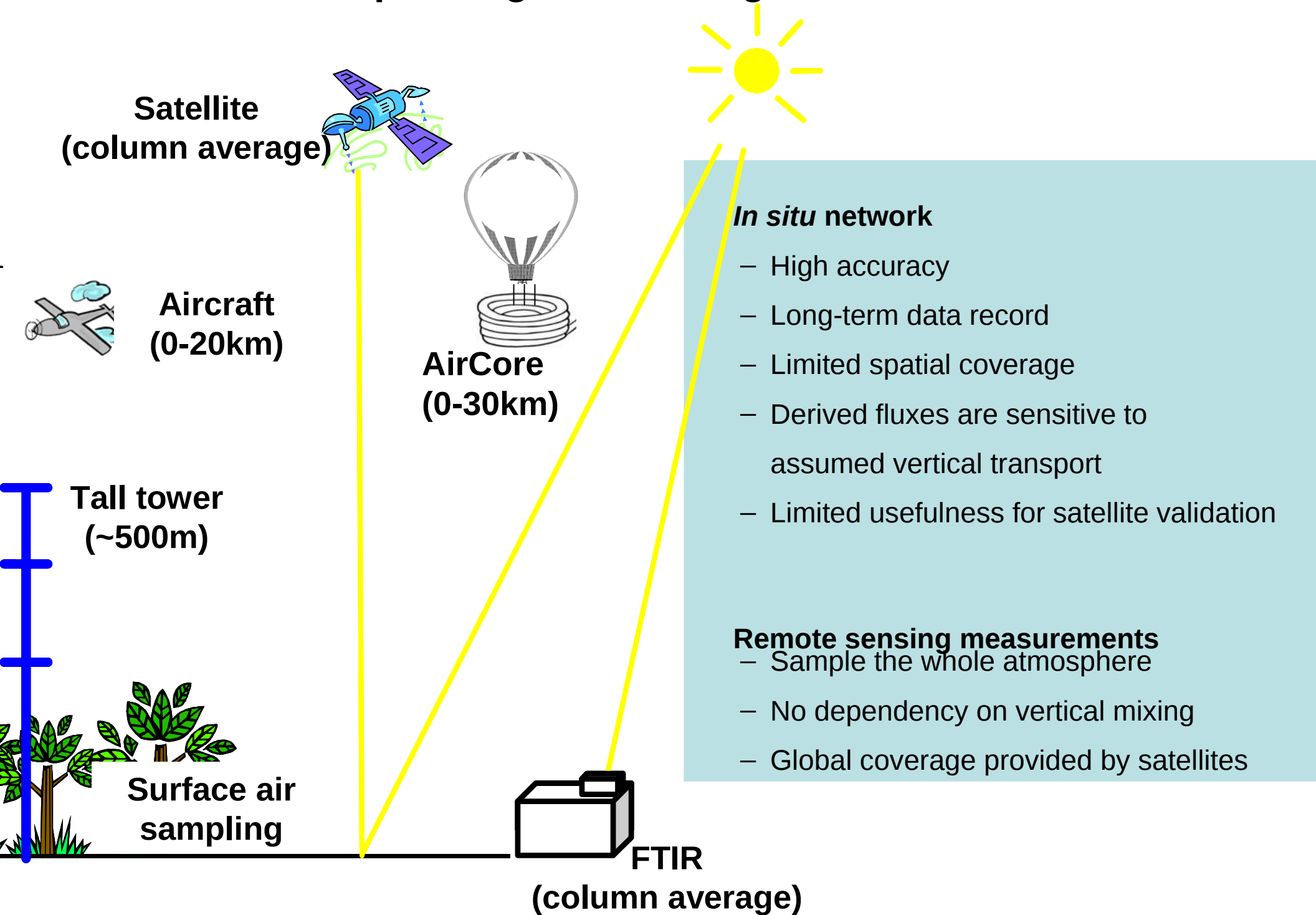
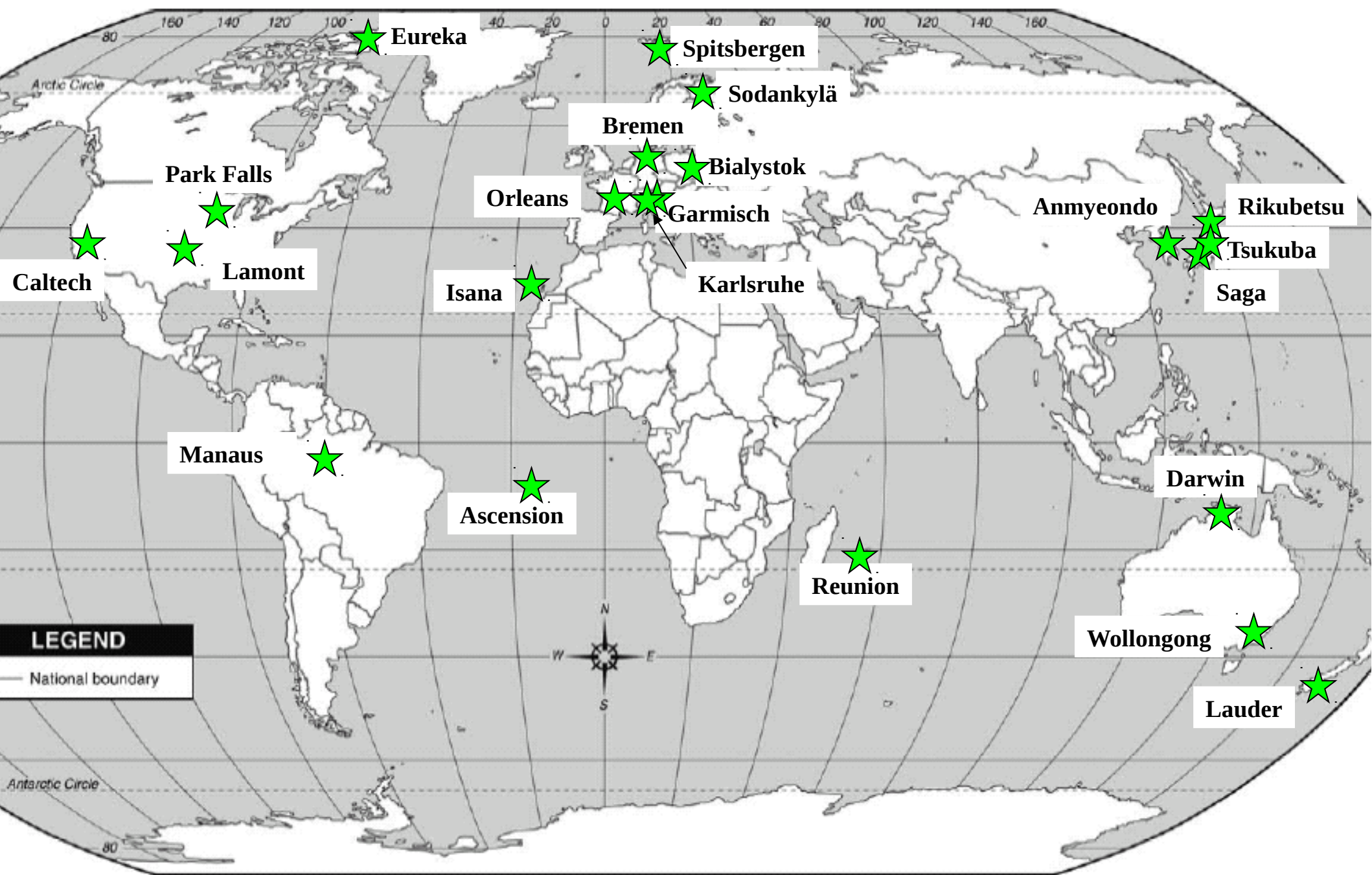


