

## Validation of SCIAMACHY products with ground-based FTIR measurements at Kiruna and on Tenerife Island

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2 ground-based FTIR (Fourier Transform Infrared) Spectrometer

at IRF Kiruna (S) and at Izaña Observatory on Tenerife Island (E)

in the framework of the NDSC (Network for the Detection of Stratospheric Change)

Species: H<sub>2</sub>O, N<sub>2</sub>O, CH<sub>4</sub>, NO, HNO<sub>3</sub>, HCl, HF, O<sub>3</sub>, OCS, HCN, CO, ClO, ClONO<sub>2</sub> & NO<sub>2</sub> ...

Numbers of measurement days within ENVISAT validation phase:

Year	2002	2002	2002	2002	2002	2002	2003	2003	2003	2003	2003	2003	TOT
Month	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	AL
Kiruna [d]	18	13	4	10	5	0	5	9	18	9	2	4	97
Izaña [d]	12	15	13	9	8	4	9	7	10	13	15	14	129

Validation of SCIAMACHY products:

column amounts of O<sub>3</sub> and NO<sub>2</sub> (UV-Vis)

column amounts of N<sub>2</sub>O, CH<sub>4</sub>, CO, and CO<sub>2</sub> (NIR) and profiles of O<sub>3</sub> (UV-Vis)

## **Observation platform at the IRF Kiruna**



## **Container at Izaña Observatory, Tenerife Island**



## Contributions to ESA Validation Workshop Frascati Dec. 2002

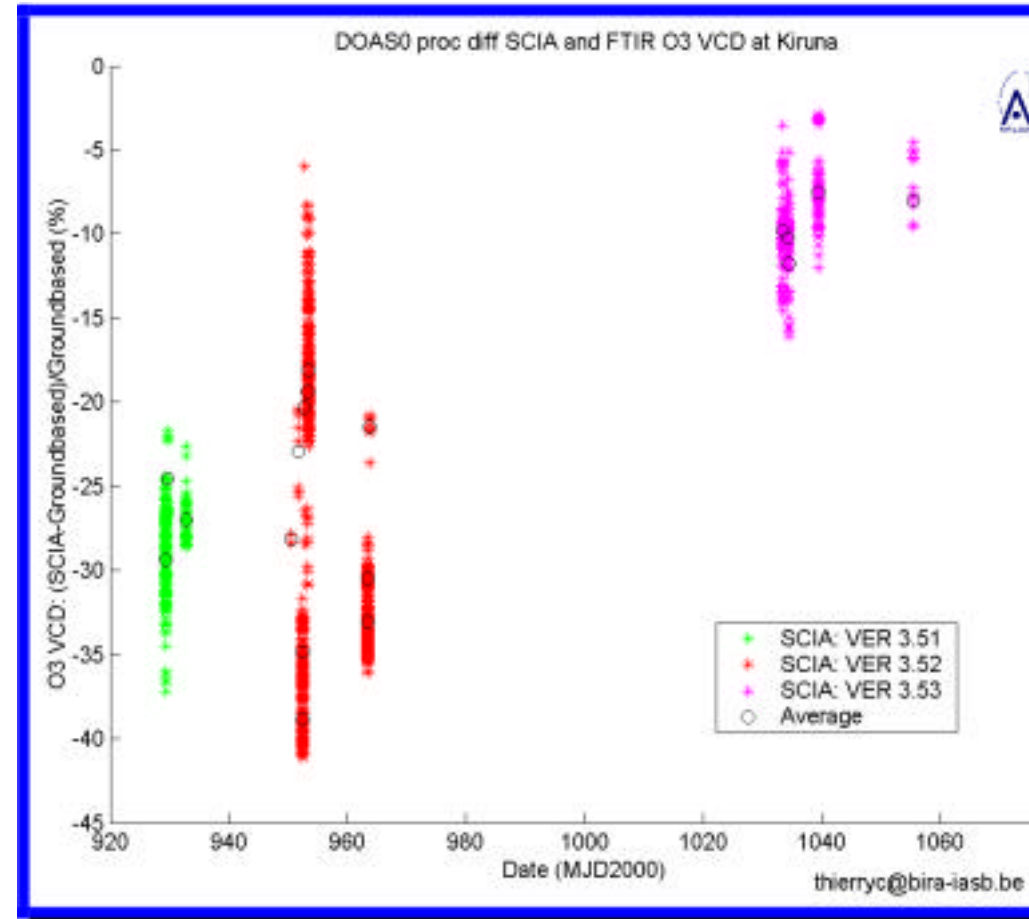
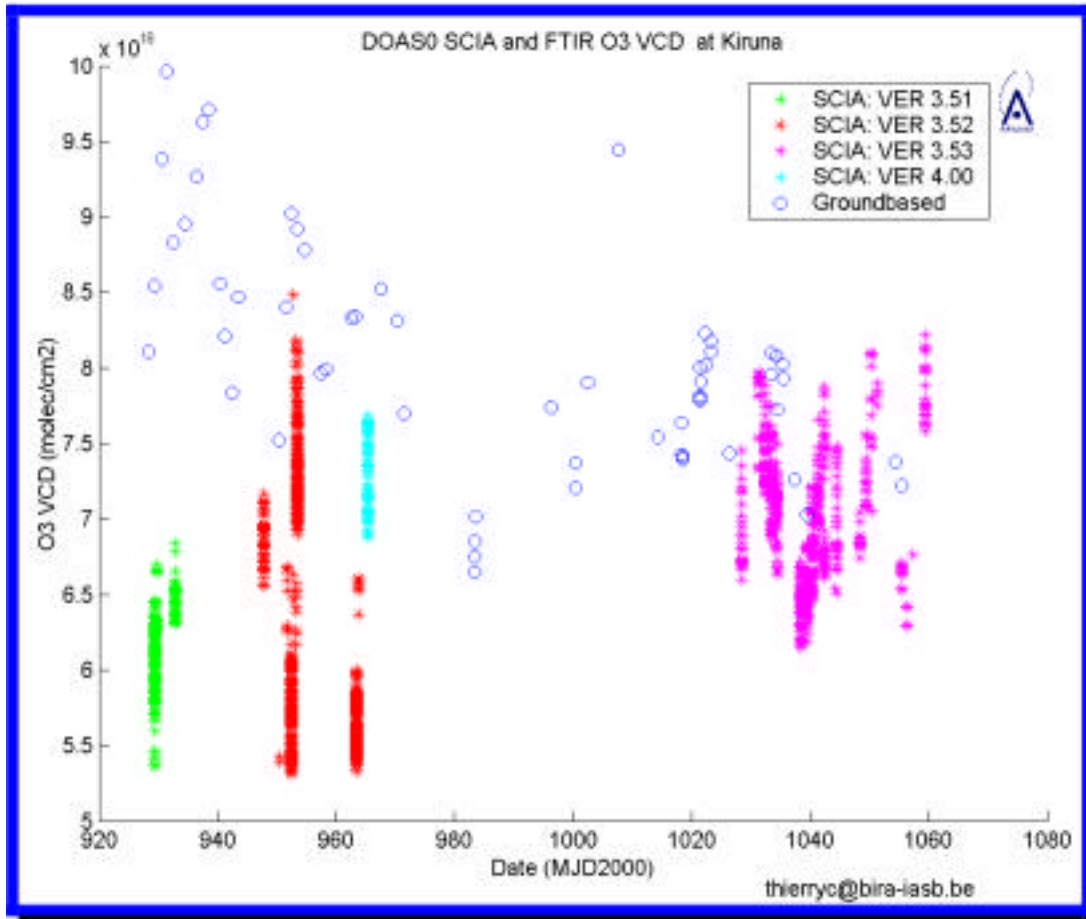
T. Blumenstock A. Griesfeller, F. Hase, M. Schneider, H. Fischer, M. Gil, J.R. Moreta, U. Raffalski, U. Friess, G. Schwarz, E. Cuevas: Validation of MIPAS, and SCIAMACHY data by ground-based spectroscopy at Kiruna, Sweden, and Izaña, Tenerife Island (AOID-191).

