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Abstract for Session 4. Emerging techniques

**Preferred presentation type:** \_\_ oral \_X\_ poster

An open-access and peer-reviewed special issue is planned for papers that emerge from GGMT-2017 and the 10th International Carbon Dioxide Conference (ICDC10). It is planned as an inter-journal special issue in five journals of the European Geosciences Union. To facilitate the organization of the special issue, **please indicate whether you foresee to submit a paper to one of the journals being part of the special issue**.

Atmospheric Chemistry and Physics (ACP) \_\_

Atmospheric Measurement Techniques (AMT) \_\_

Biogeosciences (BG) \_\_

Climate of the Past (CP) \_\_

Earth System Dynamics (ESD) \_\_

The special issue will be open for submission from October 1, 2017 to September 31, 2018.

**Measurement of greenhouse gases from novel ground-based remote sensing instruments; the FRM4GHG campaign at the Sodankylä TCCON site, N. Finland.**

Mahesh Kumar Sha1, Martine De Mazière1, Justus Notholt2, Huilin Chen3, David Griffith4\*, Nicholas Jones4, Frank Hase5, Thomas Blumenstock5 Rigel Kivi6, Damien Weidmann7

1Royal Belgian Institute for Space Aeronomy, Brussels, Belgium

2University of Bremen, Bremen, Germany

3University of Groningen, Groningen, Netherlands

4University of Wollongong, Wollongong, Australia

5Karlsruhe Institute of Technology, Karlsruhe, Germany

6Finnish Meteorological Institute, Sodankylä, Finland

7Rutherford Appleton Laboratory, United Kingdom  
\*Presenting author, [griffith@uow.edu.au](mailto:griffith@uow.edu.au)

Ground-based infrared remote sensing greenhouse gas (GHG) observations are extensively used for the validation of GHG measurements from satellites such as SCIAMACHY, GOSAT and OCO-2, as well as for model studies. The current standard network providing reference ground-based total column GHG data for satellite and model validation is the Total Carbon Column Observing Network (TCCON). TCCON is a network of about 23 stations distributed globally and measuring precise and accurate total column abundances of GHGs (scaled to WMO standards) using a Fourier-transform infrared solar absorption spectrometer (Bruker IFS 125HR). TCCON has some deficiencies in terms of the gaps in coverage, especially in remote locations and locations with high or low albedo. Setting up a TCCON station is expensive, requires special operational conditions with trained personnel for operation and maintenance, and it is not easy to move the station to a new location. This makes it very costly if further expansion of the network is desired.

Several new portable, low cost, easy to operate and maintain spectrometers have recently been developed that have the potential to ameliorate those deficiencies and complement the TCCON network. However, the performances of these instruments have not been fully characterized. The ongoing ESA funded campaign “Fiducial Reference Measurements for Ground-Based Infrared Greenhouse Gas Observations (FRM4GHG)” at the Sodankylä TCCON site in northern Finland aims at characterizing several of these low cost portable spectrometers performing TCCON type measurements simultaneously under different atmospheric conditions in comparison with a co-located TCCON instrument. Regular AirCore launches will also be performed from the site and will provide in-situ reference profiles of the target gases, which will be useful to verify the instruments’ calibrations and biases.

The campaign organized between March – October 2017 will provide a dataset of CO2, CH4 and CO measurements which can be used for validation purpose during the Sentinel 5 – precursor (S5P) commissioning phase, as well as by other satellites and model validation teams. Furthermore, it will provide a comparative characterization of the participating instruments with respect to the standard TCCON in terms of the precision, accuracy, stability, portability and ease of deployment, cost factor, etc. The outcome of the campaign will then be a guideline for the further development of new observation sites to complement the TCCON network and better support for the validation of existing and future satellite missions and models. This poster will focus on the objectives of the campaign and the first results of the measurements performed since the start of the campaign in March 2017.