

INSTRUMENT Species ACVT subgroup : N₂O MIPAS

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Validation of N₂O profiles with correlative data from
ground stations starting at slide 21

and

Validation of N₂O profiles with correlative data from:

- *Balloon* (H. Oelhaf, M. Pirre, C. Camy-Peyret, A. Engel,
F. Mencaraglia)
- Aircraft* (U. Cortesi, C. Blom)

Balloon

H. Oelhaf

Forschungszentrum Karlsruhe/Institut für Meteorologie und Klimaforschung, Germany

A. Engel

Universität Frankfurt/Institut für Meteorologie und Geophysik, Germany

M. Pirre

Laboratoire de Chimie Physique de l'Environnement, Orléans, France

C. Camy-Peyret

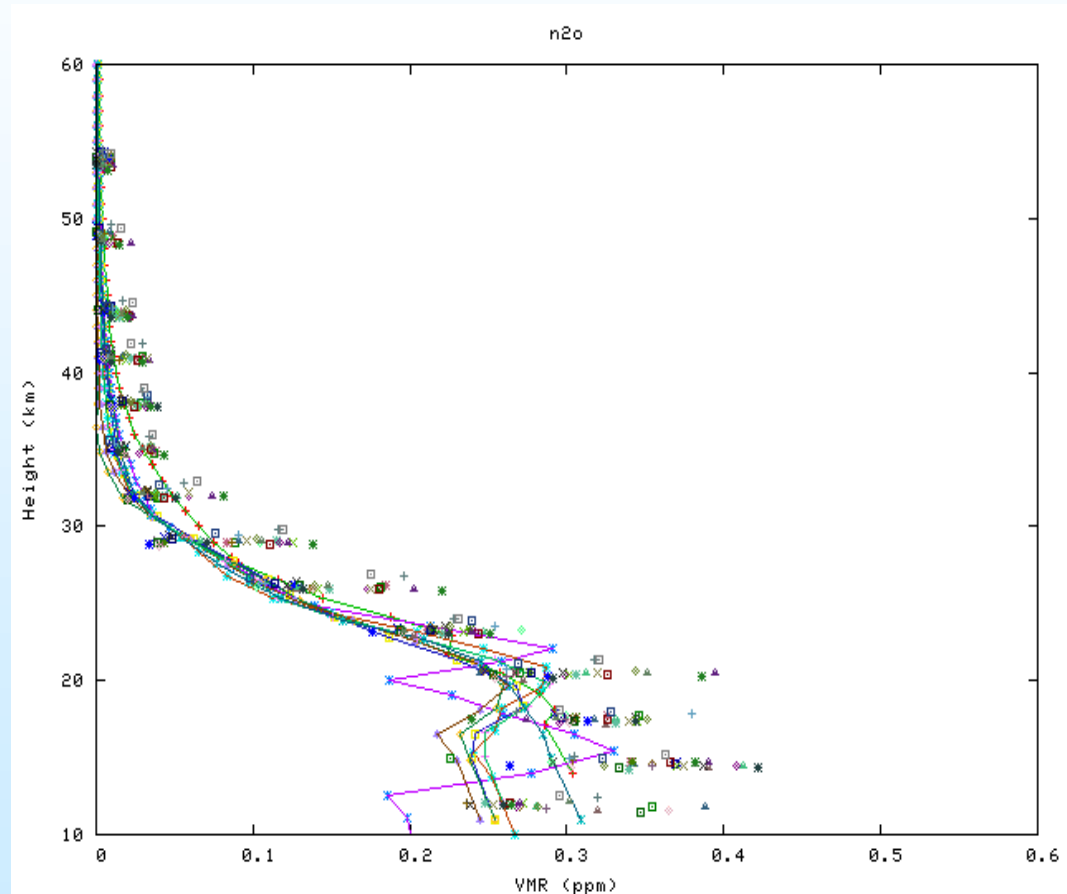
Laboratoire de Physique Moléculaire et Applications, Paris, France

F. Mencaraglia

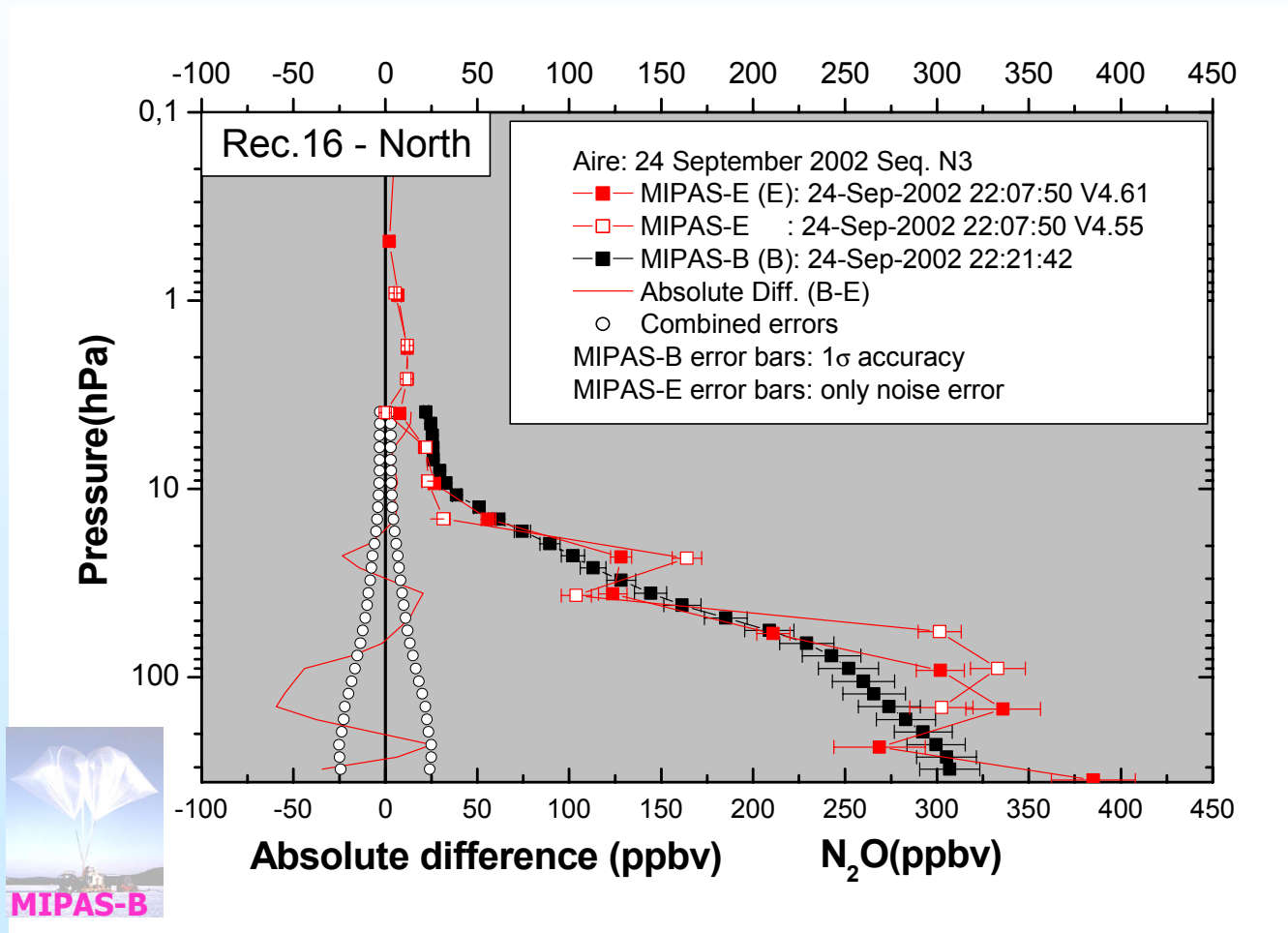
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IBEX Balloon measurements - N₂O

- Measurements (8 profiles, 4 hours) taken over mediterranean
- Mipas data within a +/- 2days window



N₂O: MIPAS-B vs. MIPAS-E

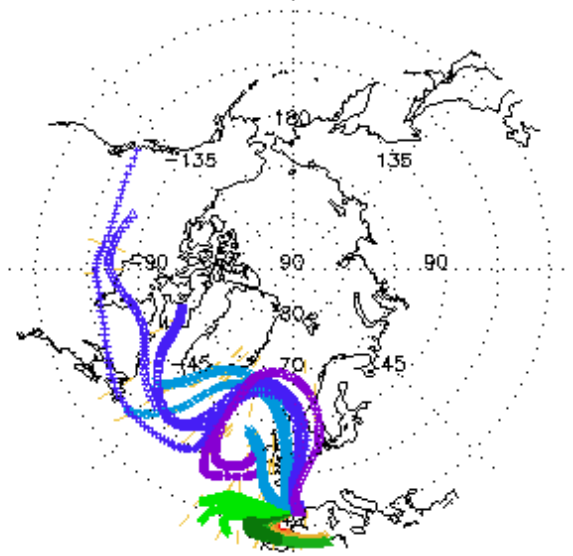


Cryosampler 24.9.2002 vs ESA Retrieval ver 4.61

- trajectory mapping for +/- 5 days: 125 matches with 49 orbits

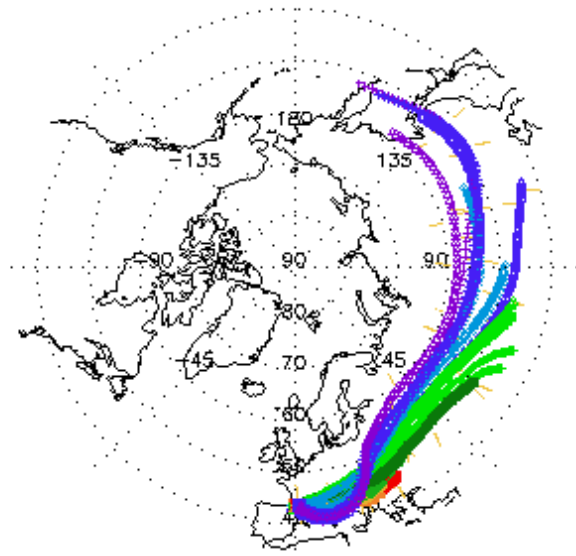
Trajectories 5-day backward
file: 31020924.AAB, matches with MIPAS: 1 h, 500 km

