

Brewer-OMI validation: a brief tutorial

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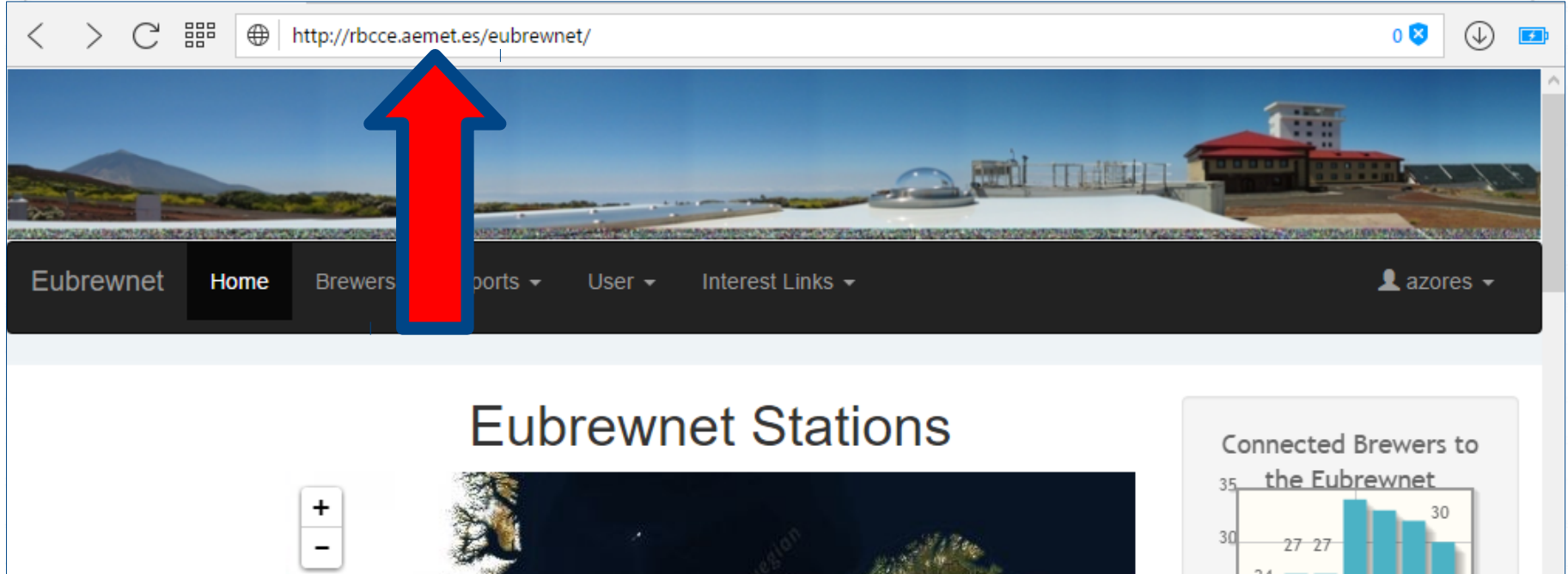
Introduction

Data from the EUBREWNET server can be obtained either downloading simple text files or using the so-called “access functions”, the latter being better for use inside codes

In this tutorial, we will show how to download and parse the data from EUBREWNET, and how to compare it to the OMI-OMTO3 product available at the Aura Validation Center (<http://avdc.gsfc.nasa.gov>)

Getting data files from EUBREWNET's server

- 1) Point your web browser to <http://rbcce.aemet.es/eubrewnet>

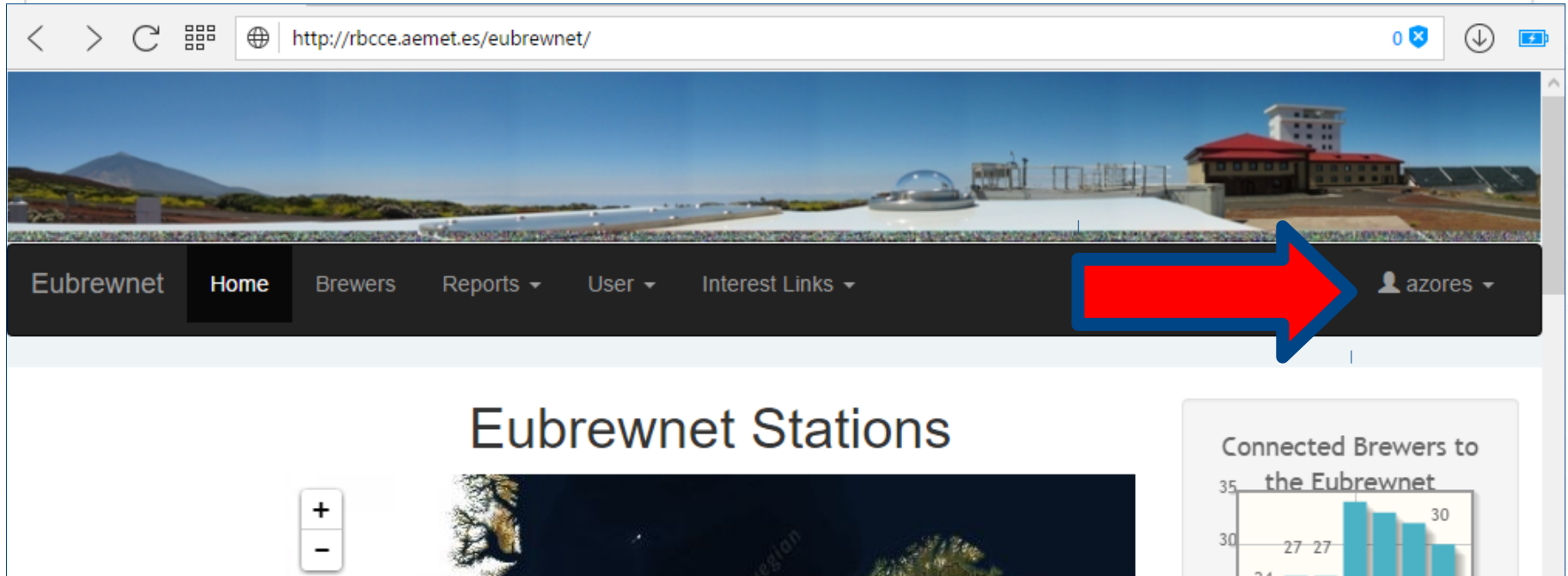


The screenshot shows a web browser window with the address bar containing the URL <http://rbcce.aemet.es/eubrewnet/>. A large red arrow with a blue outline points to the URL. The website content includes a navigation menu with 'Eubrewnet', 'Home', 'Brewers', 'Reports', 'User', and 'Interest Links'. Below the menu is a section titled 'Eubrewnet Stations' with a zoom control (+/-) and a bar chart titled 'Connected Brewers to the Eubrewnet'.

Period	Count
24	24
27	27
27	27
30	30

Getting data files from EUBREWNET's server

2) To download data, you need to be logged in



The screenshot shows a web browser window with the URL <http://rbcce.aemet.es/eubrewnet/>. The page features a navigation menu with the following items: Eubrewnet, Home, Brewers, Reports, User, and Interest Links. A red arrow points to the user profile 'azores' in the top right corner of the navigation menu. Below the navigation menu, the main content area displays 'Eubrewnet Stations' and a bar chart titled 'Connected Brewers to the Eubrewnet'.

