BIRA-IASB sites report

TCCON site @ St. Denis, Ile de La Réunion
NDACC-IRWG site @ Maïdo, Ile de La Réunion
NDACC-IRWG site @ Porto Velho, Brazil

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IRWG / TCCON Meeting, Wanaka, 20 – 24 May 24, 2019

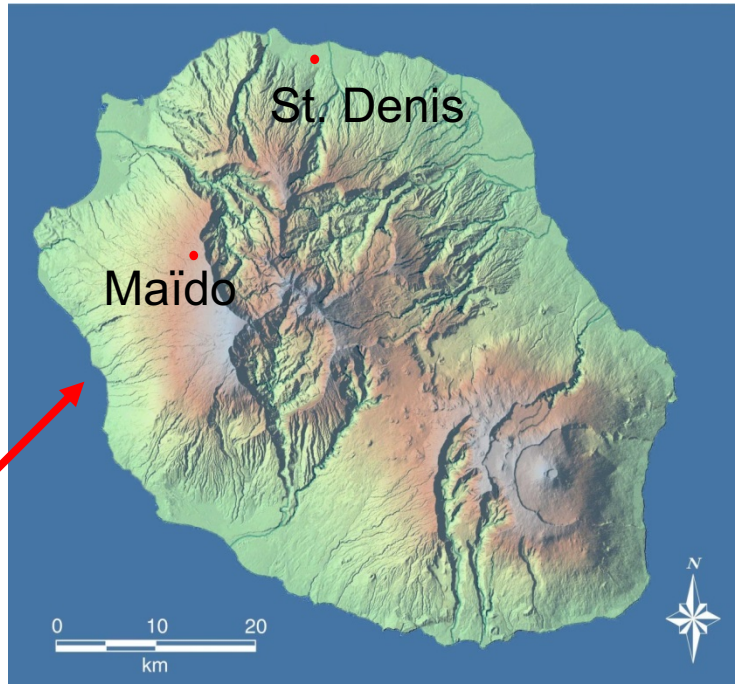
Ile de La Réunion (21° S, 55° E)

An unique atmospheric observatory situated in the Indian Ocean, about 700 km east of Madagascar and 170 km southwest of Mauritius providing the background state. In addition, we see the influence of biomass burning in Madagascar, South Africa and South America

One of the very few atmospheric observation stations providing both in-situ and remote sensing greenhouse gas (GHG) data for atmospheric components in the southern hemisphere

Two dedicated sites – St. Denis (85 m.a.s.l) and Maïdo (2157 m.a.s.l)

Ile de la Réunion



Google Earth

Instrumentation at St. Denis, Ile de La Réunion

Location: University of St. Denis (-20.901° N, 55.485° E, 85 m.a.s.l)

Instrument characteristics: Bruker IFS 125HR, CaF_2 Beamsplitter and optics, home-built sun-tracker and electronics

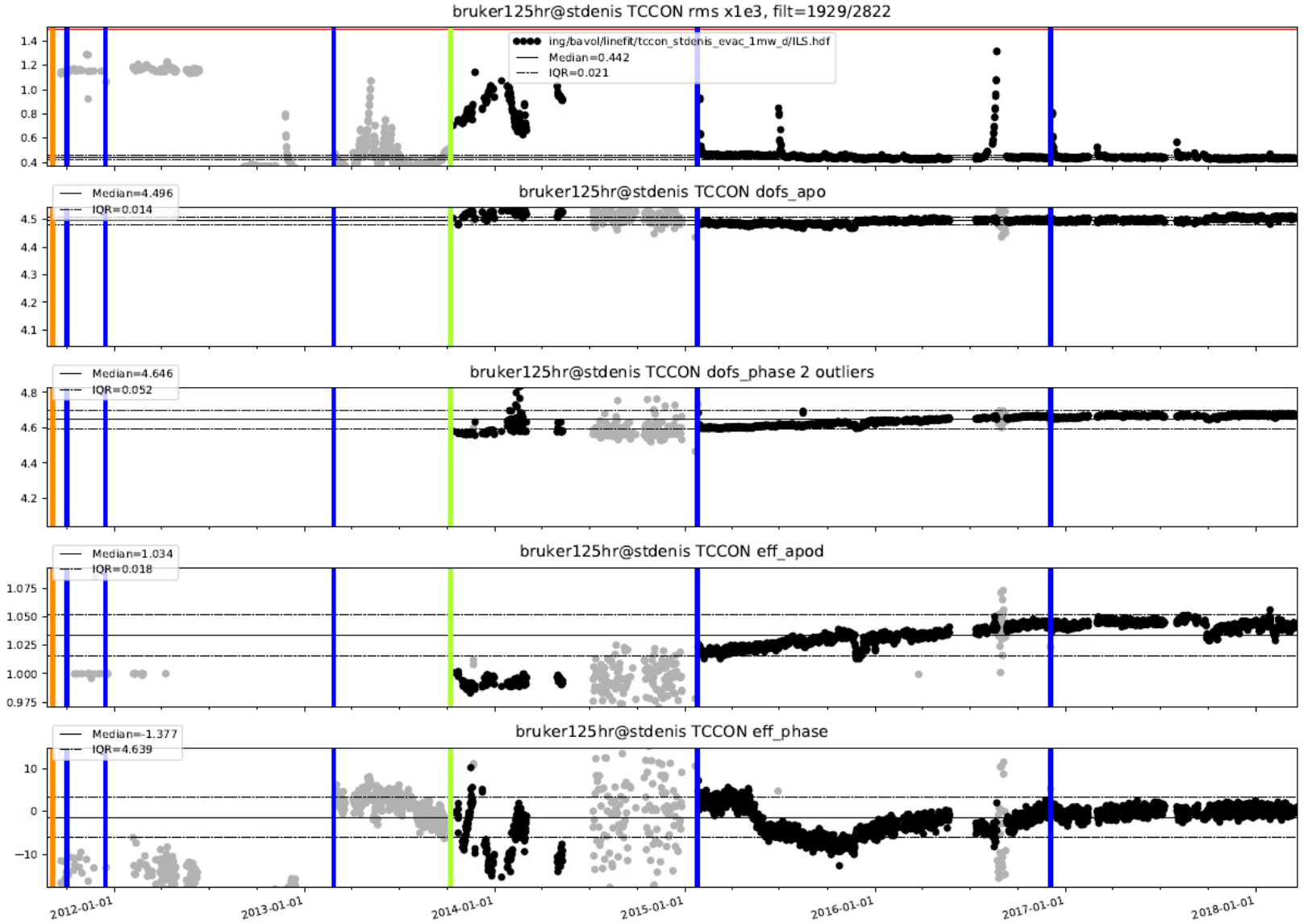
Networks: TCCON (InGaAs and Si) and NDACC (InSb) (since September 2011)

