MINISTERIO DE AGRICULTURA, ALIMENTACIÓN Y MEDIO AMBIENTE

AEMet Agencia Estatal de Meteorología

" Cross Section temperature effects on Brewer and Pandora. RBCC-E comparison Brewer Pandora "

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Izaña Atmospheric Research Centre
CIAI

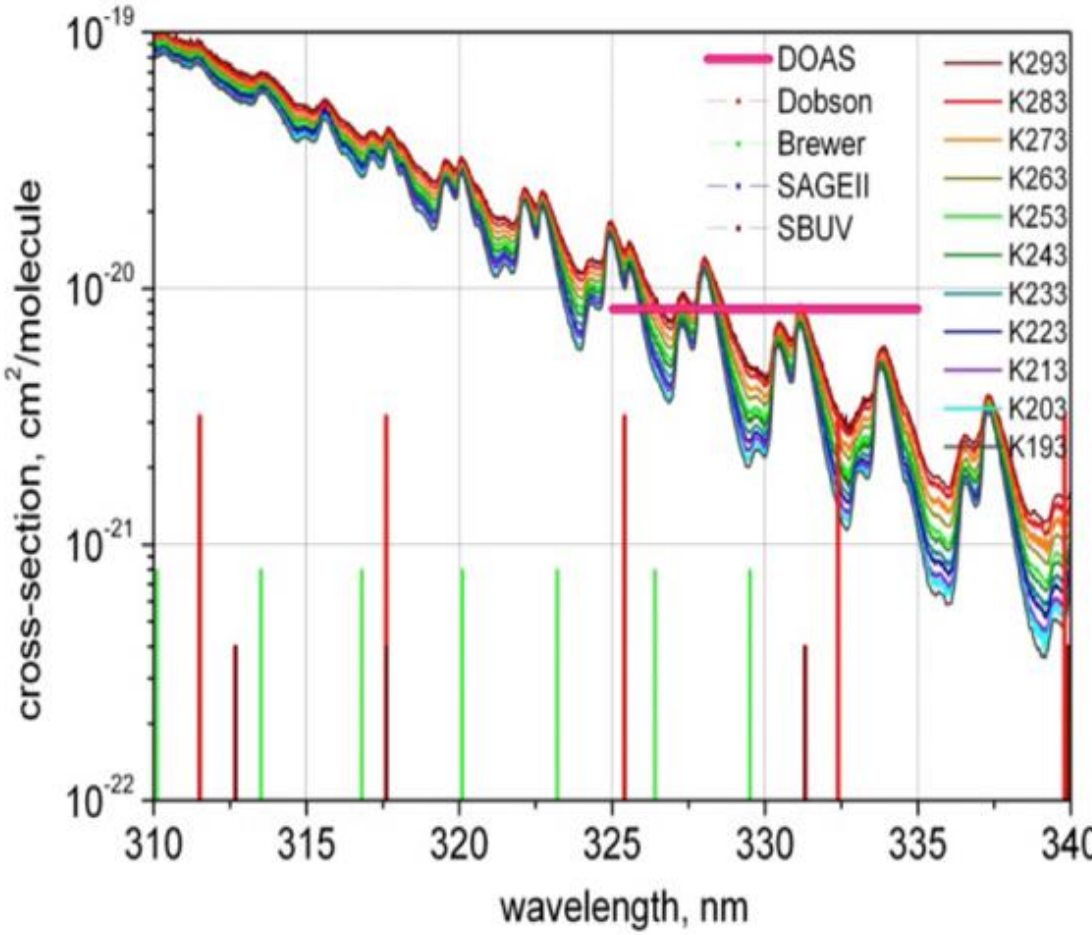
OUTLINE

- Ozone Cross section temperature dependence on Brewer instruments.
- Ozone Cross section temperature dependence on **PANDORA** ozone retrieval
- Brewer - Pandora comparison at Izaña

11/02/2008 www.aemet.es

Absorption Cross-Sections of Ozone (ACSO)

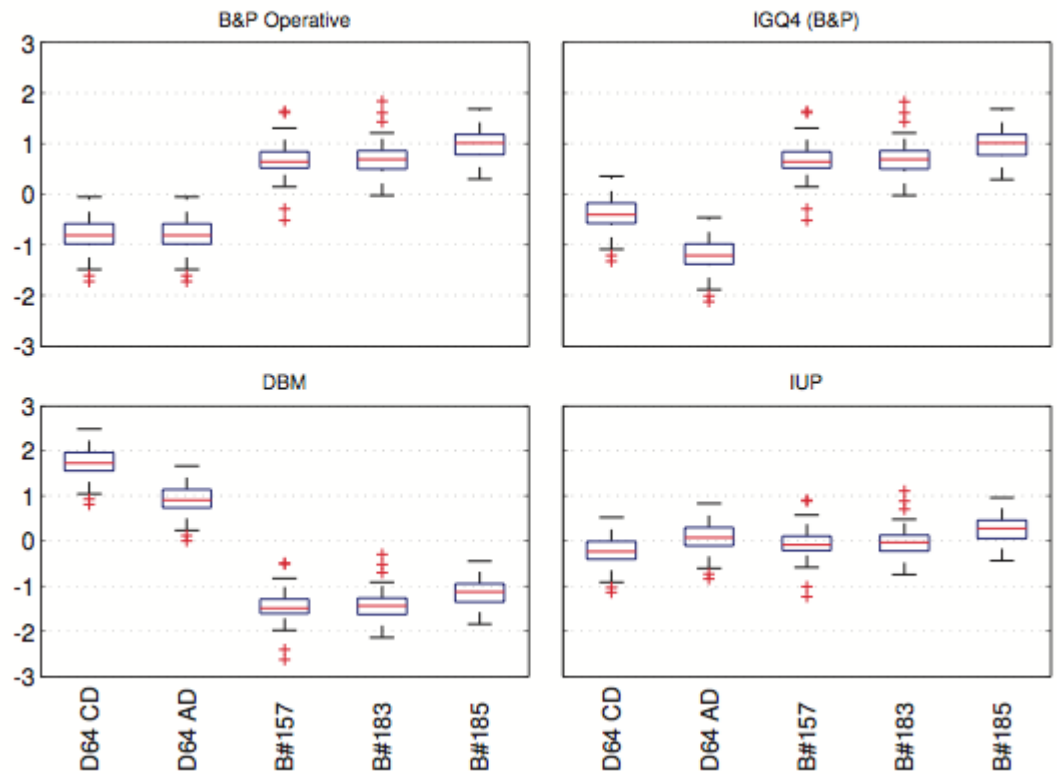
- Evaluation of the existing Ozone Cross section.
  - Brewer & Dobson use Bass & Paur
  - BDM is used by DOAS / Sattelite and Pandora.
  - HARMONICS (Bremen) provide a new set



The effect on brewer ozone is just the ratio between the ozone absorption coefficient of the new cross section to the operative one.

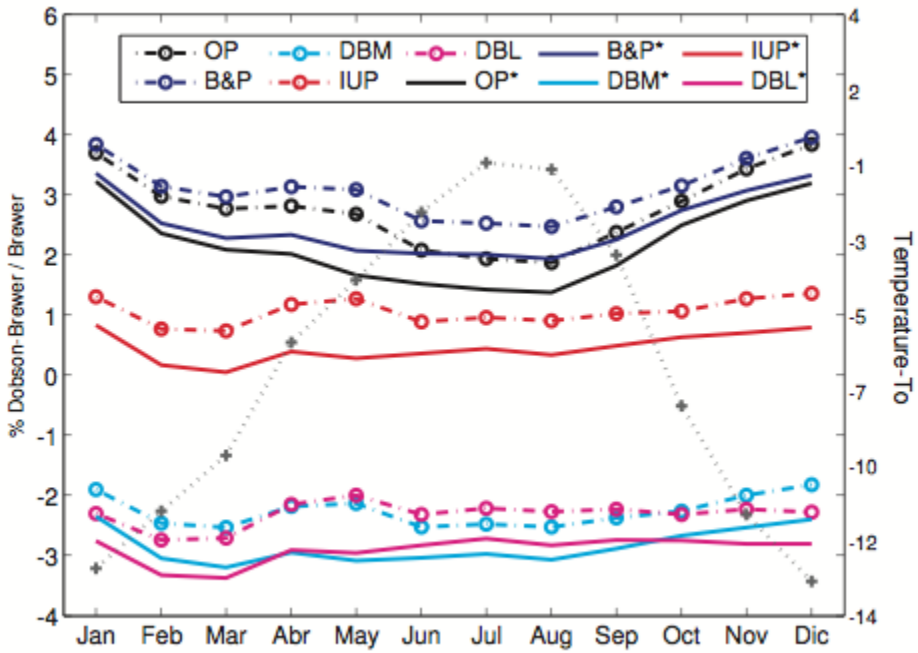
The operative is B&P at -45º C, no temperature dependence is taken into account.
The use of DMB produce a shift on Brewer ozone about -3%.

