Site Report Altzomoni Mexico

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Outline

- UNAM's Group
- Altzomoni Site
- Instrumentation
- Measurements statistics
- Publications
- Some highlights
- Funding

UNAM Group: Spectroscopy and Remote Sensing

Michel Grutter (Group coordinator)
Wolfgang Stremme, Claudia Rivera & Alejandro Bezanilla (Academic staff)
Noemie Taquet (Postdoc)
Ruben Pavia, Alan Garcia Zuber (PhD-students)
Beatriz Herrera (Master student, finished)

Other Group members:
Benedetto Schiavo (UV-SO2-Camera, Postdoc)
Zuleica Ojeda (MAX-DOAS, PhD-student)







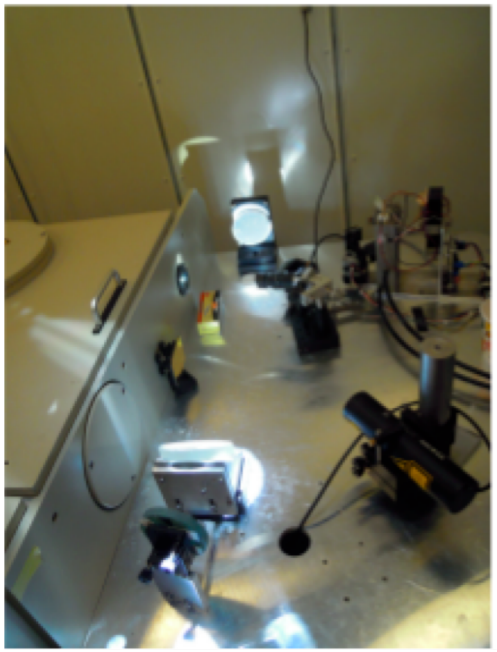
Altzomoni Site

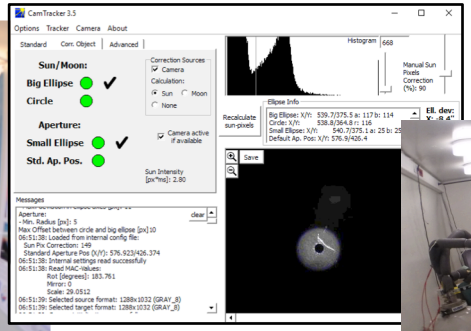
High Altitude Atmospheric Observatory "Altzomoni"

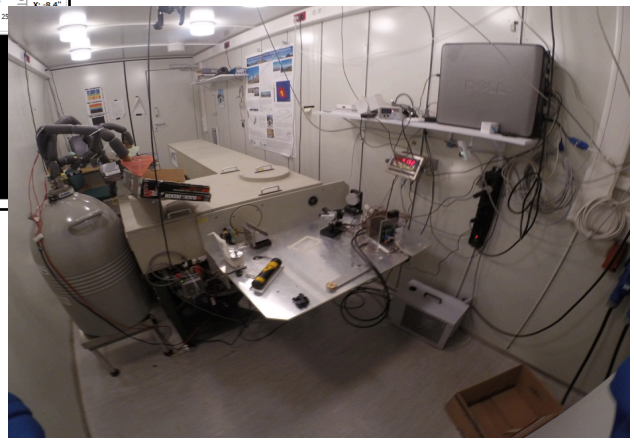
Location: Izta-Popo National Park
Altitude: 3,985 m.a.s.l.
Coordinates: 19.1187 N, 98.6552 W

Instrumentation

- IFS 120HR from Bruker (model year 1988, S/N A58-HI0420)
- Donation from DLR to KIT in 2010 (M. Birk, DLR)
- Full electronics upgrade to IFS 120/5HR in 2011
- Max. OPD of 257 cm → spectral resolution of 0.0035 cm^{-1}
- Beam splitters: KBr and CaF2 (10 and 8 mrad wedges, resp.)
- Detectors: MCT, InSb (N_2-cooled) and InGaAs
- Sealed compartment (not evacueted), ZnSe window
- Solar tracker: KIT “Camtracker” design







Measurement Loop

Measured Spectra:

0.1 cm^{-1} Volcanic

0.005 cm^{-1} NDACC Normal

0.0075 cm^{-1} NDACC SA (1)

