

# Brewer-OMI validation: a brief tutorial

Javier López-Solano, Bentorey Hernández, Sergio F. León-Luis,  
Virgilio Carreño, Alberto Berjón, Manuel Rodríguez Valido, and  
Alberto Redondas

Regional Brewer Calibration Center, Izaña Atmospheric Research Center (AEMET),  
and University of La Laguna



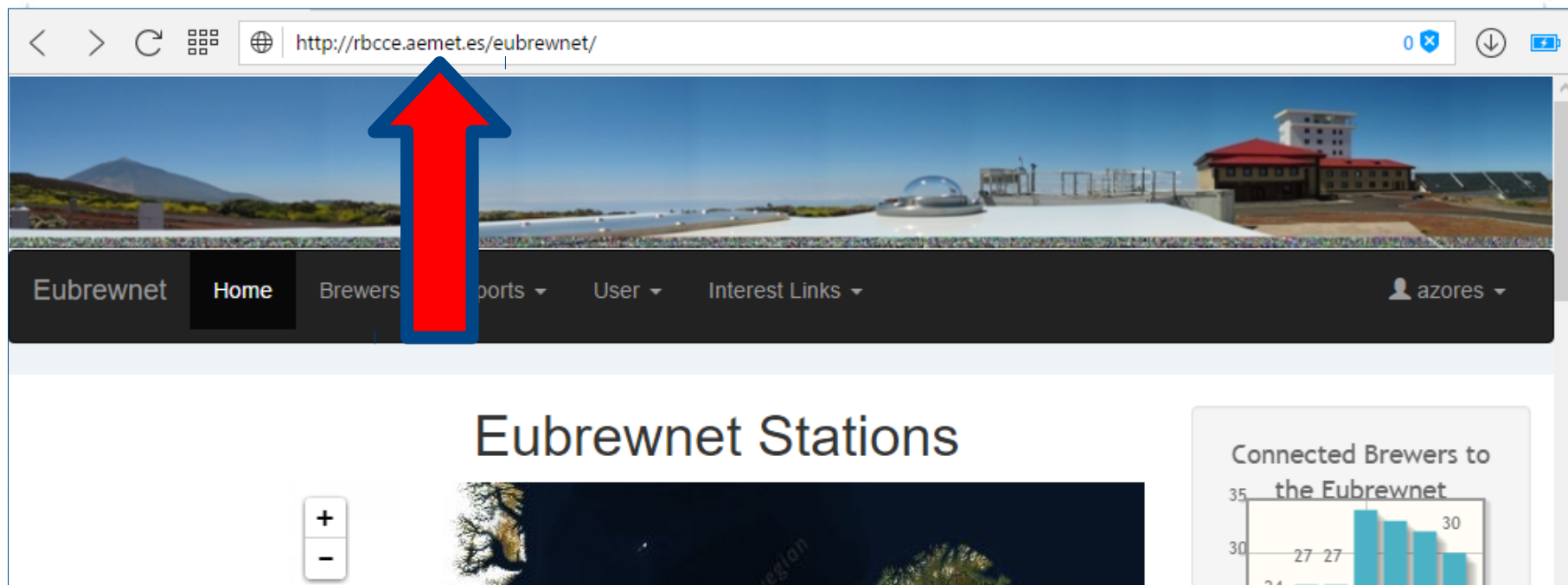
# Introduction

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>)

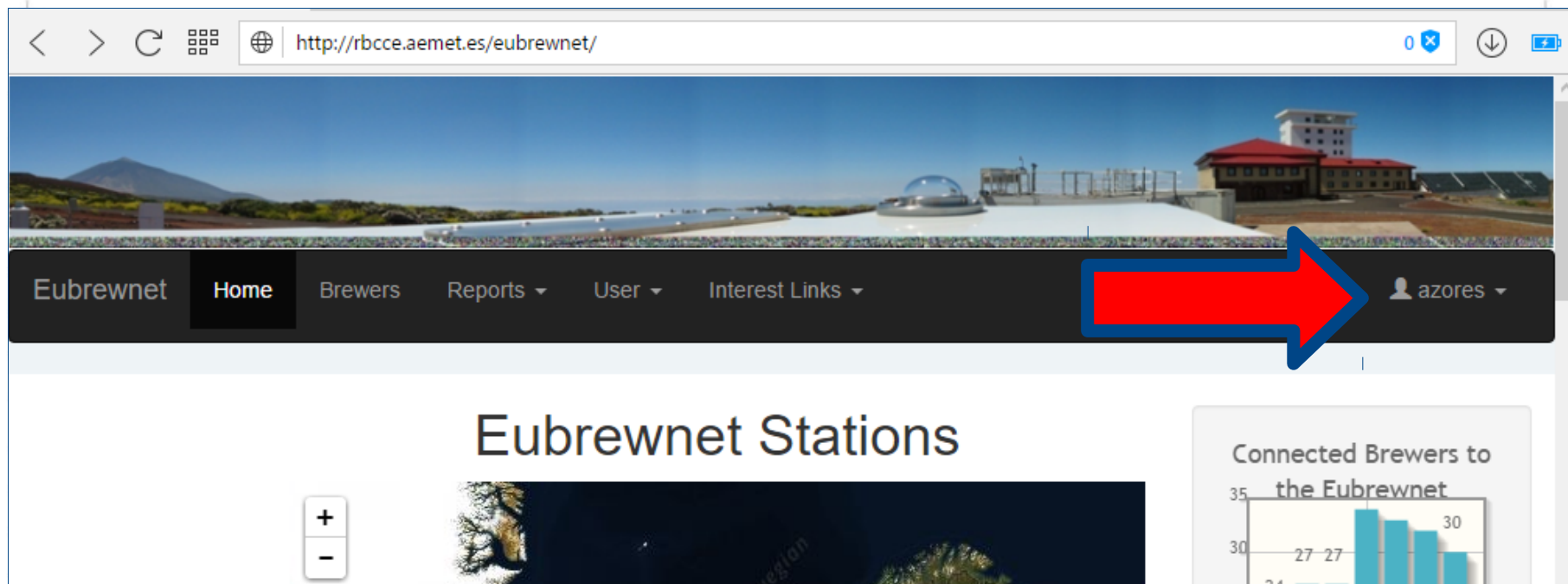
# Getting data files from EUBREWNET's server

