GOBIERNO DE ESPAÑA

MINISTERIO DE AGRICULTURA, ALIMENTACIÓN Y MEDIO AMBIENTE

AEMet Agencia Estatal de Meteorología

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Luzblick

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OUTLINE

* Absolute Calibration during ATMOZ-> introduced in Pandora calibration
* Effect of the Absolute calibration
* Effect of the absorbing gases.

1) Absolute calibration during atmoz
2) Results using the absolute calibration (CF_ABS)
3) Results removing absorbing gasses
   a) CF_SO2
   b) CF_SO2_HCHO
4) Results removing absorbing gasses and absolute calibration
   a) CF_ABS
   b) CF_ABS_SO2
   c) CF_ABS_SO2_HCLO

Prototype v2: Simple Fiber Optic Guide

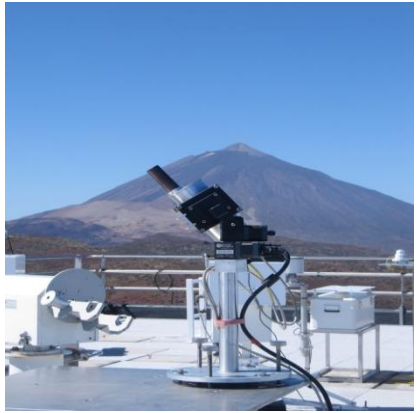
FO guide Installed

Pandonia

- Ground-based remote sensing network for air pollution monitoring and satellite validation
- Uses Pandora-2S and Pandora as core instruments

MOTIVATION:

Long, uninterrupted, well-maintained, homogeneously calibrated time-series of ground-based remote sensing atmospheric ozone measurements have been and still are the backbone for the validation of ozone columns

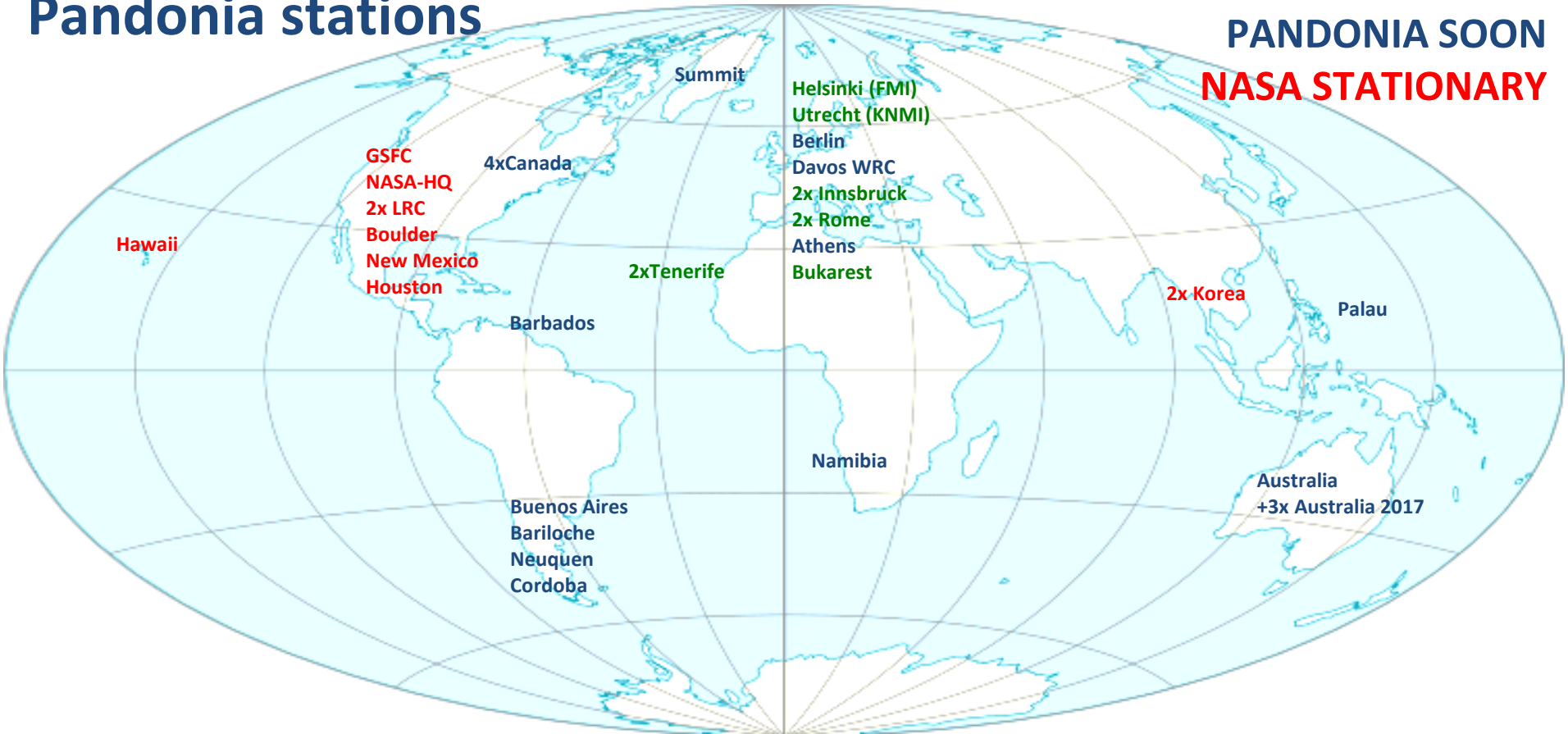


LUFTBLICK

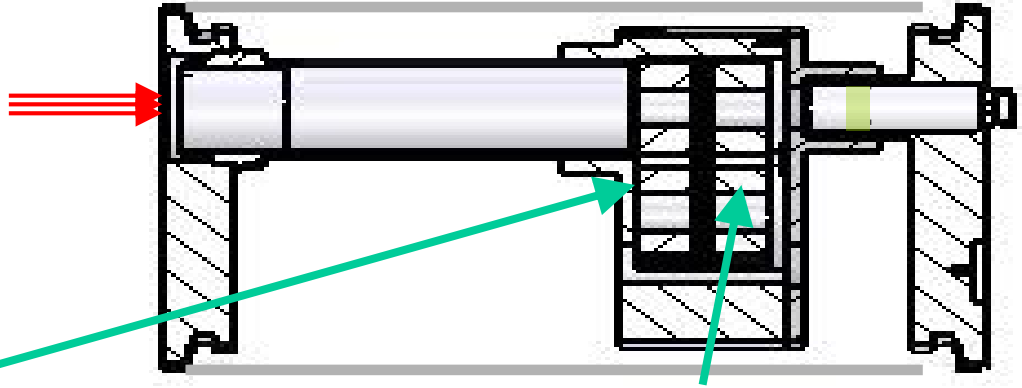
Pandora 2014 updates
Pandonia Acceptance Review Meeting and Workshop
2015-1-8, Mutters, Austria

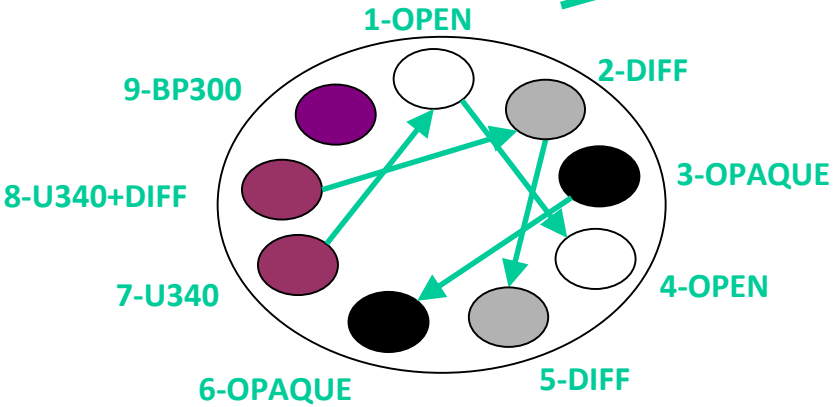
Pandonia stations

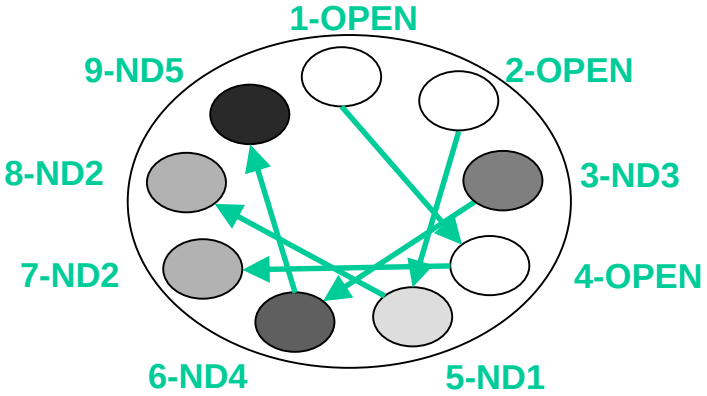
PANDONIA REAL TIME
PANDONIA SOON
NASA STATIONARY



