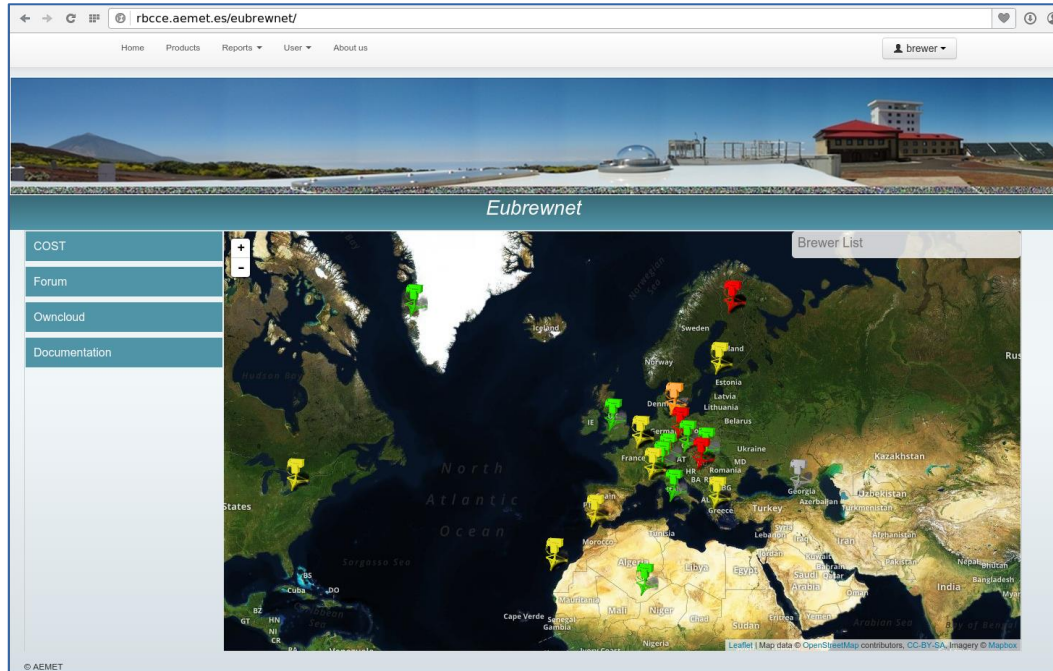


Brewer-OMI comparisons using EUBREWNET

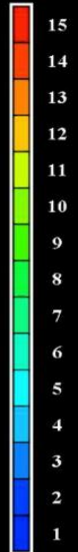
Regional Brewer Calibration Center for Europe

- EUBREWNET : Brewer database
- EUBREWNET Ozone OMI comparison
- EUBREWNET Ultraviolet OMI comparison
- Next Steps: AOD

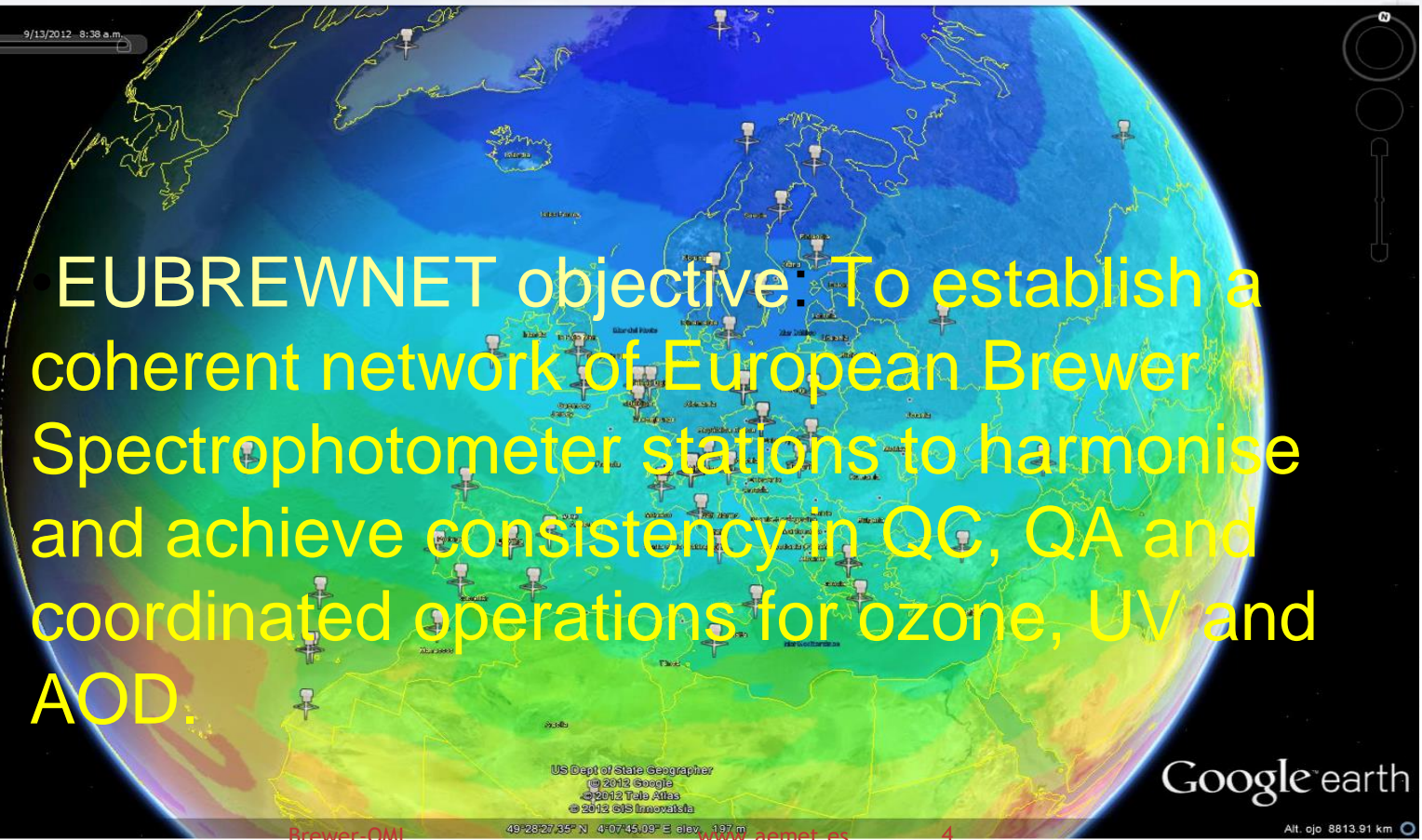
<http://rbcce.aemet.es/eubrewnet>



UV index 9/13/2012 8:38 a.m.



EUBREWNET objective: To establish a coherent network of European Brewer Spectrophotometer stations to harmonise and achieve consistency in QC, QA and coordinated operations for ozone, UV and AOD.



US Dept of State Geographer
© 2012 Google
© 2012 Tele Atlas
© 2012 GIS Innovatika

Google earth

Research directions on EUBREWNET

- Instrument characterisation.
- Standardisation of calibration protocols.
- Standard data processing algorithms.
- Effective QA/QC systems linked to satellite data.
- Understanding of uncertainties.

COST ACTION WEB

<http://rbcce.aemet.es/eubrewnet>



- 19 European participants:

AT, BE, CH, CZ, DE, DK, EL, ES, FI, HU, IE, IT, NL, NO, PL, PT, SK, SE, TR, UK

Non-European Partners :

- WMO.
- NOAA (USA).
- York University (CA).
- International Ozone Services (CA).
- Environmental Canada (Applying).
- Argelia (Tamanrasset Station).
- University of Tasmania (AUS)



FEDERATED NETWORK: Every station is responsible for his observations proper operation of the instrument and its calibration.

Calibration information will determine the level of the data.

- **Level 1** : Observations as are recorded by the instrument
- **Level 1.5** : Real Time Observations uniform processed.
- **Level 2.0** : Uniform process with **calibration information, validated by the calibration center RBCC-E for Ozone and PMOD-WRC- (QASUME) for UV) and AOD (RBCC-E/WRC project)**

The data processing is uniform and open

Brewer Processing Library (Kipp & Zonen):

<http://rbcce.aemet.es/dokuwiki/doku.php?id=devel:brewerpythonmodule>

Based on the calibration history of the instrument:

<http://rbcce.aemet.es/eubrewnet/configuration/history>

And documented

<http://rbcce.aemet.es/dokuwiki>

← → ↻ 📄 | rbcce.aemet.es/dokuwiki/doku.php?id=codes:accessfunctions

FUNCTION TABLE

Function	Short Description	Long Description	Link
getETC	Returns the ETC on Ozone ratio from ICFS	getETC	Get ETC
getDS	Returns the DS measures of a brewer for a date	getDS	Get DS
getDSinterval	Returns the DS measures of a brewer for a range of dates	getDSinterval	Get DSinterval
getZS	Returns the ZS measures of a brewer for a date	getZS	Get ZS
getSL	Returns the SL measures of a brewer for a date	getSL	Get SL
getConfigbyDate	Returns the available Configuration of a brewer for a date	getConfigbyDate	Get Config by Date
getDSS	Returns the DS summaries of a brewer for a date	getDSS	Get DSS
getZSS	Returns the ZS summaries of a brewer for a date	getZSS	Get ZSS
getSLS	Returns the SL summaries of a brewer for a date	getSLS	Get SLS
getHG	Returns the mercury lamp tests of a brewer for a date	getHG	Get HG
getFileStatus	Returns the status of the received files	getFileStatus	Get FileStatus
getUmkehr	Returns the Umkehr measures for a date	getUmkehr	Get Umkehr
getBfileAvailable	Returns the available B files for a year	getBfileAvailable	Get BfileAvailable
getHGInterval	Returns the HG tests for an interval	getHGInterval	Get HG Interval
getUV	Returns the UV measures for a specific scantype	getUV	Get UV
getUVAvailableScanTypes	Returns the UV available types of scan	getUVAvailableScanTypes	Get UV Available Scan Types
getLVP	Returns the available LVP for a	getLVP	Get LVP

1-EUBREWNET: JSON output

<http://rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=157&date=2015-01-01&enddate=2015-01-02>

```
← → C IP rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=157&date=2015-01-01&enddate=2015-01-02

[["brewerid", "gmt", "date_unix", "sza", "airmass", "temperature", "filh", "fo3", "std_o3", "ms9", "so2", "std_so2", "ms8", "fi1", "fi2", "fi3", "fi4", "fi5", "latitude", "longitude", "press", "configdate", "configtype"], [157,
20150101082939Z, 735599.3539236111, 84.08468922321024, 8.05971099088214, 12, 0, 72.90904135664641, 27.794242914960478, 3575, -2.58502303711575, 13.728557500357098, 6420, 3010, 7853, 13380,
18432, 1107, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083018Z", 735599.354375, 84.5605474532189, 7.956011155485154, 12, 0, 95.88986191821658, 27.794242914960478, 4170,
7.0886587416146, 13.728557500357098, 10519, 3010, 5402, 13380, 1914, 20951, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083056Z", 735599.3548148149, 84.4396888243204, 7.85781144831213,
12, 0, 119.8700582467072, 27.794242914960478, 4778, -9.138485248734517, 13.728557500357098, 9116, 3010, 8433, 14172, 19050, 21676, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083135Z",
735599.3552602038, 84.3157528269202, 7.758120298186739, 12, 0, 72.5647743255348, 27.794242914960478, 3491, 15, 223222204854437, 13.728557500357098, 9891, 3010, 10194, 14314, 19613, 21546, 28.3081,
16.4992, 770.0, 20140916, 3], [157, "20150101083214Z", 735599.3557175926, 84.19192178888805, 6.660163564127781, 12, 0, 156.84838805459094, 27.794242914960478, 5659, -34.92533345901745,
13.728557500357098, 6812, 6394, 8433, 14441, 20046, 22022, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083256Z", 735599.3562037037, 84.05868316084286, 7.556610082450459, 12, 0,
114.91477193889232, 24.722888131019037, 4528, -13.583367508588786, 9.289328434846524, 7437, 4176, 8945, 15311, 20120, 22620, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083335Z",
735599.356659026, 83.93507160922536, 7.46224758798836, 12, 0, 138.4043265273544, 24.722888131019037, 5086, -32.40290045530834, 9.289328434846524, 5568, 8435, 9402, 14841, 20574, 22472, 28.3081,
16.4992, 770.0, 20140916, 3], [157, "20150101083414Z", 735599.3571064814, 83.81155649910535, 7.369007479707122, 12, 0, 96.9297343858631, 24.722888131019037, 4005, 2.6358743461189036,
9.289328434846524, 8965, 4176, 10194, 15198, 20737, 22958, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083453Z", 735599.3575578703, 83.6881832234155, 7.27660630752083, 12, 0,
138.2153283598382, 24.722888131019037, 4995, -8.894607051199067, 9.289328434846524, 10045, 4176, 9816, 15311, 21162, 23181, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083532Z",
735599.3580092592, 83.56487757750472, 7.189420441049317, 12, 0, 195.97765394266384, 24.722888131019037, 6363, -19.53070149899814, 9.289328434846524, 12633, 3010, 9816, 16560, 21415, 23071, 28.3081,
16.4992, 770.0, 20140916, 3], [157, "20150101083615Z", 735599.35858099445, 83.42906674016223, 7.092360724824635, 12, 0, 229.534182905019, 42.8710092972445, 7107, -61.322733893890864,
25.00528078739803, 7193, 7186, 8433, 16643, 21550, 23646, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083652Z", 735599.3589467593, 83.30915701328419, 7.009390278873855, 12, 0,
211.96095121005, 42.8710092972445, 6862, -56.90468232884723, 25.00528078739803, 7338, 8435, 9402, 16643, 21954, 23743, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083732Z",
735599.3593981481, 83.18620553535154, 6.925231103272181, 12, 0, 120.0842984633513, 42.8710092972445, 4403, 11.378722615450549, 25.00528078739803, 11918, 3010, 11444, 16724, 22097, 24197, 28.3081,
16.4992, 770.0, 20140916, 3], [157, "20150101083811Z", 735599.359849573, 83.063529679886, 6.84280809219368, 12, 0, 133.1056024032217, 42.8710092972445, 4677, -6.29370323389735,
25.00528078739803, 8551, 5425, 11444, 16724, 22097, 24197, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083849Z", 735599.3602893159, 82.943761086048, 6.7673161086048,
196, 5349619897548, 42.8710092972445, 6093, -26.143132848056905, 25.00528078739803, 10733, 5425, 10864, 17725, 23275, 25363, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101083932Z",
735599.3607703731, 82.80855999138862, 6.67626423901122, 12, 0, 184.8913921882098, 49.608597631559924, 5771, -30.83136067686383, 17.571332708029395, 8858, 7186, 11444, 18431, 24244, 26073, 28.3081,
16.4992, 770.0, 20140916, 3], [157, "20150101084011Z", 735599.361238426, 82.6805244678852, 6.598580193753749, 12, 0, 141.50764179974513, 49.608597631559924, 4750, -16.702472862015554,
17.571332708029395, 7985, 8435, 12827, 18796, 24767, 27244, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084050Z", 735599.3616898148, 82.5636564275048, 6.5225679862404, 12, 0,
272.30017956001193, 49.608597631559924, 7610, -44.7533355049505, 17.571332708029395, 9235, 8435, 11163, 19931, 25826, 28245, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084128Z",
735599.3621296296, 82.4445066773685, 6.449381865815193, 12, 0, 249.74726122486885, 49.608597631559924, 7048, -19.096410456397308, 17.571332708029395, 15420, 3010, 12190, 20082, 26141, 28423,
28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084207Z", 735599.3625810185, 82.3223324781216, 6.376020847225862, 12, 0, 277.6048453883011, 49.608597631559924, 7589, -52.880717017026925,
17.571332708029395, 11408, 6394, 14754, 20284, 25866, 33860, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084250Z", 735599.363037078, 82.1875857668737, 6.3016312361425, 12, 0,
19.095978793906, 50.36272539952644, 4554, 4.54211934001515, 15.732841569804943, 11071, 5425, 13552, 19854, 25644, 28379, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084329Z",
735599.3635300926, 82.062381244715961, 12, 0, 195.5779292480543, 50.36272539952644, 5714, -11.877964965070731, 15.732841569804943, 12230, 6394, 13874, 20639, 20852, 29301, 28.3081,
16.4992, 770.0, 20140916, 3], [157, "20150101084407Z", 735599.36399099074, 81.94712344844064, 15.909916310359, 12, 0, 291.1394844332676, 50.36272539952644, 7668, -41.1768893005994,
15.732841569804943, 14092, 6394, 13204, 21777, 33963, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084446Z", 735599.364432983, 81.82541170844627, 735599.364432983, 81.82541170844627, 12, 0,
253.0150874851365, 50.36272539952644, 6812, -28.47242600298873, 15.732841569804943, 13262, 6394, 14026, 22142, 28244, 30809, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084525Z",
735599.364726852, 81.7038193052072, 6.024931230383806, 12, 0, 272.6278553007222, 50.36272539952644, 7157, 1.2810581137151891, 15.732841569804943, 19323, 3010, 15737, 23533, 30161, 32490, 28.3081,
16.4992, 770.0, 20140916, 3], [157, "20150101084607Z", 735599.3653587903, 81.573000919877, 5.9548248393962435, 12, 0, 230.7630103843244, 15.792123219297007, 6245, 4.34664581024839,
4.2634651185074, 16725, 18597, 4176, 16215, 24506, 30809, 33288, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084647Z", 735599.36591643519, 81.08820118466095, 5.708867678917037, 12, 0,
278.1599042126446, 15.792123219297007, 6969, 25.19268745237312, 4.2634651185074, 18869, 6394, 14026, 27635, 33889, 36475, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084725Z",
735599.36650463, 80.95811508019871, 5.643394586815375, 12, 0, 322.157821810703, 9.138499167539612, 7752, -28.193479106481007, 7.912070426283375, 16833, 13206, 23241, 32096, 38468, 40994,
28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084804Z", 735599.367129631, 81.209922138284857, 5.767074314212022, 12, 0, 295.5050664719234, 15.792123219297007, 7366, -7.8695461025517375,
7.912070426283375, 18534, 14289, 24743, 33513, 39750, 42264, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084842Z", 735599.367631643519, 81.08820118466095, 5.708867678917037, 12, 0,
325.0429084233296, 9.138499167539612, 7681, -11.41626199372169, 7.912070426283375, 19185, 13718, 26114, 34829, 41094, 43548, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101084916Z",
735599.36820046297, 80.5962125492326, 5.4728971009219754, 12, 0, 311.69631823511224, 9.138499167539612, 7372, -4.96611424439282, 7.912070426283375, 19163, 14590, 27234, 35598, 41834, 44255, 28.3081,
16.4992, 770.0, 20140916, 3], [157, "20150101085012Z", 735599.36945800186, 80.47581929805698, 5.418331204736706, 12, 0, 294.0441255303552, 9.138499167539612, 6989, 1.659207762117299,
7.912070426283375, 18790, 14590, 27198, 35135, 41409, 43815, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101085042Z", 735599.3699421298, 80.34630810310505, 5.36069976203607, 12, 0,
373.8017680176267, 3.106122186956053, 7473, -0.50561943274169, 2.073556484952666, 20347, 15533, 28921, 37354, 43594, 45997, 28.3081, 16.4992, 770.0, 20140916, 3], [157, "20150101085127Z",
```