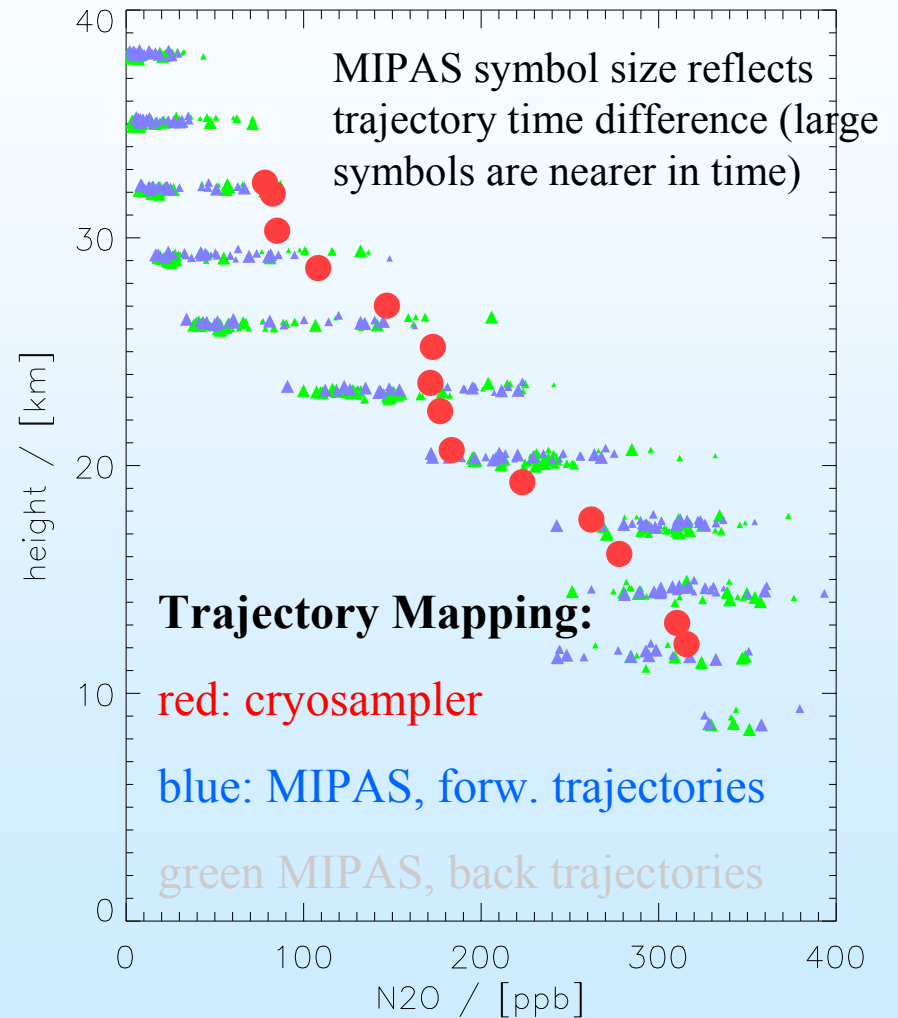
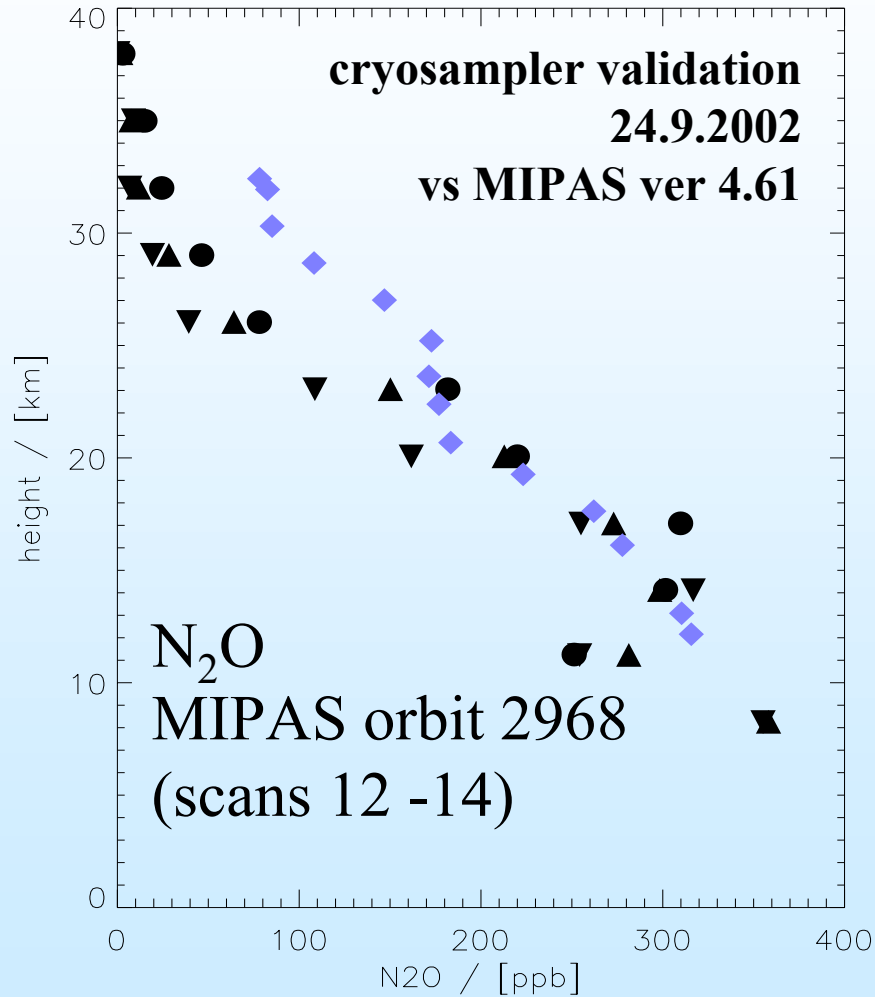
Orbit: 2896, 2897, 2898, 2900, 2904, 2905, 2906, 2907, 2911
2912, 2918, 2919, 2920, 2925, 2926, 2933, 2939, 2940
2946, 2947, 2953, 2961



Trajectories 5-day forward
file: 31020924.AAF, matches with MIPAS: 1 h, 500 km

Orbit: 2975, 2981, 2988, 2989, 2995, 3001, 3002, 3003, 3007
3009, 3010, 3014, 3015, 3016, 3017, 3020, 3022, 3027
3028, 3030, 3031, 3034, 3035, 3036, 3037, 3038