0.02 cm^{-1} InGaAs NIR

V1_KBr.XPM
V1_KBr.XPM
Normal_1_KBr.XPM

V2_KBr.XPM
V2_KBr.XPM
Normal_2_KBr.XPM

V3_KBr.XPM
V3_KBr.XPM
Normal_3_KBr.XPM

v4_KBr.XPM
v4_KBr.XPM
Normal_4_KBr.XPM

v5_KBr.XPM
v5_KBr.XPM
Normal_5_KBr.XPM

V7_KBr.XPM
V7_KBr.XPM
Normal_7_KBr.XPM

V3_KBr.XPM
V3_KBr.XPM
Normal_3_KBr.XPM

v6_KBr.XPM
v6_KBr.XPM
Normal_6_KBr.XPM
Normal_6_KBr.XPM

Normal_NIR_KBr_2.xpm
Normal_NIR_KBr_2.xpm
Normal_NIR_KBr_2.xpm
Normal_NIR_KBr_2.xpm
Normal_NIR_KBr_2.xpm
Normal_NIR_KBr_2.xpm

v6_KBr.XPM
v6_KBr.XPM
Normal_6_KBr.XPM
Normal_6_KBr.XPM

V3_KBr.XPM
V3_KBr.XPM
Normal_3_KBr.XPM

Measurement Statistics

AÑOS	DIAS	SA	SB	SC	SD	SE	SF	SG	SN
2019	101	201	213	655	187	197	901	151	1536
2018	204	362	403	1355	450	435	1142	260	1963
2017	165	287	284	976	288	293	416	369	8256
2016	188	159	135	455	133	139	556	193	11435
2015	206	547	367	1510	467	480	1262	392	6677
2014	201	424		1128	334	330	1120		11137
2013	189	327		841	282	285	1235		14357
2012	77	127		174	120	109	135		1144

Alignments and Laser replacement

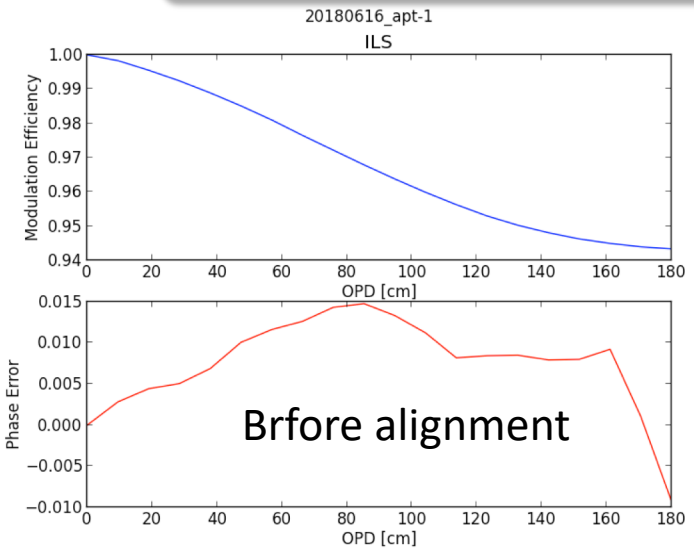
Gregor and Thomas stayed after the site visit of the meeting in Altzomoni:
Complete alignment of HR (in one night).
Firmware update by Gregor
Mirror was cleaned with Mezcal !
Very good (ca. 30%) improvement of Laser Signals!

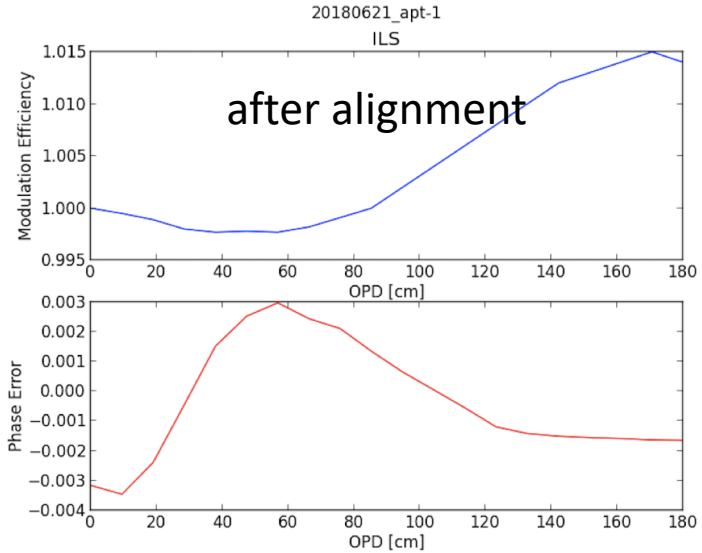
Good alignment, fringes and HBr Cell measurements!

