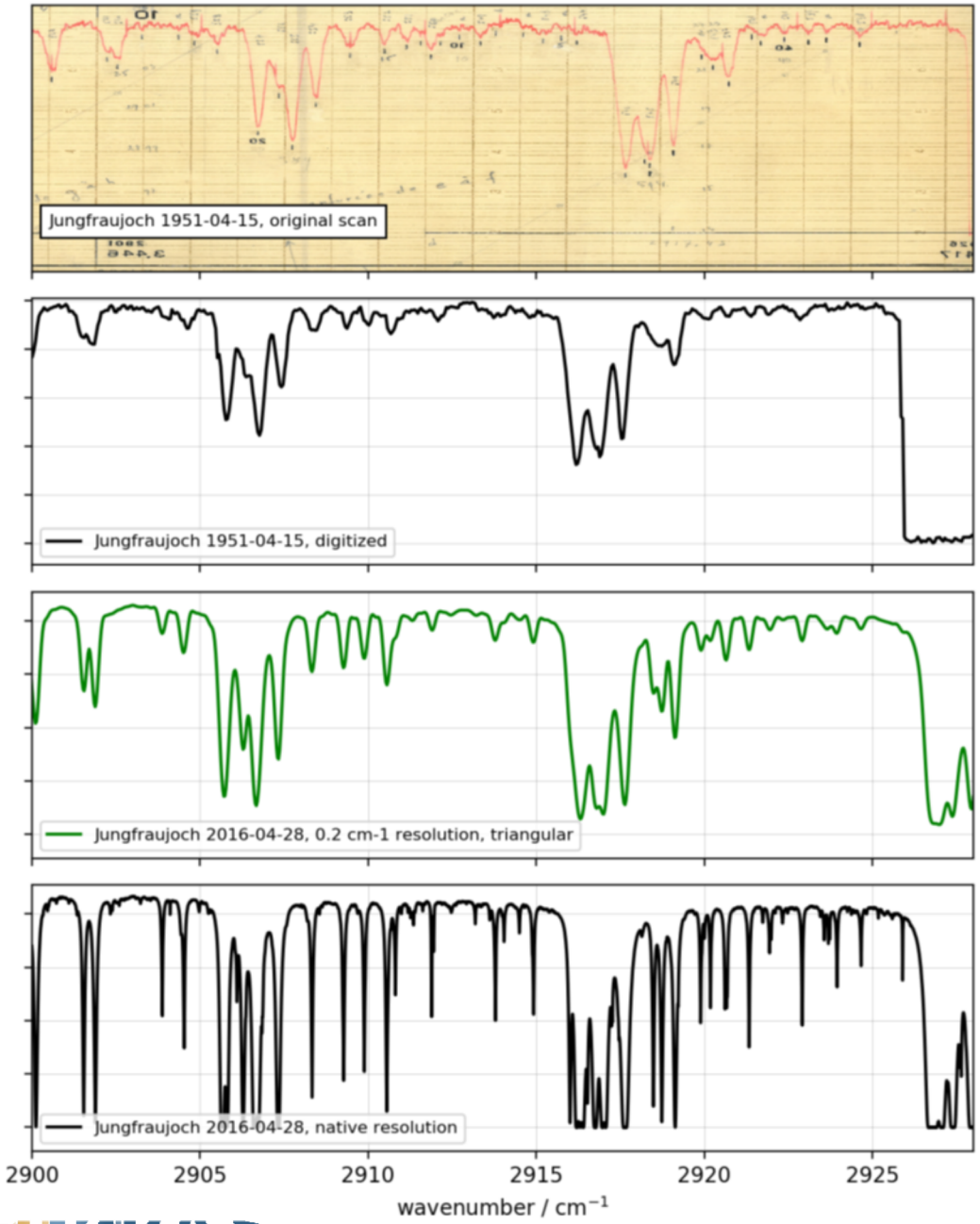
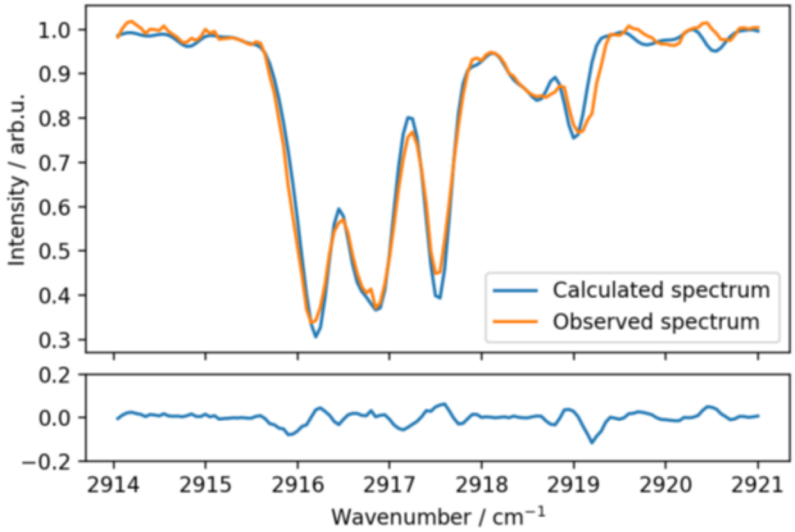
ect