From Pandora to Pandora-2S: head sensor



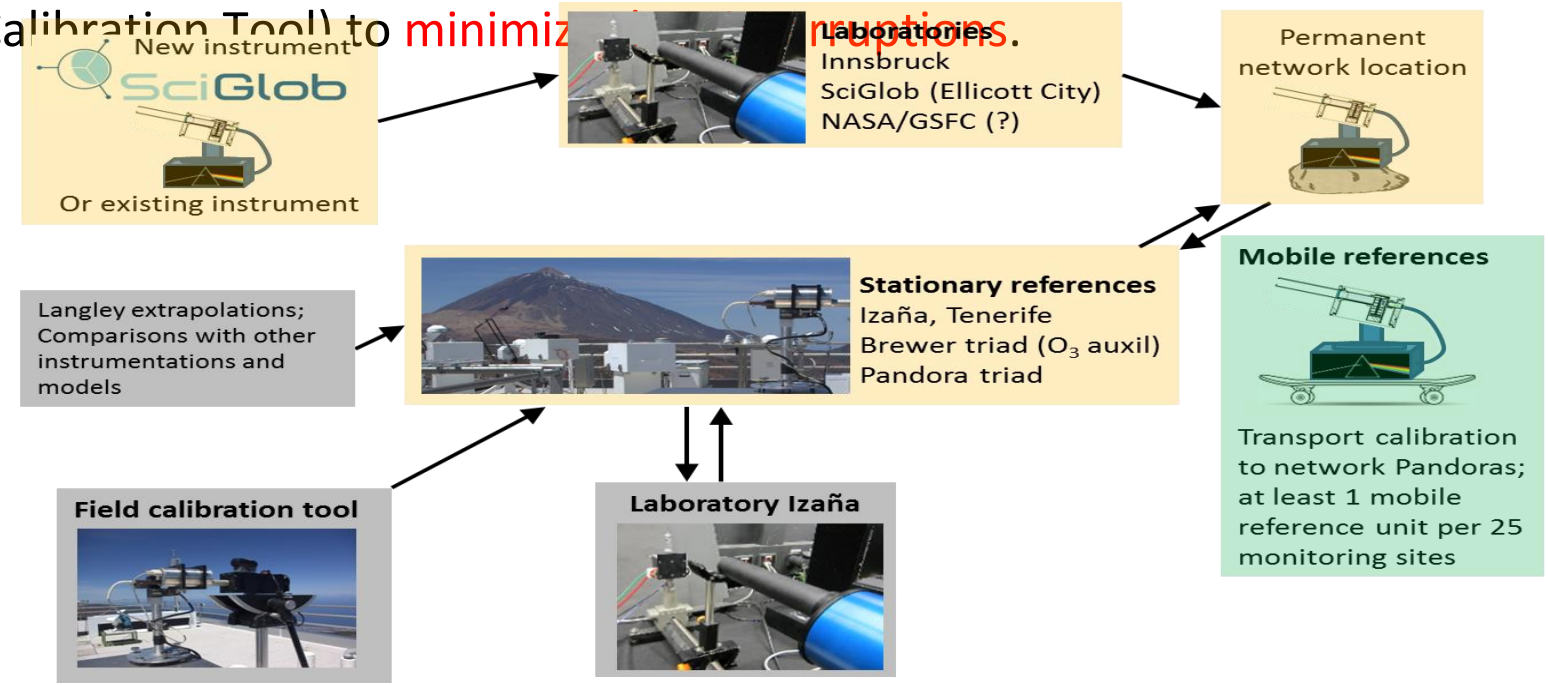




Pandonia calibration plan

There is an extensive network calibration plan, which is not fully implemented yet. The key points are:

- Instruments undergo a detailed initial lab-calibration
- Location instruments are visited by mobile reference unit and FCT (Field Calibration Tool) to minimize interruptions.



ABSOLUTE CALIBRATION:

- PTB Lamp Measurements.
- Determination of the reference plane (-27.3cm).
- Added the Absolute calibration into the P121 CF (FW5).
- Not added yet the absolute calibration for FW6.

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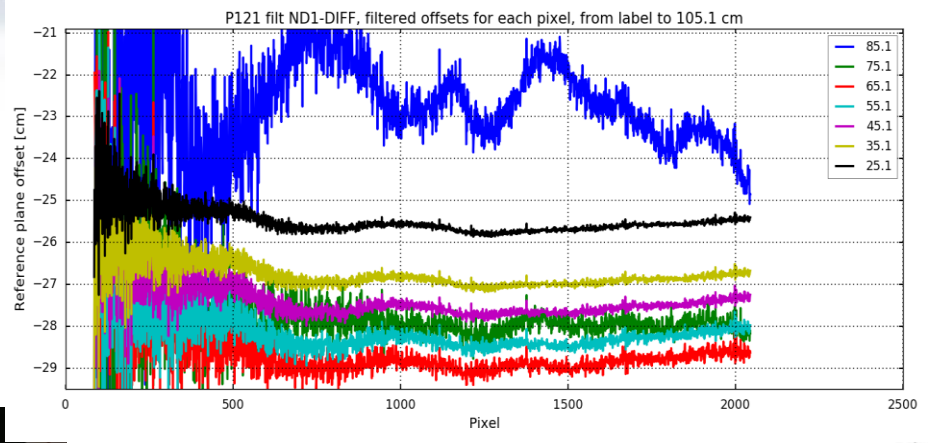
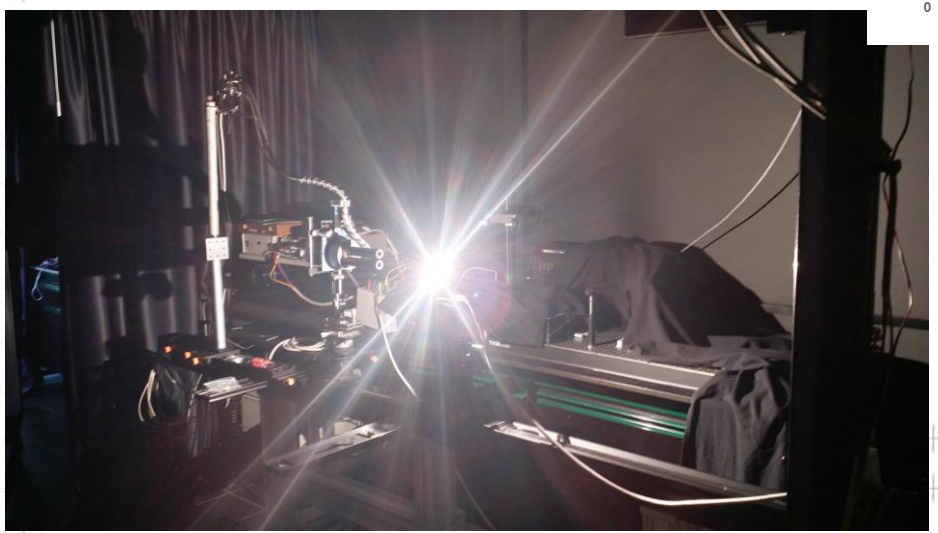
PANDORA -ATMOZ-

- Absolute Calibration
- Stray Light matrix
- New ozone cross section (Bremen)

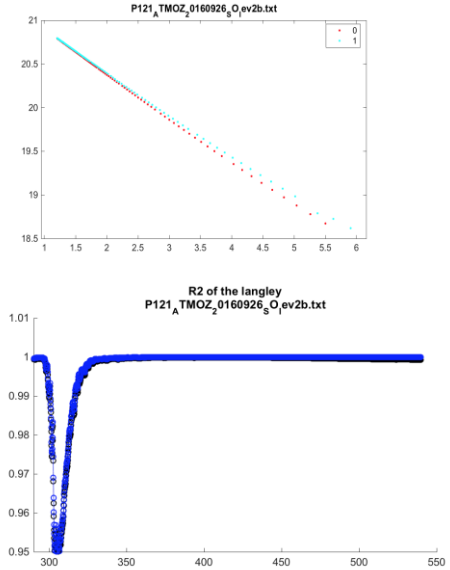




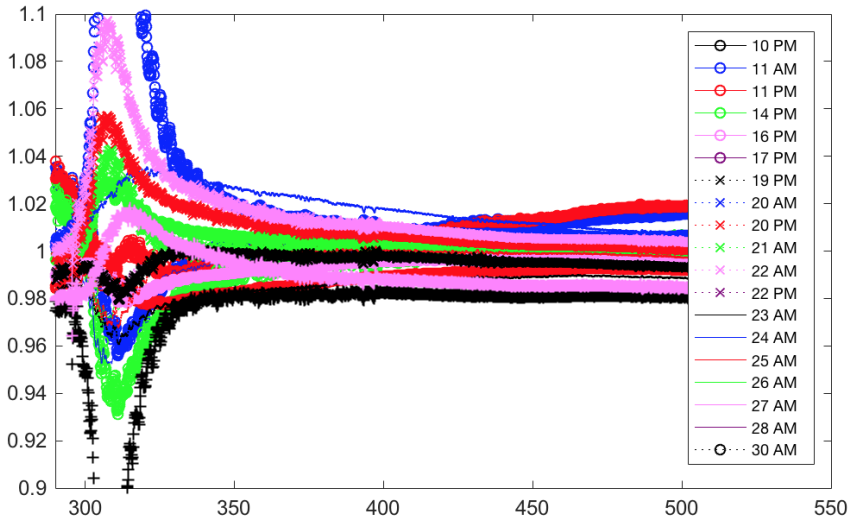
Offset for Dist >= [cm]	Mean	Std Dev
85.1	-22.749	1.854
75.1	-27.768	1.042
65.1	-28.617	0.870
55.1	-28.108	0.784
45.1	**-27.369**	**0.583**
35.1	-26.741	0.473
25.1	-25.485	0.369

Langley Absolute Calibration (no filter)