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



# Getting data files from EUBREWNET's server

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



Eubrewnet Stations

Connected Brewers to the Eubrewnet

Region	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](mailto:eubrewnet@aemet.es)

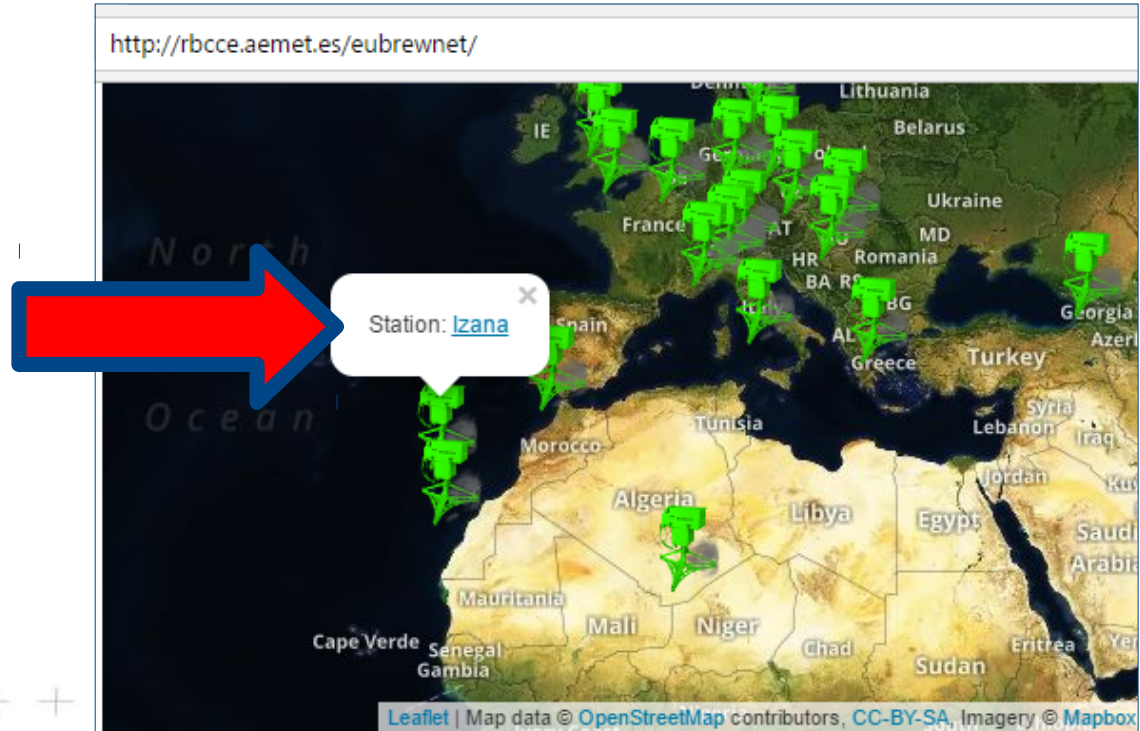
For this workshop, you can use

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



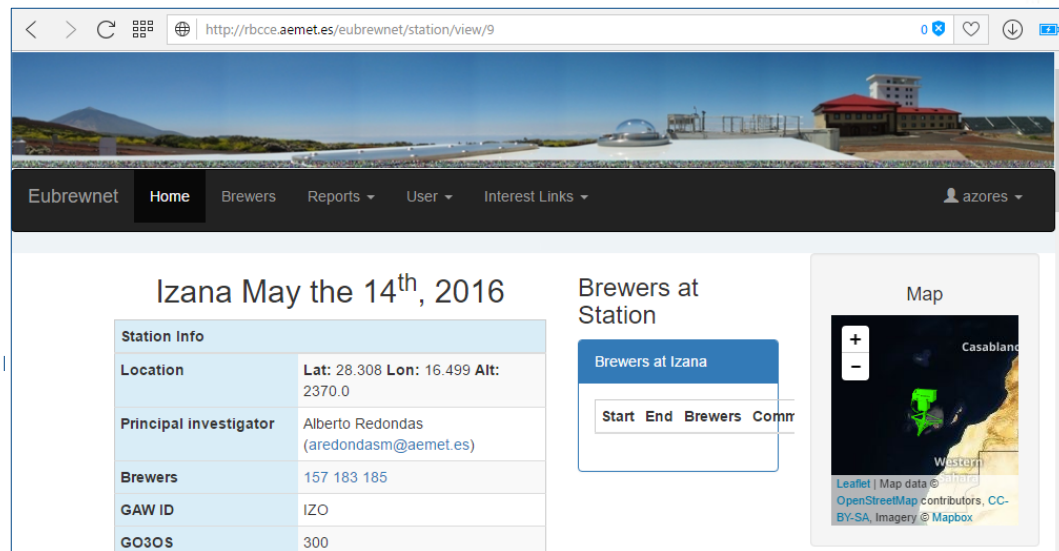
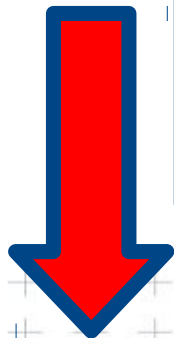
# Getting data files from EUBREWNET's server

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. At the top, there's a navigation bar with links: Eubrewnet, Home, Brewers, Reports, User, and Interest Links. Below this, the main content area displays station information for Izana on May 14th, 2016. The information is organized into a table and a sidebar.