Atmospheric greenhouse gas observations



Total Carbon Column Observing Network (TCCON) in 2015



WP14 Integration of remote sensing

Overall objective:

To prepare TCCON-Europe CH₄ retrievals for an ICOS integration and to demonstrate their importance for ICOS.

Specific objectives

To develop a standardized data product for XCH₄ and tropospheric XCH₄.

To harmonize the QA/QC among the sites within TCCON-Europe.

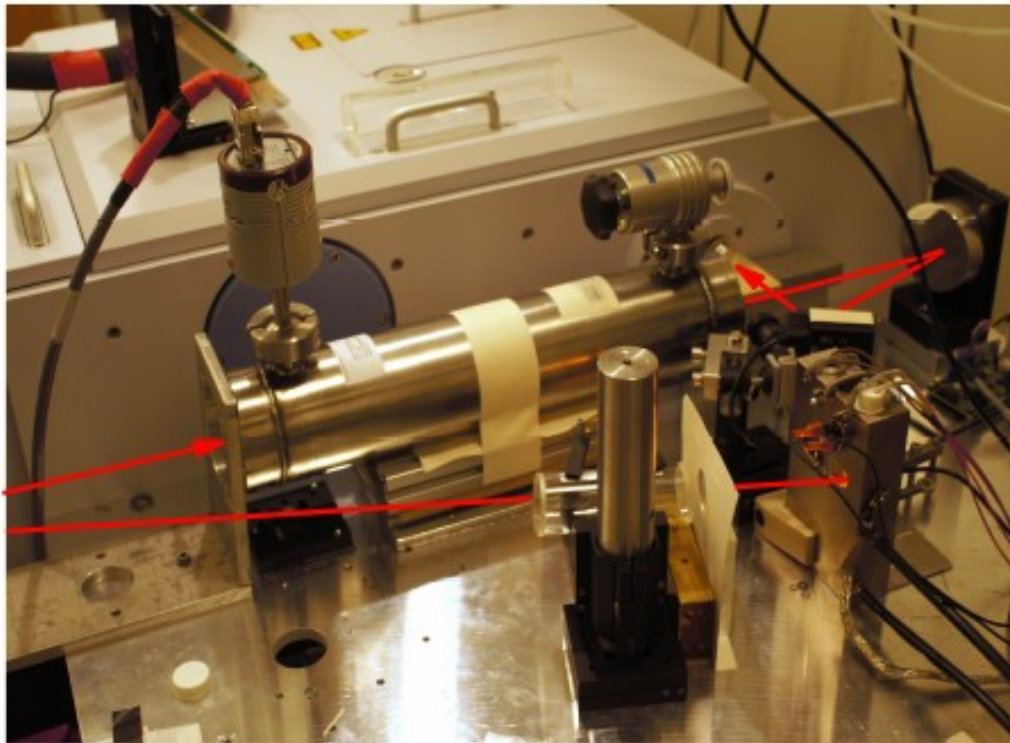
To establish the link between remotely sensed (satellite and ground-based) and in situ observations of CH₄.

To validate modeled 3D CH₄ fields (provided by JRA3 - WP 15).

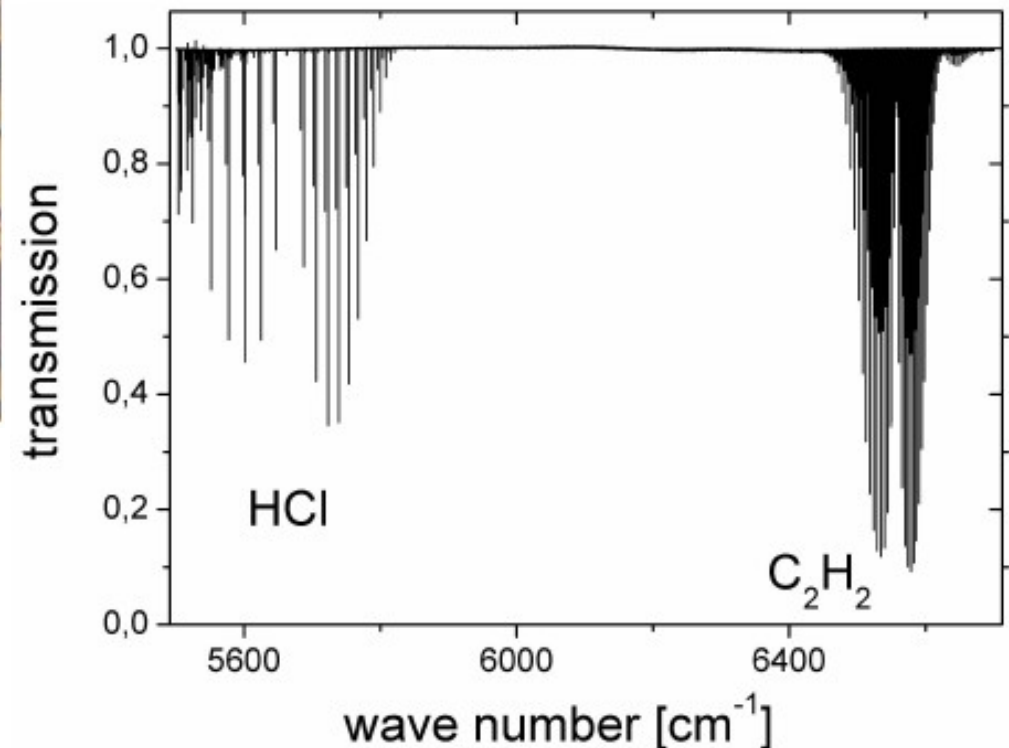
To evaluate the benefits of a potential incorporation of TCCON-Europe into ICOS, specifically for CH₄

