



Abstract

Discussion

Metrics

Research article

23 Apr 2019

## Retrieval of atmospheric CH<sub>4</sub> vertical information from TCCON FTIR spectra

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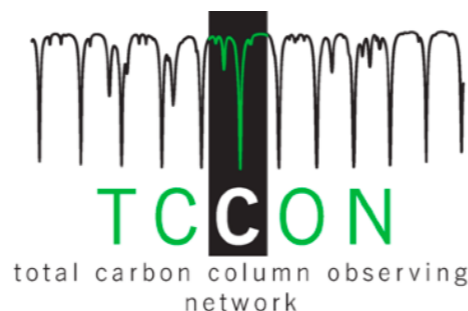
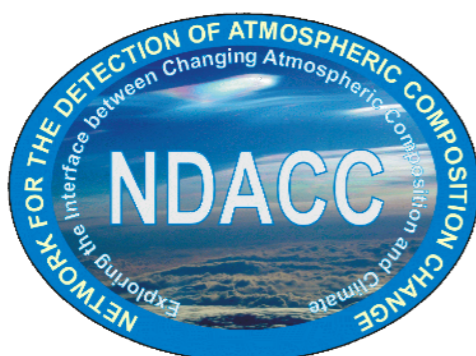
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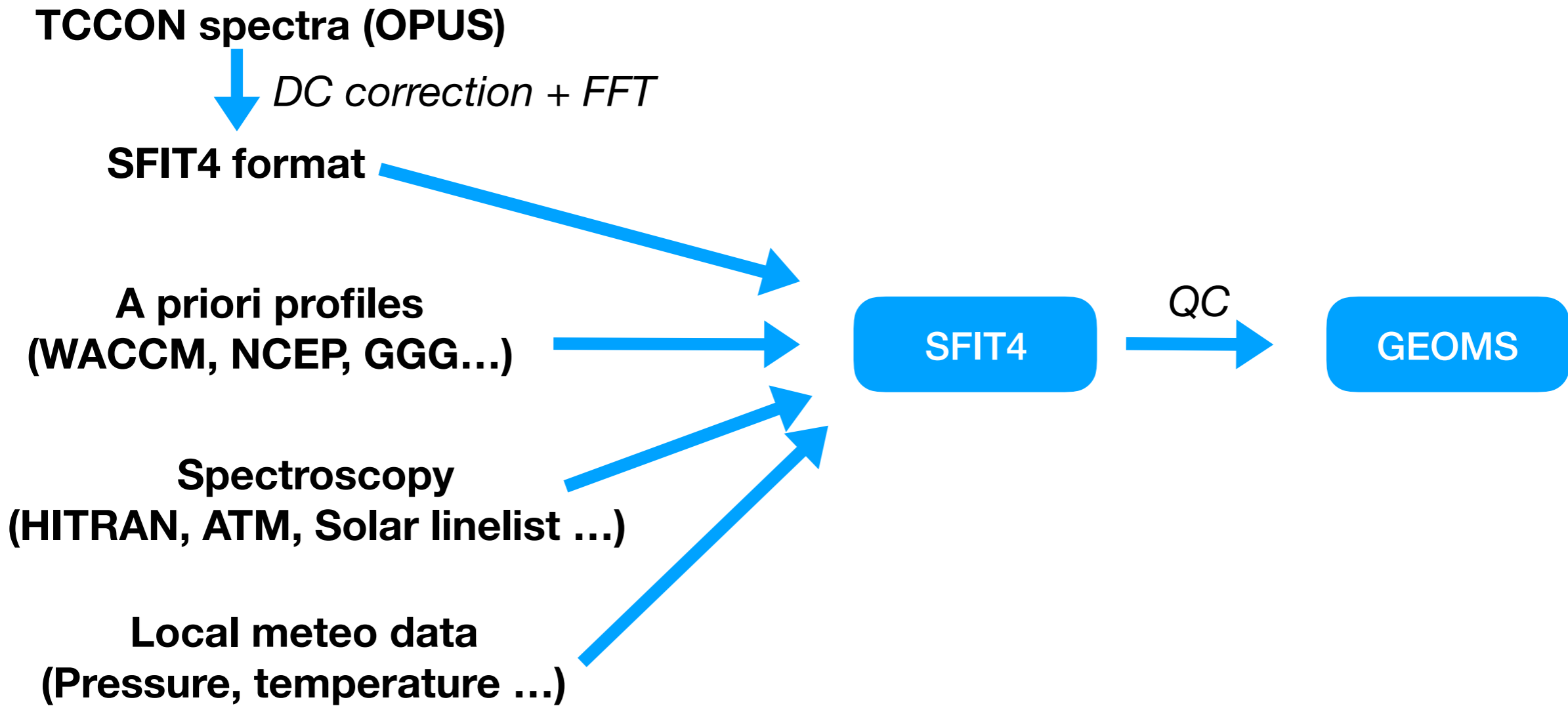
### Review status