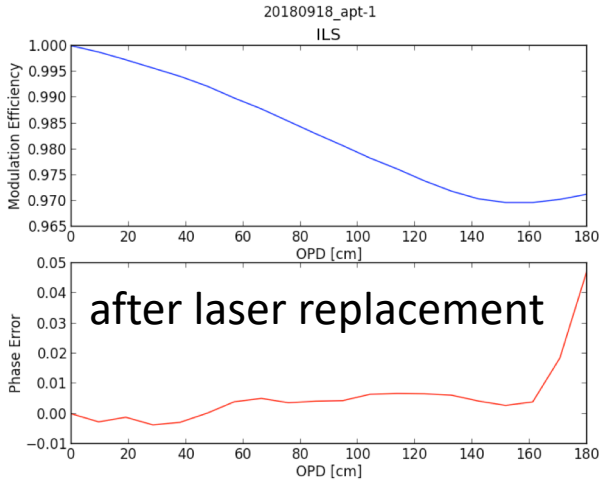
One month later Laser failed on 31 of July,
after summer holidays, but replacement
was without problems after the rainy month August.
Thanks to fact that it was immediately ordered by Thomas,
and stayed just one month at customs.

It was replaced in Sept. 2019.

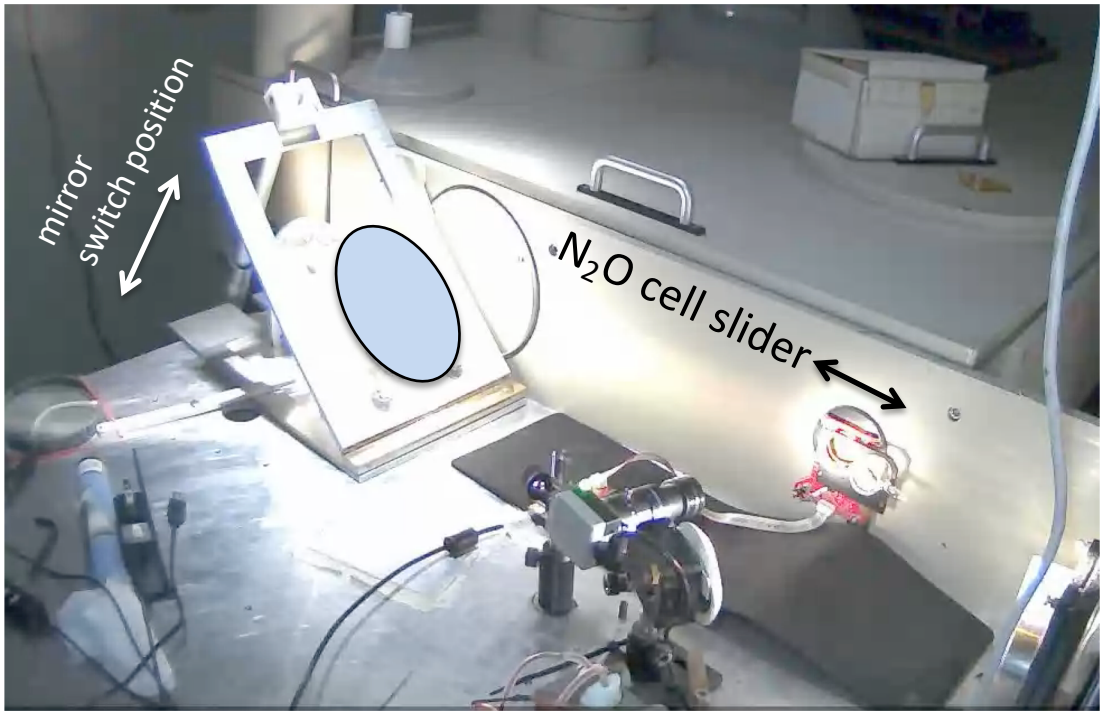
Improvements in ILS







ILS



Publications 2018 - 2019

Variability of the Mixed-Layer Height Over Mexico City. J. L. García-Franco, W. Stremme, A. Bezanilla, A. Ruiz-Angulo, M. Grutter. Boundary-Layer Meteorol (2018) 167: 493. https://doi.org/10.1007/s10546-018-0334-x (ISSN: 0006-8314, IF: 2.573)