Sun tracker for the Bruker IFS 125HR

FTIR spectrometer – Bruker IFS 125HR

Instrumental line shape parameters at St. Denis

Diagnostic parameters for checking the instrument performance



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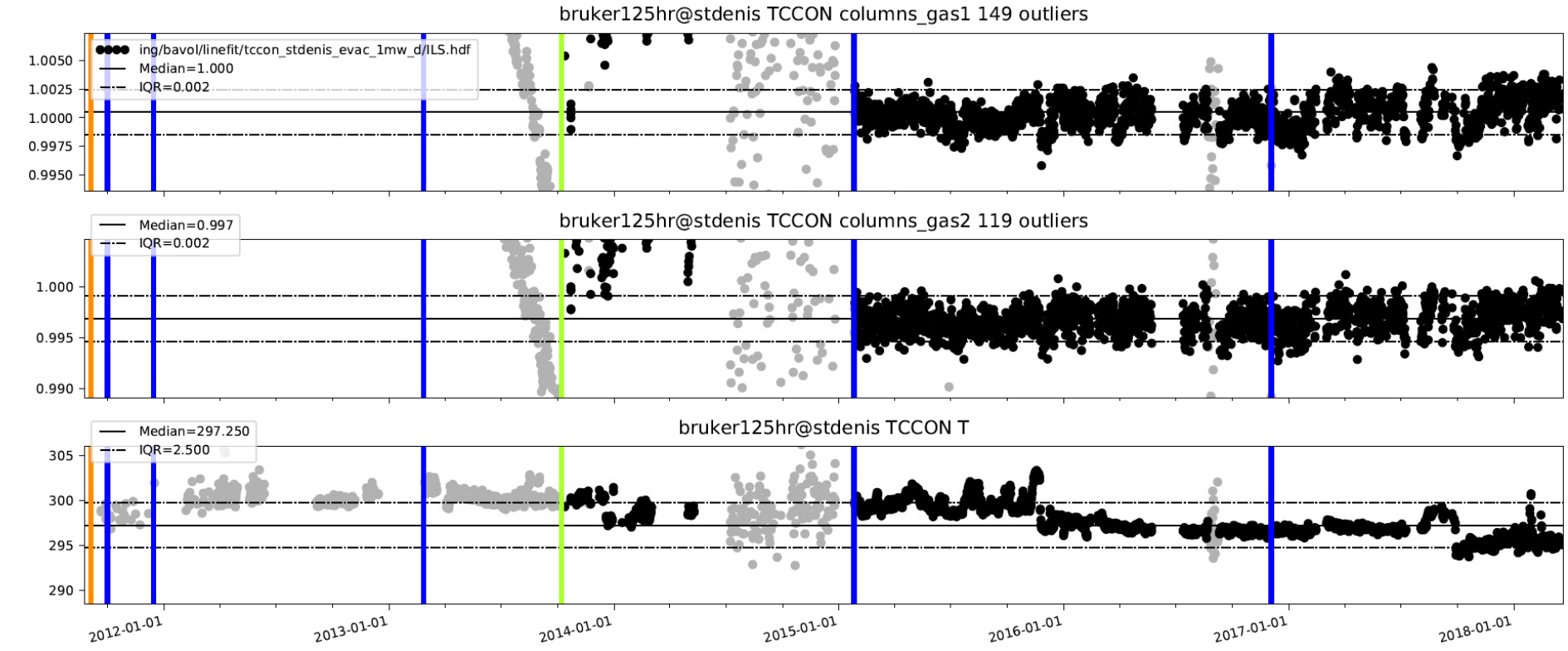