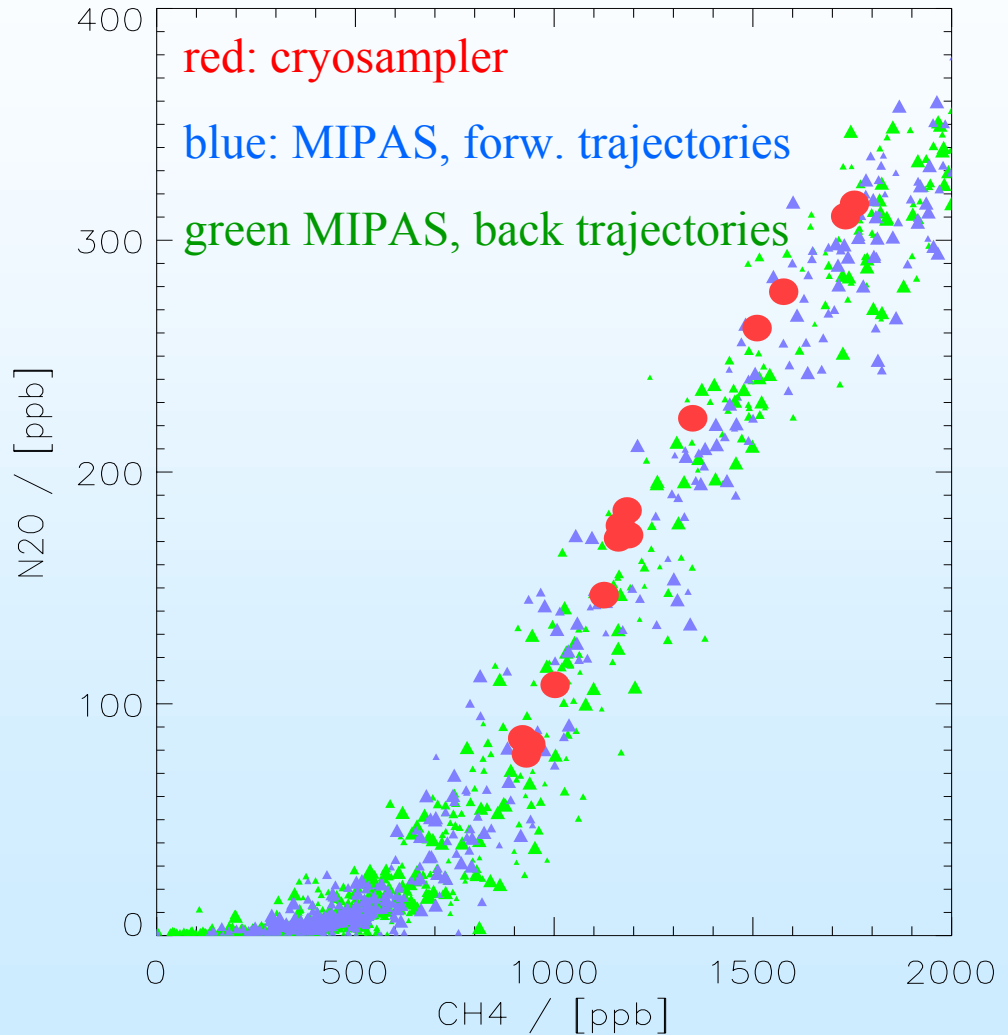




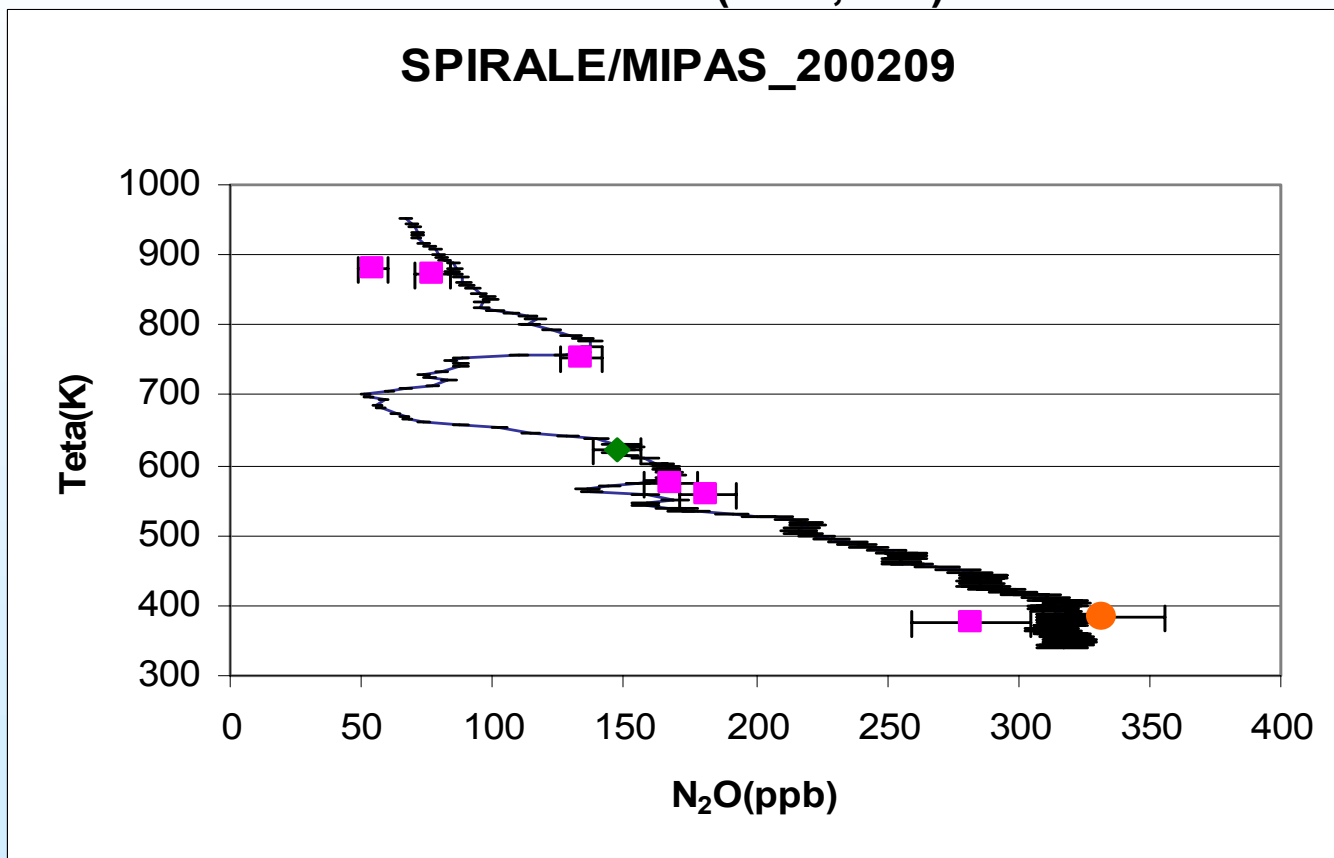
cryosampler validation
24.9.2002 vs ESA Retrieval
ver 4.61 with trajectory
mapping

comparison of CH_4 - N_2O
correlation

unrealistically high values
(above tropospheric values)
found for both N_2O and CH_4
in ver 4.61



Aire sur l'Adour (43 N, 0 E)



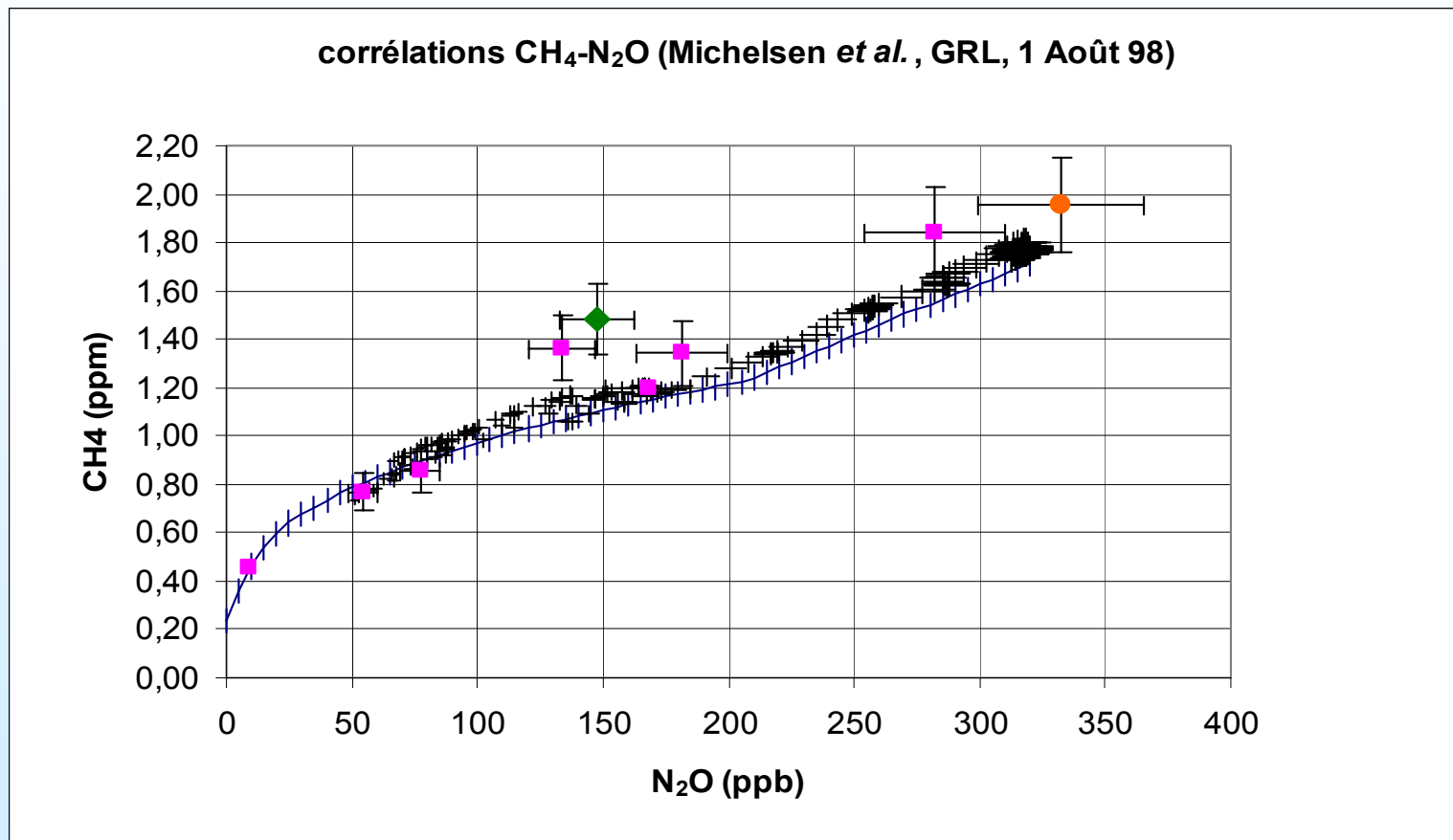
Black line with 3% error bar: SPIRALE on October 2, 2002(0715-0840UT)

MIPAS on trajectories ending at the SPIRALE location:

Circle: MIPAS on September 28, Square: MIPAS on September 27,

Diamond: MIPAS on September 26,

Aire sur l'Adour (43 N, 0 E)