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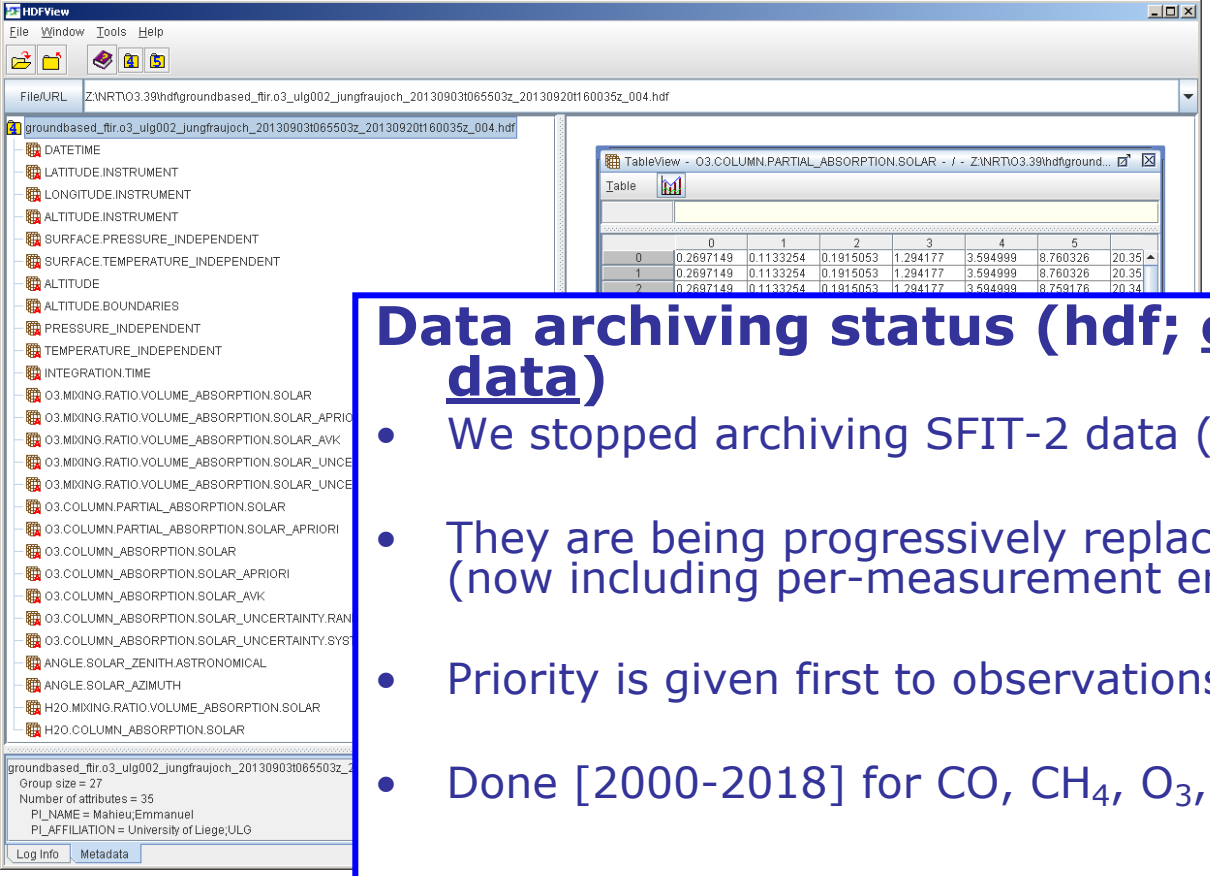
SFIT-4 (v0.9.4.4)