K. Bramstedt, M. Buchwitz, U. Blum, T. Blumenstock, C. Frankenberg, P. von der Gathen, R. Koelemeijer, M. De Maziere, Andreas Richter, C. von Savigny, H. Schrivver, Astrid Schulz, W. Steinbrecht: Comparison of scientific SCIAMACHY products with ground-based measurements.

J.-C. Lambert, J. Granville, M. Allaart, T. Blumenstock, T. Coosemans, M. De Mazière, U. Friess, M. Gil, F. Goutail, D. V. Ionov, I. Kostadinov, E. Kyrö, A. Petritoli, A. Piders, A. Richter, H. K. Roscoe, H. Schets, J. D. Shanklin, V. T. Soebijanta, T. Suortti, M. Van Roozendaal, and C. Varotsos: Ground-based comparisons of early SCIAMACHY O<sub>3</sub> and NO<sub>2</sub> columns.

M. De Mazière, T. Coosemans, B. Barret, T. Blumenstock, A. Griesfeller et al. P. Demoulin, H. Fast, D. Griffith, N. Jones, E. Mahieu, J. Mellqvist, R. L. Mittermeier, J. Notholt, A. Rinsland, A. Schulz, D. Smale, A. Strandberg, R. Sussmann, S. Wood, M. Buchwitz: Validation of ENVISAT-1 level-2 products related to lower atmosphere O<sub>3</sub> and NO<sub>x</sub> chemistry by an FTIR quasi-global network

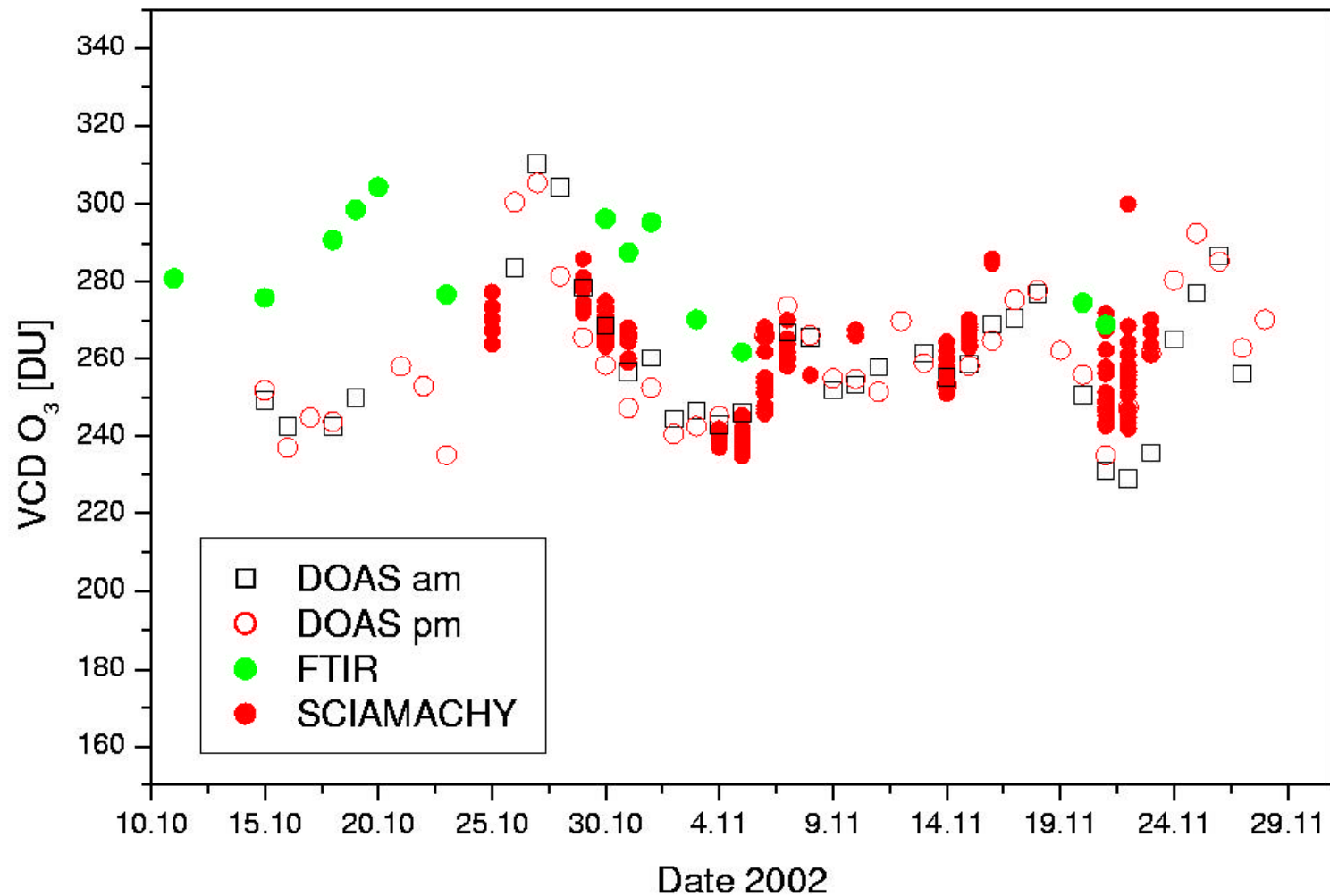
## Comparison with DOAS\_0 O<sub>3</sub> data



1. De Mazière et al.: Validation of ENVISAT-1 level-2 products ... by an FTIR quasi-global network  
proceedings on the ENVISAT Validation Workshop, Frascati, Dec. 2002, ESA Vol. SP-531,2003.