Gas cell calibration

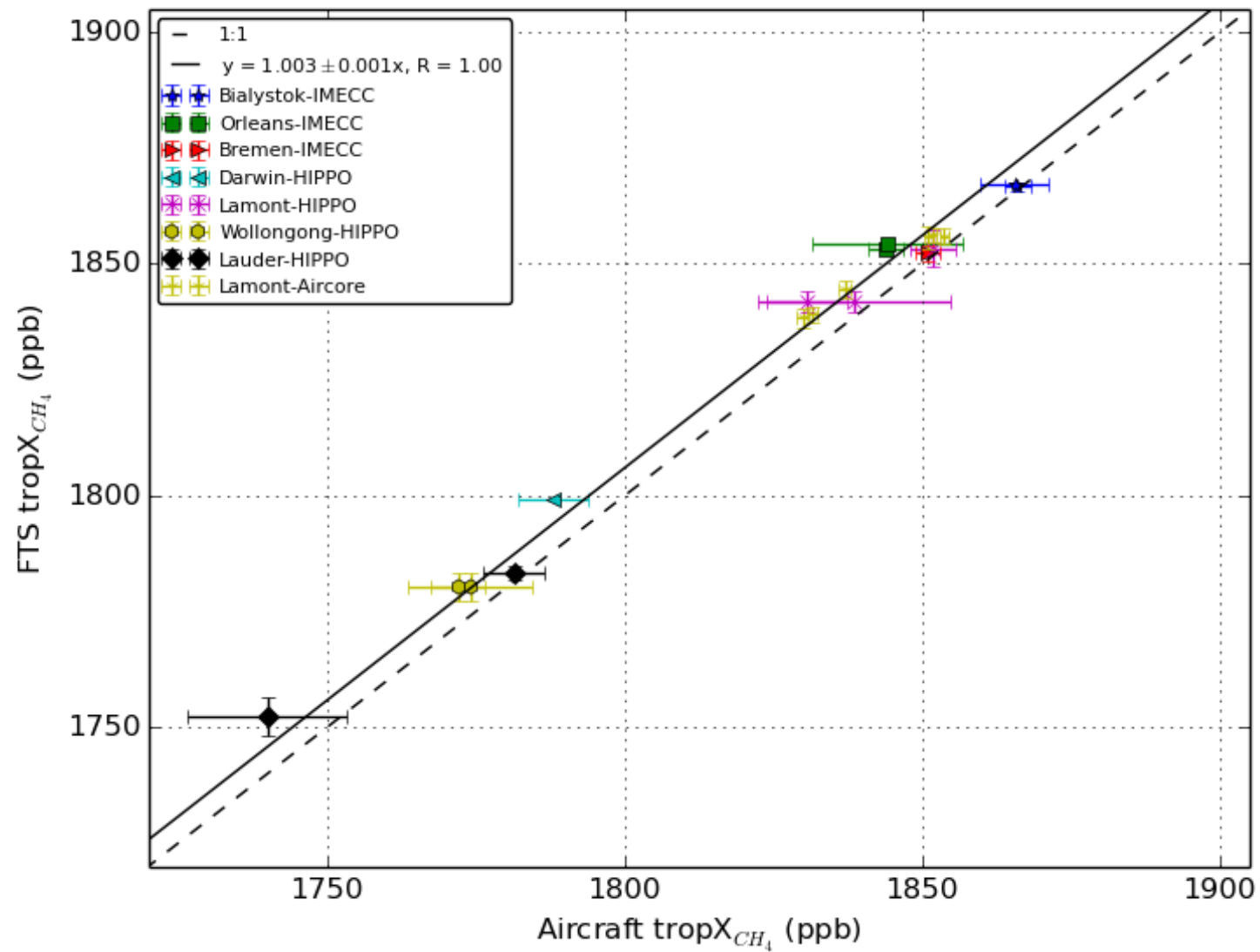
Setup used for gas cell calibration, resulting spectrum



Centralised calibration of cells for
instrumental characterisation

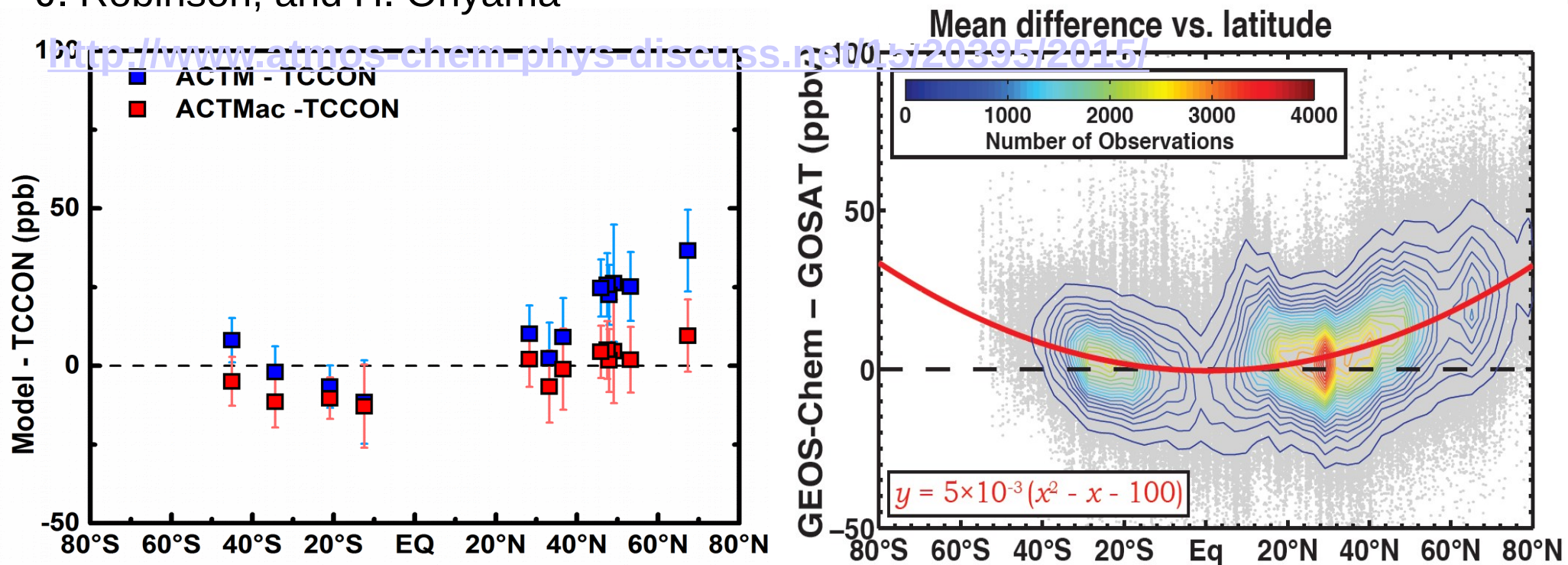


Tropospheric XCH₄ product



The imprint of stratospheric transport on column-averaged methane

Andreas Ostler, R. Sussmann, P. K. Patra, P. O. Wennberg, N. M. Deutscher, D. W. T. Griffith,
T. Blumenstock, F. Hase, R. Kivi, T. Warneke, Z. Wang, M. de Mazière,
J. Robinson, and H. Ohyama



from Turner et al., ACP (2015)

