

1) SCIAMACHY SOLAR IRRADIANCE VALIDATION USING RADIOMETRIC CALIBRATION OF BALLOONBORNE SPECTROMETERS

(measured quantity: extraterrestrial solar irradiance)

W. Gurlit, K. Gerilowski, J. P. Burrows, H. Boesch, M. Dorf, A. Butz, F. Weidner, C. Camy-Peyret, and K. Pfeilsticker

2) CHILD TDL insitu H₂O and CH₄ profiles

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Level 1 validation:

- existing balloonborne instruments LPMA-DOAS used for additional solar irradiance measurements
- no extra flights were required
- use of data: results of measurement confirm the new, re-calculated set of key-data for SCIAMACHY

TDL in-situ:

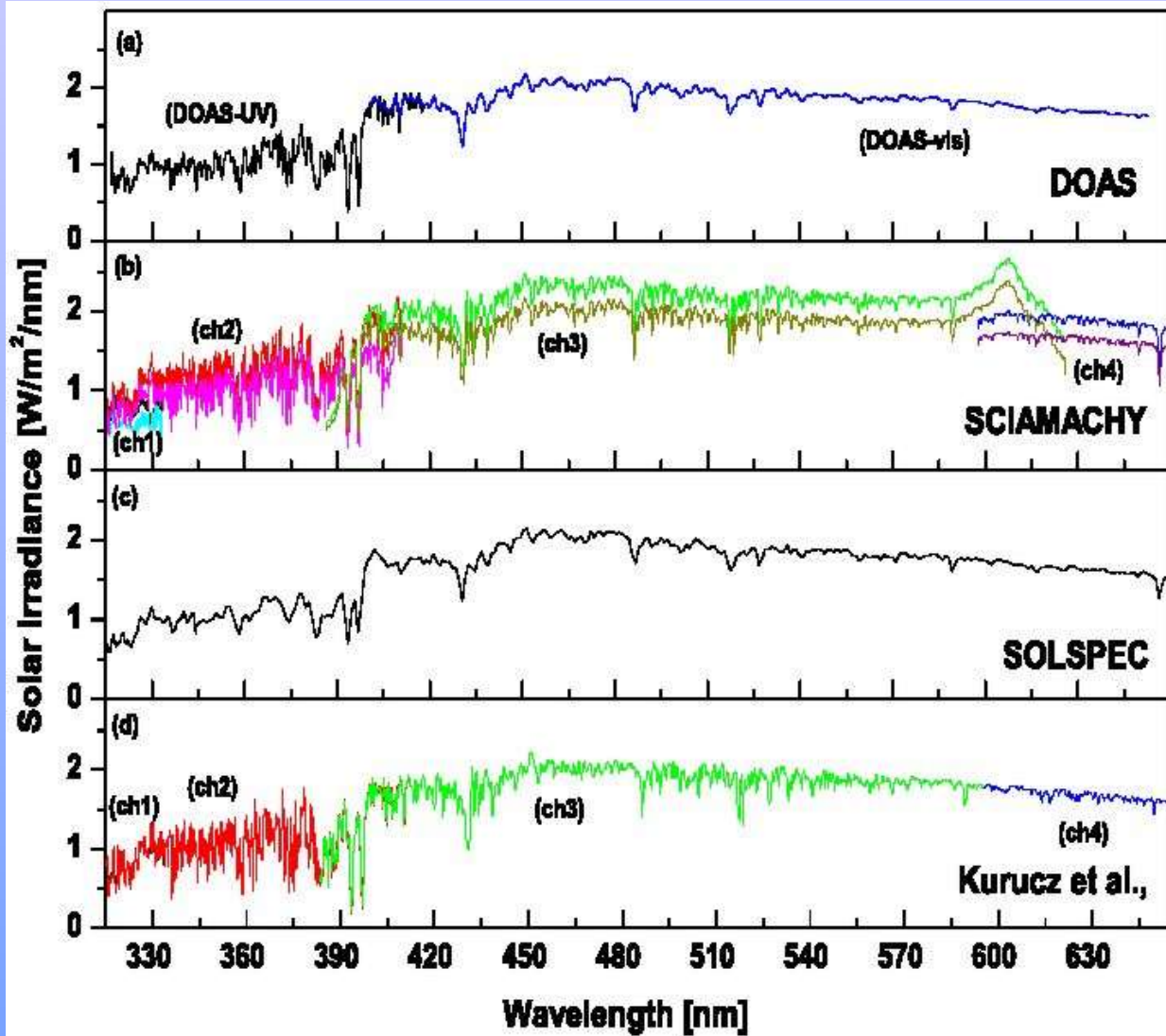
- lightweight instrument CHILD as an additional payload on TRIPLE flights, H₂O and CH₄ profiles (10-100 m vertical resolution)



