



**Barcelona  
Supercomputing  
Center**

*Centro Nacional de Supercomputación*

# **EIONET Up-to-date AQ retriever**

(Internal presentation)

Jordi Cuadrado Borbonés

Barcelona, 25 January 2016  
Updated 09 February 2016

- 1. Purpose (Why?)
- 2. Available data (What?)
- 3. How to use it (How?)
- 4. Q to be addressed & A



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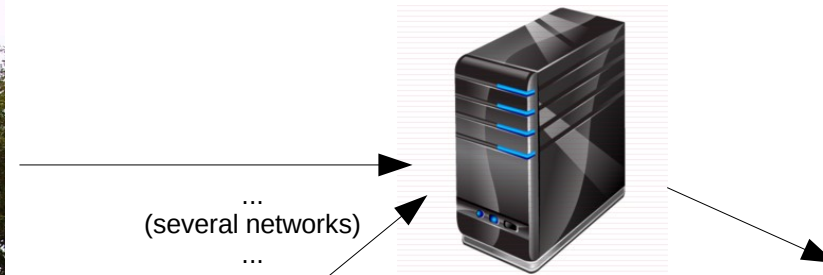
# 1. PURPOSE

# First things first: context

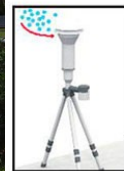
## Air Quality monitoring stations & regional networks



[1]

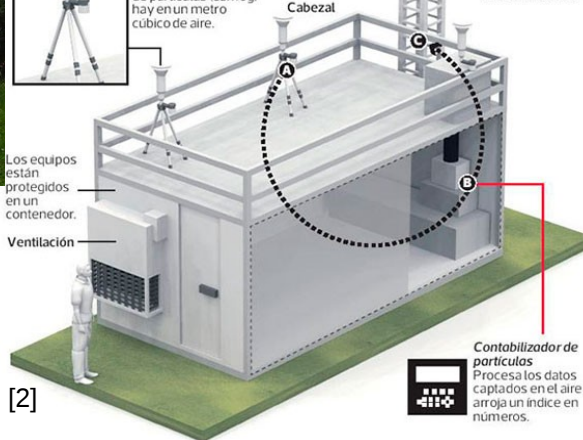


### Esquema de la estación



**Cabezal**  
Capta las partículas de contaminación. La medición contabiliza cuántos microgramos de partículas (esmog) hay en un metro cubico de aire.

**Antena**  
Los datos son enviados de manera automática al Ministerio de Medio Ambiente.



[2]

[1] <http://www.latercera.com/noticia/nacional/2014/07/680-583323-9-contaminacion-asi-miden-la-calidad-del-aire-las-207-estaciones-de-monitoreo-del.shtml>  
 [2] [https://upload.wikimedia.org/wikipedia/commons/c/c7/Contaminacio\\_XVPCA.JPG](https://upload.wikimedia.org/wikipedia/commons/c/c7/Contaminacio_XVPCA.JPG)

### Evaluación del Pronóstico

Meteorología Península Ibérica Canarias Europa Vertical Pronóstico por CC.AA

Archive Descripción ficha de evaluación Filtrado de observaciones Informes de evaluación

Let: 41.82202911 N, Lon: 2.09739896 E, Altura: 3 Tipo: SUB T

Map Satellite

Modelo vs Observación

	Últimos 15 días(Obs)	Últimos meses
O <sub>3</sub>	D+0 & D+1	01 02 03 04 05 06 07 08 09 10 11 12
NO <sub>2</sub>	D+0 & D+1	01 02 03 04 05 06 07 08 09 10 11 12
SO <sub>2</sub>	D+0 & D+1	01 02 03 04 05 06 07 08 09 10 11 12
PM10	D+0 & D+1	01 02 03 04 05 06 07 08 09 10 11 12
PM2.5	D+0 & D+1	01 02 03 04 05 06 07 08 09 10 11 12

Evolución anual del pronóstico de 2014, 2015, 2016

Datos Máximos del Pronóstico

	Max D0 (µg/m <sup>3</sup> )	Max D1 (µg/m <sup>3</sup> )
D0 14/01/2016	70	76
D1 15/01/2016	70	76
Max h O <sub>3</sub> (WIP 180 µg/m <sup>3</sup> )	77	55
Max h NO <sub>2</sub> (VL 200 µg/m <sup>3</sup> )	11	6
Max h SO <sub>2</sub> (VL 250 µg/m <sup>3</sup> )	15	12
Max h PM10	12	7
Max h PM2.5	10	5
PM10 Diario (VL 50 µg/m <sup>3</sup> )	6	3
O <sub>3</sub> Octonario (VL 120 µg/m <sup>3</sup> )	55	73

Actualmente se reciben datos de las siguientes instituciones:

- European Environment Agency
- Generalitat de Catalunya
- Gobierno de Cantabria
- Junta de Andalucía
- Gobierno de Canarias
- Comunidad de Madrid
- Ayuntamiento de Madrid
- Govern de les Illes Balears
- Xunta de Galicia
- Gobierno de La Rioja
- Gobierno Extremadura
- Junta de Castilla y León
- Junta de Castilla-La Mancha
- Govern d'Andorra
- Gobierno del Principado de Asturias
- Gobierno de Navarra

Los datos de calidad del aire utilizados en esta página son preliminares ya que no han sido validados y podrían cambiar tras su revisión (véanse los anteriores sitios web para obtener más información).

Los iconos verdes representan la existencia de datos de observación para uno o más contaminantes (O<sub>3</sub>, NO<sub>2</sub>, SO<sub>2</sub>, PM10, PM2.5), mientras que el color amarillo indica que actualmente no se disponen de datos de observación.