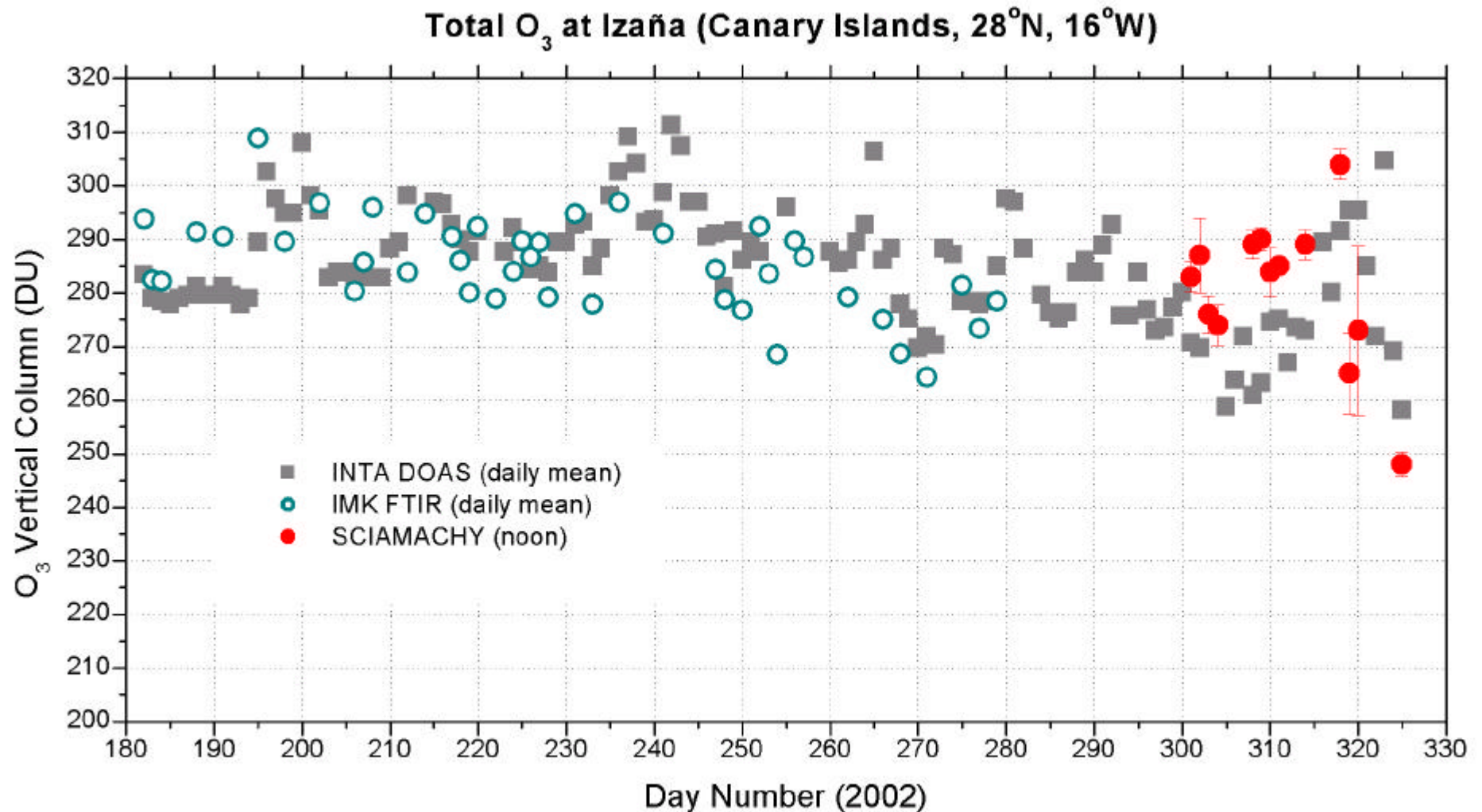
## Comparison with DOAS\_0 O<sub>3</sub> data

Ozone Vertical Column Density at Kiruna (68°N, 20°E)



T. Blumenstock,  
U. Friess et al.:  
Validation of MIPAS  
and SCIAMACHY data  
by ground-based spectrometry  
at Kiruna, Sweden, and  
Izaña, Tenerife Island  
(AOID-191),  
Proceedings on the  
ENVISAT Validation  
Workshop, Frascati,  
Dec. 2002, ESA Vol.  
SP-531, 2003

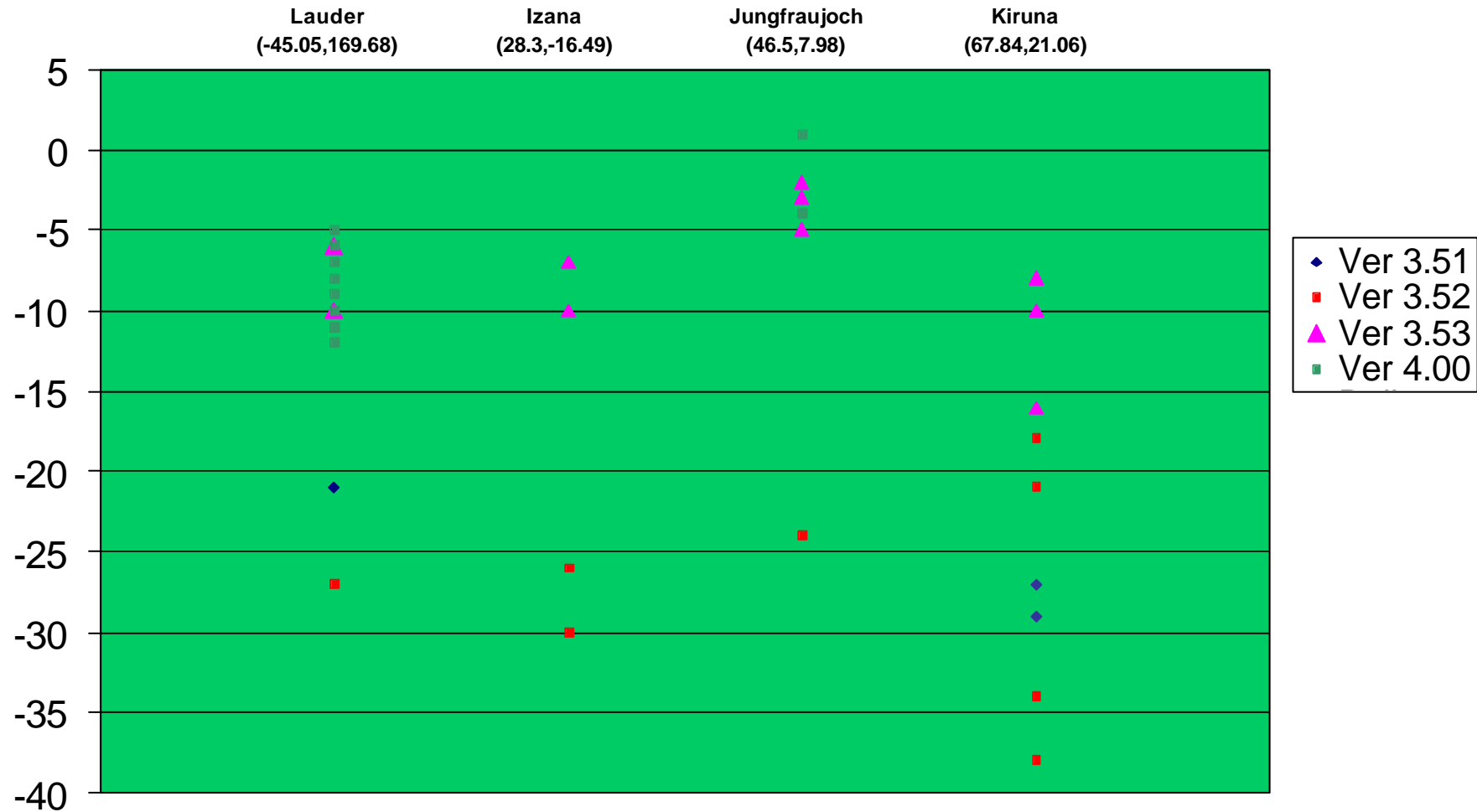
## Comparison with DOAS\_0 O<sub>3</sub> data