The change using HARMONICS (UIP) is small (less 1%) and improve the agreement between Brewer and Dobson.

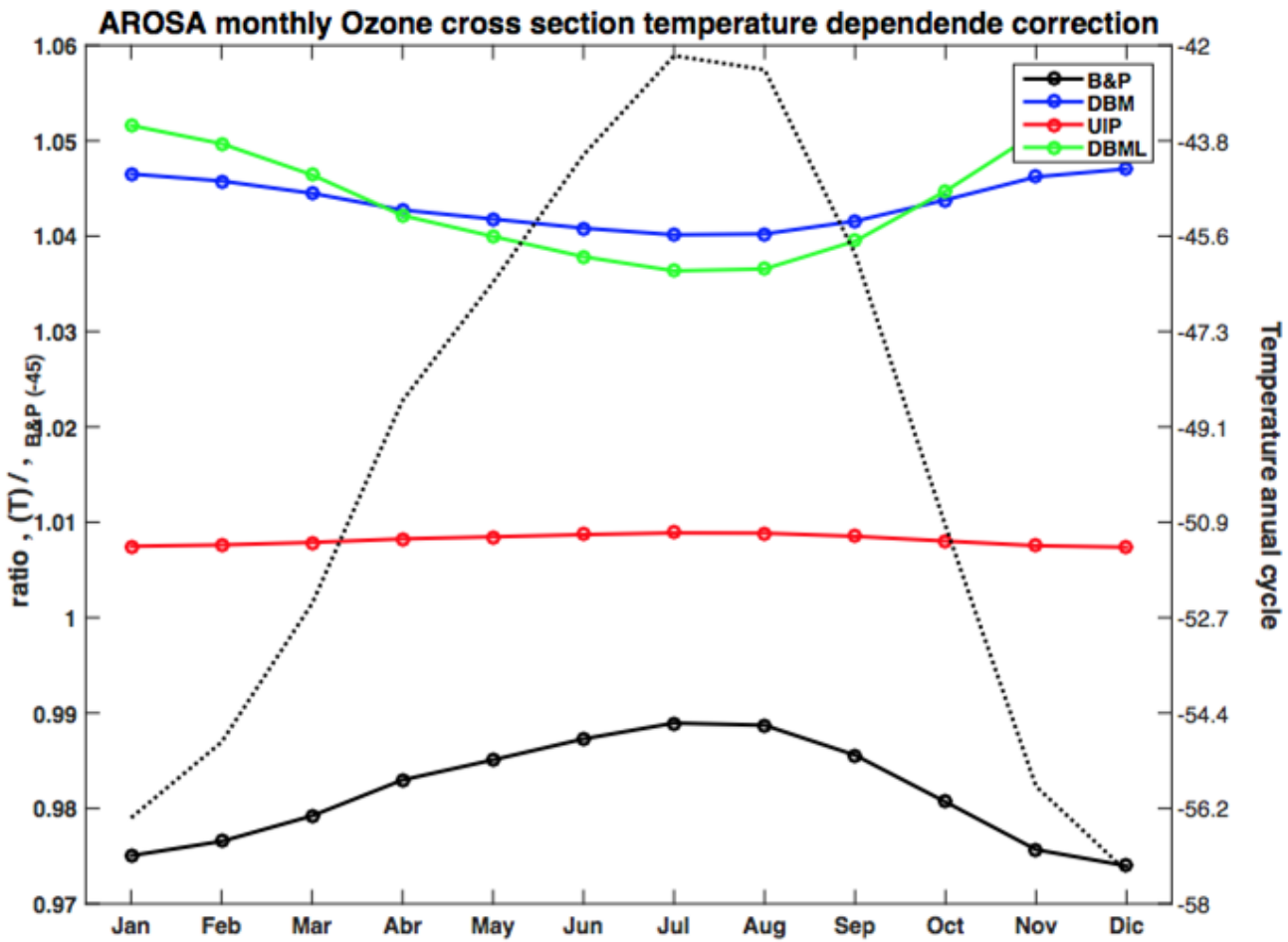


The seasonal difference between Brewer and Dobson reduces when we apply the temperature dependence of the cross section to the ozone retrieval.

ACSO: Recommends HARMONICS for Ground Base measurements.



How affect to the Brewer ?



GOBIERNO DE ESPAÑA
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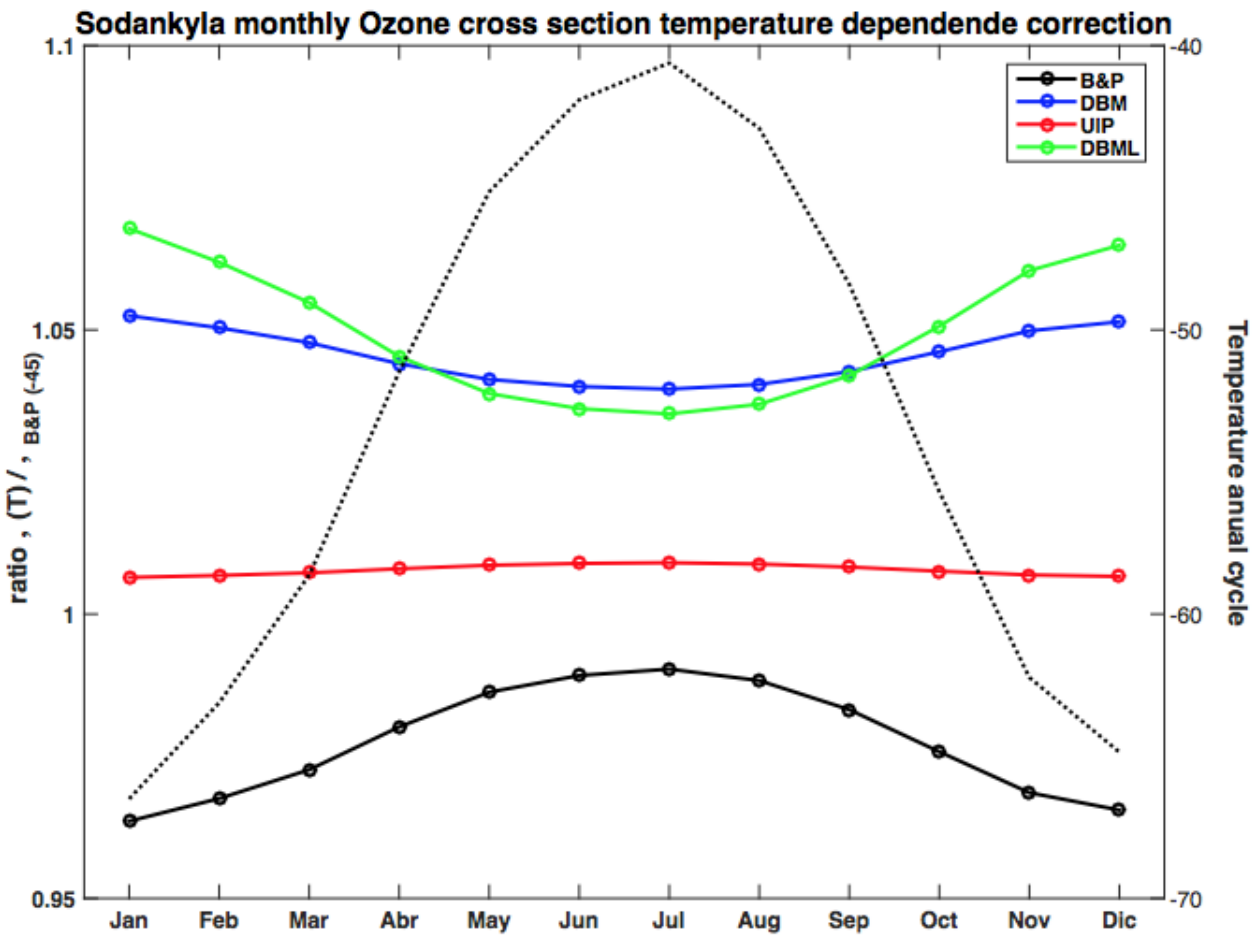
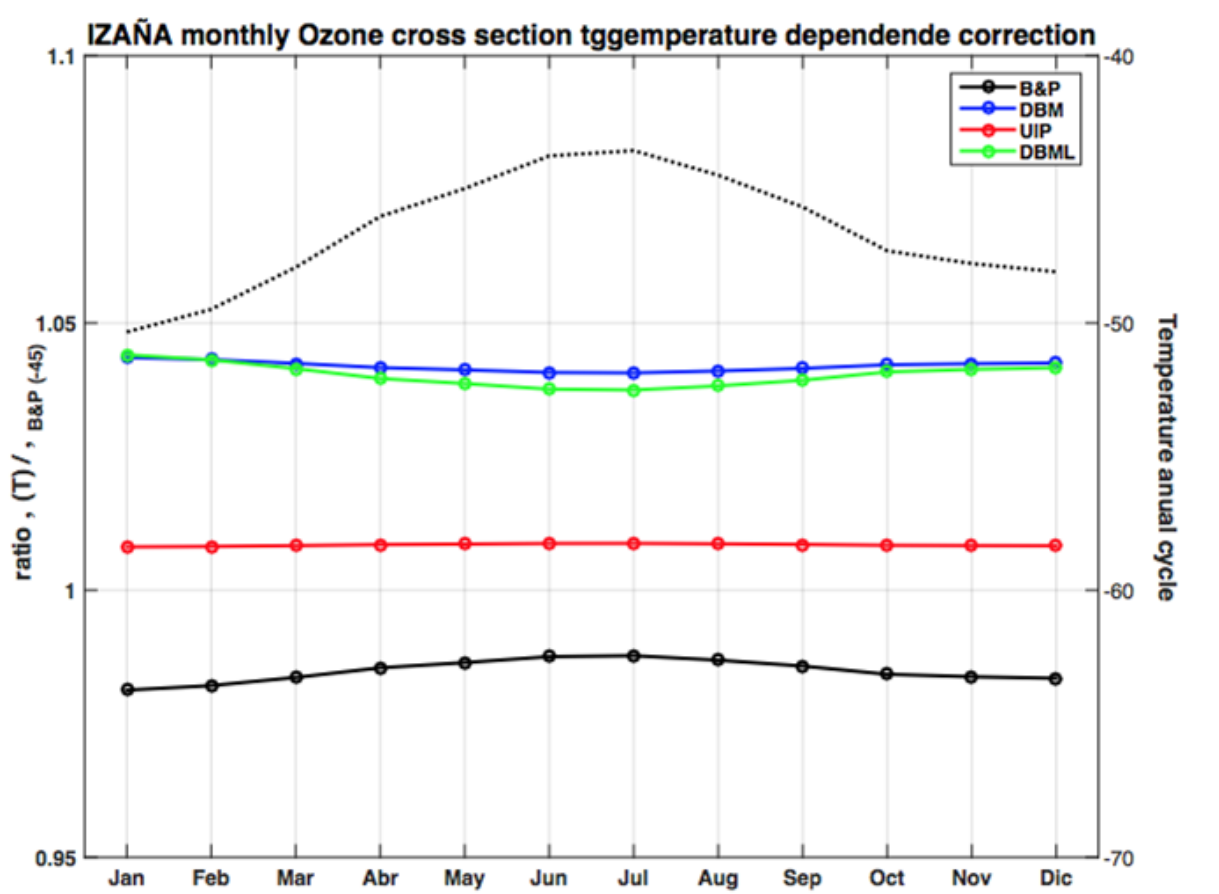
How affect to Brewer ?



