FRM4GHG

Fiducial Reference Measurements for Greenhouse Gases

Updates of the deliverables for the measurement and retrieval strategy (D2.3 and D2.5)

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1 Document change record

Issue	Date	Item	Comment
V0.0	2017-08-30	–	Initial version

2 Access list

This document is a deliverable “D3.2: Updates of the deliverables for the measurement and retrieval strategy (D2.3 and D2.5)” created for the project FRM4GHG and will be submitted to ESA. The document will be a publicly accessible document and can be downloaded from the project webpage http://frm4ghg.aeronomie.be.

3 Purpose

This document presents the updates of the deliverables for the measurement and retrieval strategy (D2.3 and D2.5) as previously submitted to ESA. The updates are provided based on the individual change for each participating instruments.

4 Document structure

Section 5 Measurement and retrieval strategy updates – Presents the key updates performed for measurement and retrieval strategies for each participating instruments in the FRM4GHG campaign.

Section 6 & 7 Applicable and reference documents – Presents a list of all applicable and reference documents.

Section 8 Reference for software/tool mentioned – Presents a list of all software/tool mentioned in this document.

5 Measurement and retrieval strategy updates

This section highlights the key updates performed for each participating instruments in the FRM4GHG campaign.

Bruker IFS 125HR (TCCON):

No change of measurement and retrieval strategy.

Bruker Vertex70:

A site visit in the beginning of July to the Sodankylä FRM4GHG campaign site was done by Christof Petri from University of Bremen. An additional aperture of 2 cm was introduced in the parallel light beam of the Vertex70 spectrometer. This instrument modification made the ILS much better (see Figure **1**).

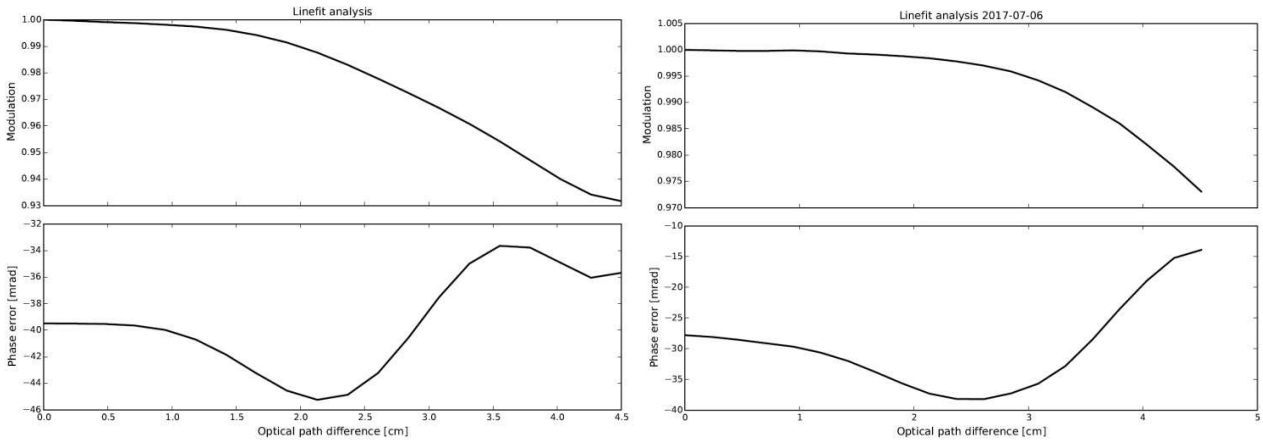

Figure 1 Modulation efficiency (upper panels) and phase error (lower panels) calculated from ILS measurements performed on 22/04/2017 (left) after installation of the spectrometer in Sodankylä and on 06/07/2017 (right) after instrument modification by adding the 2cm aperture in the parallel beam of the Vertex70 spectrometer.

As a standard one forward and one backward interferogram corresponding to about 17.3 seconds was recorded as one file since the beginning of the campaign. During the WebEx meeting on 08/08/2017 it was proposed to co-add three forward and three backward interferograms corresponding to about 52 sec to be recorded as one file. Since our target species are not changing quickly, a co-addition of interferograms on about one minute basis was selected. This also reduces the processing time for one day of measurements by a factor of three, as well as it improves the signal-to-noise levels for each interferogram.

Bruker IRCube:

The fibre cable of the solar tracker was broken one week (24th March) after the installation at the campaign site. A new fibre cable was installed on the 24th April. Measurements recommenced on 25th April.

David Griffith visited the site from 14th – 18th May. The external optics were realigned as the solar image was not centered on the input aperture. ILS lamp spectra were taken after this alignment. On the 17th May the laser was replaced and another set of lamp spectra were taken.

Since the changes and alignment of 17th May, the instrument has remained operational with no change in instrument status. We are currently investigating the apparent drift of the solar image on the input aperture.

Homemade LHR (Laser Heterodyne Radiometer):

The retrieval results of the LHR as compared to the TCCON show high bias and strong diurnal variability. This has to be investigated further in detail by the respective operating and retrieval team from Rutherford Appleton Laboratory to find the source of the bias. The update of the retrieval strategy for the LHR will then be included in the final project report.

Bruker EM27/SUN:

No change of measurement and retrieval strategy.

AirCore system:

No change of measurement and retrieval strategy.

6 Applicable documents

Statement of Work: Fiducial Reference Measurements for Ground-Based FTIR Greenhouse Gas Observations (FRM4GHG)
Prepared by: T. Fehr/B. Bojkov (EOP-GMQ), Reference: ESA-EOPG-MOM-SOW-0007

7 Reference documents

FRM4GHG deliverable D2.3: Description of measurement strategy to ensure comparable observations, made available via the project website
http://frm4ghg.aeronomie.be/index.php/outreach/deliverables

FRM4GHG deliverable D2.5: Retrieval strategy & Intercomparison strategy and protocol, made available via the project website
http://frm4ghg.aeronomie.be/index.php/outreach/deliverables

8 Reference for software/tool mentioned

N/A