Period	Connected Brewers
24	24
27	27
27	27
30	30

Getting data files from EUBREWNET's server

3) If you don't have your login information, send an email to

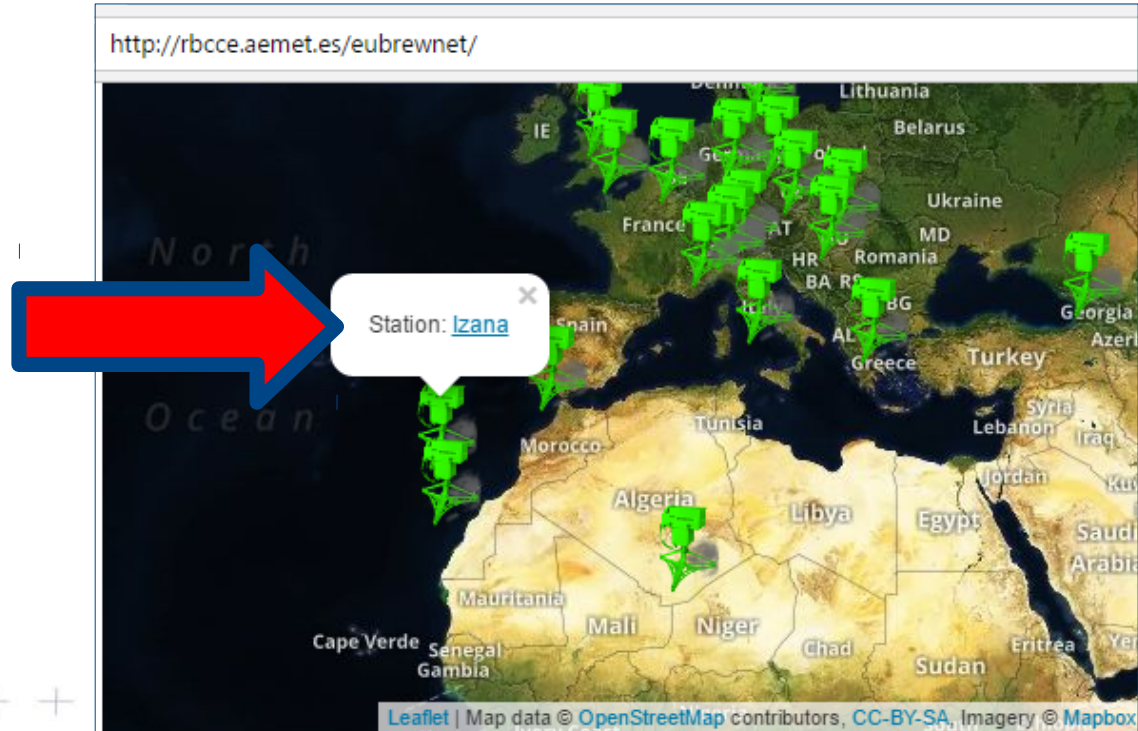
eubrewnet@aemet.es

For this workshop, you can use

user: **azores**
password: **azowork**

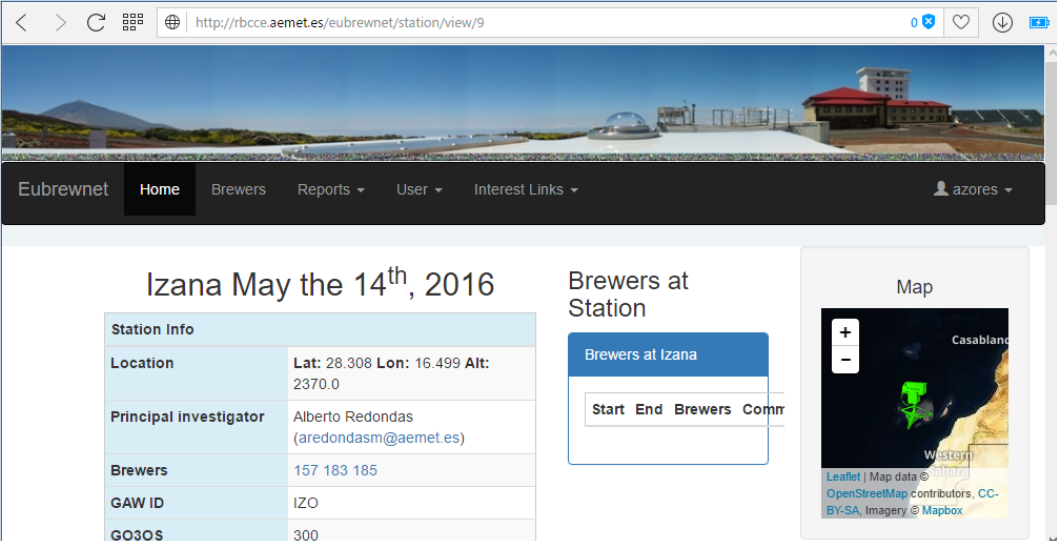
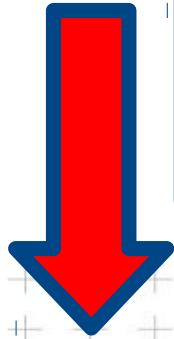
Getting data files from EUBREWNET's server

4) Click on the station you're interested in



Getting data files from EUBREWNET's server

5) Take a look at the description of the Brewer and scroll down...



The screenshot shows the EUBREWNET website interface. The main content area displays station information for Izana on May 14th, 2016. A table provides details about the station's location, principal investigator, and various identifiers. To the right, there is a section for 'Brewers at Station' with a map showing the location of Izana in the Canary Islands.

Station Info	
Location	Lat: 28.308 Lon: 16.499 Alt: 2370.0
Principal investigator	Alberto Redondas (aredondasm@aemet.es)
Brewers	157 183 185
GAW ID	IZO
GO3OS	300

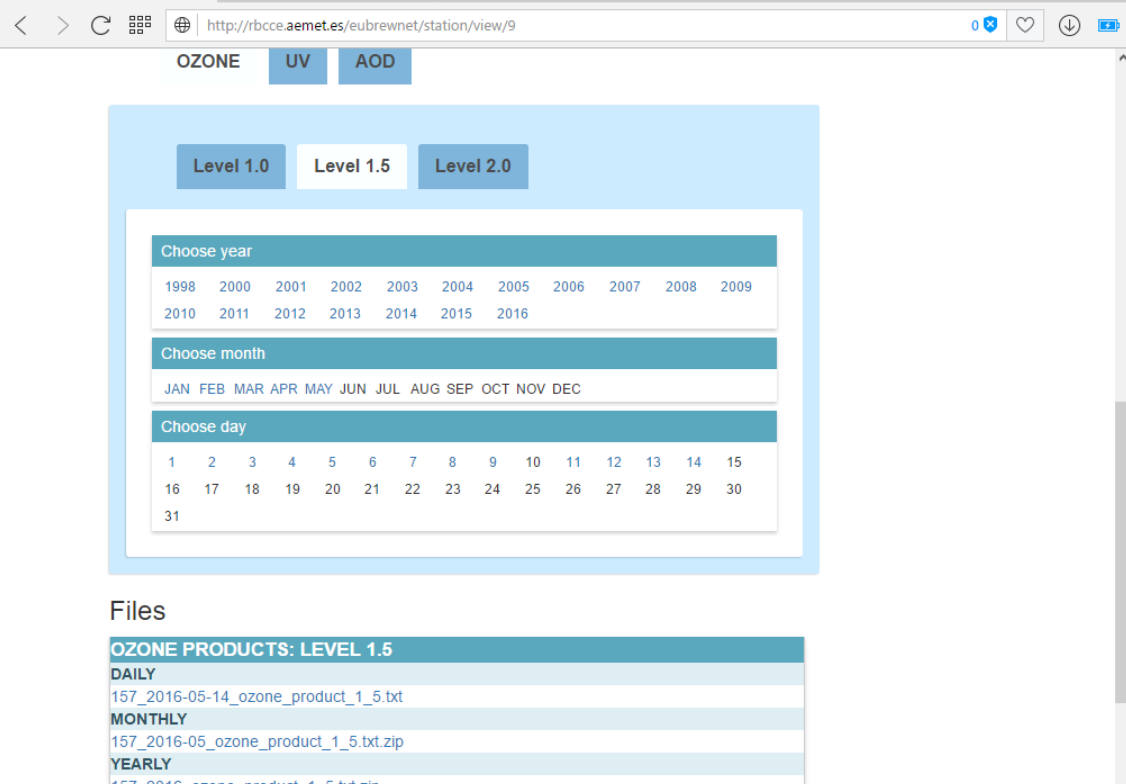
Brewers at Station

Map

Start End Brewers Comr

Getting data files from EUBREWNET's server

5) ... until you reach the download selection area



The screenshot shows a web browser window at the URL <http://rbcce.aemet.es/eubrewnet/station/view/9>. The page has tabs for 'OZONE', 'UV', and 'AOD', with 'OZONE' selected. Below these are buttons for 'Level 1.0', 'Level 1.5', and 'Level 2.0', with 'Level 1.5' selected. A selection area is highlighted with a blue border, containing three sections: 'Choose year' with a grid of years from 1998 to 2016; 'Choose month' with a row of month abbreviations from JAN to DEC; and 'Choose day' with a grid of days from 1 to 31. Below the selection area is a 'Files' section with a table of data products for 'OZONE PRODUCTS: LEVEL 1.5'. The table lists 'DAILY' and 'MONTHLY' products for the date 2016-05-14, and a 'YEARLY' product for 2016.