# Why a new retriever for Air Quality observations?

```
7 #Canary Islands, Air Quality Data
8 #00 2,5,8,11,14,17,20,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/canary/scripts/; ./downdata.sh &> downdata.log
9 #Madrid Council, Air Quality Data
10 05 11,14 * * * cd /home/evaluacion/eval_fcst/input_data/sources/ajmadrid/scripts/; ./downdata.sh &> downdata.log
11 #Andalucia CCAA, Air Quality Data
12 10 8,14,20,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/andalucia/scripts/; ./downdata.sh &> downdata.log
13 #Andorra Country, Air Quality Data
14 30 * * * * cd /home/evaluacion/eval_fcst/input_data/sources/andorra/scripts/; ./downdata.sh &> downdata.log
15 #Cantabria CCAA, Air Quality Data
16 30 15 * * * cd /home/evaluacion/eval_fcst/input_data/sources/cantabria/scripts/; ./downdata.sh &> downdata.log
17 05 0 * * * cd /home/evaluacion/eval_fcst/input_data/sources/cantabria/scripts/; ./file-control.sh
18 #Comunidad de Madrid CCAA, Air Quality Data
19 15 8,14,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/commadrid/scripts/; ./downdata.sh &> downdata.log
20 #Catalunya CCAA, Air Quality Data
21 20 8,14,20,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/catalonia/scripts/; ./downdata.sh &> downdata.log
22 #Balearic Islands, Air Quality Data
23 15 11,14,20,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/balears/scripts/; ./downdata.sh &> downdata.log
24 02 0 * * * cd /home/evaluacion/eval_fcst/input_data/sources/balears/scripts/; ./file-control.sh
25 #Galicia CCAA, Air Quality Data
26 20 10,16,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/galicia/scripts/; ./galicia.sh &> galicia.log
27 05 0 * * * cd /home/evaluacion/eval_fcst/input_data/sources/galicia/scripts/; ./file-control.sh
28 #Castilla Leon CCAA, Air Quality Data
29 35 8,14,20,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/castillaleon/scripts/; ./downdata.sh &> downdata.log
30 #Castilla Mancha CCAA, Air Quality Data
31 45 8,14,20,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/castillamancha/scripts/; ./downdata.sh &> downdata.log
32 #Murcia, Air Quality Data
33 45 * * * * cd /home/evaluacion/eval_fcst/input_data/sources/murcia/scripts/; ./downdata.sh &> downdata.log
34 #Euskadi, Air Quality Data
35 00 12,20,22 * * * cd /home/evaluacion/eval_fcst/input_data/sources/euskadi/scripts/; ./downfrom.sh &> downfrom.log
36 10 12,20,22 * * * cd /home/evaluacion/eval_fcst/input_data/sources/euskadi/scripts/; ./downdata.sh &> downdata.log
37 #Navarra, Air Quality Data web catching
38 00 8,12,16,20,22 * * * cd /home/evaluacion/eval_fcst/input_data/sources/navarra/scripts/; ./downfrom.sh &> downfrom.log
39 10 8,12,16,20,22 * * * cd /home/evaluacion/eval_fcst/input_data/sources/navarra/scripts/; ./downdata.sh &> downdata.log
40 #Navarra, Air Quality Data from Navarra source
41 30 8,14,18,22 * * * cd /home/evaluacion/eval_fcst/input_data/sources/navarraData/scripts/; ./downdata.sh &> downdata.log
42
43 #Catch Data from Valencia Site, Air Quality Data
44 00 11,17,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/comvalencia/scripts/; ./downfrom.sh &> downfrom.log
45
46 #Catch Data from Canarias Site, Air Quality Data
47 10 11,17,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/canaryCatch/scripts/; ./downfrom.sh &> downfrom.log
48
49 #EIONET, Air Quality Data
50 15 0,6,12,18 * * * cd /home/evaluacion/eval_fcst/input_data/sources/eionetArcGIS/scripts/; ./downdata.php > downdata-php.log
51 #script that will be stopped
52 25 0,6,12,18 * * * cd /home/evaluacion/eval_fcst/input_data/sources/eionetArcGIS/scripts/; ./downdata.sh &> downdata.log
53
54 #Extremadura CCAA, Air Quality Data
55 25 16 * * * cd /home/evaluacion/eval_fcst/input_data/sources/extremadura/scripts/; ./downdata.sh &> downdata.log
56 05 0 * * * cd /home/evaluacion/eval_fcst/input_data/sources/extremadura/scripts/; ./file-control.sh
57
58 #Asturias CCAA, Air Quality Data
59 30 10,14,18,23 * * * cd /home/evaluacion/eval_fcst/input_data/sources/asturias/scripts/; ./downdata.sh &> downdata.log
60
61 # Eval CALIOPE
```

20 scripts for AQ observations download as of Jan 2016  
(17 CCAA, 1 City Council (Madrid), 1 Andorra, 1 some EU (EIONET but few stations))

# Why a new retriever for Air Quality observations?

- ⌋ Further improve the gathering of air quality observations across Europe by using the EEA/EIONET (European Environment Information and Observation Network) LIVE Air Quality Data service.
- ⌋ Provide a **single, common tool** to gather air quality observations from stations, thus phasing out the several scripts used to date (one for each Comunidad Autónoma, Ayuntamiento) for the CALIOPE NRT forecast evaluation.
- ⌋ More stations, more evenly distributed across Europe.



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## 2. AVAILABLE DATA

# Where all started?

## Decision 2011/850/EU of 12 December 2011, Article 10:

- Up-to-date information asap: Primary up-to-date assessment data - measurements (E2a)
- *COMMISSION IMPLEMENTING DECISION of 12 December 2011, laying down rules for Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council as regards the reciprocal exchange of information and reporting on ambient air quality (notified under document C(2011) 9068) (2011/850/EU)*

## Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe, Article 26:

- "The information shall\* be made available free of charge by means of any easily accessible media including the Internet"

\* "shall" is a direction but does not mean mandatory

### Article 10

#### Primary validated assessment data and primary up-to-date assessment data

1. In accordance with the procedure referred to in Article 5 of this Decision, Member States shall make available the information set out in Part E of Annex II on primary validated assessment data for all sampling points where measurement data is collected for the purpose of the assessment as indicated by Member States according to Article 9 for the pollutants listed in Parts B and C of Annex I.

Where in a particular zone or agglomeration modelling techniques are applied, Member States shall make available the information set out in Part E of Annex II at the highest time resolution available.

2. The primary validated assessment data shall be made available to the Commission for a full calendar year as complete time series no later than 9 months after the end of each calendar year.

3. Member States shall, where they make use of the possibility provided for in Articles 20(2) and 21(3) of Directive 2008/50/EC, make available information on the quantification of the contribution from natural sources pursuant to Article 20(1) of Directive 2008/50/EC or from the winter-sanding or -salting of roads pursuant to Article 21(1) and (2) of Directive 2008/50/EC.

### CHAPTER V

#### INFORMATION AND REPORTING

### Article 26

#### Public information

1. Member States shall ensure that the public as well as appropriate organisations such as environmental organisations, consumer organisations, organisations representing the interests of sensitive populations, other relevant health-care bodies and the relevant industrial federations are informed, adequately and in good time, of the following:

- (a) ambient air quality in accordance with Annex XVI;
- (b) any postponement decisions pursuant to Article 22(1);
- (c) any exemptions pursuant to Article 22(2);
- (d) air quality plans as provided for in Article 22(1) and Article 23 and programmes referred to in Article 17(2).

The information shall be made available free of charge by means of any easily accessible media including the Internet or any other appropriate means of telecommunication, and shall take into account the provisions laid down in Directive 2007/2/EC.



# What is the current status?

OLD: AQ Portal (ArcGIS) → NEW: Data Monitor

The image shows a side-by-side comparison of two web interfaces. On the left is the 'EIONET The Air Quality Portal', which has a complex layout with multiple navigation tabs (SERVICES, REPORTNET, TOOLS, TOPICS) and a large list of links and services. On the right is the 'Up-to-date Air Quality Data Viewer - Hourly NO2', which features a clean, modern design with a map of Europe displaying real-time NO2 data points. The map uses a color scale from green (0-50) to red (400+). The new interface includes a search bar, a 'Layers' panel, and a 'Basemap' option. An arrow points from the 'Data monitor' tab in the old portal to the new data viewer.