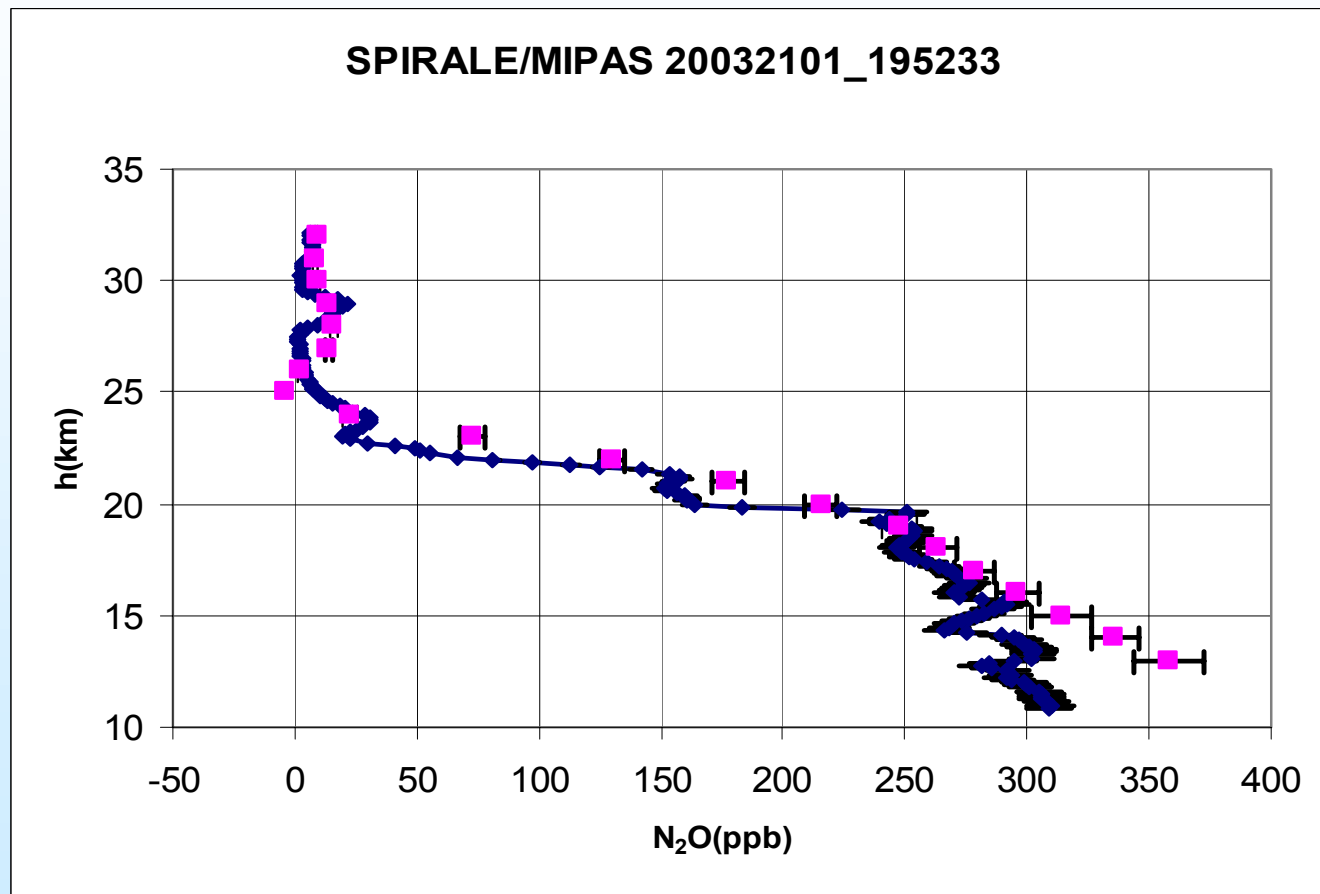


Blue full line: ATMO correlations at mid-latitude

Black crosses with 3% error bars: SPIRALE on October 2, 2002

Pink square with 10% error bars: MIPAS

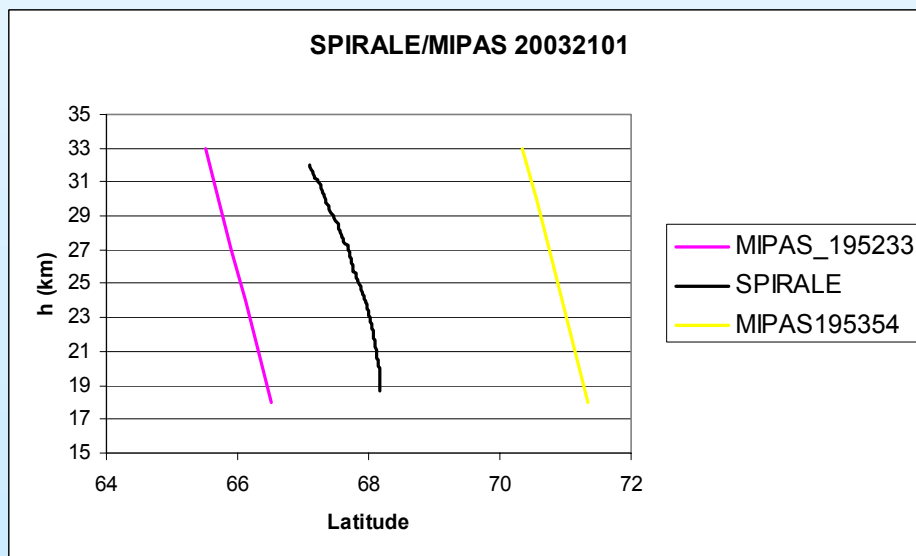
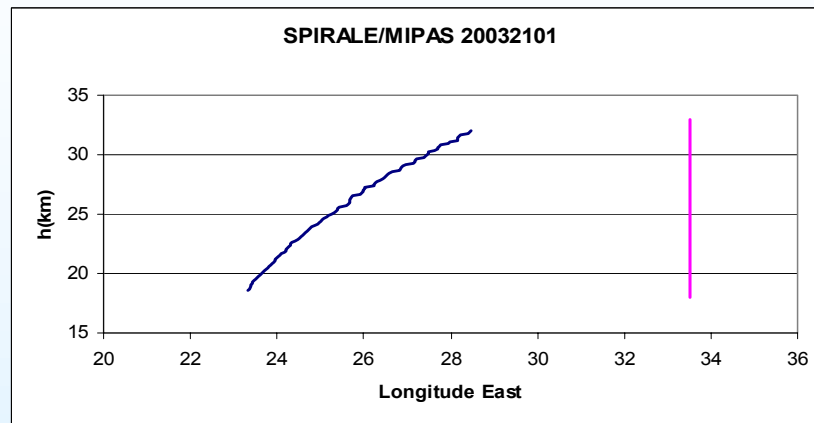
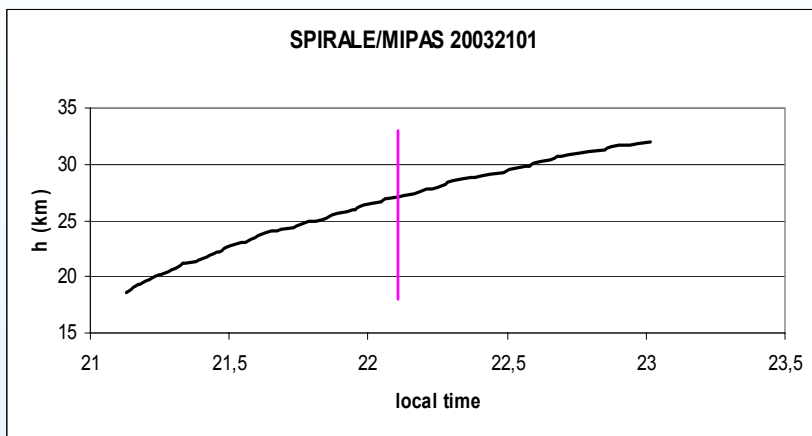
Kiruna 68 N, 20E