Choose year											
1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
2010	2011	2012	2013	2014	2015	2016					

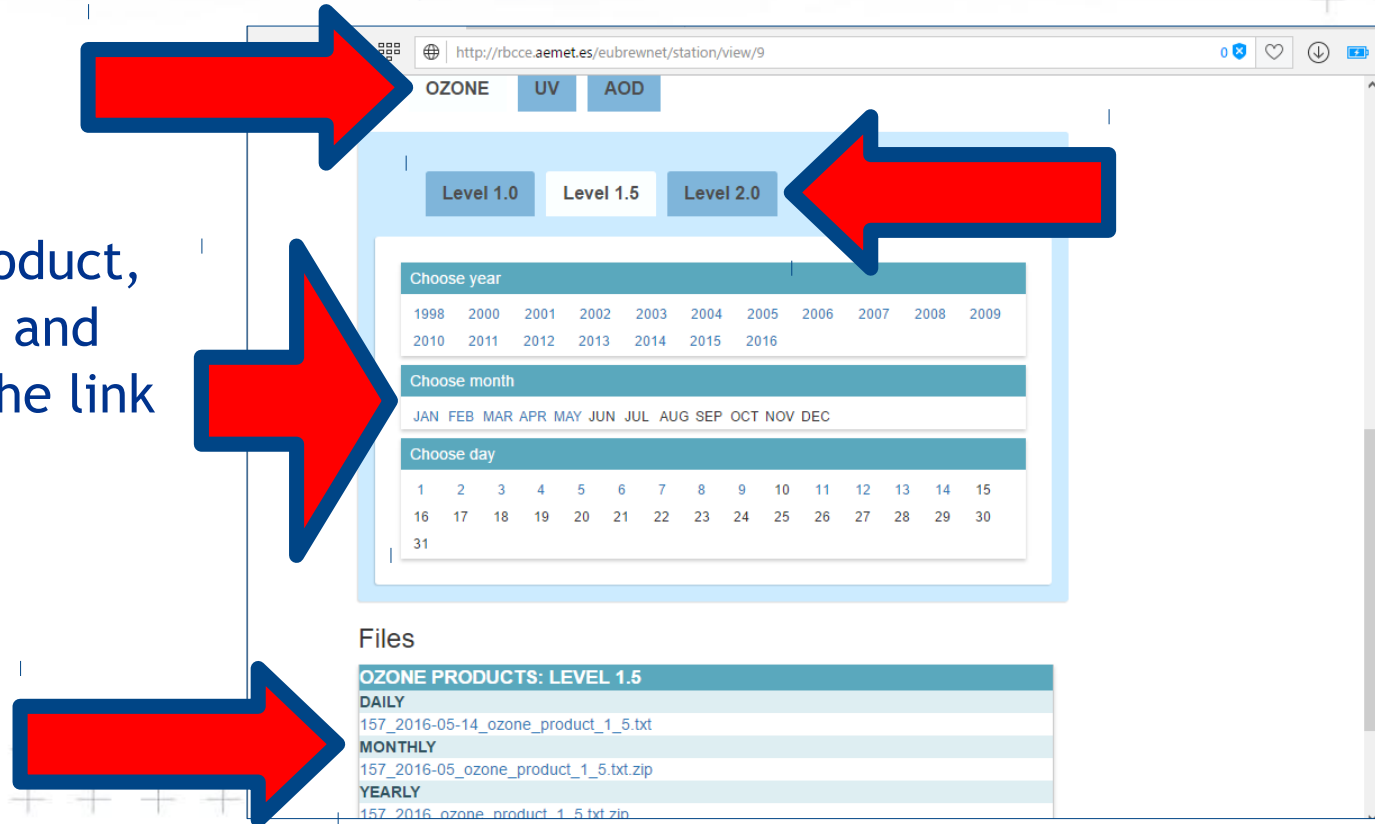
Choose month											
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Choose day														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31														

Files	
OZONE PRODUCTS: LEVEL 1.5	
DAILY	
157_2016-05-14_ozone_product_1_5.txt	
MONTHLY	
157_2016-05_ozone_product_1_5.txt.zip	
YEARLY	
157_2016_ozone_product_1_5.txt.zip	

Getting data files from EUBREWNET's server

6) Select the product, level, and date, and then click on the link



The screenshot shows the EUBREWNET web interface. The URL is <http://rbcce.aemet.es/eubrewnet/station/view/9>. The interface has tabs for OZONE, UV, and AOD. Under OZONE, there are buttons for Level 1.0, Level 1.5, and Level 2.0. Below these are three selection menus: 'Choose year' (1998-2009), 'Choose month' (JAN-DEC), and 'Choose day' (1-31). At the bottom, there is a 'Files' section with a link for 'OZONE PRODUCTS: LEVEL 1.5' and sub-sections for DAILY, MONTHLY, and YEARLY data.

Choose year										
1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
2010	2011	2012	2013	2014	2015	2016				

Choose month											
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Choose day															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
31															

Files

OZONE PRODUCTS: LEVEL 1.5

DAILY

157_2016-05-14_ozone_product_1_5.txt

MONTHLY

157_2016-05_ozone_product_1_5.txt.zip

YEARLY

157_2016_ozone_product_1_5.txt.zip

Getting data files from EUBREWNET's server

7) A pop-up with some utilization guidelines will open.
After you click on “Accept”, the file download will begin.

DATA - Usage and Guidelines

Notice to users:

The data that you are about to download, are provided by the stations of the EUBREWNET network. Each station has a Principal Investigator(s) (PI), responsible for deployment, maintenance and data collection. This PI has priority use of the data collected at the site and is entitled to be informed of any other use of that site data. Please find the PI contact information under the section 'Brewer info' of each instruments main page.

Recommended guidelines for data use and publication:

Although there is no universal policy concerning journal paper authorship and acknowledgement, the EUBREWNET contributors ask you to make every practical attempt to honour the following general guidelines.

1. **Using EUBREWNET data:** Please consult with the PI(s) of the data to be used.
2. **Referencing:** Always reference the website (<http://rbcce.aemet.es/eubrewnet/>) for any publications.
3. **Publishing EUBREWNET data from a 'few' sites:** Please consider authorship for the PI(s) and/or the following acknowledgement:
We thank the European Brewer Network (<http://rbcce.aemet.es/eubrewnet/>) for providing access to the data and "Project(s)/PI(s)" for "its/his/her/their" effort in establishing and maintaining the "site name(s)" site(s).
4. **Publishing data from 'many' sites:** A general acknowledgement is typically sufficient and may read:
We thank the European Brewer Network (<http://rbcce.aemet.es/eubrewnet/>) for providing access to the data and the PI investigators and their staff for establishing and maintaining the "#" sites used in this investigation.

However if the EUBREWNET data are a principal component of the paper then co-authorship to PI's should be offered.

In order to maintain usage statistics, your download will be registered.

If you accept the above conditions, please click the "Accept" button below to download the data. If you do not agree with the above conditions, click "Do Not Accept" to return to the main page.

or

Getting data files from EUBREWNET's server

8) The file starts with a very descriptive header...

```

183_2016_ozone_product_1_5.txt
Archivo  Editar  Buscar  Opciones  Ayuda
#####
# Product: ozone_product_1_5
# Level: level1.5
# Date: 2016
# Process Date: 2016-03-01
#####
# DATA - Usage and Guidelines
# Notice to users:
# The data that you have downloaded, are provided by the stations of the EUBREWNET network. Each station
has a Principal Investigator(s) (PI), responsible for deployment, maintenance and data collection. This
PI has priority use of the data collected at the site and is entitled to be informed of any other use of
that site data. Please find the PI contact information under the section 'Brewer info' of each
instruments main page.
# Recommended guidelines for data use and publication:
# Although there is no universal policy concerning journal paper authorship and acknowledgement, the
EUBREWNET contributors ask you to make every practical attempt to honour the following general
guidelines.
# Using EUBREWNET data: Please consult with the PI(s) of the data to be used.
# Referencing: Always reference the website (http://rbcce.aemet.es/eubrewnet/) for any publications.
# Publishing EUBREWNET data from a 'few' sites: Please consider authorship for the PI(s) and/or the
following acknowledgement:
# We thank the European Brewer Network (http://rbcce.aemet.es/eubrewnet/) for providing access to the
data and "Project(s)/PI(s)" for "its/his/her/their" effort in establishing and maintaining the "site name
(s)" site(s).
# Publishing data from 'many' sites: A general acknowledgement is typically sufficient and may read:
# We thank the European Brewer Network (http://rbcce.aemet.es/eubrewnet/) for providing access to the
data and the PI investigators and their staff for establishing and maintaining the "# sites used in
this investigation.
# However if the EUBREWNET data are a principal component of the paper then co-authorship to PI's should
be offered.
#####
# Config:
# Date: 2015-06-09 (http://rbcce.aemet.es/eubrewnet/data/get/ConfigbyId?id=458)
#####
# Column 1: brewerid; Brewer identification number (Brewerid)
# Column 2: gmt; UT time of the measure in ISO 8601 format (GMT)
# Column 3: configid; Configuration identification number (Configid)
# Column 4: n_sum; Index of daily summary (Index)
# Column 5: date_index; Continuous date index (1.0 = 0001-01-01T00:00:00Z) based in python date.toordinal
(Days)
  