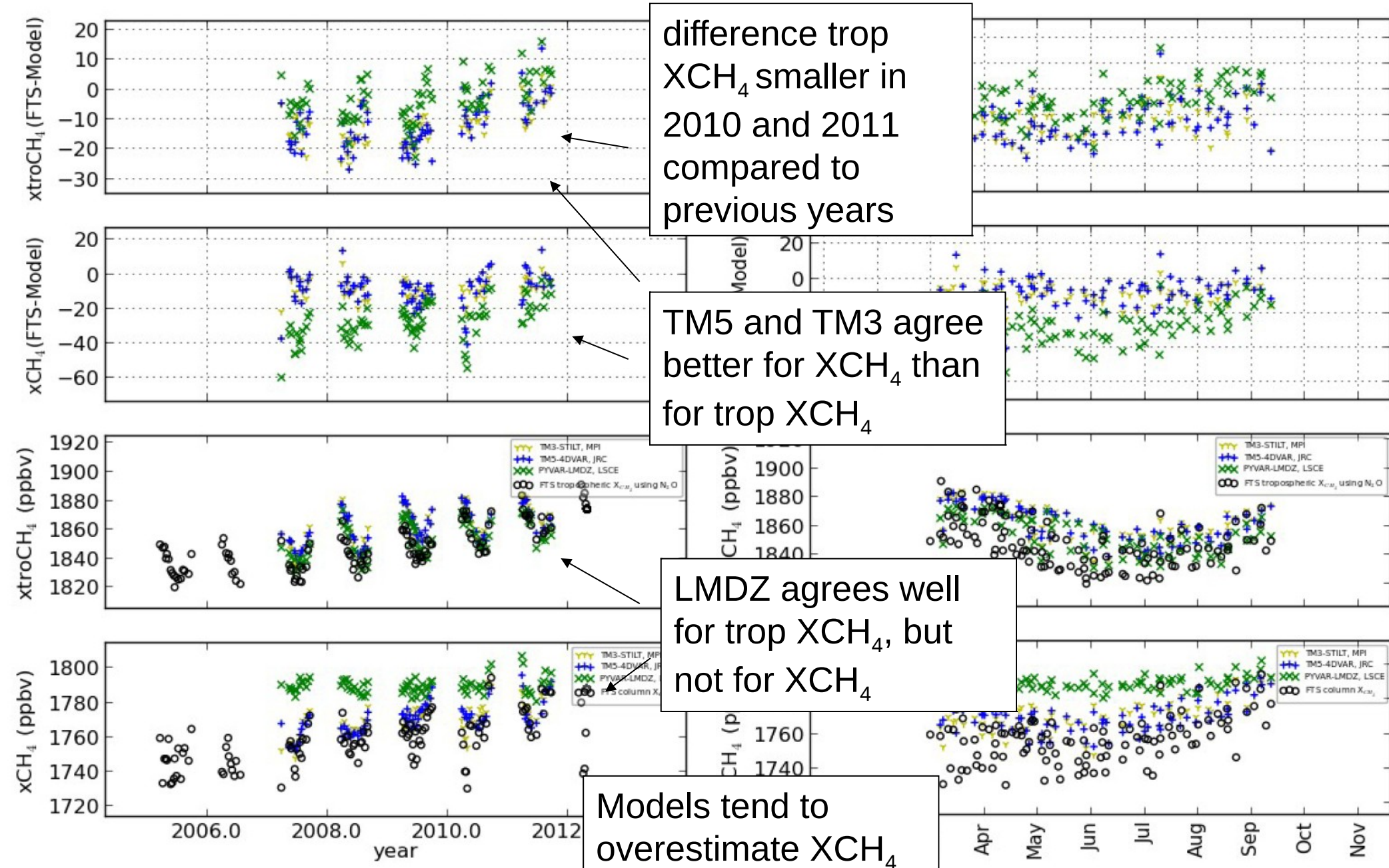
Spitsbergen

ooo FTS

YYY TM3-STILT

+++ TM5-4DVAR

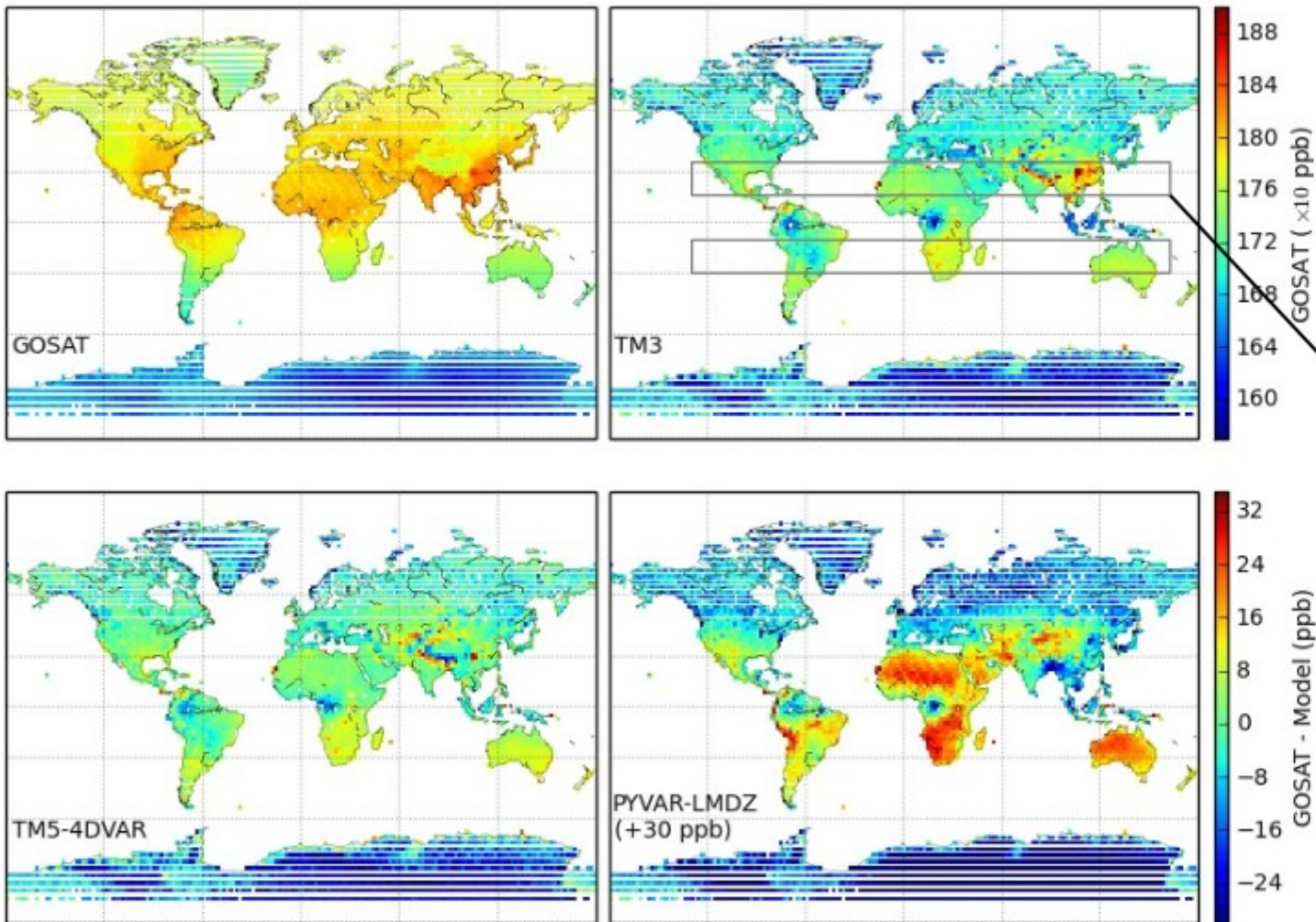
xxx PYVAR-LMDZ