Example of Langley (up) and R^2 of the fit

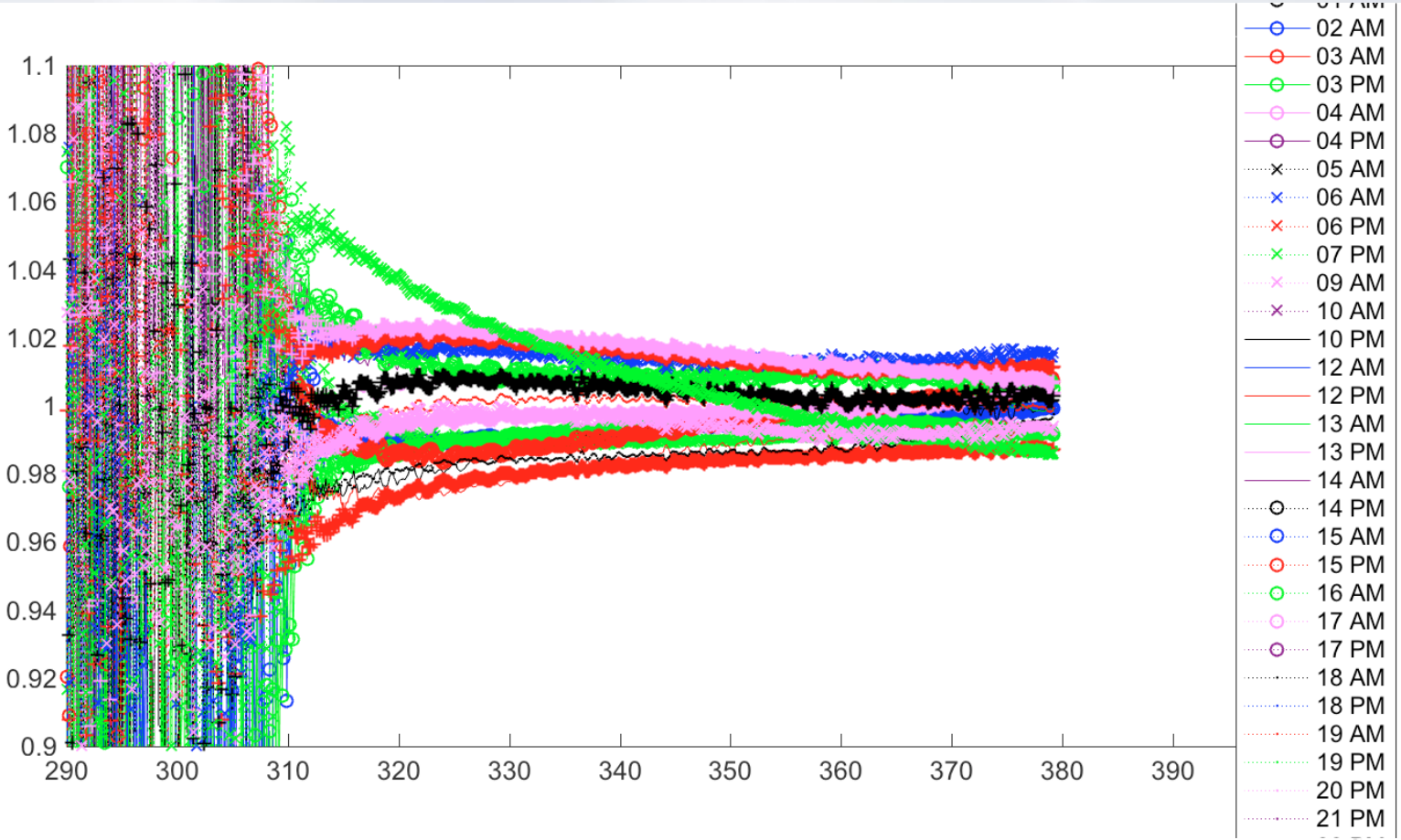


Ratio to mean langley extrapolation -ATMOZ- campaign



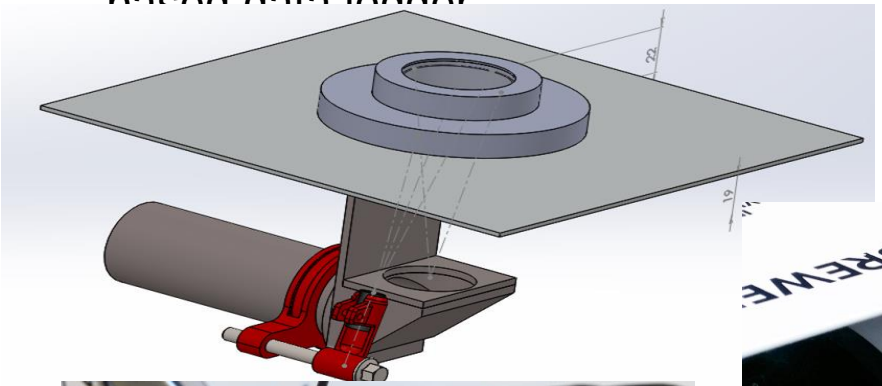
The UV range 290-325 nm shows more error on the Langley fit a bigger variability.

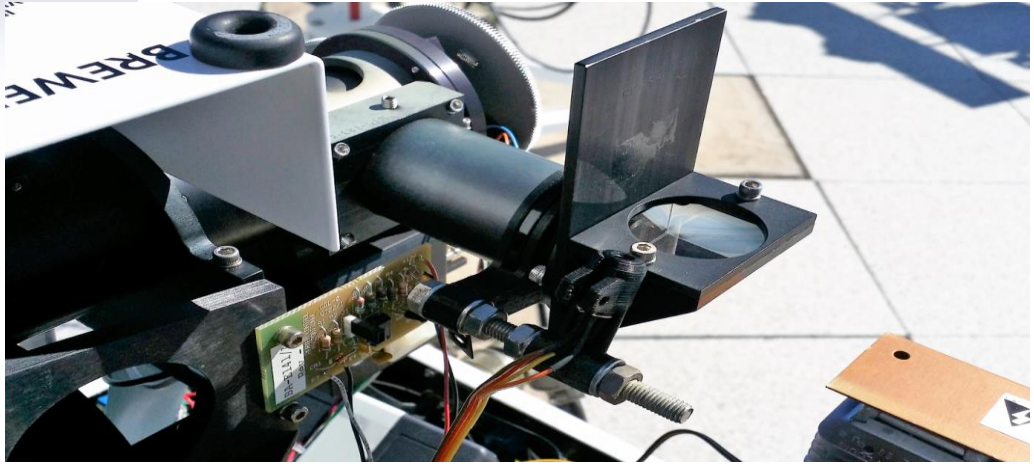
Lanlgey ratio, filter U340 included



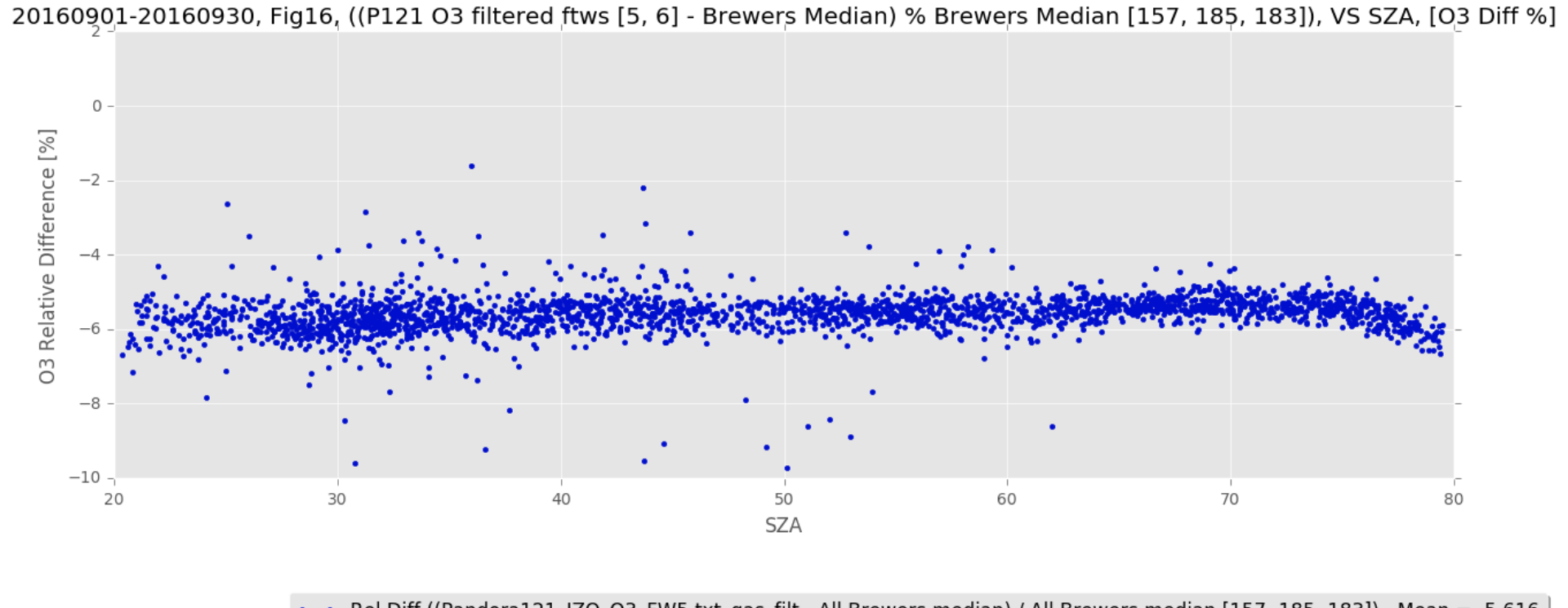
Other Improvements at IZO

Collaboration – Design and construction of a Brewer IR sensor holder and Arduino based data logger:

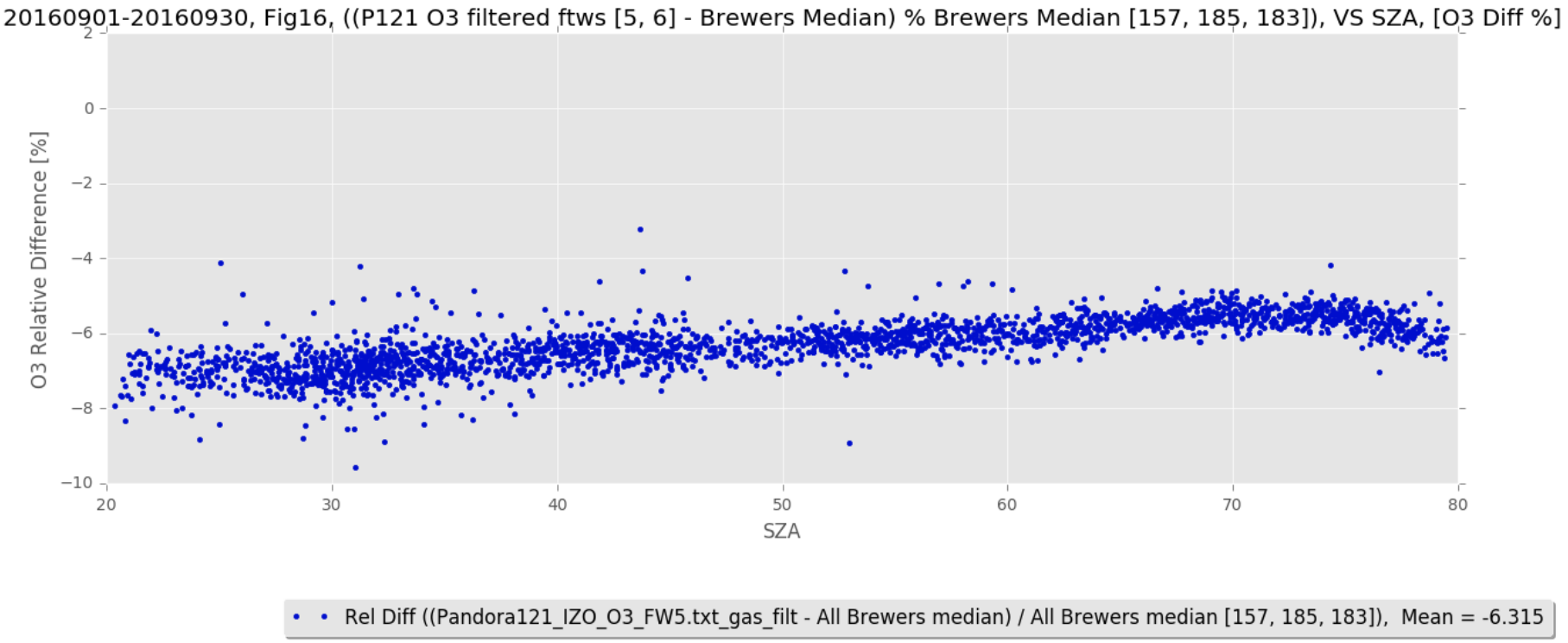




CF original - FW5 O3vc data respect Brewer Median:



CF abs - FW5 O3vc data respect Brewer Median:



Results using the absolute calibration (CF_ABS)

- The addition of the absolute calibration does not reduce the offset respect the brewers.
- The SZA dependence is worse in the ABS calibrated data. -> Wrong ABS calibration?

Effects of the Gasses in the original CF:

The standard gas retrieval method in the pandora processing software have into account 4 gasses.

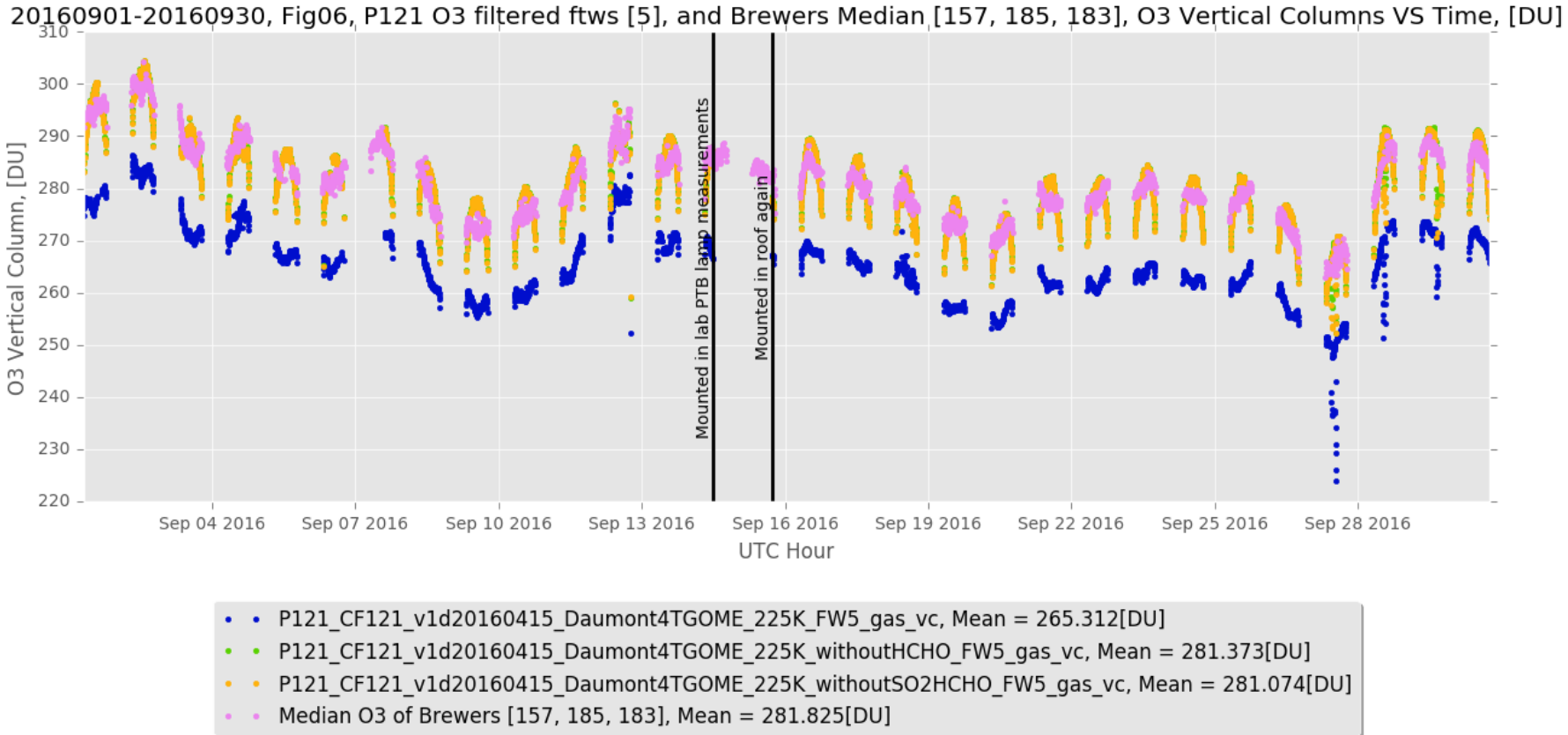
- O3
- NO2
- SO2
- HCHO

Some tests were done excluding some of them in the retrieval process.

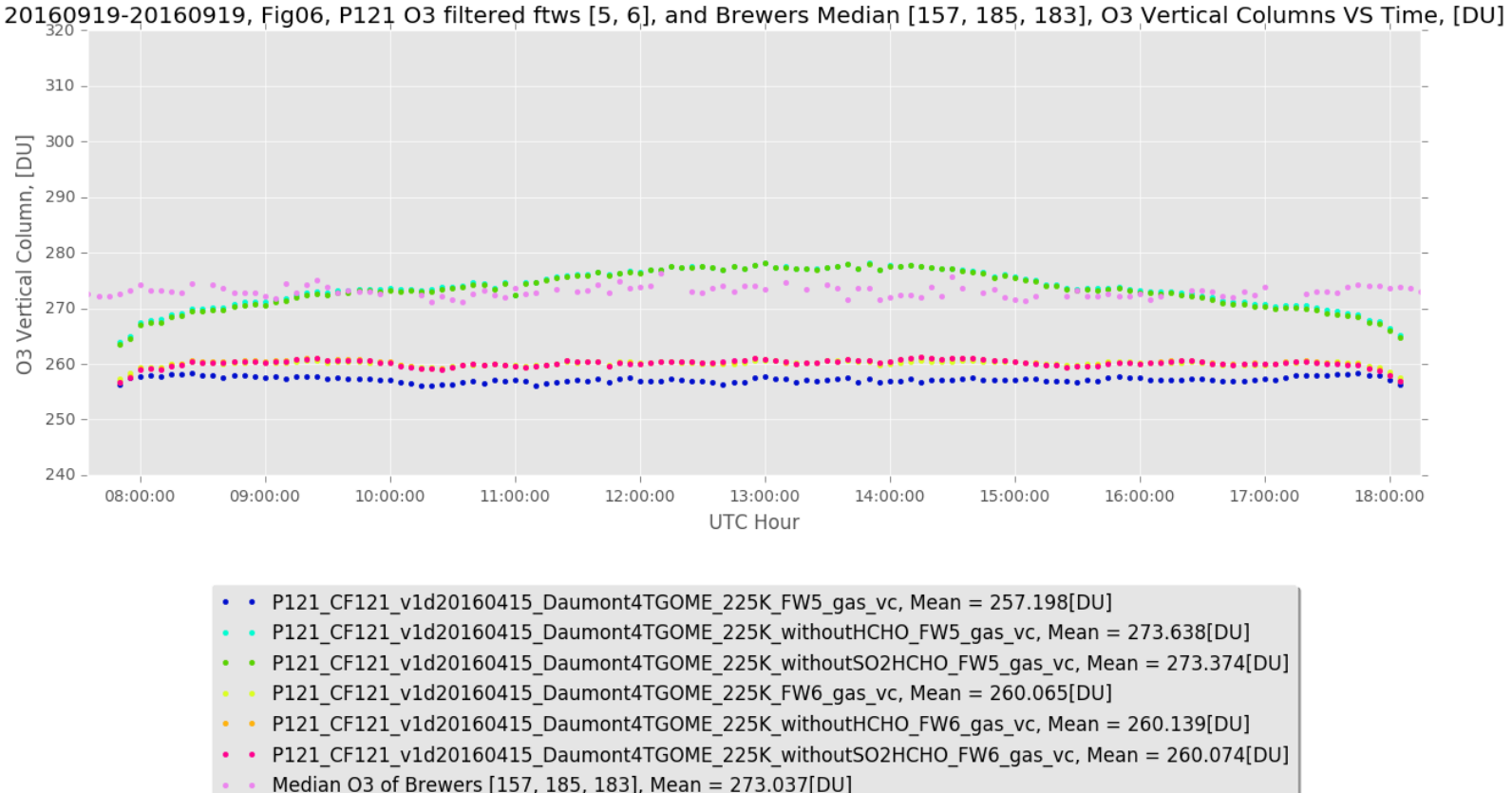
Filters used in the comparison plots:

- DQP1:wavelength shift : O3 < 0.2 nm
- DQP2:Stray Light : solar zenith angle <79
- DQP2:Stray Light : Air mass < 5
- DQP4:Clouds: Error on the retrieval Noise: < 5 DU(O3).
  DQP5:Fitting result index: 1,2=no error, >2=error