NDACC harmonized formaldehyde time series from 21 FTIR stations covering a wide range of column abundances. Vigouroux, C., Bauer Aquino, C. A., Bauwens, M., Becker, C., Blumenstock, T., De Mazière, M., García, O., Grutter, M., Guarin, C., Hannigan, J., Hase, F., Jones, N., Kivi, R., Koshelev, D., Langerock, B., Lutsch, E., Makarova, M., Metzger, J.-M., Müller, J.-F., Notholt, J., Ortega, I., Palm, M., Paton-Walsh, C., Poberovskii, A., Rettinger, M., Robinson, J., Smale, D., Stavrakou, T., Stremme, W., Strong, K., Sussmann, R., Té, Y., and Toon, G. Atmos. Meas. Tech., 11, 5049-5073, https://doi.org/10.5194/amt-11-5049-2018, 2018.. (ISSN 1867-1381, IF 3.25)

Mapping carbon monoxide pollution from space down to city scales with daily global coverage. 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., Kumar Sha, M., Pollard, D. F., Kiel, M., Roehl, C., Wennberg, P. O., Toon, G. C., and Landgraf, J. Atmos. Meas. Tech., 11, 5507-5518, https://doi.org/10.5194/amt-11-5507-2018, 2018. (ISSN 1867-1381, IF 3.25)

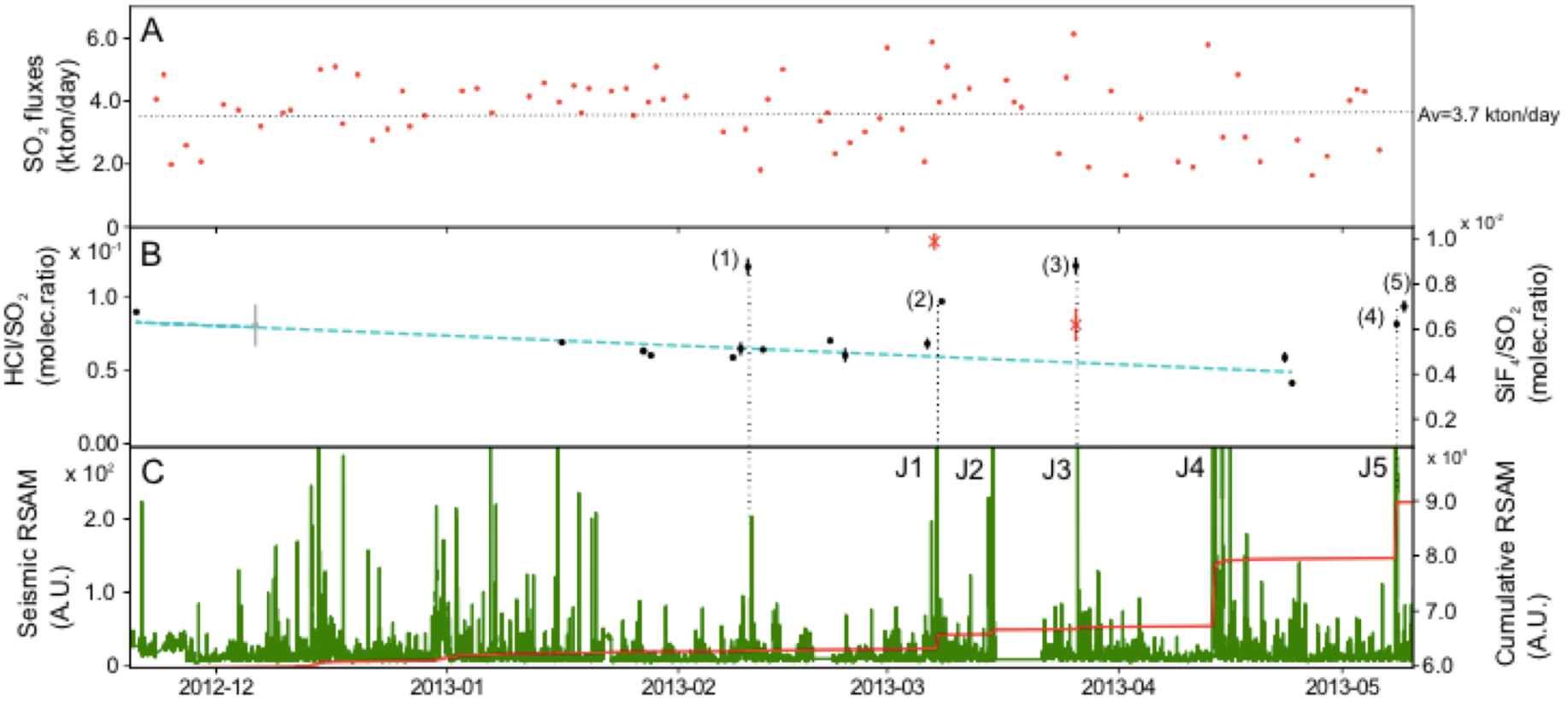
Characterization of a UV camera system for SO2 measurements from Popocatépetl Volcano. B. Schiavo, W. Stremme, M. Grutter, R. Campion, C.A. Guarin, C. Rivera, S. Inguaggiato. Journal of Volcanology and Geothermal Research, Volume 370, Pages 82-94, 2019. https://doi.org/10.1016/j.jvolgeores.2018.09.001. (ISSN 0377-0273, IF_2.54)