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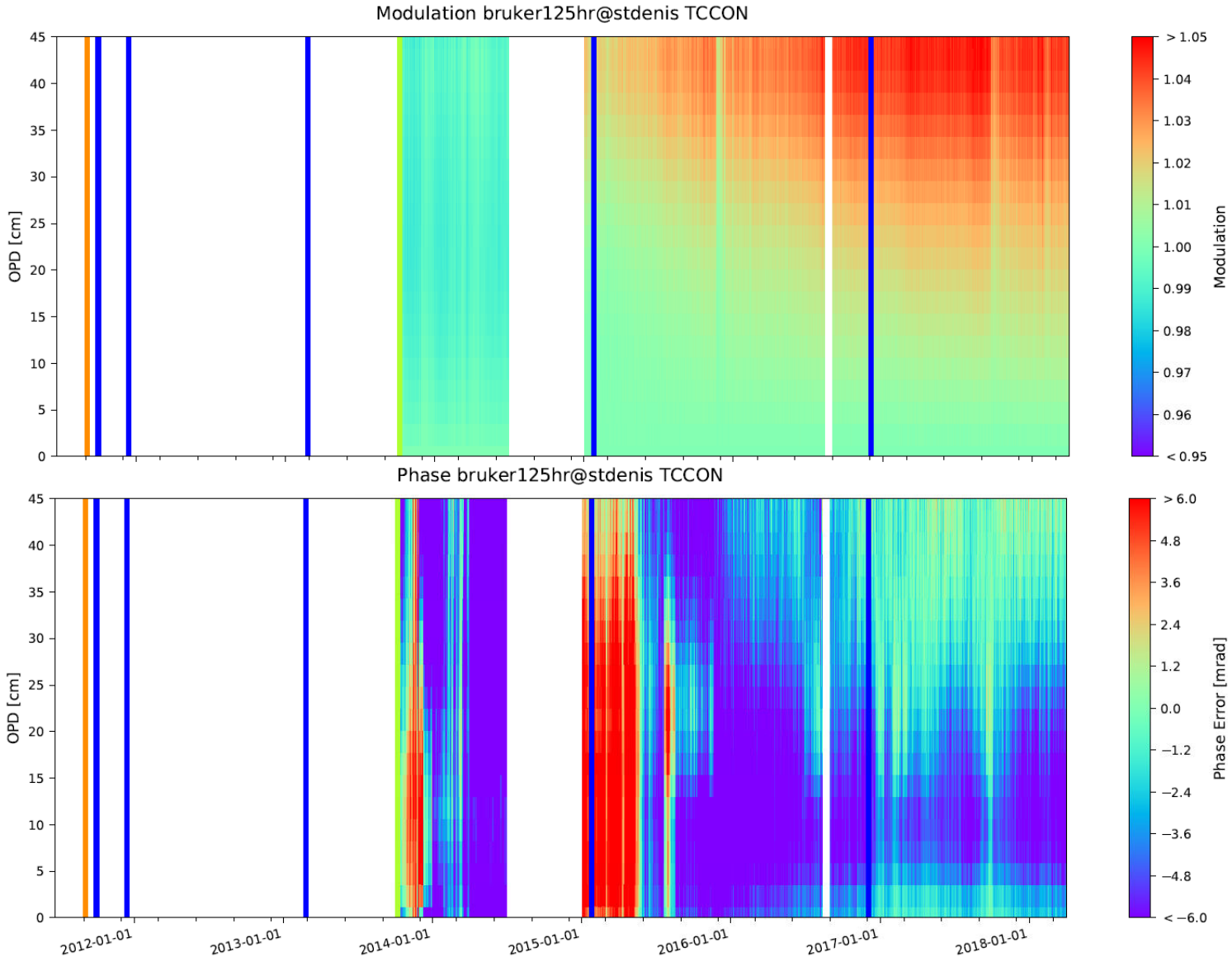


Instrumentation at Maïdo

Location: Maïdo observatory (-21.079° N, 55.384° E, 2157.7 m.a.s.l)

Instrument characteristics: Bruker IFS 125HR, KBr Beamsplitter and optics, home-built sun-tracker and electronics

