

# 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 URL <http://rbcce.aemet.es/eubrewnet> in the address bar. Below the address bar is a header image of a building with a red roof and a white dome-like structure. The main navigation menu at the top includes links for "Eubrewnet", "Home", "Brewers", "Reports", "User", "Interest Links", and a user profile for "azores". A large red arrow points upwards from the address bar towards the top of the page. The main content area displays the title "Eubrewnet Stations" and a bar chart titled "Connected Brewers to the Eubrewnet". The chart shows the following data:

Brewer	Count
27	27
24	30
31	32
35	34



# 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 header with the AEMet logo and navigation links for 'Eubrewnet', 'Home', 'Brewers', 'Reports', 'User', and 'Interest Links'. A large red arrow points to the 'User' dropdown menu, which is currently set to 'azores'. Below the header, there is a section titled 'Eubrewnet Stations' with a '+' button for adding stations and a bar chart titled 'Connected Brewers to the Eubrewnet' showing values of 24, 27, 27, 30, and 35.

Station	Count
1	24
2	27
3	27
4	30
5	35



# Getting data files from EUBREWNET's server

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

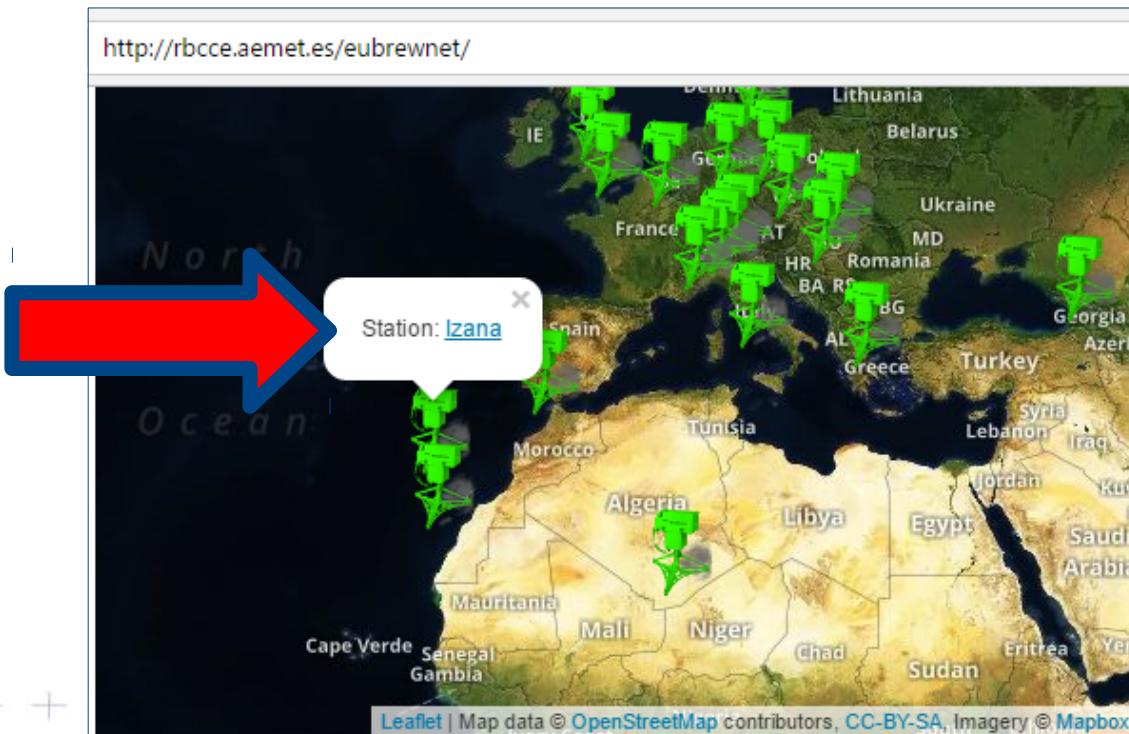
eubrewnet@aemet.es

For this workshop, you can use

user: azores  
password: azowork

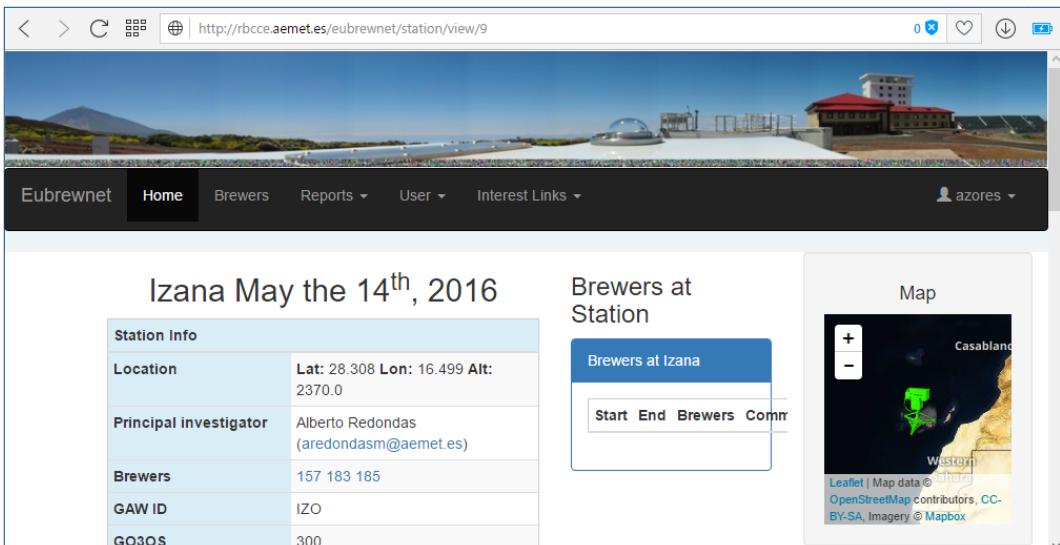
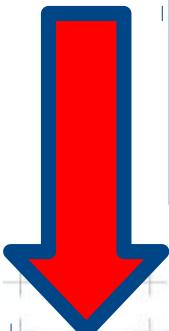
# Getting data files from EUBREWNET's server

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...



