



Universidad de La Laguna



Brewer-OMI comparison for El Arenosillo 2015 campaign

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Overview

O₃ and UV data for El Arenosillo 2015 (May 25th to June 5th)

OMI L2 data from the El Arenosillo overpass files at the Aura Validation Data Center (<http://avdc.gsfc.nasa.gov>)

Brewer data within 30 minutes of each OMI observation

$$\text{Relative difference} = \frac{X_B - X_O}{(X_B + X_O)/2} 100$$

Data at EUBREWNET

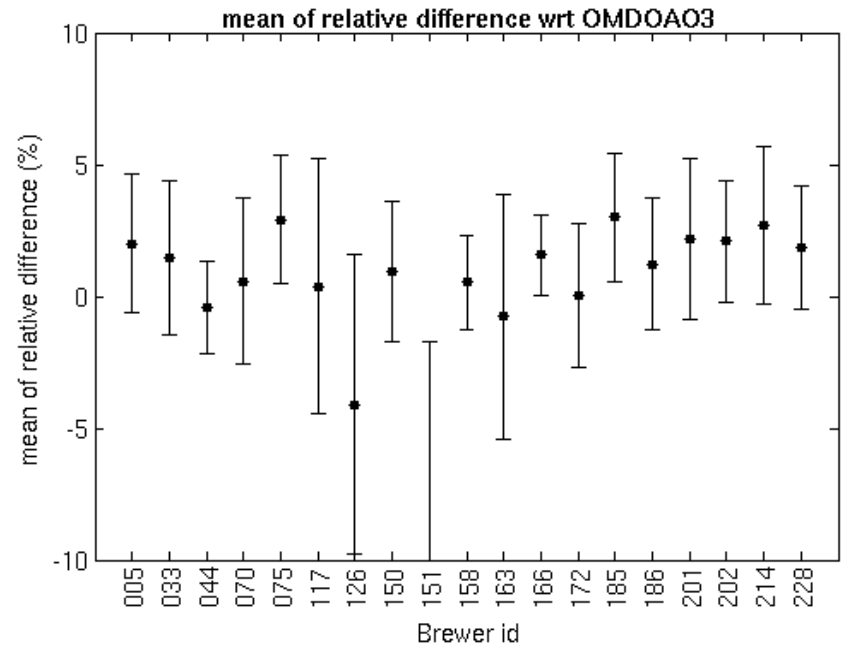
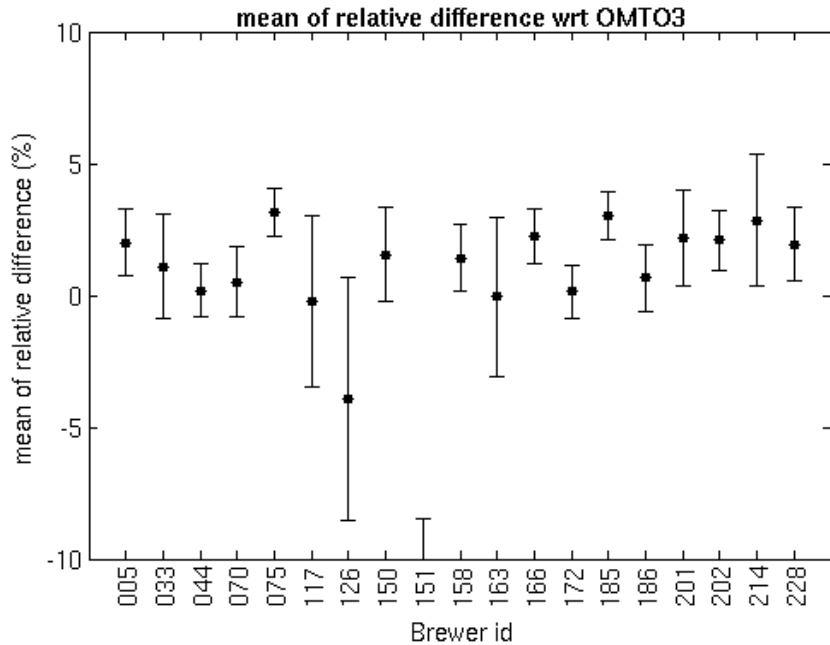
O₃ levels:

- 0) All data from B files
- 1) Counts from B files, configurations in EUBREWNET, processed with the Brewer Python Module
- 1.5) L1 data with cloud, airmass, and Hg filters, plus standard lamp, filter, and stray-light corrections
- 2) Using configurations which have been validated

UV levels:

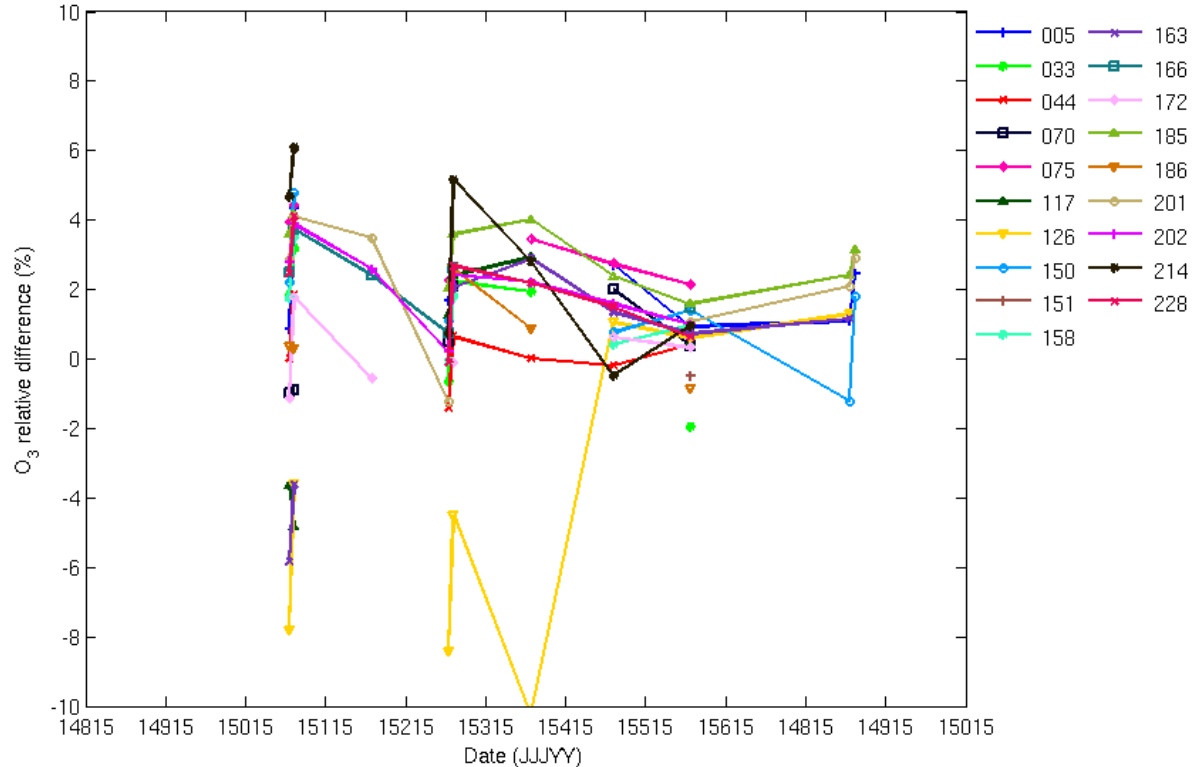
- 0) Data from UV and UVR files, processed with the Brewer Python Module