This discussion paper is a preprint. It is a manuscript under review for the journal Atmospheric Measurement Techniques (AMT).

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# SFIT4TCCON process chart



😊 Same retrieval strategy; same procedure; similar quality check

😞 The TCCON raw IFG OPUS (or after GGG i2s) need to be transferred to BIRA-IASB

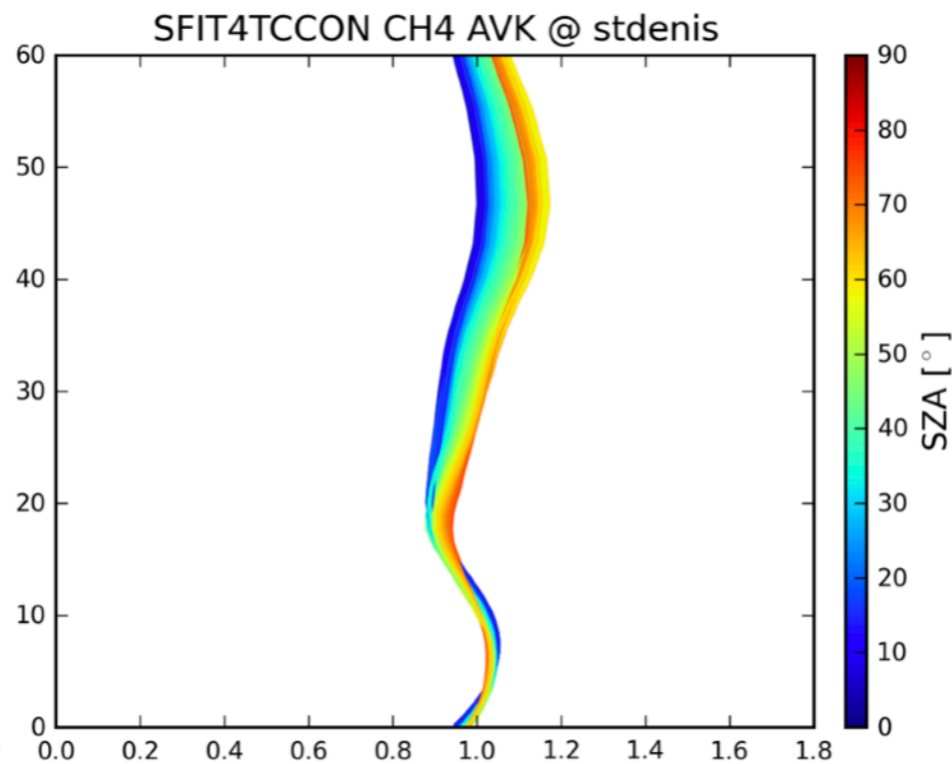
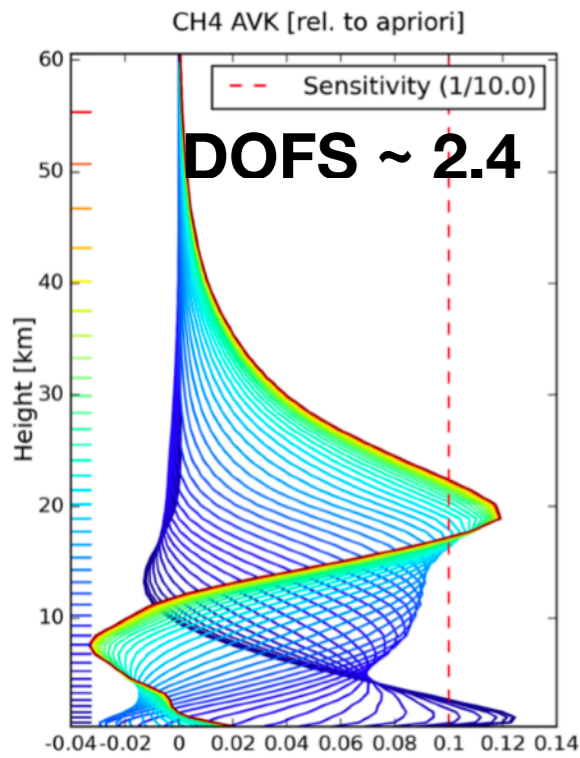
# Retrieval strategy