- On board of NASA's Aura satellite
- Data available since October 2004
- Ozone products: OMT03 (TOMS-like) and OMDOAO3 (DOAS algorithm)
- UV product: OMUVB
- Level 2 station-overpass data: Aura Validation Data Center

<http://avdc.gsfc.nasa.gov>

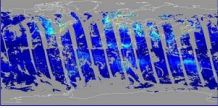


The screenshot shows the homepage of the Aura Validation Data Center (AVDC) website. The page features a header with the NASA logo and the text "GODDARD SPACE FLIGHT CENTER". A navigation menu includes "OVERVIEW", "DATA", "TOOLS", "DOCUMENTATION", "LINKS", and "EVENTS". The main content area is titled "OVERVIEW HOME" and is divided into three columns: "The AVDC", "Latest Images", and "Latest News".

The AVDC
The Aura Validation Data Center (AVDC) is a centralized, long-term, archive for validation data hosted by the Atmospheric Chemistry and Dynamics Branch at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. The AVDC mission is to support the Earth Observing System (EOS)-Aura validation and science activities, and the future "A-Train" Earth Science satellites validation activities.

Data archived at the AVDC originates from several special Aura validation campaigns, NASA aircraft and balloon deployments, established measurement networks for collection atmospheric data, the Network for Detection of Atmospheric Composition Change (NDACC), the Southern Hemisphere Additional Ozonesondes (SHADOZ), and the World Meteorological Organization (WMO)'s Global Atmosphere Watch (GAW), among others.

Latest Images
November 22, 2015
Total NO2 vertical column densities (VCD)

November 22, 2015
Tropospheric NO2 CS30 vertical column densities (VCD)

[...more data](#)

Latest News
- Oct 15, 2015 - Reprocessed OMI L2 ovp files for orbit 59434 (59487-59501 for OMNO2)
- Sep 28, 2015 - Reprocessed total column water vapor (2005-2009) online (OMH2O/SAO) [-]
- Jul 20, 2015 - MLS v4.2 profiles and station overpass files on-line [-]

Quick Links
- AVDC public data access [-]
- GEOMS data upload [-]
- GEOMS overview [-]
- DSCOVR Mission [-]
- OMNO2 L3 data access [-]
- OMNO2 L3 gallery [-]
- Summary of volcanic activity (S. T. Massie, NCAR) [-]

U.S. Government Public Information Exchange Resource. You have accessed a U.S. Government Resource. This site is intended to be used by the public for information exchange. Any attempt to modify or export this resource or associated information other than for approved use is strictly prohibited and may be punishable under the Computer Fraud and Abuse Act of 1986. The government may monitor and audit the usage of this resource. All persons are hereby notified that use of this resource constitutes consent for monitoring, keystroke recording, or auditing.

2-OMI: AVDC overpass data



GOBIERNO DE ESPAÑA

MINISTERIO DE AGRICULTURA, ALIMENTACIÓN Y MEDIO AMBIENTE

AEMet
Agencia Estatal de Meteorología

avdc.gsfc.nasa.gov/index.php?site=2045907950

Aura/OMI data

Product	Level/Type	Description	Source	Access
Level 1B	L1	OMI Level-1B	GES-DISC	public
	L2 OVP	Aerosol Optical Thickness & Single Scattering Albedo. Station overpass data.	AVDC	public
OMAERUV	L3	OMI Near-UV Aerosol Extinction and Absorption Optical Depth Daily L3 Global.	GES-DISC	public
	L2 OVP	Total column bromine monoxide (BrO). Station overpass data.	AVDC	public
OMBRO	L2 OVP	Total column bromine monoxide (BrO). Station overpass data.	AVDC	public
OMCLDO2	L2G	Cloud pressure and fraction measured using O2-O2 absorption and the DOAS technique. Gridded dataset.	GES-DISC	public
OMCLDRR	L2G	Cloud pressure and cloud fraction from Raman scattering. Gridded dataset.	GES-DISC	public
OMDOAO3	L2 OVP	Total ozone column using the DOAS technique. Station overpass data.	AVDC	public
	L2G	Total ozone column using the DOAS technique. Gridded dataset.	GES-DISC	public
OMHCHO	L2 OVP	Total column formaldehyde (HCHO). Station overpass data.	AVDC	public
	L2 OVP	Nitrogen dioxide (NO2) total column. Station overpass data.	AVDC	public
OMNO2	L2G	Nitrogen dioxide (NO2) total columns using the DOAS technique. Gridded dataset.	GES-DISC	public
	L3	Mapped OMI NO2 product. Daily 0.25 deg. x 0.25 deg. Images and data.	AVDC	public
	L2 OVP	Slant column chlorine dioxide (ClO). Station overpass data.	AVDC	public
OMOCLO	L2 OVP	Slant column chlorine dioxide (ClO). Station overpass data.	AVDC	public
OMSO2	L2 OVP	Sulphur dioxide (SO2) total column. Station overpass data.	AVDC	public
OMTO3	L2 OVP	TOMS-like total ozone column and aerosol index. Station overpass data.	AVDC	public
	L2G	TOMS-like total ozone column and aerosol index. Gridded dataset.	GES-DISC	public
	L3	Mapped OMI TO3 product. Daily 0.25 deg. x 0.25 deg. data.	GES-DISC	public
OMUVB	L2 OVP	Surface UV irradiances. Station overpass data.	AVDC	public
OMO3PR	L2	Ozone Profiles	GES-DISC	public
	L2 OVP	Ozone Profiles. Station overpass data.	AVDC	public
PROFOZ	L2	Ozone Profiles, including tropospheric ozone.	SAO	public
OMH2O	L2	Total column water vapor (H2O).	SAO	public

Aura/TES data

Please download and read the TES product information documents that describe quality status, expected precision, resolution, and known

- Brewers at El Arenosillo (2015 campaign, May 25th to June 5th) or at their stations (January 1st 2013 to October 15th 2015)
- Average of Brewer data within 30 minutes of each OMI observation (usually, 1 per day)
- Relative difference =



Arenosillo, Huelva (Spain), May 27th -- June 05th, 2015



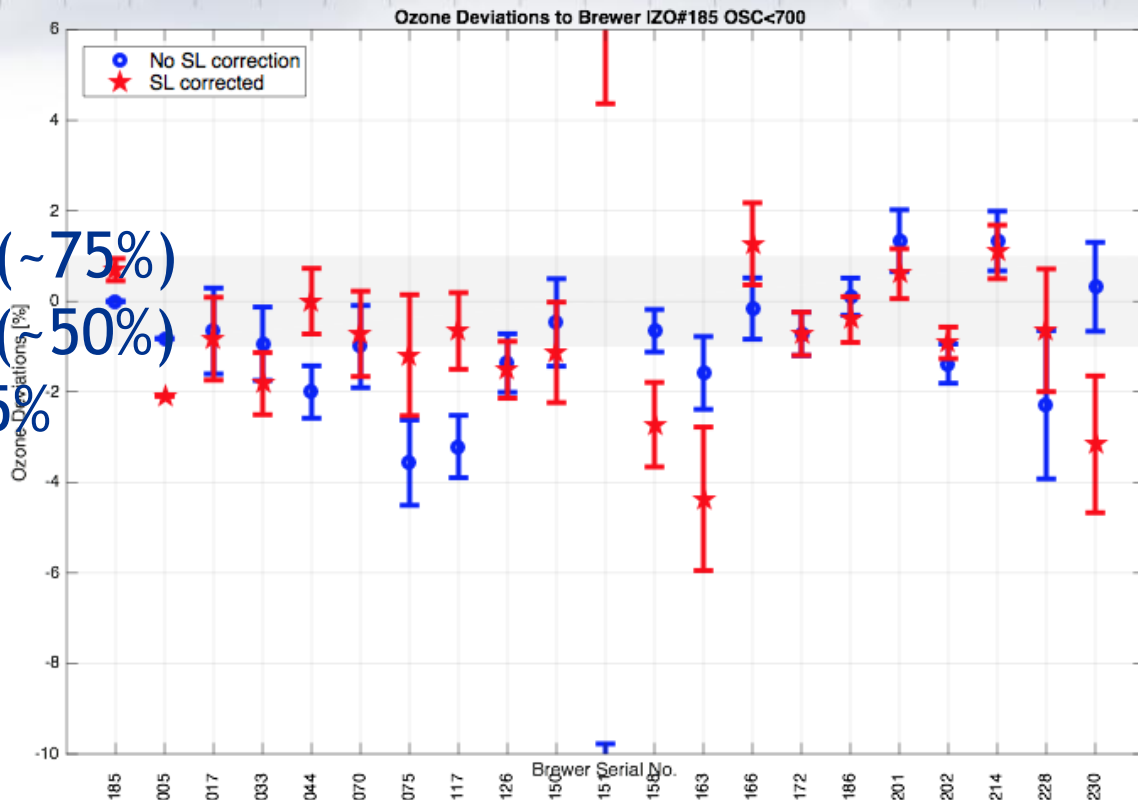


Blind Days:

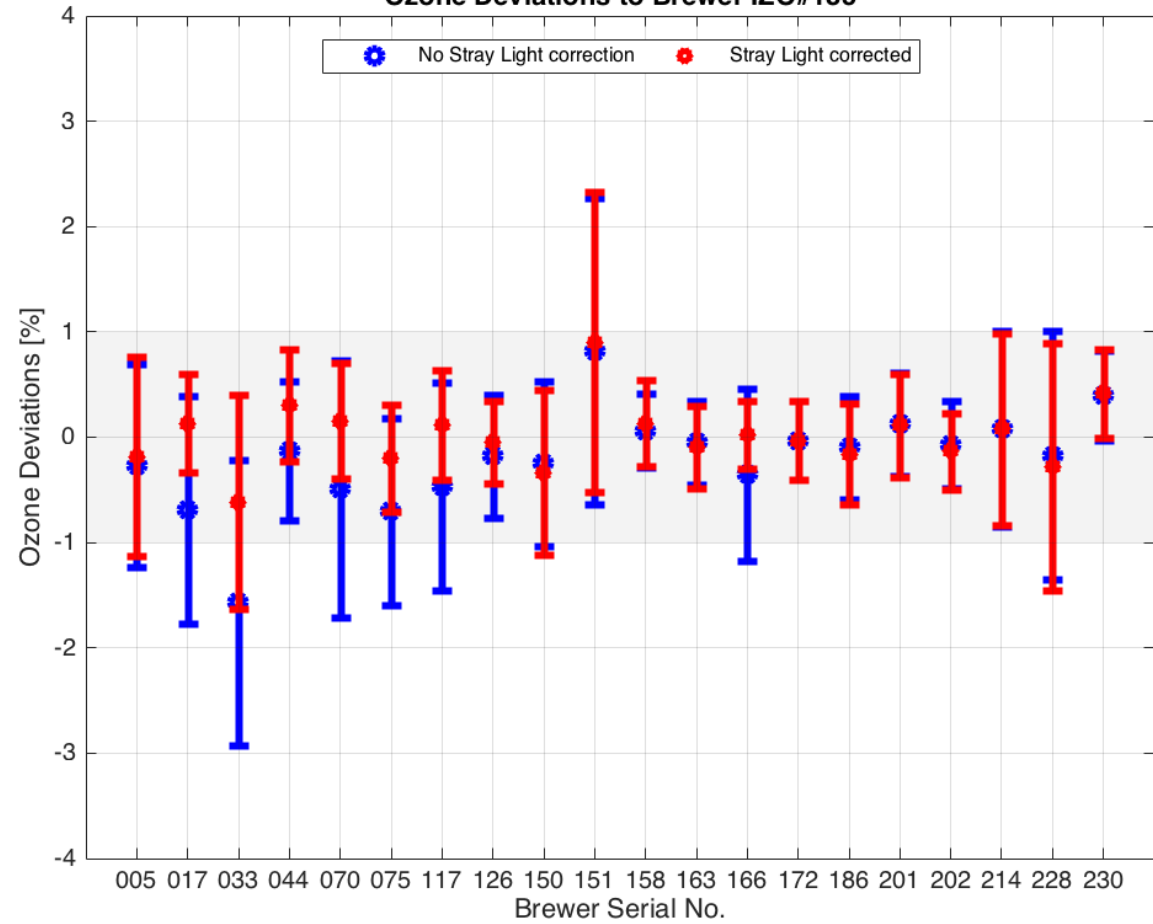
16 Brewer inside 1% (~75%)

10 Brewer +/- 0.5% (50%)

Max average error 1.5%
(OSC < 700)



Ozone Deviations to Brewer IZO#185



→ O₃ products:

Level 0 : All data from B files (raw)

Level 1: Counts from B files, configurations in EUBREWNET, processed with the Brewer Processing Library

Level 1.5 : L1 data with cloud mask, airmass, and Hg filters, plus standard lamp, filter, and stray-light corrections

Level 2 : Using configurations which have been validated

UV products:

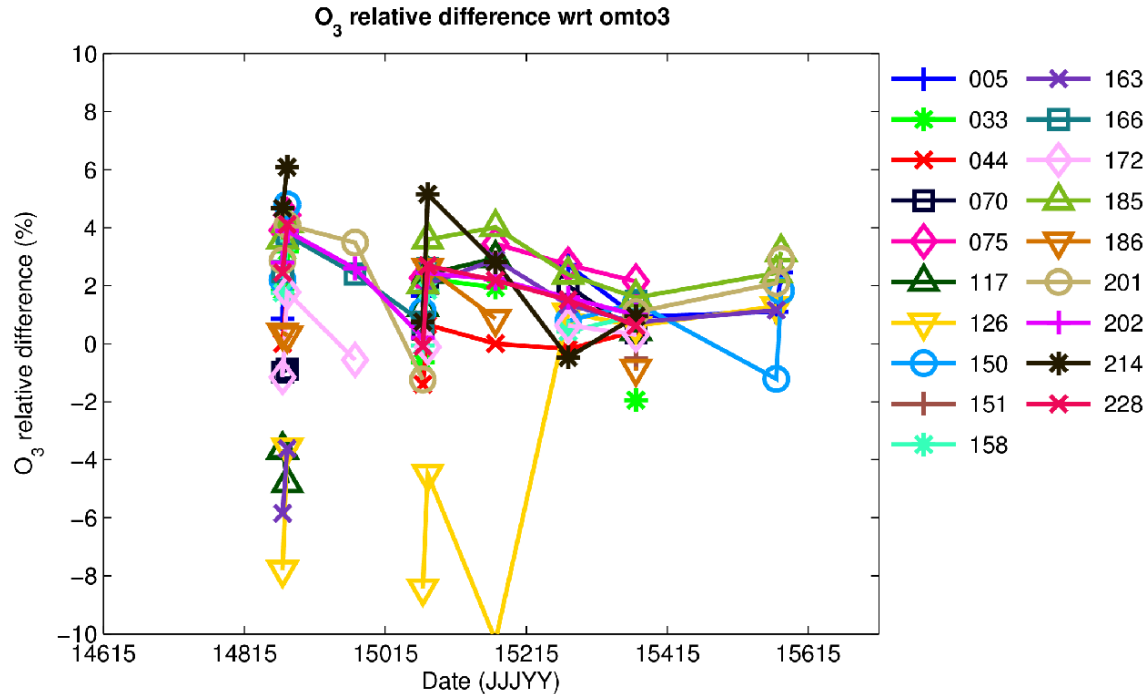
Level 0) Data from UV and UVR files, processed with the Brewer Python Module