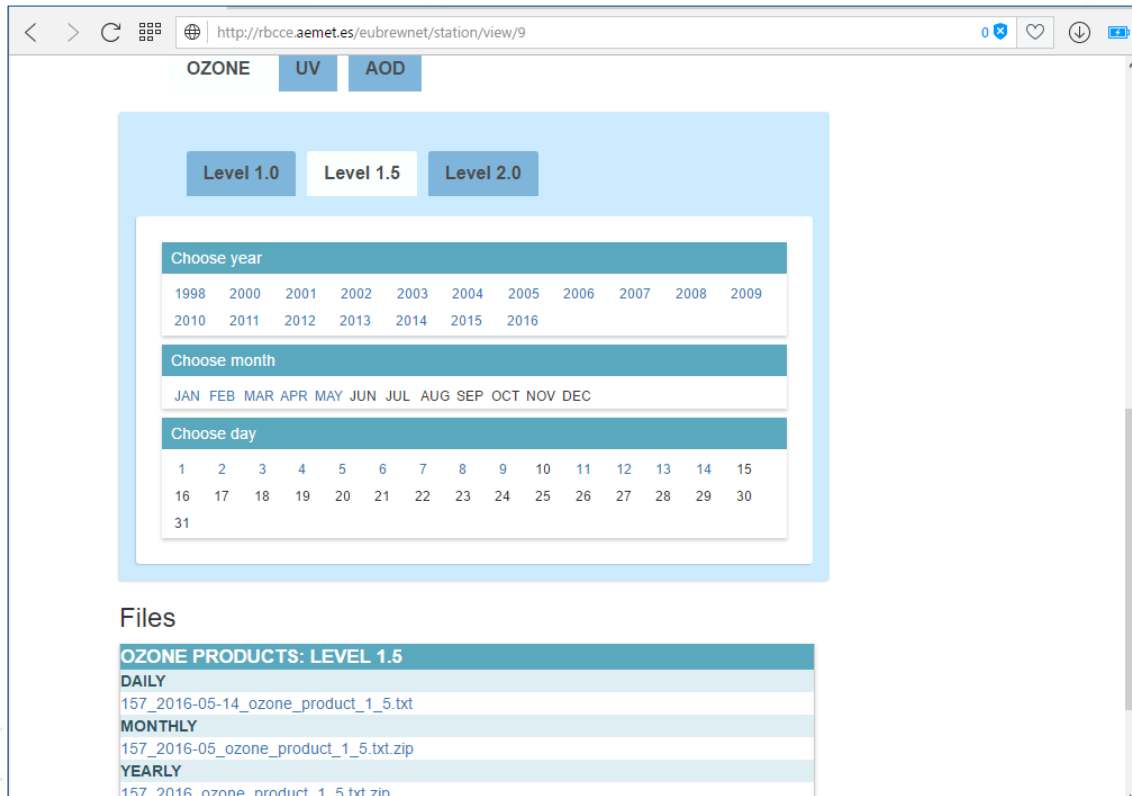
Station Info	
Location	Lat: 28.308 Lon: 16.499 Alt: 2370.0
Principal investigator	Alberto Redondas (aredondasm@aemet.es)
Brewers	157 183 185
GAW ID	IZO
GO3OS	300

To the right of the table, there's a section titled "Brewers at Station" with a sub-section "Brewers at Izana" containing buttons for "Start", "End", "Brewers", and "Comr".

On the far right, there's a "Map" section showing a map of the Canary Islands with Izana highlighted. The map includes a scale bar and a legend.

# Getting data files from EUBREWNET's server

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



The screenshot shows a web browser window with the URL <http://rbcce.aemet.es/eubrewnet/station/view/9>. The page has tabs for OZONE, UV, and AOD, with UV selected. Below these are tabs for Level 1.0, Level 1.5, and Level 2.0, with Level 1.5 selected. A light blue box highlights the date selection area, which includes three dropdown menus: 'Choose year' (showing 1998-2016), 'Choose month' (showing JAN-DEC), and 'Choose day' (showing 1-31). Below the date selection, the 'Files' section is visible, showing 'OZONE PRODUCTS: LEVEL 1.5' with options for DAILY, MONTHLY, and YEARLY data. The DAILY option is selected, showing a file named '157\_2016-05-14\_ozone\_product\_1\_5.txt'.