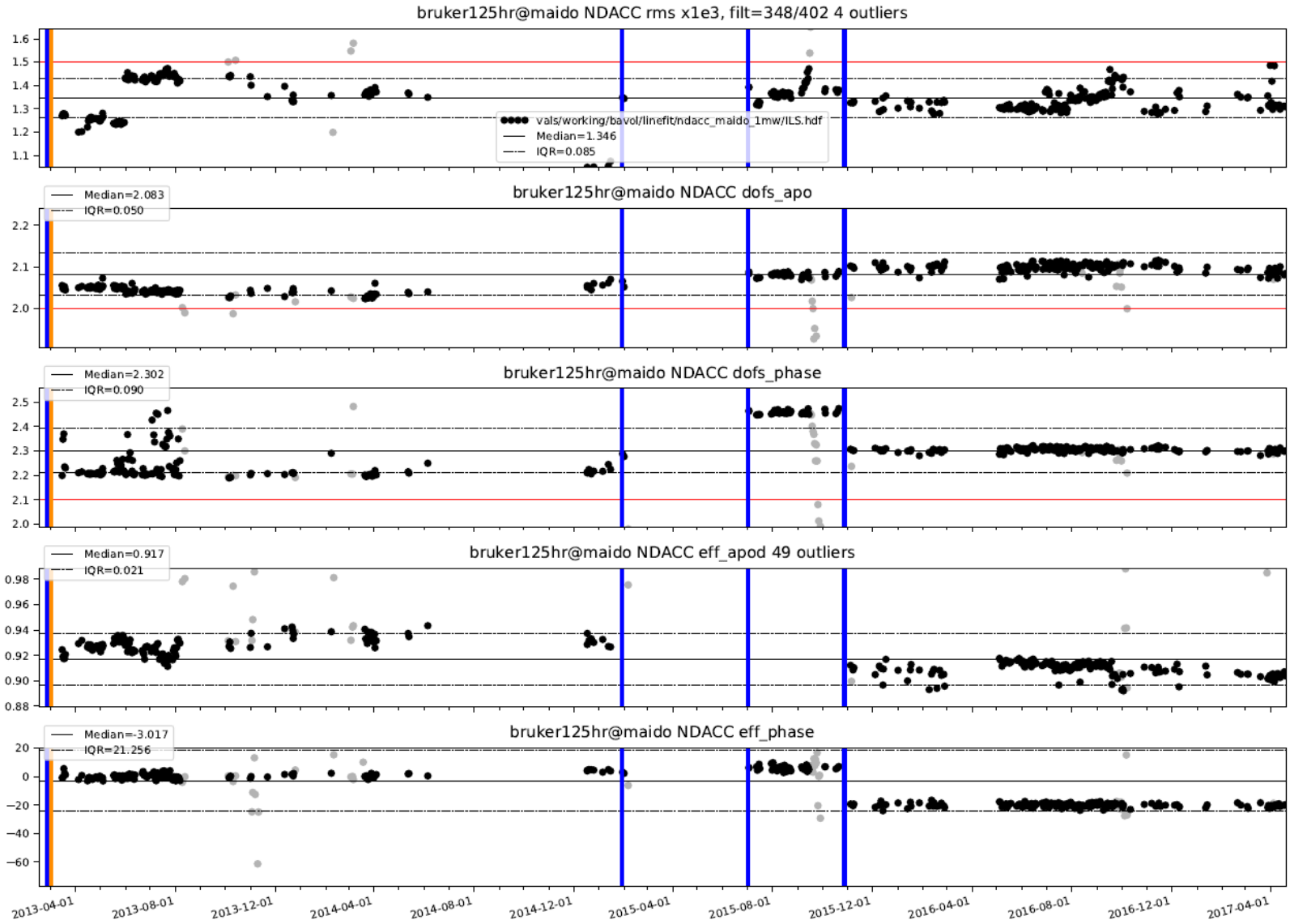
Networks: NDACC (InSb and HgCdTe) and TCCON (InGaAs) (since March 2013)

Maïdo observatory

FTIR spectrometer – Bruker IFS 125HR

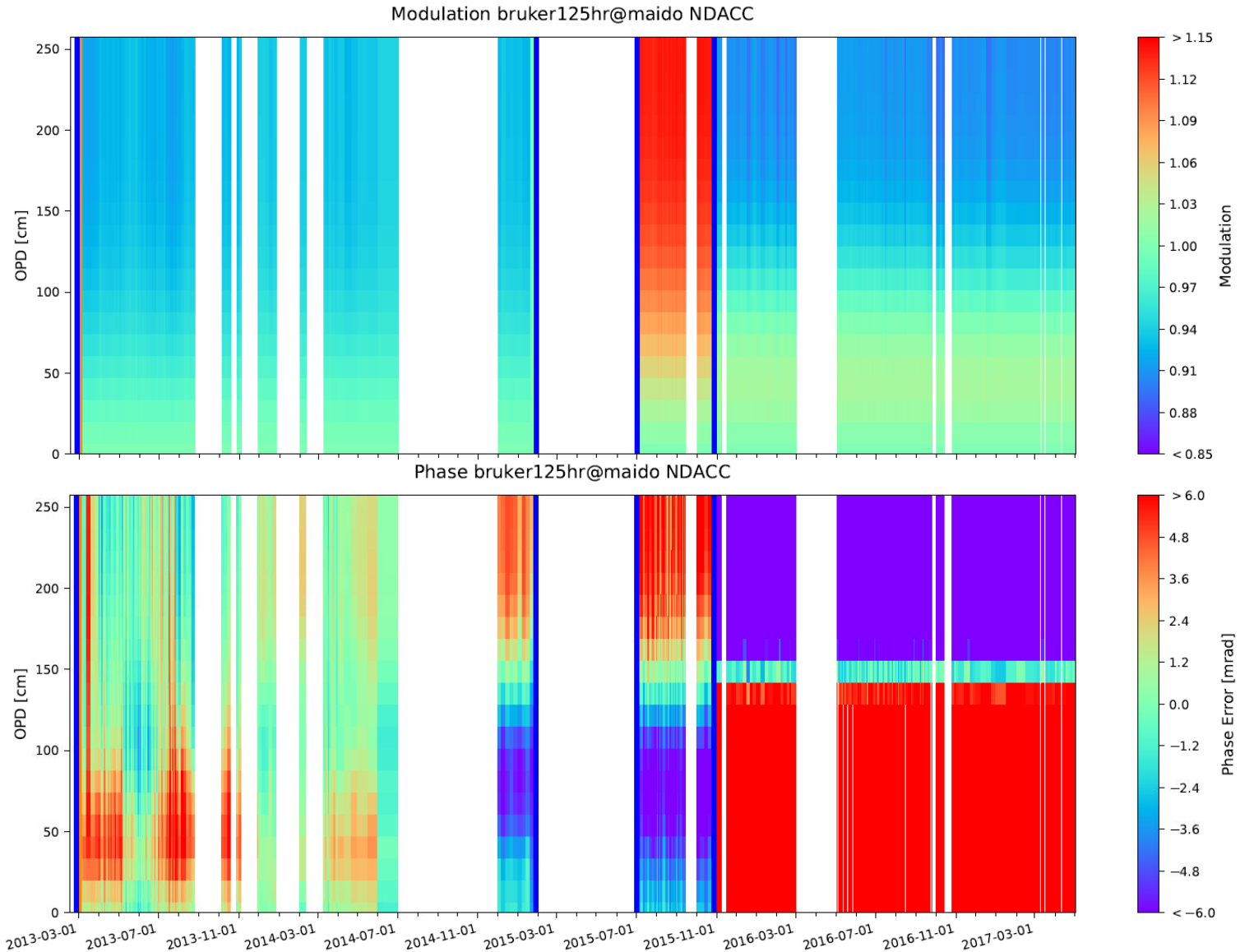
Instrumental line shape parameters at Maido