```


EUBREWNET's access functions

Access functions are just web URLs pointing to data

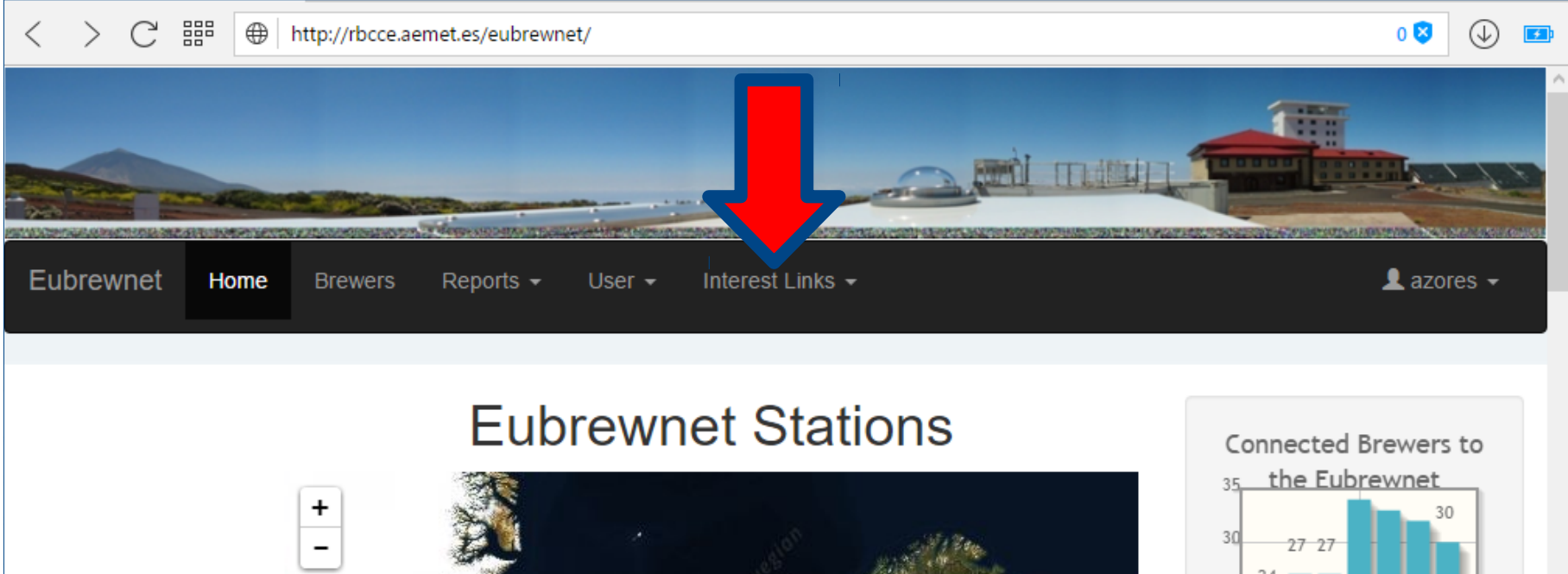
They are easy to use inside your code

The simplest syntax is

```
http://user:password@rbcce.aemet.es/eubrewnet/  
data/get/function?brewerid=XXX&date=YYYY-MM-DD
```

EUBREWNET's access functions

1) Open the “EUBREWNET wiki” by clicking on “Links”

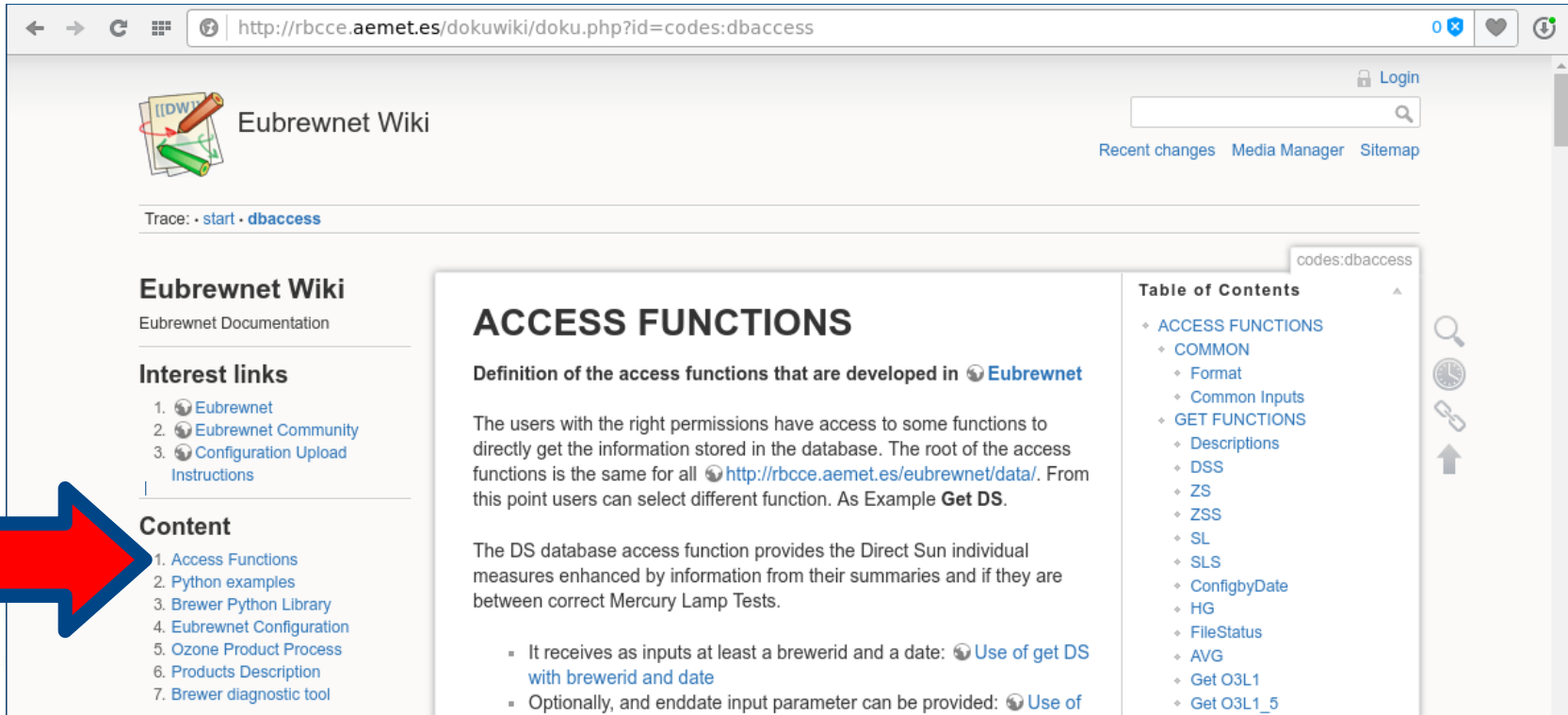


The screenshot shows a web browser window with the URL <http://rbcce.aemet.es/eubrewnet/>. The website features a navigation menu with the following items: Eubrewnet, Home, Brewers, Reports, User, Interest Links, and a user profile for 'azores'. A large red arrow points to the 'Interest Links' dropdown menu. Below the navigation menu, the page displays 'Eubrewnet Stations' and a bar chart titled 'Connected Brewers to the Eubrewnet'.

Period	Connected Brewers
24	24
27	27
27	27
30	30

EUBREWNET's access functions

2) Open the “Access Functions” wiki page



The screenshot shows a web browser window displaying the Eubrewnet Wiki page for 'ACCESS FUNCTIONS'. The browser address bar shows the URL: <http://rbcce.aemet.es/dokuwiki/doku.php?id=codes:dbaccess>. The page header includes the Eubrewnet Wiki logo, a search bar, and navigation links for 'Recent changes', 'Media Manager', and 'Sitemap'. The main content area is titled 'ACCESS FUNCTIONS' and contains the following text:

Definition of the access functions that are developed in [Eubrewnet](#)

The users with the right permissions have access to some functions to directly get the information stored in the database. The root of the access functions is the same for all <http://rbcce.aemet.es/eubrewnet/data/>. From this point users can select different function. As Example **Get DS**.