Building the COllaborative Carbon Column Observing Network (COCCON): long-term stability and ensemble performance of the EM27/SUN Fourier transform spectrometer. Frey, M., Sha, M. K., Hase, F., Kiel, M., Blumenstock, T., Harig, R., Surawicz, G., Deutscher, N. M., Shiomi, K., Franklin, J. E., Bösch, H., Chen, J., Grutter, M., Ohyama, H., Sun, Y., Butz, A., Mengistu Tsidu, G., Ene, D., Wunch, D., Cao, Z., Garcia, O., Ramonet, M., Vogel, F., and Orphal, J. Atmos. Meas. Tech., 12, 1513-1530, https://doi.org/10.5194/amt-12-1513-2019, 2019. (ISSN 1867-1381, IF 3.25)

NO2 vertical profiles and column densities from MAX-DOAS measurements in Mexico City. Friedrich, M. M., Rivera, C., Stremme, W., Ojeda, Z., Arellano, J., Bezanilla, A., García-Reynoso, J. A., and Grutter, M. Atmos. Meas. Tech., 12, 2545-2565, https://doi.org/10.5194/amt-12-2545-2019, 2019. (ISSN 1867-1381, IF 3.25)

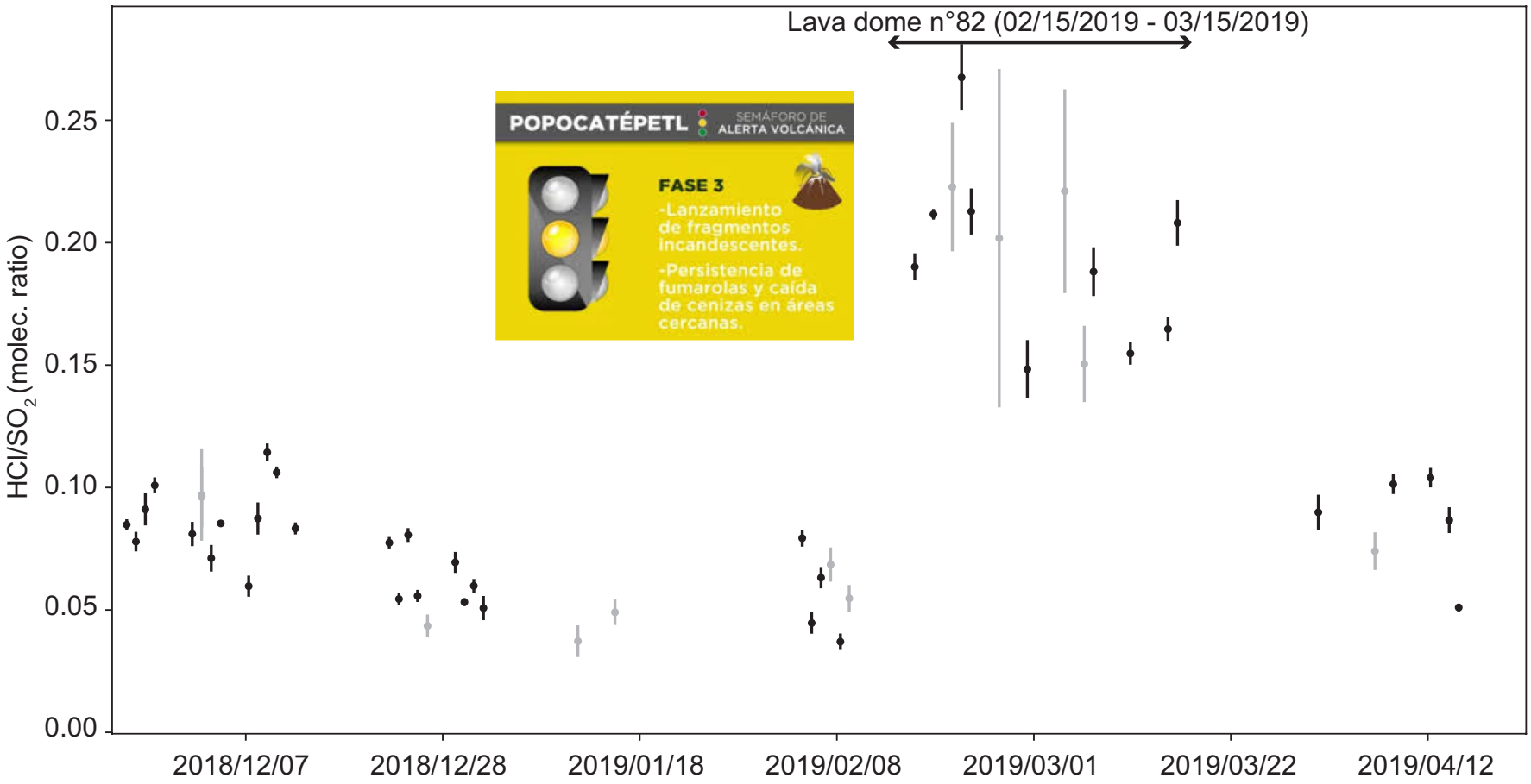
Variability in the gas composition of the Popocatepetl volcanic plume. N. Taquet, W. Stremme, M. Grutter, J. Baylon, A. Bezanilla, B. Schiavo, C. Rivera, R. Campion, T. Boulesteix, A. Nieto Torres, R. Espinasa Perena, Thomas Blumenstock and Frank Hase. Frontiers in Earth Science. Accepted. 2019.

Monitoring volcanic activity (HCl/SO_2)



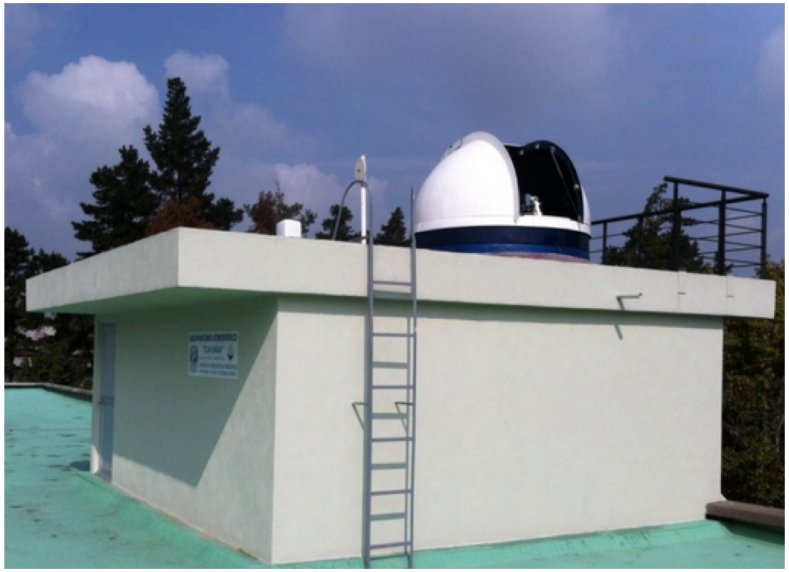
Taquet et al, 2019

Monitoring volcanic activity (HCl/SO_2)