Diagnostic parameters for checking the instrument performance

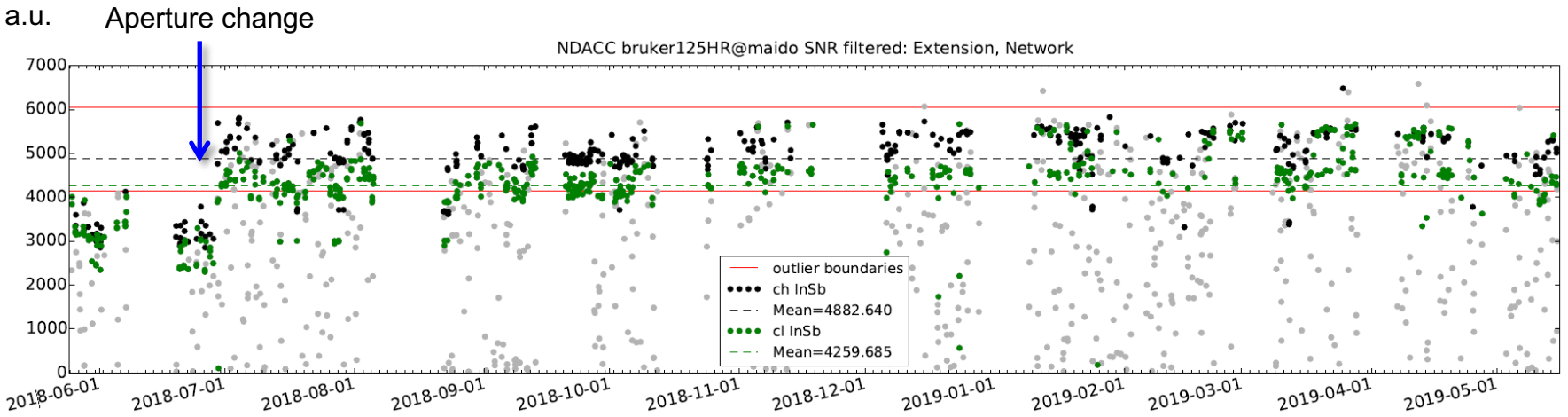


Instrumental line shape parameters at Maido

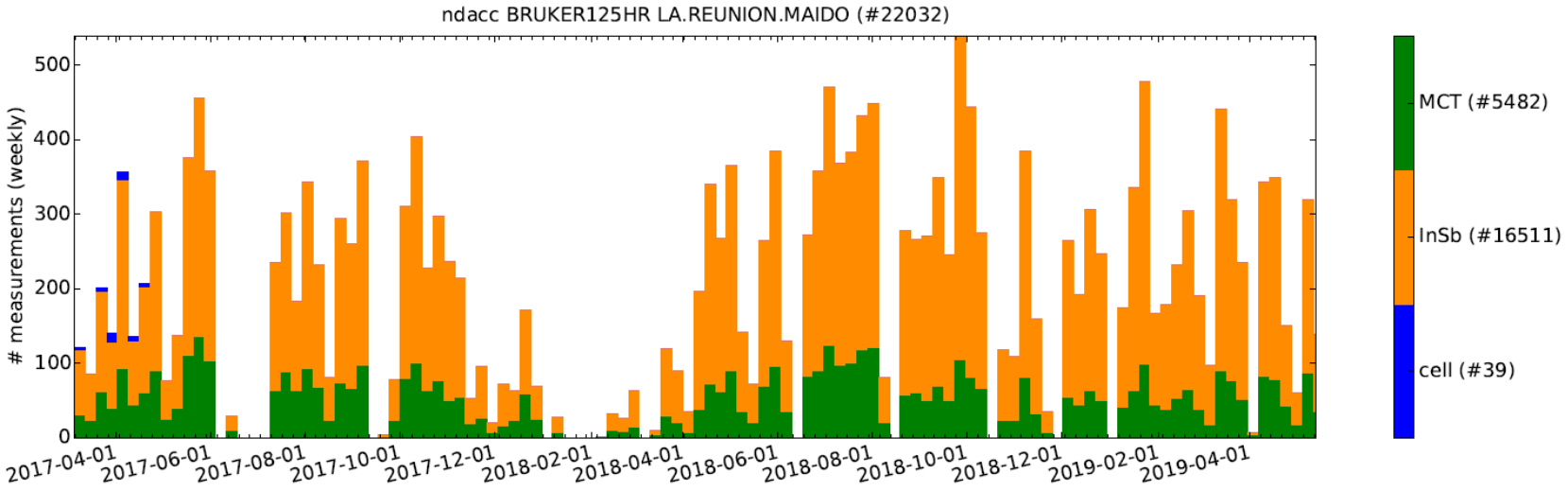
Diagnostic parameters for checking the instrument performance



SNR plot and measurement statistics at Maïdo



No instrumental problem during the last year, few gaps in the timeseries due to liquid nitrogen delivery delay, storm warning and power failure.