4-O₃: EUBREWNET L1 vs OMI OMT03 L2



GOBIERNO DE ESPAÑA

MINISTERIO DE AGRICULTURA, ALIMENTACIÓN Y MEDIO AMBIENTE



El Arenosillo
2015

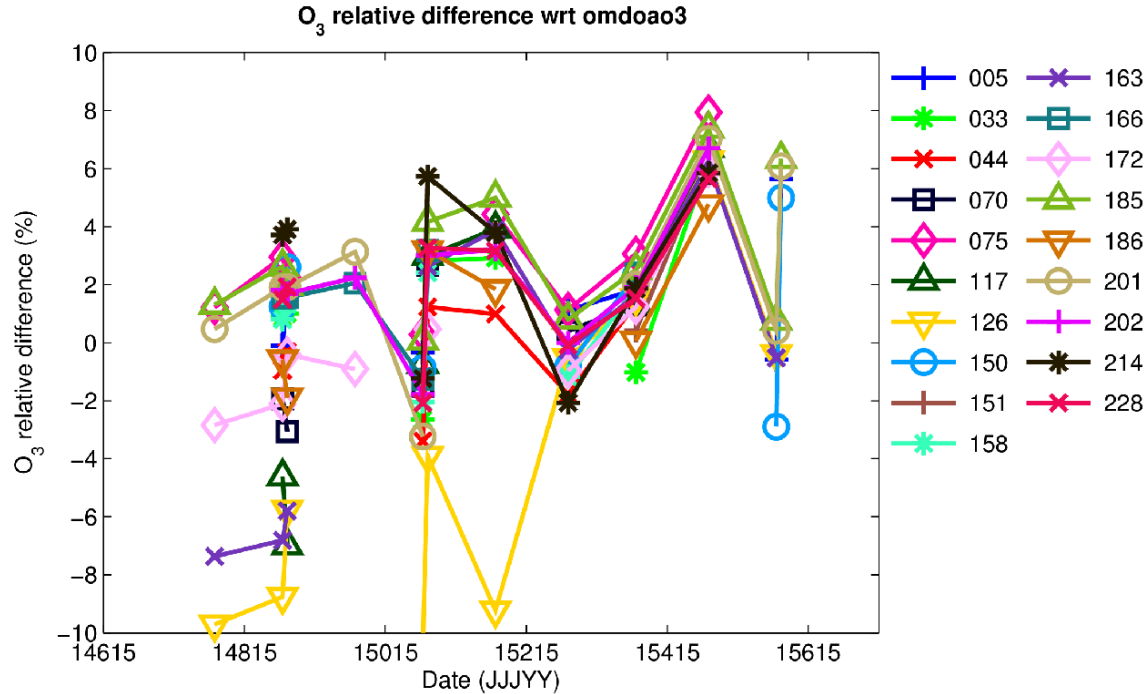
Most Brewers
behave in the
same way during
the last days of
the campaign

4-O₃: EUBREWNET L1 vs OMI OMDAO3 L2



GOBIERNO DE ESPAÑA

MINISTERIO DE AGRICULTURA, ALIMENTACIÓN Y MEDIO AMBIENTE



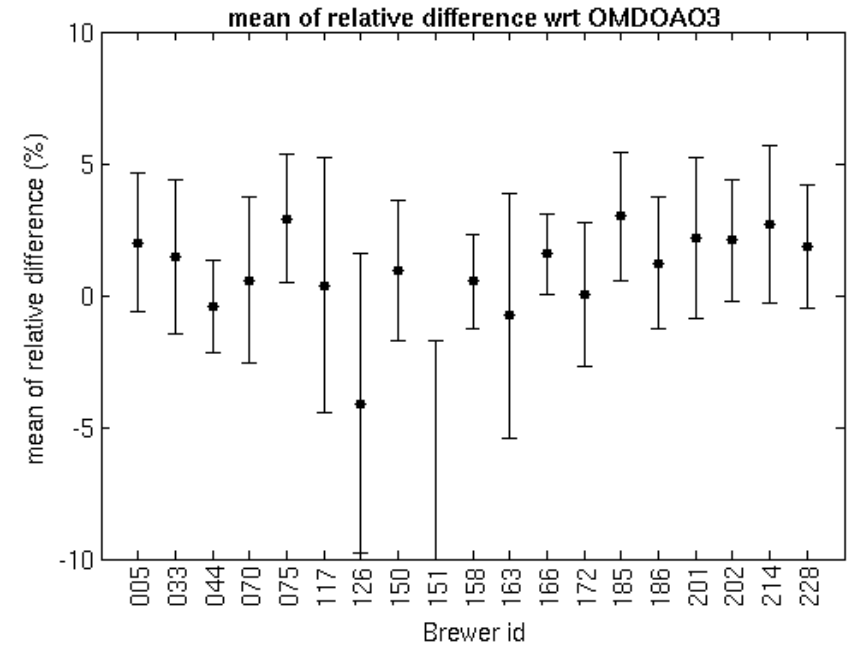
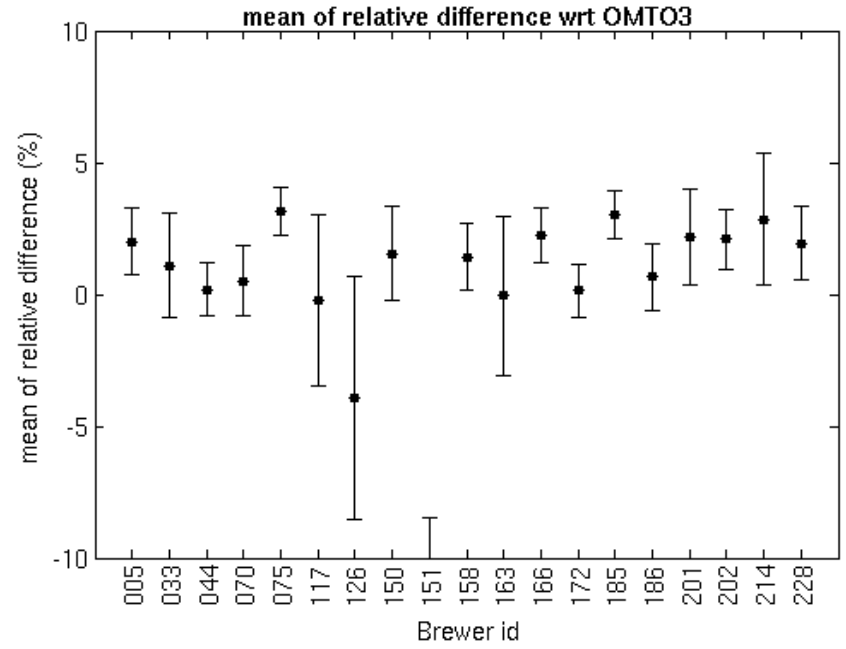
El Arenosillo
2015

Differences
w.r.t. OMI's
TOMS-like and
DOAS products
are roughly the
same

El Arenosillo 2015 campaign

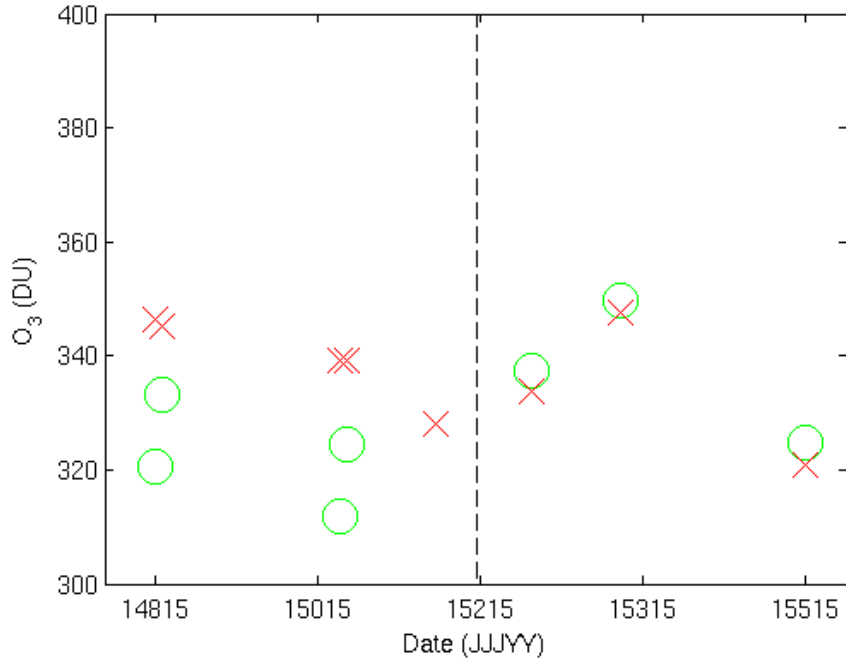
OMT03

OMDOA03

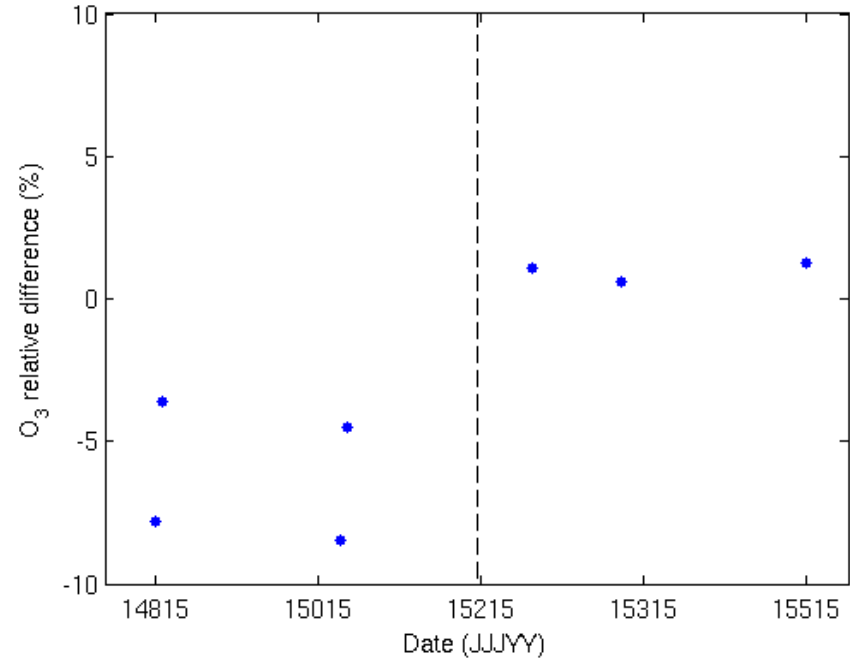


Brewer #126@El Arenosillo 2015 campaign → Maintenance on June 1st

Brewer #126 O₃ simultaneous (30 min) obs: Eubrewnet (go), OMT03 (rx)

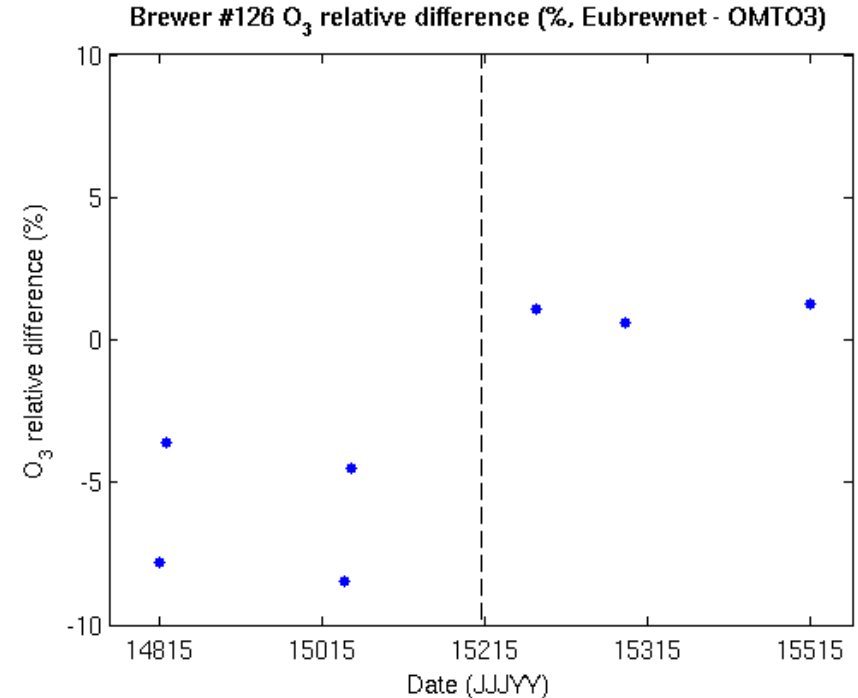


Brewer #126 O₃ relative difference (%; Eubrewnet - OMT03)



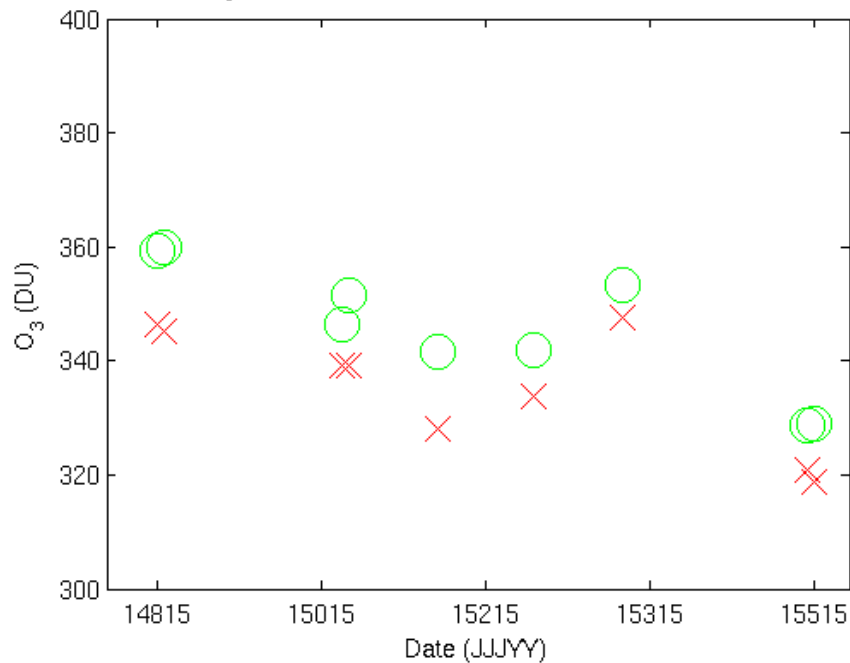
Brewer #126@El Arenosillo 2015 campaign

Calibration date	2013-06-15	2015-06-01
Brewer model	MKIV	mkii
O3 temp. coeff. slit 1	0	0
O3 temp. coeff. slit 2	0.5518	0.5518
O3 temp. coeff. slit 3	0.3869	0.3869
O3 temp. coeff. slit 4	-0.1935	-0.1935
O3 temp. coeff. slit 5	-1.3538	-1.3538
O3 on O3-ratio	0.3435	0.34
ETC on O3-ratio	3250	3240
Dead time	0	3.4e-08
Calibration step number	290	290
Neutral-density filter 0	0	0
Neutral-density filter 1	4900	4900
Neutral-density filter 2	9200	9200
Neutral-density filter 3	13900	13900
Neutral-density filter 4	21520	21520
Neutral-density filter 5	25000	25000
R5 reference	4500	4446
R6 reference	2100	2093
ETC corr. slit 0	0	0
ETC corr. slit 1	0	0
ETC corr. slit 2	0	0
ETC corr. slit 3	0	0
ETC corr. slit 4	0	0
ETC corr. slit 5	0	0
Straylight multiplier A	0	0
Straylight exponent B	0	0