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

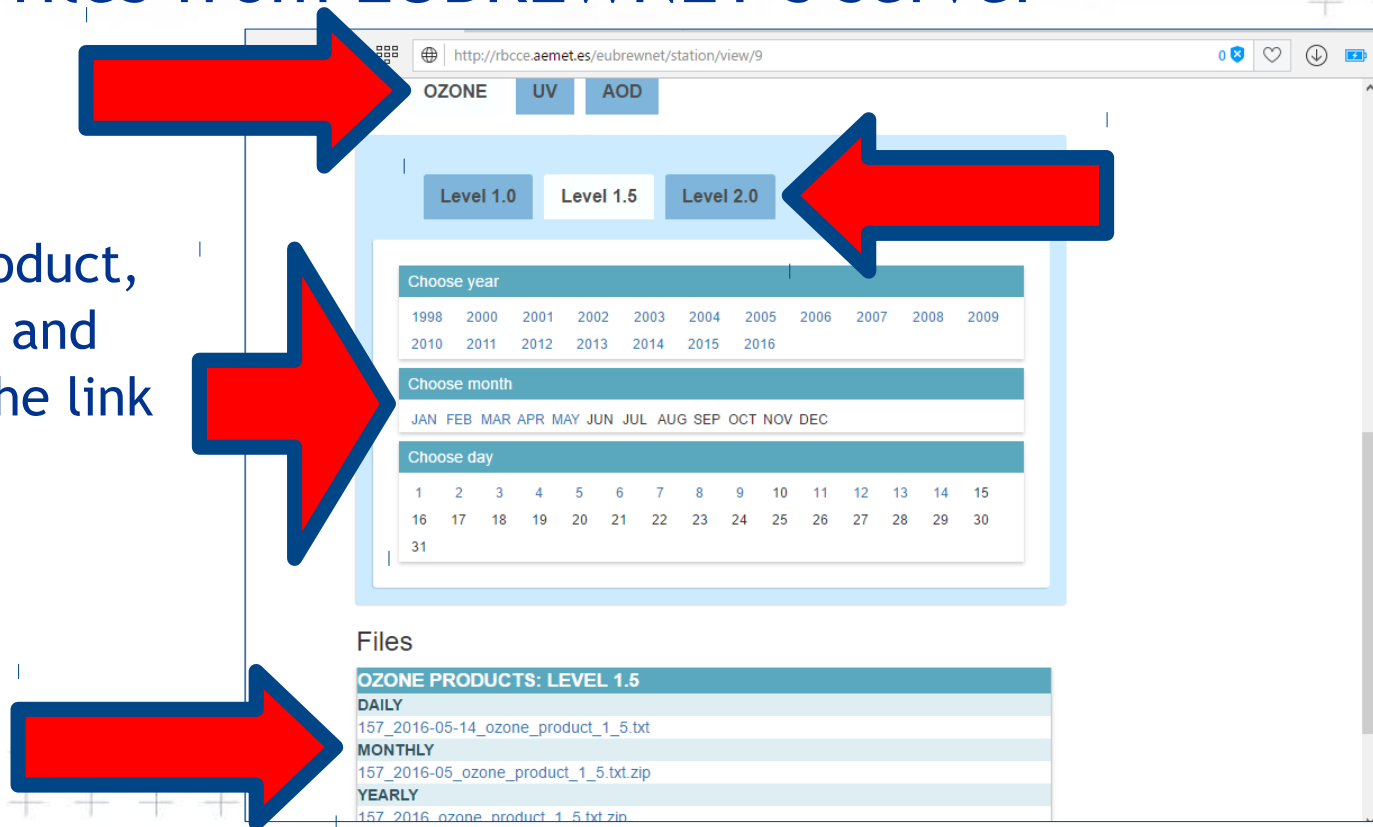
YEARLY

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. A red arrow points to the 'OZONE' tab. Another red arrow points to the 'Level 1.5' button. A third red arrow points to the date selection fields (year, month, day). A fourth red arrow points to the 'Files' section, which lists the following files:

Files
<b>OZONE PRODUCTS: LEVEL 1.5</b>
<b>DAILY</b>
157_2016-05-14_ozone_product_1_5.txt
<b>MONTHLY</b>
157_2016-05_ozone_product_1_5.txt.zip
<b>YEARLY</b>
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)
```

8) ... and below the header you will find the data in CSV format

[illegible]

# EUBREWNET's access functions

Access functions are just web URLs pointing to data

They are easy to use inside your code

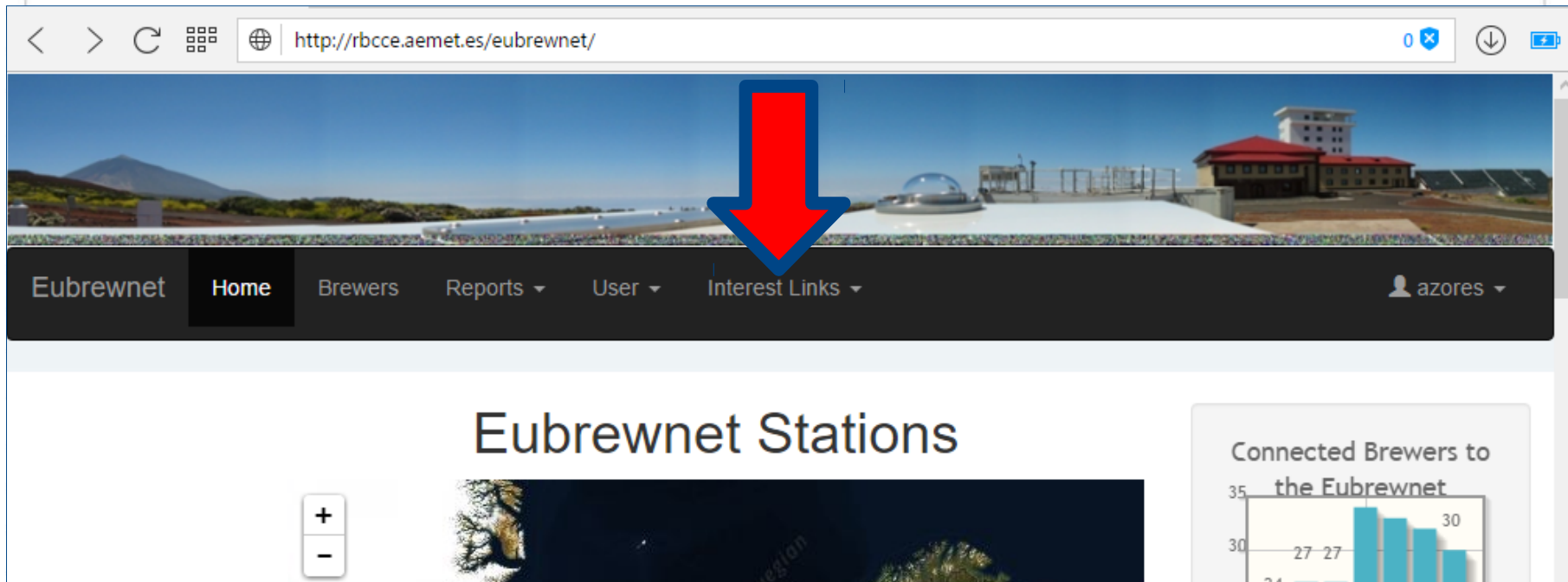
The simplest syntax is