Submission of standard NDACC species as usual.

Our new site in Brazil – @ Porto Volho

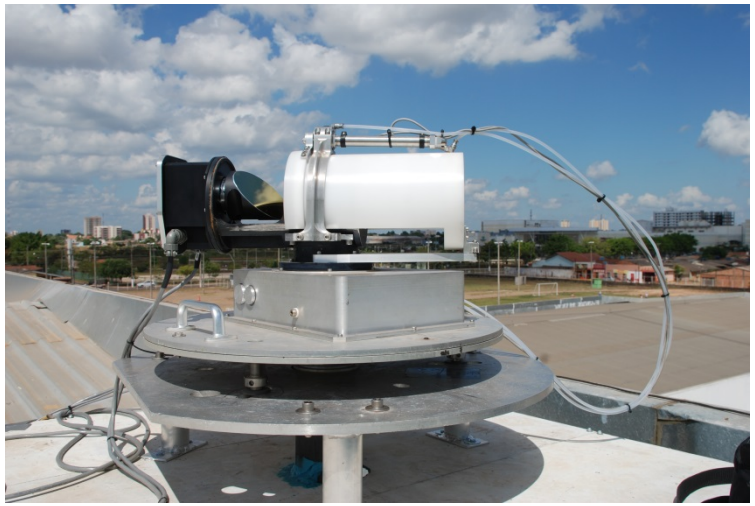
- Site location: Porto Velho – in the amazon forest in Brazil
- Laboratory constructed for hosting our Bruker spectrometer
- Instrument installed and measurements started on 15 July 2016
- We plan to start TCCON like measurements of GHGs in the NIR at Porto Velho.

Instrumentation at Porto Velho

Location: Porto Velho (-8.774° N, 296.128° E, 87.0 m.a.s.l)

Instrument characteristics: Bruker IFS 125M (upgraded St. Denis Bruker IFS 120M spectrometer)
KBr/CaF2 Beamsplitter and optics, home-built sun-tracker and electronics, fully automatic operation

Networks: NDACC (currently – InSb detector only, very soon we will install – HgCdTe detector)