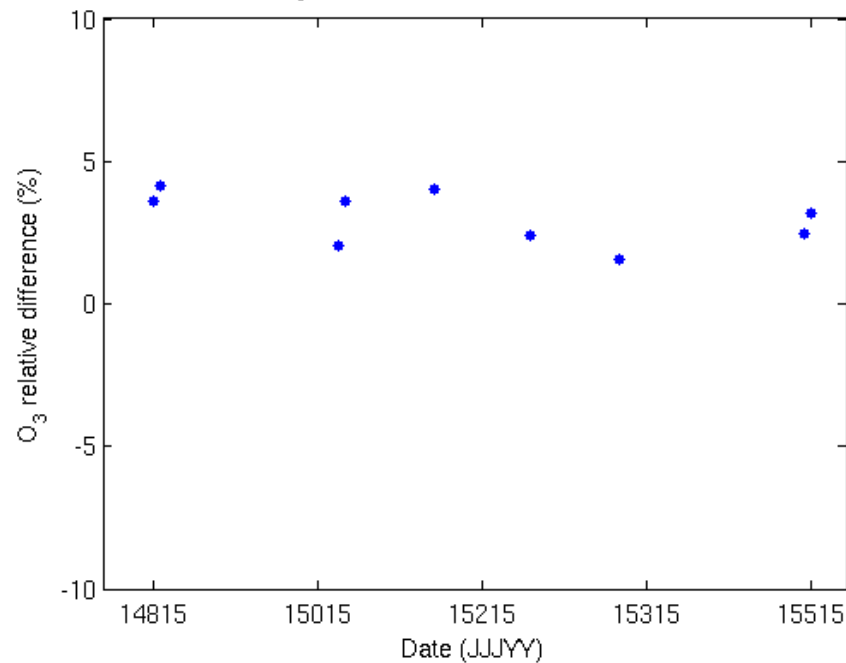


Brewer #185@El Arenosillo 2015 campaign

Brewer #185 O₃ simultaneous (30 min) obs: Eubrewnet (go), OMT03 (rx)

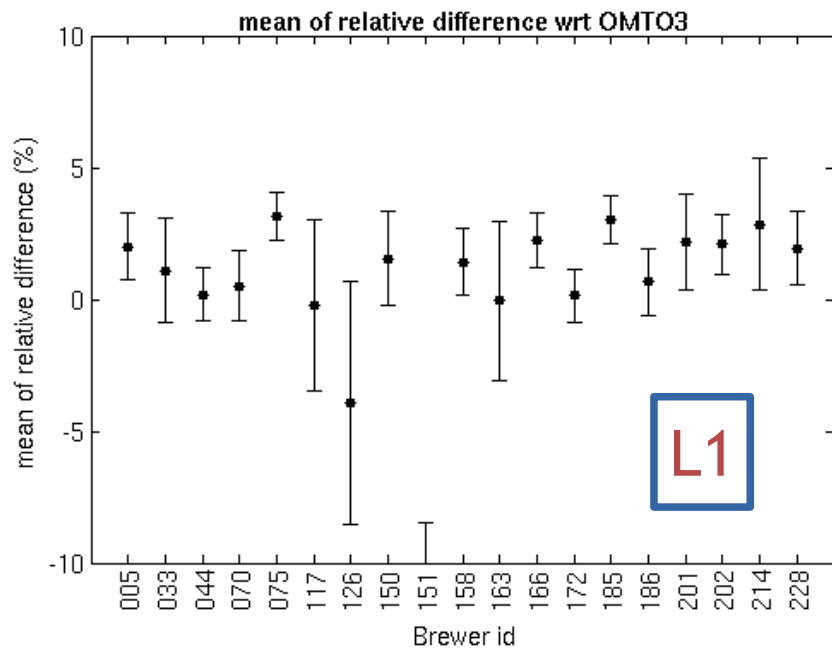


Brewer #185 O₃ relative difference (% , Eubrewnet - OMT03)

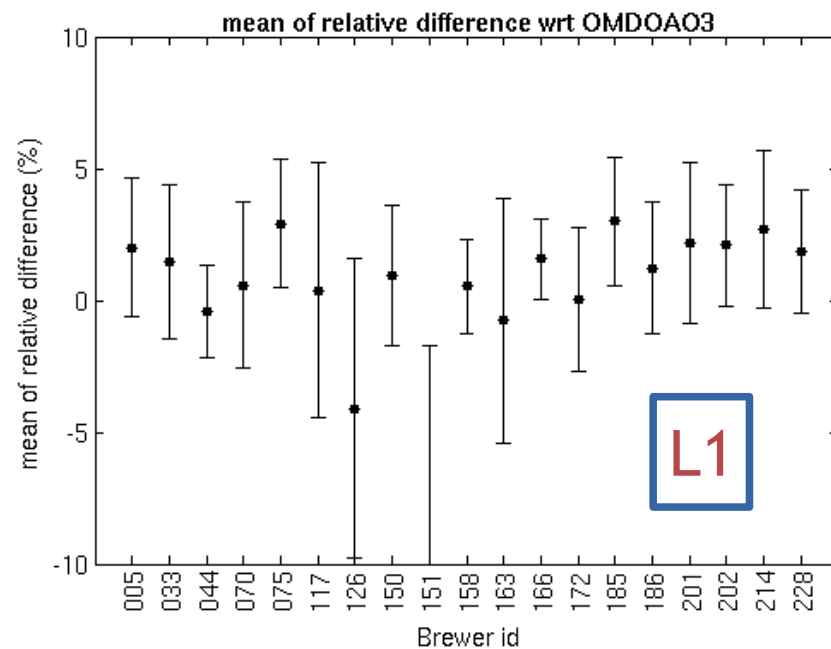


El Arenosillo 2015 campaign

OMT03

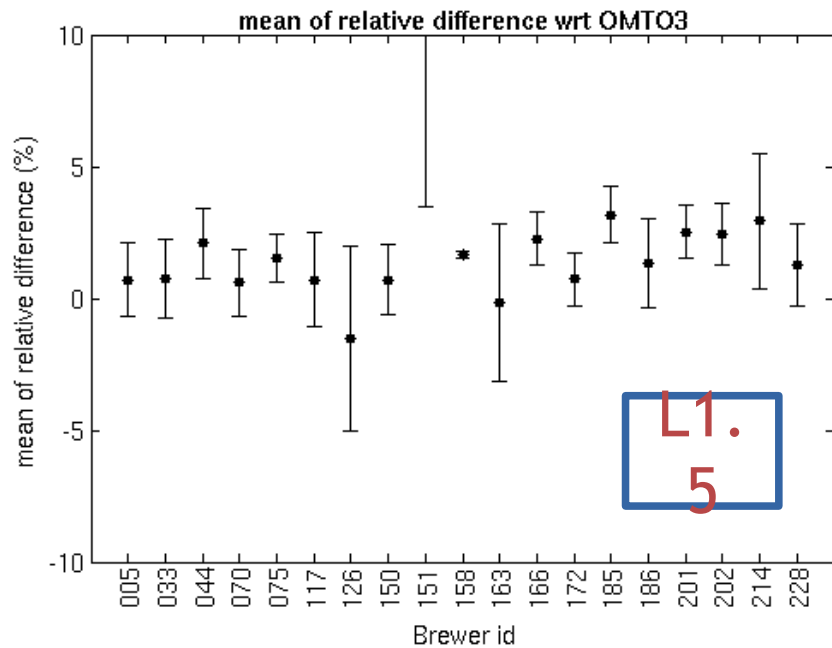


OMDOA03

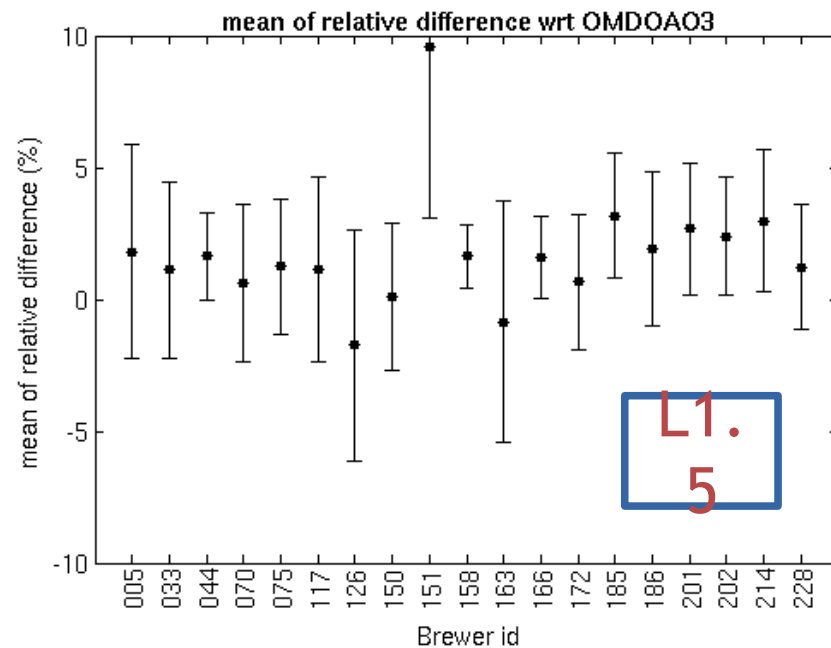


El Arenosillo 2015 campaign

OMT03



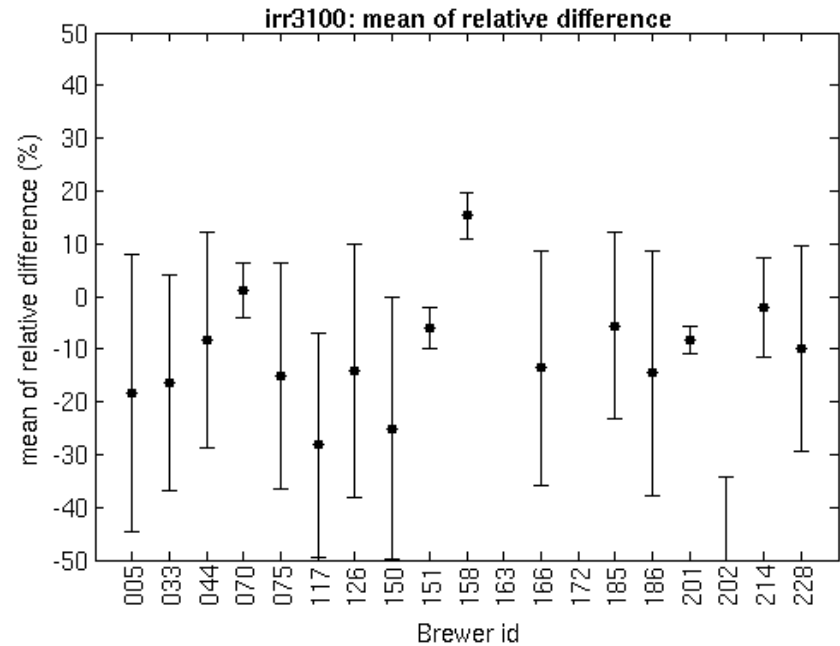
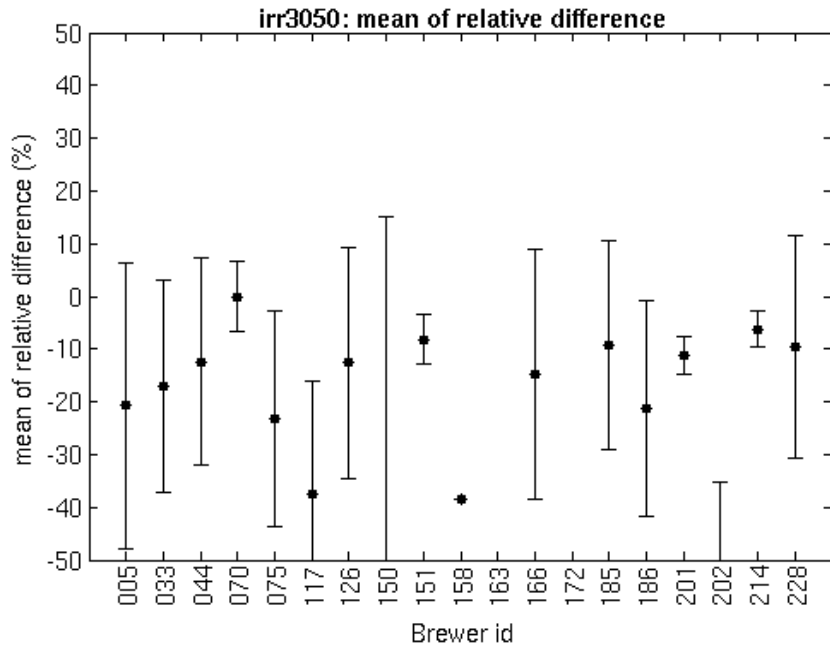
OMDOA03



El Arenosillo 2015 campaign

Irradiance@305 nm

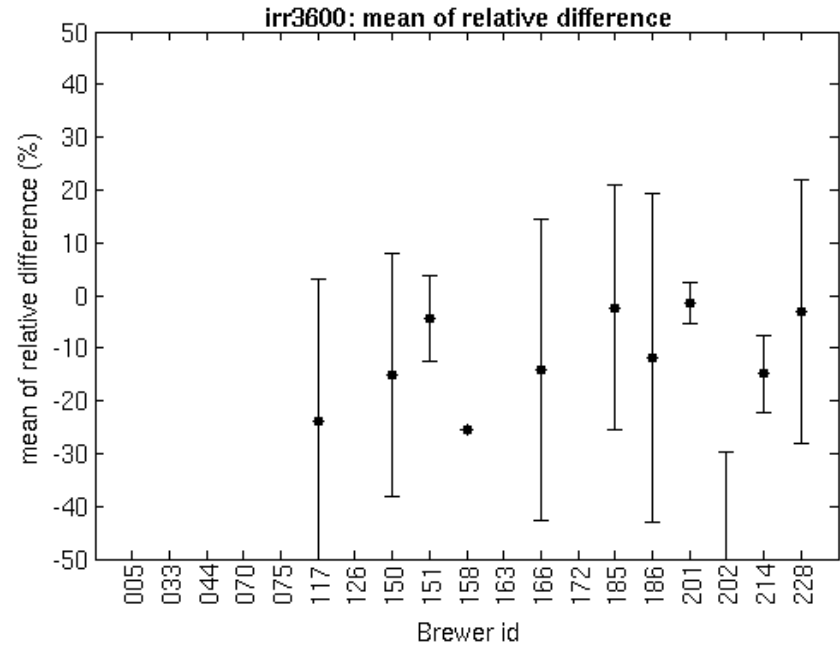
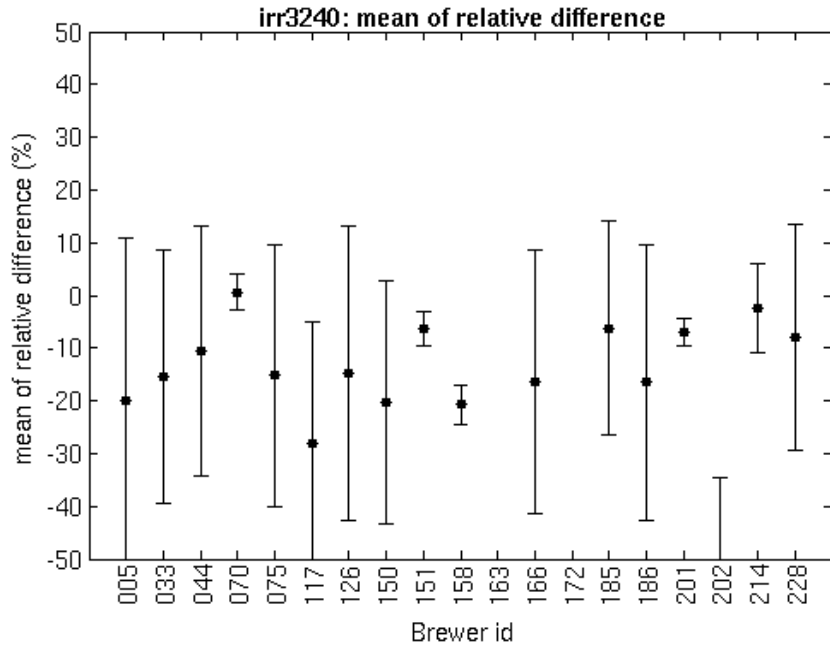
Irradiance@310 nm