EUBREWNET O₃ L1 vs OMI OMT03 & OMDOAO3 L2



EUBREWNET O₃ L1 vs OMI OMT03 L2

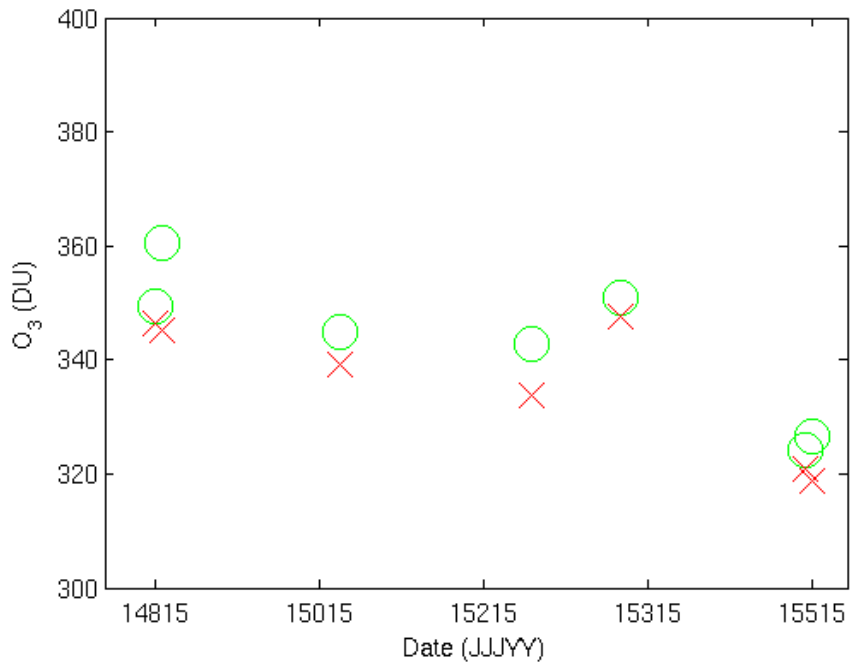
O₃ relative difference wrt omt03



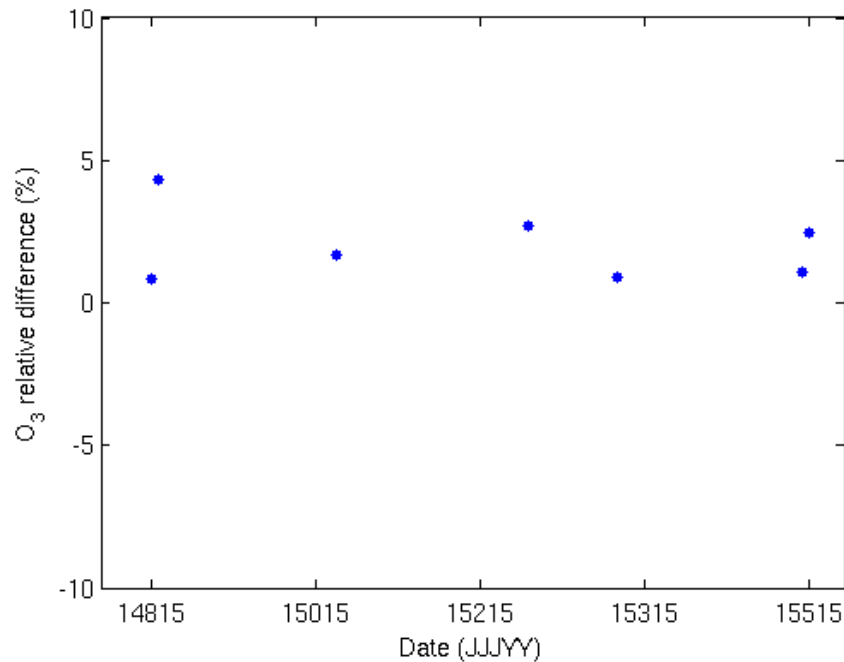
Last days of the campaign: most Brewers show the same behaviour

Brewer #005: EUBREWNET O₃ L1 vs OMI OMT03 L2

Brewer #005 O₃ simultaneous (30 min) obs: Eubrewnet (go), OMT03 (rx)

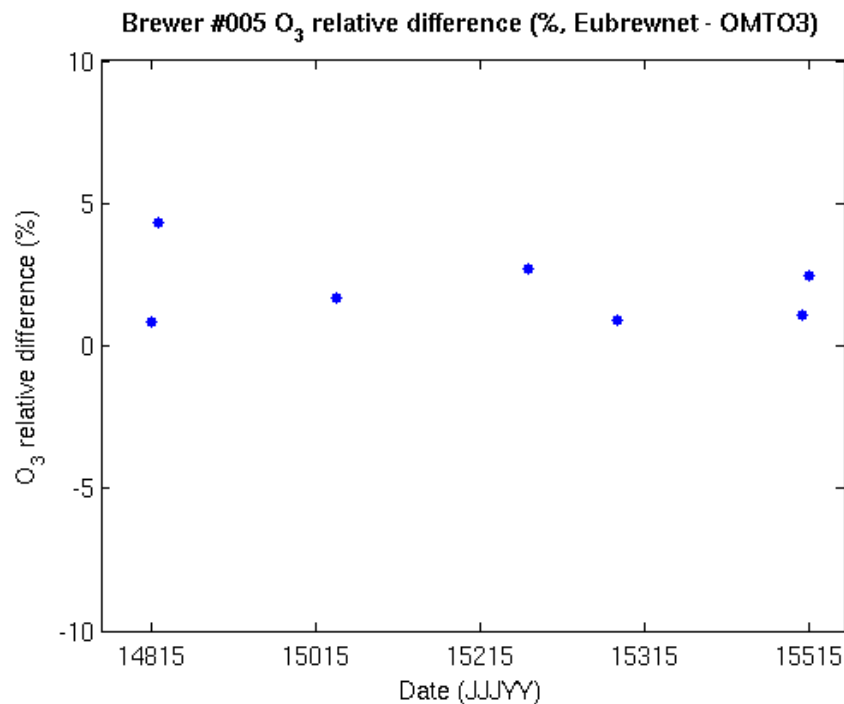


Brewer #005 O₃ relative difference (%; Eubrewnet - OMT03)



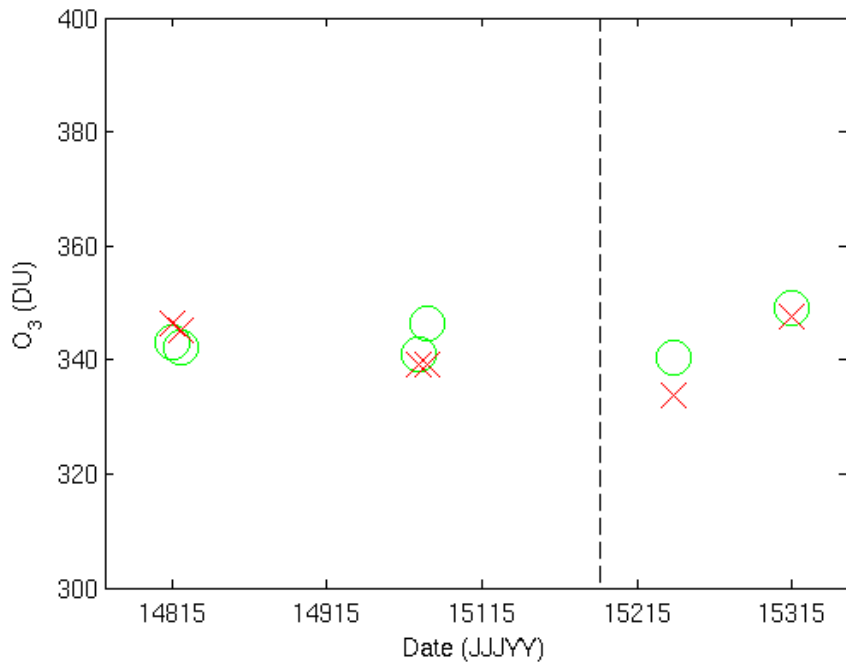
Brewer #005: EUBREWNET O₃ L1 vs OMI OMT03 L2