Campaign activity & results overview

TIME	LOCA-TION	CHILD TDL	DATA	IRRAD LEVEL1	DATA
SEPT. 2002	Aire sur L'Adour	H2O CH4	Ready, NILU		
MARCH 2003	Esrange Kiruna	H2O CH4	Ready, NILU	Solar Irrad.	Ready, NILU
JUNE 2003	Esrange Kiruna	H2O CH4	Ready, NILU		
OCT. 2003	Aire sur L'Adour			Solar Irrad.	Ready, NILU
MARCH 2004	Esrange Kiruna			Solar Irrad.	Proc.



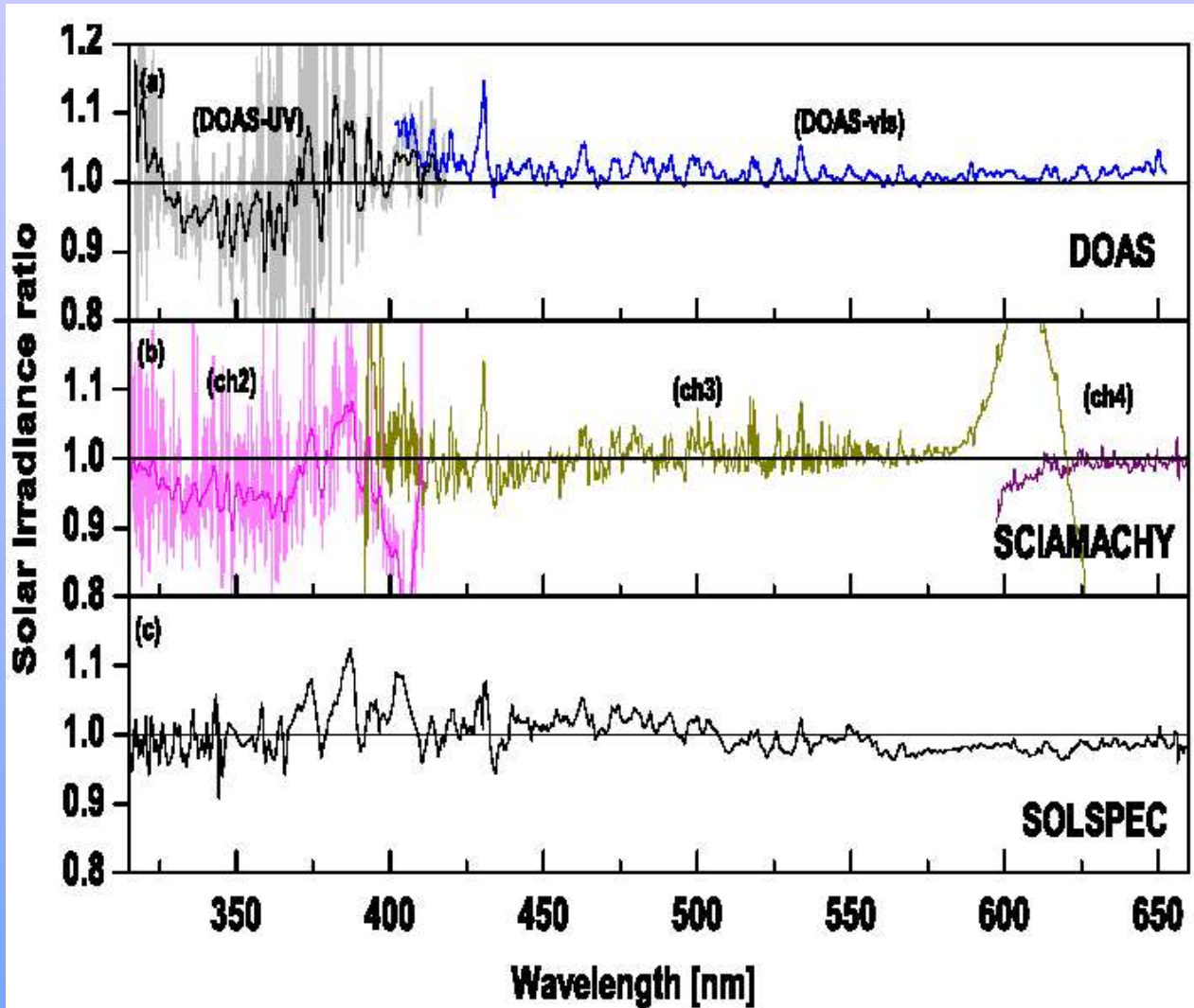


Results (1)

UV-VIS solar irradiance measurements from

- DOAS (balloon)
- SCIAMACHY ch1-4
- SOLSPEC
- Kurucz et al.