Izana May the 14<sup>th</sup>, 2016

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

Brewers at Izana
Start End Brewers Comm

Map

Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox



# 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 OZONE selected. Below the tabs are three buttons: Level 1.0, Level 1.5 (which is highlighted), and Level 2.0. A large blue box contains three dropdown menus for selecting a year, month, and day. The 'Choose year' menu lists years from 1998 to 2009 and 2010 to 2016. The 'Choose month' menu lists months from JAN to DEC. The 'Choose day' menu lists days from 1 to 15, 16 to 30, and 31. Below these menus is a section titled 'Files' containing a table for 'OZONE PRODUCTS: LEVEL 1.5'. It includes sections for DAILY, MONTHLY, and YEARLY, with corresponding file names: 157\_2016-05-14\_ozone\_product\_1\_5.txt, 157\_2016-05\_ozone\_product\_1\_5.txt.zip, and 157\_2016\_ozone\_product\_1\_5.txt.zip.

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 a web browser window with the URL <http://rbcce.aemet.es/eubrewnet/station/view/9>. At the top, there are tabs for OZONE, UV, and AOD. Below the tabs, there are three buttons: Level 1.0, Level 1.5 (which is highlighted in blue), and Level 2.0. Underneath these are three dropdown menus: 'Choose year' (with options from 1998 to 2016), 'Choose month' (with options JAN through DEC), and 'Choose day' (with options 1 through 31). At the bottom, there is a section titled 'Files' containing a list of ozone products:

- 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.