```
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”

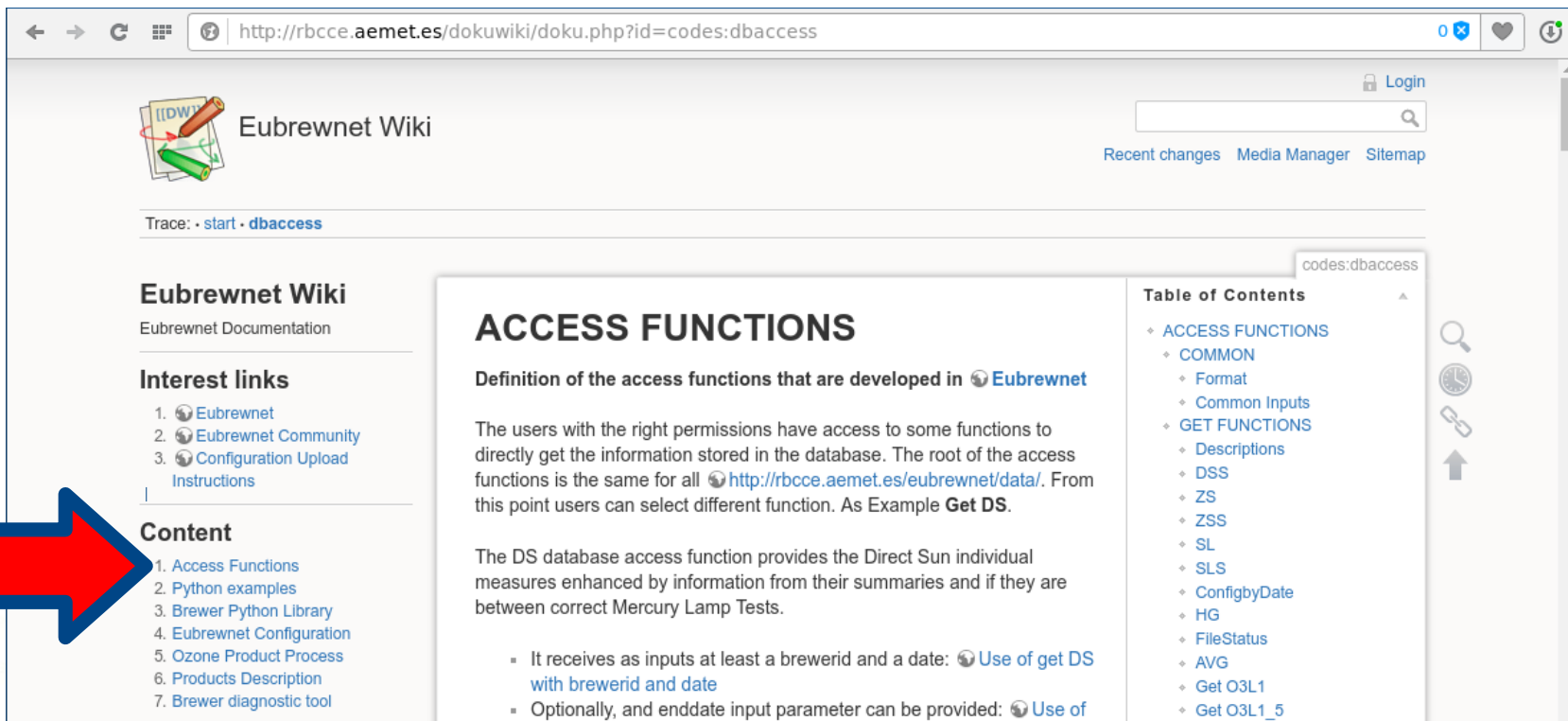


The screenshot shows a web browser window with the URL <http://rbcce.aemet.es/eubrewnet/>. The website features a header with a large image of a coastal landscape and a navigation bar with the following items: Eubrewnet, Home, Brewers, Reports, User, Interest Links, and a user profile dropdown for 'azores'. A red arrow points to the 'Interest Links' menu item. Below the navigation bar, the main content area is titled 'Eubrewnet Stations'. To the right of this title is a bar chart titled 'Connected Brewers to the Eubrewnet' showing data for various regions.

Region	Connected Brewers
Canary Islands	24
Madrid	27
Valencia	27
Basque Country	30
Other Regions	30

# EUBREWNET's access functions

## 2) Open the “Access Functions” wiki page



The screenshot shows a web browser window with the URL <http://rbcce.aemet.es/dokuwiki/doku.php?id=codes:dbaccess>. The page is titled "Eubrewnet Wiki" and contains the following sections:

- Trace:** • start • **dbaccess**
- Eubrewnet Wiki**  
Eubrewnet Documentation
- Interest links**
  1. [Eubrewnet](#)
  2. [Eubrewnet Community](#)
  3. [Configuration Upload Instructions](#)
- Content**
  1. [Access Functions](#)
  2. [Python examples](#)
  3. [Brewer Python Library](#)
  4. [Eubrewnet Configuration](#)
  5. [Ozone Product Process](#)
  6. [Products Description](#)
  7. [Brewer diagnostic tool](#)
- ACCESS FUNCTIONS**