Due small temperature variation over the tropical stratosphere the temperature oscillation is very small (<.01%). So brewer can be used without temperature correction.

At Izaña (28°) only the scale, is different when considering the different XS



The Izaña Pandora Series : 2011-2014

- Pandora obs (L4) is filtered using the Data Quality Flags of the previous ESA-CALVAL project.
- Three ozone cross sections were evaluated:
  - B&P
  - Harmonics 2013
  - BDM : 4 temps Liu et al. 2007, (Operative)

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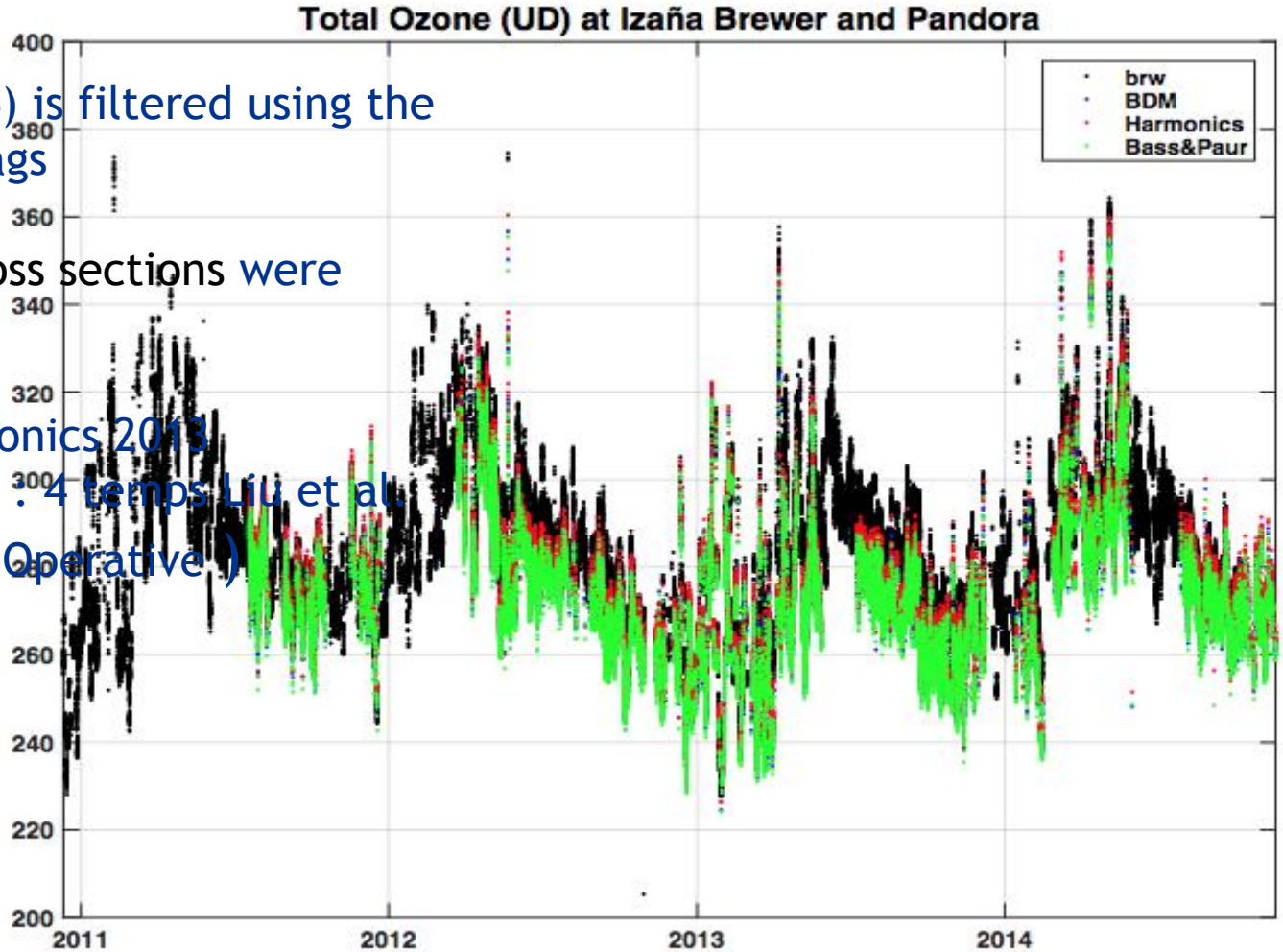
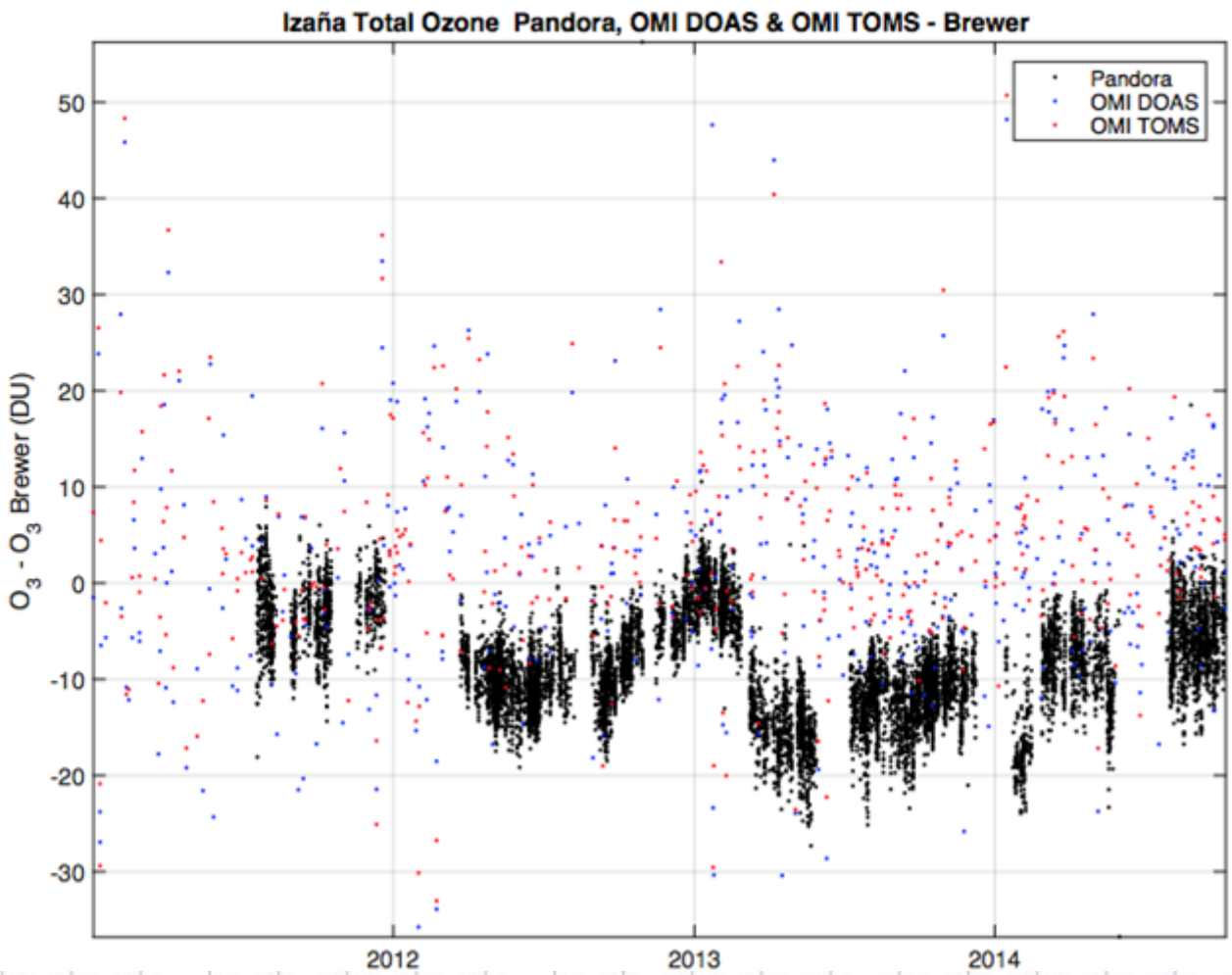
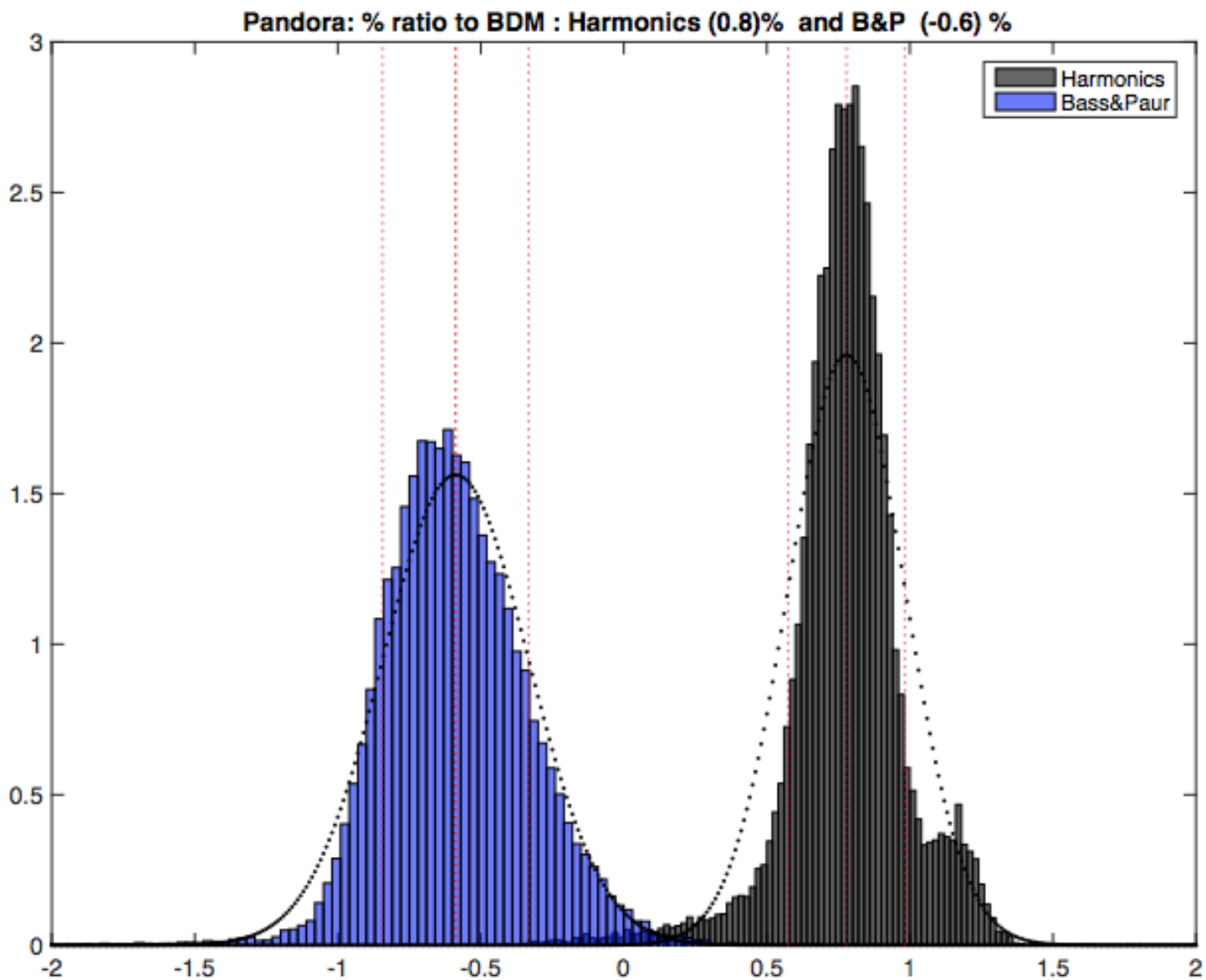
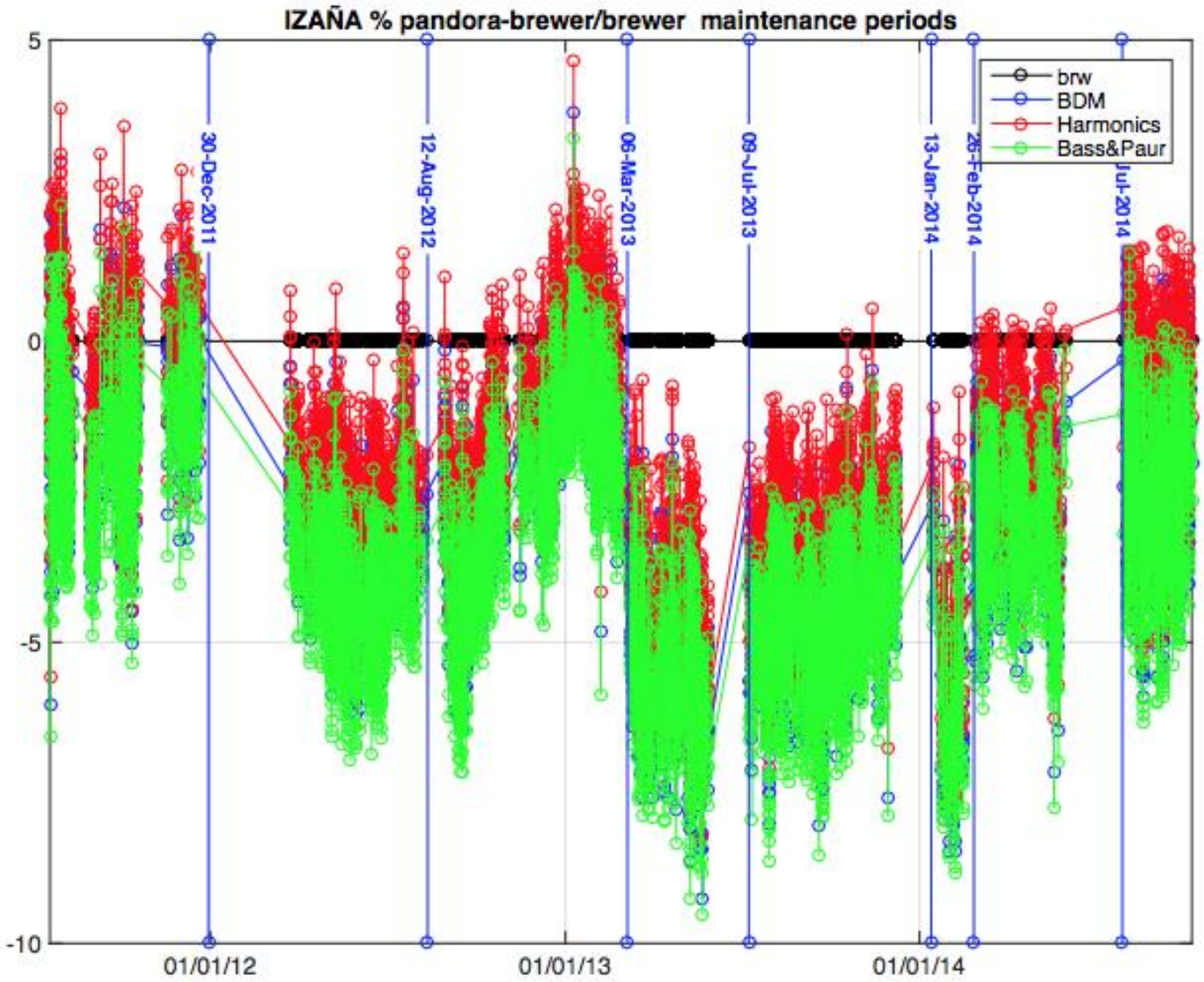
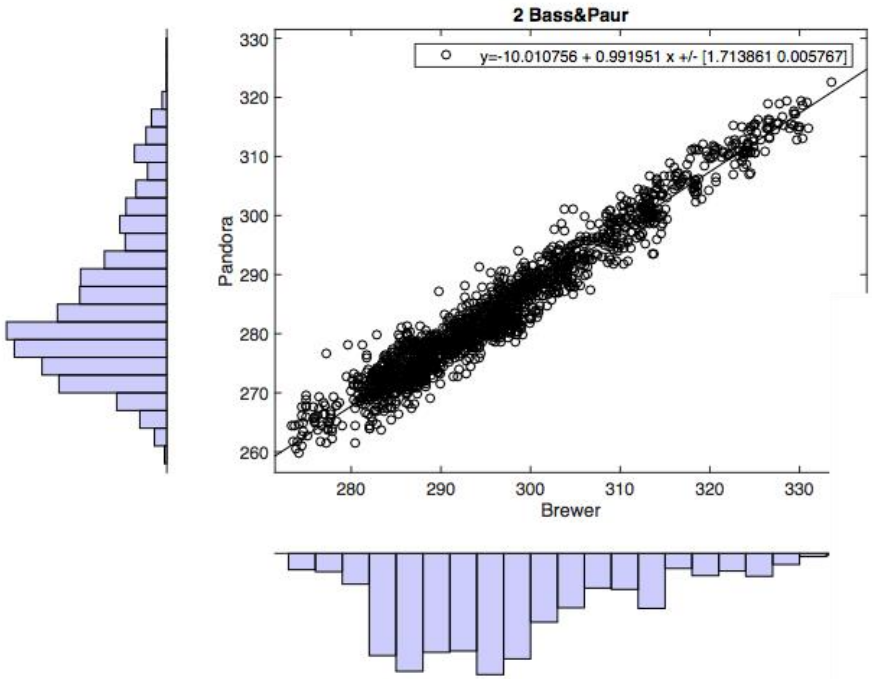