Satellite comparison

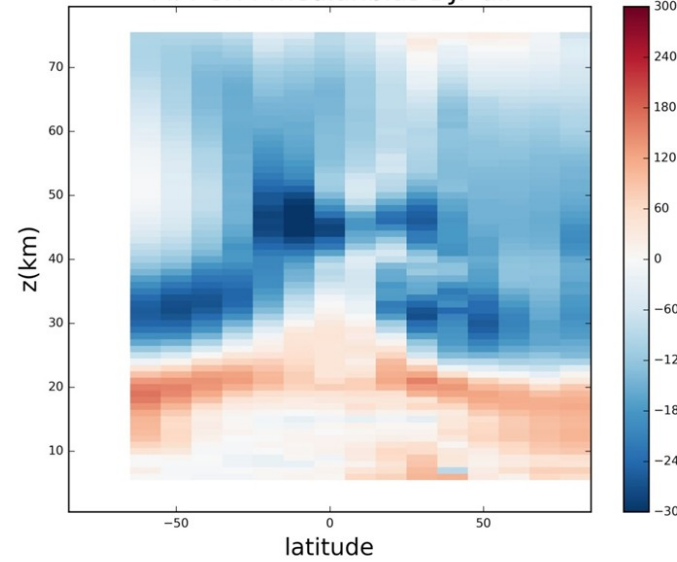
Institut für Umweltphysik

Fachbereich 1
Physik

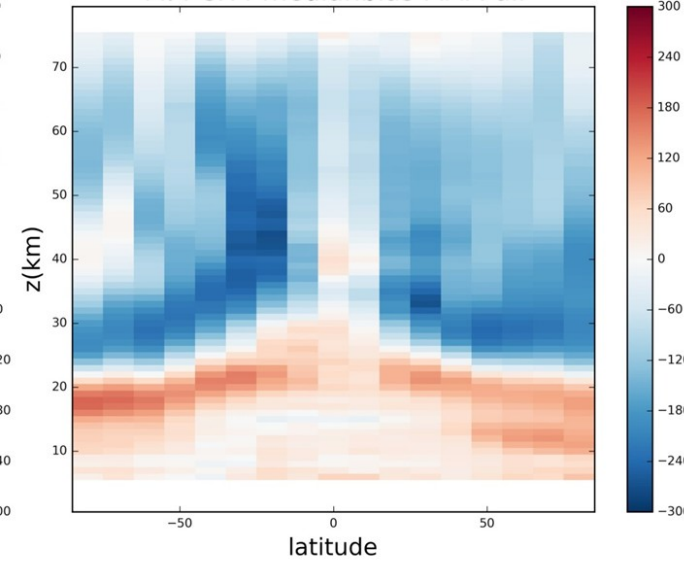


TM3 (MPI)