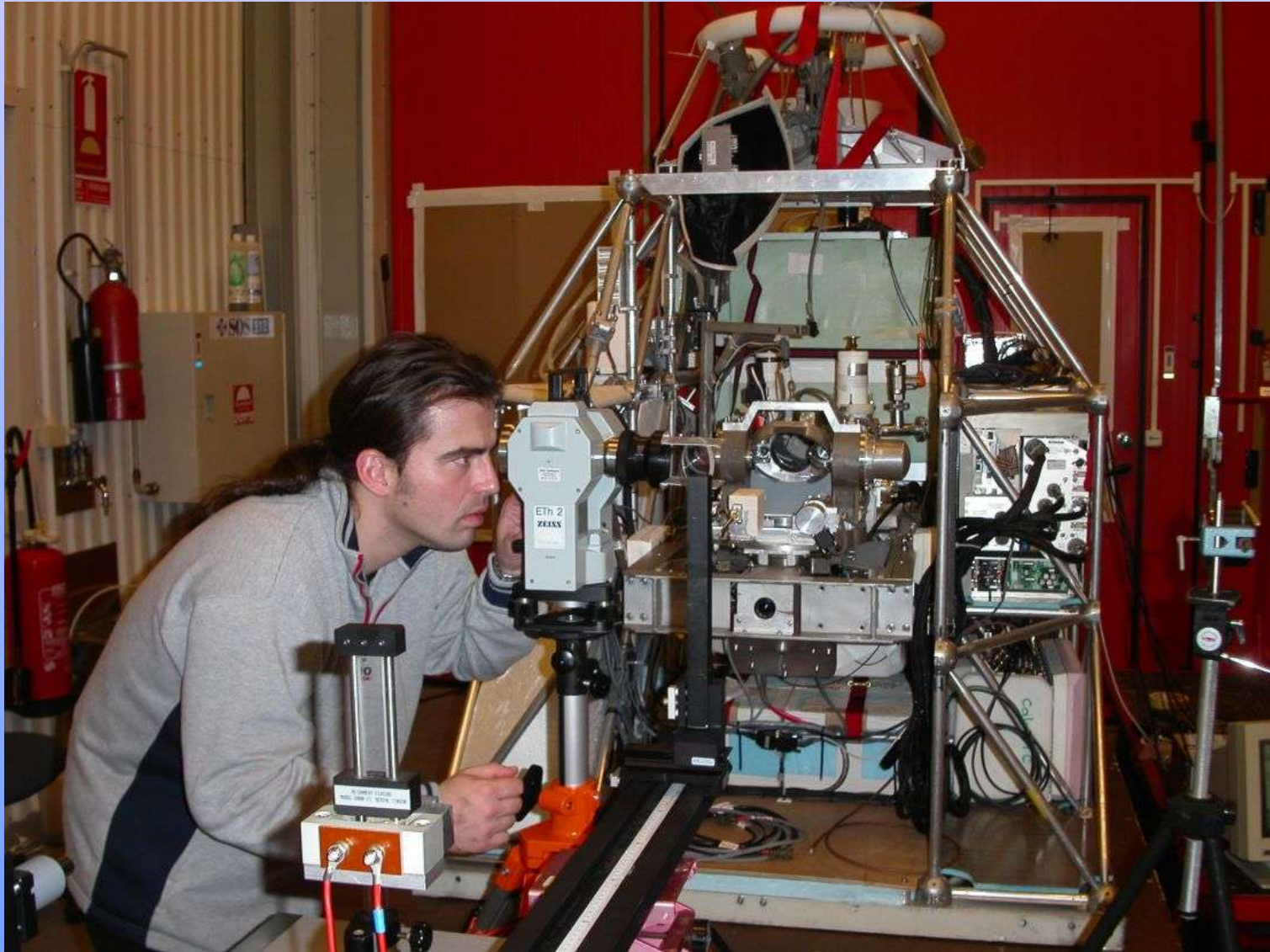


Results (2)

Ratio w. respect to
Kurucz et al.