- Operational since fall 2017
- Mostly using Python code/libraries from NCAR (pre-processing and processing) and BIRA-IASB (error calc.)
- We developed specific code only for post-processing and hdf preparation (Python and MATLAB scripts)
- Currently running on two slow multicore LINUX servers… ☹ A proposal will be submitted next month to update our computing infrastructure
- Rapid Delivery chain for supporting CAMS has been running now for more than one year; more than 90 hdf files have been submitted in due time for CH_4, CO and O_3.



Data archiving status (hdf; consolidated data)

- We stopped archiving SFIT-2 data (SFIT-2 retr. discont.)
- They are being progressively replaced with SFIT-4 data (now including per-measurement error information)
- Priority is given first to observations from 2000 onwards
- Done [2000-2018] for CO, CH_4, O_3, N_2O and $ClONO_2$

Observation statistics

Slight improvement after a poor 2017 (lab renovation):

- 73 days in 2017
- 93 days in 2018
- 38 days for 2019 [Jan.-Apr.] – extrap.: 114 days for 2019
- 120/yr on average over 2000-2015

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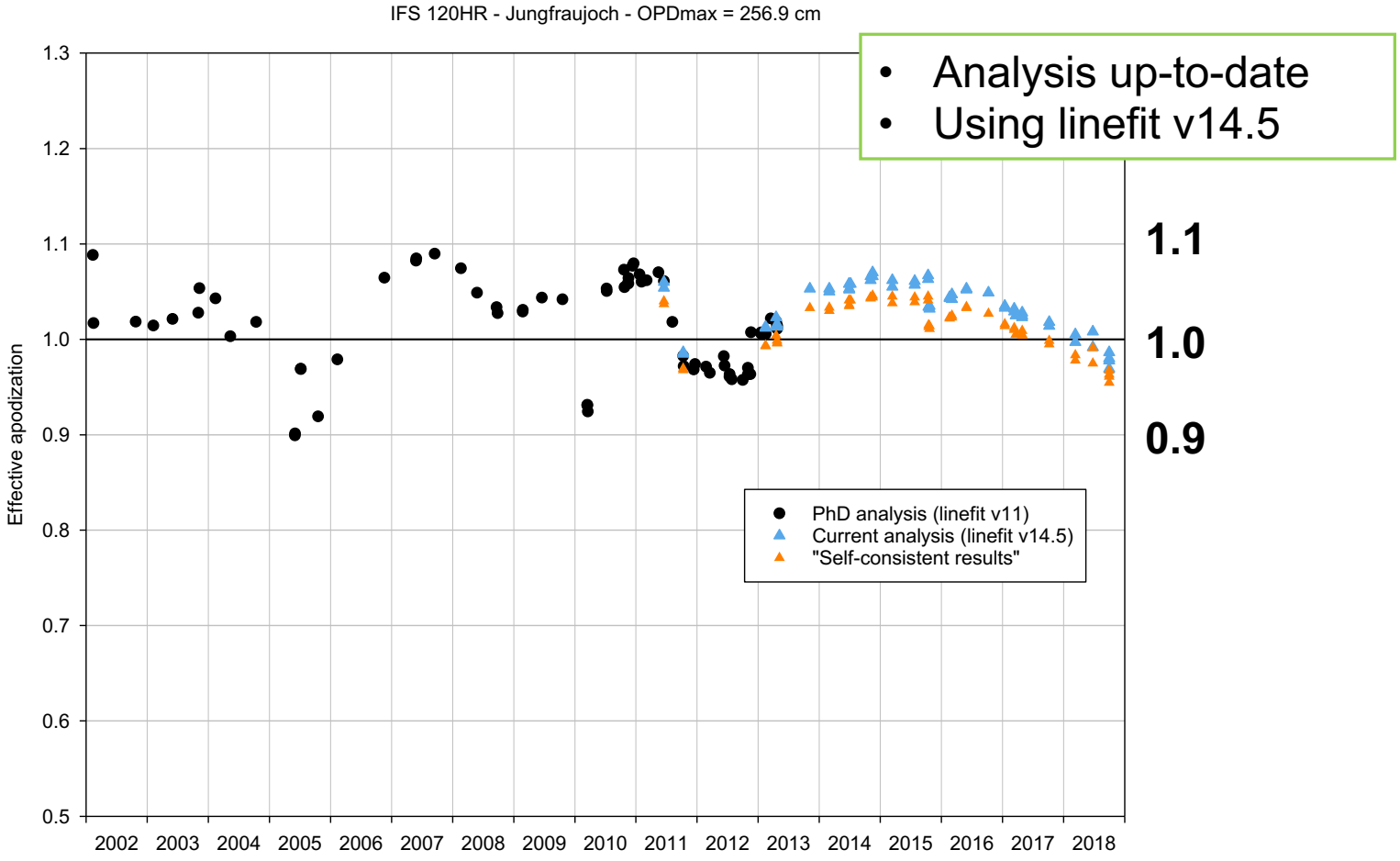
HBr cell spectra/modulation efficiency