**Table 2.** Lists of the most important parameters in the SFIT4TCCON CH<sub>4</sub> retrieval strategy.

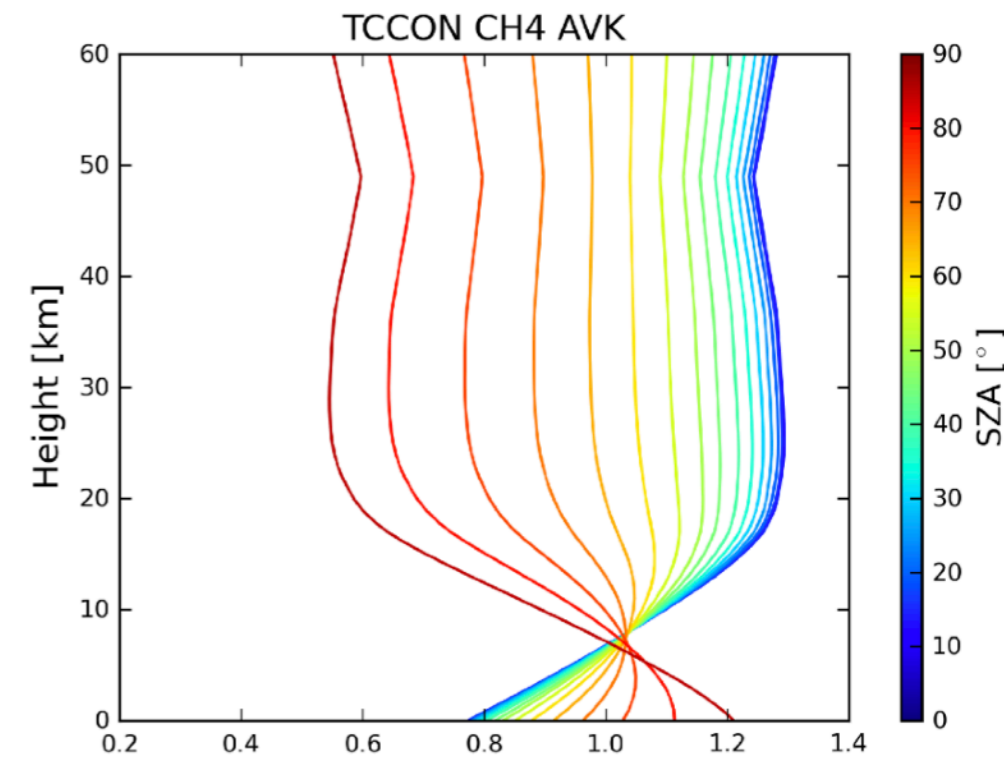
Retrieval window (cm <sup>-1</sup> )	5996.45-6007.55
Interfering species	CO <sub>2</sub> , H <sub>2</sub> O
Spectroscopy	ATM
Regularization	Tikhonov $L_1$ with $\alpha = 1000$
A priori profile	WACCM v6 (fixed)
SNR	250
ILS	a linear polynomial fitting