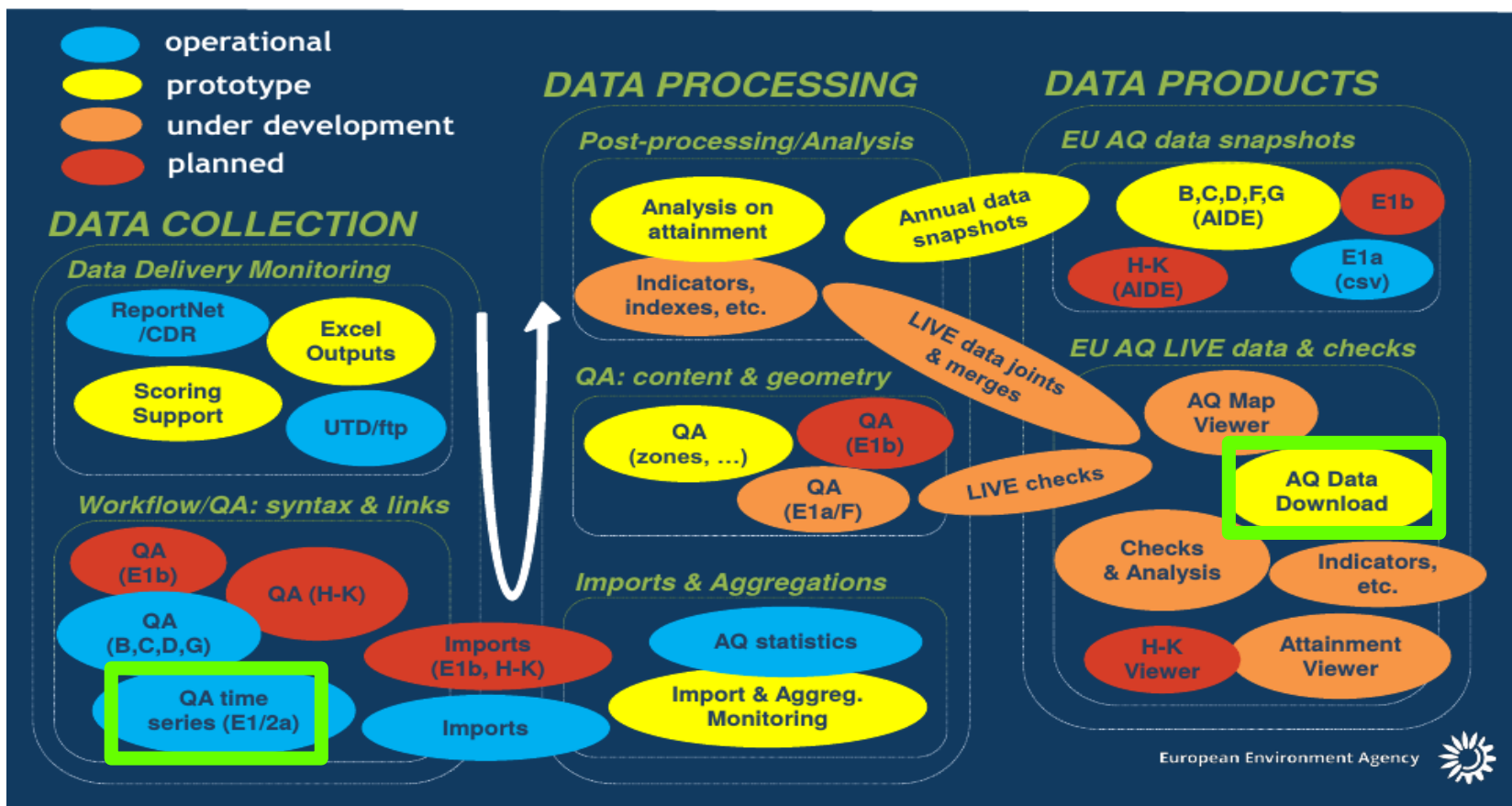
Modernised Near real Time data exchange to new UTD XML: to allow new products

<http://maps.eea.europa.eu/hub/AirQuality/>

# Overview EIONET AQ products: recent development!

☞ Status by the end of November 2015:

## AQ e-Reporting progress status



<http://www.eionet.europa.eu/aqportal/pmeet/AQDpil14/Day2.1.IPR14%20Progress%20and%20data%20products.pdf>

# EIONET data download service status (II)

- "The UTD dataflow is voluntary and the list currently counts 20 countries, additional countries are expected to join in 2016."
- "The download service is monitored by EEA in normal office hours, following the EEA calendar." 07/jan/16  
(<http://discomap.eea.europa.eu/map/fme/doc/UTDAirQualityDownloadGuide.pdf>)
- Personal communication: AQ data download operational except France and Lithuania (expected February 2016) but we've seen some service shortages. No news about Italy.

[https://tableau.discomap.eea.europa.eu/t/Aironline/Views/Airquality\\_E2a\\_monitoring/DashboardE2a?%3Aembed=y&%3AshowShareOptions=t](https://tableau.discomap.eea.europa.eu/t/Aironline/Views/Airquality_E2a_monitoring/DashboardE2a?%3Aembed=y&%3AshowShareOptions=t)

## E2a/UTD Air quality - primary pollutants delivery

Country..	Namespace	Pollutant							
		Benzene	CO	NO2	NOx	Ozone	PM2.5	PM10	SO2
AT	AT.0008.20.AQ	0	0	0	0	0	0	0	0
BE	BE.CELINE-IRCEL.AQ	0	0	0	0	0	0	0	0
DE	http://gdi.uba.de/arcgis/rest/..	4	2	2	2	2	4	2	2
DK	DK.NERI.AQ	0	0	0	0	0	0	0	0
ES	ES.BDCA.AQD	0	0	0	0	0	0	0	0
FI	FI.FMI.AQ	0	0	0	0	0	0	0	0
FR	FR.LCSQA-INERIS.AQ	0	1	1	0	1	1	1	1
GB	http://environment.data.gov..	0	0	0	0	0	0	0	0
GI	gib.air-quality	0	0	0	0	0	0	0	0
HR	aqd.azo.hr	0	0	0	0	0	0	0	0
HU	HU.OMSZ.AQ	0	0	0	0	0	0	0	0
IE	http://erc.epa.ie/airquality/irp	0	0	0	0	0	0	0	0
LT	LT.LT-EPA.AQ	25	25	25	25	25	25	25	25
LU	LU.AdmEnv_AirBruit.AQ	0	0	0	0	0	0	0	0
MK	MK.MinEPPAQ	0	0	0	0	0	0	0	0
MT	MT.MEPA.AQ	0	0	0	0	0	0	0	0
NL	NL.RIVM.AQ	0	0	0	0	0	0	0	0
NO	NO.NILU.AQD	0	0	0	0	0	0	0	0
PL	PL.CIEPAQ	0	0	0	0	0	0	0	0
PT	PT.APA.AQ	0	0	0	377	0	0	0	0
SE	SE.NVA.AQ	0	0	0	0	0	0	0	0

The UTD delivery board is updated every 2 hours and based on the last delivered value per specific country and pollutant. Note: If a pollutant has not been delivered for more than 100 days, no color is applied.

## e-Reporting on air quality - Current status - E2a

Note: The old report has been replaced with this one due to poor performance and lack of update. This report is simpler, but more stable and hopefully more useful than the old.