T. Blumenstock, M. Gil et al.: Validation of MIPAS and SCIAMACHY data by ground-based spectroscopy at Kiruna, Sweden, and Izaña, Tenerife Island (AOID-191),

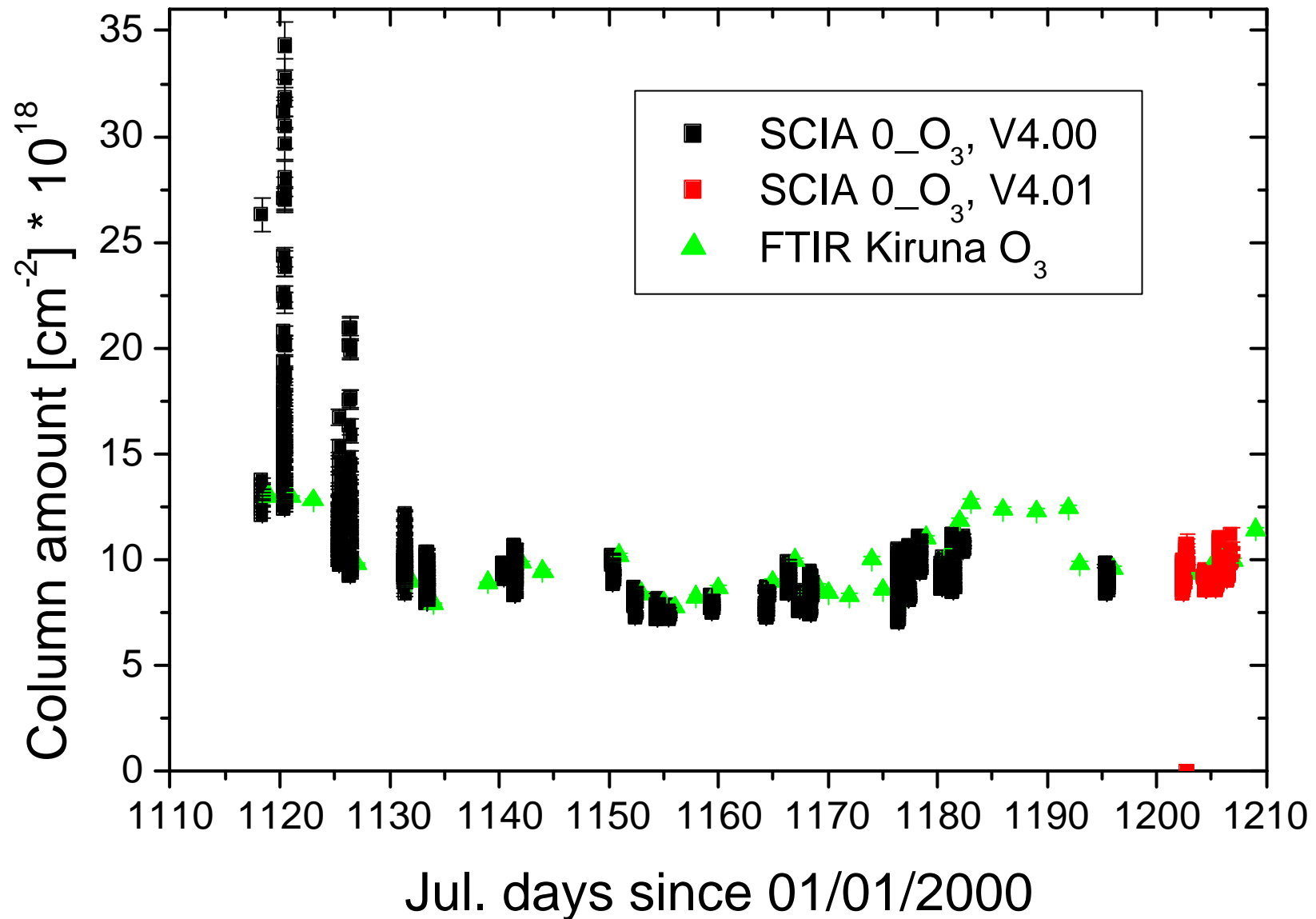
## Comparison with DOAS\_0 O<sub>3</sub> data

Average procentual difference DOAS 0 -FTIR for O<sub>3</sub> at different groundstations  
(500km radius average Sciamachy)