- DOAS (balloon)
- SCIAMACHY
- SOLSPEC



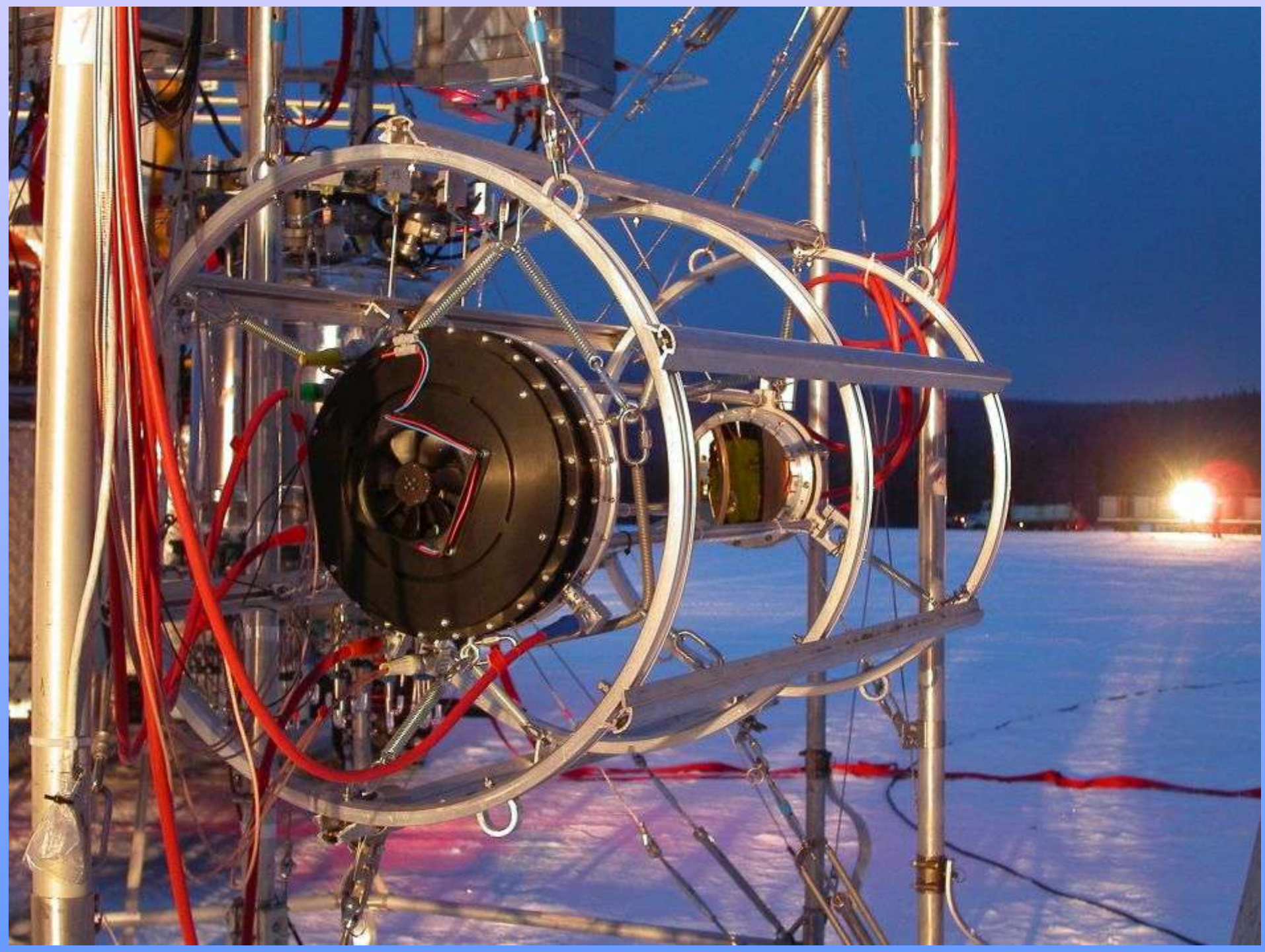