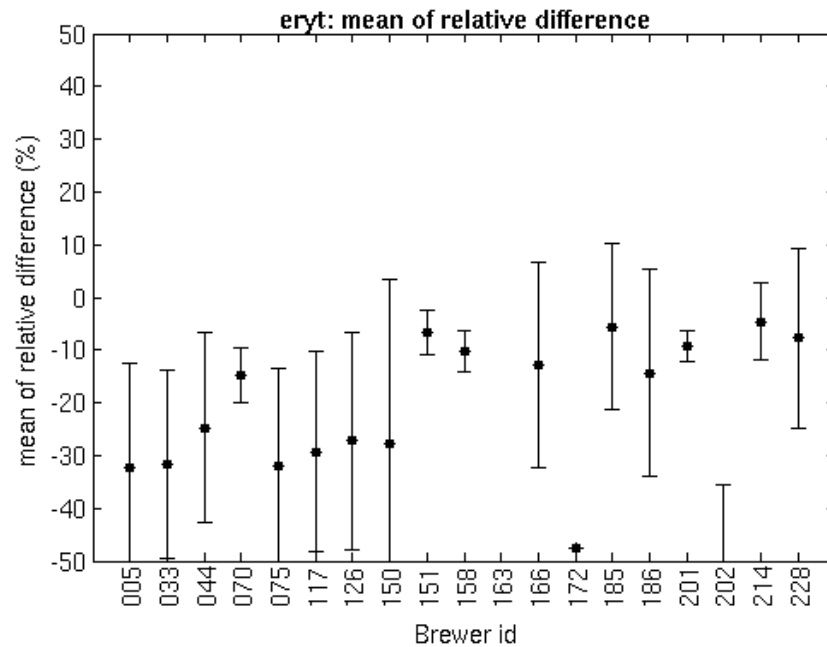
El Arenosillo 2015 campaign

Irradiance@324 nm

Irradiance@360 nm

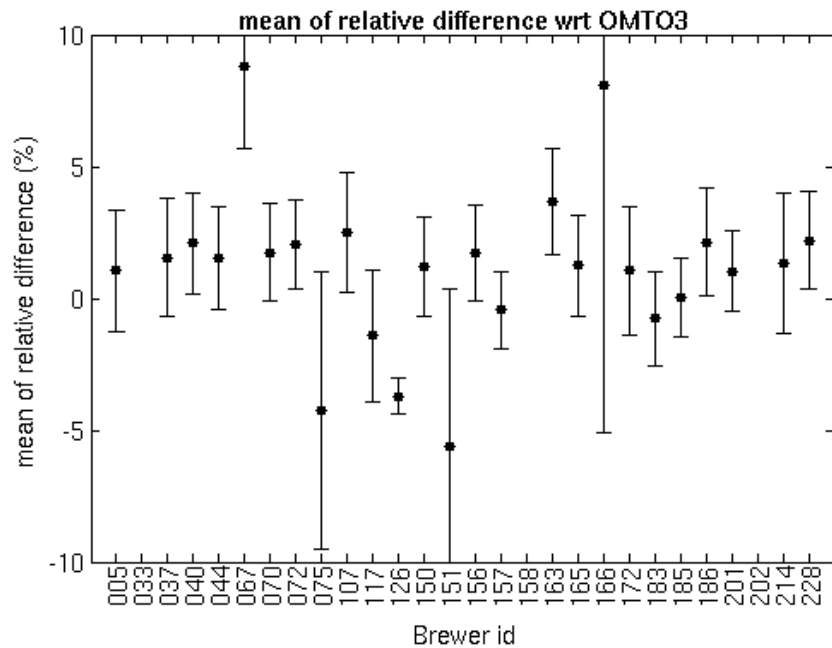


El Arenosillo 2015 campaign Erythemal Daily Dose Rate

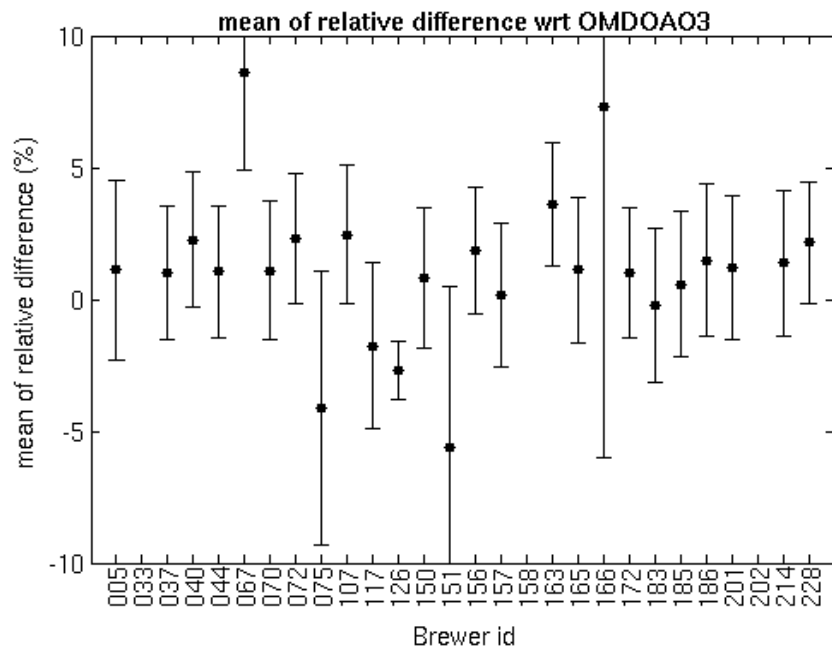


2013 – 2016

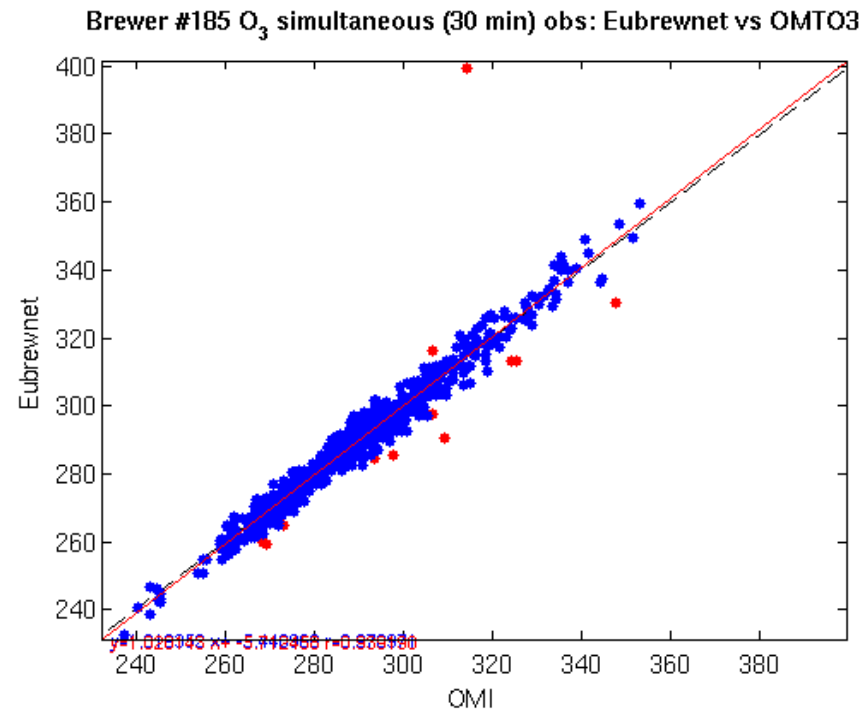
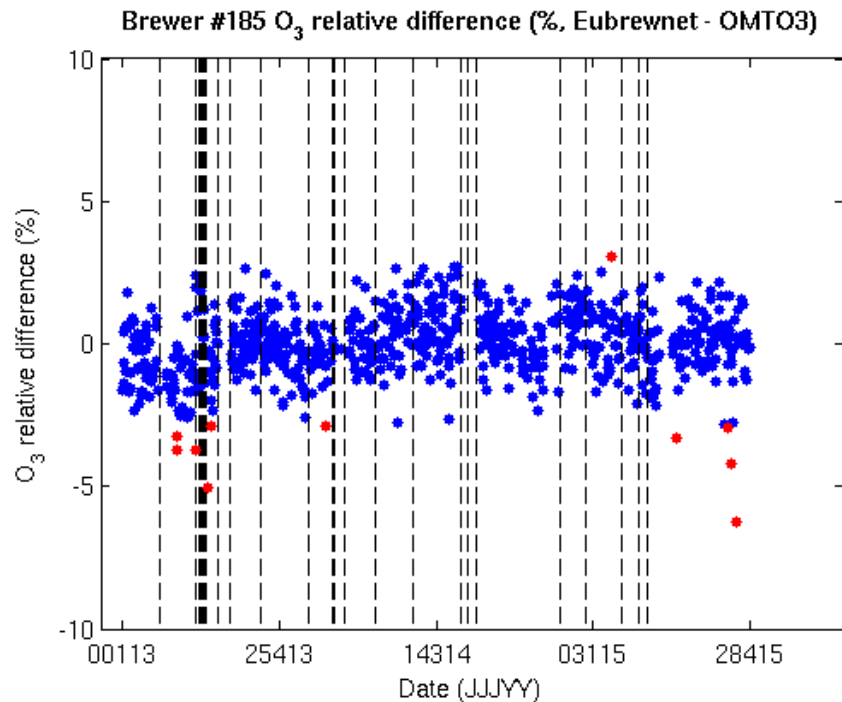
OMT03



OMDOA03

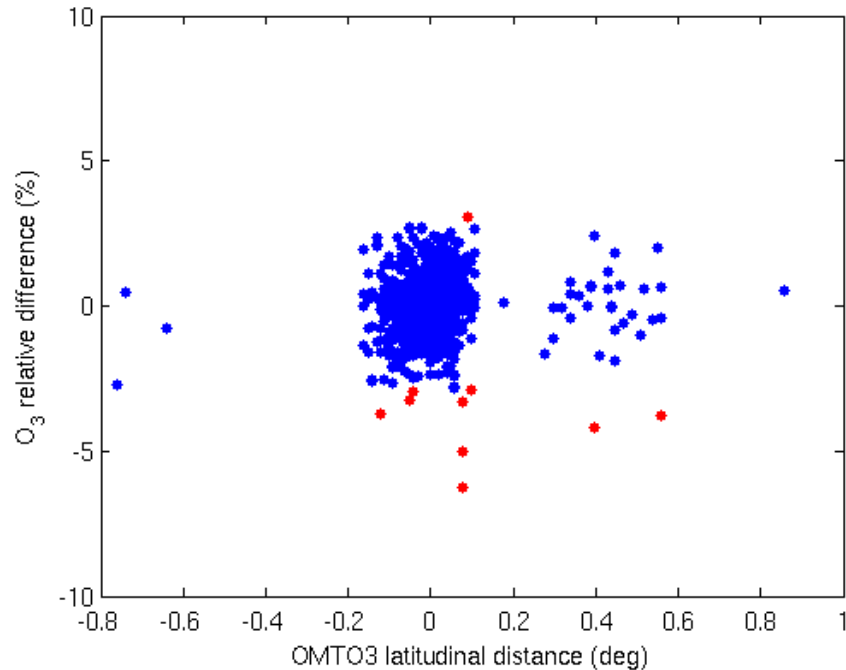


Brewer #185@Izaña 2013-2016

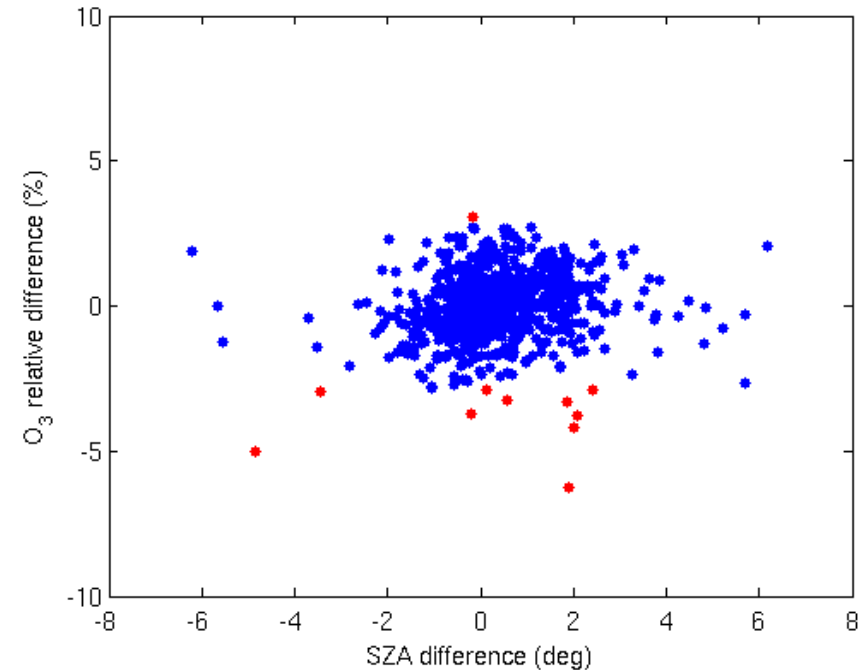


Brewer #185@Izaña 2013-2016

Brewer #185 O₃ relative difference vs OMT03 latitudinal distance

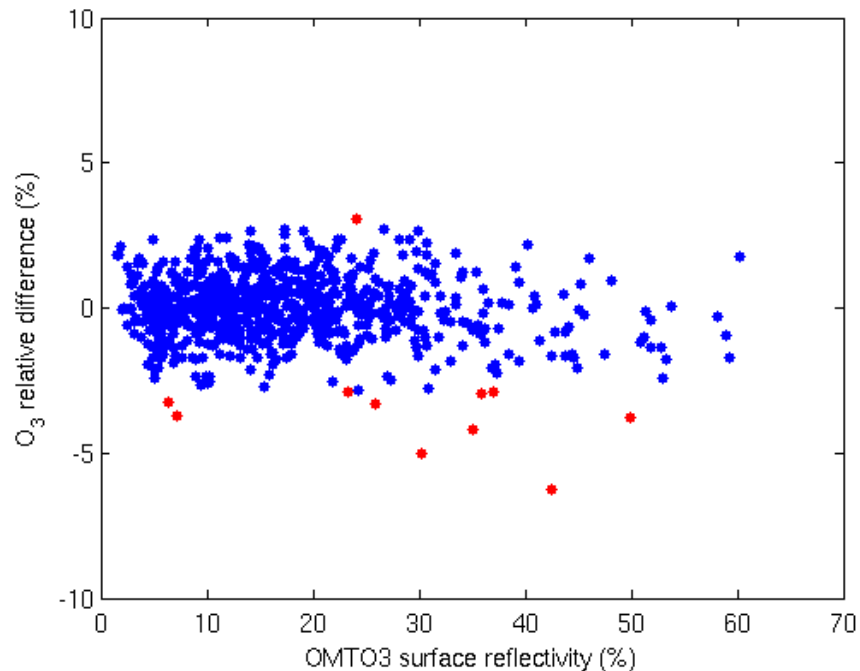


Brewer #185 O₃ relative difference vs SZA difference (OMT03)