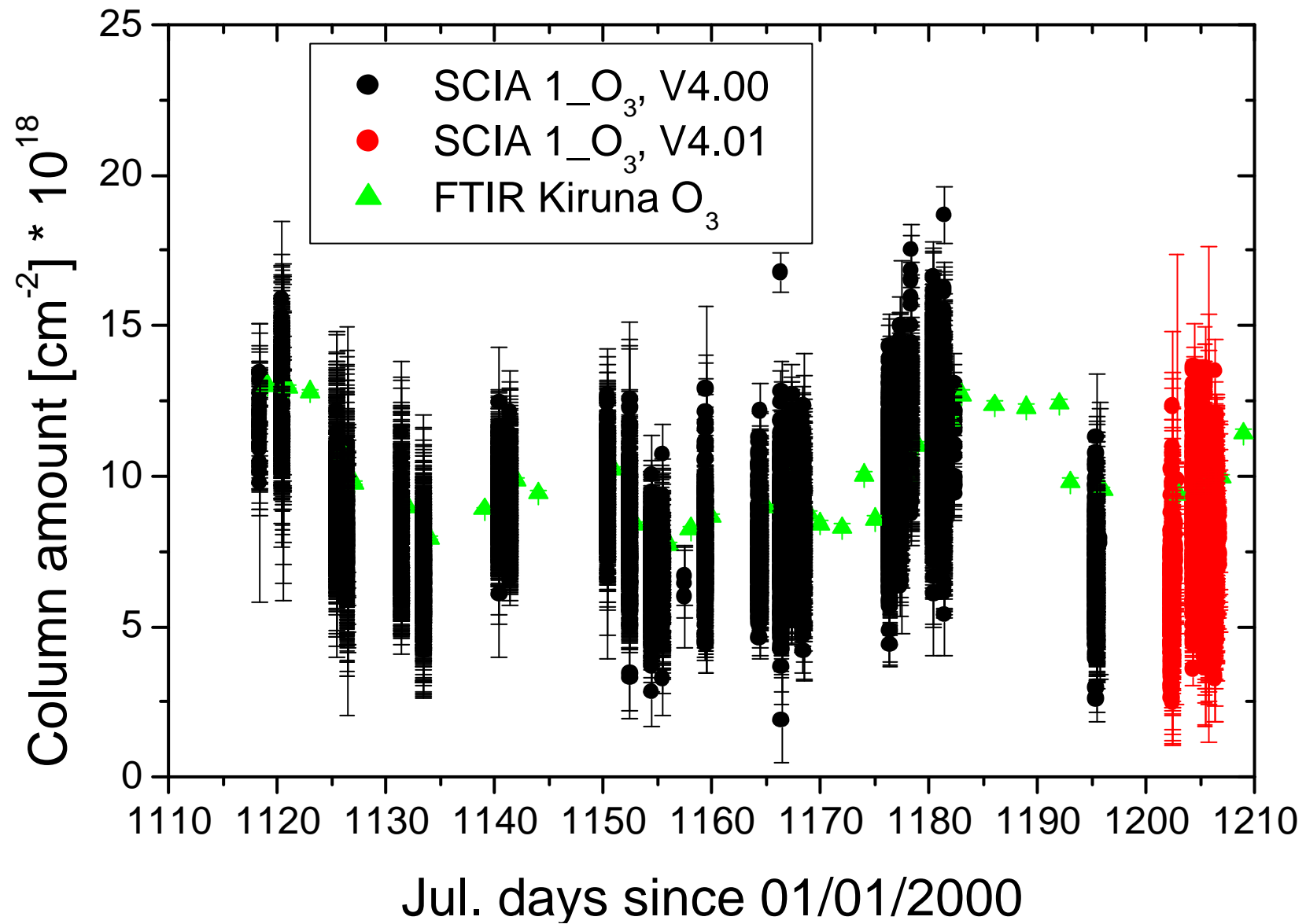




## Comparison with DOAS\_0 O<sub>3</sub> data - 2003

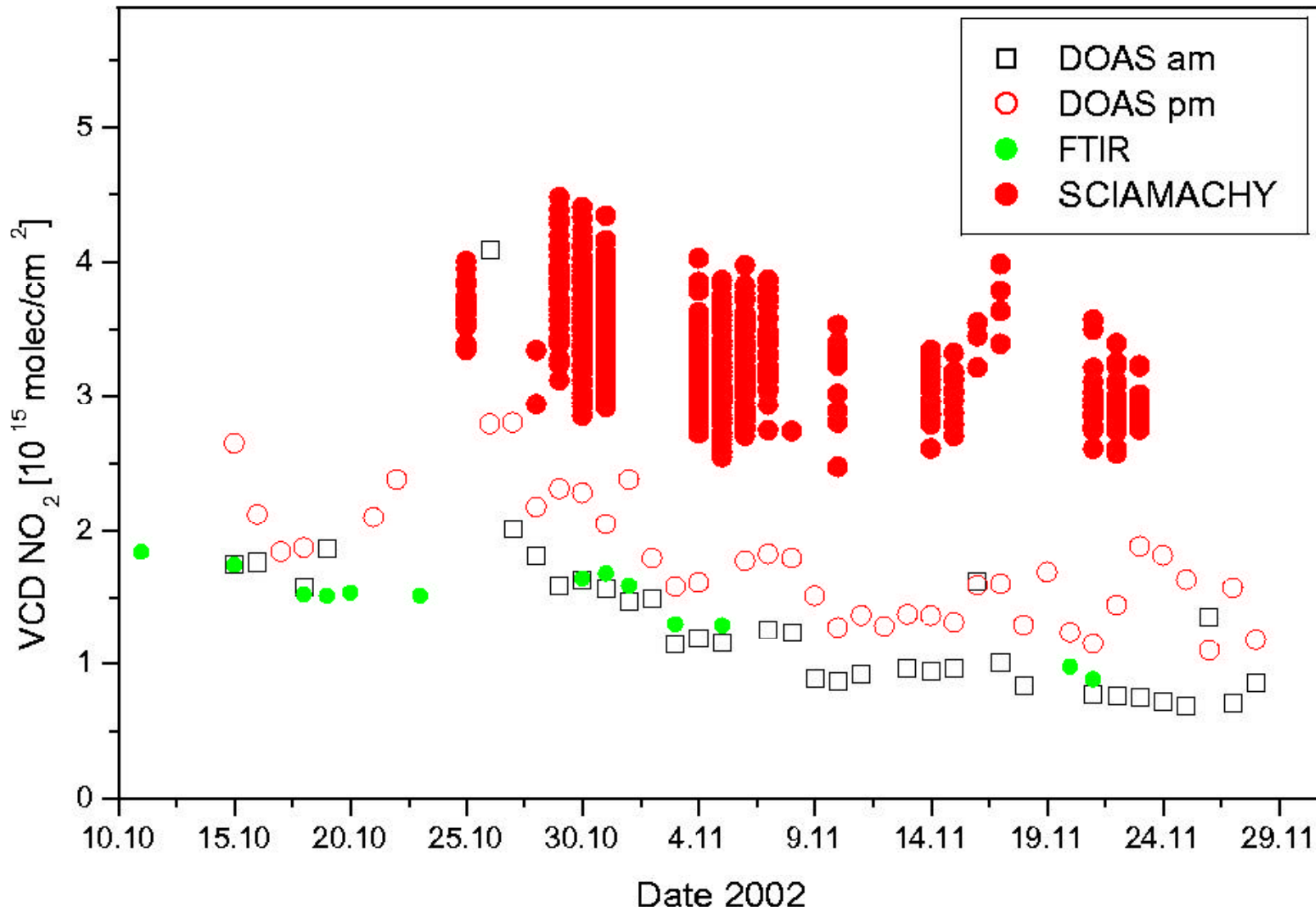


## Comparison with DOAS\_1 O<sub>3</sub> data - 2003



## Comparison with DOAS\_0 NO<sub>2</sub> data

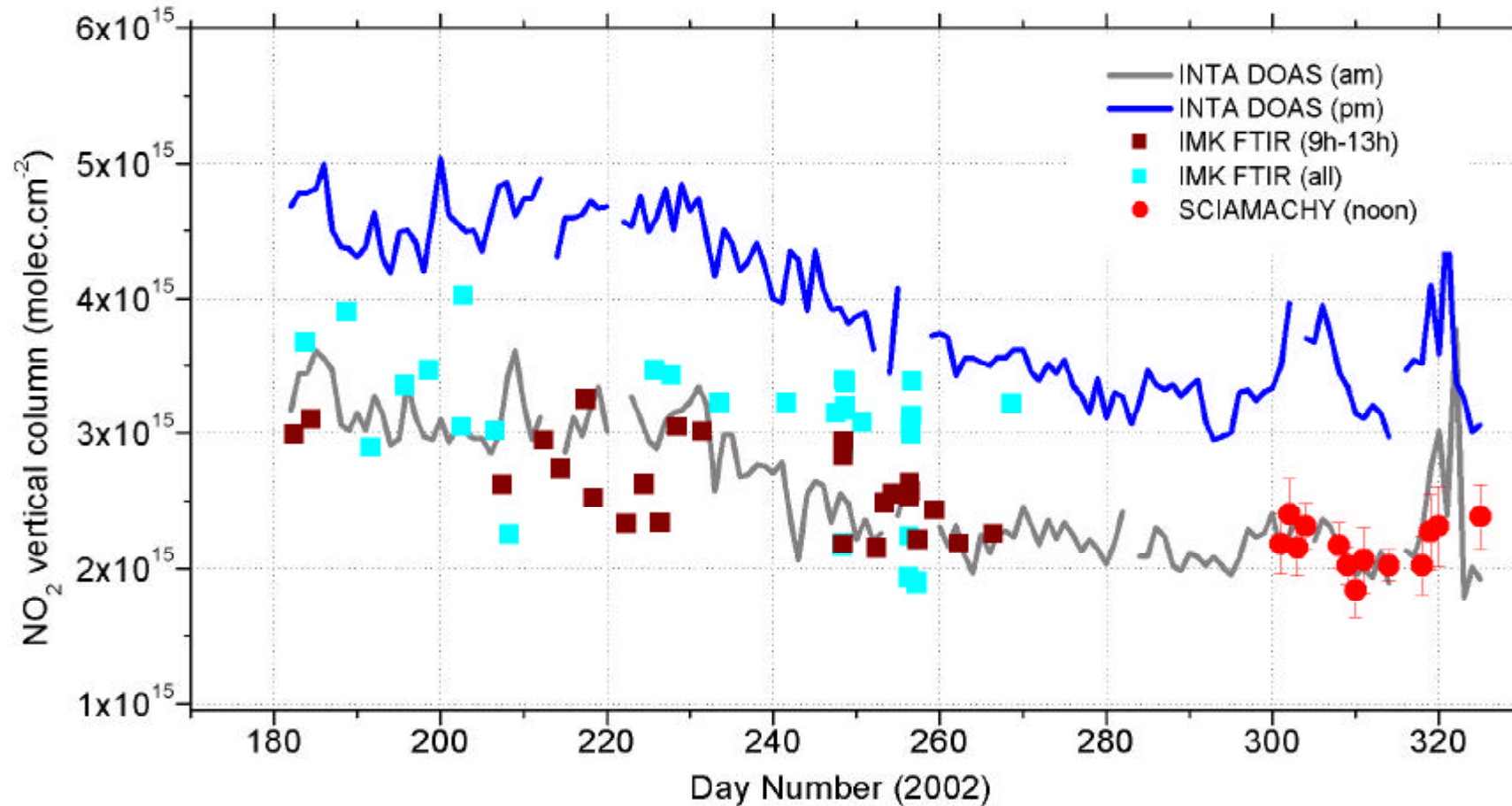