The DS database access function provides the Direct Sun individual measures enhanced by information from their summaries and if they are between correct Mercury Lamp Tests.

- It receives as inputs at least a brewerid and a date: [Use of get DS with brewerid and date](#)
- Optionally, and enddate input parameter can be provided: [Use of](#)

The left sidebar contains the following sections:

- Eubrewnet Wiki**
Eubrewnet Documentation
- Interest links**
 - [Eubrewnet](#)
 - [Eubrewnet Community](#)
 - [Configuration Upload Instructions](#)
- Content**
 - [Access Functions](#)
 - [Python examples](#)
 - [Brewer Python Library](#)
 - [Eubrewnet Configuration](#)
 - [Ozone Product Process](#)
 - [Products Description](#)
 - [Brewer diagnostic tool](#)

The right sidebar contains a 'Table of Contents' for the page 'codes:dbaccess':

- ACCESS FUNCTIONS
 - COMMON
 - Format
 - Common Inputs
 - GET FUNCTIONS
 - Descriptions
 - DSS
 - ZS
 - ZSS
 - SL
 - SLS
 - ConfigbyDate
 - HG
 - FileStatus
 - AVG
 - Get O3L1
 - Get O3L1_5

A large red arrow points to the 'Content' section in the left sidebar.

EUBREWNET's access functions

2) Scrolling down a bit, you will find a description of the options available to all the access functions...

http://rbcce.aemet.es/dokuwiki/doku.php?id=codes:dbaccess

For security purposes user authentication has been added to this tools and their use is registered.

COMMON

Format

The access functions provide four different ways of data access using the format input parameter.

Format input	Description	Example
jsonM	JSON matrix formed by lists of lists (default value). The first list is formed by the value names and the following lists are the query outputs	Get DS by default
jsonO	JSON object of lists, where each key is the value name and its value is the time sorted list of them	Get DS with jsonO format
text	Human readable comma separated values where first row is the value names and the following are the query outputs	Get DS with text format
csv	CSV direct download where first row are the value names and the following are the query outputs	Get DS with text format

Common Inputs

Almost all functions receive the following inputs, too:

Parameter	Description	Example
brewerid	Brewer identification number	Get function with brewerid input parameter
date	Date in YYYY-MM-DD format	Get function with date input parameter
enddate	Date in YYYY-MM-DD format. If provided, the function will return the query in a date range	Get function with enddate input parameter

Examples of connections in [matlab](#) and [python](#) are provided for understanding.

EUBREWNET's access functions

2) ... and below it, you will find a list of all the access functions currently available

http://rbcce.aemet.es/dokuwiki/doku.php?id=codes:dbaccess

GET FUNCTIONS

Function	Short Description	Long Description	Link
DS	Returns DS measures	DS	Get DS
DSS	Returns the DS summaries	DSS	Get DSS
ZS	Returns ZS measures	ZS	Get ZS
ZSS	Returns the ZS summaries	ZSS	Get ZSS
SL	Returns SL measures	SL	Get SL
SLS	Returns the SL summaries	SLS	Get SLS
ConfigbyDate	Returns the available Configuration	ConfigbyDate	Get Config by Date
HG	Returns the mercury lamp tests	HG	Get HG
ActiveBrewers	Returns the number of Brewers whith at least one SL test by dates	HG	Get HG
FileStatus	Returns the status of the received files	FileStatus	Get FileStatus
ActiveBrewers	Returns the number of Active Brewers	ActiveBrewers	Get ActiveBrewers
Umkehr	Returns the Umkehr measures	Umkehr	Get Umkehr
BfilesbyLocation	Returns the Available B files for a range of locations	BfilesbyLocation	Get Bfiles by Location
BrewerLocation	Returns the changes in location of a Brewer	BrewerLocation	Get Brewer Location
AVG	Returns the available AVG measures	AVG	Get AVG
O3L1	Returns the Level 1 of Ozone	O3L1	Get O3L1
O3L1_5	Returns the Level 1.5 of Ozone	O3L1_5	Get O3L1_5
O3L2_0	Returns the Level 2.0 of Ozone	O3L2_0	Get O3L2_0

EUBREWNET's access functions

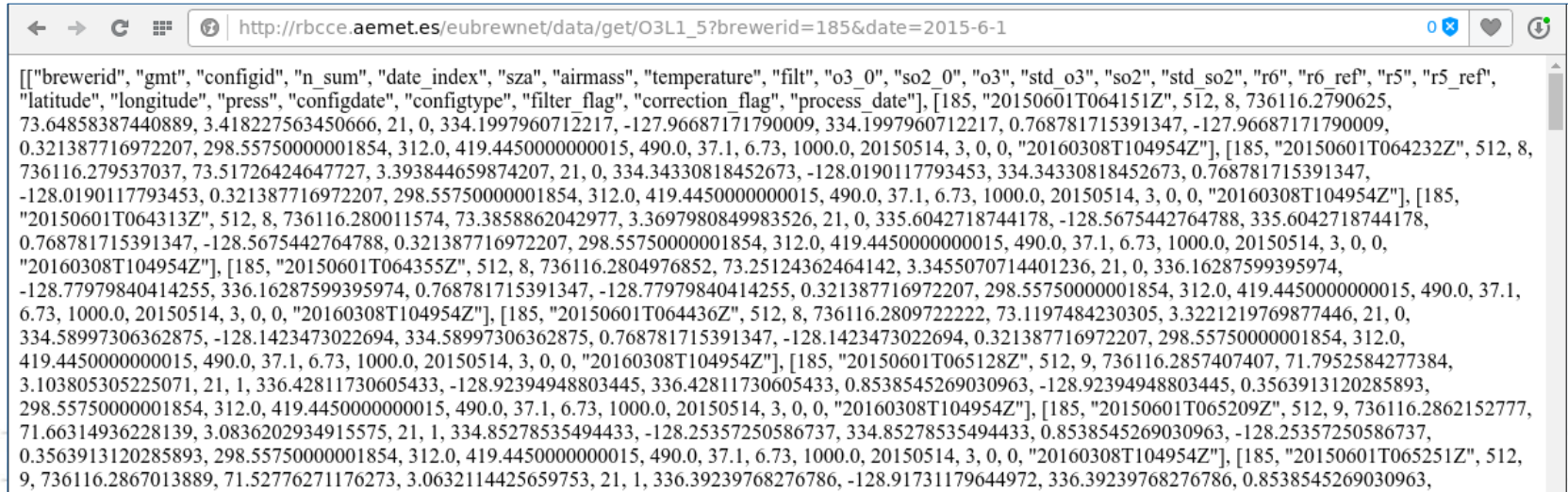
3) For example, to download the Level 1.5 ozone for Brewer #185 and day 2015-06-01 you just have to use the URL

```
http://azores:azowork@rbcce.aemet.es/eubrewnet/  
data/get/O3L1_5?brewerid=185&date=2015-06-01
```

EUBREWNET's access functions

4) The access functions' URLs do work from within any web browser, but you usually need to be logged in EUBREWNET's server

The default output is a JSON string...