Countrycode	Benzene (air)		Carbon monoxide (air)		Nitrogen dioxide (air)		Nitrogen oxides (air)		Oz
	Hours since last delivery	Value	Hours since last delivery	Value	Hours since last delivery	Value	Hours since last delivery	Value	
AT			230	●	230	●			23
BE	224	●	223	●	223	●			22
DE	227	●	227	●	227	●	227	●	22
DK			223	●	223	●			22
ES	223	●	223	●	223	●	223	●	22

# What information is available?

491 pollutants listed in the Vocabulary: AQD - Air Quality Pollutants

<http://dd.eionet.europa.eu/vocabulary/aq/pollutant/view>

8 pollutants available at the Up-to-date AQ data download service.

22 member states + Gibraltar delivering data:

ISO 3166-1 alpha-2 codes, not EU Commission's UK (for GB) and EL (for GR)

## E2a/UTD Air quality - primary pollutants delivery

Countryco..	Namespace	Pollutant							
		Benzene	CO	NO2	NOx	Ozone	PM2.5	PM10	SO2
AD	AD.GovernAndorra.AQ	1	1	1	0	1	1	1	1
AT	AT.0008.20.AQ	0	0	0	0	0	0	0	0
BE	BE.CELINE-IRCEL.AQ	0	0	0	0	0	0	0	0
DE	http://gdi.uba.de/arcgis/rest/..	0	0	0	0	0	0	0	0
DK	DK.NERIA.AQ	0	0	0	0	0	0	0	0
ES	ES.BDCA.AQD	0	0	0	0	0	0	0	0
FI	FI.FMI.AQ	0	0	0	0	0	0	0	0
FR	FR.LCSQA-INERIS.AQ	0	0	0	0	0	0	0	0
GB	http://environment.data.gov..	0	0	0	0	0	0	0	0
GI	gib.air-quality	0	0	0	0	0	0	0	0
HR	aqd.azo.hr	0	0	0	0	0	0	0	0
HU	HU.OMSZ.AQ	0	0	0	0	0	0	0	0
IE	http://erc.epa.ie/airquality/ipr	0	0	0	0	0	0	0	0
LT	LT.LT-EPA.AQ	0	0	0	0	0	0	0	0
LU	LU.AdmEnv_AirBruit.AQ	0	0	0	0	0	0	0	0
MK	MK.MinEPP.AQ	0	0	0	0	0	0	0	0
MT	MT.MEPA.AQ	0	0	0	0	0	0	0	0
NL	NL.RIVM.AQ	0	0	0	0	0	0	0	0
NO	NO.NILU.AQD	0	0	0	0	0	0	0	0
PL	PL.CIEP.AQ	0	0	0	0	0	0	0	0
PT	PT.APA.AQ	0	0	0	406	0	0	0	0
SE	SE.NVA.AQ	0	0	0	0	0	0	0	0
SI	SI.ARSO.AQ	0	0	0	0	0	0	0	0

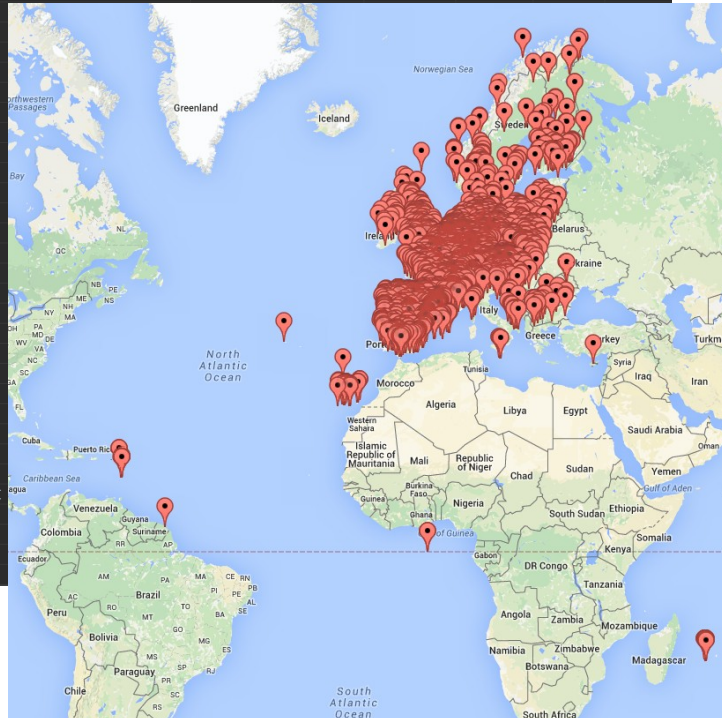
# Primary results

Over 300k observations only for Spain, (NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub>, PM2.5, PM10) in about two weeks time – not all stations reporting regularly

At current rate (just a few more stations to be added) 2,2 Million observations per month/pollutant

1749 new stations so far, 201 new for Spain:

id	code	code_obs	name	lat	lon	height	area	env	city
1176	1309	ES1845A	<null>	36.9968	-1.89535	5	<null>	<null>	<null>
1177	1310	ES1253A	<null>	38.0929	-3.78392	368	<null>	<null>	<null>
1178	1311	ES1897A	<null>	36.7279	-4.56095	55	<null>	<null>	<null>
1179	1312	ES1898A	<null>	36.9623	-4.84483	359	<null>	<null>	<null>
1180	1313	ES1718A	<null>	38.1694	-3.01022	692	<null>	<null>	<null>
1181	1314	ES1653A	<null>	37.2845	-5.91384	49	<null>	<null>	<null>
1182	1315	ES0624A	<null>	36.8475	-2.03819	50	<null>	<null>	<null>
1183	1316	ES1786A	<null>	36.8649	-2.3905	55	<null>	<null>	<null>
1184	1317	ES1620A	<null>	36.6609	-6.11449	49	<null>	<null>	<null>
1185	1318	ES1648A	<null>	36.2339	-5.6635	189	<null>	<null>	<null>
1186	1319	ES0712A	<null>	36.1754	-5.48083	45	<null>	<null>	<null>
1187	1320	ES1792A	<null>						
1188	1321	ES1750A	<null>						
1189	1322	ES1996A	<null>						
1190	1323	ES1821A	<null>						
1191	1324	ES0817A	<null>						
1192	1325	ES1425A	<null>						
1193	1326	ES1479A	<null>						
1194	1327	ES1664A	<null>						
1195	1328	ES0890A	<null>						
1196	1329	ES1924A	<null>						
1197	1330	ES1560A	<null>						
1198	1331	ES1256A	<null>						
1199	1332	ES2030A	<null>						
1200	1333	ES1393A	<null>						
1201	1334	ES2047A	<null>						
1202	1335	ES1610A	<null>						
1203	1336	ES1990A	<null>						
1204	1337	ES1095A	<null>						
1205	1338	ES1094A	<null>						
1206	1339	ES1247A	<null>						
1207	1340	ES1246A	<null>						
1208	1341	ES1995A	<null>						
1209	1342	ES2055A	<null>						
1210	1343	ES1340A	<null>						
1211	1344	ES2031A	<null>						
1212	1345	ES2068A	<null>						
1213	1346	ES2063A	<null>						
1214	1347	ES2061A	<null>						
1215	1348	ES1248A	<null>						