NO<sub>2</sub> Vertical Column Density at Kiruna (68°N, 20°E)



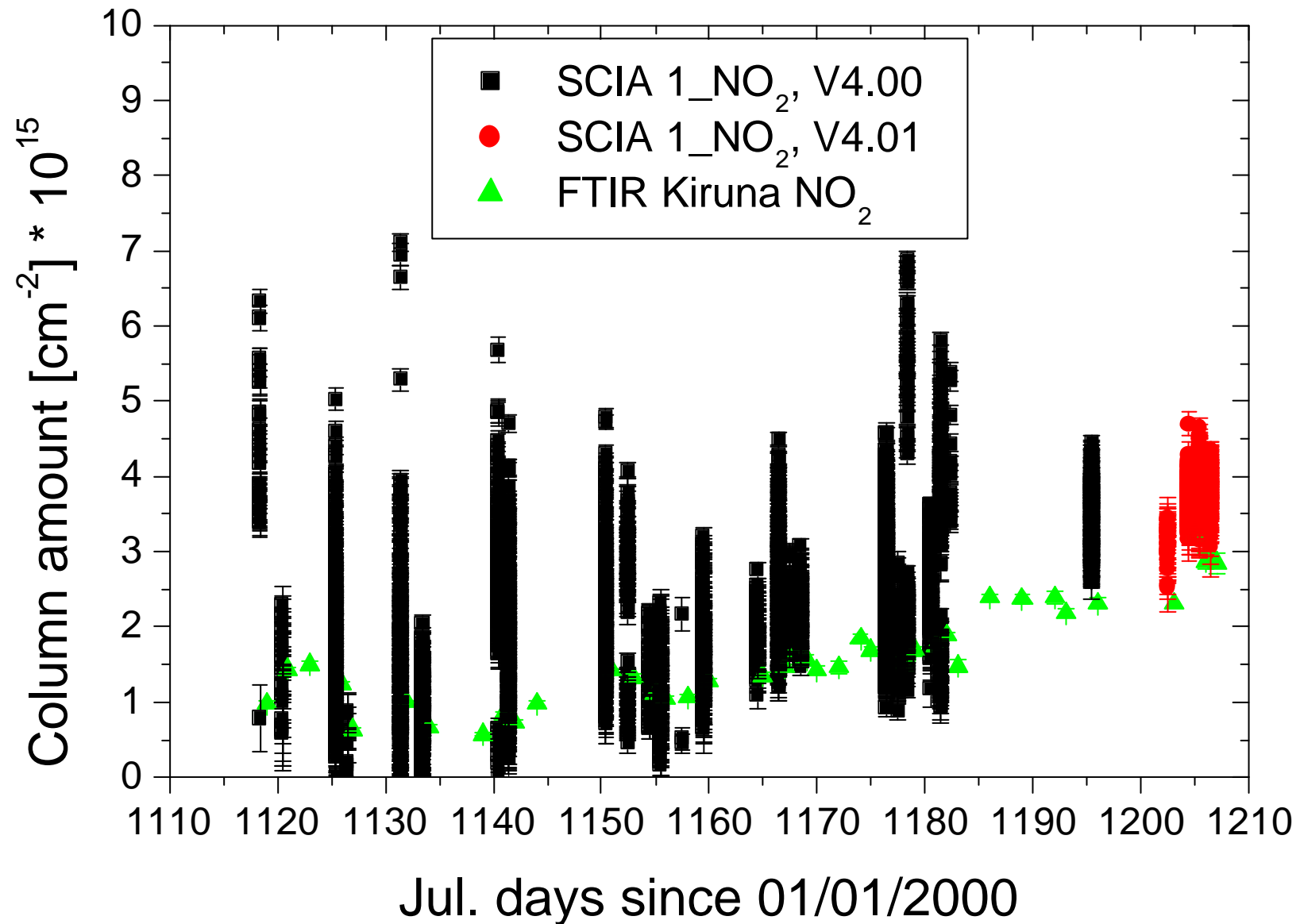
T. Blumenstock,  
U. Friess et al.:  
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Workshop, Frascati,  
Dec. 2002, ESA Vol.  
SP-531, 2003

