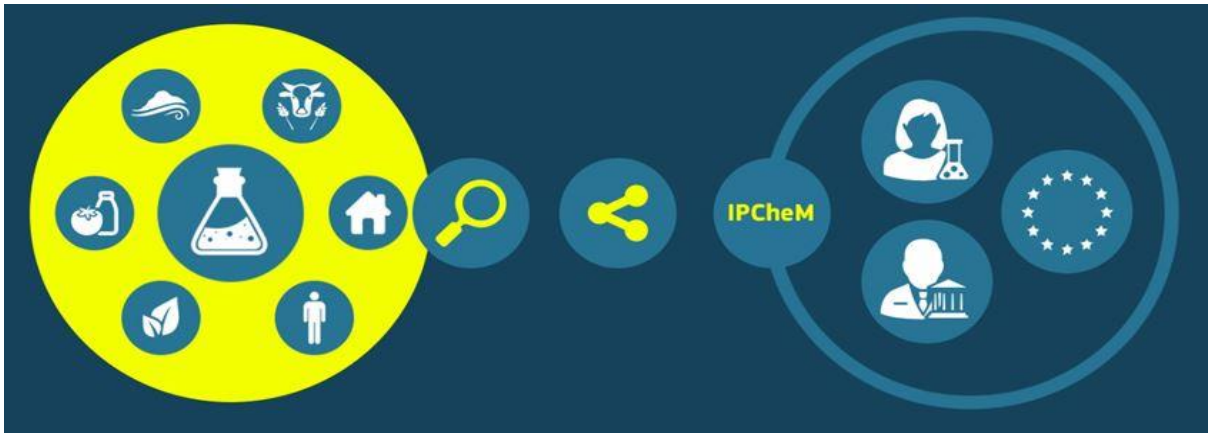
IPCHEM - Information Platform for Chemical Monitoring

Quick reference guide for end-users

Version 4 (December 2018)



https://ipchem.jrc.ec.europa.eu

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1 INTRODUCTION TO THE IPCHEM PLATFORM

Aim

IPCHEM - the Information Platform for Chemical Monitoring is the reference access point for locating and retrieving chemical occurrence data across various media (e.g. environment, human, food/feed, indoor air and products) in the European Union[1]. IPCHEM is being operated by the European Commission Services and the European Union Agencies.

IPCHEM addresses one of the major gaps in our knowledge base for chemical policies, which is the lack of information on exposure to chemicals and their burden in the human body and the environment. To this purpose, IPCHEM supports a coordinated approach for collecting, storing, accessing and evaluating data related to occurrence of chemicals and chemical mixtures. *"This would help identify links between exposure and epidemiological data in order to explore potential biological effects and lead to improved health outcomes"* as it is stated in the EC Communication "The combination effects of chemicals – Chemical mixtures" (COM/2012/0252 final) .

Objectives

The main objectives of the IPCHEM platform are:

- Assisting policy makers and scientific communities to discover and access existing and future chemical occurrence data across various matrices and media;
- Hosting data currently not readily accessible (e.g. outcomes of EU research projects, off-line stored monitoring data, etc.) including data on new, emerging and less-investigated chemicals that will be accessible through the platform;
- Providing chemical monitoring information of defined quality concerning spatial, temporal, methodological and metrological traceability.

Bearing these objectives in mind, IPCHEM was designed and implemented as a distributed infrastructure (web portal and related tools), providing when feasible remote access to existing chemical monitoring data. In parallel, it offers data hosting capacities if requested by Data Providers/Data Owners.

While Data Providers/Data Owners maintain the structure of their own databases, the provision of data therein is harmonised in order to be accessible, retrievable and comparable through a common interface. This creates greater visibility and promotes a wider use of chemical monitoring data, thus increasing the knowledge base for sound risk assessment, management and communication. Combining information and chemical data from different sources across various environmental media, consumer products and food/feed, and ultimately from human beings themselves will provide the knowledge base for better understanding and assessing the effects of exposure to chemicals and chemical mixtures and ultimately support the effective implementation of EU chemical policy.