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](#)
- Table of Contents**
  - ♦ **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 on 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	<a href="#">Get DS by default</a>
jsonO	JSON object of lists, where each key is the value name and its value is the time sorted list of them	<a href="#">Get DS with jsonO format</a>
text	Human readable comma separated values where first row is the value names and the following are the query outputs	<a href="#">Get DS with text format</a>
csv	CSV direct download where first row are the value names and the following are the query outputs	<a href="#">Get DS with text format</a>

### Common Inputs

Almost all functions receive the following inputs, too:

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

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

# 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

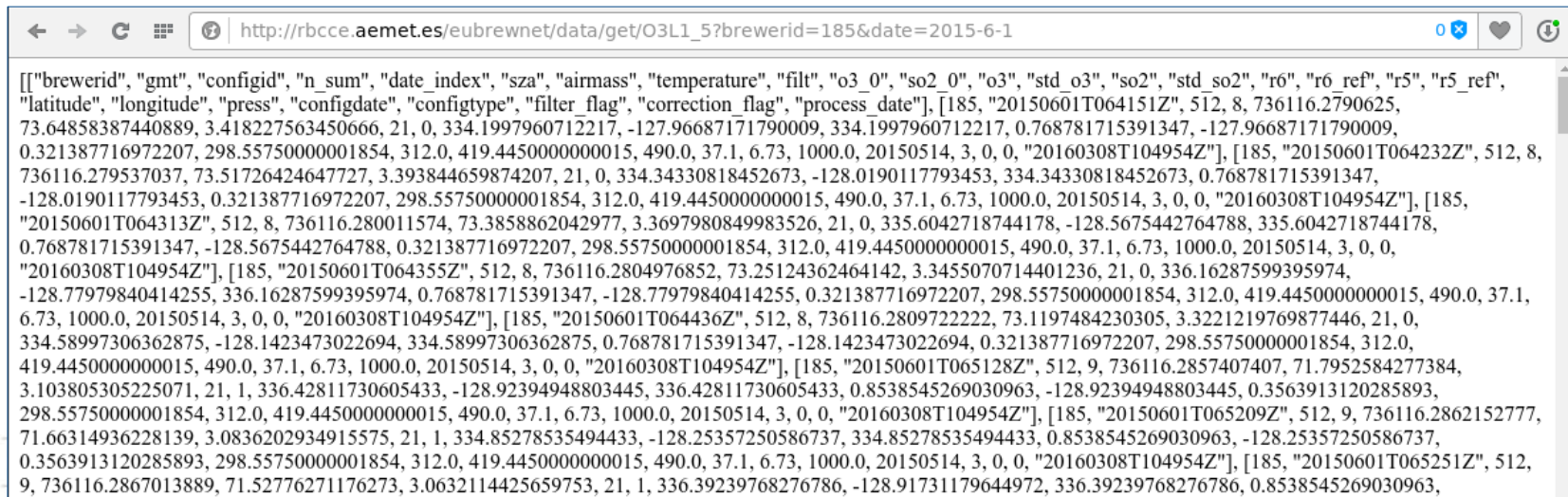
```
http://azores:azowork@rbcce.aemet.es/eubrewnet/  
data/get/O3L1_5?brewerid=185&date=2015-06-01
```