## Averaging kernel

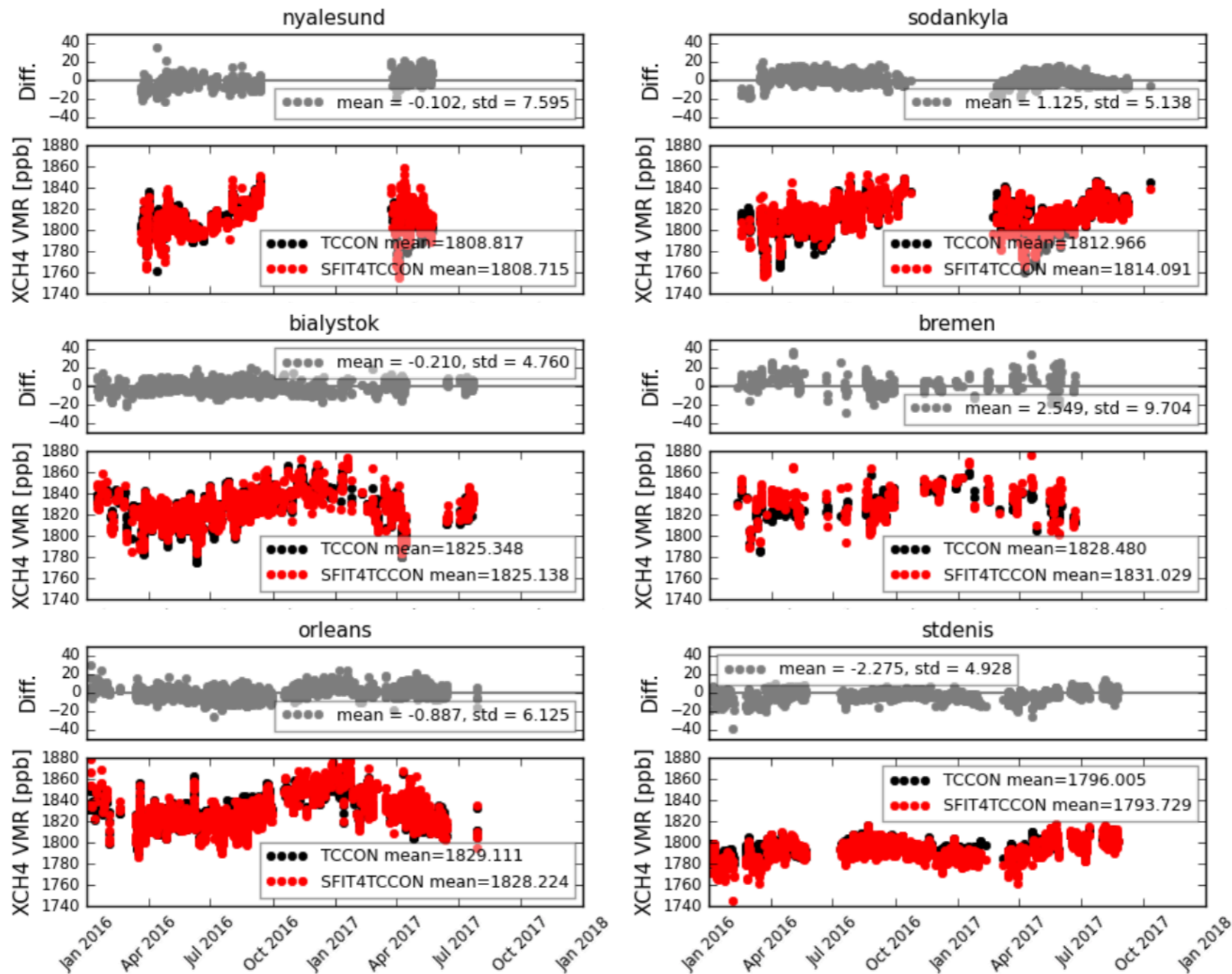
### SFIT4TCCON



### TCCON



# Total column

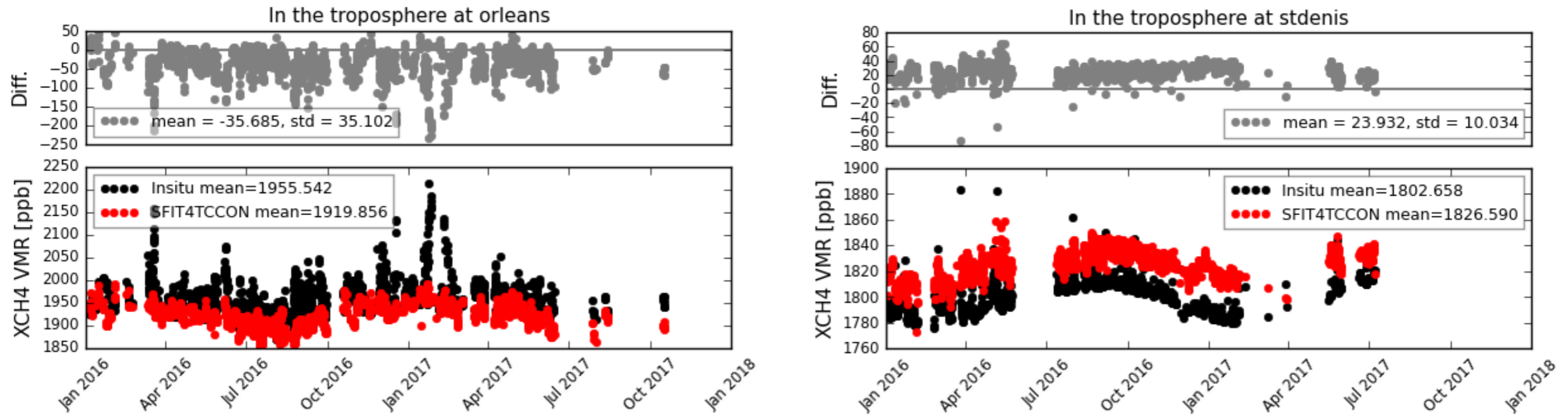


**Difference between TCCON and SFIT4TCCON XCH4 at these sites:  
Systematic bias  $\leq 2.5$  ppb (0.14%); Random bias  $\leq 9.7$  ppb (0.52%)**