Accept

or

Do Not Accept



# Getting data files from EUBREWNET's server

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

The screenshot shows a Windows-style text editor window titled "183\_2016\_ozone\_product\_1\_5.txt". The window contains a multi-line text header describing the data product. The text is as follows:

```
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)
```



# Getting data files from EUBREWNET's server

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

183\_2016\_ozone\_product\_1\_5.txt

Archivo	Editar	Buscar	Opciones	Ayuda
# Column 13: std_o3;Standard deviation of the group of measures (DU)				
# Column 14: so2;Calculated so2 value with Standard algorithm + attenuation filter correction (DU)				
# Column 15: std_so2;Standard deviation of the group of measures (DU)				
# Column 16: r6_ref;Ozone value for Standard Lamp (DU)				
# Column 17: r6_ref;Ozone value for Standard Lamp of Reference (DU)				
# Column 18: r5;Ozone value for Mercury Lamp (DU)				
# Column 19: r5_ref;Ozone value for Mercury Lamp of Reference (DU)				
# Column 20: latitude;Latitude of the Brewer Location (Degrees)				
# Column 21: longitude;Longitude of the Brewer Location (Degrees)				
# Column 22: press;Medium Pressure of the Brewer Location (Milibars)				
# Column 23: configdate;UT Date of the used configuration in ISO 8601 format (GMT)				
# Column 24: configtype;Type of the used configuration (B header(1), ICF (2), Config (3))				
# Column 25: filter_flag;APPLIED FLAGS: HG Filter, Max Airmass, O3 std (1 means True) (Applied flags)				
# Column 26: correction_flag;APPLIED CORRECTIONS: Straylight, ETC Correction, Standard Lamp correction(1 means True) (Applied corrections)				
# Column 27: process_date;UT process time of the product in ISO 8601 format (process GMT)				
#####				
#%dm%#dT%#%SZ,%d,%d,%6f,%f,%2f,%d,%d,%2f,%2f,%2f,%2f,%2f,%2f,%2f,%2f,%2f,%2f,%2f,%3f,%3f,%1f,%Y%m%#d,%d,%d,%d,%Y%m%#dT%H%M%SZ				
183,20160101T092842Z,458,8,736330.394931,73.89,3.46,18,2,274.30,-25.07,274.30,1.81,-25.07,0.49,385.93,385.				
183,20160101T092923Z,458,8,736330.395405,73.77,3.44,18,2,273.15,-24.71,273.15,1.81,-24.71,0.49,385.93,385.				
183,20160101T093005Z,458,8,736330.395891,73.65,3.42,18,2,271.50,-24.44,271.50,1.81,-24.44,0.49,385.93,385.				
183,20160101T093046Z,458,8,736330.396366,73.53,3.40,18,2,273.56,-25.09,273.56,1.81,-25.09,0.49,385.93,385.				
183,20160101T093128Z,458,8,736330.396852,73.41,3.37,18,2,277.01,-25.90,277.01,1.81,-25.90,0.49,385.93,385.				
183,20160101T093740Z,458,9,736330.401157,72.35,3.19,18,2,275.70,-25.87,275.70,0.79,-25.87,0.35,385.93,385.				
183,20160101T093821Z,458,9,736330.401632,72.24,3.17,18,2,274.69,-25.67,274.69,0.79,-25.67,0.35,385.93,385.				
183,20160101T093903Z,458,9,736330.402118,72.12,3.15,18,2,275.51,-25.52,275.51,0.79,-25.52,0.35,385.93,385.				
183,20160101T093945Z,458,9,736330.402604,72.00,3.14,18,2,274.40,-25.16,274.40,0.79,-25.16,0.35,385.93,385.				
183,20160101T094026Z,458,9,736330.403079,71.89,3.12,18,2,273.51,-24.91,273.51,0.79,-24.91,0.35,385.93,385.				
183,20160101T094120Z,458,10,736330.403704,71.73,3.09,18,2,275.61,-26.00,275.61,0.82,-26.00,0.44,385.93,385.				
183,20160101T094202Z,458,10,736330.404190,71.62,3.08,18,2,274.97,-25.73,274.97,0.82,-25.73,0.44,385.93,385.				
183,20160101T094243Z,458,10,736330.404664,71.50,3.06,18,2,273.48,-24.95,273.48,0.82,-24.95,0.44,385.93,385.				
183,20160101T094325Z,458,10,736330.405150,71.39,3.04,18,2,274.95,-25.56,274.95,0.82,-25.56,0.44,385.93,385.				
183,20160101T094407Z,458,10,736330.405637,71.27,3.02,18,2,273.71,-24.88,273.71,0.82,-24.88,0.44,385.93,385.				
183,20160101T094834Z,458,11,736330.408727,70.53,2.92,18,2,273.06,-24.89,273.06,1.29,-24.89,0.40,385.93,385.				
183,20160101T094915Z,458,11,736330.409201,70.42,2.91,18,2,273.46,-25.00,273.46,1.29,-25.00,0.40,385.93,385.				
183,20160101T094957Z,458,11,736330.409687,70.30,2.89,18,2,273.72,-24.99,273.72,1.29,-24.99,0.40,385.93,385.				
183,20160101T095039Z,458,11,736330.410174,70.19,2.88,18,2,275.51,-25.75,275.51,1.29,-25.75,0.40,385.93,385.				
183,20160101T095121Z,458,11,736330.410660,70.07,2.86,18,2,276.39,-25.80,276.39,1.29,-25.80,0.40,385.93,385.				
183,20160101T095731Z,458,12,736330.414942,69.07,2.74,18,2,275.03,-24.93,275.03,0.59,-24.93,0.26,385.93,385.				
183,20160101T095812Z,458,12,736330.415417,68.96,2.72,19,2,274.58,-25.56,274.58,0.59,-25.56,0.26,385.93,385.				