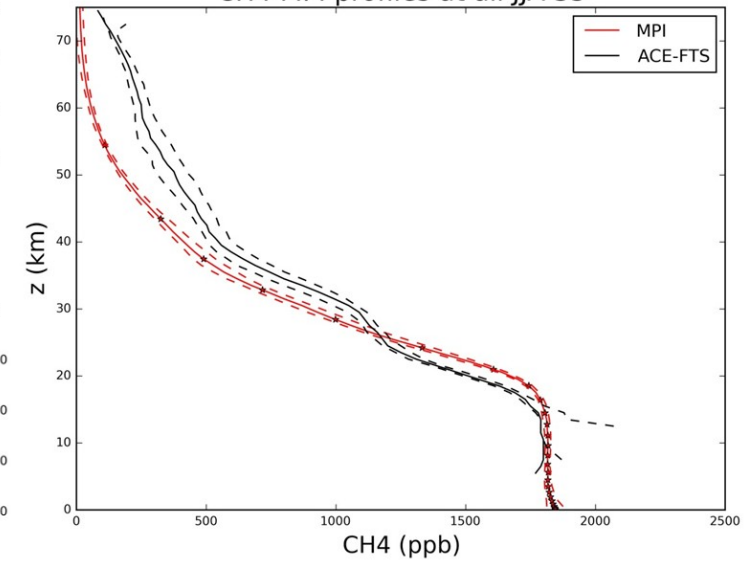
MPI CH4 medianbias DJF all



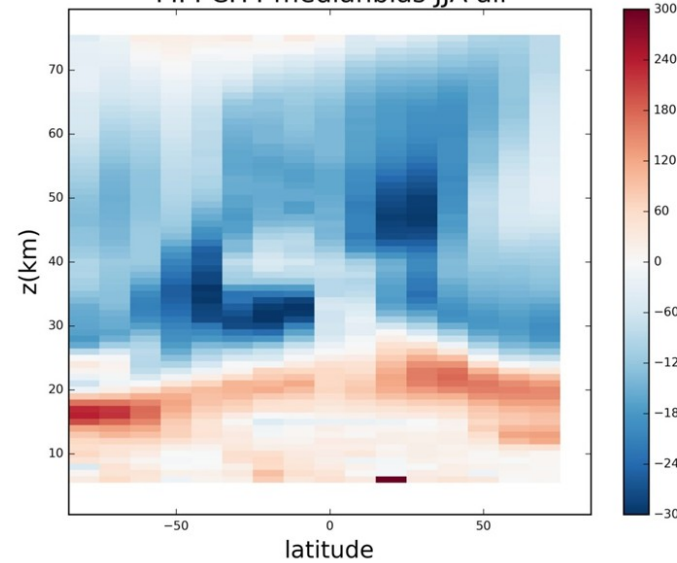
MPI CH4 medianbias MAM all



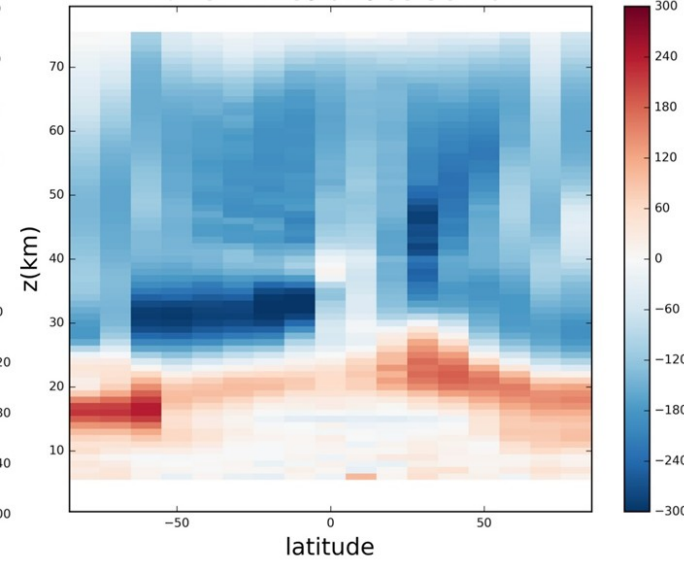
CH4 MPI profiles at all JJA 35



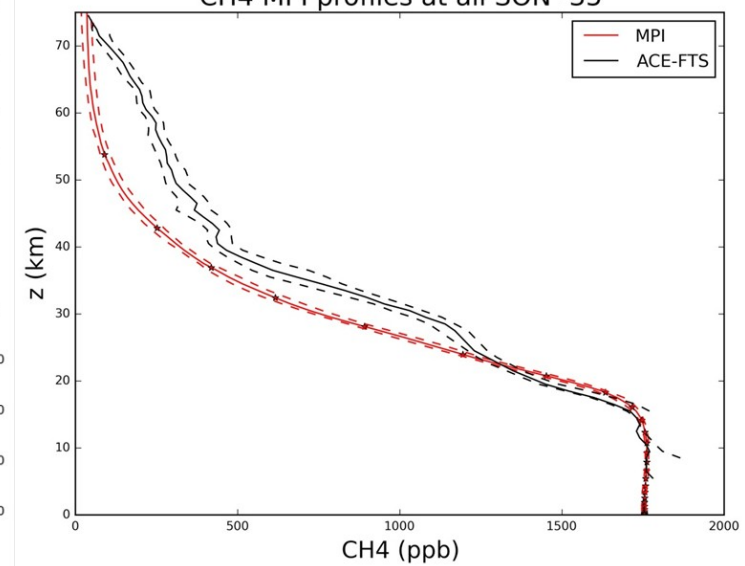