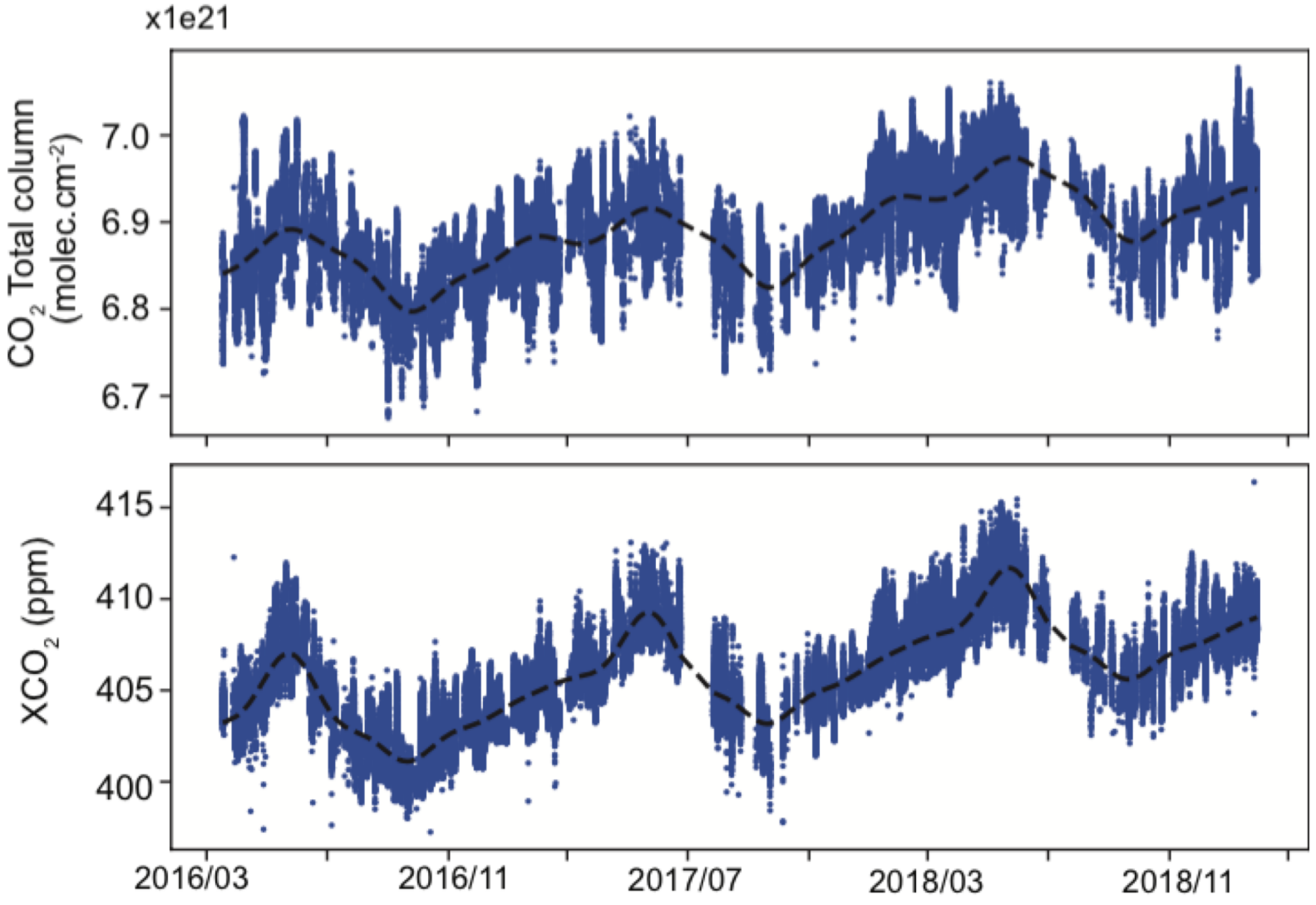
Vertex80 at UNAM

Alignment at UNAM:
Christoph Petri stayed after the meeting at UNAM
and aligned the Vertex 80
and he put an extra
Field-stop in the parallel beam.