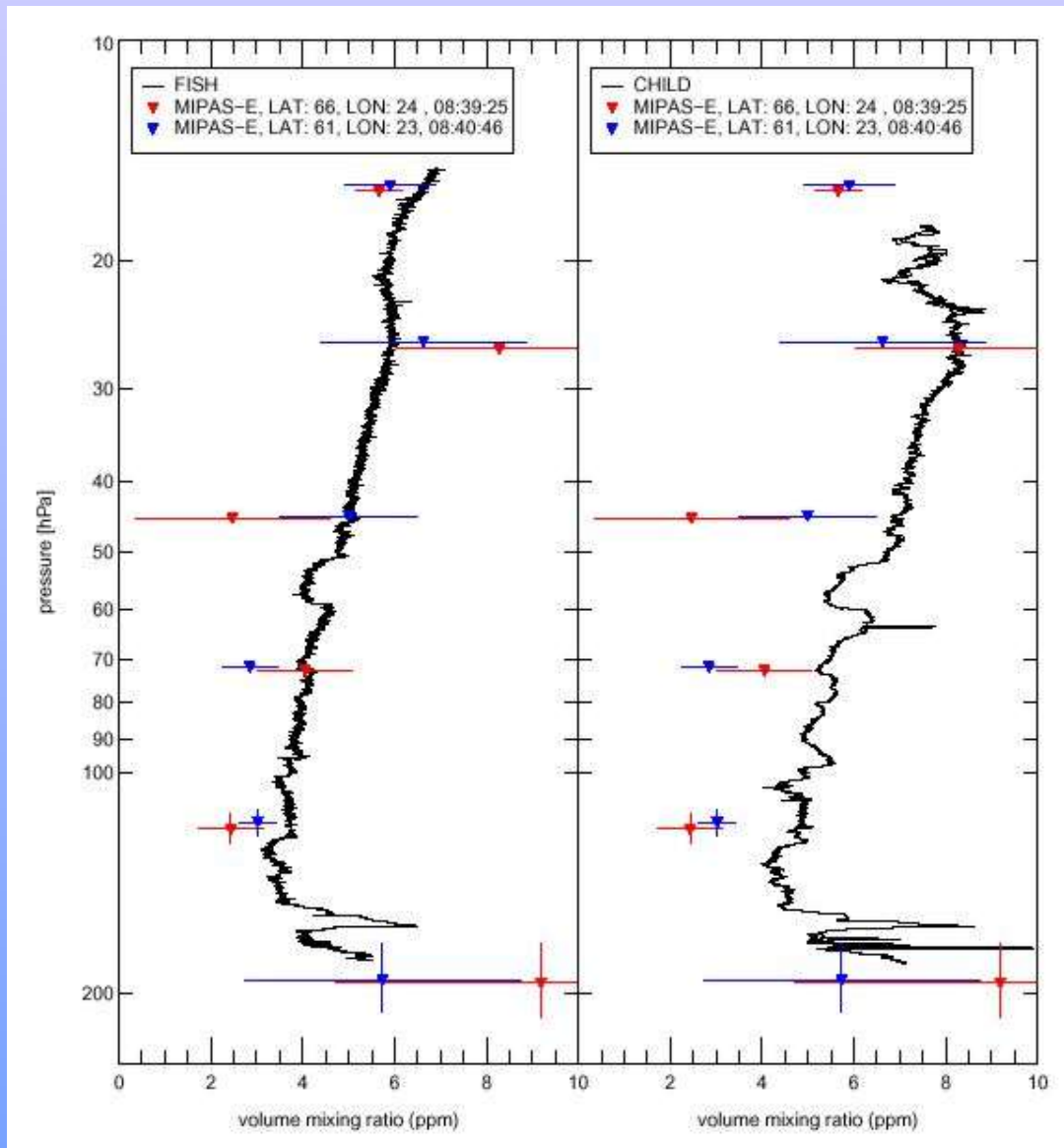
Error budget of calibrated irradiance spectra from DOAS