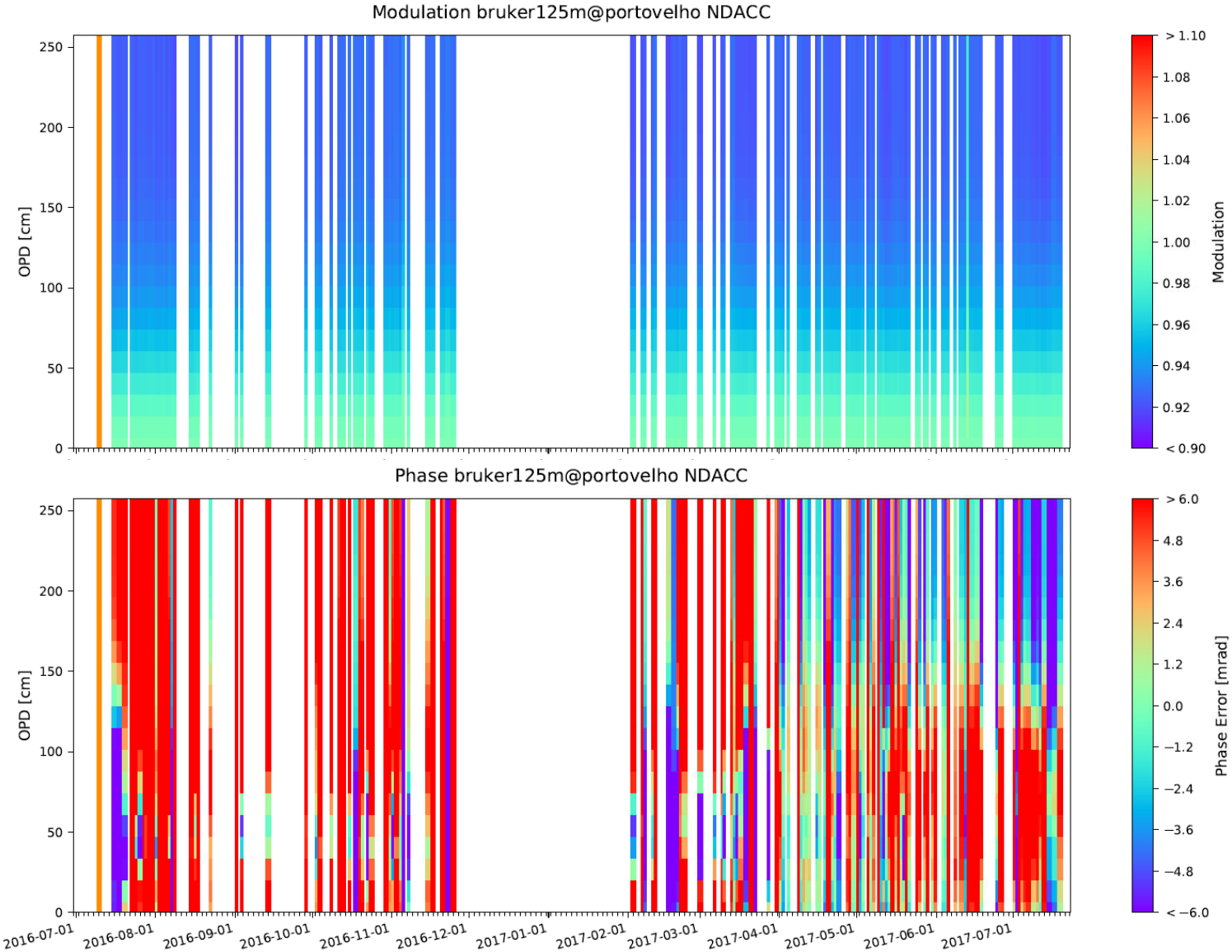
Homemade solar tracker

Meteostation

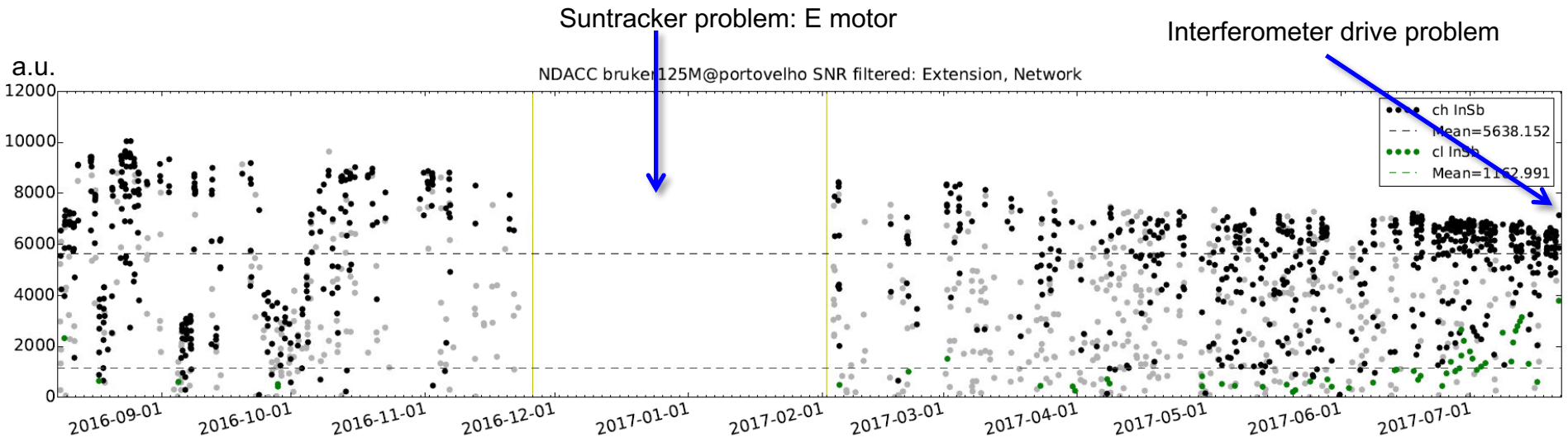
FTIR spectrometer – Bruker IFS 125M

Instrumental line shape parameters at Porto Velho

Diagnostic parameters for checking the instrument performance



Measurement status at Porto Velho



Measurements started with InSb detector on 15/07/2016

Interferometer drive problem: since 20/07/2017

- Site visit in Autumn 2018 however the material did not get custom clearance
- Ordered new material which arrived on site and next visit in mid-June

Data not yet submitted to NDACC

For retrieval results contact:
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Minqiang Zhou minqiang.zhou@aeronomie.be

Publication list since last meeting

•**Zhou, M., Langerock, B., Sha, M. K., Kumps, N., Hermans, C.**, Petri, C., Warneke, T., Chen, H., Metzger, J.-M., Kivi, R., Heikkinen, P., Ramonet, M., and **De Mazière, M.**: Retrieval of atmospheric CH4 vertical information from TCCON FTIR spectra, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2019-94, in review, 2019.

•Agustí-Panareda, A., Diamantakis, M., Massart, S., Chevallier, F., Muñoz-Sabater, J., Barré, J., Curcoll, R., Engelen, R., **Langerock, B.**, Law, R., Loh, Z., Morguí, J. A., Parrington, M., Peuch, V.-H., Ramonet, M., Roehl, C., Vermeulen, A. T., Warneke, T., and Wunch, D.: Modelling CO2 weather – why horizontal resolution matters, Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-177, in review, 2019

•**Zhou, M., Langerock, B.**, Wells, K. C., Millet, D. B., **Vigouroux, C., Sha, M. K., Hermans, C.**, Metzger, J.-M., Kivi, R., Heikkinen, P., Smale, D., Pollard, D. F., Jones, N., Deutscher, N. M., Blumenstock, T., Schneider, M., Palm, M., Notholt, J., Hannigan, J. W., and **De Mazière, M.**: An intercomparison of total column-averaged nitrous oxide between ground-based FTIR TCCON and NDACC measurements at seven sites and comparisons with the GEOS-Chem model, Atmos. Meas. Tech., 12, 1393-1408, https://doi.org/10.5194/amt-12-1393-2019, 2019.