**==> close to the TCCON uncertainty**

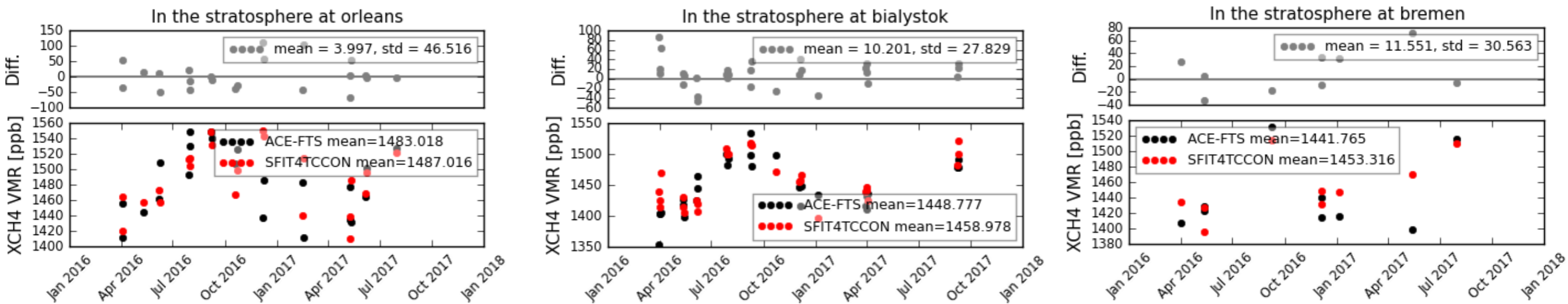
# Partial columns

- SFIT4TCCON tropospheric column with in situ measurements



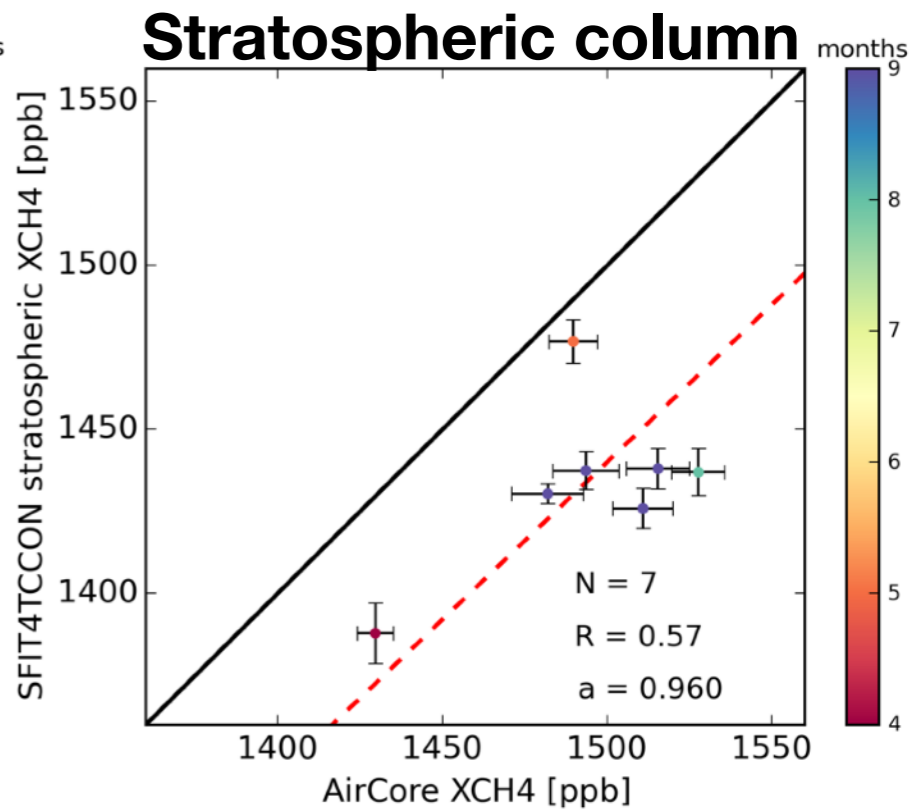
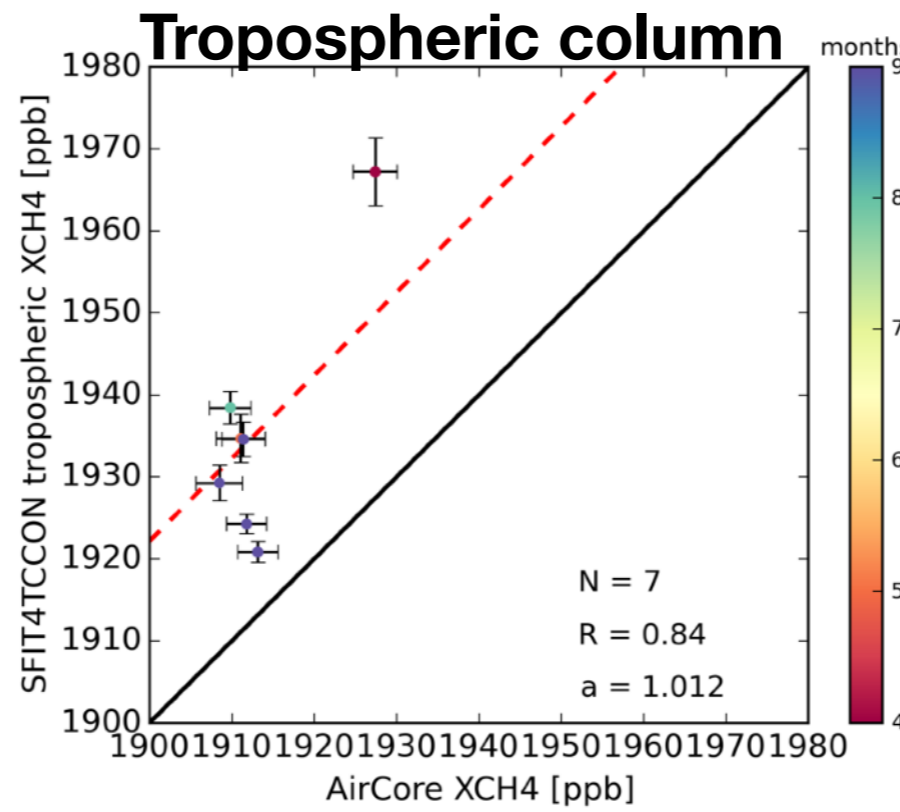
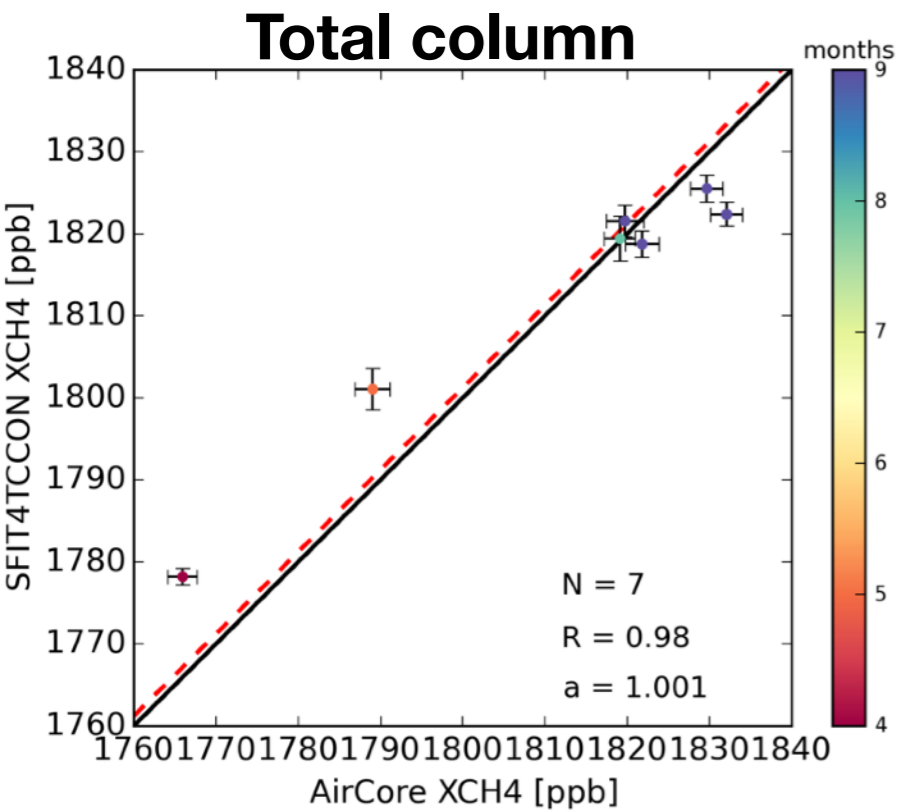
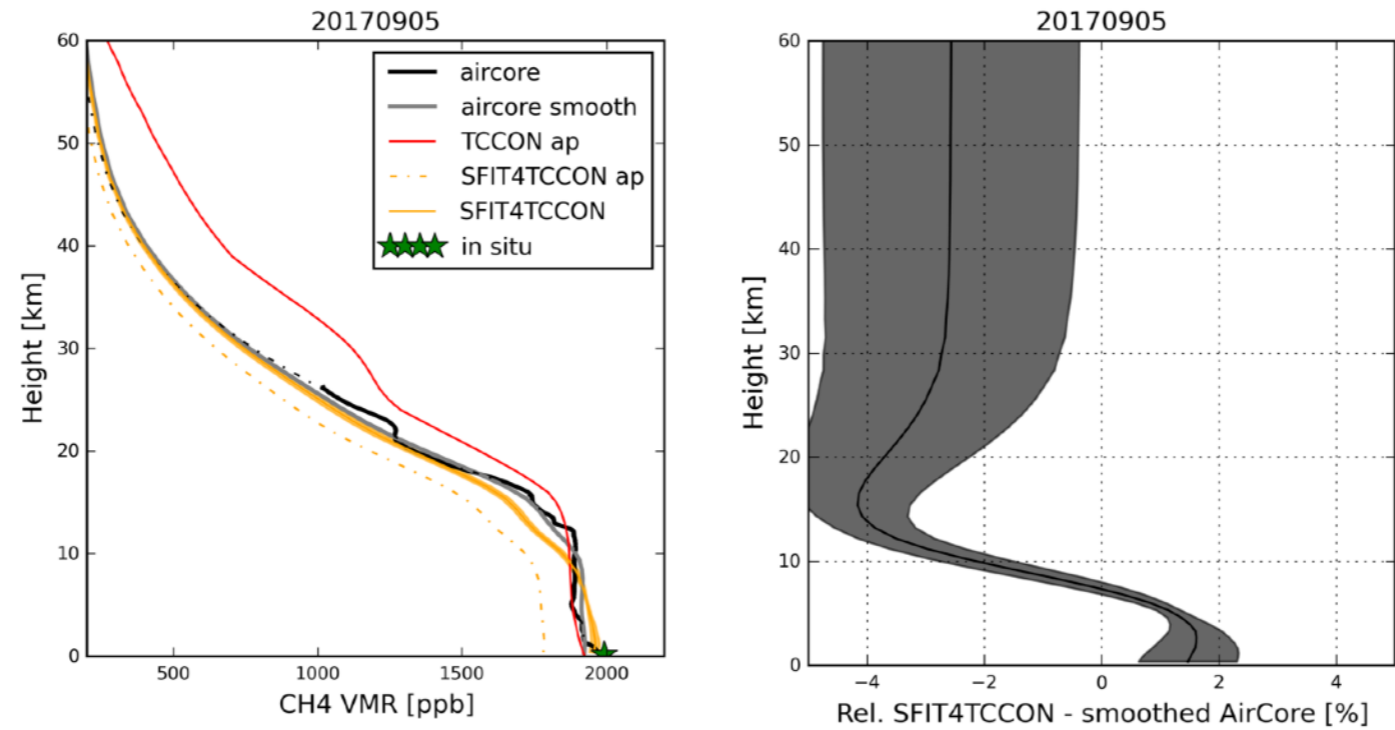
**Similar seasonal cycle;  $R > 0.8$**

- SFIT4TCCON stratospheric column with ACE-FTS measurements



**Similar seasonal cycle;  $R > 0.6$**

# Compare with AirCore measurements at Sodankyla



Systematic biases

Total column

$0.1\% \pm 0.4\%$

Tropospheric PC

$1.2\% \pm 0.4\%$

Stratospheric PC

$-4.0\% \pm 2.0\%$

- With more TCCON sites (now 6), we can understand the uncertainty of the SFIT4TCCON retrieval better, and the SFIT4TCCON data can be more useful for scientific studies!
- There is a clear interest of the satellite community (SRON) in these data .... needs a more global coverage (less solar zenith angle dependent in AVK, and less smoothing error)
- BIRA-IASB is willing to do this analysis for other TCCON sites and make the SFIT4TCCON result available to the community (like standard TCCON data) 🙌

*Thanks a lot for your attention!*