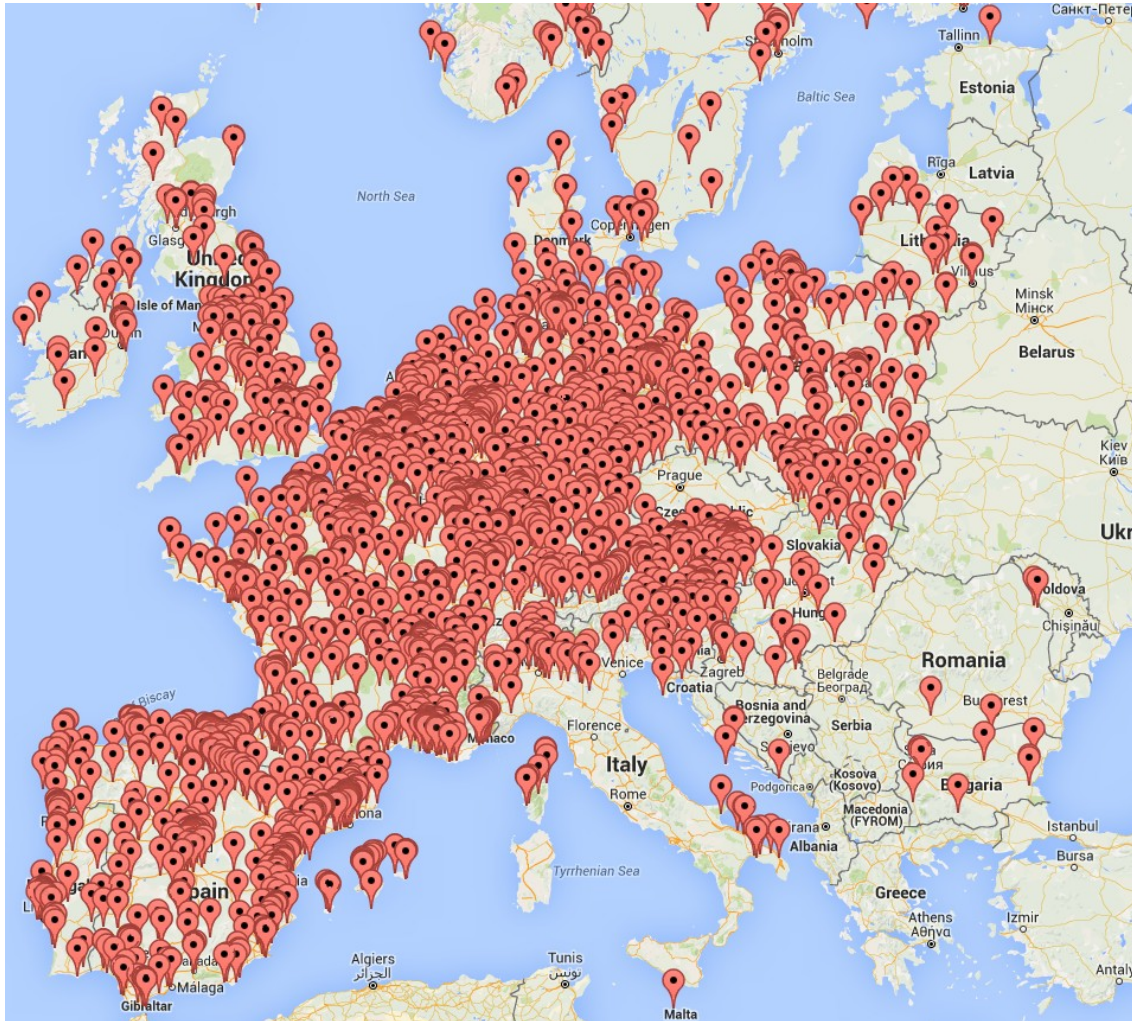


Until 20/01/16 09h	COUNT
Austria	171
Belgium	86
Germany	433
Denmark	12
Spain	466
Finland	64
France	615
United Kingdom	146
Sweden	28
Croatia	16
Hungary	13
Lithuania	20
Luxembourg	5
Macedonia	13
Malta	5
Netherlands	47
Norway	55
Poland	144
Portugal	52
Sweden	28

Ongoing Europe-wide test: still auto-creating new stations!!

# Primary results: Stations

☹ No info for IT, GR (still better than now)



# Primary results: “not verified” data

☞ All observations retrieved so far have validity=1 and verification=3 or 2 (bottom table)

Notation	Label	URI
-1	Not valid	<a href="http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/-1">http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/-1</a>
-99	Not valid due to station maintenance or calibration	<a href="http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/-99">http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/-99</a>
1	Valid	<a href="http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/1">http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/1</a>
2	Valid, but below detection limit measurement value given	<a href="http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/2">http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/2</a>
3	Valid, but below detection limit and number replaced by 0.5*detection limit	<a href="http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/3">http://dd.eionet.europa.eu/vocabulary/aq/observationvalidity/3</a>

Notation	Label	URI
1	Verified	<a href="http://dd.eionet.europa.eu/vocabulary/aq/observationverification/1">http://dd.eionet.europa.eu/vocabulary/aq/observationverification/1</a>
2	Preliminary verified	<a href="http://dd.eionet.europa.eu/vocabulary/aq/observationverification/2">http://dd.eionet.europa.eu/vocabulary/aq/observationverification/2</a>
3	Not verified	<a href="http://dd.eionet.europa.eu/vocabulary/aq/observationverification/3">http://dd.eionet.europa.eu/vocabulary/aq/observationverification/3</a>

# Flags applied to data (suspicious values)

⌋ In-house filtering also implemented, same as old system:

- Flag **IR** is applied if observation is not in range for its pollutant.

date (yyyy-MM-d...▲ 1	valu...	vali...
2015-11-11 17:00:00	241	<null>
2015-11-11 18:00:00	301	IR
2015-11-11 19:00:00	424	IR
2015-11-11 20:00:00	404	IR
2015-11-11 21:00:00	223	<null>

- Flag **DS** is applied if observation is constant for the past five hours (-5h..-1h range) and above a value of 10 for its pollutant.

date (yyyy-MM-d...▲ 1	valu...	vali...
2016-01-19 23:00:00	239	<null>
2016-01-20 00:00:00	239	<null>
2016-01-20 01:00:00	239	<null>
2016-01-20 02:00:00	239	<null>
2016-01-20 03:00:00	239	<null>
2016-01-20 04:00:00	239	DS
2016-01-20 05:00:00	239	DS
2016-01-20 06:00:00	239	DS

- Flag **MP** is applied if previous observation (past hour) is an outlier (has absolute maximum slide change) for its pollutant.

date (yyyy-MM-dd ...	valu...	vali...
2015-12-25 14:00:00	384	<null>
2015-12-25 15:00:00	554	MP
2015-12-25 16:00:00	340	MP
2015-12-25 17:00:00	467	MP
2015-12-25 18:00:00	192	<null>

date (yyyy-MM-dd ...	valu...	vali...
2015-12-28 22:00:00	22	<null>
2015-12-28 23:00:00	12	<null>
2015-12-29 00:00:00	180	MP
2015-12-29 01:00:00	20	<null>
2015-12-29 02:00:00	17	<null>