# 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”

A screenshot of a web browser displaying the Eubrewnet website. The URL in the address bar is <http://rbcce.aemet.es/eubrewnet/>. The page features a header with a navigation bar containing "Eubrewnet", "Home", "Brewers", "Reports", "User", and "Interest Links". A large red arrow points down to the "Interest Links" menu item. Below the header, there is a section titled "Eubrewnet Stations" with a small "+" button icon. To the right, there is a chart titled "Connected Brewers to the Eubrewnet" showing the number of connected brewers: 35, 27, 27, 30, and 24.

Connected Brewers to the Eubrewnet	Count
1	35
2	27
3	27
4	30
5	24



# EUBREWNET's access functions

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

The screenshot shows a web browser window displaying a DokuWiki page titled "dbaccess". The URL in the address bar is <http://rbcce.aemet.es/dokuwiki/doku.php?id=codes:dbaccess>. The page content is as follows:

**Eubrewnet Wiki**

Trace: • start • dbaccess

**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
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    - ❖ ZSS
    - ❖ SL
    - ❖ SLS
    - ❖ ConfigbyDate
    - ❖ HG
    - ❖ FileStatus
    - ❖ AVG
    - ❖ Get O3L1
    - ❖ Get O3L1\_5

A large red arrow points to the "Content" section on the left side of the page.