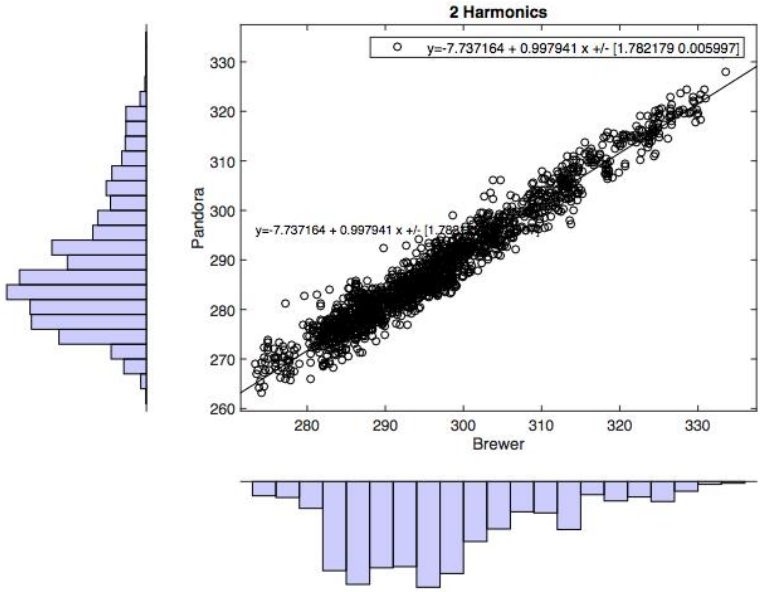
Brewer Pandora & OMI

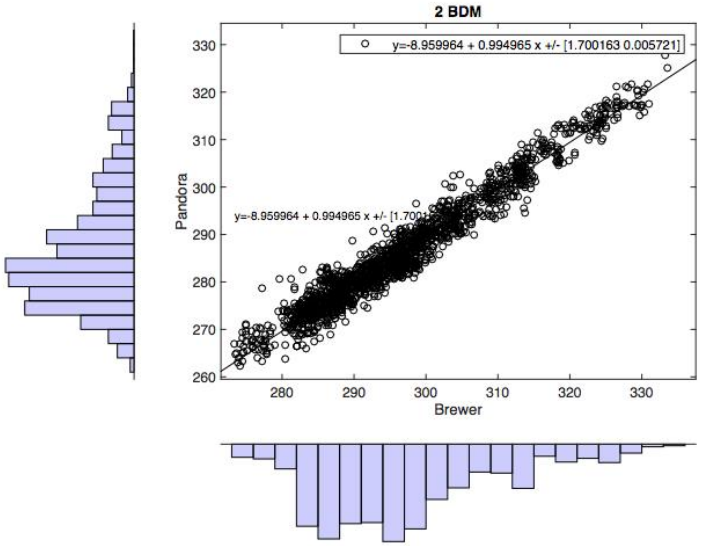



Pandora: % ratio to BDM : Harmonics (0.8)% and B&P (-0.6) %
Harmonics
Bass&Paur
3
2.5
2
1.5
1
0.5
0
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