[1] https://ipchem.jrc.ec.europa.eu/

Challenges

The main scientific and technical challenges for the IPCHEM project are: 1) how to handle in a transparent way the heterogeneity of data related sources, formats and policies; 2) how to improve the comparability across multi-source data and 3) how to ensure interoperability with other existing relevant information systems in EU and also globally.

Benefits

- IPCHEM as *improver:*
  - Promotes the generation of good quality chemical monitoring data and reporting;
  - Helps identifying priority substances in environmental legislation (e.g. SVHCs for REACH, priority substances for Water Framework Directive, POPs nomination);
  - Supports an enhanced exposure and risk assessment analysis of chemicals and chemical mixtures;
  - Supports the validation of chemical exposure and deposition models.

- IPCHEM as *enabler:*
  - Acts as an early warning system for emerging chemical pollutants in various media (e.g. environment, human, food/feed, indoor air and products) thus helps undertaking subsequent informed policy actions;
  - Enables an overall evaluation of the state of environment with respect to burden of chemicals and their impact;
  - Enables evaluating the effectiveness of chemical policies/legislation in reducing the impact of chemicals in the environment and understanding their effects on human health;
  - Helps tracing pathways of chemical exposure and analysing the correlations among chemicals occurrence and effects on the environment and human health.

- IPCHEM as *resource saver and promoter:*
  - Helps European Commission and Member States saving resources and reducing administrative burden by:
    - Providing a tool which facilitates the co-ordinated retrieval, accessibility, storage and reporting of chemical monitoring data;
    - Facilitating targeting the scope and better planning of chemical monitoring campaigns;
    - Sharing knowledge about analytical methodologies and tools related to chemical monitoring and reporting;
    - Promoting the use of harmonised procedures and standards for chemical monitoring and analysis.

2 TERMS OF USE

The information available in the IPCHEM platform (which is owned and managed by the European Commission) is subject to a disclaimer, a copyright notice and rules related to personal data protection, according to the IPCHEM Data Protection Notification[2].

The access, use and re-use of the data available through the IPCHEM platform, is governed by the terms and conditions specified in the IPCHEM Data Policy which is accessible online and can be downloaded from the IPCHEM website (https://ipchem.jrc.ec.europa.eu).

Below are reported the objectives and scope of the IPCHEM Data Policy as stated in Article 1 of the corresponding document.

1. The IPCHEM Data Policy:

a) Defines and formulates the principles and conditions that govern provision, management, access, use and re-use of chemical monitoring data and metadata retrievable through the IPCHEM platform, to increase their accessibility and to facilitate their wider use and re-combination, across and beyond thematic modules of IPCHEM in order to better understand the overall exposure of environment and humans to chemicals and chemical mixtures;
b) Lays down rules for effective and efficient implementation of such principles and conditions applicable to chemical monitoring data and metadata retrievable through the IPCHEM platform;
c) Promotes transparency and good governance practices in order to enable and facilitate a coordinated and integrated approach for the access, use and re-use of chemical monitoring data and metadata;
d) Promotes and implements the overarching principles of free, full, open and timely access to all kinds of chemical monitoring data where possible, whilst recognizing and respecting relevant legislative provisions and government guidance regarding the data ownership and intellectual property rights that apply to such data.

2. The IPCHEM Data Policy ensures compliance with the following principles:

a) Protecting the integrity, transparency, and traceability of chemical monitoring data, and of the use of the data for analysis and forecasts;
b) Recognising and respecting data protection legislation, both at the European Union and national levels;
c) Recognising and respecting intellectual property rights of IPCHEM Data Providers and Data Owners as defined in agreement with them;
d) Using European or international standards and services on data interoperability and the principles set out in the INSPIRE Directive and in the Shared Environmental Information System (SEIS).

3. The IPCHEM Data Policy lays down the Open Data principles as the default regime for making chemical monitoring data retrievable through the IPCHEM platform for further use and re-use, and outlines the conditions that allow Data Providers and Data Owners to impose special accessibility regimes to restrict access to their data.