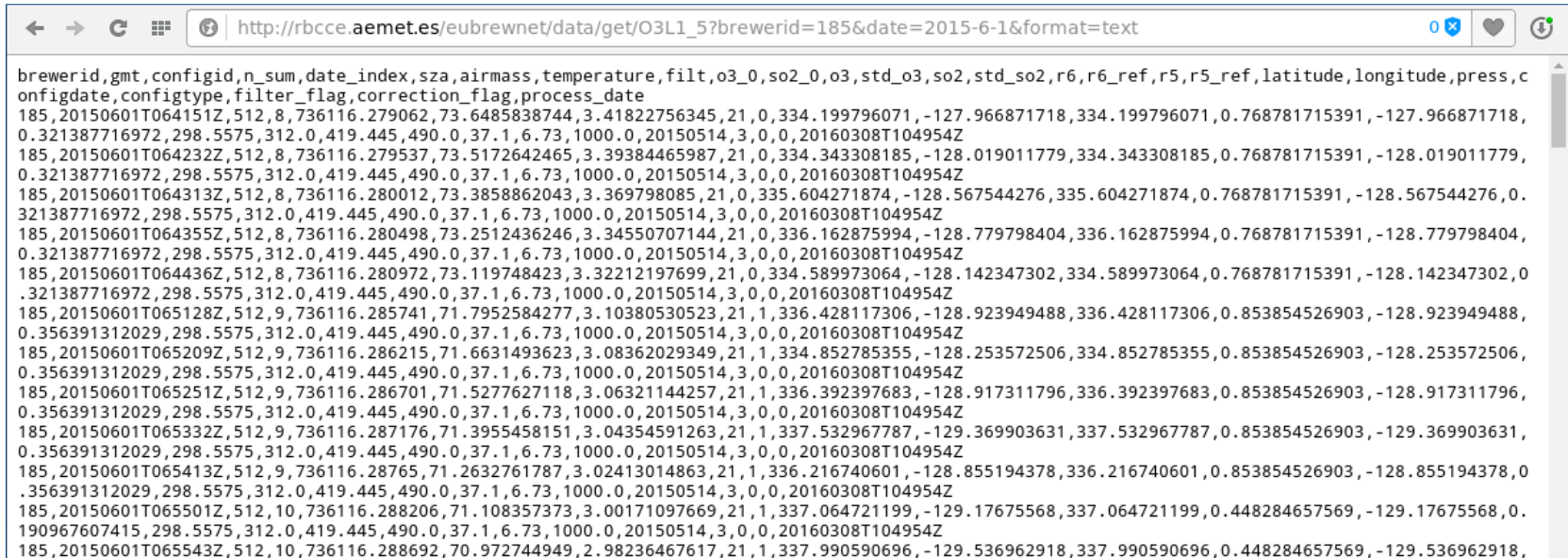
```

[[{"brewerid", "gmt", "configid", "n_sum", "date_index", "sza", "airmass", "temperature", "filt", "o3_0", "so2_0", "o3", "std_o3", "so2", "std_so2", "r6", "r6_ref", "r5", "r5_ref", "latitude", "longitude", "press", "configdate", "configtype", "filter_flag", "correction_flag", "process_date"}, [185, "20150601T064151Z", 512, 8, 736116.2790625, 73.64858387440889, 3.418227563450666, 21, 0, 334.1997960712217, -127.96687171790009, 334.1997960712217, 0.768781715391347, -127.96687171790009, 0.321387716972207, 298.55750000001854, 312.0, 419.4450000000015, 490.0, 37.1, 6.73, 1000.0, 20150514, 3, 0, 0, "20160308T104954Z"], [185, "20150601T064232Z", 512, 8, 736116.279537037, 73.51726424647727, 3.393844659874207, 21, 0, 334.34330818452673, -128.0190117793453, 334.34330818452673, 0.768781715391347, -128.0190117793453, 0.321387716972207, 298.55750000001854, 312.0, 419.4450000000015, 490.0, 37.1, 6.73, 1000.0, 20150514, 3, 0, 0, "20160308T104954Z"], [185, "20150601T064313Z", 512, 8, 736116.280011574, 73.3858862042977, 3.3697980849983526, 21, 0, 335.6042718744178, -128.5675442764788, 335.6042718744178, 0.768781715391347, -128.5675442764788, 0.321387716972207, 298.55750000001854, 312.0, 419.4450000000015, 490.0, 37.1, 6.73, 1000.0, 20150514, 3, 0, 0, "20160308T104954Z"], [185, "20150601T064355Z", 512, 8, 736116.2804976852, 73.25124362464142, 3.3455070714401236, 21, 0, 336.16287599395974, -128.77979840414255, 336.16287599395974, 0.768781715391347, -128.77979840414255, 0.321387716972207, 298.55750000001854, 312.0, 419.4450000000015, 490.0, 37.1, 6.73, 1000.0, 20150514, 3, 0, 0, "20160308T104954Z"], [185, "20150601T064436Z", 512, 8, 736116.2809722222, 73.1197484230305, 3.3221219769877446, 21, 0, 334.58997306362875, -128.1423473022694, 334.58997306362875, 0.768781715391347, -128.1423473022694, 0.321387716972207, 298.55750000001854, 312.0, 419.4450000000015, 490.0, 37.1, 6.73, 1000.0, 20150514, 3, 0, 0, "20160308T104954Z"], [185, "20150601T065128Z", 512, 9, 736116.2857407407, 71.7952584277384, 3.103805305225071, 21, 1, 336.42811730605433, -128.92394948803445, 336.42811730605433, 0.8538545269030963, -128.92394948803445, 0.3563913120285893, 298.55750000001854, 312.0, 419.4450000000015, 490.0, 37.1, 6.73, 1000.0, 20150514, 3, 0, 0, "20160308T104954Z"], [185, "20150601T065209Z", 512, 9, 736116.2862152777, 71.66314936228139, 3.0836202934915575, 21, 1, 334.85278535494433, -128.25357250586737, 334.85278535494433, 0.8538545269030963, -128.25357250586737, 0.3563913120285893, 298.55750000001854, 312.0, 419.4450000000015, 490.0, 37.1, 6.73, 1000.0, 20150514, 3, 0, 0, "20160308T104954Z"], [185, "20150601T065251Z", 512, 9, 736116.2867013889, 71.52776271176273, 3.0632114425659753, 21, 1, 336.39239768276786, -128.91731179644972, 336.39239768276786, 0.8538545269030963,

```

EUBREWNET's access functions

4) ... but to get a text output you just have to add to the URL
&format=text



```
brewerid,gmt,configid,n_sum,date_index,sza,airmass,temperature,filter,o3_0,so2_0,o3,std_o3,so2,std_so2,r6,r6_ref,r5,r5_ref,latitude,longitude,press,c
onfigdate,configtype,filter_flag,correction_flag,process_date
185,20150601T064151Z,512,8,736116.279062,73.6485838744,3.41822756345,21,0,334.199796071,-127.966871718,334.199796071,0.768781715391,-127.966871718,
0.321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T064232Z,512,8,736116.279537,73.5172642465,3.39384465987,21,0,334.343308185,-128.019011779,334.343308185,0.768781715391,-128.019011779,
0.321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T064313Z,512,8,736116.280012,73.3858862043,3.369798085,21,0,335.604271874,-128.567544276,335.604271874,0.768781715391,-128.567544276,0.
321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T064352Z,512,8,736116.280498,73.2512436246,3.34550707144,21,0,336.162875994,-128.779798404,336.162875994,0.768781715391,-128.779798404,
0.321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T064436Z,512,8,736116.280972,73.119748423,3.32212197699,21,0,334.589973064,-128.142347302,334.589973064,0.768781715391,-128.142347302,0.
321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T065128Z,512,9,736116.285741,71.7952584277,3.10380530523,21,1,336.428117306,-128.923949488,336.428117306,0.853854526903,-128.923949488,
0.356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T065209Z,512,9,736116.286215,71.6631493623,3.08362029349,21,1,334.852785355,-128.253572506,334.852785355,0.853854526903,-128.253572506,
0.356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T065251Z,512,9,736116.286701,71.5277627118,3.06321144257,21,1,336.392397683,-128.917311796,336.392397683,0.853854526903,-128.917311796,
0.356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T065332Z,512,9,736116.287176,71.3955458151,3.04354591263,21,1,337.532967787,-129.369903631,337.532967787,0.853854526903,-129.369903631,
0.356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T065413Z,512,9,736116.28765,71.2632761787,3.02413014863,21,1,336.216740601,-128.855194378,336.216740601,0.853854526903,-128.855194378,0.
356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T065501Z,512,10,736116.288206,71.108357373,3.00171097669,21,1,337.064721199,-129.17675568,337.064721199,0.448284657569,-129.17675568,0.
190967607415,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z
185,20150601T065543Z,512,10,736116.288692,70.972744949,2.98236467617,21,1,337.990590696,-129.536962918,337.990590696,0.448284657569,-129.536962918,
```