- Analysis up-to-date
- Using linefit v14.5

1.1

1.0

0.9

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Ongoing investigations and foreseen publications

- **Multidecadal trend of HCFC-22** above Jungfraujoch: comparison with BASCOE & WACCM model simulations and with surface and satellite measurements (Prignon et al., ACPD, 2019)
- Impact of lower stratospheric dynamical variability on **total inorganic fluorine** derived from ground-based FTIR, satellite and model date (Prignon et al, manuscript in prep.)
- **Retrieval and modeling of PAN** (PeroxyAcetyl Nitrate; reservoir of NO_x) for dry FTIR sites (Mahieu et al.)
- Use of mid- and upper- stratospheric columns to derive more robust/representative **long-term trends of HCl** (Mahieu et al.; talk on Thursday)

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nd SF_6 from in situ and remote sensing measurements.

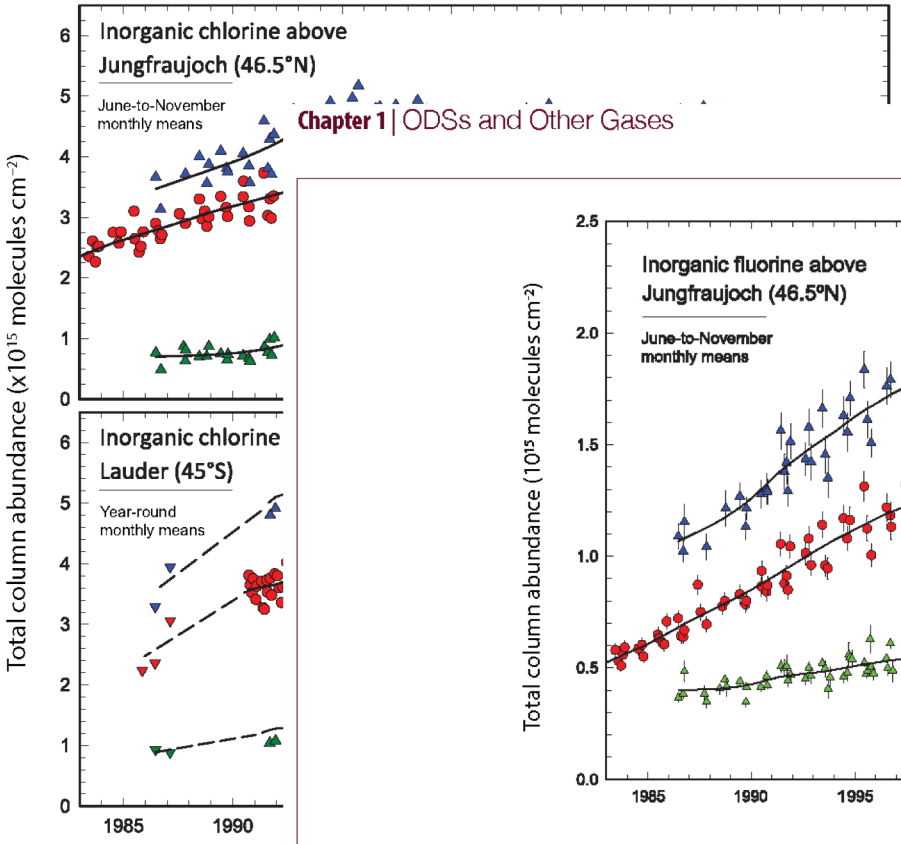

Figure 1-13. Multi-decadal m
HCl and $ClONO_2$, and their s
3,580 m altitude) and the La
the NDACC network. For the
restricted to the June to Nov
transport and subsidence du