## Comparison with DOAS\_0 NO<sub>2</sub> data

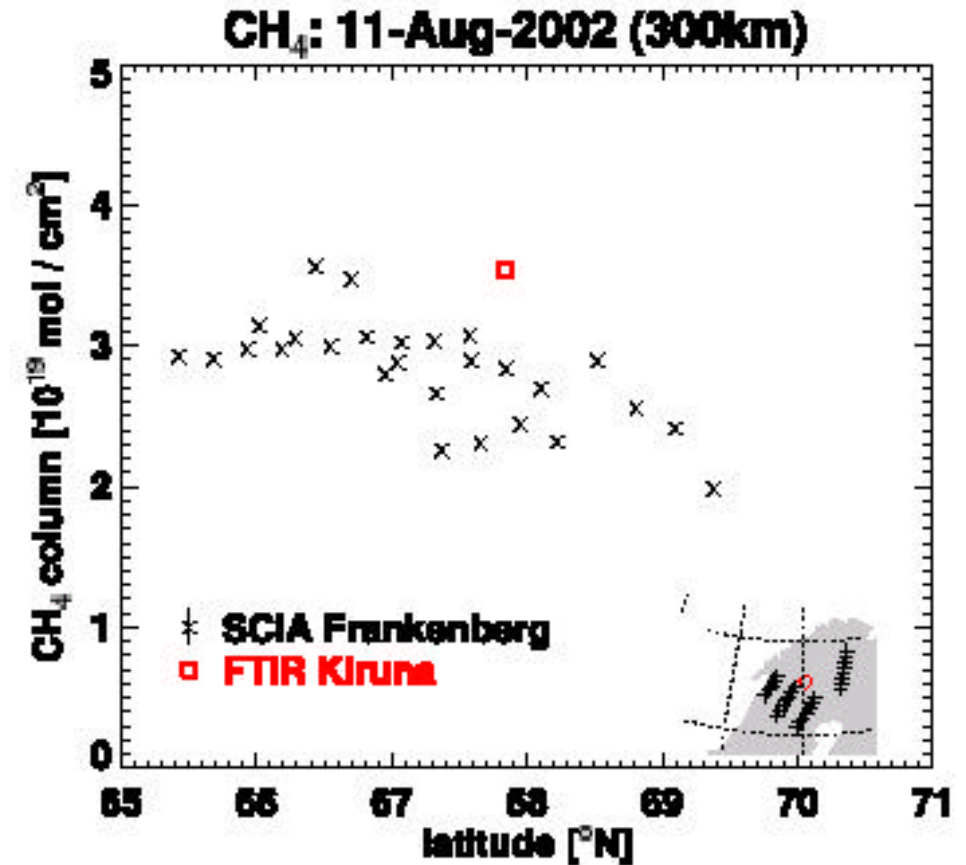
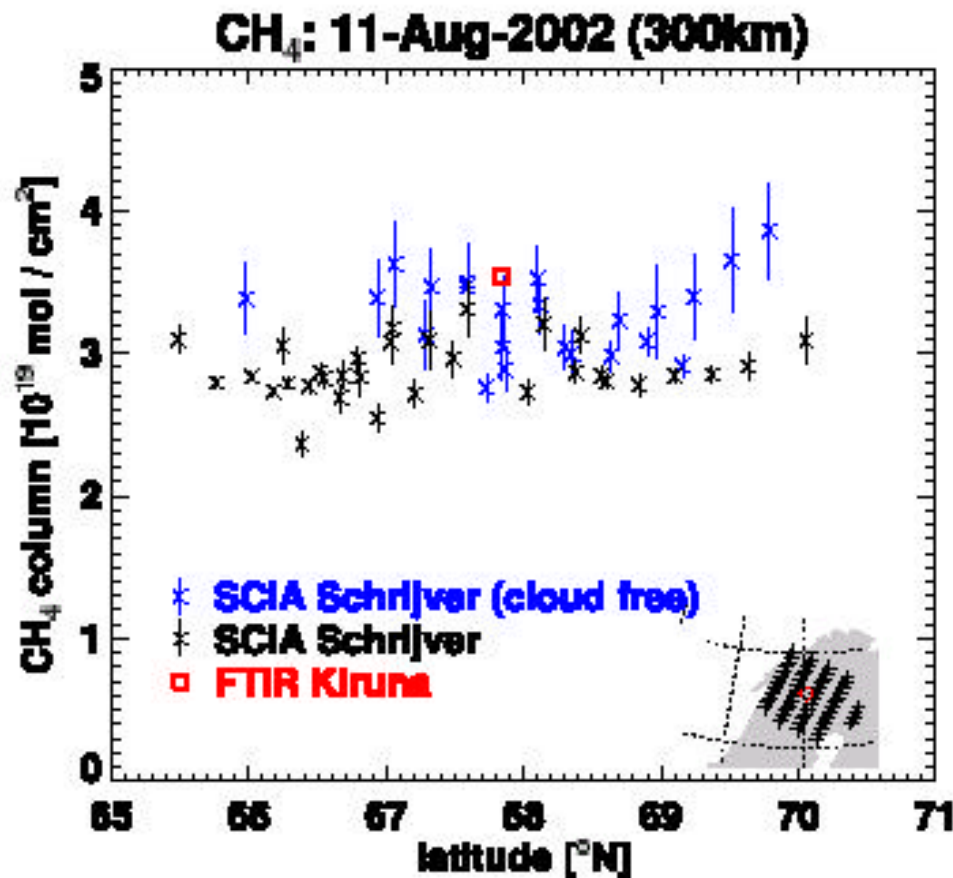
Total NO<sub>2</sub> at Izaña (Canary Islands, 28°N, 16°S)