# 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
<b>jsonM</b>	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>
<b>jsonO</b>	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>
<b>text</b>	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>
<b>csv</b>	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
<b>brewerid</b>	Brewer identification number	<a href="#">Get function with brewerid input parameter</a>
<b>date</b>	Date in YYYY-MM-DD format	<a href="#">Get function with date input parameter</a>
<b>enddate</b>	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
<b>DS</b>	Returns DS measures	<a href="#">DS</a>	<a href="#">Get DS</a>
<b>DSS</b>	Returns the DS summaries	<a href="#">DSS</a>	<a href="#">Get DSS</a>
<b>ZS</b>	Returns ZS measures	<a href="#">ZS</a>	<a href="#">Get ZS</a>
<b>ZSS</b>	Returns the ZS summaries	<a href="#">ZSS</a>	<a href="#">Get ZSS</a>
<b>SL</b>	Returns SL measures	<a href="#">SL</a>	<a href="#">Get SL</a>
<b>SLS</b>	Returns the SL summaries	<a href="#">SLS</a>	<a href="#">Get SLS</a>
<b>ConfigbyDate</b>	Returns the available Configuration	<a href="#">ConfigbyDate</a>	<a href="#">Get Config by Date</a>
<b>HG</b>	Returns the mercury lamp tests	<a href="#">HG</a>	<a href="#">Get HG</a>
<b>ActiveBrewers</b>	Returns the number of Brewers whith at least one SL test by dates	<a href="#">HG</a>	<a href="#">Get HG</a>
<b>FileStatus</b>	Returns the status of the received files	<a href="#">FileStatus</a>	<a href="#">Get FileStatus</a>
<b>ActiveBrewers</b>	Returns the number of Active Brewers	<a href="#">ActiveBrewers</a>	<a href="#">Get ActiveBrewers</a>
<b>Umkehr</b>	Returns the Umkehr measures	<a href="#">Umkehr</a>	<a href="#">Get Umkehr</a>
<b>BfilesbyLocation</b>	Returns the Available B files for a range of locations	<a href="#">BfilesbyLocation</a>	<a href="#">Get Bfiles by Location</a>
<b>BrewerLocation</b>	Returns the changes in location of a Brewer	<a href="#">BrewerLocation</a>	<a href="#">Get Brewer Location</a>
<b>AVG</b>	Returns the available AVG measures	<a href="#">AVG</a>	<a href="#">Get AVG</a>
<b>O3L1</b>	Returns the Level 1 of Ozone	<a href="#">O3L1</a>	<a href="#">Get O3L1</a>
<b>O3L1_5</b>	Returns the Level 1.5 of Ozone	<a href="#">O3L1_5</a>	<a href="#">Get O3L1_5</a>
<b>O3L2_0</b>	Returns the Level 2.0 of Ozone	<a href="#">O3L2_0</a>	<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": "185", "GMT": "0", "CONFIGID": "0", "N_SUM": "1", "DATE_INDEX": "0", "SZA": "0", "AIRMASS": "0", "TEMPERATURE": "0", "FILT": "0", "O3_0": "0", "SO2_0": "0", "O3": "0", "STD_O3": "0", "SO2": "0", "STD_SO2": "0", "R6": "0", "R6_REF": "0", "R5": "0", "R5_REF": "0", "LATITUDE": "37.64858387440889", "LONGITUDE": "2.418227563450666", "PRESS": "21", "CONFIGDATE": "0", "CONFIGTYPE": "0", "FILTER_FLAG": "0", "CORRECTION_FLAG": "0", "PROCESS_DATE": "20150601T064151Z", "VAL": "512", "TIME": "8", "STATION": "7361162790625", "O3": "34.1997960712217", "SO2": "0.7368781715391347", "R6": "-127.96687171790009, 0.321387716972207", "R5": "298.55750000001854", "REF": "312.0", "R6_REF": "419.445000000015", "R5_REF": "490.0", "R6_DATE": "20150514", "R5_DATE": "3, 0, 0", "R6_TIME": "20160308T104954Z", "R5_TIME": "185", "R6_STATION": "20150601T064232Z", "R5_STATION": "512", "R6_CONFIG": "8", "R5_CONFIG": "736116279537037", "R6_PRESS": "21", "R5_PRESS": "0", "R6_CONFIG_DATE": 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# EUBREWNET's access functions

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

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# EUBREWNET's access functions

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

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http://rbcce.aemet.es/eubrewnet/data/get/O3L1_5?brewerid=185&date=2015-6-1&enddate=2015-6-2&format=text

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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
185,20150601T065512Z,512,10,736116.288692,70.97741949,3.09226467617,21,1,227.990590696,0.119291657569,129.526967919
```



# EUBREWNET & MATLAB

Code examples from the next slides are available at

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

The screenshot shows a web browser window with the following details:

- Address bar: http://rbcce.aemet.es svn/azores/brewer-omi/
- Page title: svn - Revision 243: /azores/brewer-omi
- Content area:
  - List of files and directories:
    - ..
    - [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](#)



# 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');
```