least-squares fits involving a
tonic and non-linear change

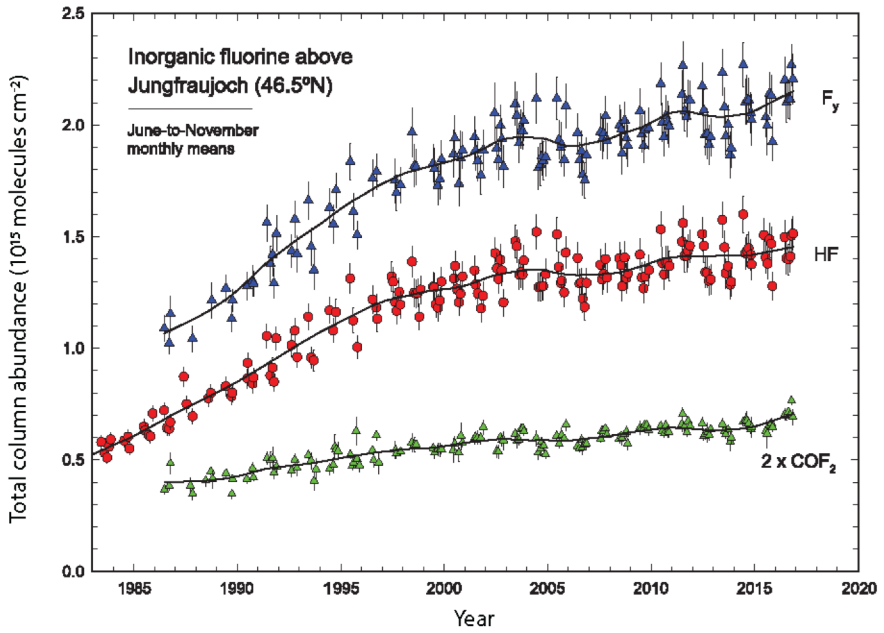

Figure 1-20. Multi-decadal monthly mean total column time series of the two main fluorine reservoirs, HF and COF_2, and their summation (F_y), as monitored at the Jungfraujoch station (Swiss Alps, 46.5°N, 3,580 m altitude), in the framework of the NDACC network. The datasets are restricted to the June to November months, so as to reduce the variability caused by atmospheric transport and subsidence during winter and spring. The continuous lines come from non-parametric least-squares fits involving an integration time of about 3 years and help to visualize the non-monotonic and non-linear changes in stratospheric chlorine after the peak in 1996–1997.

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Thank you for your attention!

emmanuel.mahieu@uliege.be

http://labos.ulg.ac.be/girpas/en

NETWORK FOR THE DETECTION OF ATMOSPHERIC COMPOSITION CHANGE
Interface between Changing Atmospheric Composition and Climate
Exploring the
NDACC

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