[2] https://intragate.ec.europa.eu/dpms/record/DPR-EC-00213.1

3 GETTING STARTED

The IPCHEM home page at a glance

Figure 1: *IPCHEM home page*

The home page allows access to seven key features of the IPCHEM platform:

- **'Main toolbar Menu'**: allows access to the IPCHEM main functionalities;
- **'EU Login'**: manages restricted access to data reserved to specific User Groups or enables saving and accessing results in subsequent working (browsing) sessions;
- **'Search data by Chemical, Media and Country'**: allows direct access to the page for searching chemical monitoring data (via the chemical's name or CAS number) and refining the search via optional filters (i.e. selecting media, project/institution, date) or by IPCHEM Thematic Module;
- **'Search Multi-Chemical by Location (Pilot)'**: allows displaying and accessing chemical monitoring data collected inside a geographical Area area defined by the user;
- **'More IPCHEM web pages'**: to obtain additional information (e.g. Data Providers, Data Policy, Collaborations with Research Projects, Type of Data available, Tutorials, Presentations and Case Studies).
- **'Video tutorials'**: for a quick tour on the IPCHEM main capabilities and functionalities;
- **'IPCHEM News & Events'**: to keep up to date with IPCHEM latest news and events.

IPCHEM workflow scheme

The IPCHEM platform is designed to allow for searching, retrieving and comparing chemical monitoring data that provided in different databases.

Operations, starting from the 'Search Page', are logically streamlined via five steps, according to the following general IPCHEM workflow scheme (**Figure *2*Error! Reference source not found.**).

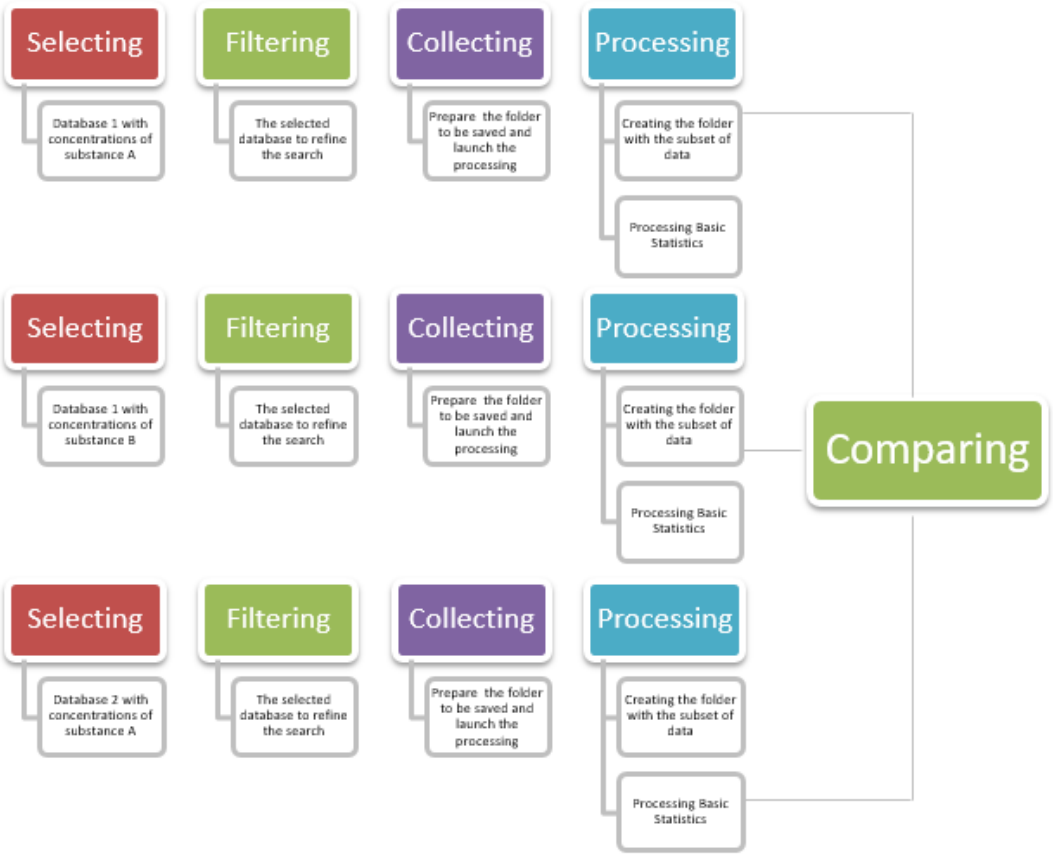


Figure 2: *IPCHEM workflow scheme*

Searching for a specific chemical and the subsequent selection of a specific database (containing concentration measurements of the chemical of interest) are performed via the 'Search page' (*'Selecting'* action). It is also possible to access the Metadata info page for an overview of the specific database's content (e.g. the data monitoring reasons, the methods adopted for the data sampling and analysis, the contact point, etc.).