•Borsdorff, T., Aan de Brugh, J., Hu, H., Hasekamp, O., Sussmann, R., Rettinger, M., Hase, F., Gross, J., Schneider, M., Garcia, O., Stremme, W., Grutter, M., Feist, D.G., Arnold, S.G., **De Mazière, M., Sha, M.K.**, Pollard, D.F., Kiel, M., Roehl, C., Wennberg, P.O., Toon, G.C., and Landgraf, J., Mapping carbon monoxide pollution from space down to city scales with daily global coverage, Atmospheric Measurement Techniques, 11(10), 5507-5518, doi:10.5194/amt-11-5507-2018, 2018.

•**Vigouroux C.:** co-author of Chapters 2 **(**Observations and model data) and 5 **(**Time series and trend results) of the SPARC/IO3C/GAW Report on Long-term Ozone Trends and Uncertainties in the Stratosphere. I. Petropavlovskikh, S. Godin-Beekmann, D. Hubert, R. Damadeo, B. Hassler, V. Sofieva (Eds.), SPARC Report No. 9, GAW Report No. 241, WCRP-17/2018, doi: 10.17874/f899e57a20b, available at www.sparc-climate.org/publications/sparc-reports.

Publication list since last meeting

•Boynard, A., Hurtmans, D., Garane, K., Goutail, F., Hadji-Lazaro, J., Koukouli, M. E., Wespes, C., **Vigouroux, C.**, Keppens, A., Pommereau, J.-P., Pazmino, A., Balis, D., Loyola, D., Valks, P., Sussmann, R., Smale, D., Coheur, P.-F., and Clerbaux, C**.:** Validation of the IASI FORLI/EUMETSAT ozone products using satellite (GOME-2), ground-based (Brewer–Dobson, SAOZ, FTIR) and ozonesonde measurements, Atmos. Meas. Tech., 11, 5125-5152, https://doi.org/10.5194/amt-11-5125-2018, 2018.

•**Vigouroux, C.** et al.: NDACC harmonized formaldehyde time-series from 21 FTIR stations covering a wide range of column abundances, Atmos. Meas. Tech., 11, 5049-5073, https://doi.org/10.5194/amt-11-5049-2018, 2018.

•Chabrillat, S., **Vigouroux, C.,** Christophe, Y., Engel, A., Errera, Q., Minganti, D., Monge-Sanz, B. M., Segers, A., and Mahieu, E.: Comparison of mean age of air in five reanalyses using the BASCOE transport model, Atmos. Chem. Phys., 18, 14715-14735, https://doi.org/10.5194/acp-18-14715-2018, 2018.

•Sun, Y., Liu, C., Palm, M., **Vigouroux, C.,** Hu, Q., Tian, Y., Wang, W., Su, W., Zhang, W., Shan, C., Xu, X., Liu, J., Notholt, J., and **De Mazière, M.:** Ozone seasonal evolution and photochemical production regime in polluted troposphere in eastern China derived from high resolution FTS observations, Atmos. Chem. Phys., 18, 14569-14583, https://doi.org/10.5194/acp-18-14569-2018, 2018.

•**Zhou, M., Langerock, B., Vigouroux, C., Sha, M. K.**, Ramonet, M., Delmotte, M., Mahieu, E., Bader, W., **Hermans, C., Kumps, N.**, Metzger, J.-M., Duflot, V., Wang, Z., Palm, M., and **De Mazière, M.:** Atmospheric CO and CH4 time series and seasonal variations on Reunion Island from ground-based in-situ and FTIR (NDACC and TCCON) measurements, Atmos. Chem. Phys., 18, 14569-14583, https://doi.org/10.5194/acp-18-14569-2018, 2018.

•Staehelin, J., Petropavlovskikh, I., **De Mazière, M.**, and Godin-Beekmann, S., The role and performance of ground-based networks in tracking the evolution of the ozone layer, Comptes Rendus Geoscience, 350(7), 354-367, doi:10.1016/j.crte.2018.08.007, 2018.

Funding situation / projects

NDACC funding:

Porto Velho

- IKARE (limited) funding until end of September 2019

La Réunion:

- ACTRIS money for buying LIq N2 generator and instrument upgrading in 2022
- No support for measurements apart from some own institute funding
- Some projects support for rapid data delivery and delivery of data (O3, CO, CH4) to Copernicus
- Support for use of NDACC HCHO data for S-5P validation (until end of 2019)
- Belgium committed to supporting La Reunion in ACTRIS *in future*, to some extent....

TCCON funding:

La Réunion

- Support for TCCON via commitment of Belgium to ICOS until end of 2019;
  beyond 2019: procedure for continuation of funding will be revised, and funding will probably become less structural.
- RINGO project support for preparing embedding of TCCON-Europe in ICOS and for expanding TCCON capabilities with vertical profiling
- Support for use of TCCON data for S-5P validation (until end of 2019)
- Some own institute funding

Outlook

- Repair of Porto Velho NDACC and La Reunion TCCON instruments by summer 2019 (hopefully)
- Start of implementation of ACTRIS -> for supporting NDACC-Europe (for a few target gases)
- Continuation of use/delivery of NDACC data for Copernicus Atmosphere Monitoring and Climate Change Services in 2019 - 2020 (with Copernicus support).
- Continuation of use of NDACC HCHO and TCCON data for validation of S5P (with ESA support - to be confirmed)

Thank you for your attention