EUBREWNET's access functions

4) ... and to get the data between 2015-06-01 and 2015-06-02, also add **&enddate=2015-06-02**




```
← → ↻ ☰ http://rbcce.aemet.es/eubrewnet/data/get/O3L1\_5?brewerid=185&date=2015-6-1&enddate=2015-6-2&format=text 0x ♥ ⓘ
```

```
brewerid,gmt,configid,n_sum,date_index,sza,airmass,temperature,filt,o3_0,so2_0,o3,std_o3,so2,std_so2,r6,r6_ref,r5,r5_ref,latitude,longitude,press,c  
onfigdate,configtype,filter_flag,correction_flag,process_date  
185,20150601T064151Z,512,8,736116.279062,73.6485838744,3.41822756345,21,0,334.199796071,-127.966871718,334.199796071,0.768781715391,-127.966871718,  
0.321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T064232Z,512,8,736116.279537,73.5172642465,3.39384465987,21,0,334.343308185,-128.019011779,334.343308185,0.768781715391,-128.019011779,  
0.321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T064313Z,512,8,736116.280012,73.3858862043,3.369798085,21,0,335.604271874,-128.567544276,335.604271874,0.768781715391,-128.567544276,0.  
321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T064355Z,512,8,736116.280498,73.2512436246,3.34550707144,21,0,336.162875994,-128.779798404,336.162875994,0.768781715391,-128.779798404,  
0.321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T064436Z,512,8,736116.280972,73.119748423,3.32212197699,21,0,334.589973064,-128.142347302,334.589973064,0.768781715391,-128.142347302,0.  
.321387716972,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T065128Z,512,9,736116.285741,71.7952584277,3.10380530523,21,1,336.428117306,-128.923949488,336.428117306,0.853854526903,-128.923949488,  
0.356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T065209Z,512,9,736116.286215,71.6631493623,3.08362029349,21,1,334.852785355,-128.253572506,334.852785355,0.853854526903,-128.253572506,  
0.356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T065251Z,512,9,736116.286701,71.5277627118,3.06321144257,21,1,336.392397683,-128.917311796,336.392397683,0.853854526903,-128.917311796,  
0.356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T065332Z,512,9,736116.287176,71.3955458151,3.04354591263,21,1,337.532967787,-129.369903631,337.532967787,0.853854526903,-129.369903631,  
0.356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T065413Z,512,9,736116.28765,71.2632761787,3.02413014863,21,1,336.216740601,-128.855194378,336.216740601,0.853854526903,-128.855194378,0.  
.356391312029,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T065501Z,512,10,736116.288206,71.108357373,3.00171097669,21,1,337.064721199,-129.17675568,337.064721199,0.448284657569,-129.17675568,0.  
190967607415,298.5575,312.0,419.445,490.0,37.1,6.73,1000.0,20150514,3,0,0,20160308T104954Z  
185,20150601T065543Z,512,10,736116.288692,70.972744949,2.98226467617,21,1,337.990590696,-129.526962918,337.990590696,0.448284657569,-129.526962918
```

EUBREWNET & MATLAB

Code examples from the next slides are available at

<http://rbcce.aemet.es/svn/azores/brewer-omi/>



< > ↻ ☰ 🌐 <http://rbcce.aemet.es/svn/azores/brewer-omi/> 0 🔒 ❤️

svn - Revision 243: /azores/brewer-omi

- [_](#)
- [azores2016_o3115.m](#)
- [azores2016_o3115_vs_omto3.m](#)
- [azores2016_omto3.m](#)
- [curl-7.48.0-win32-mingw/](#)
- [curl-7.48.0-win64-mingw/](#)
- [getBrewer.m](#)
- [getOmto3.m](#)
- [plotOzone.m](#)
- [syncBrewerOmto3.m](#)

EUBREUNET & MATLAB

Generating the URL of the access function

azores2016_o3l15.m

```
1 % download and parse O3 Level 1.5 data for Brewer #185, between 2015-6-1 and 2015-6-2:
2 % http://user:password@rbcce.aemet.es/eubrewnet/data/get/O3L1?brewerid=185&date=2015-6-1&enddate=2015-6-2&format=text
3 %
4 % JLS 201605
5
6 %% start time counter
7 tic
8
9 %% generate the link
10 user='azores';
11 password='azowork';
12 eubrewnet_function='O3L1_5';
13 brewer_id='185';
14 date_start='2015-6-1';
15 date_end='2015-6-2';
16
17 % join all parts to create the link for eubrewnet
18 eubrewnet_link=['http://' user ':' password '@rbcce.aemet.es/eubrewnet/data/get/' eubrewnet_function ...
19 '?brewerid=' brewer_id '&date=' date_start '&enddate=' date_end '&format=text'];
```

EUBREWNET & MATLAB

Downloading the data

```
23 %% get the data
24 % two options:
25 % 1) internal matlab function 'urlread': [data, status]=urlread(eubrewnet_link);
26 % 2) google for 'curl', download the .exe to your work folder, and use it
27 %+as: [status, data]=system(['curl -s "' eubrewnet_link '"'])
28
29 - [status, data]=system(['curl -s "' eubrewnet_link '"']); % no error -> status=0
30
31 %disp(data)
32
```

azores2016_o3l15.m

EUBREWNET & MATLAB

Parsing the data

azores2016_o3l15.m

```
33 %% parse the data
34 % this is a long code, but will return a nice header. see the omt03 example
35 %+for an alternative
36
37 % get the number of fields
38 lines=textscan(data,'%s');
39 num_fields=strfind(lines{1},',');
40 num_fields=numel(num_fields{1})+1;
41
42 % load the data in a cell
43 o3l15_cell=textscan(data,'%s','delimiter',',');
44 o3l15_cell=reshape(o3l15_cell{1},num_fields,size(o3l15_cell{1},1)/num_fields);
45 o3l15_cell=o3l15_cell';
46
47 % split the cell in header and data
48 o3l15_header=o3l15_cell(1,:);
49 o3l15_data=str2double(o3l15_cell(2:end,:)); % this will render the gmt and process_date columns unusable
50
51 % get the timestamp and ozone
52 time_col=strcmp(o3l15_header,'date_index'); % this is already in MATLAB's datenum format
53 ozone_col=strcmp(o3l15_header,'o3');
54
55 brewer.time=o3l15_data(:,time_col);
56 brewer.ozone=o3l15_data(:,ozone_col);
```

EUBREWNET & MATLAB

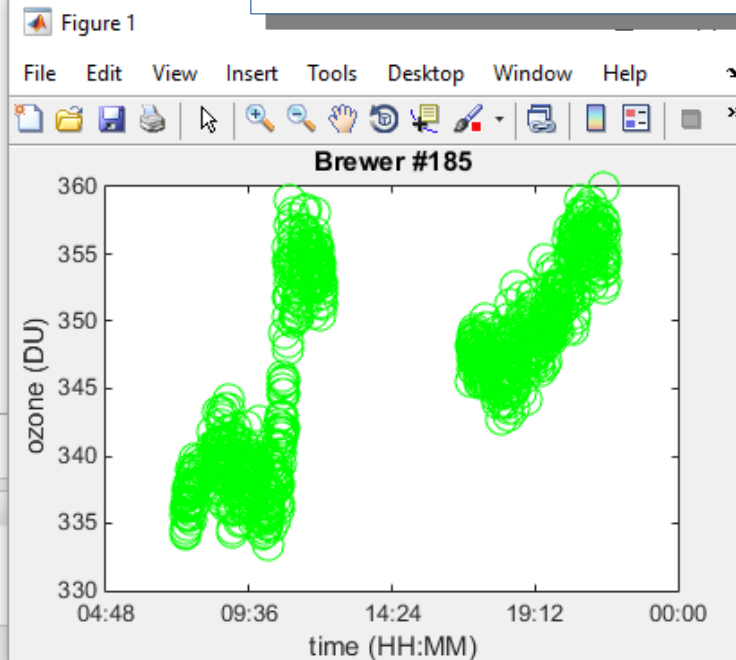
Plotting the ozone

```
58 %% plot the ozone
59 - plot(brewer.time,brewer.ozone,'go','MarkerSize',13)
60
61 - title(['Brewer #',brewer_id])
62
63 %% make the X axis prettier
64 - xlabel=get(gca,'XTick');
65 - xlabel=datestr(xlabel,'HH:MM');
66 - set(gca,'XTickLabel',xlabel)
67
68 - xlabel('time (HH:MM)')
69 - ylabel('ozone (DU)')
70
71 %% end time counter
72 - toc
```

Command Window

```
>> azores2016_o3115
Elapsed time is 7.929584 seconds.
fx >>
```

azores2016_o3115.m



AVDC & MATLAB

Downloading the OMT03 Level 2 overpass data

azores2016_omto3.m

```
1 % download and parse OMI-OMT03 overpass data from the Aura Validation Center:
2 % http://avdc.gsfc.nasa.gov/pub/most_popular/overpass/OMI/OMT03/
3 %
4 % JLS 201605
5
6 %% start time counter
7 - tic
8
9 %% overpass for the Izaña observatory at El Teide:
10 - avdc_link='http://avdc.gsfc.nasa.gov/pub/most_popular/overpass/OMI/OMT03/aura_omi_l2ovp_omto3_v8.5_izana_300.txt';
11
12 %% download the data with curl:
13 - [status,data]=system(['curl -s "',avdc_link,'"']); % no error -> status=0
14
```