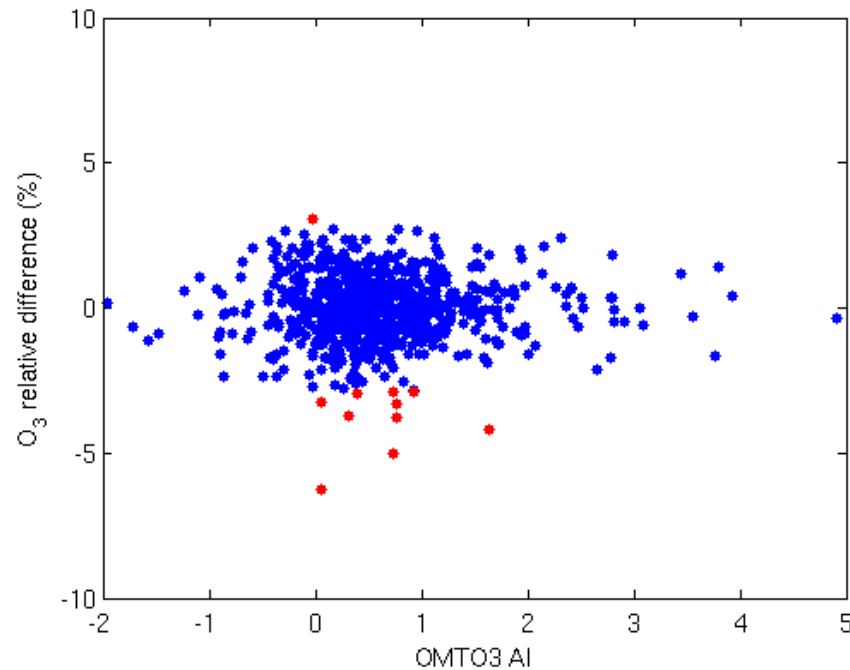


Brewer #185@Izaña 2013-2016

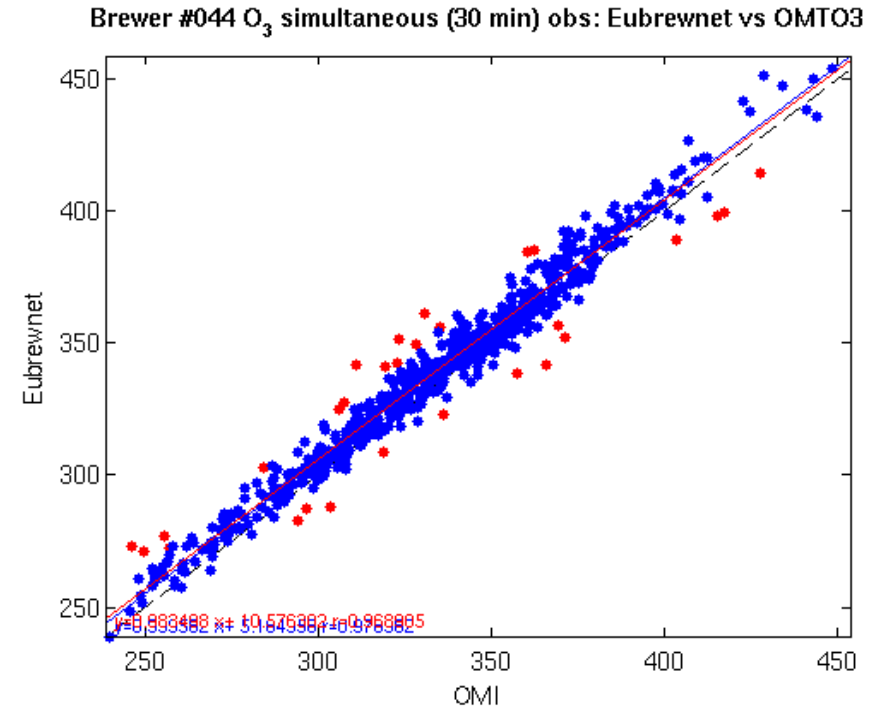
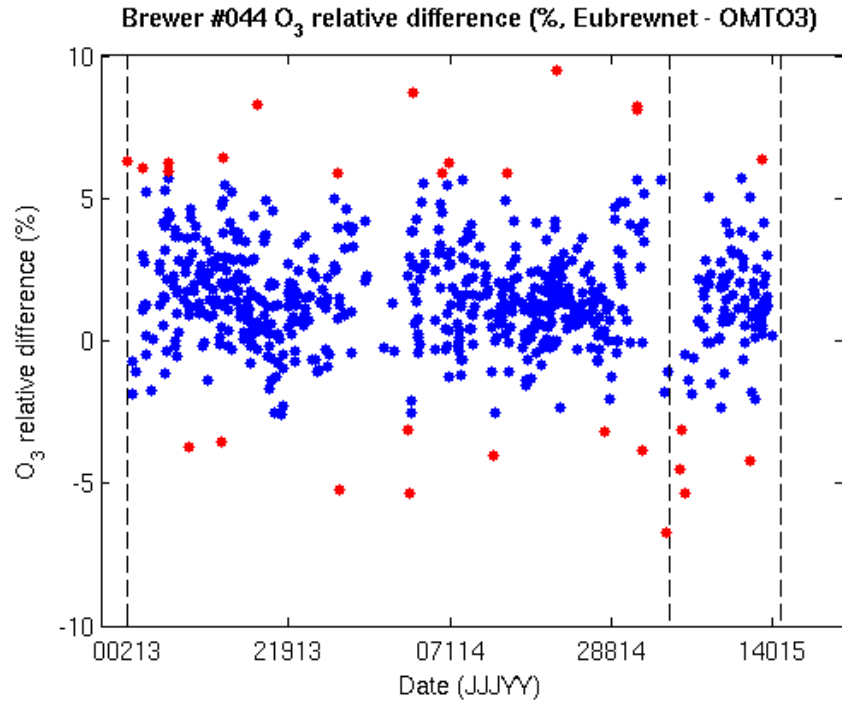
Brewer #185 O₃ relative difference vs OMT03 surface reflectivity



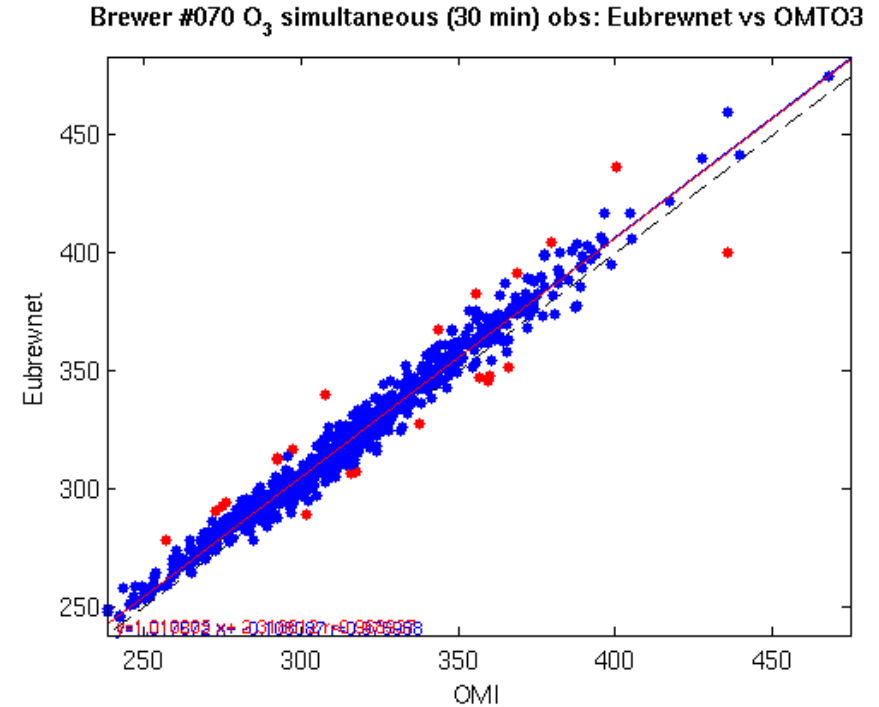
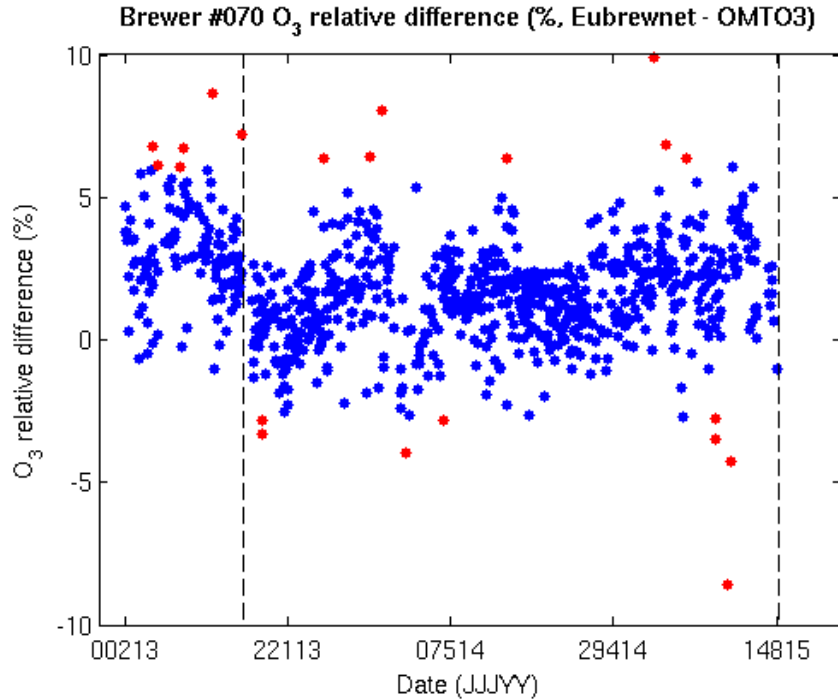
Brewer #185 O₃ relative difference vs OMT03 AI



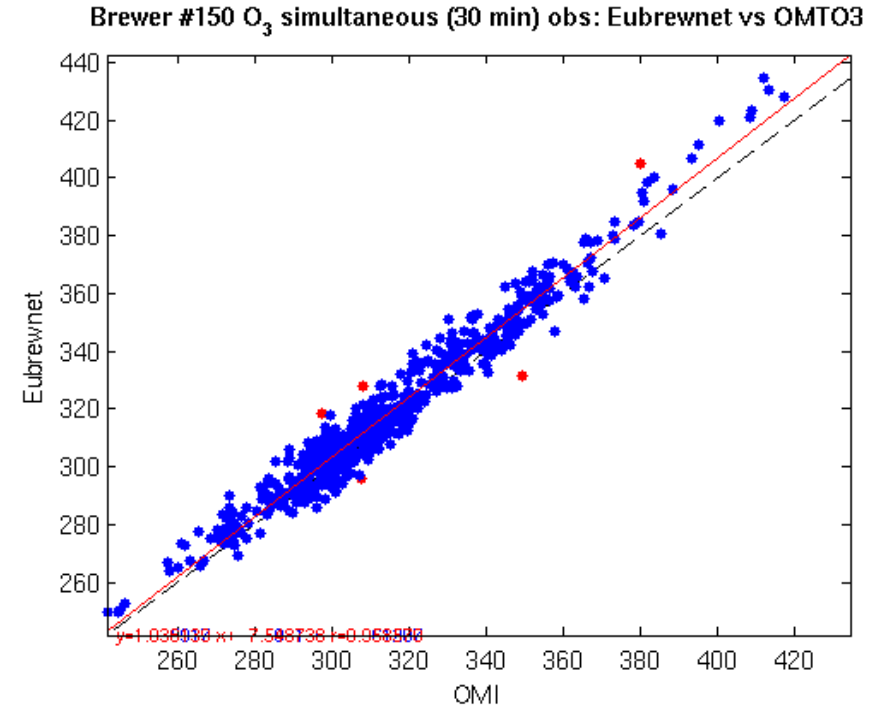
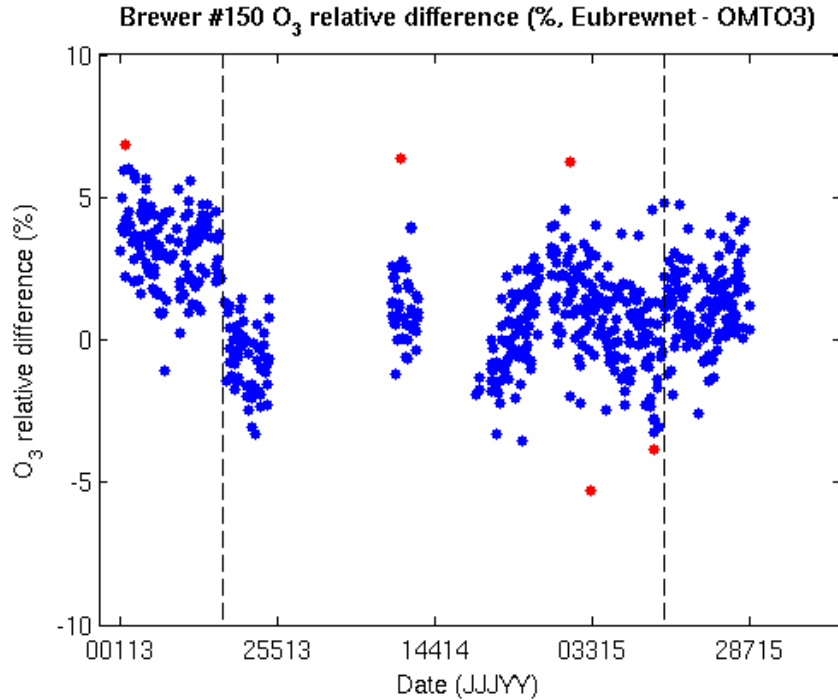
Brewer #044@Obninsk 2013-2016



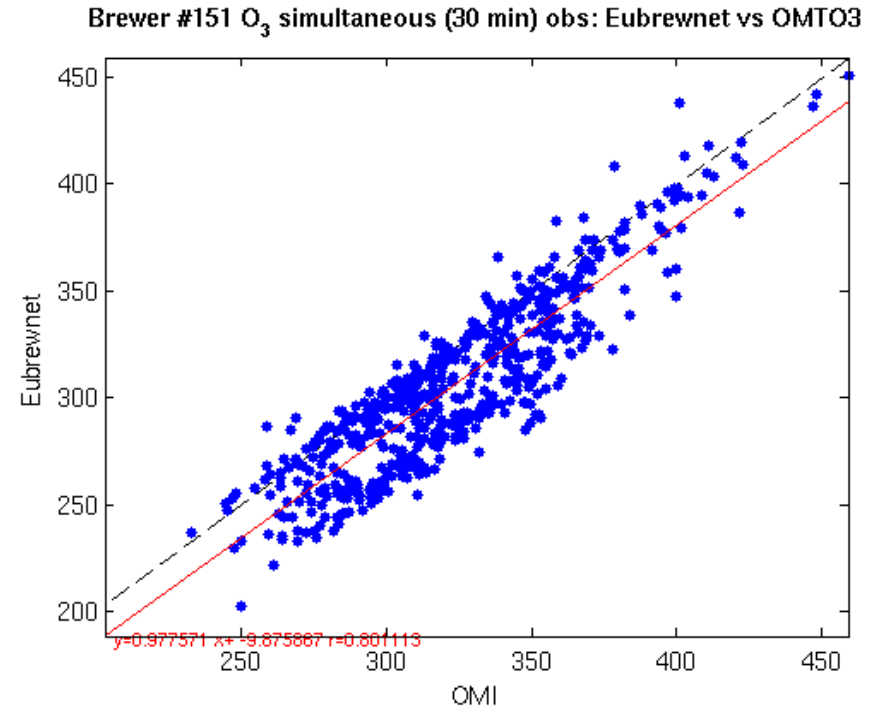
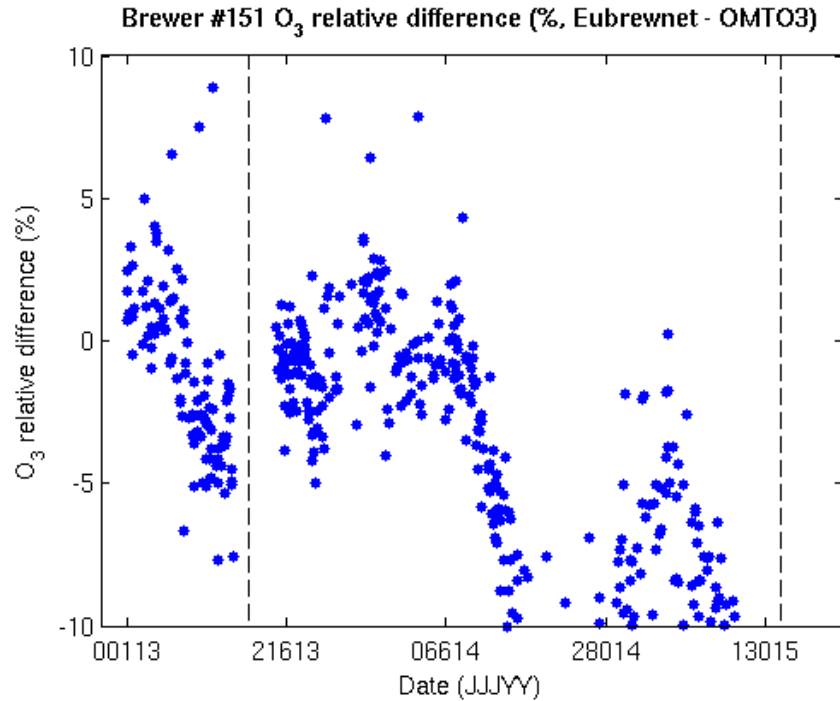
Brewer #070@Madrid 2013-2016