PM10

NO2



# Primary results: trivia

“Future” observations detected (also see log example [Future AQ observations DK-FI log example 2016-01-11.txt](#)):

```
-<record>
  <network_namespace>ES.BDCA.AQD</network_namespace>
  <network_localid>NET_ES203A</network_localid>
  <network_name>CCAA Asturias</network_name>
  <network_countrycode>ES</network_countrycode>
  <network_timezone>NULL</network_timezone>
  <station_namespace>ES.BDCA.AQD</station_namespace>
  <station_localid>STA_ES2051A</station_localid>
  <station_code>ES2051A</station_code>
  <station_name>LUGONES INSTITUTO</station_name>
  <station_altitude uom="m">168</station_altitude>
  <samplingpoint_namespace>ES.BDCA.AQD</samplingpoint_namespace>
  <samplingpoint_localid>SP_33066004_1_38</samplingpoint_localid>
  <samplingpoint_point x="-5.8026999997652897" y="43.401500000242656" coordsys="EPSG:4979"/>
  <pollutant>SO2</pollutant>
  <value_datetime_begin>2015-12-26 15:00:00.0000000</value_datetime_begin>
  <value_datetime_end>2015-12-26 16:00:00.0000000</value_datetime_end>
  <value_datetime_inserted>2015-12-26 00:08:41.2660000</value_datetime_inserted>
  <value_datetime_updated>2016-01-04 15:06:41.5750000</value_datetime_updated>
  <value_numeric>10</value_numeric>
  <value_validity>1</value_validity>
  <value_verification>3</value_verification>
</record>
```

2016-01-14 10:57:32,024 URI requested: http://fme.discomap.eea.europa.eu/fmedatastreaming/AirQuality/AirQualityUTDExport.fmw?UserToken=ACC9054D-8863-43CE-80A6-0E2D0BC38293&ToDate=2016-01-14+10:57&Format=XML&Pollutant=N02&FromDate=2016-01-04+00:00&InsertedSinceDate=2016-01-13+10:15&Countrycode=fi  
2016-01-14 10:57:34,838 688 observations processed.  
2016-01-14 10:57:34,838 576 observations ignored (inserted time < observation end time AND updated missing).  
2016-01-14 10:57:34,849 [END] data retrieval for pollutant: N02 (using INSERTED FILTER)

Solution considers limits set in place by EIONET (download restricted to max 50k observations per request) so filters must always be used

Some data providers uploading data once a day (e.g.: Canarias)

Performance, summary of raw info from logs: [/home/Earth/jcuadrad/Documents/EIONET Data portal/EIONET data retrieval evaluation.ods](#)



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## 3. HOW TO USE IT

# Cron (time-based job scheduler) usage

☞ Normal, automated usage: bscct08.bsc.es (production)  
bsces145.int.bsc.es (test)

☞ Configuration file (one .conf for every group of countries):

```
1 [aqdownload]
2 # Time frame of past Days of observations (since today) to be downloaded
3 # Recommended value=8, recommended min value=3, recommended max value=14
4 days_of_obs = 10
5 # list of member states (separated by comma; i.e.: es,de,pt) of which we want to download observations from their stations
6 # ISO 3166-1 alpha-2 must be used
7 countrycodes = es
8
9 [pollutants]
10 # pollutants to be downloaded (observations of those pollutants)
11 # to add another pollutant to be downloaded add a line with the CALIOPE acronym as key and EIONET notation as value
12 # acronym in CALIOPE DB / notation EIONET for request
13 O3 = O3
14 NO2 = NO2
15 SO2 = SO2
16 PM2.5T = PM2%2E5
17 PM10T = PM10
18 # Note EIONET notation PM2.5 must be URI safe
```

☞ Please see groups of countries in following slide. Groups are based on number of stations and proximity

# Cron for Europe-wide data retrieval – Upd. 09/feb/16

## Proposed schema to balance Europe-wide data download:

ISO c.c.	Country	Total	ISO c.c.	Country	Total
FR	Francia	616	FR	Reunión	15
ES	España	467	CH	Suiza	13
DE	Alemania	435	MK	Macedonia	13
AT	Austria	174	SI	Eslovenia	13
GB	Reino Unido	145	DK	Dinamarca	12
PL	Polonia	145	BG	Bulgaria	10
BE	Bélgica	85	FR	Martinica	9
FI	Finlandia	64	SK	Eslovaquia	8
PT	Portugal	60	LU	Luxemburgo	6
NO	Noruega	55	MT	Malta	4
IT	Italia	48	FR	Guadalupe	3
NL	Países Bajos	47	GI	Gibraltar	3
SE	Suecia	28	RO	Rumanía	3
HU	Hungría	24	AD	Andorra	2
LT	Lituania	20	CY	Chipre	1
HR	Croacia	16	EE	Estonia	1
IE	Irlanda	16	FR	Guayana Francesa	1

2534 Stations in total. Updated 11/feb/2016 13h

Execution every 6h (4 times per day):

- 1. EIONET-ES (ES)
- 2. EIONET-GER (DE-AT-PL)
- 3. EIONET-FRIT (FR-IT)

Execution every 8h (3 times per day):

- 4. EIONET-BENEPT (PT-BE-NL)
- 5. EIONET-UKSCANDINAVIA (GB-NO-SE-FI)

Execution every 12h (2 times per day):

- 6. EIONET-SMALL (DK-IE-GI-LT-MT-LU-HU-MK-HR)
- 7. EIONET-POLLUTANT-CO (all countries reporting CO: ad,at,be,de,dk,es,fr,gb,lt,lu,mk,mt,nl,no,pl,pt,si)

Times script execution starts:

- 1. 00:44, 06:44, 12:44, 18:44.
- 2. 01:44, 07:44, 13:44, 19:44.
- 3. 02:44, 08:44, 14:44, 20:44.
- 4. 03:24, 11:24, 19:24.
- 5. 04:24, 12:24, 20:24.
- 6. 05:14, 17:14.
- 7. 06:14, 18:14.

# Groups for .conf files and countries included - 09/feb/16

Every .conf file has all five pollutants, except ES and CO-POLLUTANT:

**BENEPT.conf**  
pt,be,nl

**CO-POLLUTANT.conf**  
ad,at,be,de,dk,es,fr,gb,lt,lu,mk,mt,nl,no,pl,pt,si

**ES.conf**  
es (+ NO pollutant)

**FRIT.conf**  
fr,it

**GER.conf**  
de,at,pl

**SMALL.conf**  
dk,ie,ad,lu,hu,hr,lt,si,mt,mk,gi

**UKSCANDINAVIA.conf**  
gb,no,se,fi

## COUNTRIES REPORTING DATA:

UPDATED 09/FEB/16:

AD

AT

BE

DE

DK

ES

FI

FR

GB

GI

HR

HU

IE

LT

LU

MK

MT

NL

NO

PL

PT

SE

SI

# Manual usage

- Manual usage intended for one-time test purposes
- This tool does not replace the Visor BD CALIOPE web interface
- Documentation:  
<https://earth.bsc.es/wiki/doku.php?id=tools:eionet-utdretriever>
- HTML Sphinx-generated technical documentation (in /docs):  
<https://earth.bsc.es/gitlab/jcuadrado/EIONET.git>



\* If last\_download (Inserted or Updated) < from\_date → from\_data=last\_download

- Web interface for one-time raw data (XML and CSV outputs):  
<http://discomap.eea.europa.eu/map/fme/AirQualityUTDExport.htm>

# Manual usage - CLI

- (download:** Normal operation, automated data download data uses the UpdatedSince and CreatedSince filters. In this mode, the retriever will keep track of the dates of last successful download for each pollutant and country, storing it in the DOWNLOAD\_DATE table in the database.
- (download\_no\_filters:** Manual operation, intended to troubleshoot missing data in the DB. Since the filters are not used in this mode all observations from the time window specified will be downloaded (be aware of reaching the 50k observations limit has set in place). The retriever will not keep track of the last successful downloads in this mode.
- (download\_sliding\_no\_filters:** Same as “download\_no\_filters” mode but it can be used with relative dates (to today). Please see example below.