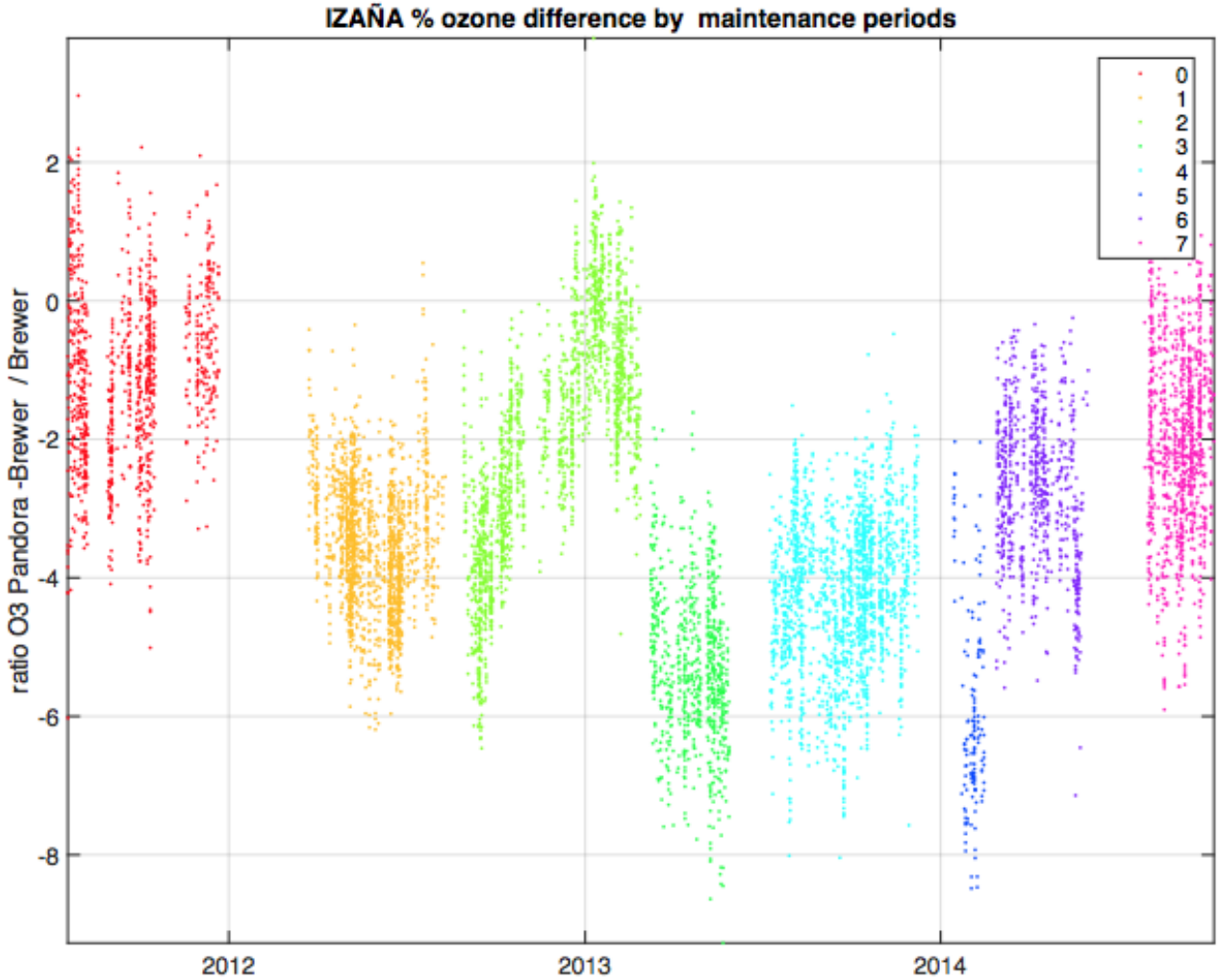

IZAÑA % pandora-brewer/brewer maintenance periods
brw
BDM
Harmonics
Bass&Paur
30-Dec-2011
12-Aug-2012
06-Mar-2013
09-Jul-2013
13-Jan-2014
26-Feb-2014
Jul-2014
5
0
-5
-10
01/01/12
01/01/13
01/01/14