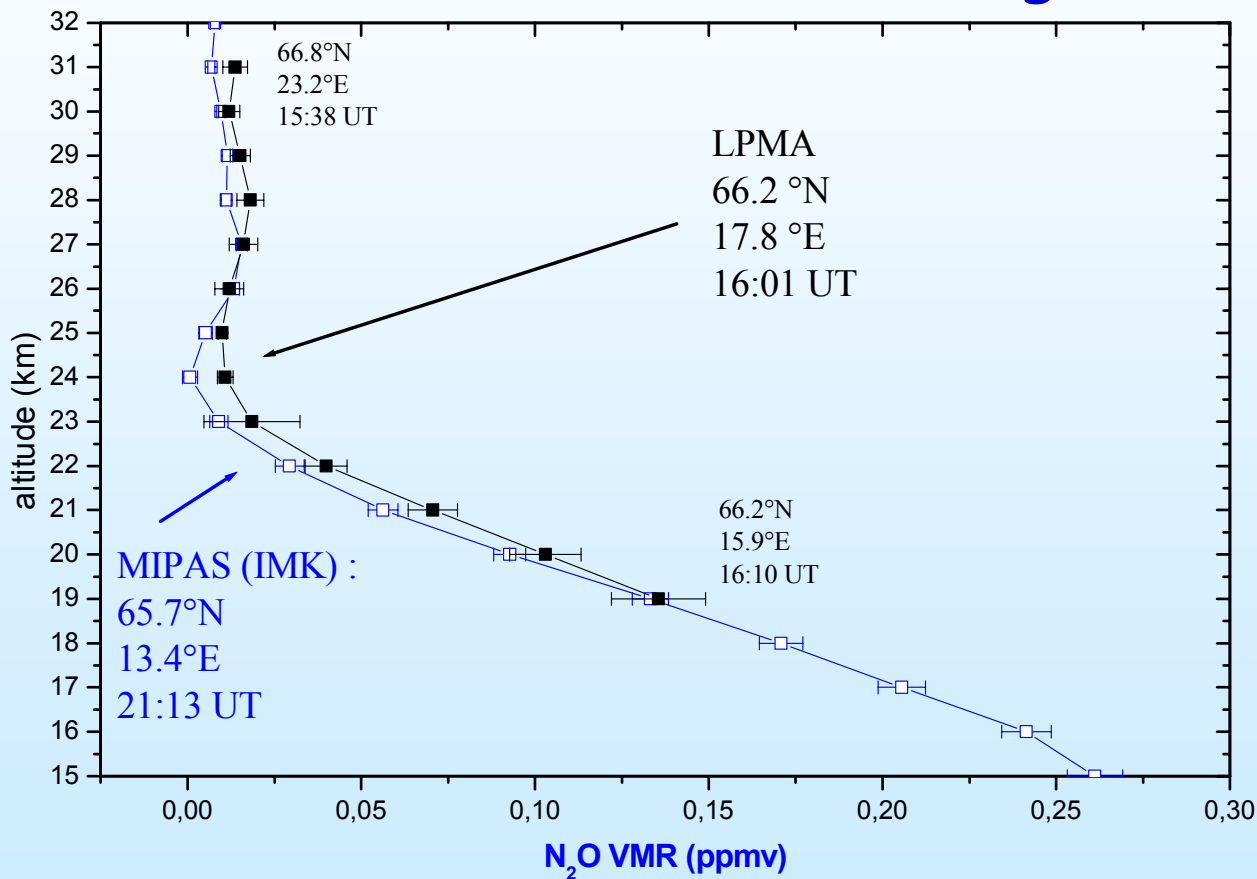
Full line with 3% error bars: SPIRALE

Square with error bars: MIPAS

Black full line: SPIRALE, Pink full line MIPAS at 19:52:33 UT



N₂O: LPMA vs. MIPAS-E 4 March 2003 from Esrange



Aircraft

U. Cortesi

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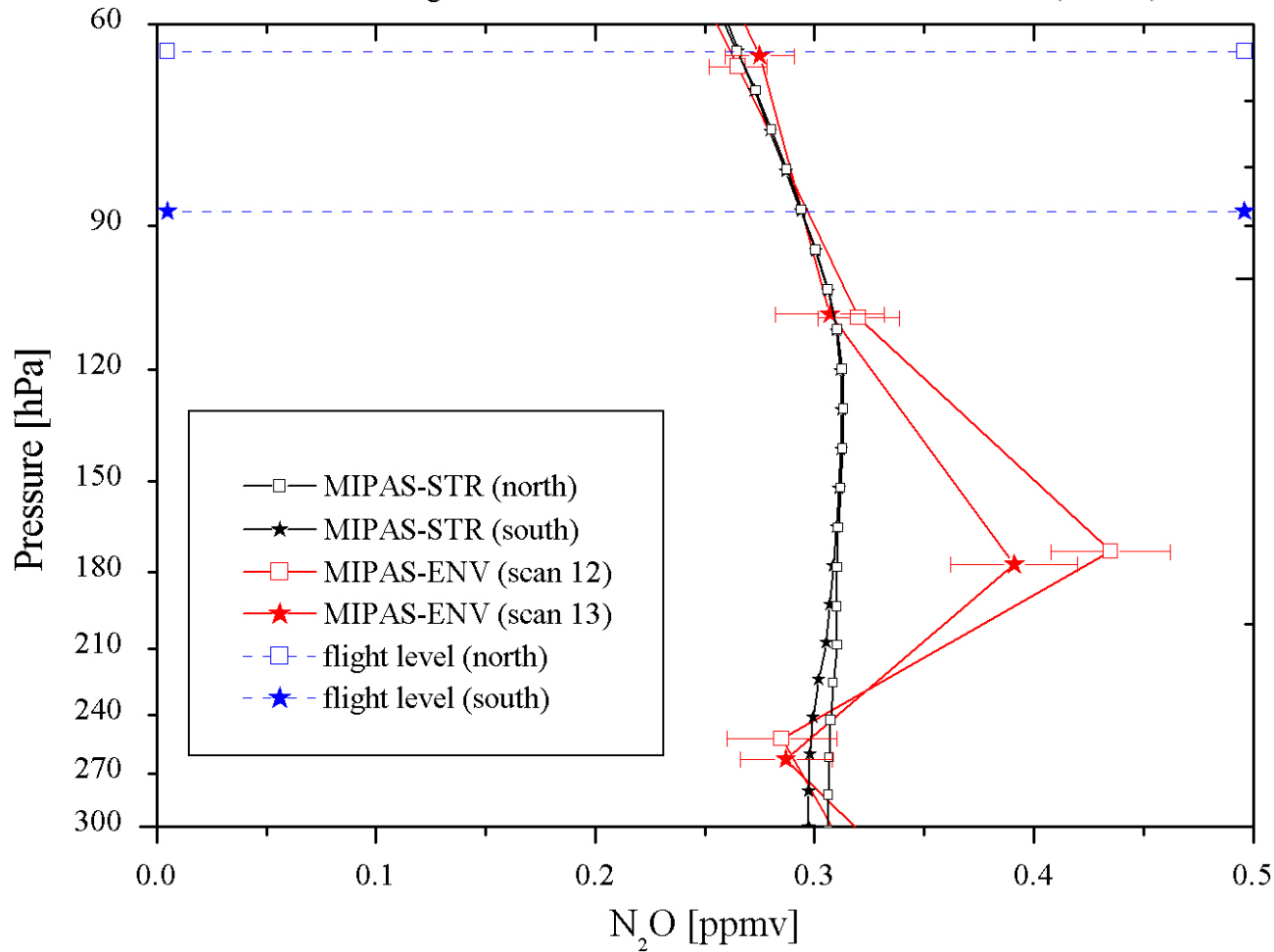
C. Blom



Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft

Forschungszentrum Karlsruhe/Institut für Meteorologie und limaforschung, Germany

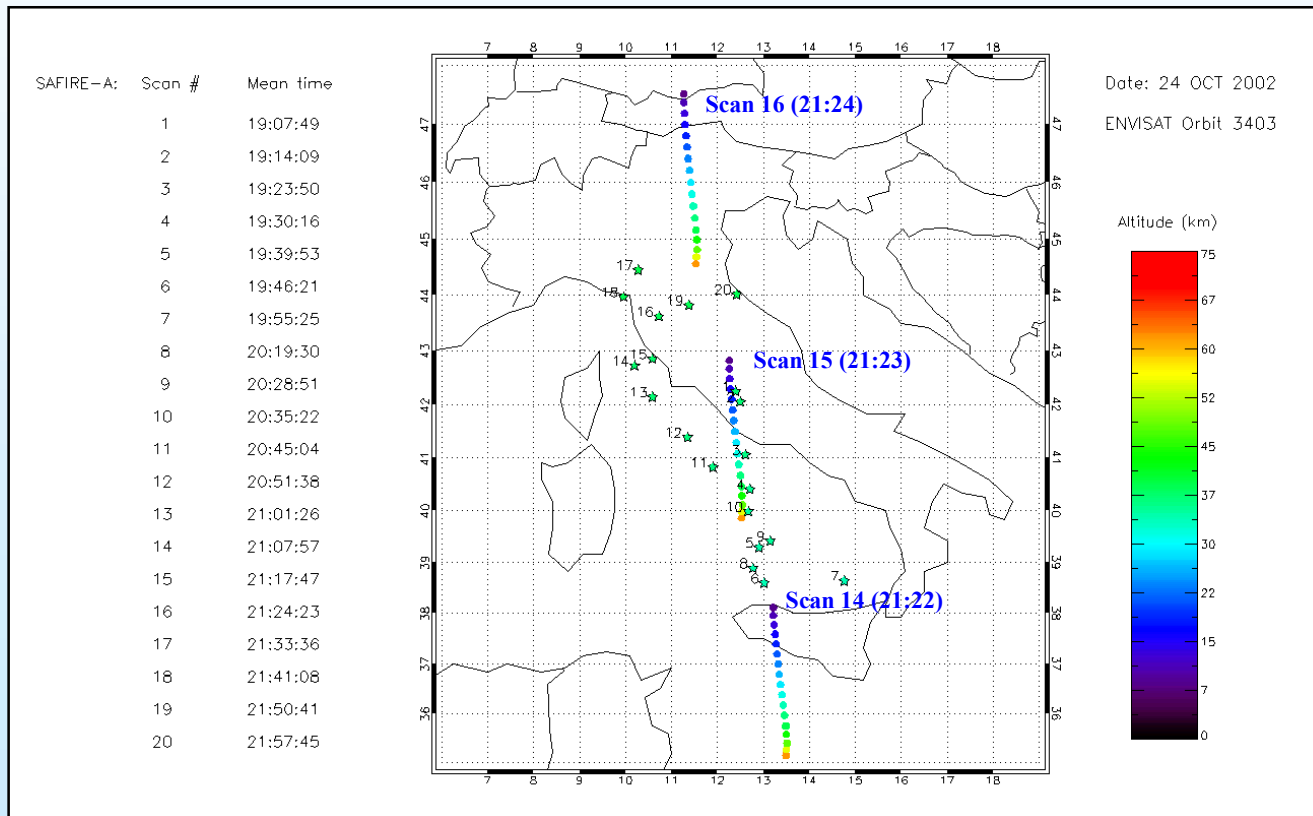
M55-flight 22-Jul-2002 / ENVISAT orbit 2051 (v4.61)



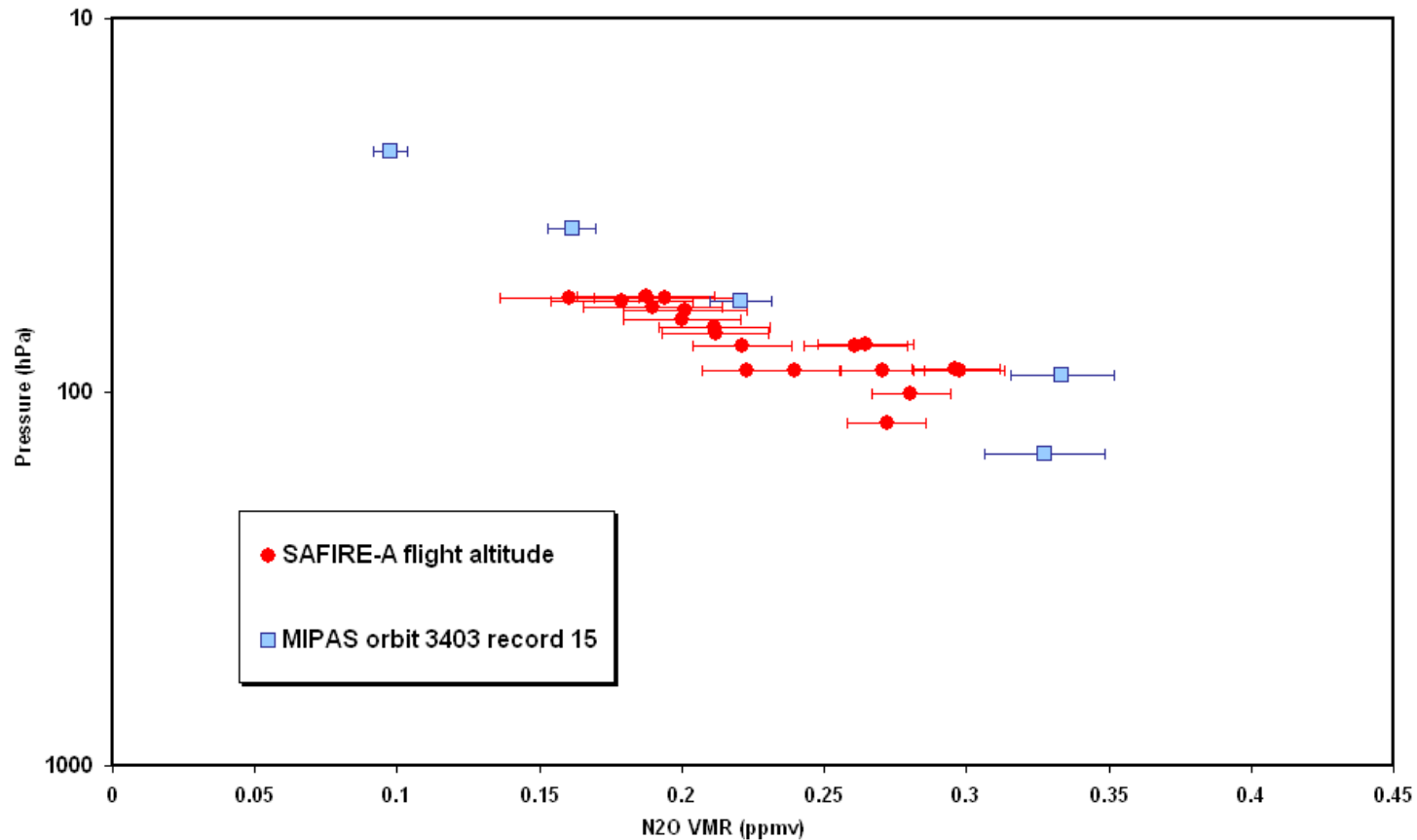
N_2O : MIPAS-STR vs. MIPAS-E 22.7.02 Orbit 2051