AVDC & MATLAB

Parsing and selecting the data

azores2016_omto3.m

```
15 %% parse the data
16 % much shorter than in the brewer example, but won't return the header
17 % note we split the first column in two with 'whitespace','TZ '
18 - omto3_data=textscan(data,',' , 'whitespace','TZ ','HeaderLines',28,'CollectOutput',1);
19 - omto3_data=cell2mat(omto3_data);
20 - omto3_data(omto3_data==-90000.00)=NaN;
21
22 % date in "Modified Julian Date 2000" format
23 - omto3_mjd2000=omto3_data(:,3);
24
25 % the MJD2000 date format starts to count days in 2000-1-1 00:00:00,
26 %+while MATLAB's datenum starts to count days in 0000-1-0 00:00:00,
27 %+so there is just a shift of datenum(2000,1,1,00,00,00)
28 - omto3.time=omto3_mjd2000+datenum(2000,1,1,00,00,00);
29
30 % ozone
31 - omto3.ozone=omto3_data(:,13);
32
33 %% select the data for the dates we're interested in
34 - in_range=omto3.time>=datenum(2015,6,1) & omto3.time<=datenum(2015,6,3);
35
36 - omto3.time_in_range=omto3.time(in_range,:);
37 - omto3.ozone_in_range=omto3.ozone(in_range,:);
```

AVDC & MATLAB

Plotting the OMT03 product for Izaña

```

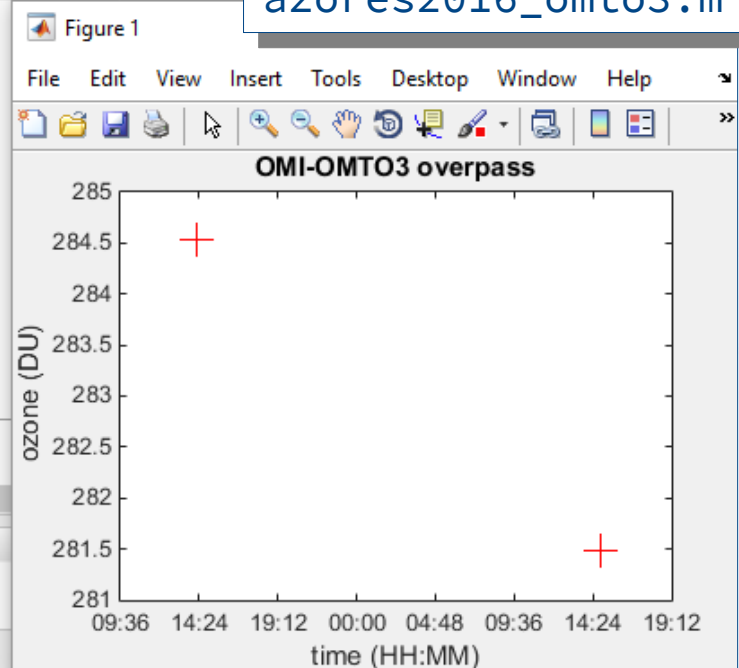
39  %% plot the ozone
40  plot(omto3.time_in_range,omto3.ozone_in_range,'r+','MarkerSize',13)
41
42  title('OMI-OMT03 overpass')
43
44  % make the X axis prettier
45  xlabel=get(gca,'XTick');
46  xlabel=datestr(xlabel,'HH:MM');
47  set(gca,'XTickLabel',xlabel)
48
49  xlabel('time (HH:MM)')
50  ylabel('ozone (DU)')
51
52  %% end time counter
53  toc

```

Command Window

Elapsed time is 6.386200 seconds.

fx >>

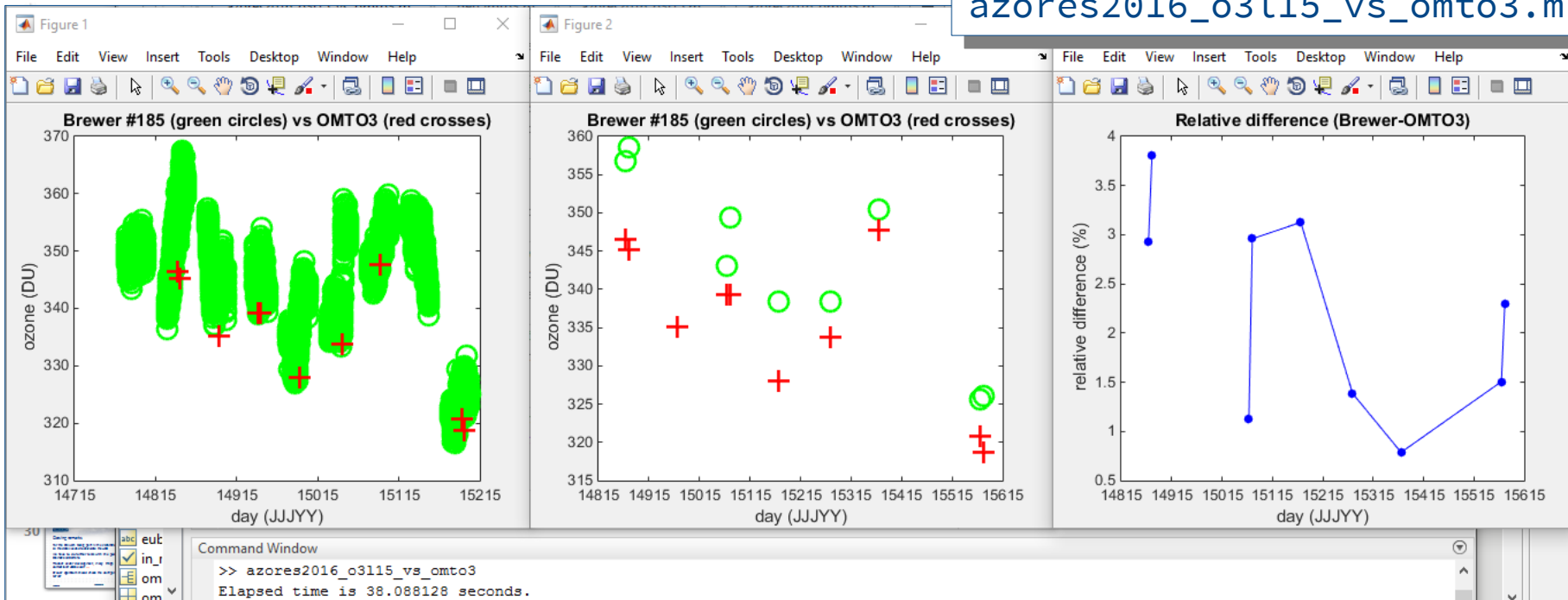


EUBREWNET's L1.5 vs OMI's OMT03 L2

```
8 - user='azores';
9 - password='azowork';
10 - eubrewnet_function='O3L1_5';
11 - brewer_id='185';
12 - date_start='2015-5-27';
13 - date_end='2015-6-5';
14 - avdc_link='http://avdc.gsfc.nasa.gov/pub/most_popular/overpass/OMI/OMT03/aura_omi_l2ovp_omto3_v8.5_el.arenosillo_213.txt';
15
16 %% get the brewer data
17 brewer=getBrewer(user,password,eubrewnet_function,brewer_id,date_start,date_end);
18
19 %% get omi-omto3 data
20 omto3=getOmto3(avdc_link,date_start,date_end);
21
22 %% plot both datasets together
23 plot_title=['Brewer #',brewer_id,' (green circles) vs OMT03 (red crosses)'];
24 plotOzone(plot_title,brewer,omto3);
25
26 %% synchronize both datasets
27 % use the mean of the Brewer ozone within 30 minutes of the omto3 time
28 brewer_sync=syncBrewerOmto3(brewer,omto3,30);
29
30 %% plot the synchronized brewer and the omto3 data
31 plot_title=['Brewer #',brewer_id,' (green circles) vs OMT03 (red crosses)'];
32 plotOzone(plot_title,brewer_sync,omto3);
33
34 %% calculate the relative difference
35 rdiff.ozone=(brewer_sync.ozone-omto3.ozone)./(brewer_sync.ozone+omto3.ozone)*2*100;
36 rdiff.time=brewer_sync.time;
37
38 %% plot the relative difference
39 plot_title='Relative difference (Brewer-OMT03)';
40 plotOzone(plot_title,rdiff)
```

```
azores2016_o3l15_vs_omto3.m
getBrewer.m
getOmto3.m
plotOzone.m
syncBrewerOmto3.m
```

EUBREWNET's L1.5 vs OMI's OMT03 L2



Closing remarks

If you don't have login information, contact eubrewnet@aemet.es

You can manually download EUBREWNET's data in files or using the access functions

EUBREWNET's access functions will work nicely inside your code

If you already have a code to read data from the AVDC, AERONET, ... you can mostly reuse it for EUBREWNET