Brewer #150@El Arenosillo 2013-2016

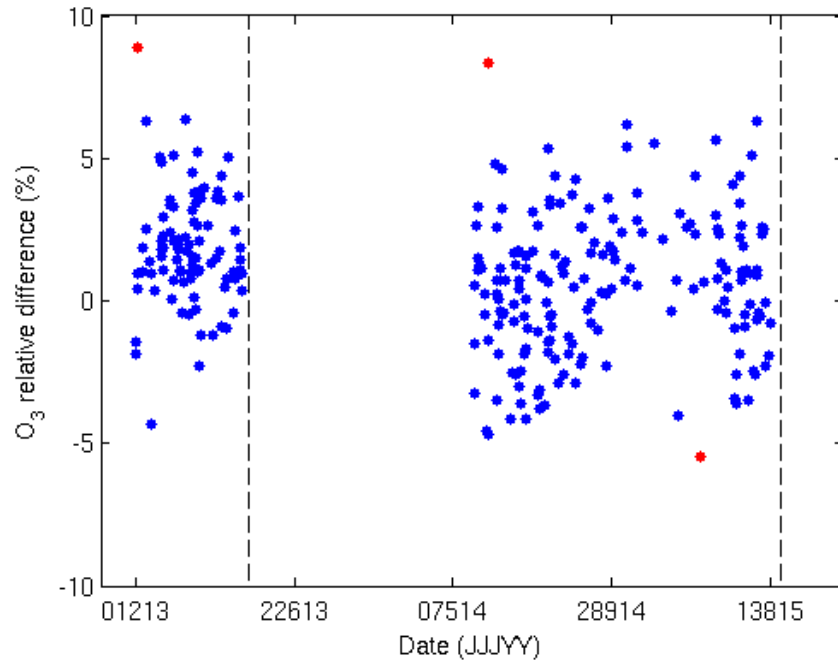


Brewer #151@La Coruña 2013-2016

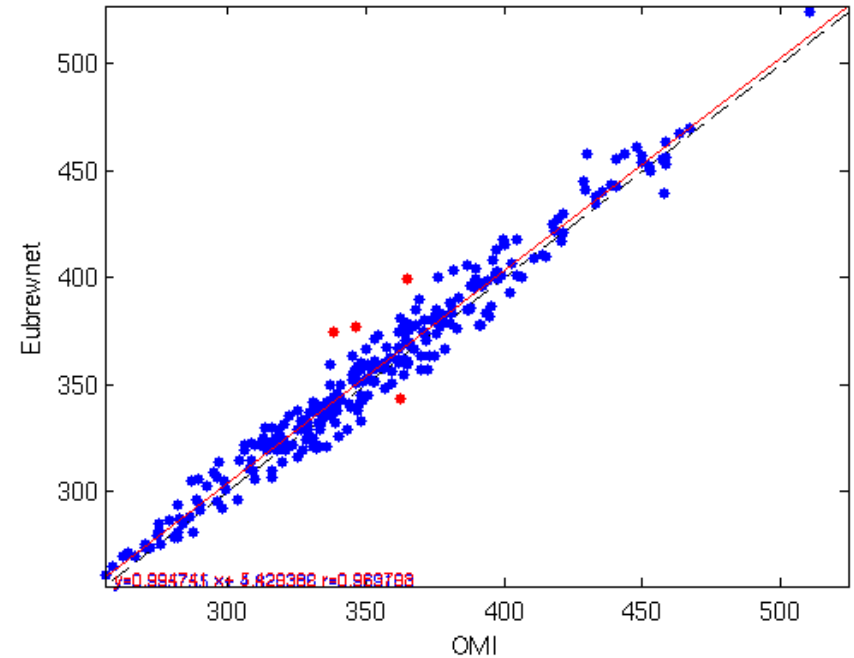


Brewer #172@Manchester 2013-2016

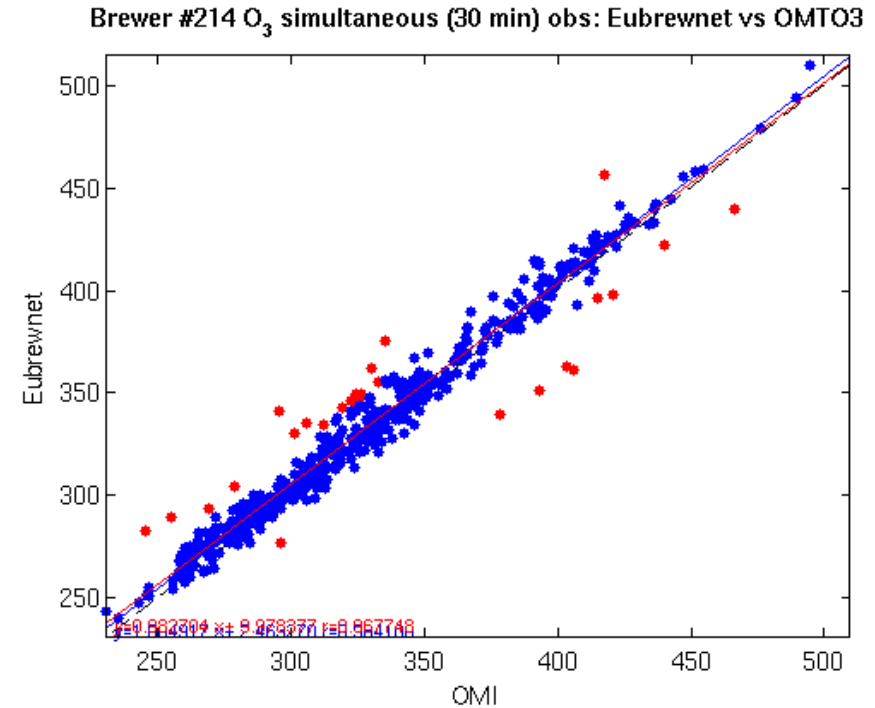
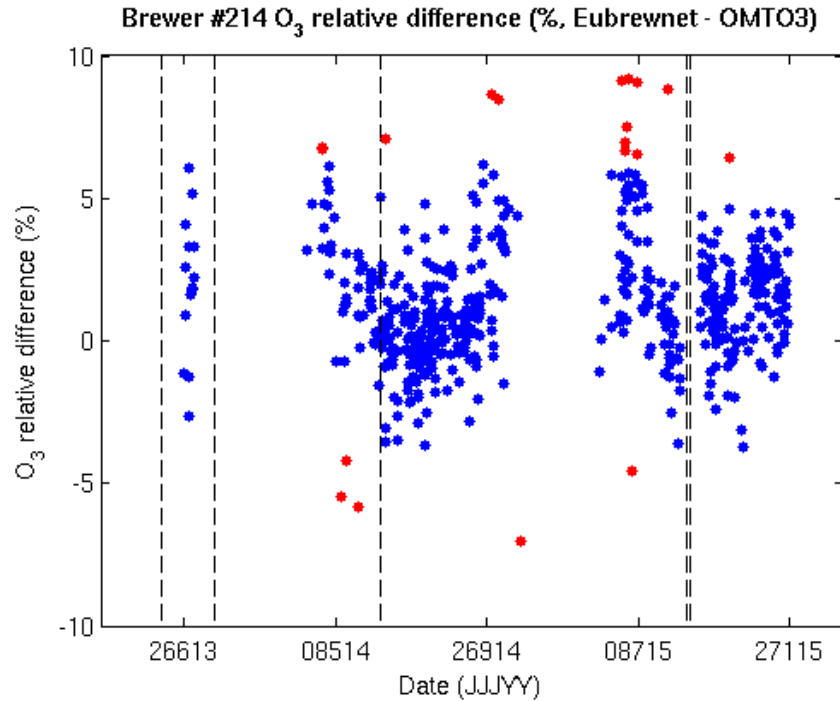
Brewer #172 O₃ relative difference (% , Eubrewnet - OMDOAO3)



Brewer #172 O₃ simultaneous (30 min) obs: Eubrewnet vs OMDOAO3



Brewer #214@Sodankylä 2013-2016



- EUBREWNET is ready for production
- O₃ relative differences <~5%, correlations ~0.9
- UV relative differences <~15%, correlations ~0.8 ←Level 0!
- Brewer observation quality will depend on calibration information.
- Brewer-OMI comparison products will be included EUBREWNET

- UV Level 2 data definition
- AOD Brewer transfer calibrati3n/product



GOBIERNO
DE ESPAÑA

MINISTERIO
DE AGRICULTURA, ALIMENTACIÓN
Y MEDIO AMBIENTE

AEMet
Agencia Estatal de Meteorología



Getting data from EUBREWNET

O₃ L1:

<http://rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=185&date=2015-06-02>

Configuration:

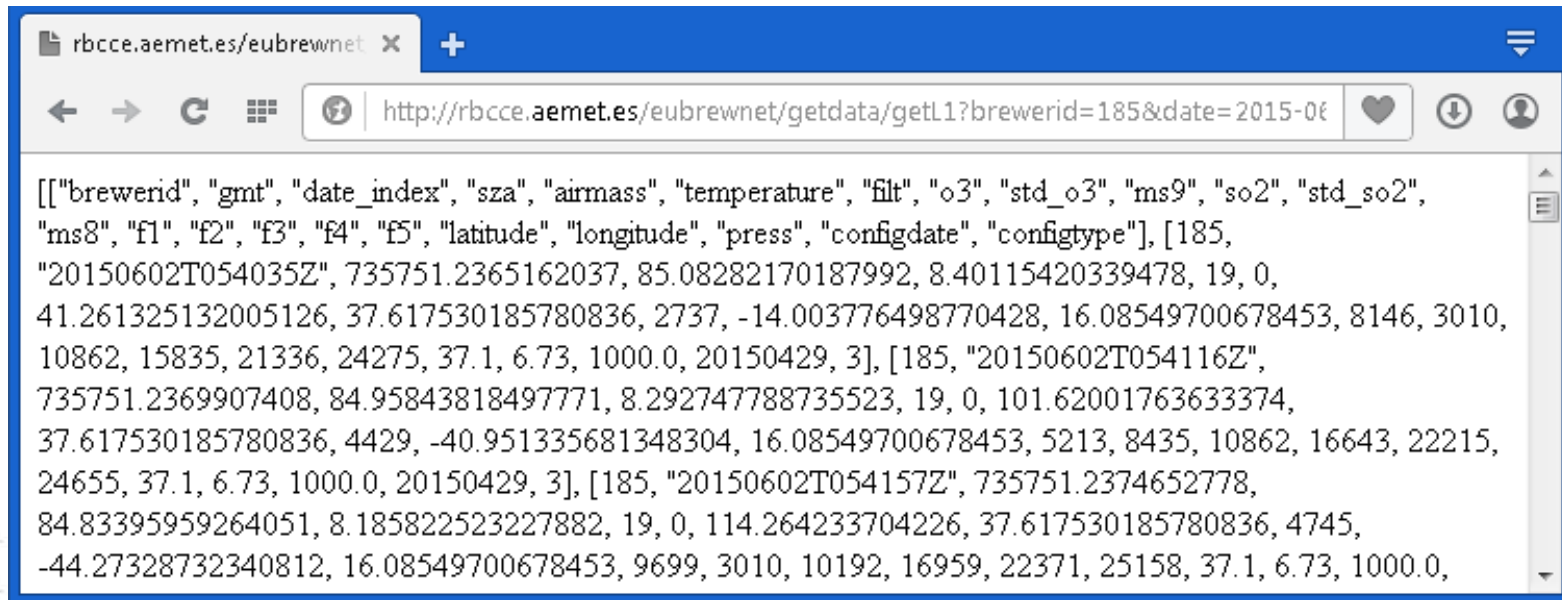
<http://rbcce.aemet.es/eubrewnet/getdata/getConfigbyDate?brewerid=185&date=2015-06-02>

UV L0:

<http://rbcce.aemet.es/eubrewnet/getdata/getUVL0?brewerid=185&date=2015-06-02>

Getting data from EUBREWNET with a browser

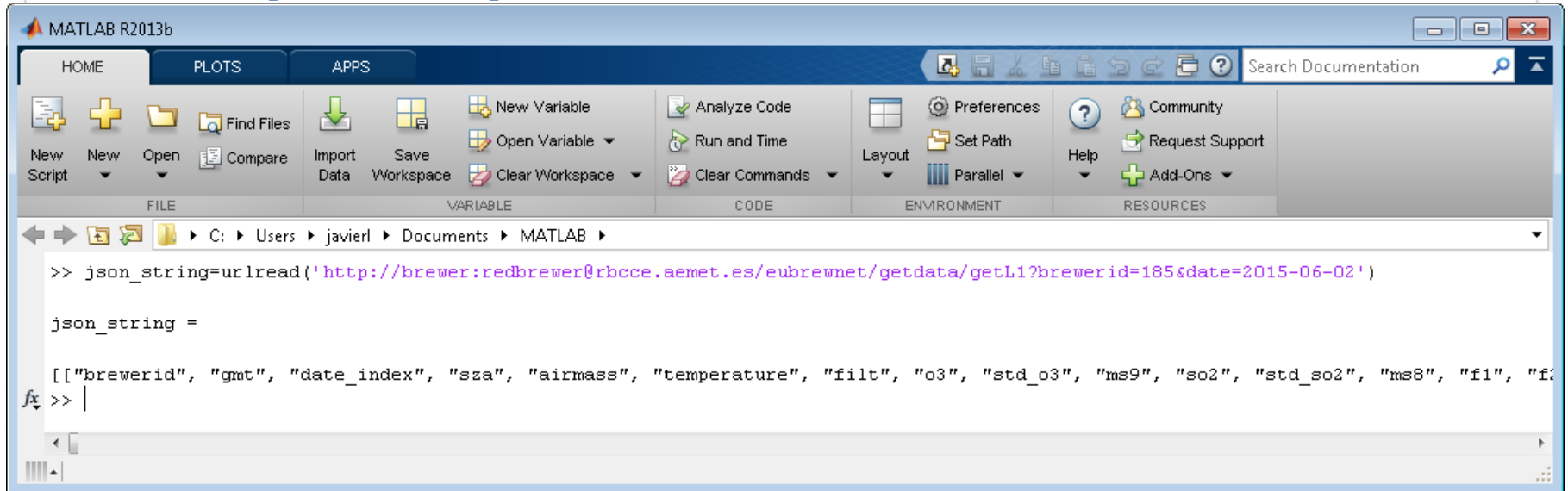
<http://rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=185&date=2015-06-02>



```
[[{"brewerid", "gmt", "date_index", "sza", "airmass", "temperature", "filt", "o3", "std_o3", "ms9", "so2", "std_so2", "ms8", "f1", "f2", "f3", "f4", "f5", "latitude", "longitude", "press", "configdate", "configtype"}, [185, "20150602T054035Z", 735751.2365162037, 85.08282170187992, 8.40115420339478, 19, 0, 41.261325132005126, 37.617530185780836, 2737, -14.003776498770428, 16.08549700678453, 8146, 3010, 10862, 15835, 21336, 24275, 37.1, 6.73, 1000.0, 20150429, 3], [185, "20150602T054116Z", 735751.2369907408, 84.95843818497771, 8.292747788735523, 19, 0, 101.62001763633374, 37.617530185780836, 4429, -40.951335681348304, 16.08549700678453, 5213, 8435, 10862, 16643, 22215, 24655, 37.1, 6.73, 1000.0, 20150429, 3], [185, "20150602T054157Z", 735751.2374652778, 84.83395959264051, 8.185822523227882, 19, 0, 114.264233704226, 37.617530185780836, 4745, -44.27328732340812, 16.08549700678453, 9699, 3010, 10192, 16959, 22371, 25158, 37.1, 6.73, 1000.0,
```

Getting data from EUBREWNET with MATLAB

```
urlread('http://brewer:redbrewer@rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=185&date=2015-06-02')
```



The screenshot shows the MATLAB R2013b software interface. The Command Window displays the following code and output:

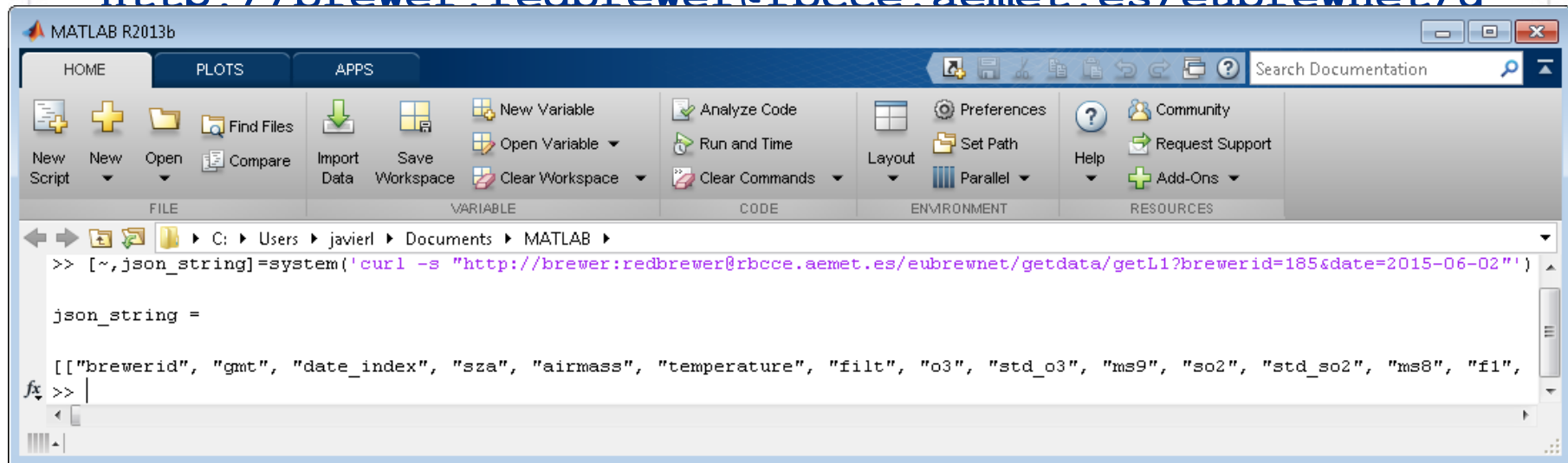
```
>> json_string=urlread('http://brewer:redbrewer@rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=185&date=2015-06-02')  
  
json_string =  
  
[["brewerid", "gmt", "date_index", "sza", "airmass", "temperature", "filt", "o3", "std_o3", "ms9", "so2", "std_so2", "ms8", "f1", "f2"]]
```

Getting data from EUBREWNET with MATLAB

Problems with `urlread`? `curl` is your friend!

```
system('curl -s
```

```
"http://brewer:redbrewer@rbcce.aemet.es/eubrewnet/α
```