M-55 Geophysica mid-latitude flights, October 2002 MIPAS-ENVISAT N₂O validation with SAFIRE-A

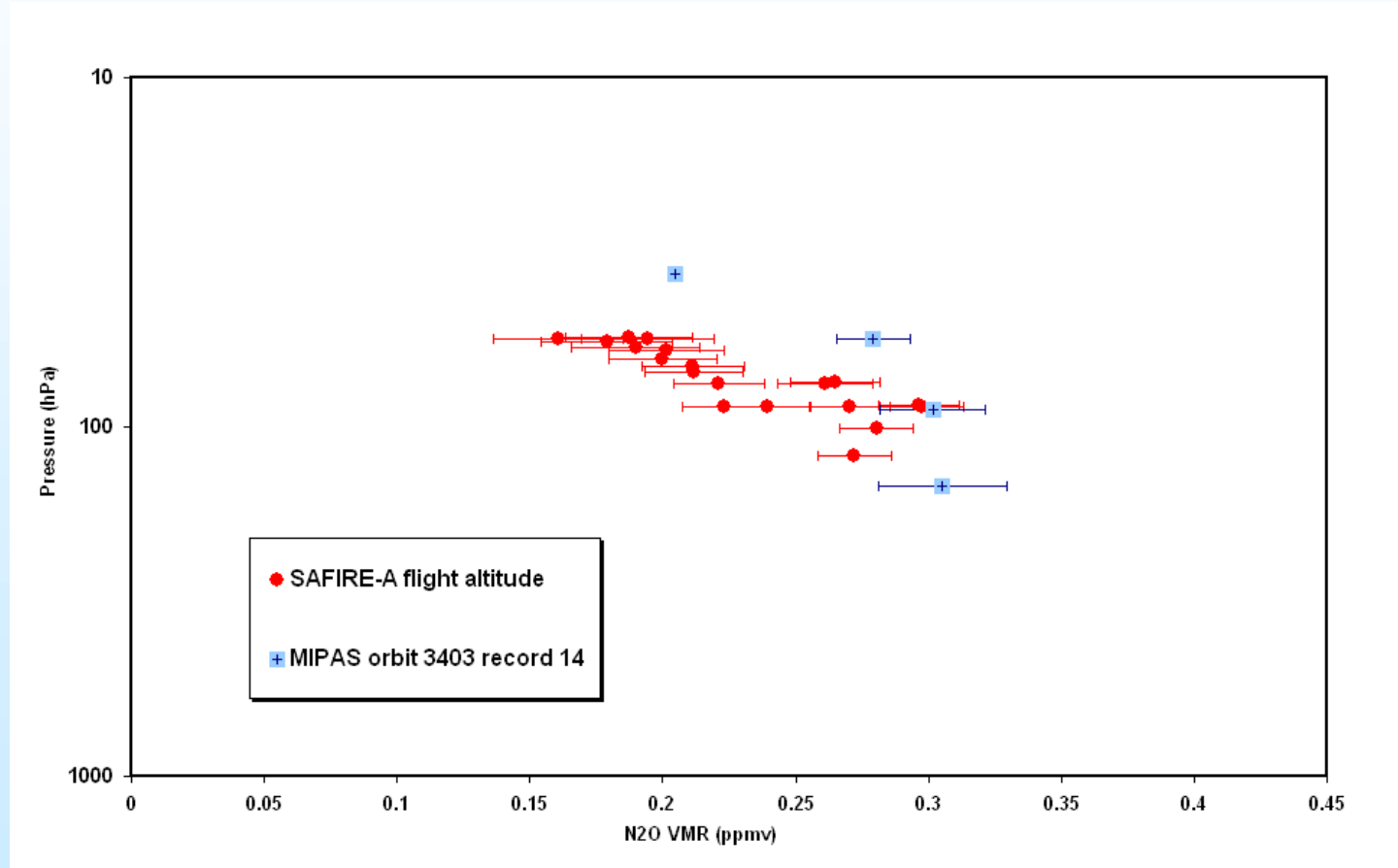
Institute for Applied Physics "Nello Carrara", IFAC-CNR, Florence, Italy



October 24th, 2002 - ENVISAT orbit 3403, MIPAS scan 15
N₂O VMR measurements: comparison MIPAS versus SAFIRE-A

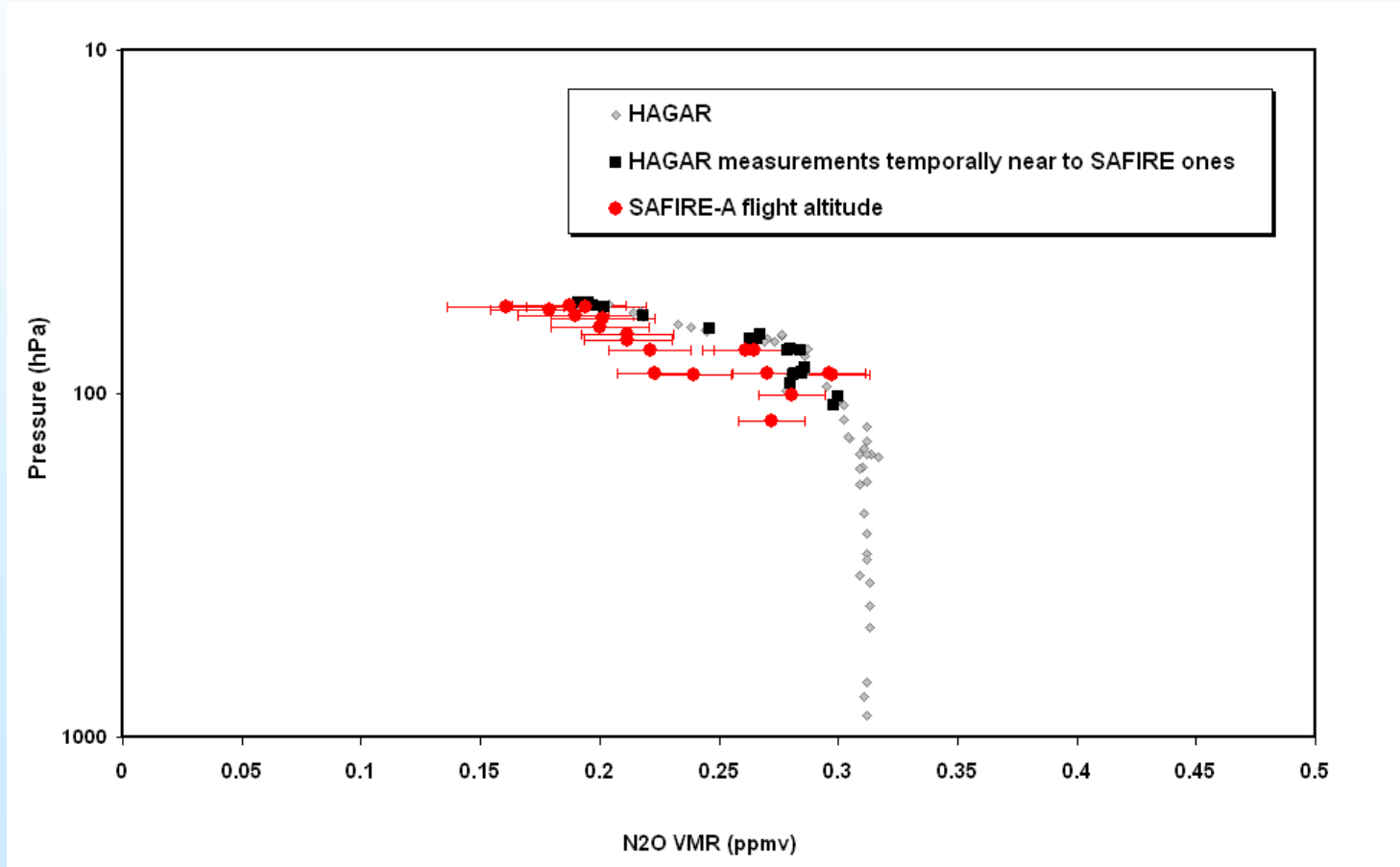


October 24th, 2002 - ENVISAT orbit 3403, MIPAS scan 14
N₂O VMR measurements: comparison MIPAS versus SAFIRE-A



M-55 Geophysica flight October 24th, 2002

N₂O measurements: intercomparison SAFIRE-A versus HAGAR



Conclusions

Comparison with MIPAS 4.61 N₂O profiles

➔ **Precision**: $\pm 10\%$ (seems better than for CH₄)

but

- ✓ “zigzag” profiles in the lower stratosphere
- ✓ outliers in the CH₄-N₂O correlation

➔ **Accuracy**

MIPAS may have too high values in the lower stratosphere/
upper troposphere

➔ **Comparison with the IMK off-line processor (G. Stiller)**

- ✓ smoother profiles
- ✓ better agreement

Acknowledgements

Thanks to all the providers of material/plates for this presentation

H. Oelhaf, (balloon), G. Stiller (IMK processor), C. Blom (aircraft)

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Sorry for those having correlative data but not having sent them to the designated presenter