2 Bass&Paur
y=-10.010756 + 0.991951 x +/- [1.713861 0.005767]
Pandora
Brewer

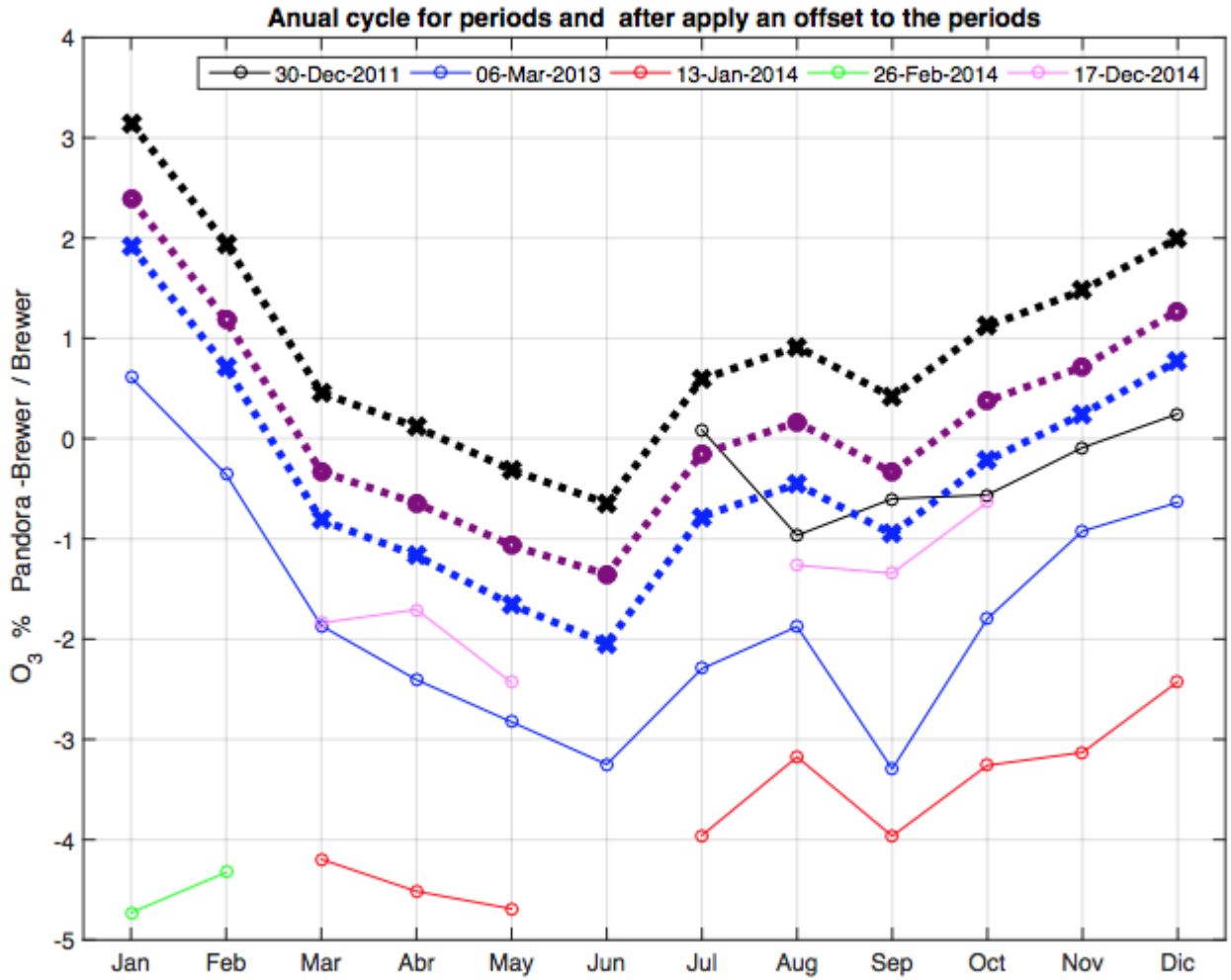

2 Harmonics
y=-7.737164 + 0.997941 x +/- [1.782179 0.005997]
Pandora
Brewer


2 BDM
y=-8.959964 + 0.994965 x +/- [1.700163 0.005721]
Pandora
Brewer

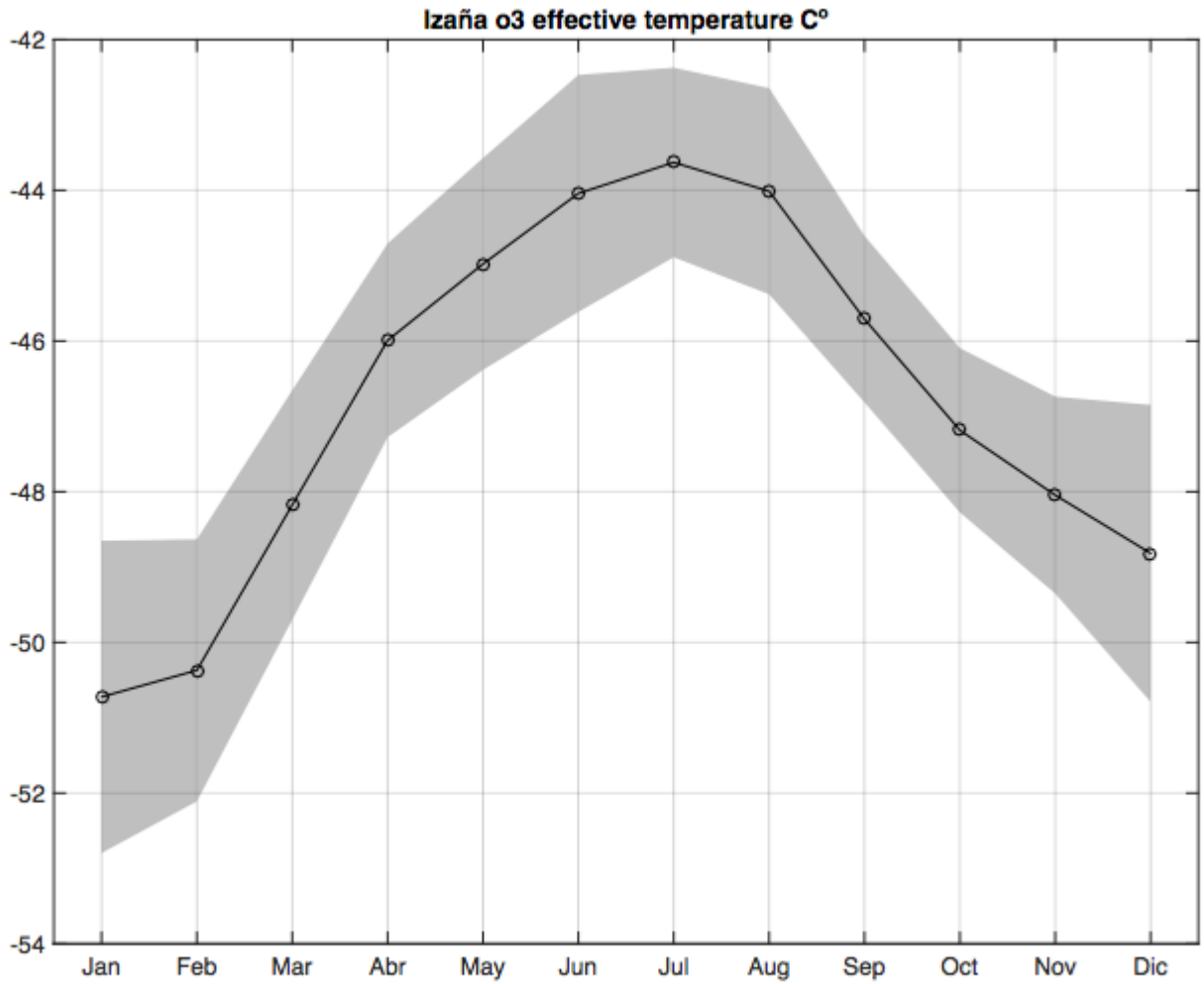
Brewer Ratio

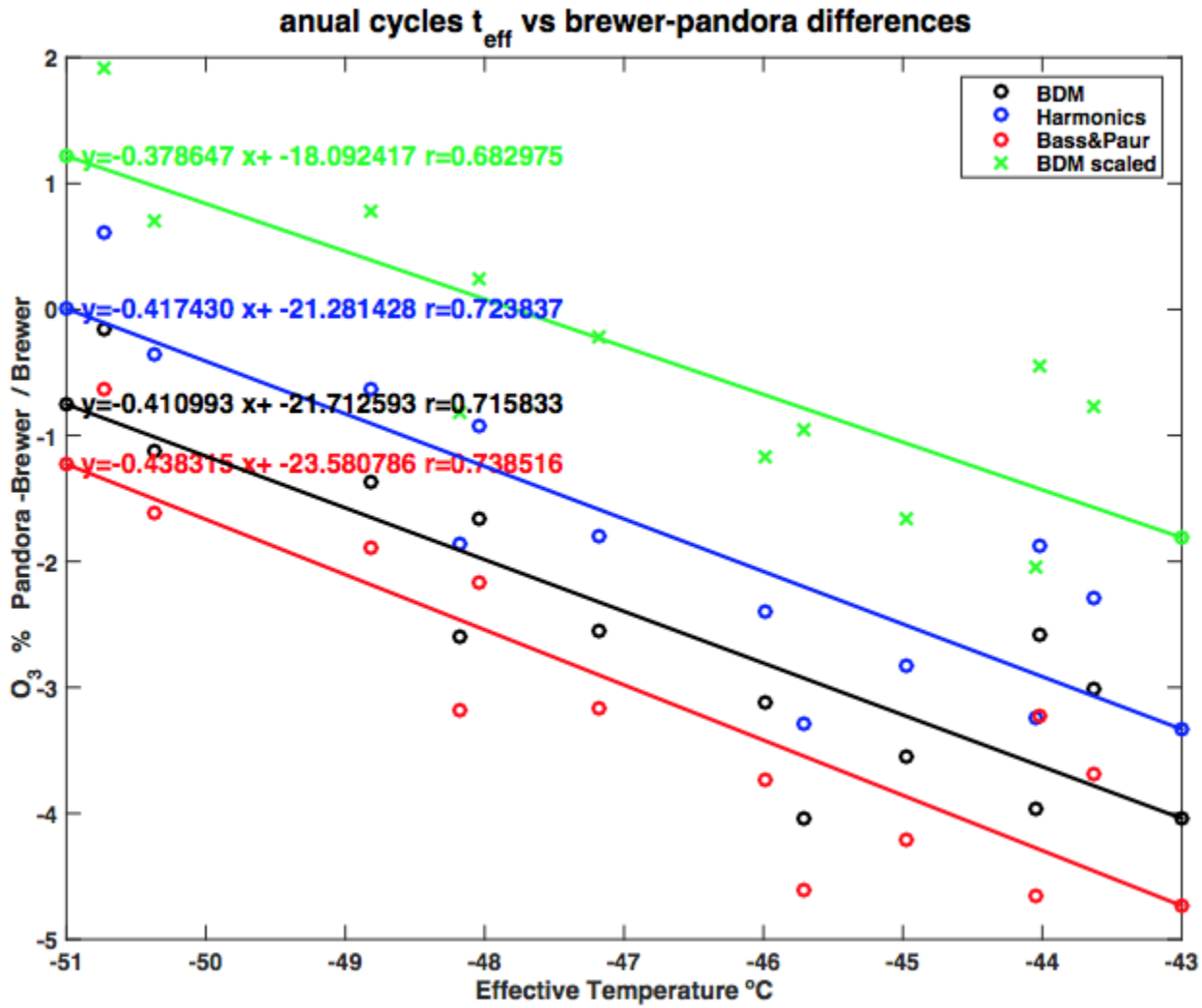


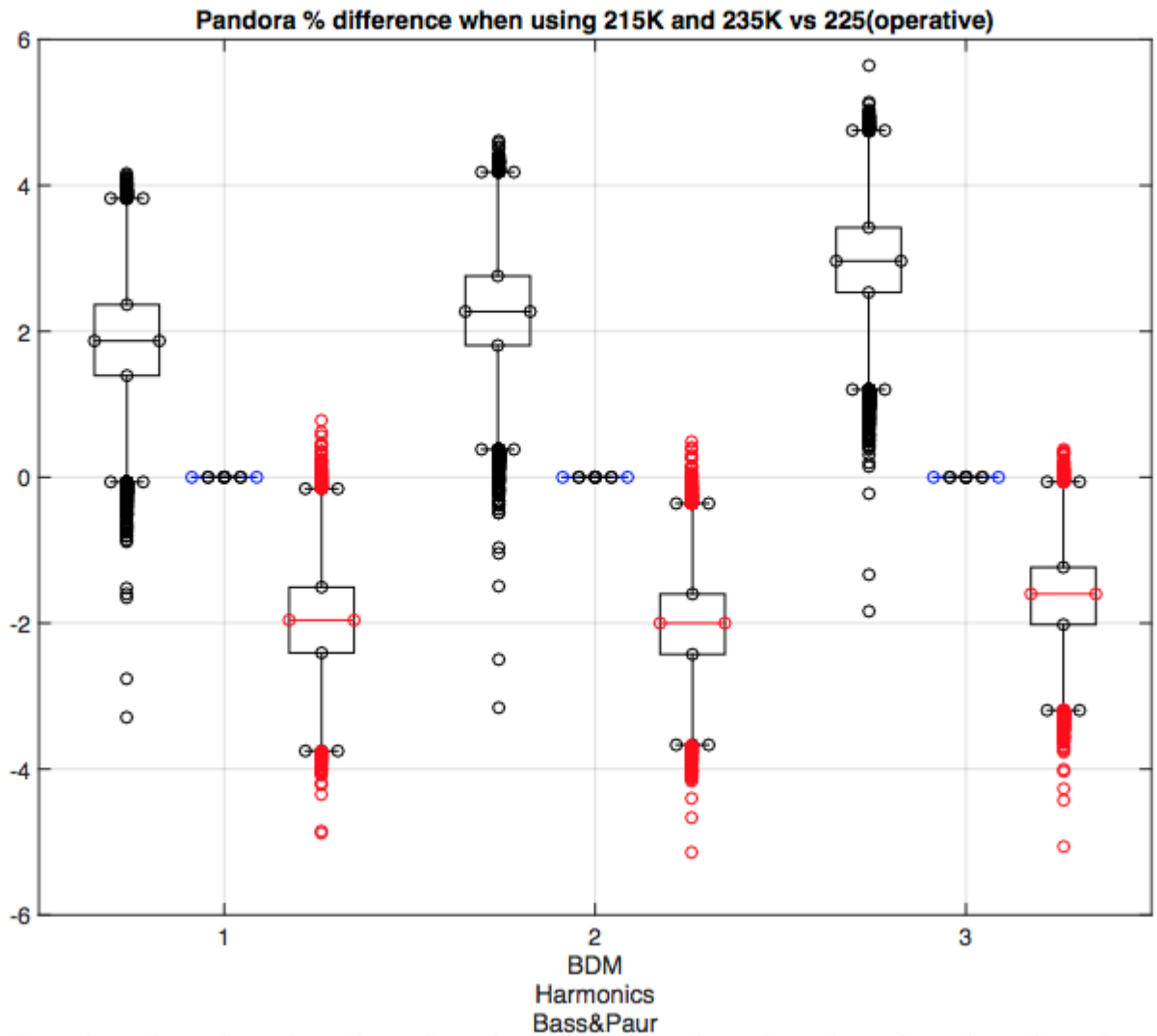
anual cycle of the differences



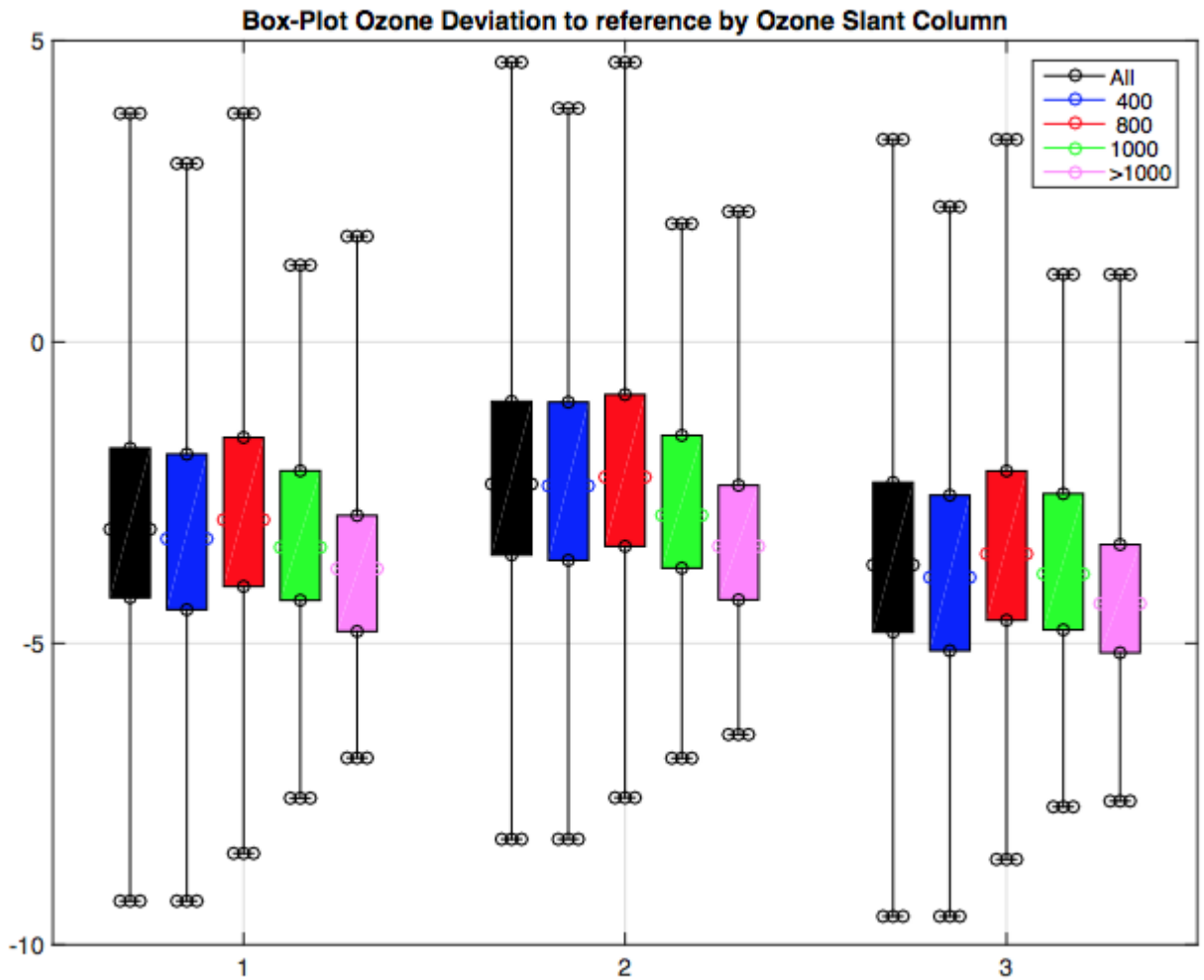
anual cycle of the difference (scaled)



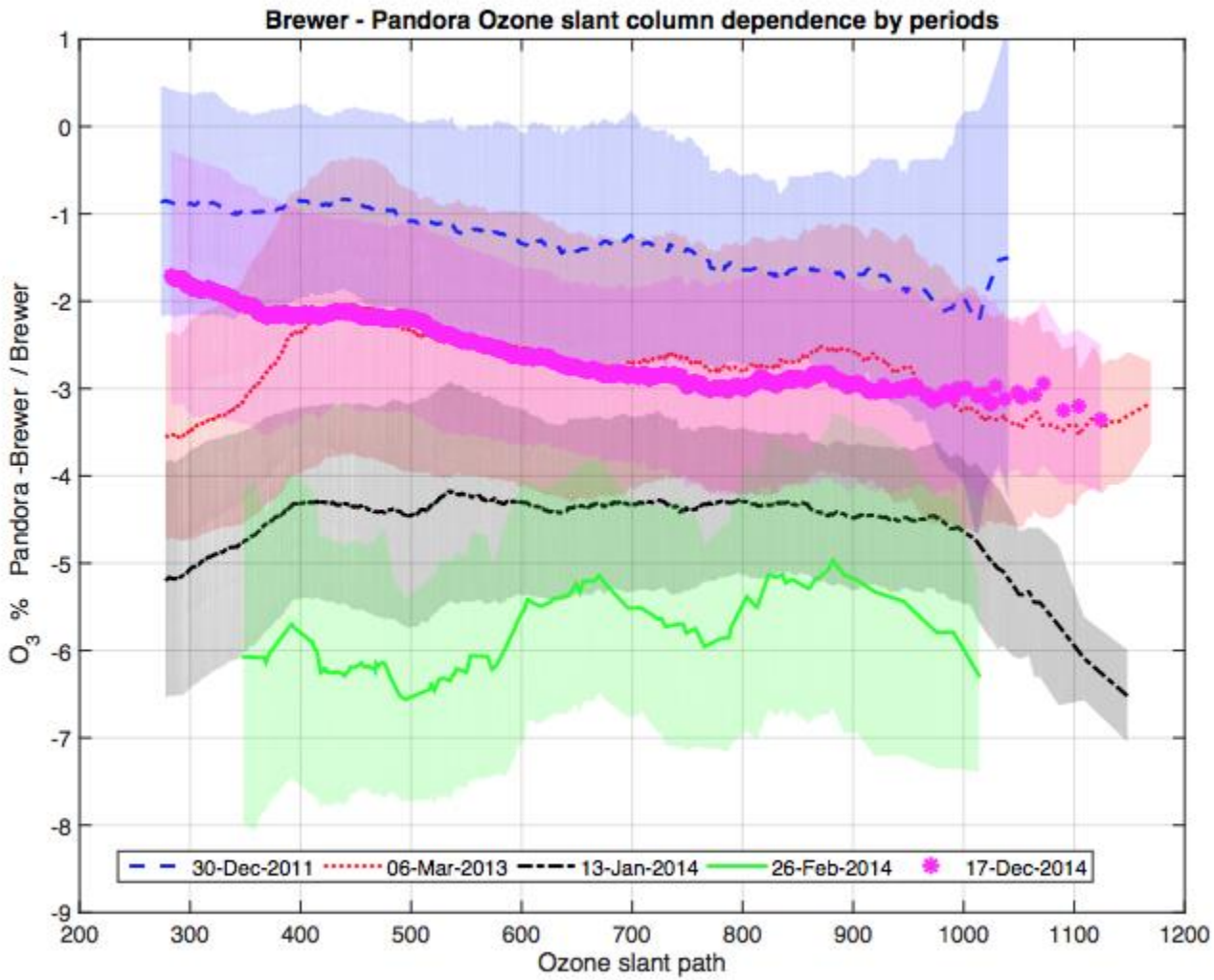

anual cycles t eff vs brewer-pandora differences
BDM
Harmonics
Bass&Paur
BDM scaled
y=-0.378647 x+ -18.092417 r=0.682975
y=-0.417430 x+ -21.281428 r=0.723837
y=-0.410993 x+ -21.712593 r=0.715833
y=-0.438315 x+ -23.580786 r=0.738516
O3 % Pandora -Brewer / Brewer
Effective Temperature °C
2
1
0
-1
-2
-3
-4
-5
-51
-50
-49
-48
-47
-46
-45
-44
-43


Pandora % difference when using 215K and 235K vs 225(operative)
6
4
2
0
-2
-4
-6
1
2
3
BDM
Harmonics
Bass&Paur

Stray Light


Box-Plot Ozone Deviation to reference by Ozone Slant Column
5
0
-5
-10
1
2
3
All
400
800
1000
>1000

Stray light (II)



CONCLUSIONS

-The effect is small 0.8% for Harmonics -0.6% B&P

-Initial Brewer comparison “suggest” a 4%/10K whereas the direct application of +/- 10K get 2%/10K.

- Stray Light: Pandora behaves as a good “single” brewer