## Comparison with DOAS\_1 NO<sub>2</sub> data - 2003

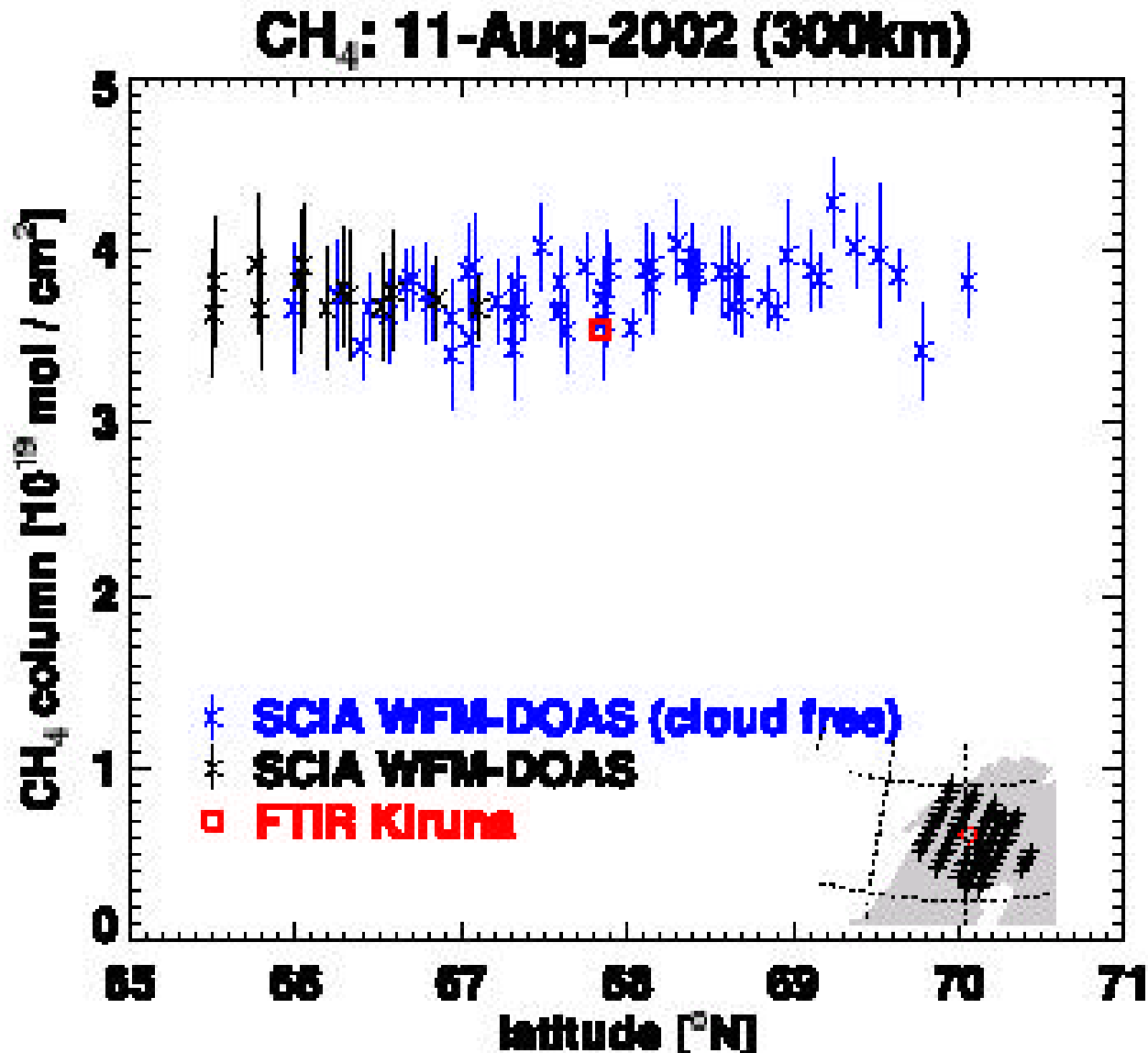


## Comparison with scientific products



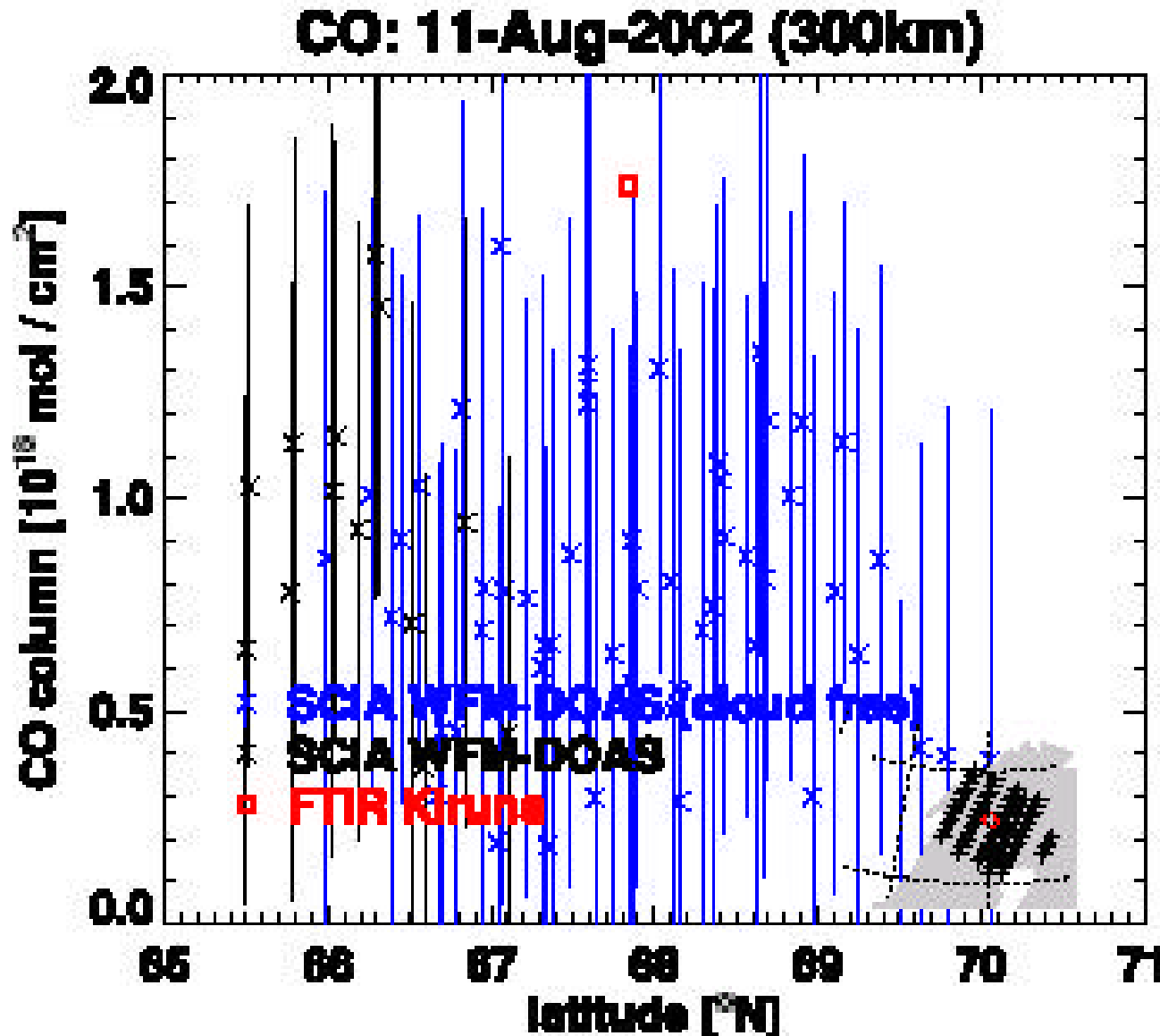
5. Bramstedt et al.: Comparison of scientific SCIAMACHY products with ground-based measurements  
proceedings on the ENVISAT Validation Workshop, Frascati, Dec. 2002, ESA Vol. SP-531, 2003.

## Comparison with scientific products



K. Bramstedt et al.: Comparison of scientific SCIAMACHY products with ground-based measurements, Proceedings on the ENVISAT Validation Workshop, Frascati, Dec 2002, ESA Vol. SP-531, 2003.

## Comparison with scientific products



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2003.



## Validation of SCIAMACHY products with ground-based FTIR measurements at Kiruna and on Tenerife Island

### Standard products:

#### **O<sub>3</sub>:**

3.51 & 3.52: difference ~ 30%

3.53 & 3.52: difference ~ 10%

4.00 & 4.01: good agreement

DOAS\_1: larger scatter and error as compared to DOAS\_0

#### **NO<sub>2</sub>:**

Kiruna: SCIA columns too large

Tenerife: SCIA columns quite well

### Scientific products

**CH<sub>4</sub>:** looks promising; more comparisons needed

**CO:** SCIA columns ~50 % too low

## Outlook

### 2003

**O<sub>3</sub>**: statistical analysis

**NO<sub>2</sub>**: day time correction

**validation of reprocessed data when available**

### 2004

**NIR products: scientific & standard products**

Column amounts of N<sub>2</sub>O, CH<sub>4</sub>, CO, and CO<sub>2</sub>

profiles of O<sub>3</sub>

**going to increase statistics & check for stability**