# 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

```
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);
```

azores2016\_o3l15.m

# EUBREWNET & MATLAB

## Plotting the ozone

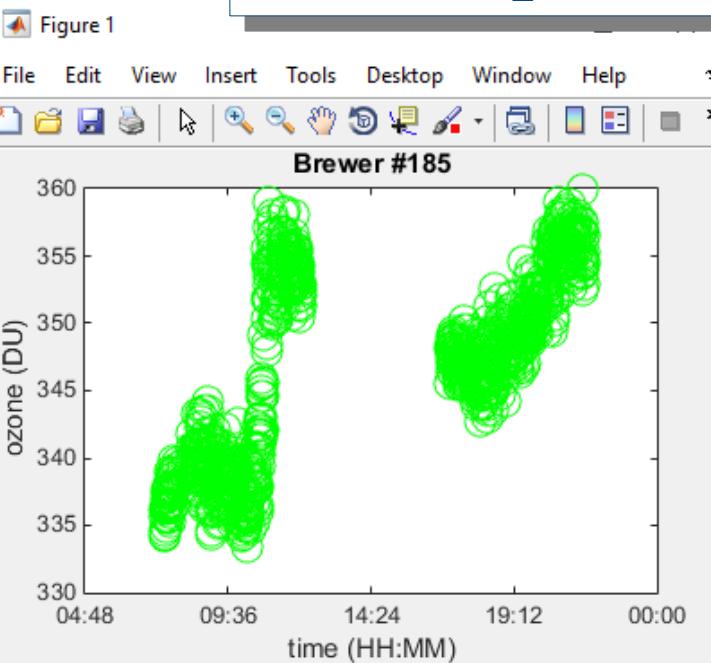
```
58 %% plot the ozone
59 - plot(brewer.time,brewer.ozone, 'go', 'MarkerSize',13)
60
61 - title(['Brewer #',brewer_id])
62
63 % make the X axis prettier
64 - xlabel= get(gca,'XTick');
65 - xlabel=datestr(xlabel,'HH:MM');
66 - set(gca,'XTickLabel', xlabel)
67
68 - xlabel('time (HH:MM)')
69 - ylabel('ozone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

### Command Window

```
>> azores2016_o3l15
Elapsed time is 7.929584 seconds.
```

```
fx >>
```

azores2016\_o3l15.m





# AVDC & MATLAB

## Downloading the OMTO3 Level 2 overpass data

```
1 % download and parse OMI-OMTO3 overpass data from the Aura Validation Center:  
2 % http://avdc.gsfc.nasa.gov/pub/most_popular/overpass/OMI/OMTO3/  
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/OMTO3/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
```

azores2016\_omto3.m

# AVDC & MATLAB

## Parsing and selecting the data