Calibration date	2015-01-26	2015-05-28
Brewer model	mkii	mkii
O3 temp. coeff. slit 1	-9.569	0
O3 temp. coeff. slit 2	-9.9882	-0.54
O3 temp. coeff. slit 3	-10.3365	-1.08
O3 temp. coeff. slit 4	-10.8432	-1.82
O3 temp. coeff. slit 5	-12.1055	-3.02
O3 on O3-ratio	0.33366	0.33366
ETC on O3-ratio	3020	3040
Dead time	3.4e-08	4e-08
Calibration step number	159	159
Neutral-density filter 0	0	0
Neutral-density filter 1	5000	5000
Neutral-density filter 2	10000	10000
Neutral-density filter 3	15000	15000
Neutral-density filter 4	20000	20000
Neutral-density filter 5	25000	25000
R5 reference		3623
R6 reference		1857
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	-18.7
Straylight exponent B	0	4.32

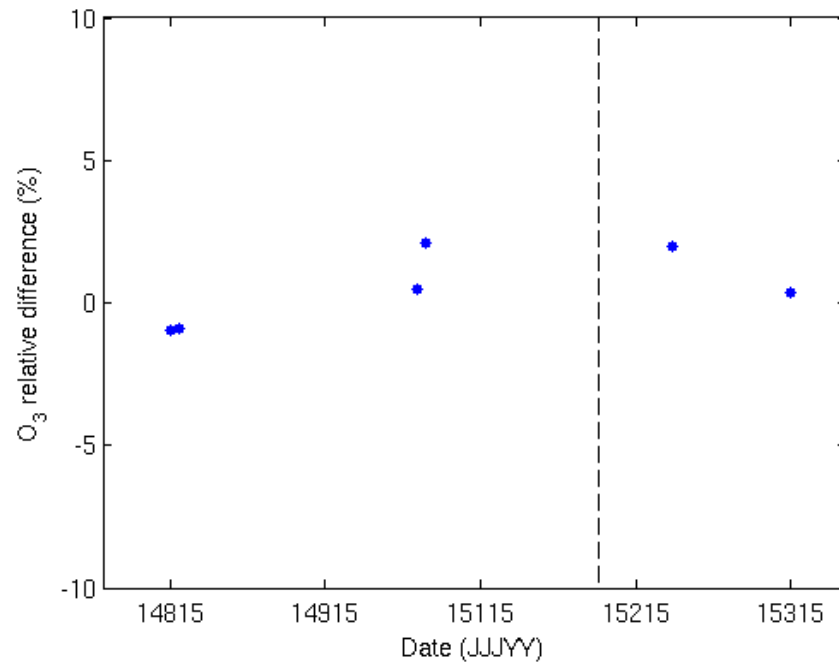


Brewer #070: EUBREWNET O₃ L1 vs OMI OMT03 L2

Brewer #070 O₃ simultaneous (30 min) obs: Eubrewnet (go), OMT03 (rx)

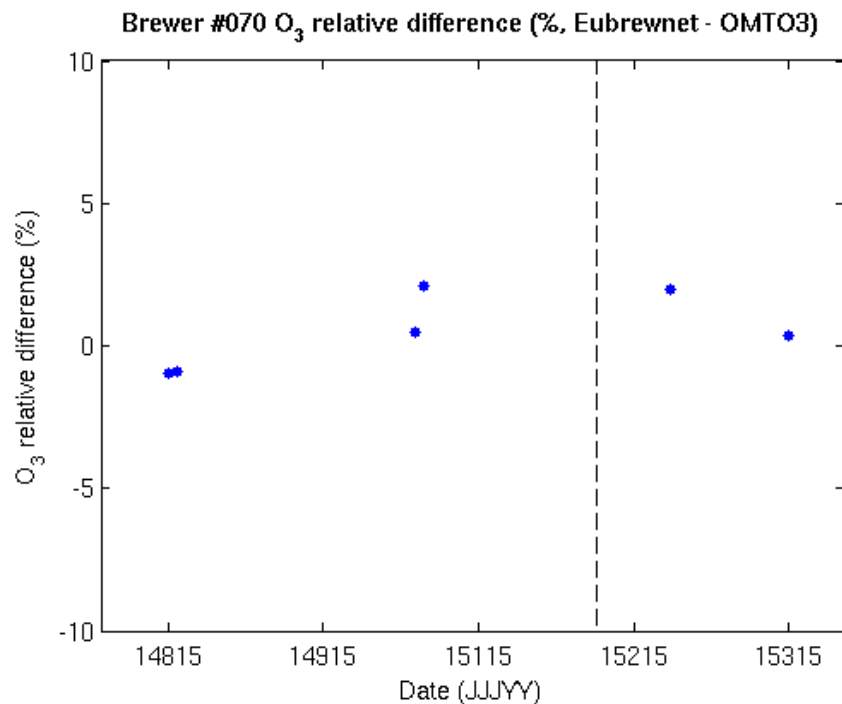


Brewer #070 O₃ relative difference (%; Eubrewnet - OMT03)



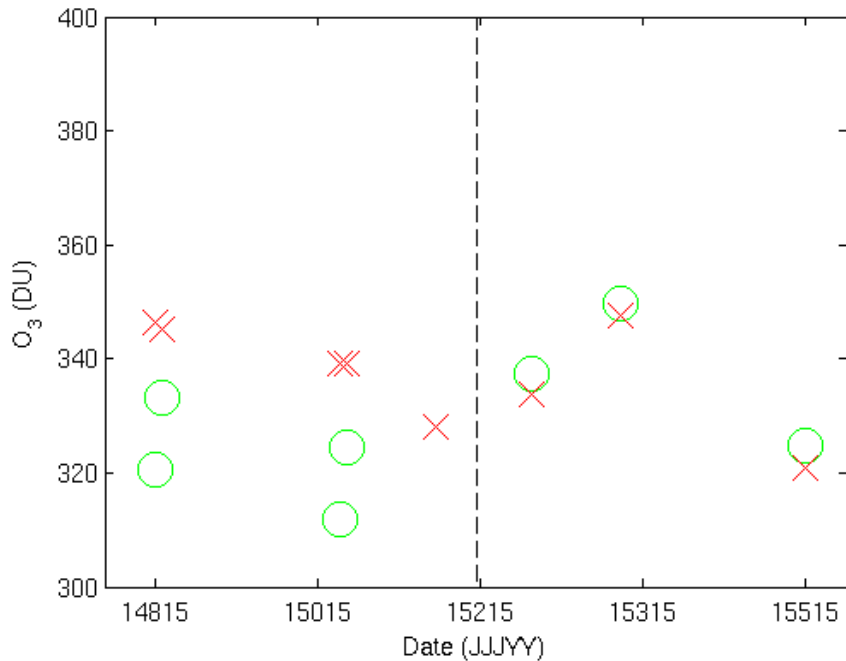
Brewer #070: EUBREWNET O₃ L1 vs OMI OMT03 L2