With the '*Filtering'* action, performed via the 'Search page' or at a later stage from within the 'Database Console', it is possible to explore the selected database and refine the search criteria according to general and/or database specific related filters in order to prepare the subset of data to be placed into the 'Basket' for further processing (i.e. creating the folder containing the subset of data of interest and performing basic statistics on the selected data).

The *'Collecting'* action is used for the data selection in the 'Database Console', where a subset of data for each selected database are displayed and made available for transferring them into the 'Basket' for further processing.

With the '*Processing*' action, performed inside the 'Basket', data are prepared for being downloaded and for creating basic statistics; successively, the data can be used for offline analysis and ready for employing the '*Comparing'* capability which is performed under the 'Viewer'.

4 IPCHEM MAIN COMPONENTS

'Search' page

End-users may search for a chemical compound via its name and CAS registry number. It is possible to refine the search by combining one or more filtering criteria such as the IPCHEM thematic module, the measured matrix/media, the research project or institution that carried out the study, the interval of time in which data were collected, the spatial extension (coverage) of the database (**Figure *3***).

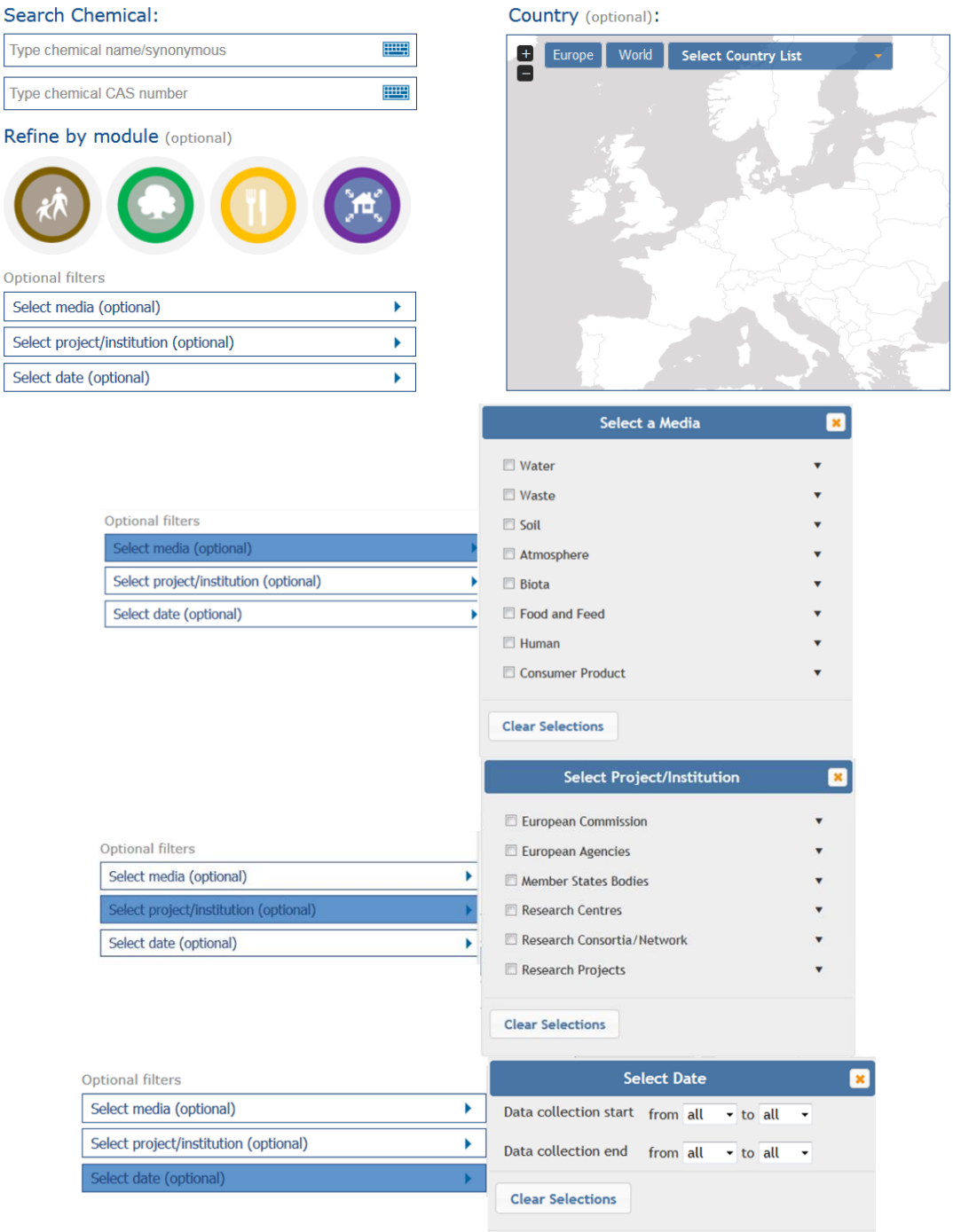


Figure 3: *IPCHEM filtering parameters*

When a specific chemical has been searched, all available databases containing concentration measurements of this chemical are then listed in the same page (or consecutive pages).

For each of the listed databases a number of additional functionalities are available, e.g. access to the 'Metadata info' page of each database, access to the 'Database Console', access to the 'Chemical structural information and properties' window, etc. (**Figure *4*Error! Reference source not found.**).

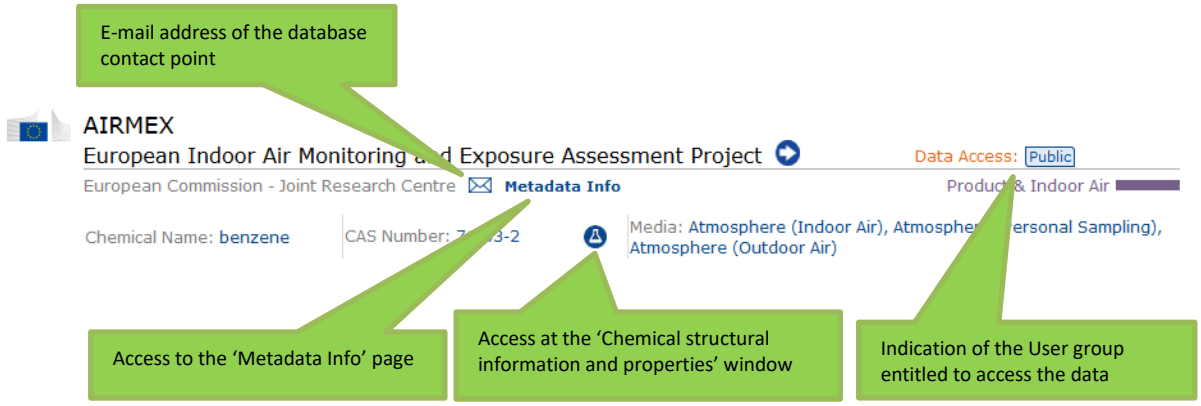


Figure 4: *Additional info and access to further IPCHEM tools and interfaces*

'Metadata info' page

The 'Metadata info' page summarises the relevant information about a specific database, including data accessibility, use and re-use conditions and sampling and analytical information about the monitored chemicals. When available, direct links to the specific database's website or web application are provided. Contact data for the data owner/data provider are also provided as well as links to official technical and scientific documentation related to the specific database, via the tab "Related resources" (**Figure *5***).

The Metadata information for each specific database available in IPCHEM can also be consulted independently from the process of selecting a specific chemical.