MPI CH4 medianbias JJA all



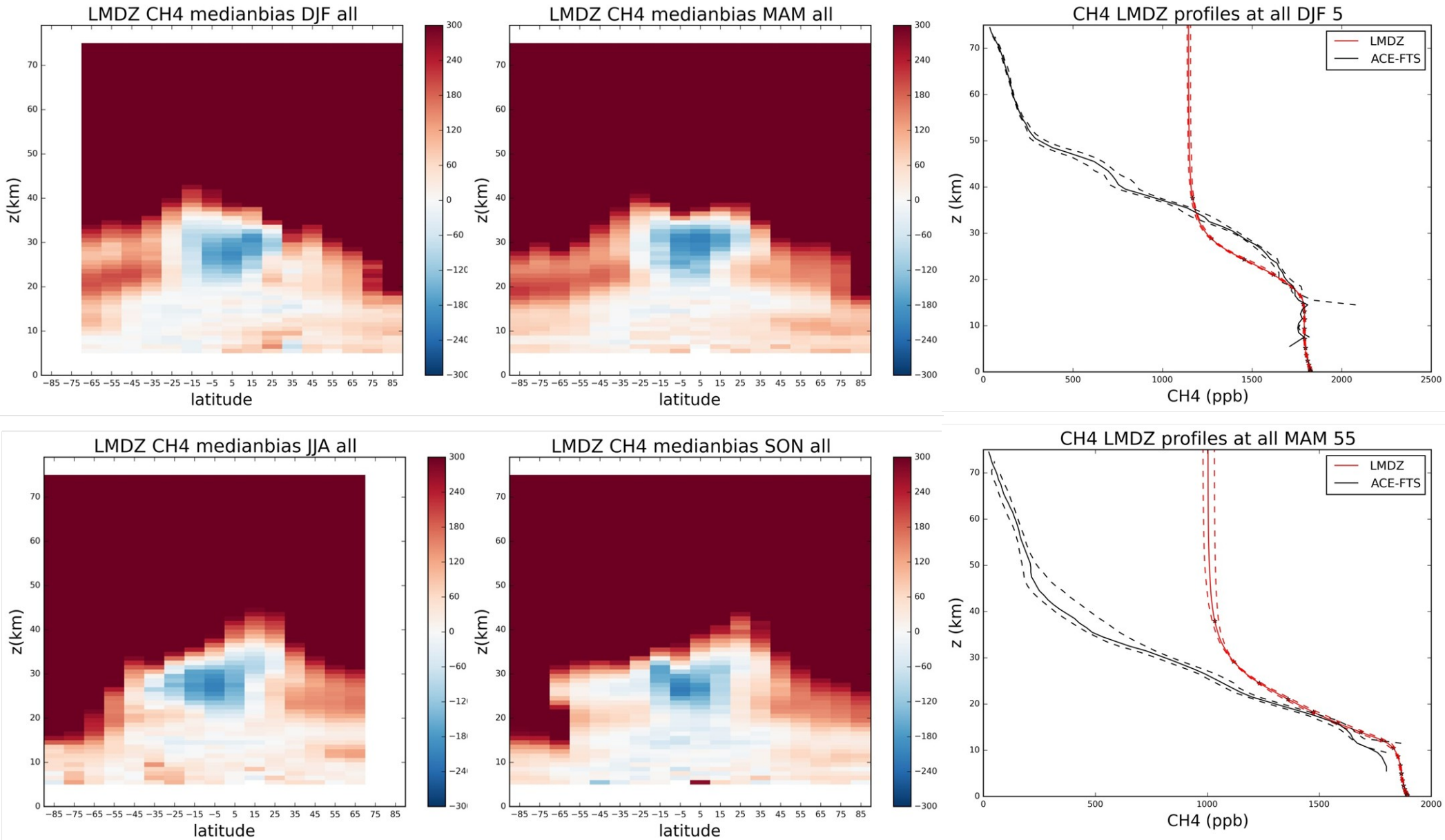
MPI CH4 medianbias SON all



CH4 MPI profiles at all SON -35

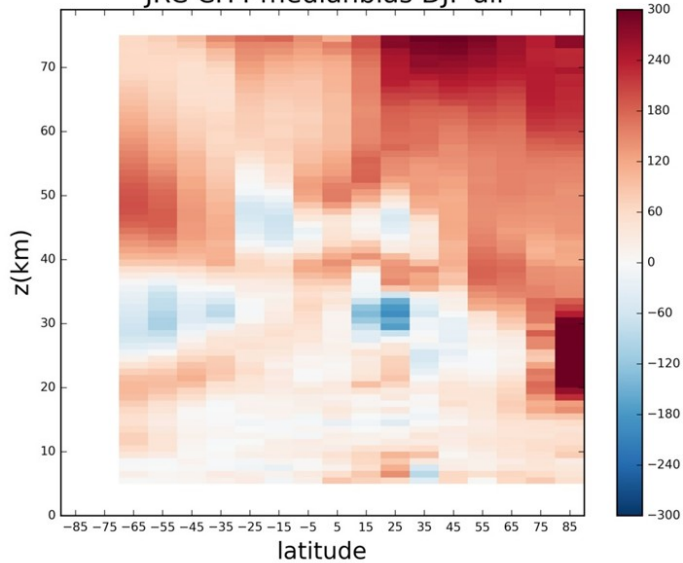


LMDZ(LSCE)

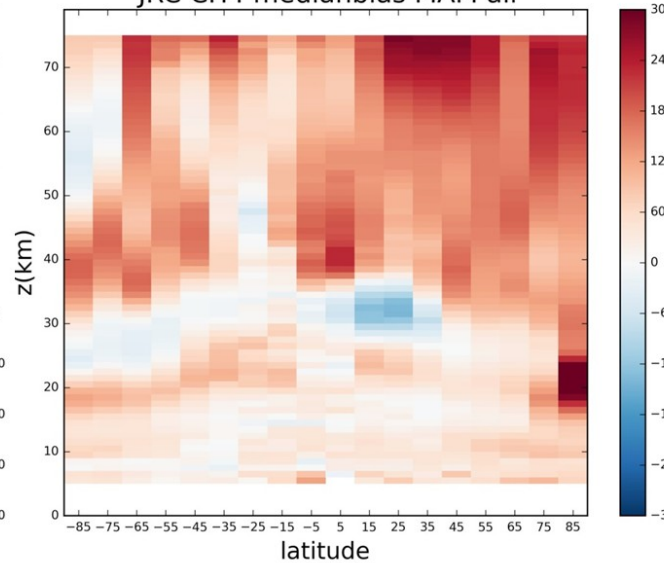


TM5 (JRC)