# 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...

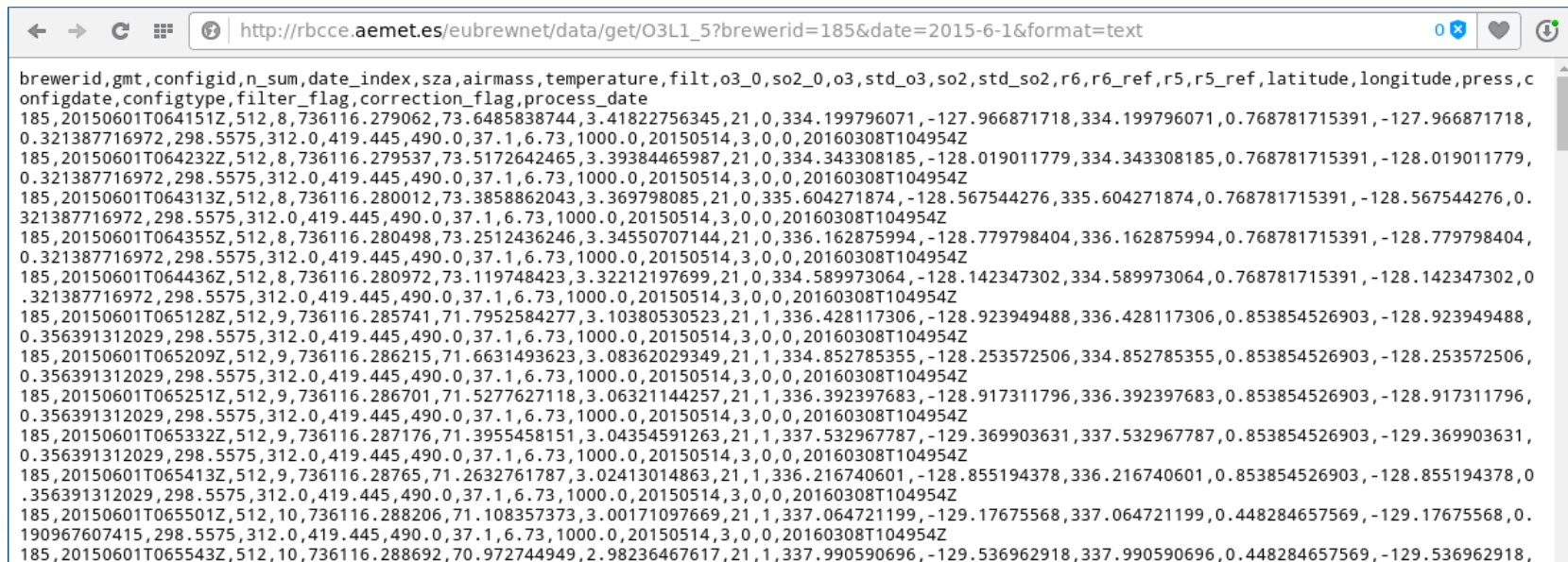


```
http://rbcce.aemet.es/eubrewnet/data/get/O3L1_5?brewerid=185&date=2015-6-1

[[{"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, 419.44500000000015, 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, 419.44500000000015, 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, 419.44500000000015, 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, 419.44500000000015, 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, 419.44500000000015, 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, 419.44500000000015, 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, 419.44500000000015, 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

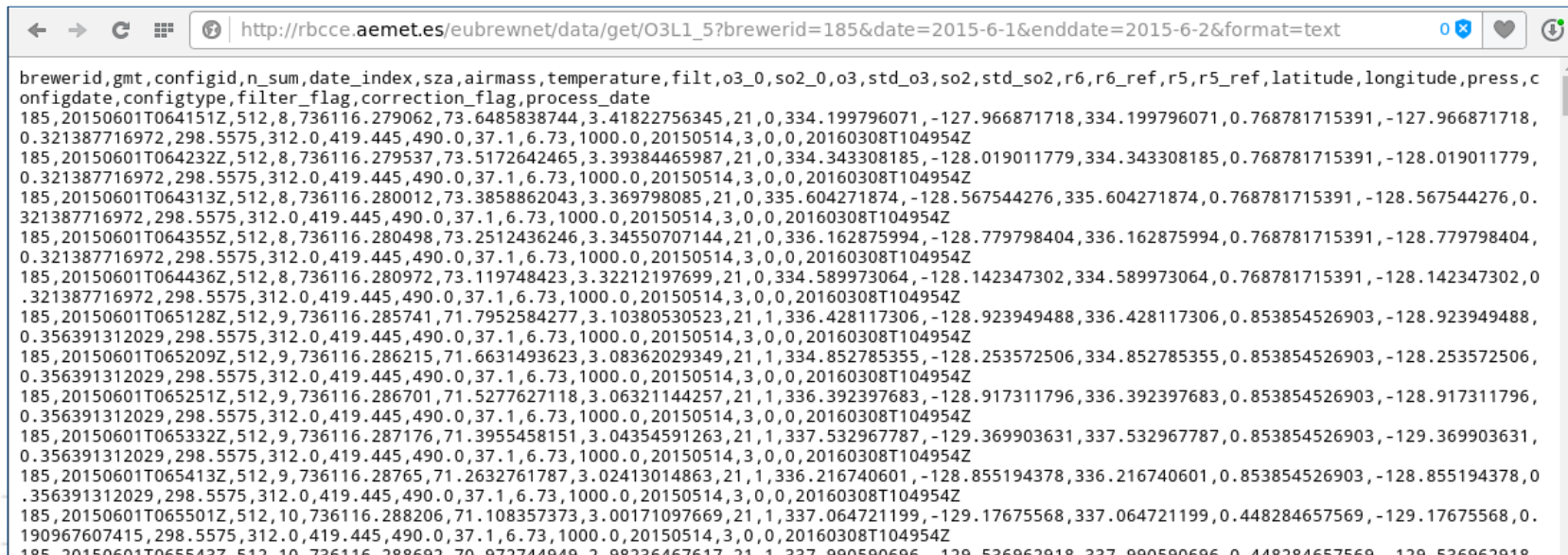
4) ... but to get a text output you just have to add to the URL  
**&format=text**



```
← → ↺ ☰ ⓘ http://rbcce.aemet.es/eubrewnet/data/get/O3L1_5?brewerid=185&date=2015-6-1&format=text 0 🔒 ❤️ ⓘ  
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  
185,20150601T064355Z,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,512,10,736116.288692,70.972744949,2.98236467617,21,1,337.990590696,-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 0 x ♥ ⓘ
```

```
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  
185,20150601T064355Z,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,512,9,736116.287657,71.2632761787,3.02413014863,21,1,336.216740601,-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
```

# EUBREUNET & 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 x ♥
```

**svn - Revision 243: /azores/brewer-omi**

- [.](#)
- [azores2016\\_o3i15.m](#)
- [azores2016\\_o3i15\\_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](#)



# EUBREWNET & 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'];
```



# EUBREWNENET & MATLAB

## Downloading the data

azores2016\_o3l15.m

```
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
```

# 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 omto3 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);
```

# EUBREUNET & MATLAB

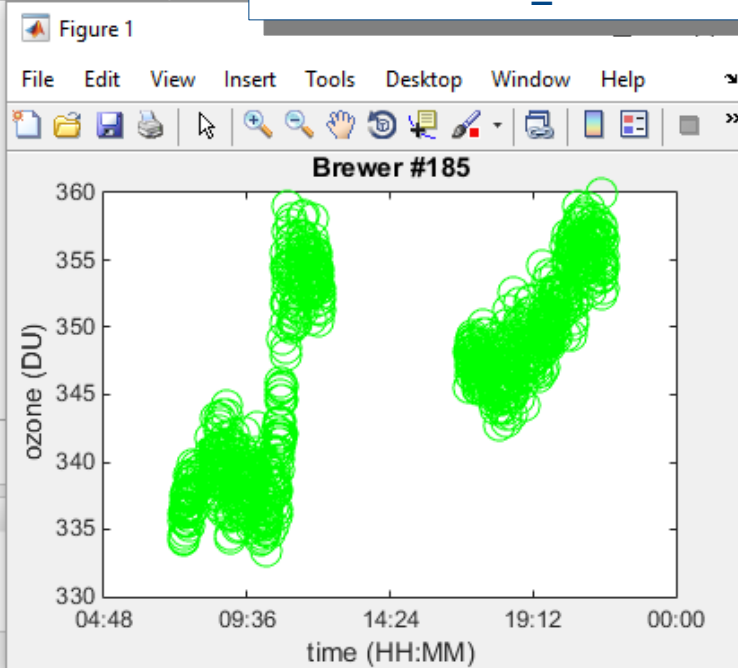
## Plotting the ozone

```
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_o3l15
Elapsed time is 7.929584 seconds.
fx >>
```