Calibration date	2013-06-10	2015-06-01
Brewer model	MKIV	mkiv
O3 temp. coeff. slit 1	0	0
O3 temp. coeff. slit 2	-0.4009	-0.4009
O3 temp. coeff. slit 3	-1.0721	-1.0721
O3 temp. coeff. slit 4	-1.9735	-1.9735
O3 temp. coeff. slit 5	-3.417	-3.417
O3 on O3-ratio	0.3365	0.3385
ETC on O3-ratio	2970	2950
Dead time	4.1e-08	4.1e-08
Calibration step number	162	162
Neutral-density filter 0	0	0
Neutral-density filter 1	3810	3810
Neutral-density filter 2	9310	9310
Neutral-density filter 3	15090	15090
Neutral-density filter 4	18815	18815
Neutral-density filter 5	26950	26950
R5 reference	3110	3105
R6 reference	1708	1703
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	-45.9
Straylight exponent B	0	3.94

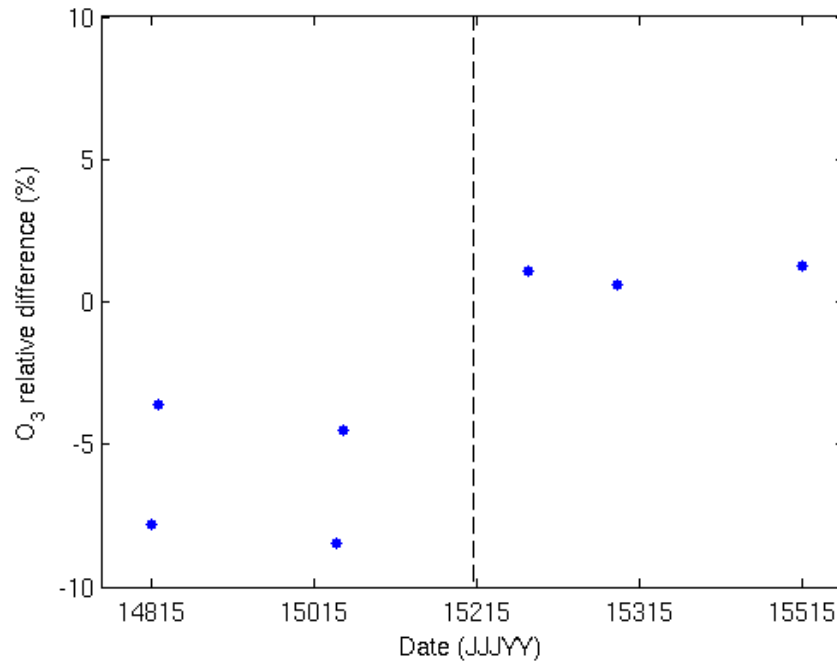


Brewer #126: EUBREWNET O₃ L1 vs OMI OMT03 L2

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

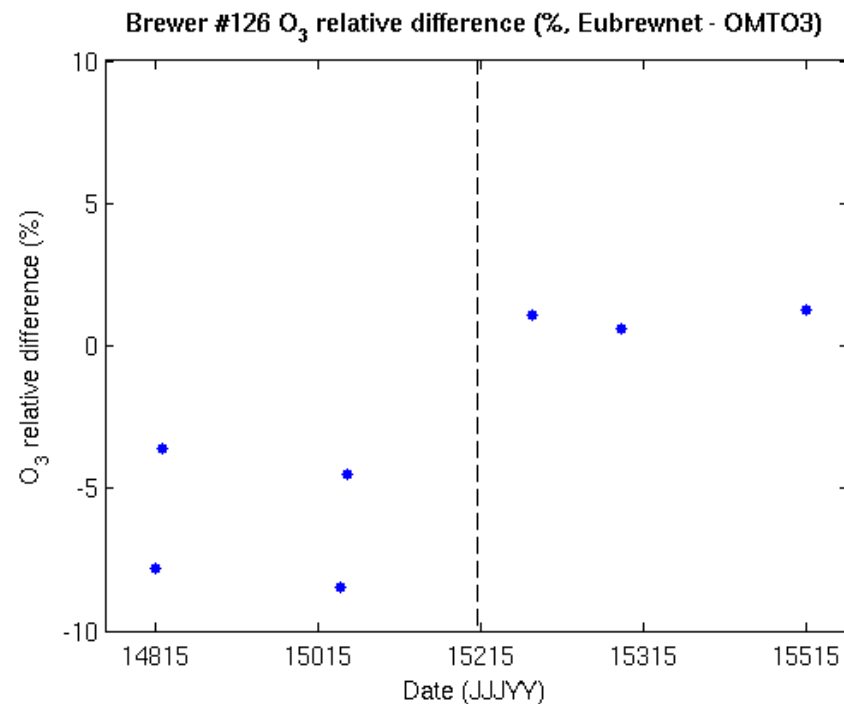


Brewer #126 O₃ relative difference (%; Eubrewnet - OMT03)

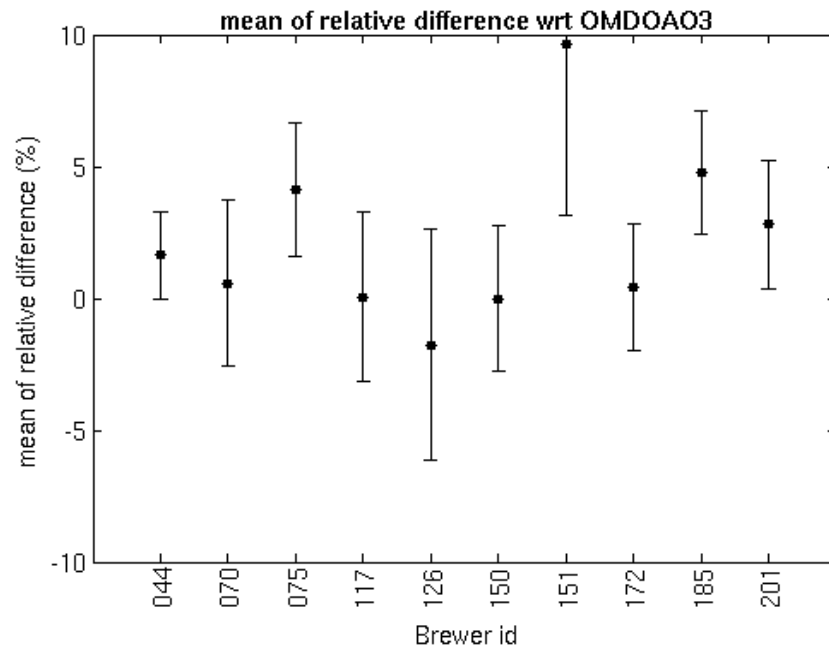
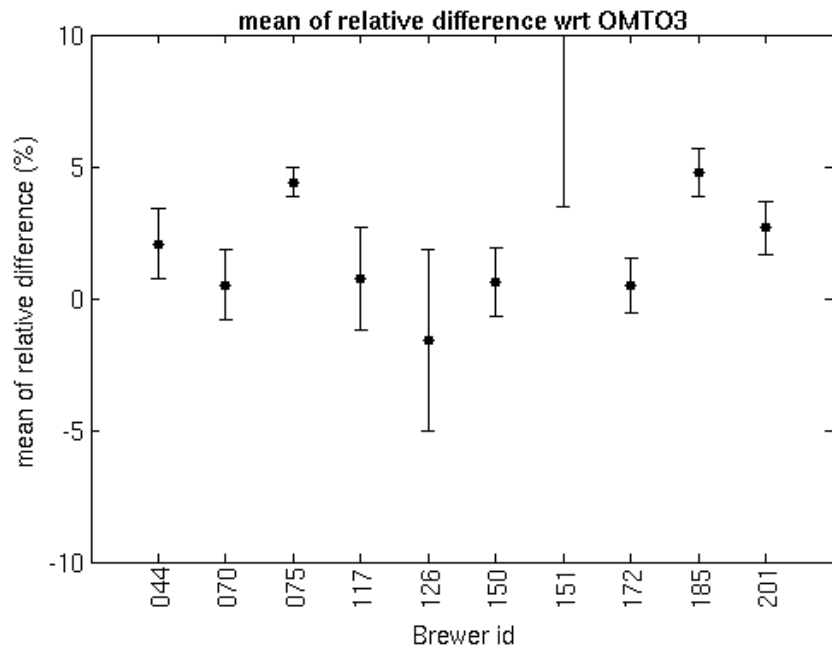