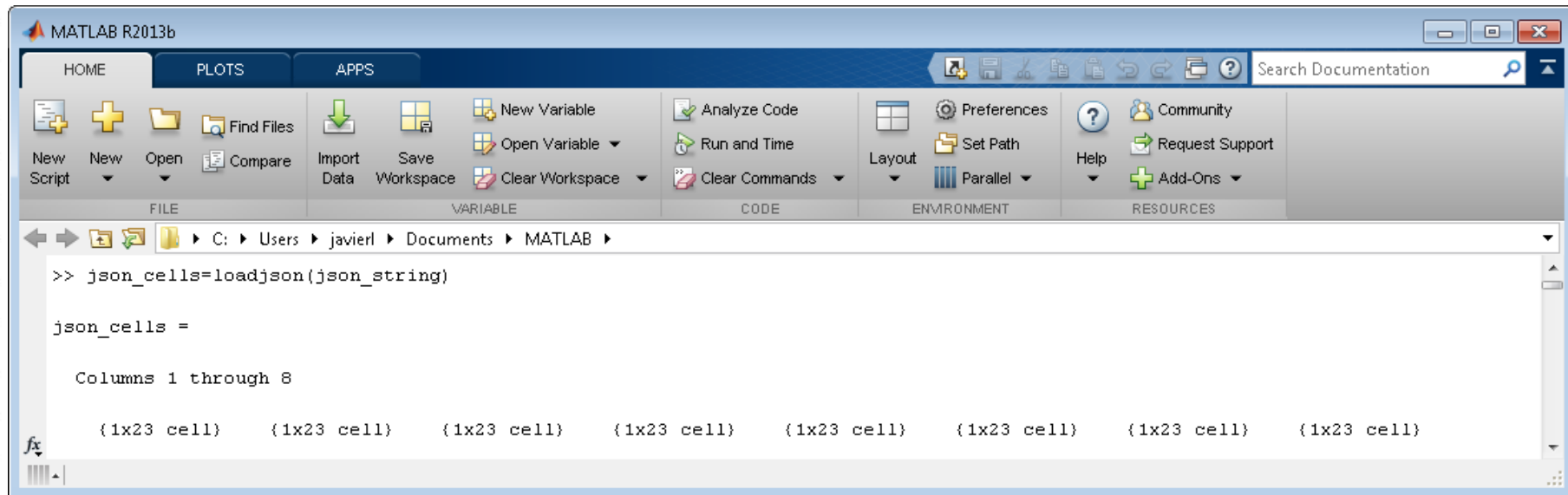


The screenshot shows the MATLAB R2013b interface. The Command Window displays the following code and output:

```
>> [~,json_string]=system('curl -s "http://brewer:redbrewer@rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=185&date=2015-06-02"')  
  
json_string =  
  
[["brewerid", "gmt", "date_index", "sza", "airmass", "temperature", "filt", "o3", "std_o3", "ms9", "so2", "std_so2", "ms8", "f1",
```


Parsing the data from EUBREWNET with MATLAB

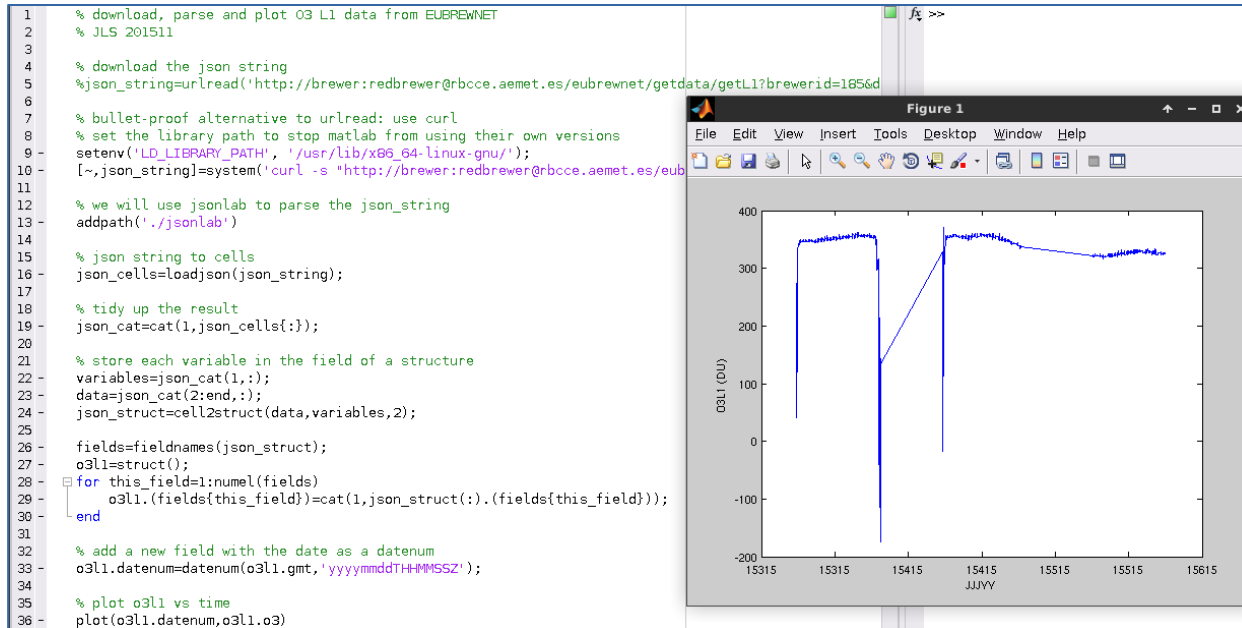
Use jsonlab (<http://iso2mesh.sourceforge.net/cgi-bin/index.cgi?jsonlab>)



```
MATLAB R2013b  
HOME PLOTS APPS  
New Script New Open Find Files Compare Import Data Save Workspace New Variable Open Variable Clear Workspace Analyze Code Run and Time Clear Commands Preferences Set Path Parallel Help Community Request Support Add-Ons  
FILE VARIABLE CODE ENVIRONMENT RESOURCES  
C:\Users\javier\Documents\MATLAB  
>> json_cells=loadjson(json_string)  
  
json_cells =  
  
Columns 1 through 8  
  
{1x23 cell} {1x23 cell} {1x23 cell} {1x23 cell} {1x23 cell} {1x23 cell} {1x23 cell} {1x23 cell}
```

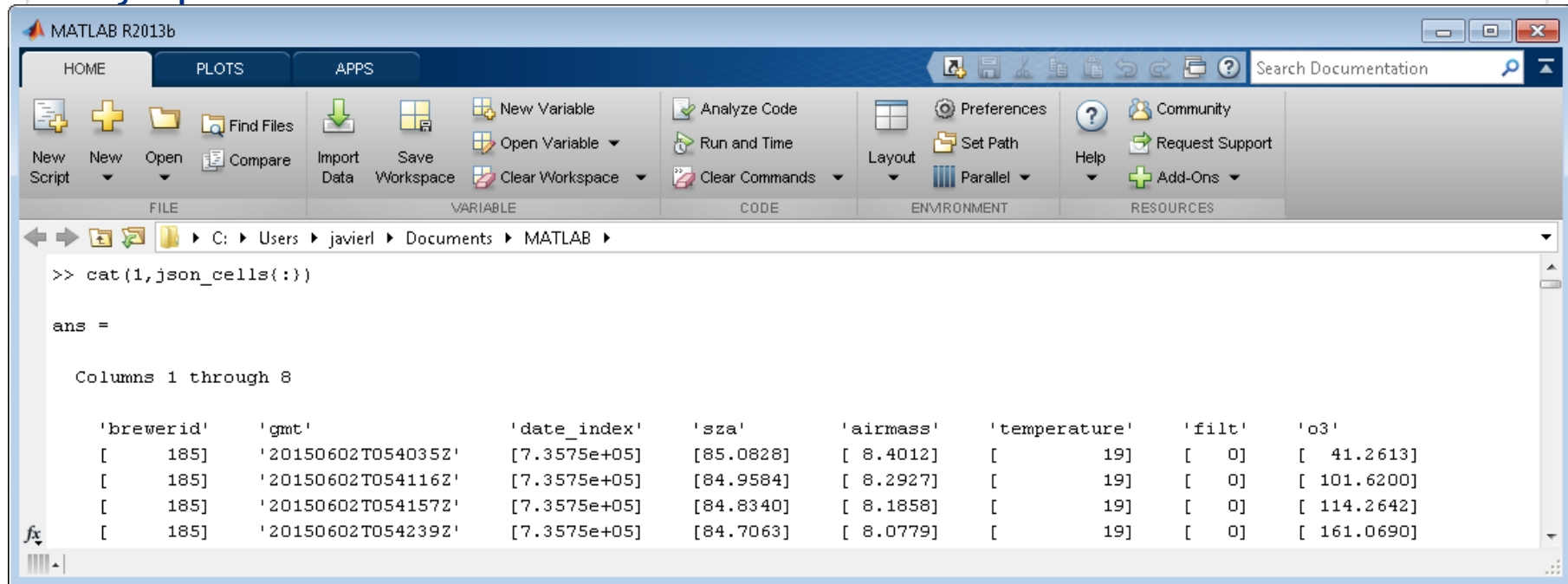
→ JSONlab

<http://iso2mesh.sourceforge.net/cgi-bin/index.cgi?jsonlab>



Parsing the data from EUBREWNET with MATLAB

Tidy up the result



MATLAB R2013b

HOME PLOTS APPS

Search Documentation

FILE VARIABLE CODE ENVIRONMENT RESOURCES

C:\Users\javier\Documents\MATLAB

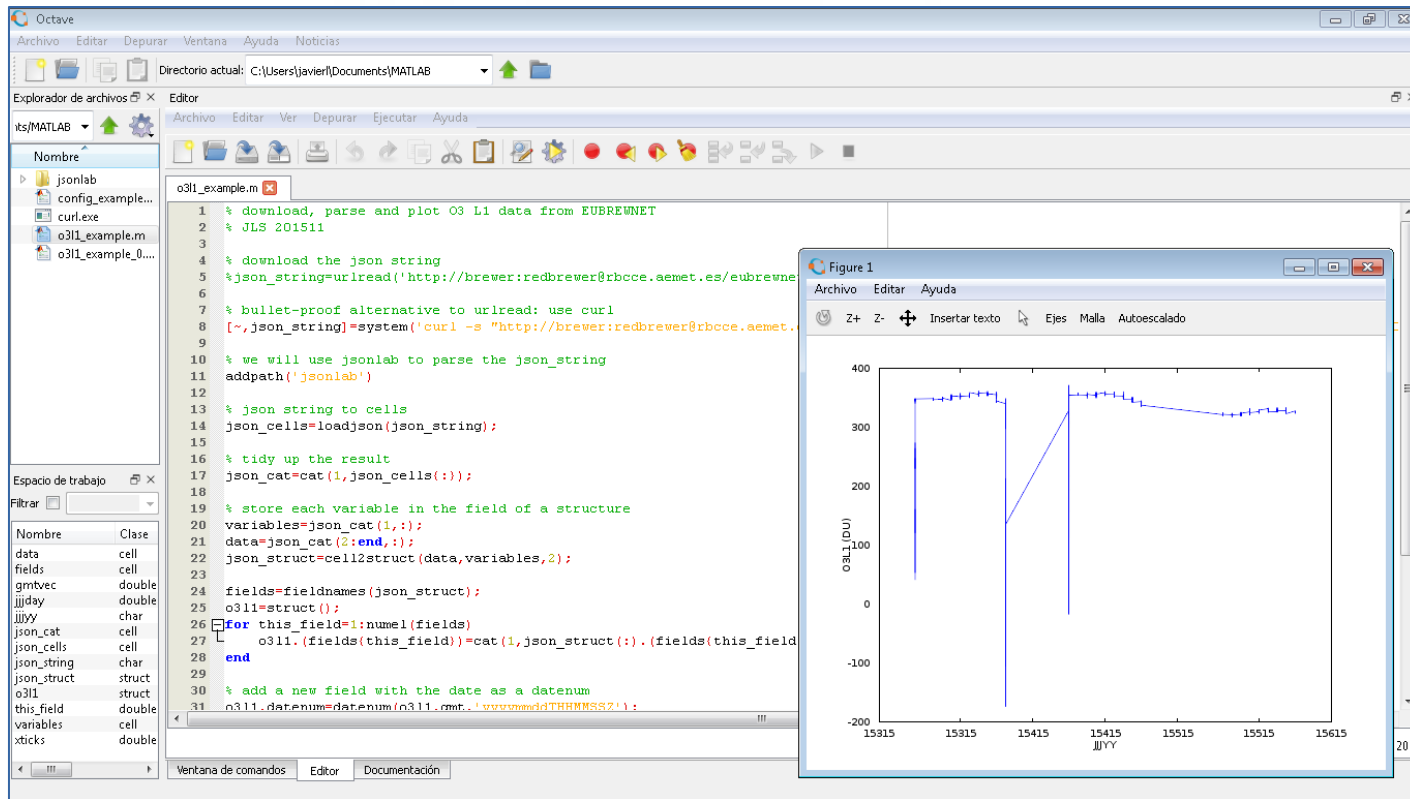
```
>> cat(1,json_cells{:})

ans =

Columns 1 through 8

    'brewerid'    'gmt'          'date_index'   'sza'          'airmass'      'temperature'  'filt'         'o3'
    [    185]    '20150602T054035Z' [7.3575e+05] [85.0828]    [ 8.4012]    [    19]    [  0]    [ 41.2613]
    [    185]    '20150602T054116Z' [7.3575e+05] [84.9584]    [ 8.2927]    [    19]    [  0]    [ 101.6200]
    [    185]    '20150602T054157Z' [7.3575e+05] [84.8340]    [ 8.1858]    [    19]    [  0]    [ 114.2642]
    [    185]    '20150602T054239Z' [7.3575e+05] [84.7063]    [ 8.0779]    [    19]    [  0]    [ 161.0690]
```

Also works in OCTAVE



The screenshot displays the Octave software interface. The main window shows a script named 'o3l1_example.m' with the following code:

```

1 % download, parse and plot O3 L1 data from EUBREWNET
2 % JLS 201511
3
4 % download the json string
5 %json_string=uriread('http://brewer:redbrewer@rbce.aemet.es/eubrewne
6
7 % bullet-proof alternative to uriread: use curl
8 [~,json_string]=system('curl -s "http://brewer:redbrewer@rbce.aemet.
9
10 % we will use jsonlab to parse the json_string
11 addpath('jsonlab')
12
13 % json string to cells
14 json_cells=loadjson(json_string);
15
16 % tidy up the result
17 json_cat=cat(1,json_cells{:});
18
19 % store each variable in the field of a structure
20 variables=json_cat(1,:);
21 data=json_cat(2:end,:);
22 json_struct=cell2struct(data,variables,2);
23
24 fields=fieldnames(json_struct);
25 o3l1=struct();
26 for this_field=1:numel(fields)
27     o3l1.(fields(this_field))=cat(1,json_struct{:}.(fields(this_field
28 end
29
30 % add a new field with the date as a datenum
31 o3l1.datenum=datenum(o3l1.cmf.','yyyymmddTHHMMSSZ');

```

The 'Figure 1' window shows a plot of O3 L1 data. The x-axis is labeled 'JJYY' and ranges from 15915 to 15615. The y-axis is labeled 'o3l1(DU)' and ranges from -200 to 400. The plot shows a blue line with markers, representing the O3 L1 data over time. The data shows a significant increase from approximately 350 DU in 15915 to about 380 DU in 15415, followed by a slight decrease to around 330 DU in 15615.

Complete examples

- 1) Download, parse, and plot O₃ L1 data
- 2) Download and parse a configuration

```
1 % download, parse and plot O3 L1 data from EUBREWNET
2 % JLS 201511
3
4 % download the json string
5 %json_string=urlread('http://brewer:redbrewer@rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=185&date=2015-06-01&enddate=2015-06-06');
6
7 % bullet-proof alternative to urlread: use curl
8 [~,json_string]=system('curl -s "http://brewer:redbrewer@rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=185&date=2015-06-02&enddate=2015-06-06"');
9
10 % we will use jsonlab to parse the json_string
11 addpath('jsonlab')
12
13 % json string to cells
14 json_cells=loadjson(json_string);
15
16 % tidy up the result
17 json_cat=cat(1,json_cells{:});
18
19 % store each variable in the field of a structure
20 variables=json_cat(1,:);
21 data=json_cat(2:end,:);
22 json_struct=cell2struct(data,variables,2);
23
24 fields=fieldnames(json_struct);
25 o3l1=struct();
26 for this_field=1:numel(fields)
27     o3l1.(fields{this_field})=cat(1,json_struct(:).(fields{this_field}));
28 end
29
30 % add a new field with the date as a datenum
31 o3l1.datenum=datetime(o3l1.gmt, 'yyyymmddTHHMMSSZ');
32
33 % plot o3l1 vs time
34 plot(o3l1.datenum,o3l1.o3)
```

1

```
1 % download and parse a configuration from EUBREWNET
2 % JLS 201511
3
4 % download the json string
5 %json_string=urlread('http://brewer:redbrewer@rbcce.aemet.es/eubrewnet/getdata/getConfigbyDate?brewerid=185&date=2015-06-02');
6
7 % bullet-proof alternative to urlread: use curl
8 - [~,json_string]=system('curl -s "http://brewer:redbrewer@rbcce.aemet.es/eubrewnet/getdata/getConfigbyDate?brewerid=185&date=2015-06-02"');
9
10 % we will use jsonlab to parse the json_string
11 - addpath('jsonlab')
12
13 % json string to cells
14 - json_cells=loadjson(json_string);
15
16 % tidy up the result
17 - json_cat=cat(1,json_cells{:});
18
19 % store each variable in the field of a structure
20 - variables=json_cat(1,:);
21 - data=json_cat(2:end,:);
22
23 - config=cell2struct(data,variables,2);
24
25 - disp(config)
```

2