azores2016\_o3l15.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

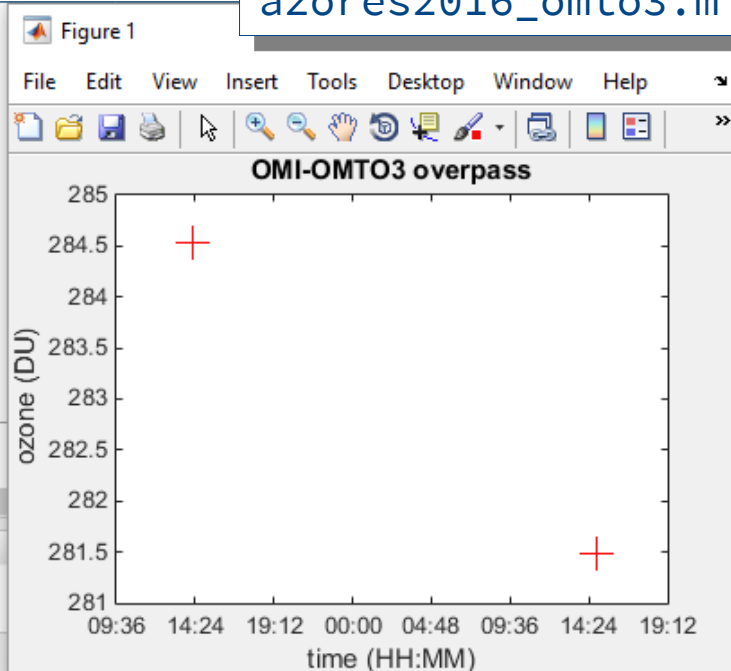
## Plotting the OMT03 product for Izaña

```
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 &gt;&gt;



azores2016\_omto3.m

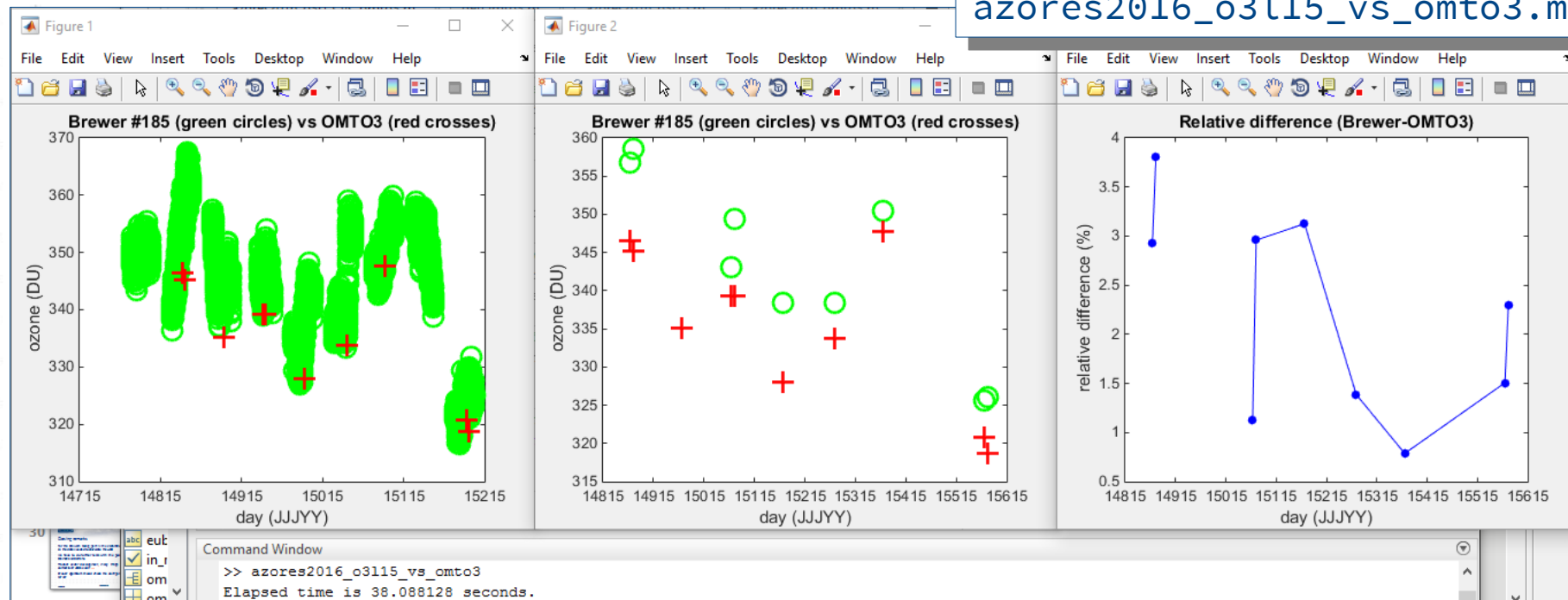
# EUBREWNET's L1.5 vs OMI's OMT03 L2

```
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

azores2016\_o3l15\_vs\_omto3.m



## Closing remarks

If you don't have login information, contact [eubrewnet@aemet.es](mailto: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