INSTRUMENT Species

ACVT subgroup: N₂O MIPAS

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CNRS/UPMC, France

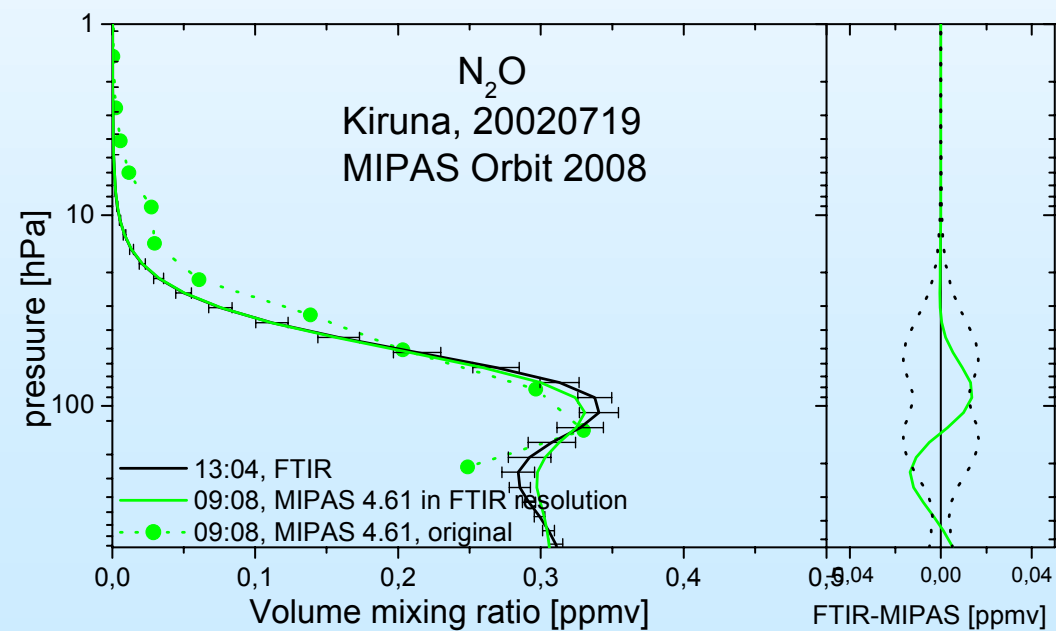
Validation of N₂O profiles with correlative data from ground stations

Ground based FTIR (Th. Blumenstock, M. De Mazière)

Comparisons of MIPAS 4.61 N₂O profiles with ground-based FTIR at Kiruna

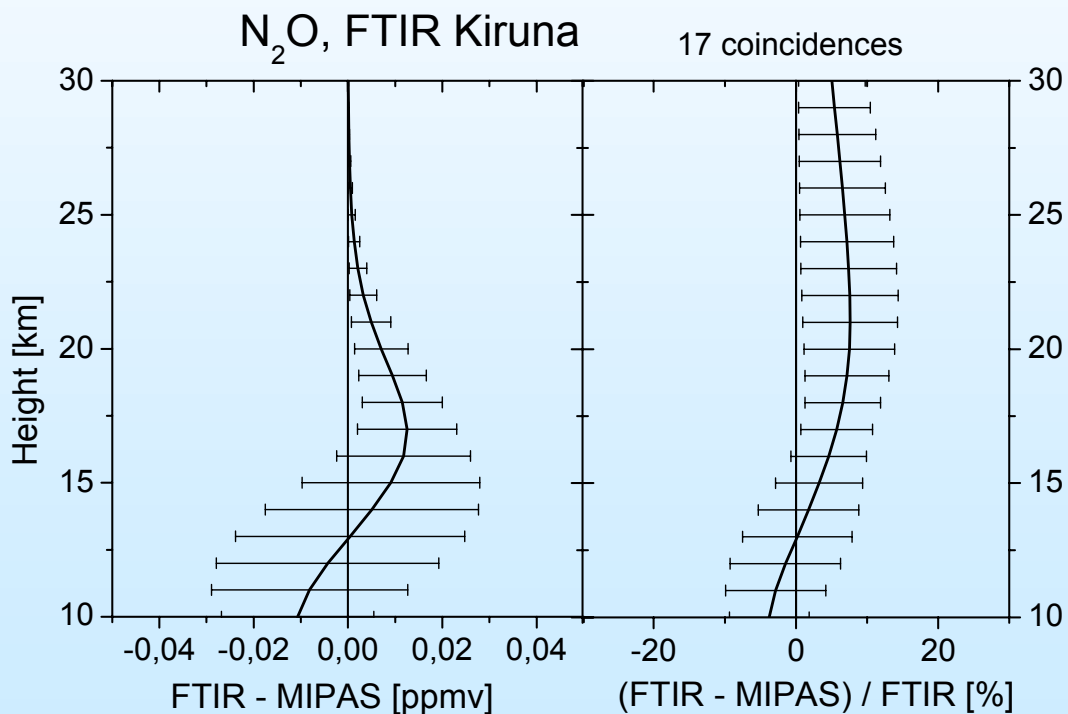
17 coincidences from 20020718 to 20021101

N₂O an example:

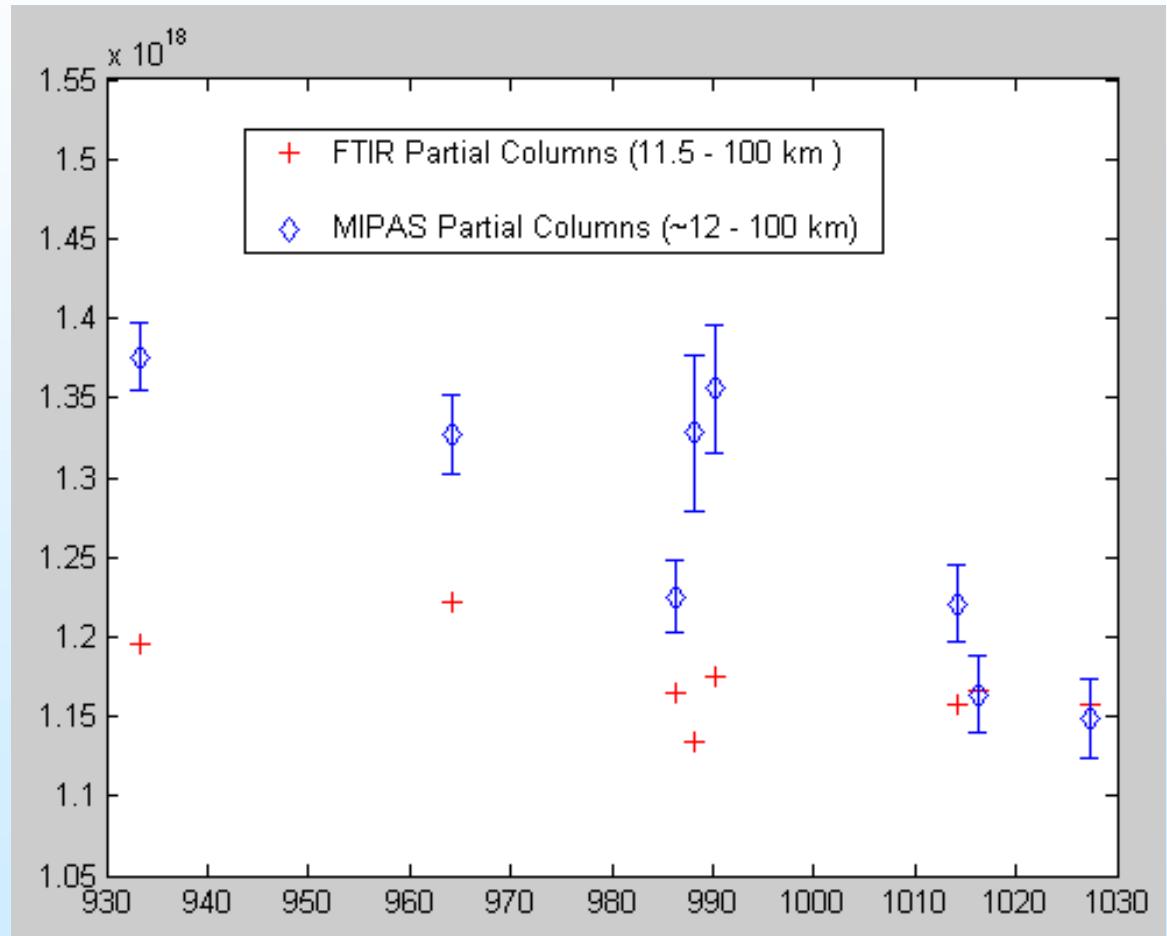


Comparisons of MIPAS 4.61 N₂O profiles with ground-based FTIR at Kiruna

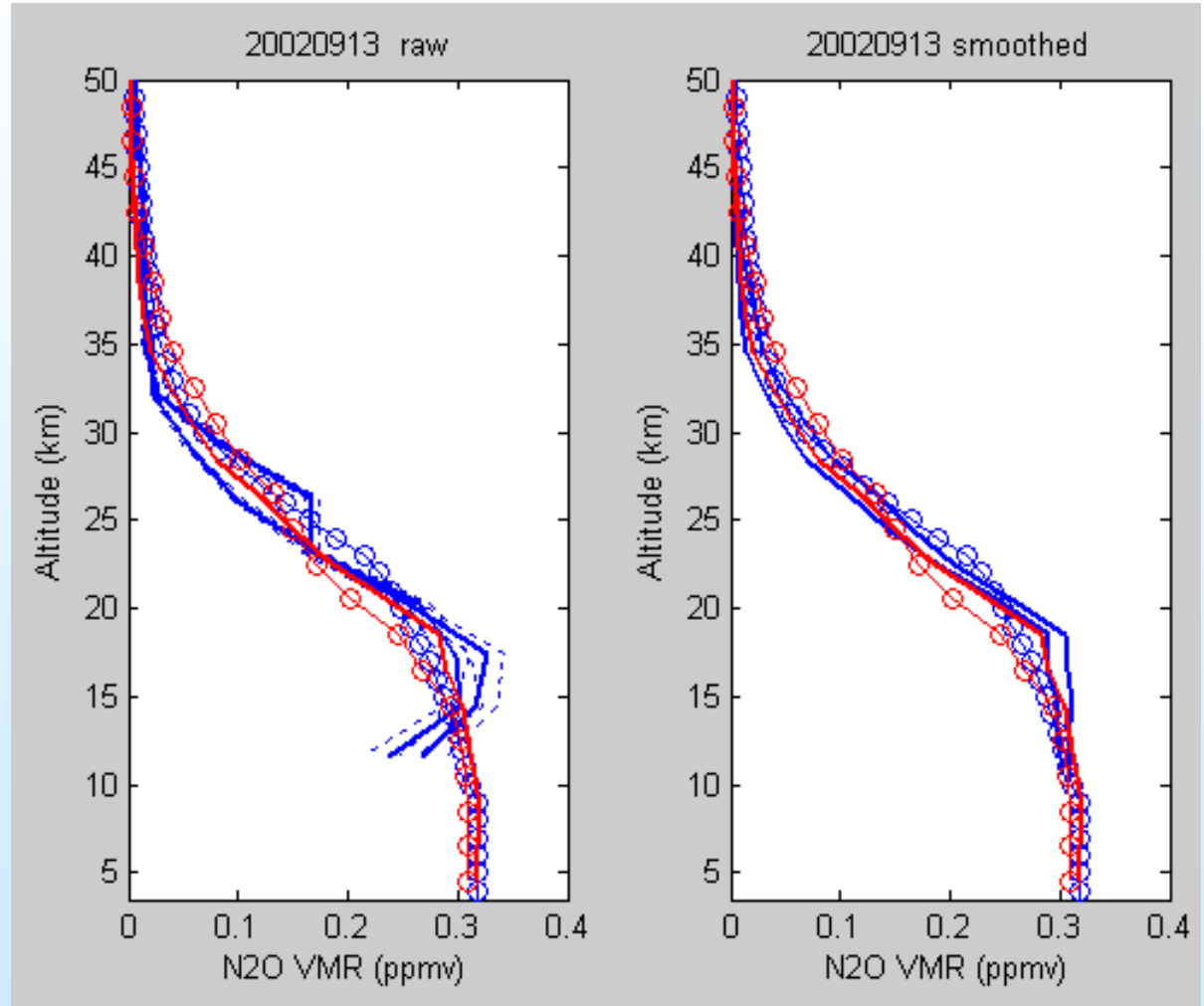
Statistics



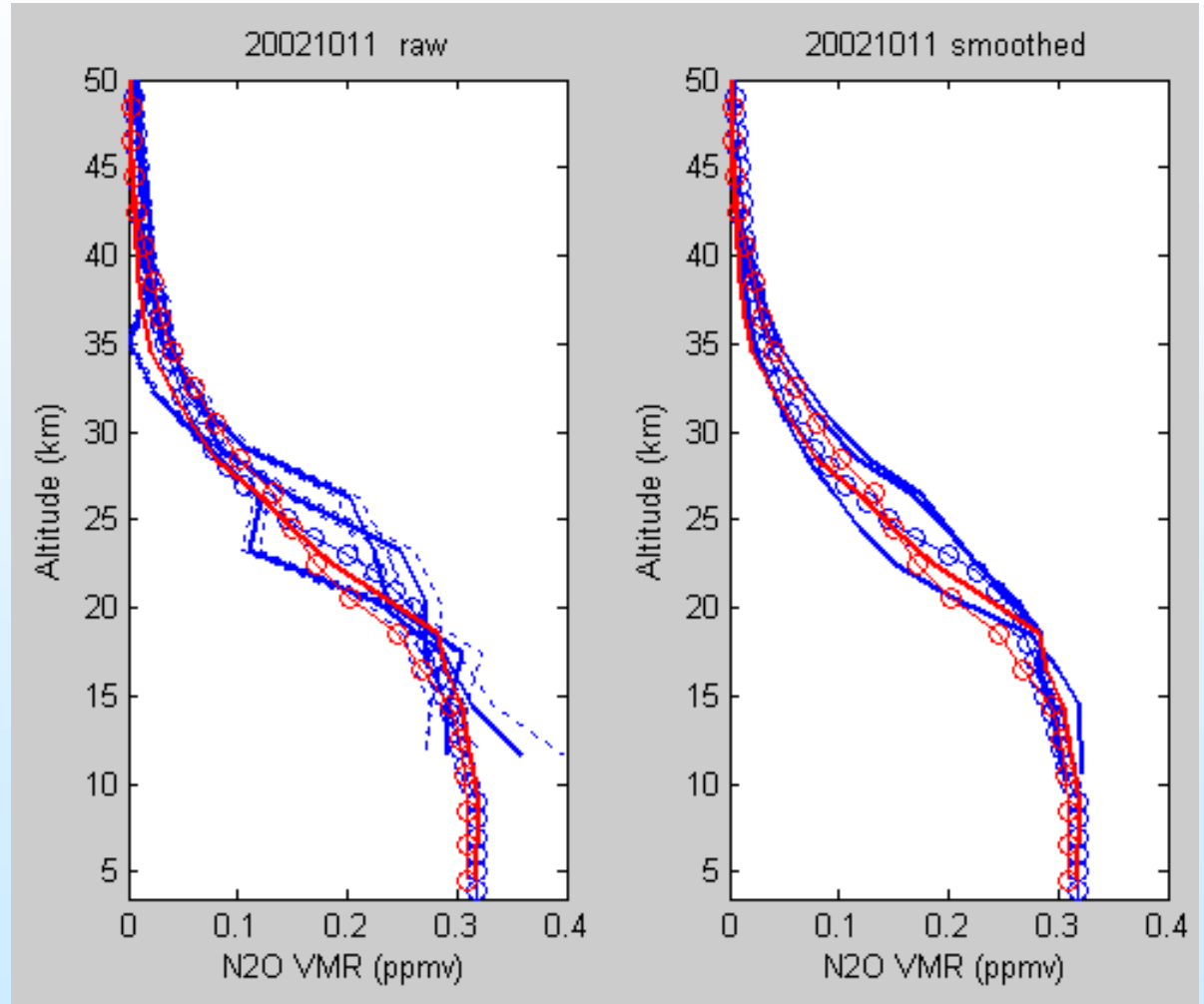
Comparisons of MIPAS 4.61 N₂O "stratospheric" columns with ground-based FTIR at ISSJ-Jungfrauoch



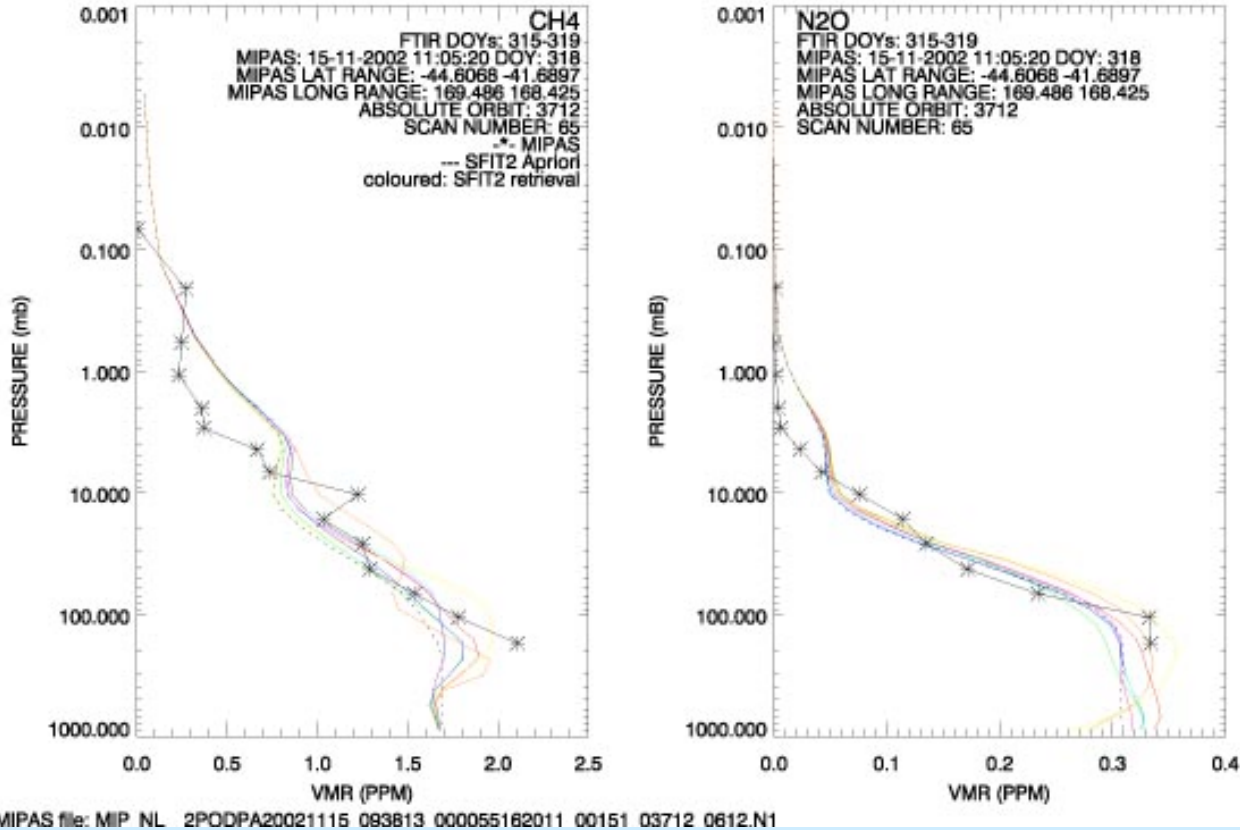
**Comparisons of MIPAS
4.61 N₂O profiles
with ground-based FTIR
at ISSJ-Jungfraujoch**



**Comparisons of MIPAS
4.61 N₂O profiles
with ground-based FTIR
at ISSJ-Jungfrauoch**



COMPARISON OF MIPAS(ODP PRODUCT 4.61) AND FTIR DATA, LAUDER NZ(45.04S 169.68E)



Conclusions

Comparison of ground based FTIR profiles with MIPAS 4.61 N₂O profiles

- Better agreement for N₂O than for CH₄
- Precision: ± 10 % except in the UT/LS where larger differences can be observed (zigzag)
- Limited vertical resolution of ground based FTIR profiles underlines the importance of using appropriate averaging kernels for comparison
- Upper part of the FTIR profiles largely constrained by *a priori*
- Possibility to make a statistics on a larger number of profiles than with balloon/aircraft. FTIR useful for trend comparisons with MIPAS

Acknowledgements

Thanks to all the providers of material/plates for this presentation

T. Blumenstock (ground based FTIR)

Forschungszentrum Karlsruhe/Institut für Meteorologie und Klimaforschung, Germany

M. De Mazière (ground based FTIR), representing the NDSC community at large

BIRA-IASB, Belgian Institute for Space Aeronomy, Brussels, Belgium

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