In the “download\_no\_filters” mode the usage is as follows:

```
python3 EIONETretriever.py download_no_filters GER --fromDate 2016-01-01 --toDate 2016-01-03 > logs/GER/GER-20160101-20160102.log
```

In this example, all observations of the countries (de,at,pl) and pollutants defined in the “GER.conf” file from 01/jan/2016 to 03/jan/2016 (not included) will be downloaded and stored in the database.

Example for “download\_sliding\_no\_filters”:

If today is 2016-01-27 and we want to download the observations of days 2016-01-12 and 2016-01-13 we can get them in two ways:

```
python3 EIONETretriever.py download_no_filters ES --fromDate 2016-01-12 --toDate 2016-01-14 > logs/ES/ES-20160112-20160113.log
python3 EIONETretriever.py download_sliding_no_filters ES --fromDaysAgo 15 --toDaysAgo 13 > logs/ES/ES-20160112-20160113.log
```

Please note that in this mode, if the option –toDaysAgo is not provided the download will be until To date (now).

# Q & A

- ⌋ Presenter to audience (AC group)
- ⌋ Audience to presenter





# Changes introduced in meeting 2016-01-25

Up-to-date data download of five pollutants: NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub>, PM2.5, PM10 + (as requested by Jaime Benavides): CO (EU) + NO (only for Spain)

Label	Notation EIONET	URI	acronym in CALIOPE DB / notation EIONET
Benzene (air)	C6H6	<a href="http://dd.eionet.europa.eu/vocabulary/aq/pollutant/20">http://dd.eionet.europa.eu/vocabulary/aq/pollutant/20</a>	
Carbon monoxide (air)	<b>CO</b>	<a href="http://dd.eionet.europa.eu/vocabulary/aq/pollutant/10">http://dd.eionet.europa.eu/vocabulary/aq/pollutant/10</a>	
Nitrogen dioxide (air)	<b>NO2</b>	<a href="http://dd.eionet.europa.eu/vocabulary/aq/pollutant/8">http://dd.eionet.europa.eu/vocabulary/aq/pollutant/8</a>	<b>NO2 = NO2</b>
Nitrogen oxides (air)	NOX as NO2	<a href="http://dd.eionet.europa.eu/vocabulary/aq/pollutant/9">http://dd.eionet.europa.eu/vocabulary/aq/pollutant/9</a>	However, <b>NO</b> notation (id 38) returns also data
Ozone (air)	<b>O3</b>	<a href="http://dd.eionet.europa.eu/vocabulary/aq/pollutant/7">http://dd.eionet.europa.eu/vocabulary/aq/pollutant/7</a>	<b>O3 = O3</b>
Particulate matter < 10 µm (aerosol)	<b>PM10</b>	<a href="http://dd.eionet.europa.eu/vocabulary/aq/pollutant/5">http://dd.eionet.europa.eu/vocabulary/aq/pollutant/5</a>	<b>PM10T = PM10</b>
Particulate matter < 2.5 µm (aerosol)	<b>PM2.5</b>	<a href="http://dd.eionet.europa.eu/vocabulary/aq/pollutant/6001">http://dd.eionet.europa.eu/vocabulary/aq/pollutant/6001</a>	<b>PM2.5T = PM2%2E5</b>
Sulphur dioxide (air)	<b>SO2</b>	<a href="http://dd.eionet.europa.eu/vocabulary/aq/pollutant/1">http://dd.eionet.europa.eu/vocabulary/aq/pollutant/1</a>	<b>SO2 = SO2</b>

OLD (before January 2016): In CALIOPE implementation guide:

7.2.2. Datos de observaciones: "...para los contaminantes: O3, NO, NO2, SO2, PM10 y PM2.5, Benceno y Tolueno."

# Changes introduced in meeting 2016-01-25

Old stations (station codes not normalized)? → **REMOVED!**

id	code	code_obs	name	lat	lon	height	area	env	city	province	country	active	
1	1236	ES1929A	<null>	IS-EL PRAT (JARDINS DE LA PAU)	41.3215	2.09773	5	<null>	<null>	<null>	<null>	0	
2	1113	IS	8169008	El Prat de Llobregat (jardins de la pau)	41.3215	2.09773	3	SUB	T	El Prat...	Cataluña	ESPAÑA	1
3	1235	ES1983A	<null>	EL PRAT DE LLOBREGAT (CEM SAGNIER)	41.3218	2.08214	7	<null>	<null>	<null>	<null>	<null>	0
4	1112	G5	8169009	El Prat de Llobregat (CEM Sagnier)	41.3218	2.08214	3	SUB	T	El Prat...	Cataluña	ESPAÑA	1
5	397	IB	8169006	El Prat de Llobregat	41.3309	2.09197	9	URB	F	El Prat...	Cataluña	ESPAÑA	0

3.- ...and their observations? → **Fresh start (DELETE!)** (1.400 Million rows of data!)

4.- Should an extended quality control/review of new stations be performed? (Intended: automated script will fill City/Province/Country info from Gmaps) → **NO, but a review of the inverse geolocation has been performed**

id	code	code_obs	name	lat	lon	height	area	env	city	province	country	active	
1	1296	ES1854A	<null>	R4-VANDELLÓS I L'HOSPITALET (ELS DEDALTS)	41.0082	0.831085	737	<null>	<null>	<null>	<null>	0	
2	1180	ES0692A	<null>	I3-L'HOSPITALET DE LLOBREGAT	41.3705	2.11497	29	<null>	<null>	<null>	<null>	0	
3	144	I3	8101001	L'Hospitalet de Llobregat	41.3719	2.11583	20	URB	T	<null>	Cataluña	ESPAÑA	1

Manual name curation for new stations: (Unnecessary quotation marks; Correct names in all caps?) → **DONE**

code	name
FR03048	AIX PLATANES
FR08026	MEZE TRAFIC
FR08020	Lunel
FR08252	GARNOR03
ES0316A	MONAGREGA
ES1881A	PUIGMORENO
ES0324A	ESTANCA
ES1130A	ESCATRÓN
SE0050A	Stockholm Norrlandsg
SE0071A	Sollentuna E4 Häggvik
FI00080	"Rautionkylä"
FI00027	"Nokela"
FI00208	"Luukki"
FI00363	"Kasarmipuisto"
FI00301	"Pyykösjärvi"