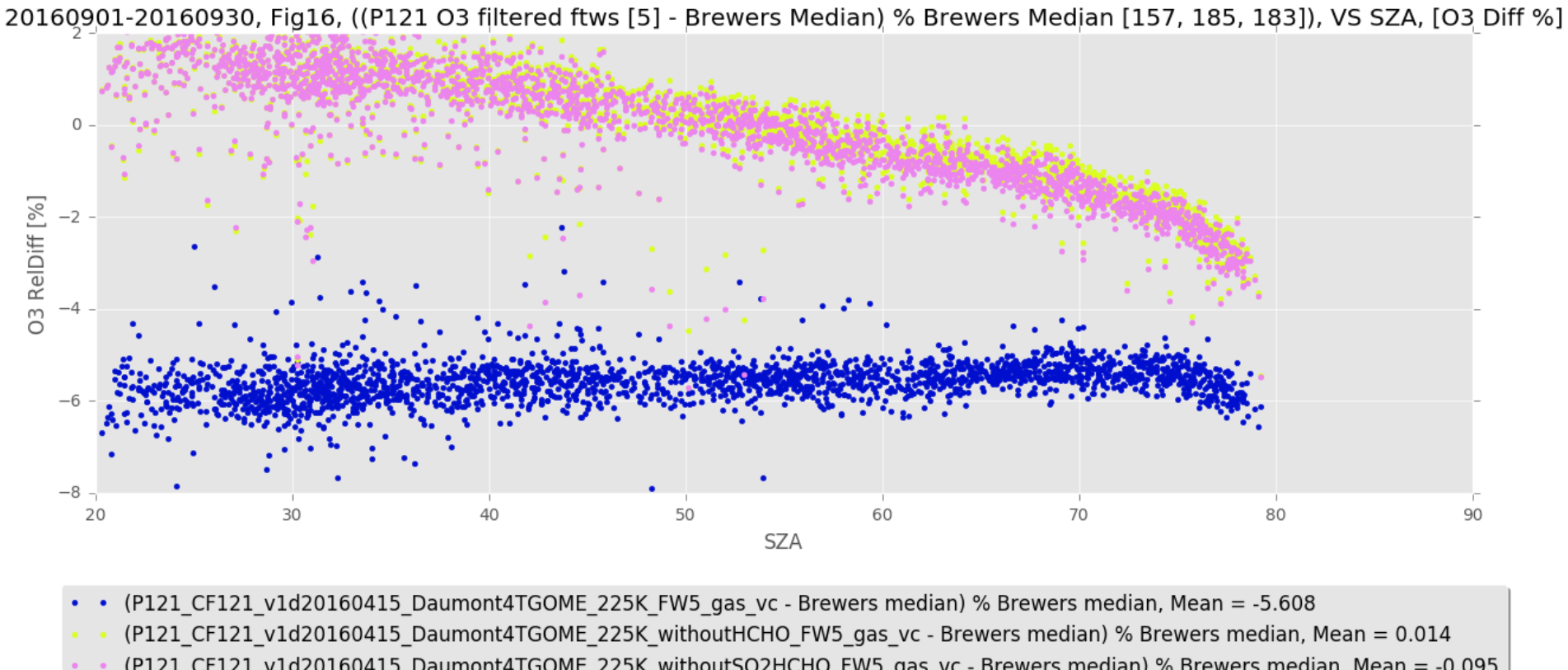
CF Original - FW5 comparison



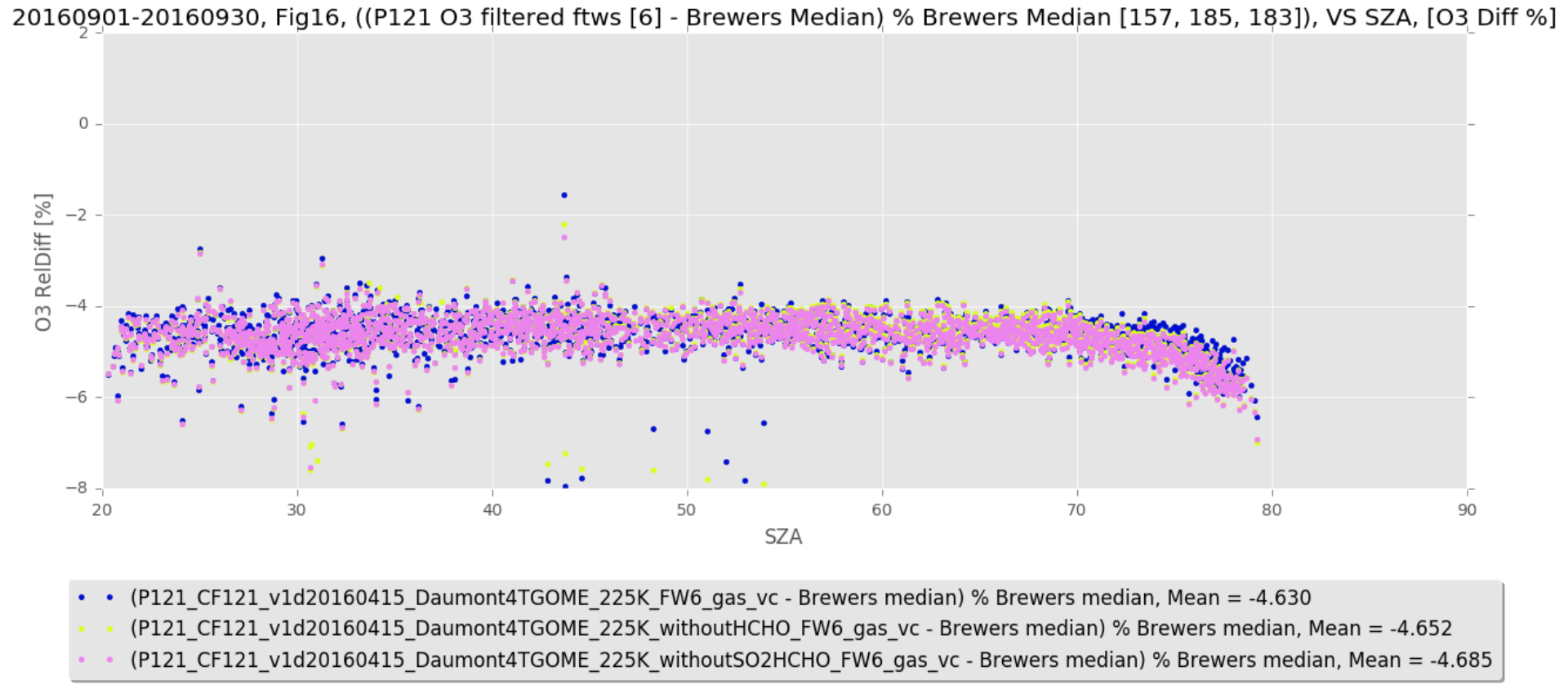
CF Original - FW5 and FW6 comparison



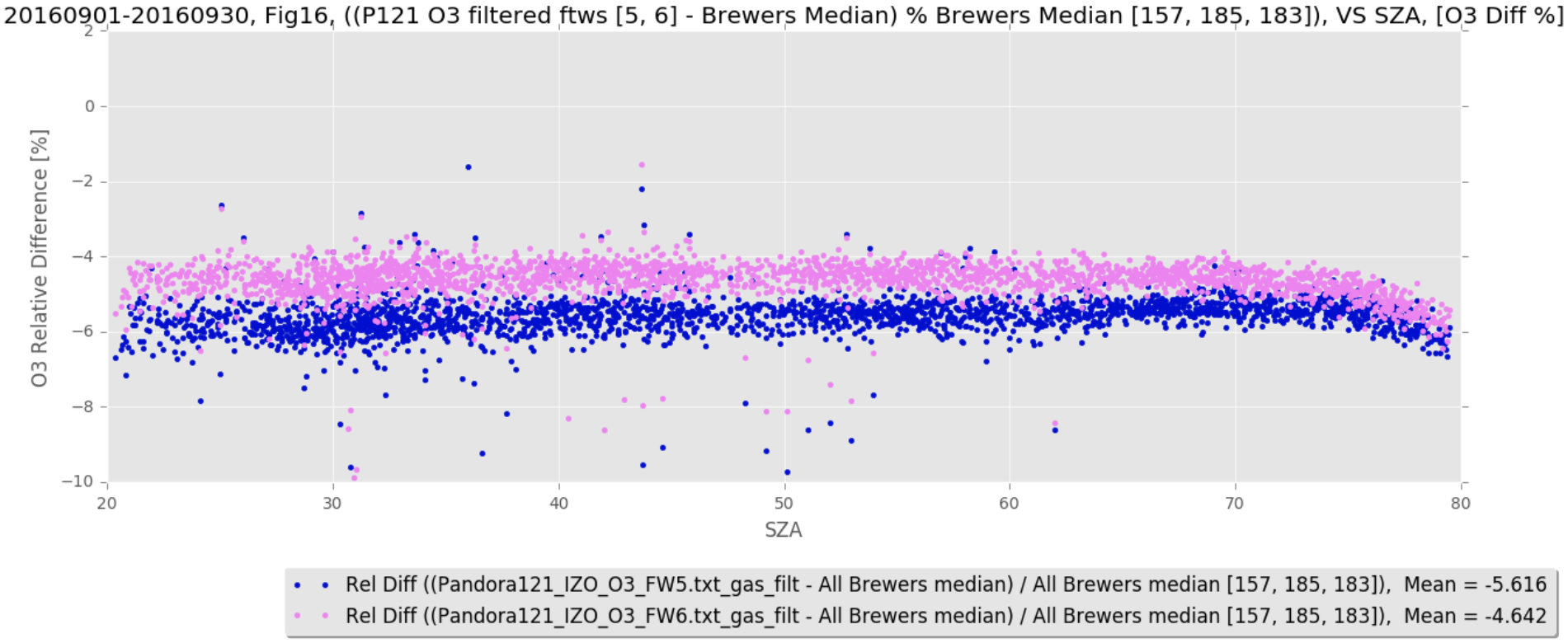
CF Original - FW5 comparison



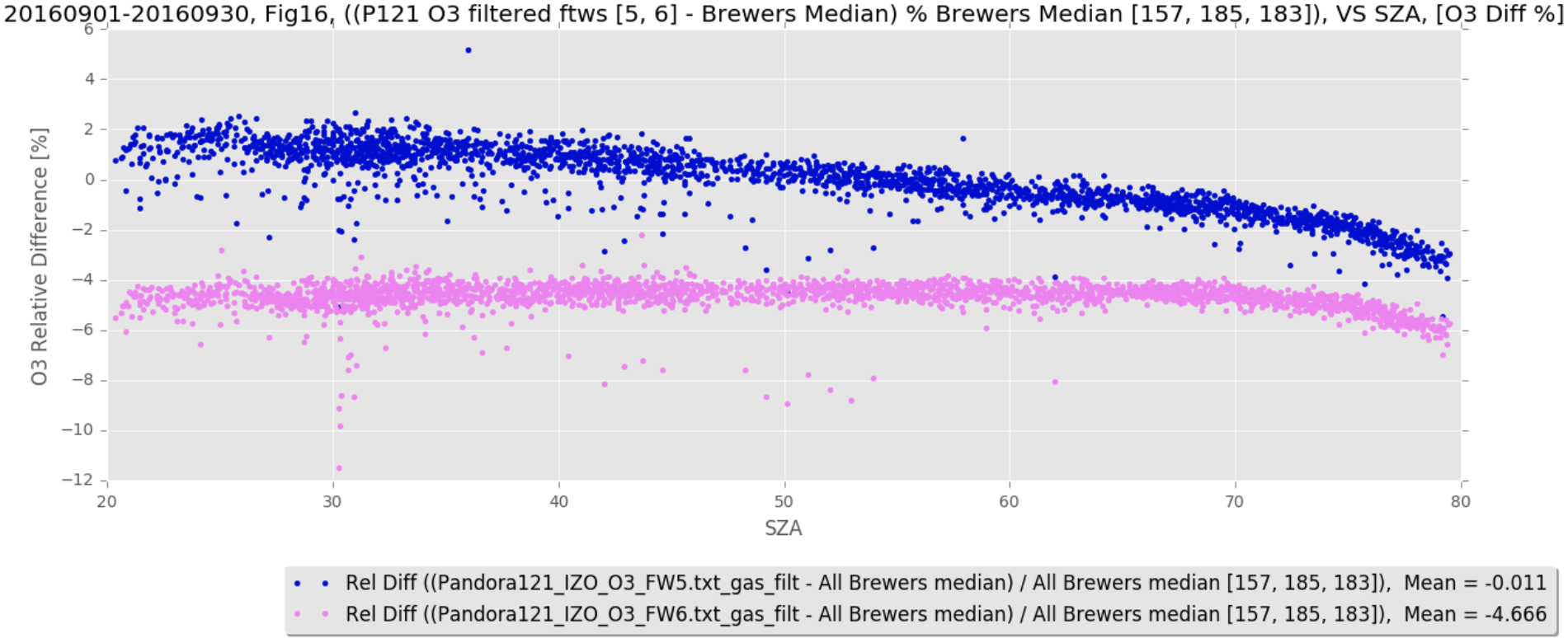