```
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,:);
```

azores2016\_omto3.m

# AVDC & MATLAB

## Plotting the OMTO3 product for Izaña

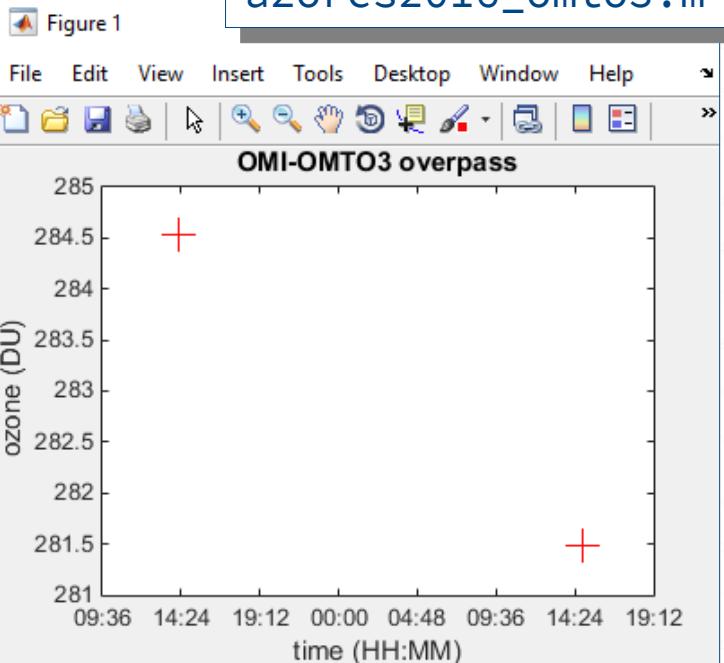
```
39 % plot the ozone
40 plot(omto3.time_in_range,omto3.ozone_in_range,'r+','MarkerSize',13)
41
42 title('OMI-OMTO3 overpass')
43
44 % make the X axis prettier
45 xlabelss=get(gca,'XTick');
46 xlabelss=datestr(xlabelss,'HH:MM');
47 set(gca,'XTickLabel',xlabelss)
48
49 xlabel('time (HH:MM)')
50 ylabel('ozone (DU)')
51
52 %% end time counter
53 toc
```

Command Window

Elapsed time is 6.386200 seconds.

&gt;&gt;

azores2016\_omto3.m



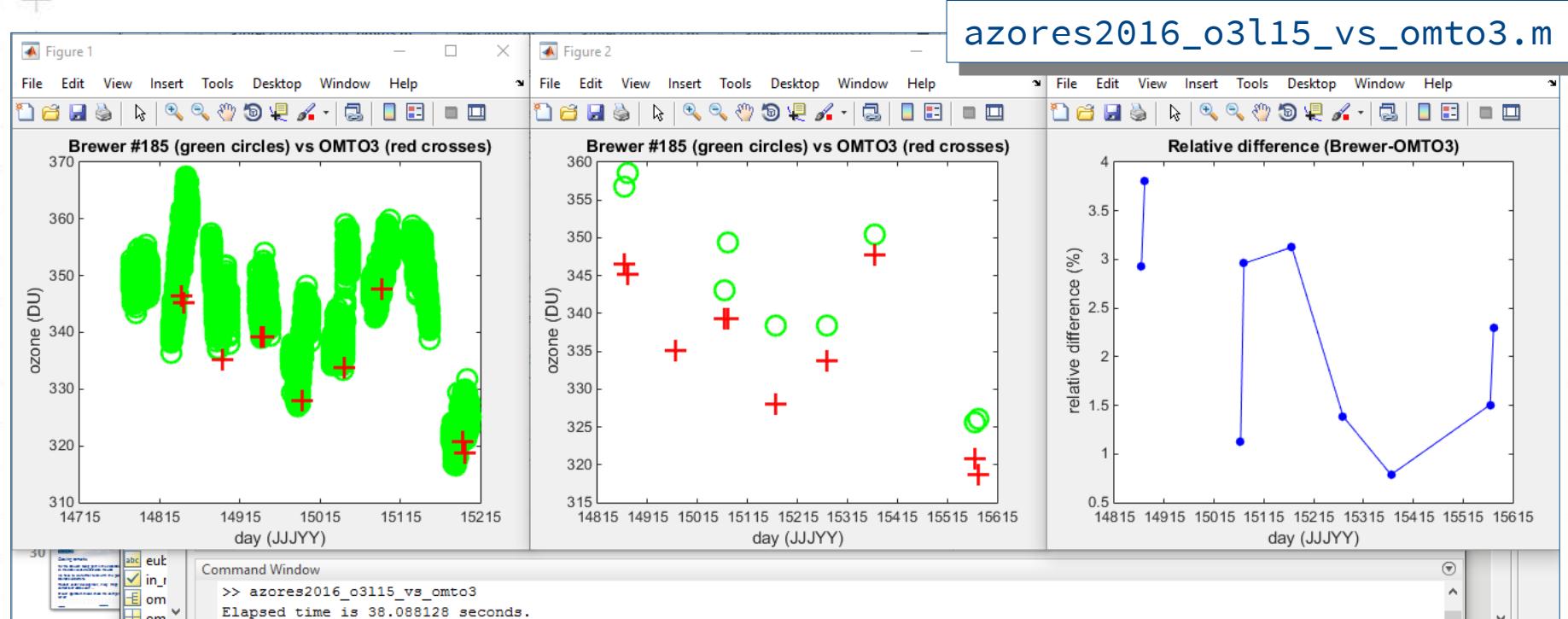


# EUBREWNET's L1.5 vs OMI's OMTO3 L2

```
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/OMTO3/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 OMTO3 (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 OMTO3 (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-OMTO3)';
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 OMTO3 L2





## 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