# Supplementary info: meeting 2016-01-25

Regarding Q3: deleting past NRT observations.  
Current database has some minor issues with datetimes:

HORA LOCAL	EIONET UTC_date	EIONET	CALIOPE date		
2015-11-11 14:00:00	2015-11-11 13:00:00	80	2015-11-11 14:00	91	91
2015-11-11 15:00:00	2015-11-11 14:00:00	90	2015-11-11 15:00	104	104
2015-11-11 16:00:00	2015-11-11 15:00:00	91	<b>2015-11-11 16:00</b>	<b>241</b>	<b>241</b>
2015-11-11 17:00:00	2015-11-11 16:00:00	104	2015-11-11 17:00	-999	301
<b>2015-11-11 18:00:00</b>	2015-11-11 17:00:00	<b>241</b>	2015-11-11 18:00	-999	424
2015-11-11 19:00:00	2015-11-11 18:00:00	301	2015-11-11 19:00	-999	404
2015-11-11 20:00:00	2015-11-11 19:00:00	424	<b>2015-11-11 20:00</b>	<b>223</b>	<b>223</b>
2015-11-11 21:00:00	2015-11-11 20:00:00	404	2015-11-11 21:00	121	121
<b>2015-11-11 22:00:00</b>	2015-11-11 21:00:00	<b>223</b>	2015-11-11 22:00	72	72
2015-11-11 23:00:00	2015-11-11 22:00:00	121	2015-11-11 23:00	45	45
2015-11-12 00:00:00	2015-11-11 23:00:00	72	2015-11-12 00:00	36	36
2015-11-13 01:00:00	2015-11-12 00:00:00	45	2015-11-12 01:00	28	
<b>HORA LOCAL MADRID</b>	<b>HORA EIONET (UTC)</b>		<b>HORA OUTPUT CALIOPE (UTC-1??)</b>	<b>DATOS BD C.</b>	
18H CET (UTC+1 winter)	17H UTC		<b>UTC-1? CET-2?</b>	14	

Fecha	Hora	Plaza de España	Escuelas Aguirre	Ramon y Cajal
10-11-15	19:00			213
10-11-15	20:00		249	297
10-11-15	21:00		299	256
10-11-15	22:00		271	
10-11-15	23:00		229	
11-11-15	18:00			241
11-11-15	19:00	216	212	301
11-11-15	20:00	219	297	424
11-11-15	21:00		369	404
11-11-15	22:00		325	223
11-11-15	23:00			
12-11-15	19:00			282

El anterior cambio (al horario de Invierno) se produjo:  
El día 25 de octubre de 2015.  
De UTC+2 a UTC+1. A las 3:00 de la mañana el reloj se cambió 2:00 de la mañana.

# Changes introduced in meeting 2016-01-25

5.- Is an extra verification of the association of new stations to **Domains** needed? (because of auto filling city/country from google maps) → **NO**

6.- Collapse EEA's **area**? (Maintain the actual or use EEA's shown in the table)  
Waiting for EEA's updated list of **Classification** [Background/Industrial/Traffic] and **Area** (see table)

<http://dd.eionet.europa.eu/vocabulary/aq/areaclassification>

→ **MAINTAIN BOTH** (A NEW COLUMN IN DB has been created)

Area (CALIOPE)	EIONET:
RUR	rural
SUB	suburban
URB	urban
	rural-nearcity
	rural-regional
	rural-remote

7.- Filling data for new stations: Latest info available for Classification (type) and Area is from 2013.

7.- What to do with stations that cannot be classified? → **MERGED FROM AVAILABLE OFFICIAL SOURCES:**

[http://aide.apps.eea.europa.eu/?source={%22query%22:{%22match\\_all%22:{%22namespace%22:{%22order%22:%22asc%22}},{%22ReportingYear%22:{%22order%22:%22asc%22}}}](http://aide.apps.eea.europa.eu/?source={%22query%22:{%22match_all%22:{%22namespace%22:{%22order%22:%22asc%22}},{%22ReportingYear%22:{%22order%22:%22asc%22}}})

<http://www.eea.europa.eu/data-and-maps/data/aqereporting#tab-european-data>

<http://www.eea.europa.eu/data-and-maps/data/airbase-the-european-air-quality-database-8> (deprecated)

[http://cdr.eionet.europa.eu/es/eu/aqd/d/envvemqaq/ES\\_D\\_Metainfo.xml](http://cdr.eionet.europa.eu/es/eu/aqd/d/envvemqaq/ES_D_Metainfo.xml)

[http://cdr.eionet.europa.eu/es/eu/aqd/d/envvojdda/ES\\_D\\_Metainfo.xml](http://cdr.eionet.europa.eu/es/eu/aqd/d/envvojdda/ES_D_Metainfo.xml)

<http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0522.pdf>

<http://uk-air.defra.gov.uk/networks/find-sites>

# Changes introduced in meeting 2016-01-25

8.- Datetimes are UTC, showing a reminder in the web data interface (Visor BD CALIOPE) would be needed?  
(Show the reminder effective from the date when EIONET becomes the only source of observations) → **Implemented in CALIOPE-MANAGER (VISOR) by Miguel**

9.- Warning about no data (pollutant per country) since XX days?  
Mail not necessary: Show a new view with the last succesful data download (per pollutant and country – pretty much like the matrix in Slide 12) → **NOT NECESSARY**

POLLUT...	last_exec_updated...	last_exec_inserted...	country
1	2016-01-22 15:44:39	2016-01-22 12:47:19	es
2	2016-01-22 15:44:23	2016-01-22 12:47:11	es
4	2016-01-22 15:46:40	2016-01-22 09:50:51	es
24	2016-01-22 15:44:01	2016-01-22 09:50:33	es
25	2016-01-22 15:45:29	2016-01-22 09:50:40	es
1	2016-01-22 16:15:06	2016-01-22 16:18:00	pt
2	2016-01-22 16:14:20	2016-01-22 16:17:28	pt
4	2016-01-22 16:14:50	2016-01-22 16:17:50	pt
24	2016-01-22 16:14:01	2016-01-22 16:17:10	pt
25	2016-01-22 16:14:36	2016-01-22 16:17:39	pt
1	2016-01-22 17:15:39	2016-01-22 17:16:34	at
2	2016-01-22 17:15:36	2016-01-22 17:16:30	at
4	2016-01-22 17:15:28	2016-01-22 17:16:02	at
24	2016-01-22 17:15:33	2016-01-22 17:16:08	at
25	2016-01-06 00:45:58	2016-01-05 16:09:00	at



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**Thank you for your attention!**

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# Acronyms glossary

- ⌘ AC: Atmospheric Composition
- ⌘ AQ: Air Quality
- ⌘ CLI: Command-line interface
- ⌘ EEA: European Environment Agency
- ⌘ EIONET: European Environment Information and Observation Network
- ⌘ KF: Kalman Filter
- ⌘ NRT: Near Real Time
- ⌘ UTD: Up-to-date (previously NRT in EEA/EIONET documents)