CF Original - FW6 comparison



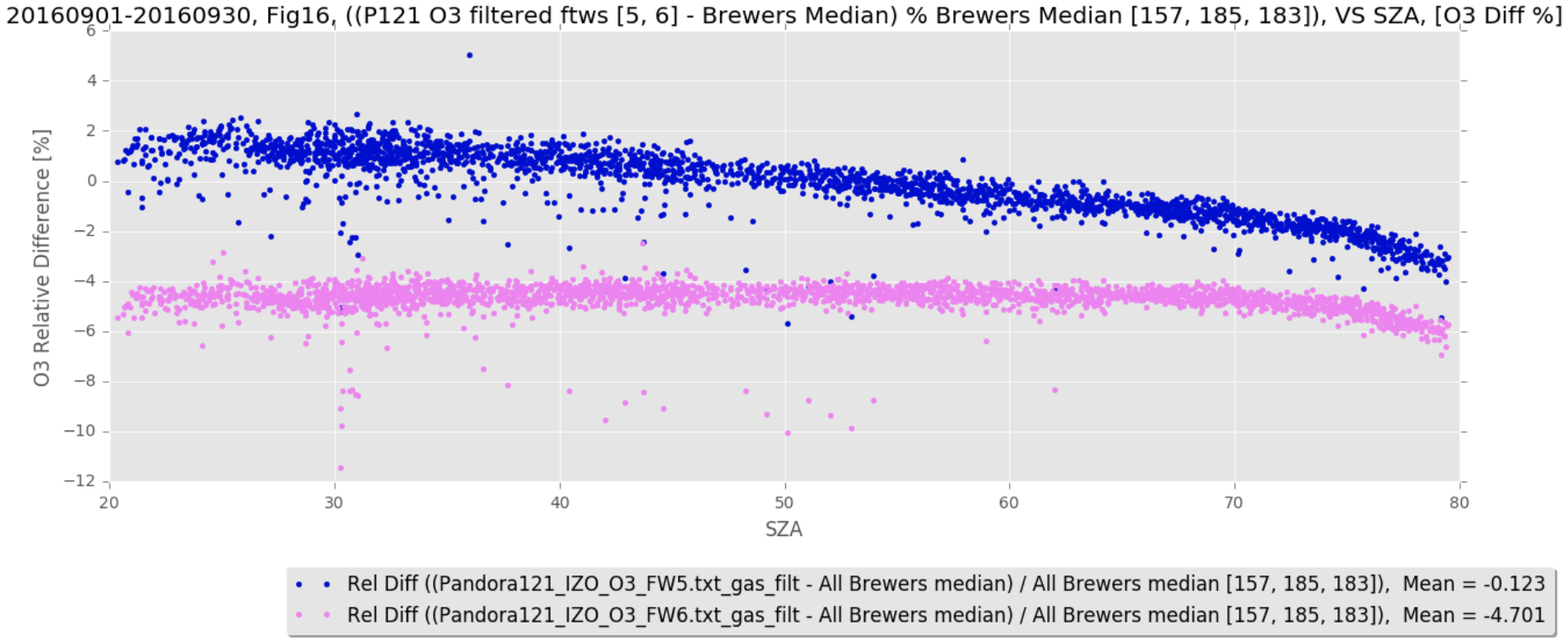
CF Original - FW5 and FW6



CF Original - FW5 and FW6 Without HCHO



CF Original - FW5 and FW6 Without SO2, HCHO

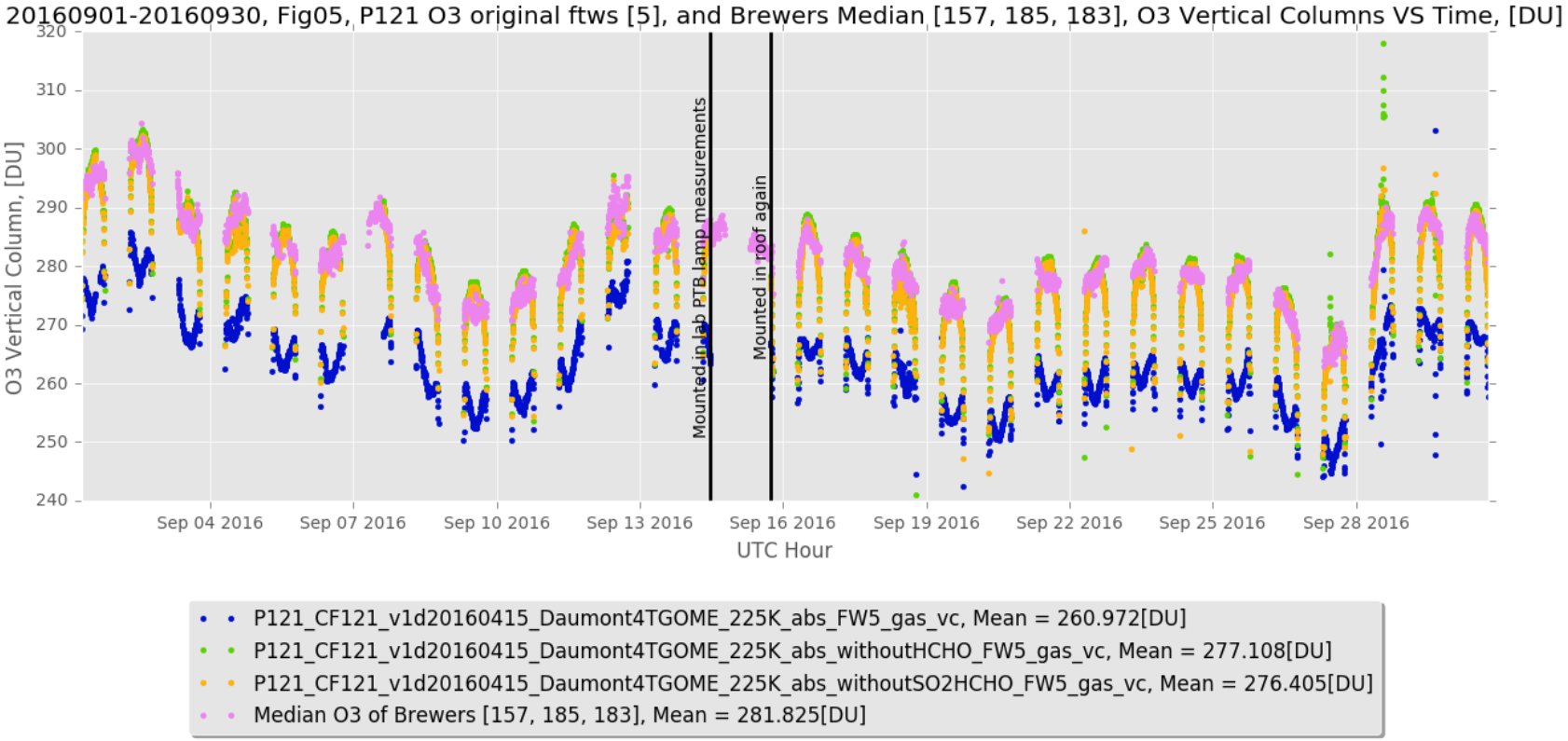


Results removing absorbing gasses in CF original:

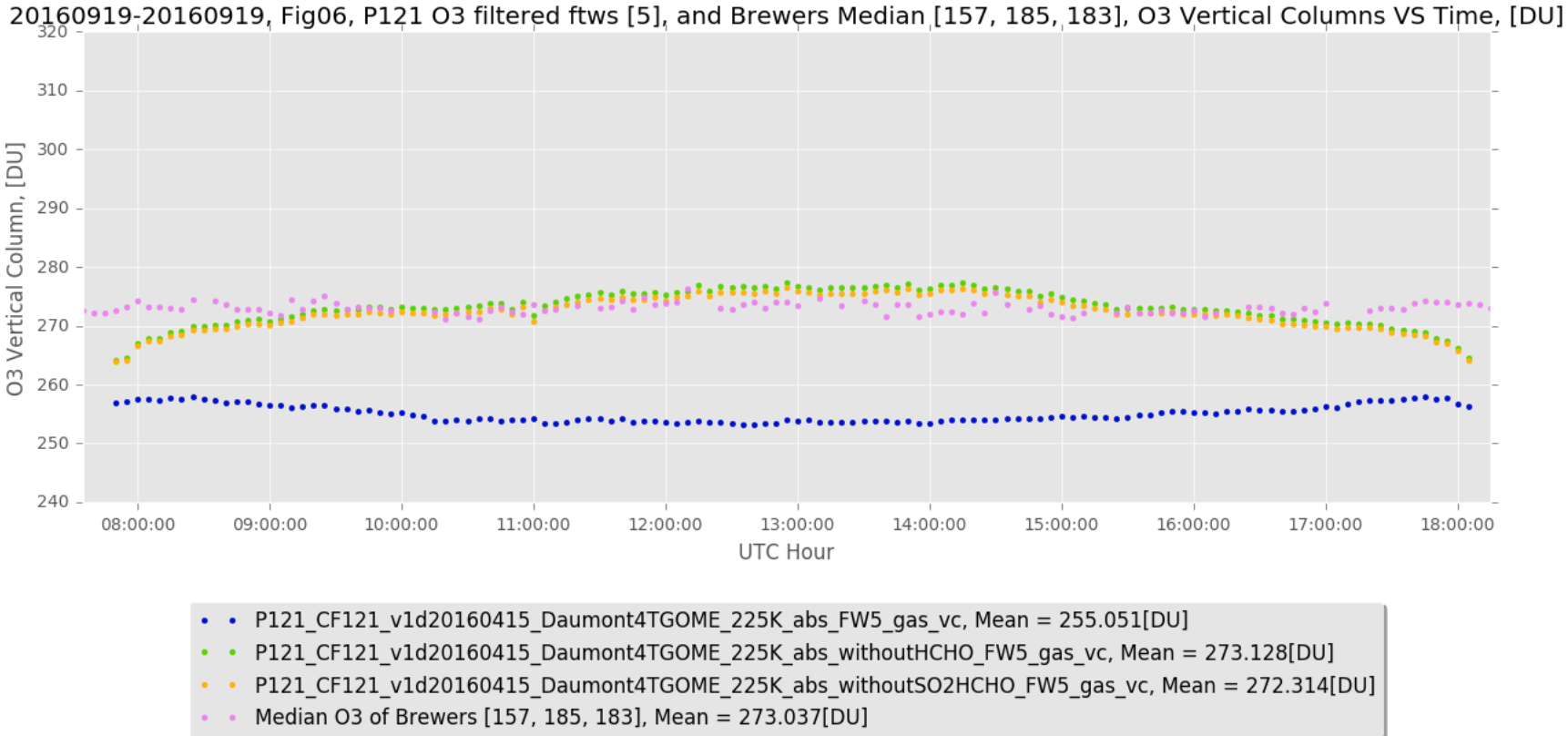
- Removing the HCHO is enough to reduce the [mean] offset until 0.01% in the FW5
- Removing SO2+HCHO is not better than only HCHO.
- In both cases, a SZA dependence appears.
- None of the cases affects to the FW6