Brewer #126: EUBREWNET O₃ L1 vs OMI OMT03 L2

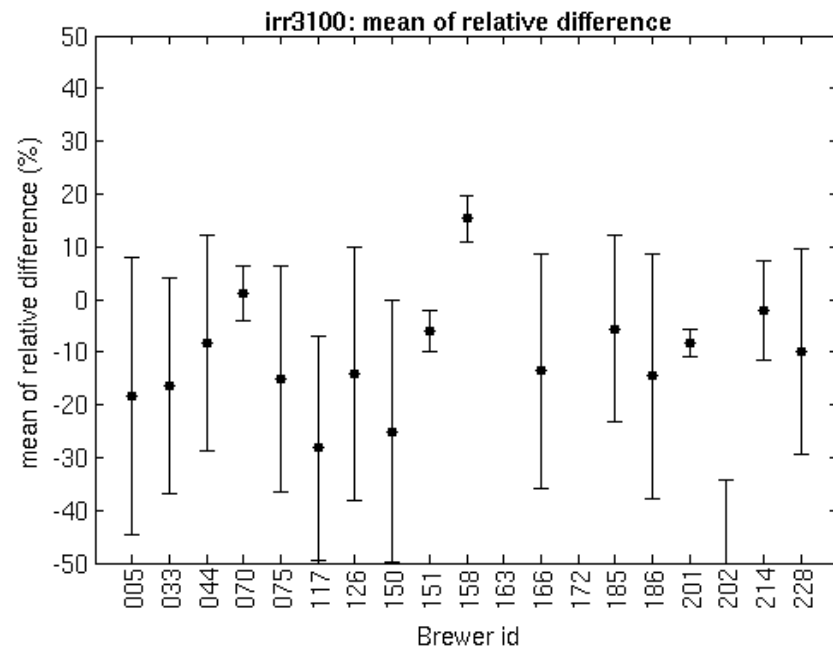
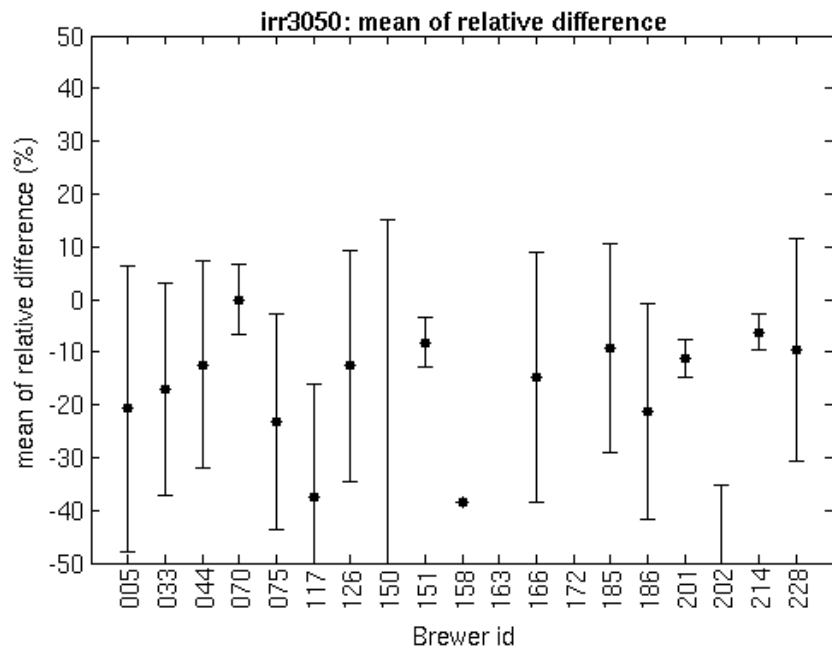
Calibration date	2013-06-15	2015-06-01
Brewer model	MKIV	mkii
O3 temp. coeff. slit 1	0	0
O3 temp. coeff. slit 2	0.5518	0.5518
O3 temp. coeff. slit 3	0.3869	0.3869
O3 temp. coeff. slit 4	-0.1935	-0.1935
O3 temp. coeff. slit 5	-1.3538	-1.3538
O3 on O3-ratio	0.3435	0.34
ETC on O3-ratio	3250	3240
Dead time	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



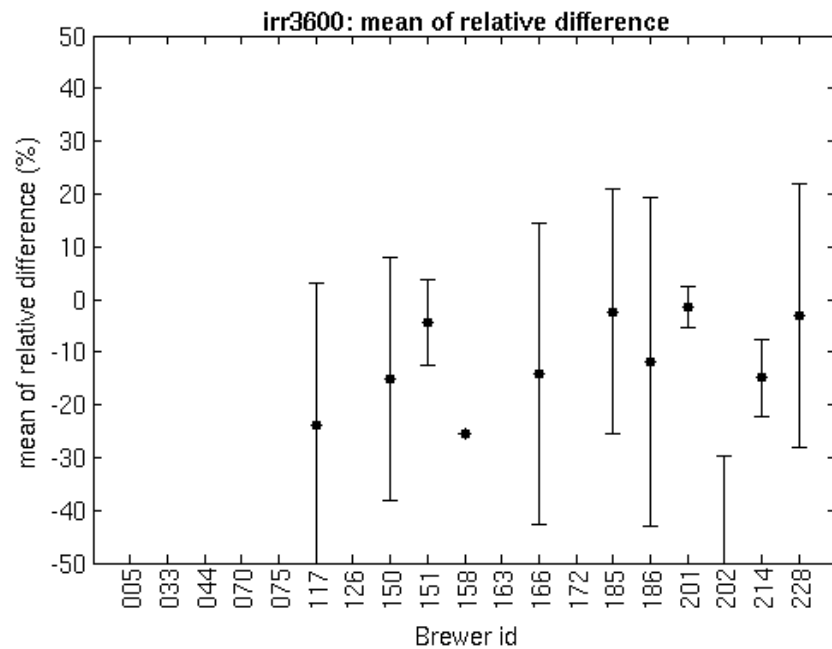
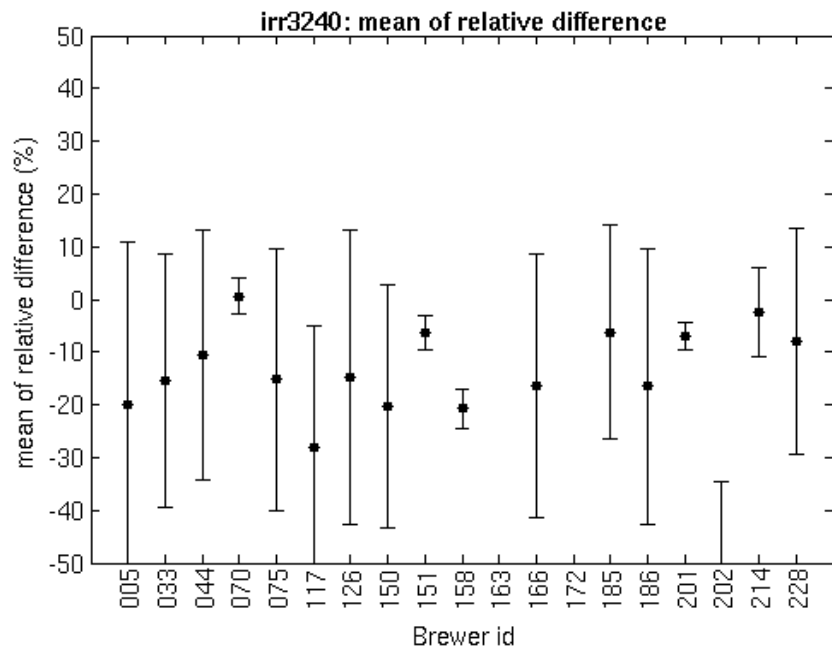
EUBREWNET O₃ L1.5 vs OMI OMT03 & OMDOAO3 L2