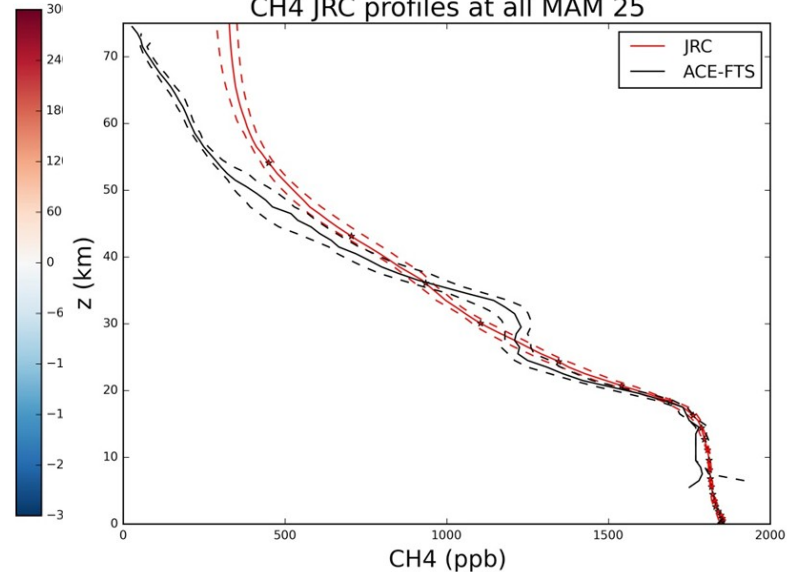
JRC CH4 medianbias DJF all



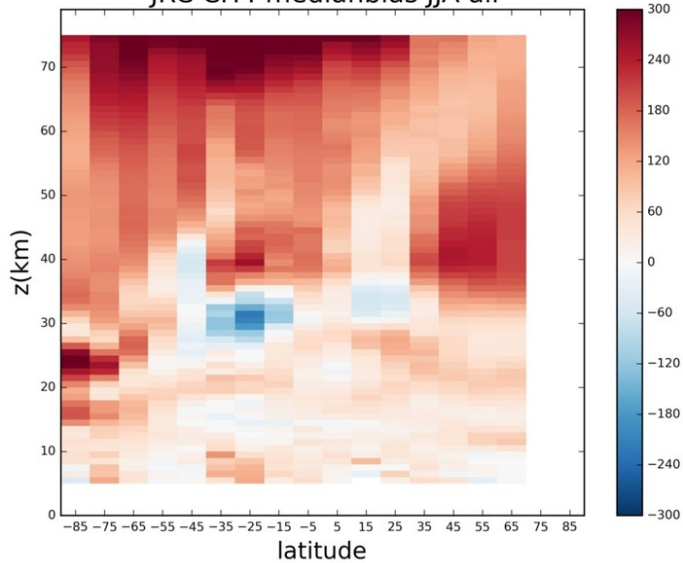
JRC CH4 medianbias MAM all



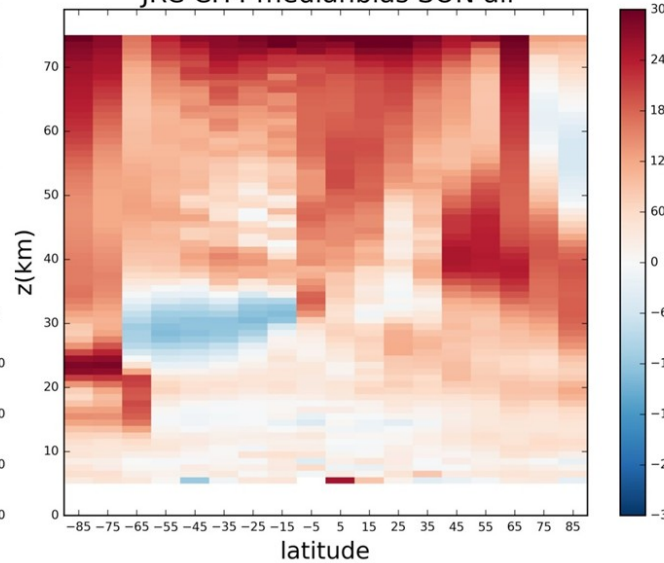
CH4 JRC profiles at all MAM 25



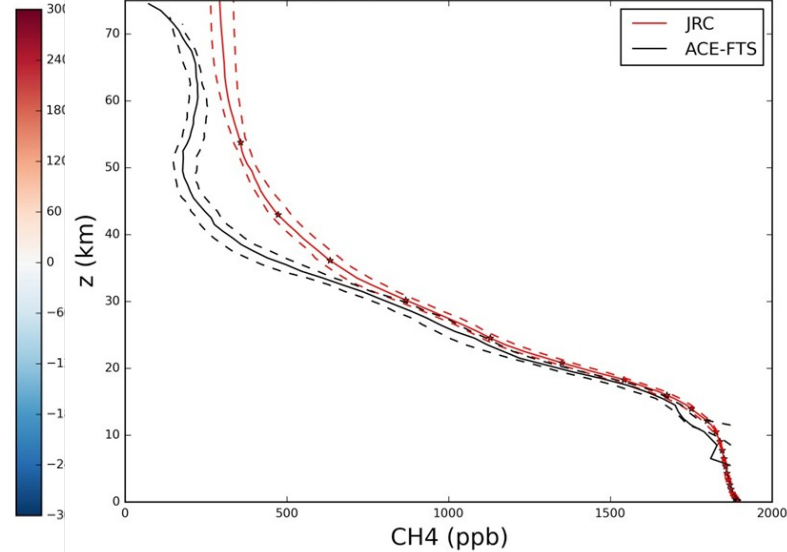
JRC CH4 medianbias JJA all



JRC CH4 medianbias SON all

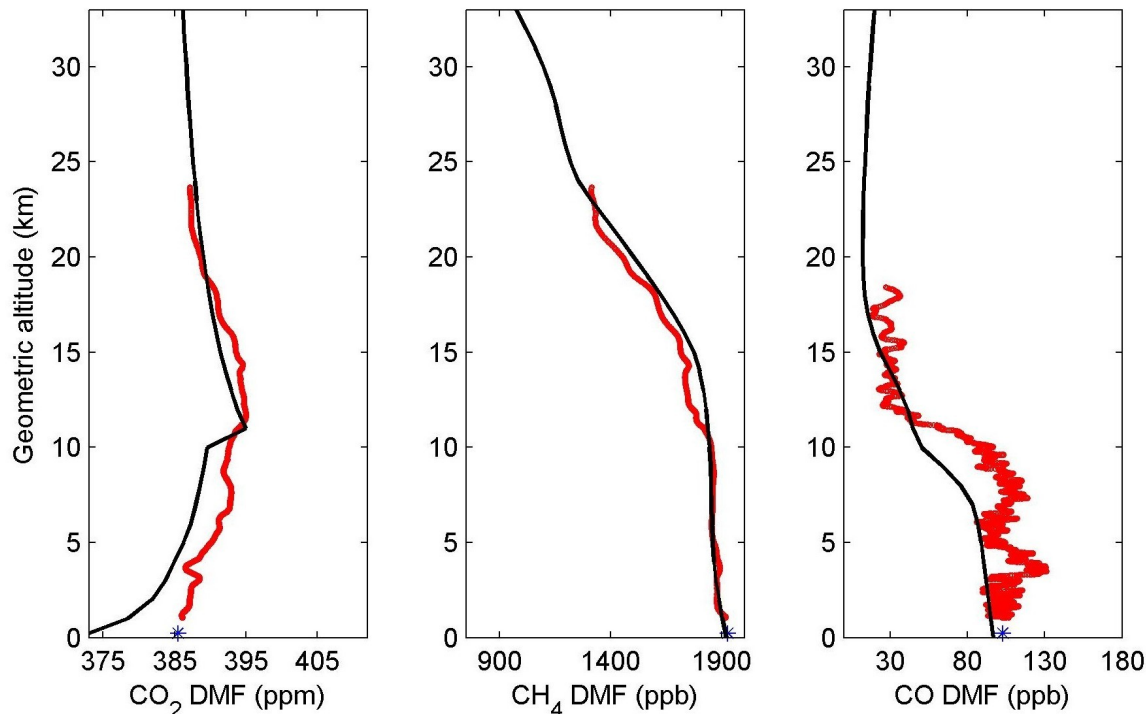


CH4 JRC profiles at all SON 55

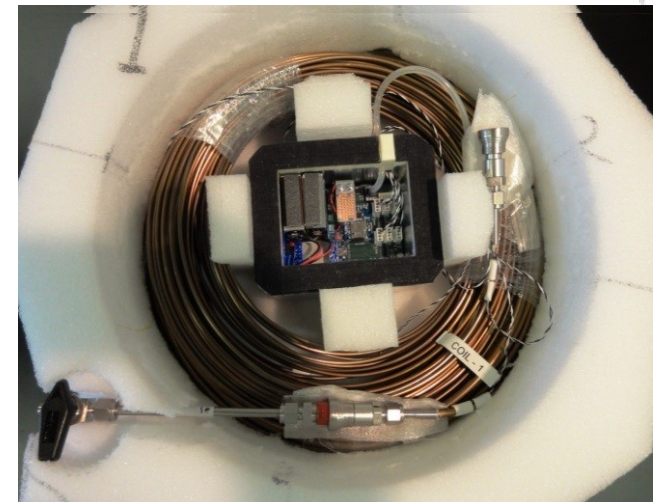




AirCore at Sodankylä



- At Sodankylä we have performed AirCore observations since September 2013. The measurements cover all seasons. An example of AirCore profiles of CO_2 , CH_4 and CO is shown above (from September 3, 2013). AirCore profiles are in red and the TCCON a priori profiles in black. Blue star corresponds to tower measurements at Sodankylä.
- The AirCore system at Sodankylä is built as a stainless steel tubing of about 100 m long, consisting of ~40 m of 1/4" and ~60 m of 1/8" tube. This configuration makes it possible to measure profiles with vertical resolution of 5 mb in the stratosphere and 15 mb in the troposphere.
- The system also involves a data acquisition unit to store pressure and temperature during an AirCore flight, a RS92 radiosonde and a positioning device.
- AirCore is lifted to the stratosphere using a meteorological balloon. After the landing we have analysed the sample using the Picarro G2401 gas analyser.



AirCore instrument with an open cover