Effects of the Gasses with ABS calibration

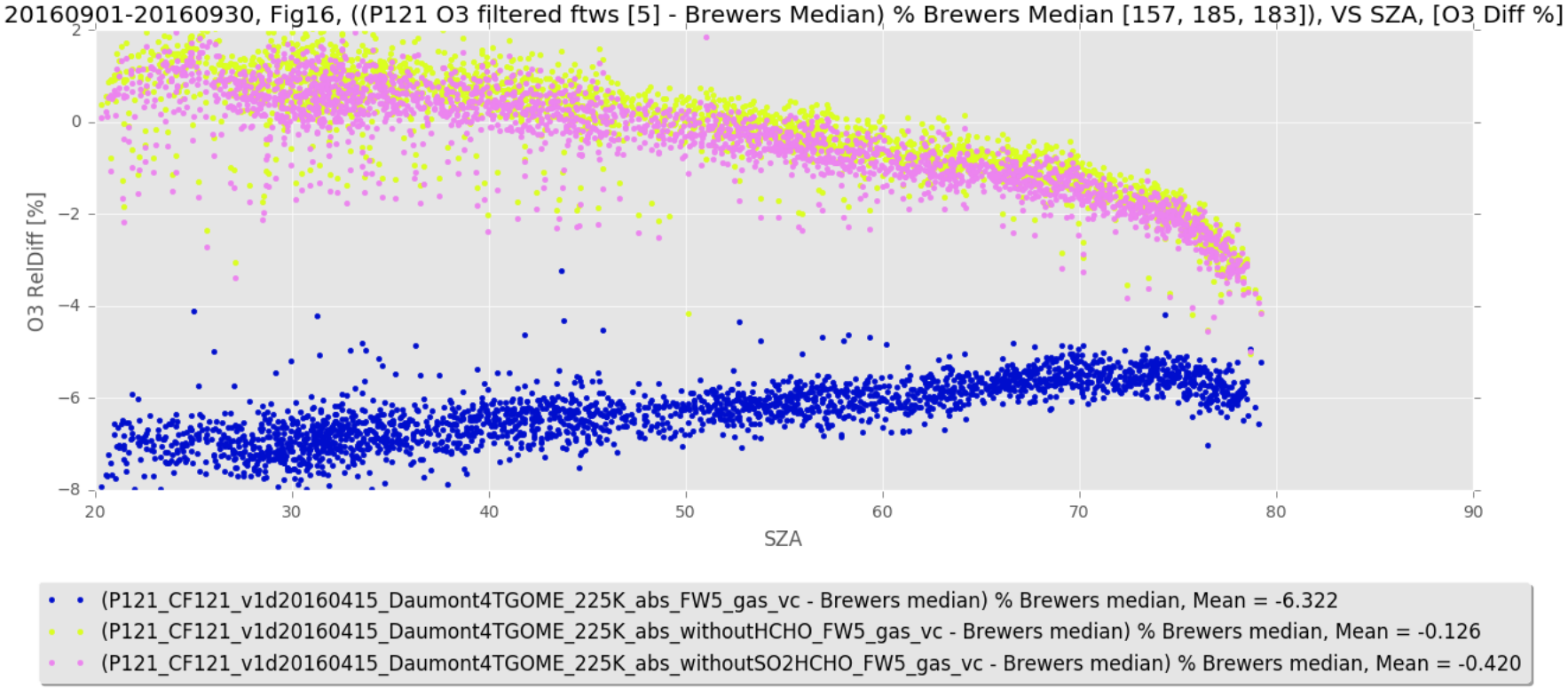
CF abs - FW5 comparison



CF abs - FW5 comparison



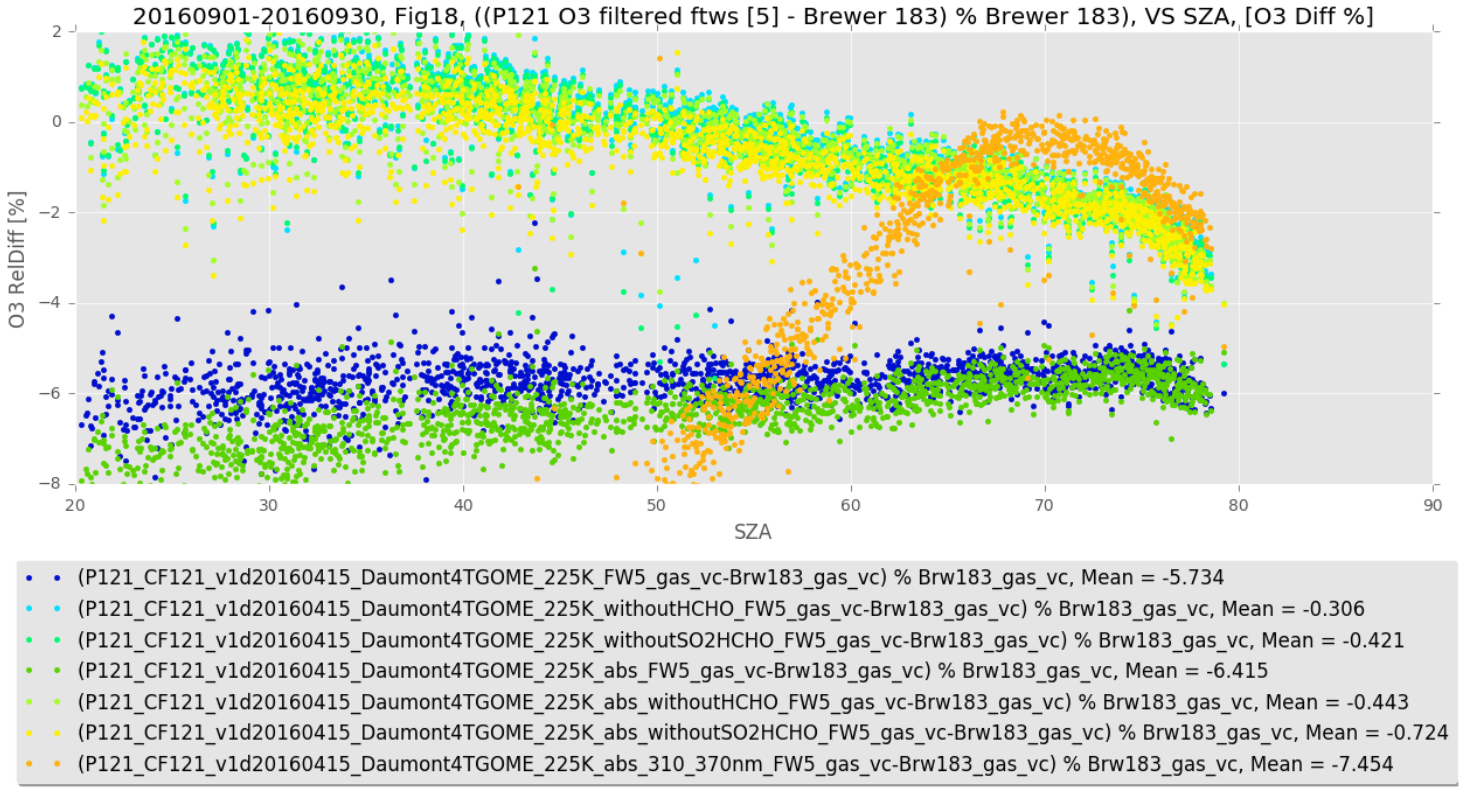
CF abs - FW5 comparison

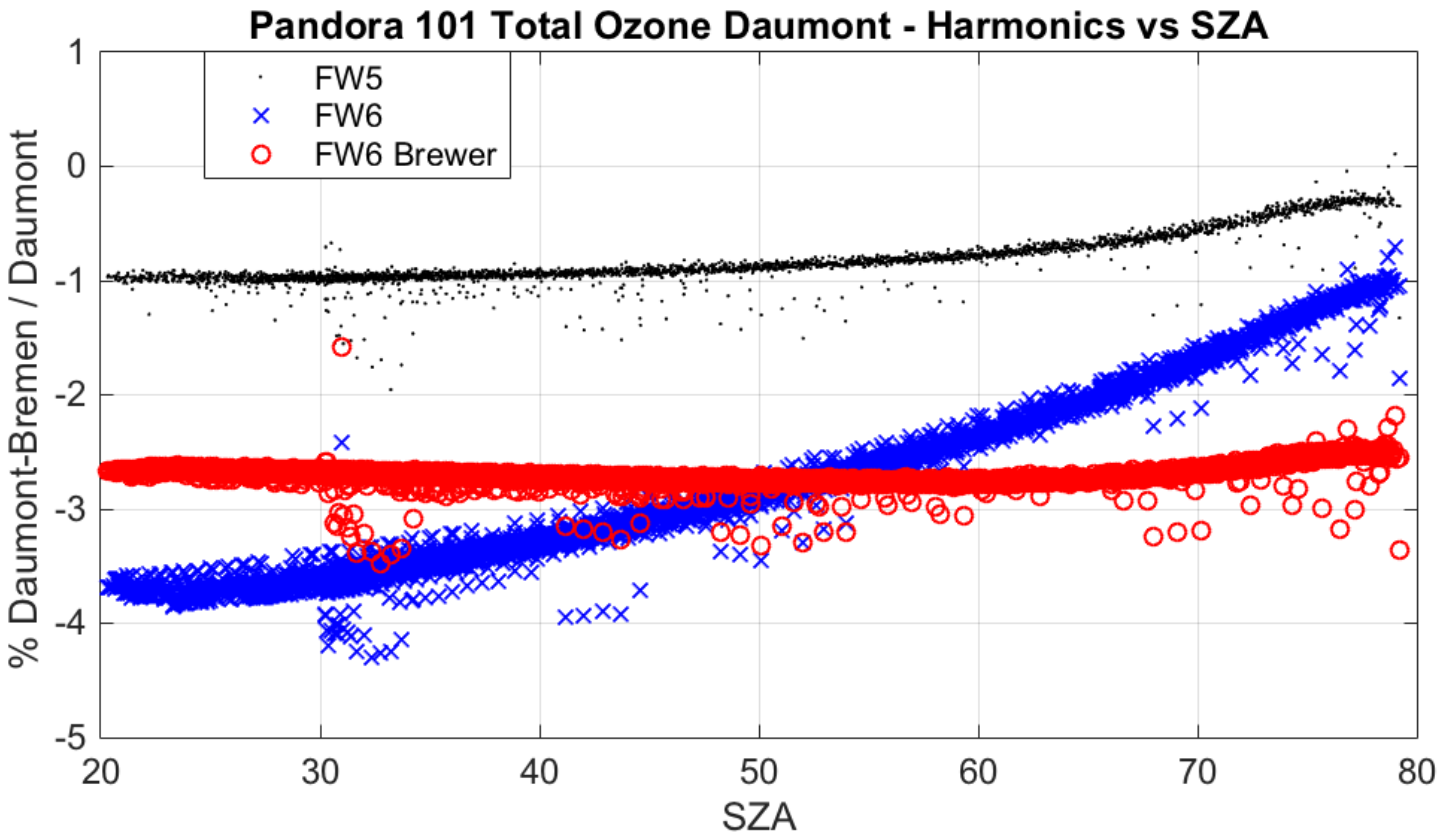


Results removing absorbing gasses in CF abs:

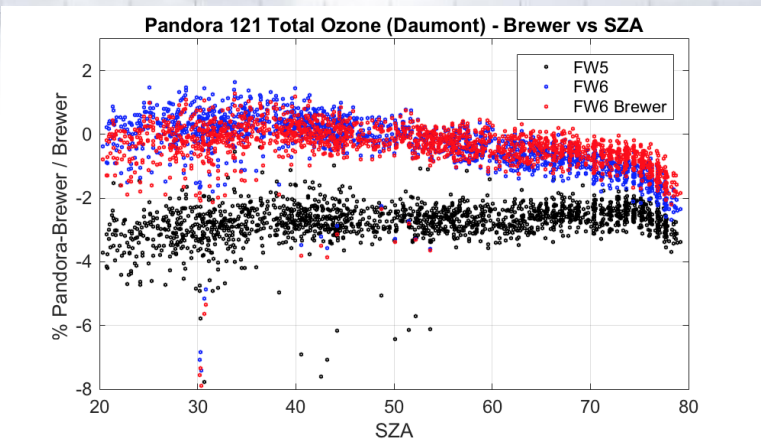
- The conclusions are the same as in the CF orig.
- Removing the HCHO is enough to reduce the [mean] offset until -0.15% in the FW5
- Removing SO2+HCHO is not better than only HCHO.
- In both cases, a SZA dependence appears.

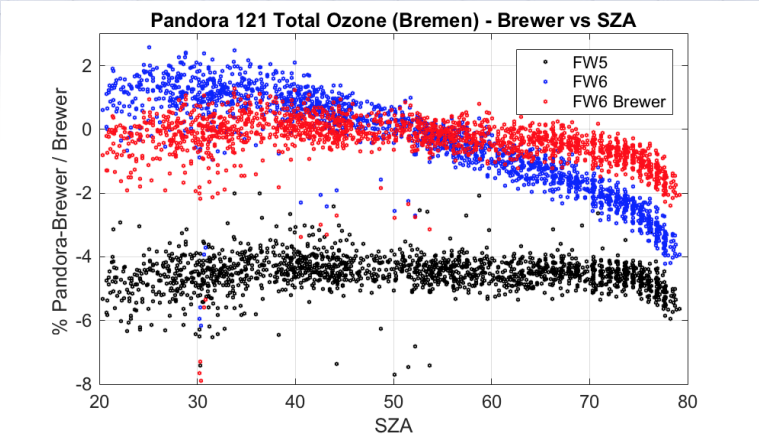
CF Original + CF abs with and without different Gasses

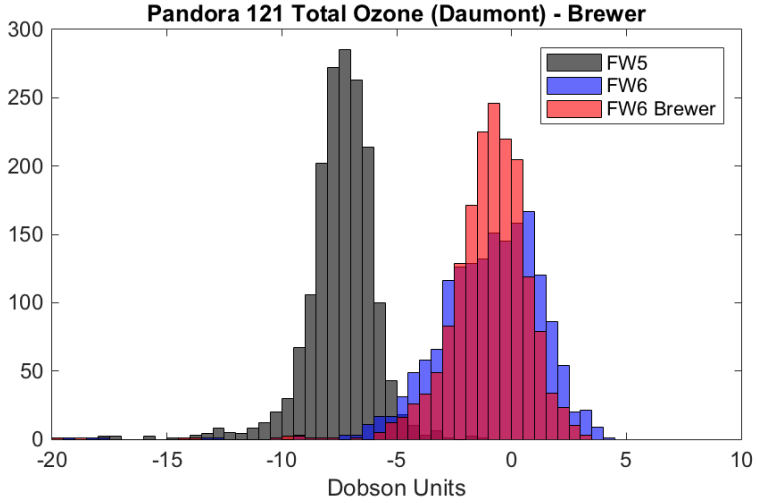


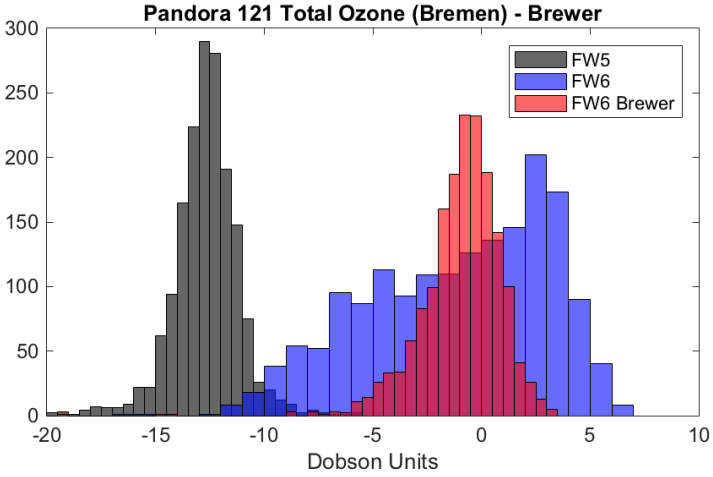

Pandora 101 Total Ozone Daumont - Harmonics vs SZA
FW5
FW6
FW6 Brewer
% Daumont-Bremen / Daumont
1
0
-1
-2
-3
-4
-5
20
30
40
50
60
70
80
SZA

Brewer - Pandora during ATMOZ









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ATMOZ

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TESTBED

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