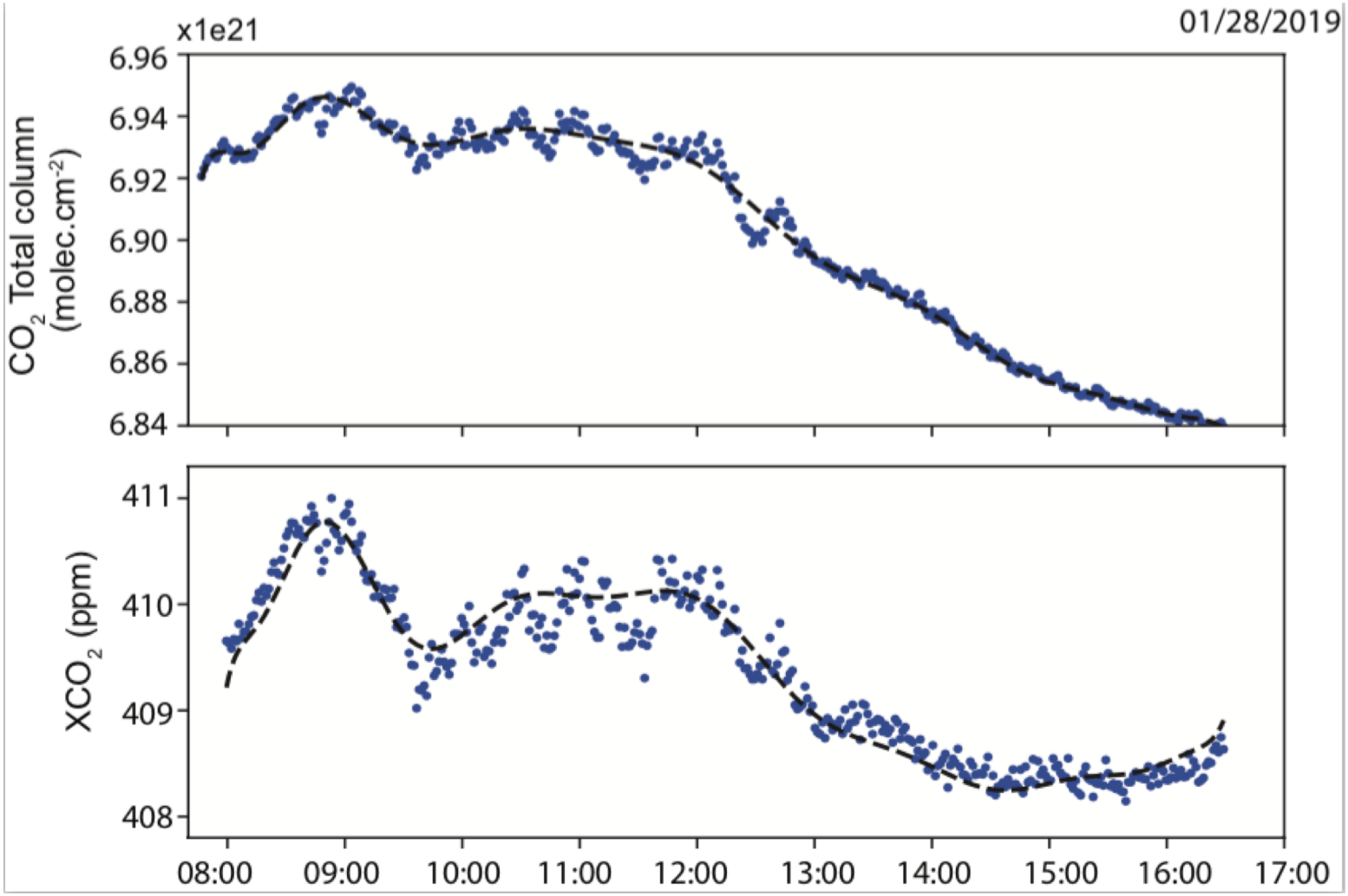


EM27/SUN Intercomparison at UNAM

EM27/SUN CO2 timeseries at UNAM



EM27/SUN CO2 diurnal cycle at UNAM



Funding

- RUOA “University Network of Atmospheric Observatories”
  - Coordinated by Michel Grutter
- Conacyt-AEM (Mexican Space Agency) No 275239
- Conacyt-ANR (Mexico France) No 290589 “Merci-CO2”.
  - 2nd EM27/SUN, Noemie’s Postdoc position
- UNAM-PAPIIT (IN107417)
- UNAM-PAPIIT (IN141018)

- CONACYT-Stipends: Alan, Ruben,

Thanks !