- 3) uncertainty of irradiance standards used ($\sim 1\%$)
- 5) standard drift and ageing errors (0.5% per 24 h operation)
- 7) positioning errors in optomechanical setup, measured by reproducibility (1%)
- 4) errors by not completely satisfying inverse square law (DOAS linearity errors 3%, definition / reproducibility of optical axis 2%)

errors are in part systematic (linearity error, integration time error) and can be reduced by further investigation







Intercomparison campaign instruments

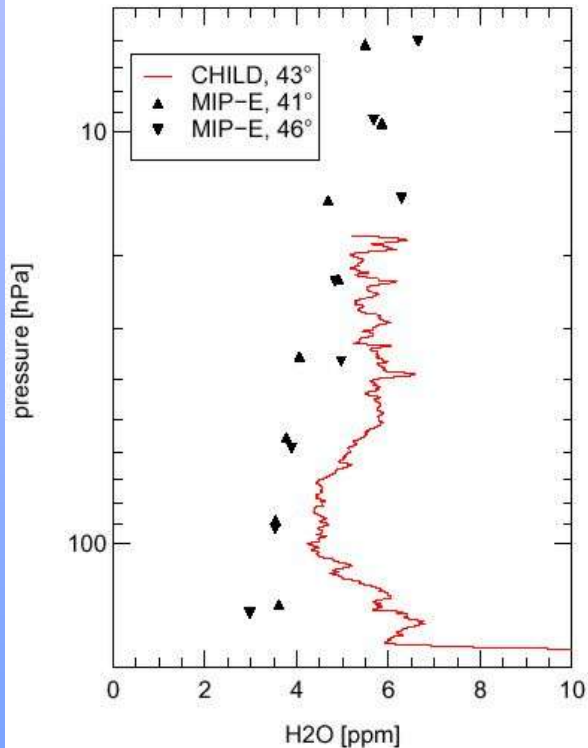
September 2002,
Aire sur l'Adour, H₂O

- FISH (in situ)
- MIPAS (remote)
- CHILD (in situ)