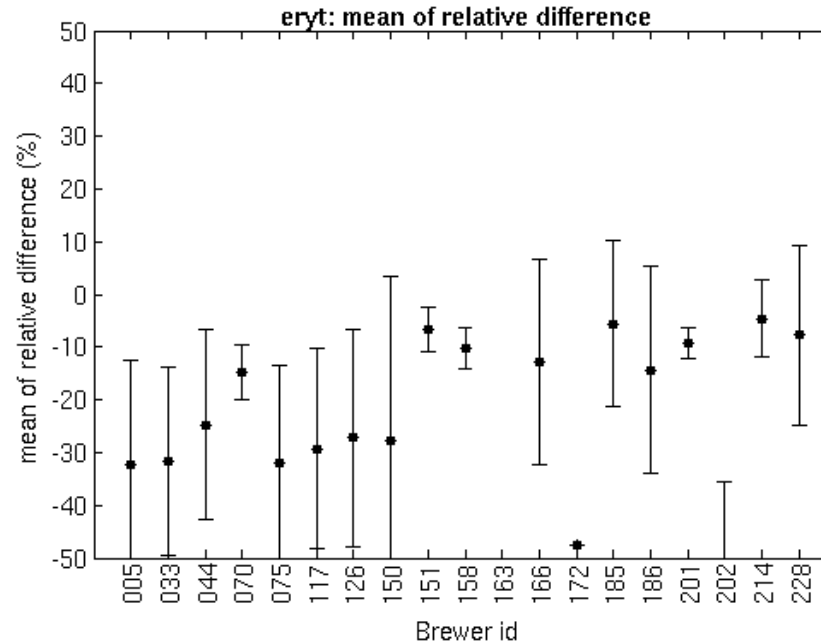
EUBREWNET UV vs OMI OMUVB L2



EUBREWNET UV vs OMI OMUVB L2



EUBREWNET UV vs OMI OMUVB L2



Closing remarks

O₃ relative differences lower than ~5%

UV relative differences lower than ~15%

Brewer-OMI plots coming to EUBREWNET soon

Brewer operators should check the configurations at EUBREWNET

Thursday

08:45	Bus and cars	Pick up from Hotel Karhu
09:00	Diemoz	An updated zenith sky retrieval algorithm, preliminary results
09:20	Josefsson	Daily ozone value
09:40	Kaisa	IDEAS software
10:00	Hernandez	Database update
10:20	Hernandez/Redondas	EUBrewnet wiki & documentation
10:40	coffee	break
11:10	Rimmer	EUBrewnet future activities
11:30	Grobner	WG1 update & future tasks discussion
12:00	Karppinen	WG2 update & future tasks discussion
12:30	Lunch	Break
13:50	DeBock	WG3 update & future tasks discussion
14:20	Bais	WG4 update & future tasks discussion
14:50	Coffee	Break
15:20	Hernandez/Redondas	Database update II, Q&A
15:50	Hernandez	Database user interface features, hands on approach
16:30	Bus and cars	Transportation to Karhu

Getting data from EUBREWNET

O₃ L1: <http://rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=185&date=2015-06-02>

Configuration:

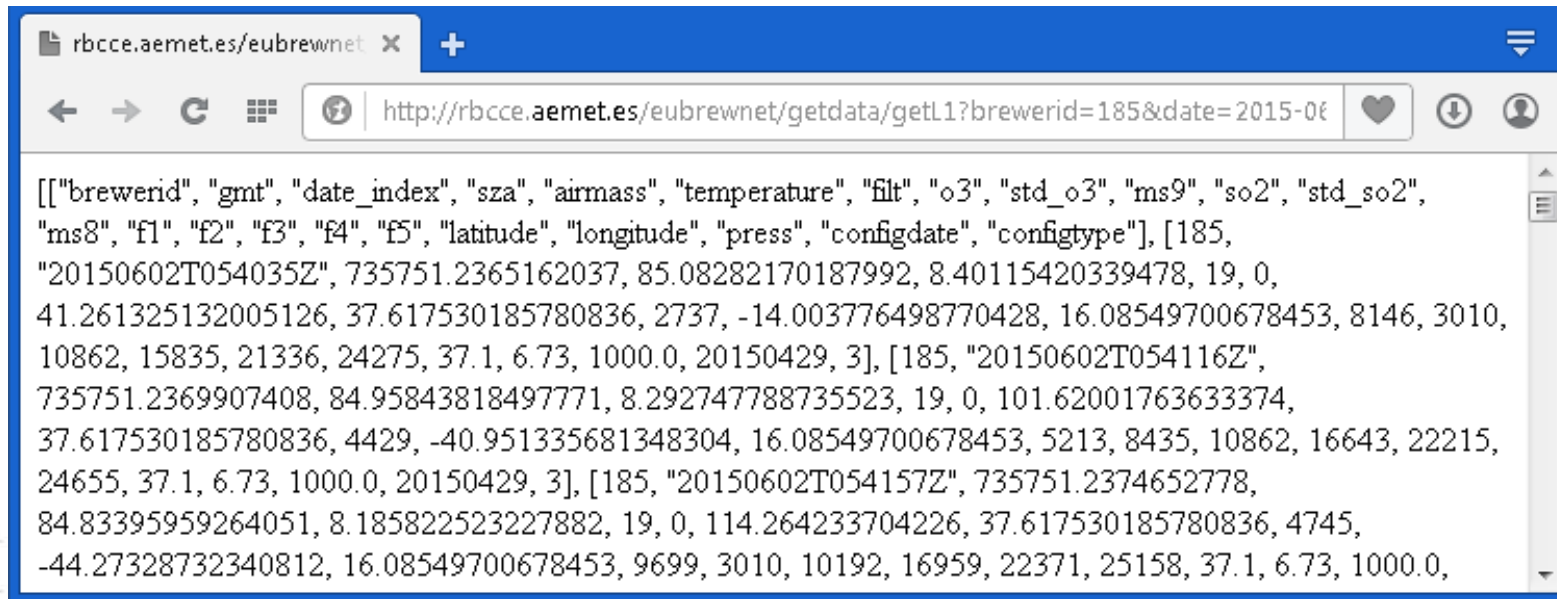
<http://rbcce.aemet.es/eubrewnet/getdata/getConfigbyDate?brewerid=185&date=2015-06-02>

UV L0:

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

Getting data from EUBREWNET with a browser

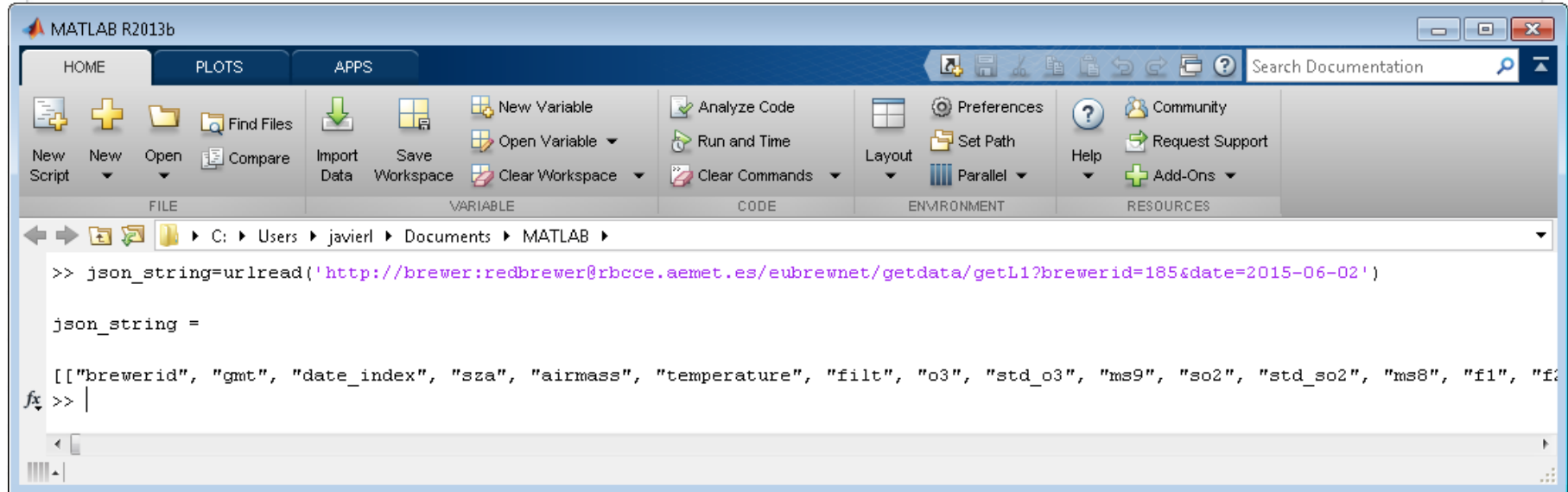
<http://rbcce.aemet.es/eubrewnet/getdata/getL1?brewerid=185&date=2015-06-02>



```
[[{"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')
```



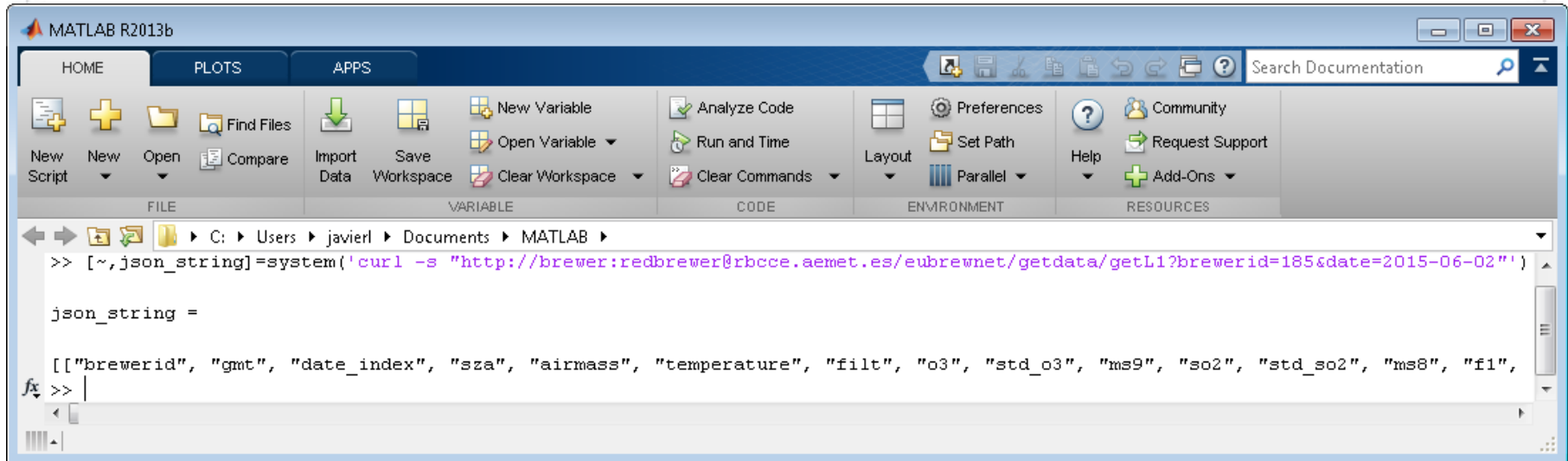
The screenshot shows the MATLAB R2013b environment. The Command Window displays the following code and output:

```
>> 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/g  
etdata/getL1?brewerid=185&date=2015-06-02"')
```

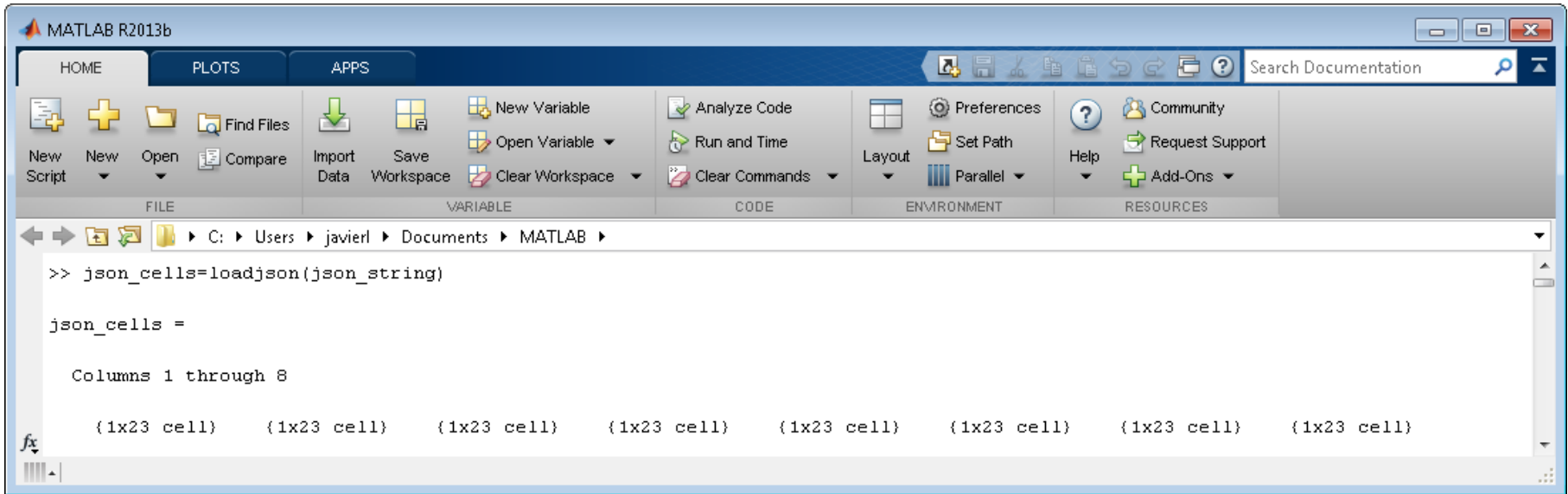


The screenshot shows the MATLAB R2013b interface. The Command Window displays the following code and output:

```
>> [~,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>)



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

```
>> json_cells=loadjson(json_string)

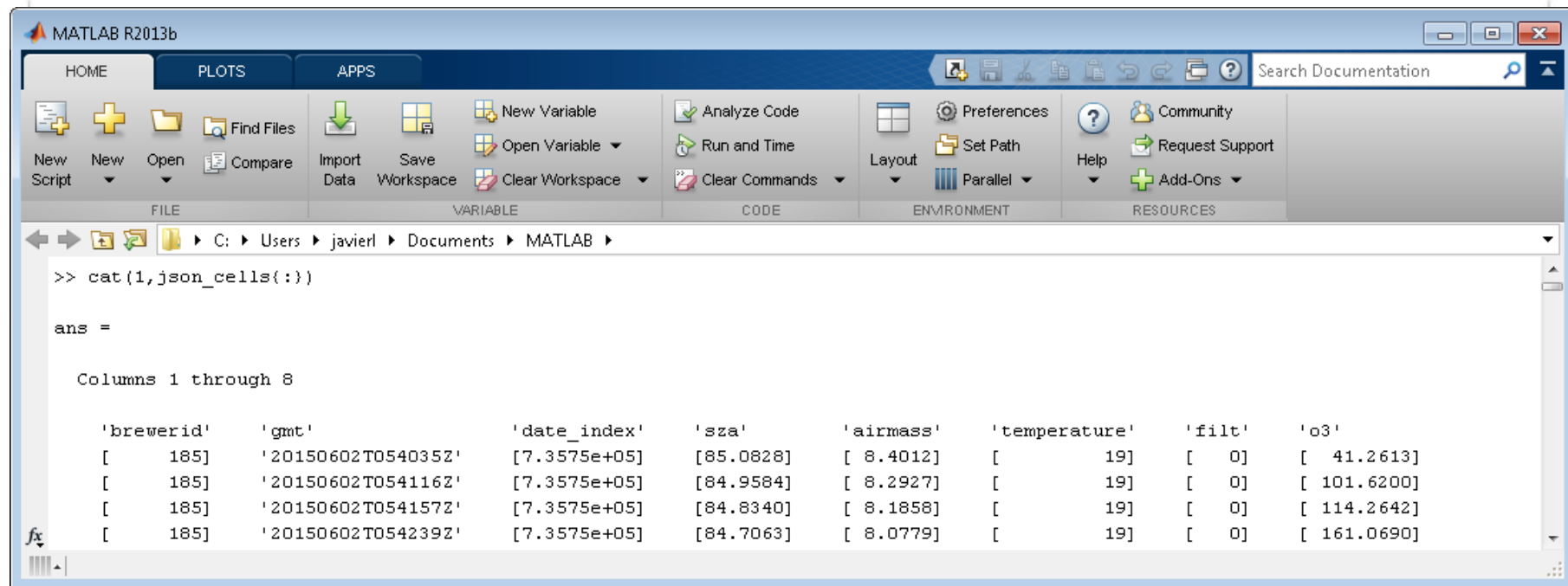
json_cells =

Columns 1 through 8

    {1x23 cell}    {1x23 cell}    {1x23 cell}    {1x23 cell}    {1x23 cell}    {1x23 cell}    {1x23 cell}    {1x23 cell}
```

Parsing the data from EUBREWNET with MATLAB

Tidy up the result



MATLAB R2013b

HOME PLOTS APPS

Search Documentation

FILE VARIABLE CODE ENVIRONMENT RESOURCES

Navigation: C:\Users\javier\Documents\MATLAB

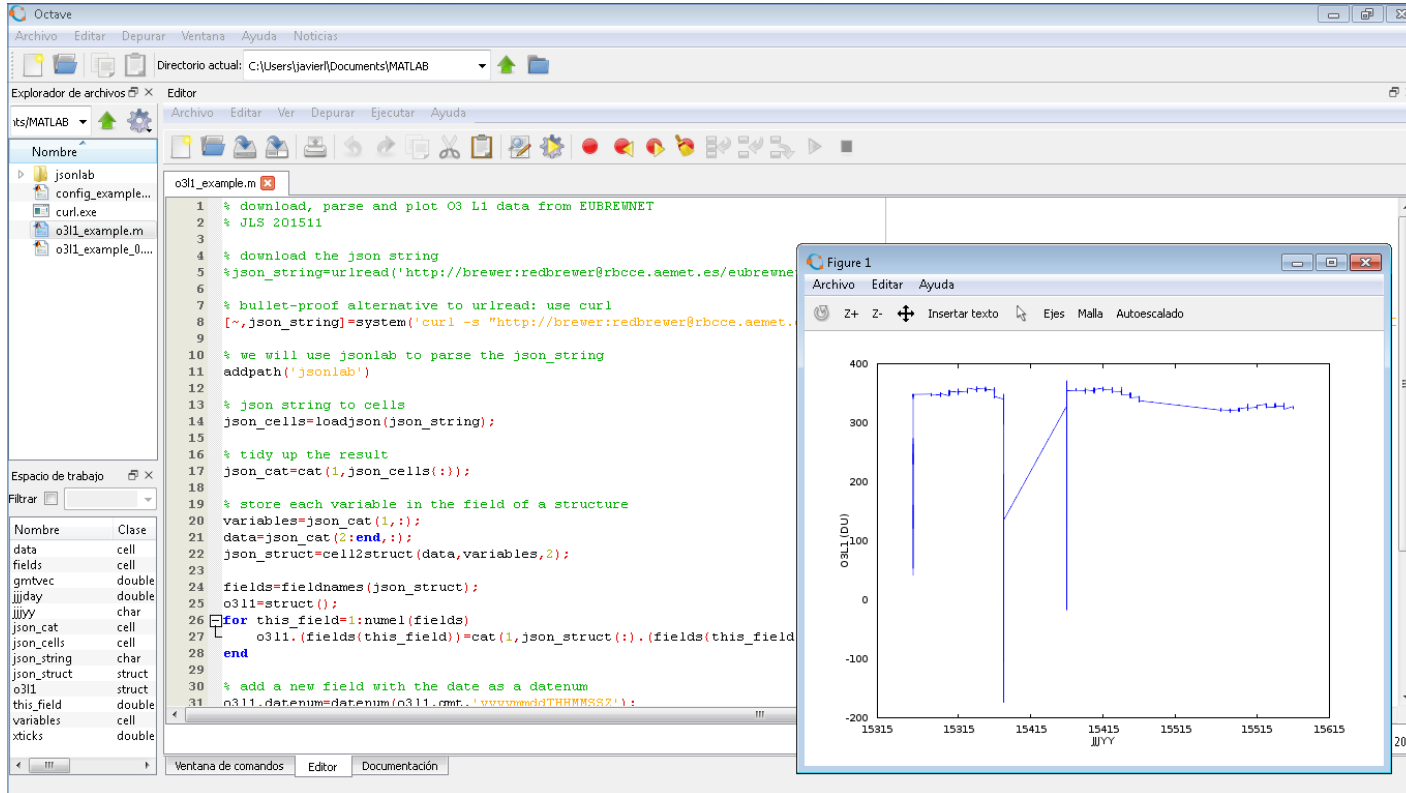
```
>> cat(1,json_cells{:})
```

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



```

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/eubrewnet
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,'%u%mm%dT%H%M%S2');

```

Figure 1: Plot of O3 L1 (DU) vs JJYY. The x-axis ranges from 15915 to 15615, and the y-axis ranges from -200 to 400. The plot shows a blue line with markers, exhibiting a seasonal cycle with a sharp dip in late 2015.

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