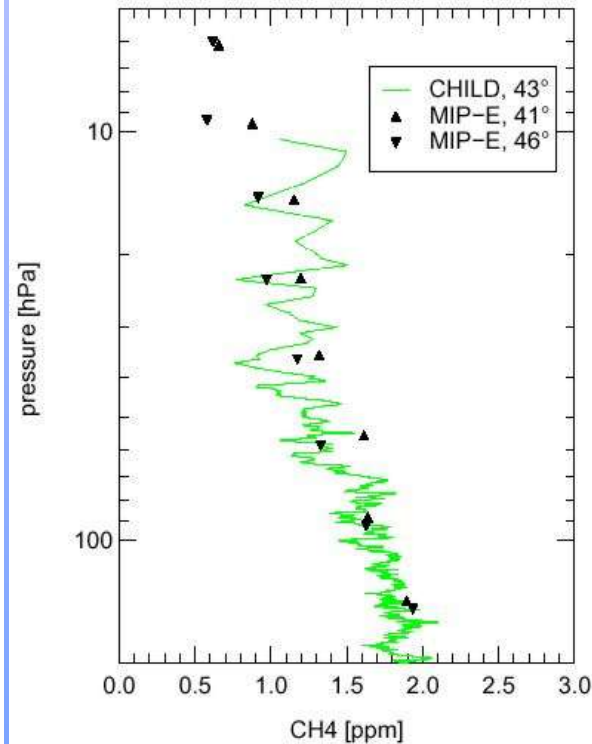
Intercomparison campaign instruments (Aire sur L'Adour 2002)

remote sensing (MIPAS)vs. in situ (CHILD) H₂O and CH₄

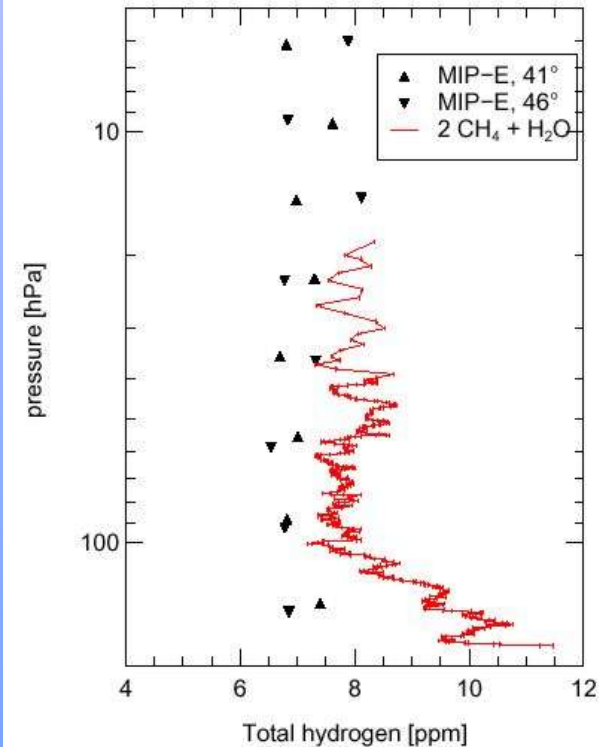
CHILD and MIPAS-E: H₂O
Aire sur l'Adour, Sept. 24, 2002



CHILD and MIPAS-E (v4.61): CH₄
Aire sur l'Adour, Sept. 24, 2002



CHILD and MIPAS-E: Total Hydrogen
Aire sur l'Adour, Sept. 24, 2002



Applied Optics



Northern
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Optical Society of America

1 January 2004

Publications:

The UV-A and visible solar irradiance spectrum:
Intercomparison of absolutely calibrated, spectrally
medium resolved solar irradiance spectra from balloon-
and satellite-borne measurements

Gurlit, W., H. Bösch, H. Bovensmann, J. P. Burrows, A.
Butz, C. Camy-Peyret, M. Dorf, K. Gerilowski, A.
Lindner, S. Noel, U. Platt, F. Weidner, and K. Pfeilsticker
ACP, 2005

Lightweight diode laser spectrometer CHILD (Compact
High-altitude In-situ Laser Diode) for balloonborne
measurements of water vapor and methane

W. Gurlit, R. Zimmermann, U. Platt, C. Gieseemann, V.
Ebert, Th. Fernholz, J. Wolfrum, and J. P. Burrows

Applied Optics Jan. 2005

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