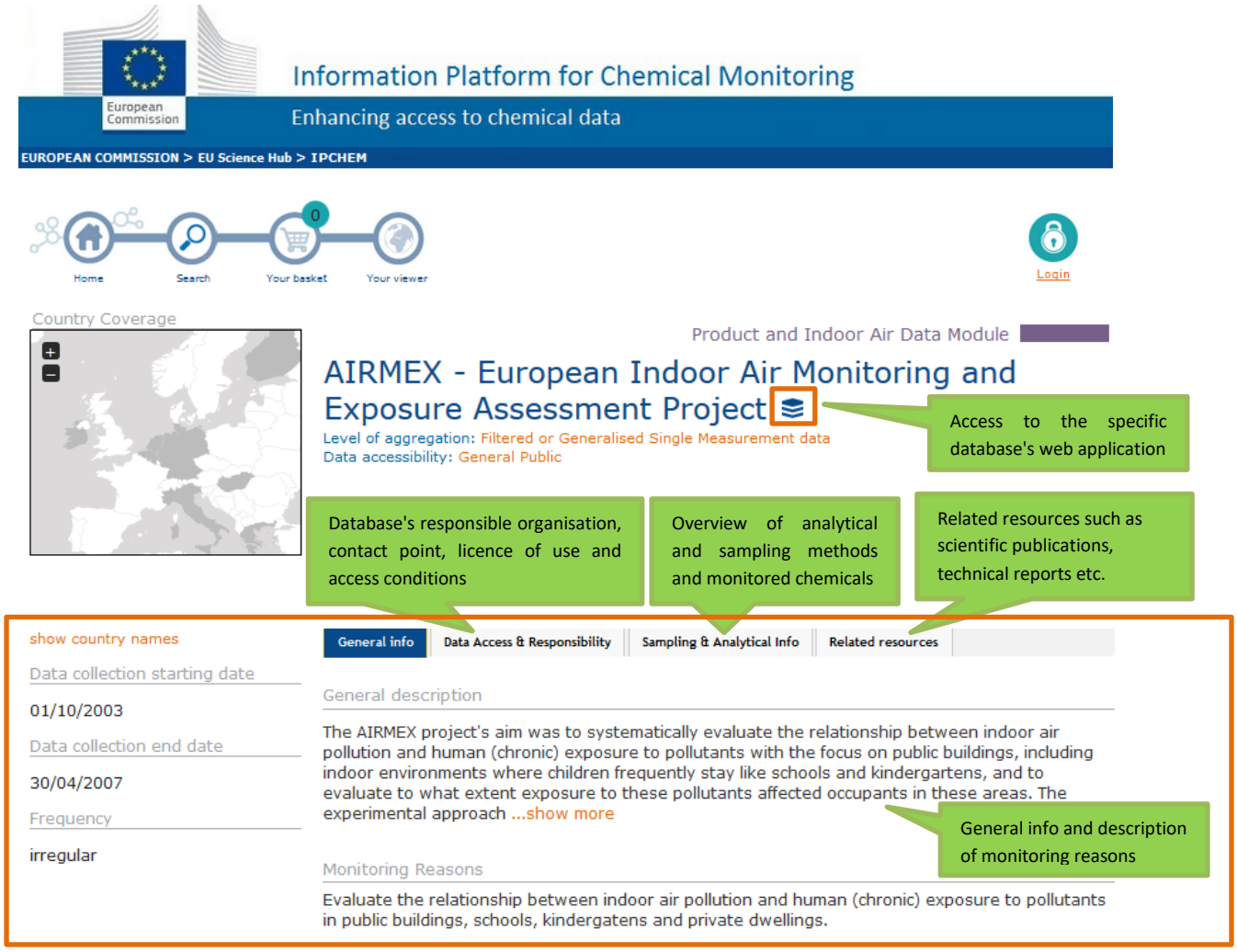


Figure 5: *'Metadata Info' page*

Database Console'

All concentration measurements which are available in a specific database that was retrieved via the search are displayed inside the 'Database Console' and can be further filtered according to specific database filters. Measurements are reported into a table (each row of which represents a measurement record featuring specific attributes such as location, sample source, sampling date, concentration value, unit of measure, LOD, LOQ, media/setting, level of aggregation) and represented into a map (where sampling source locations are geometrically represented). Data could then be picked-up (**Figure *7*Error! Reference source not found.**) or bulk transferred (**Figure *8*Error! Reference source not found.**) into the 'Basket' for further processing.

Figure 6: *IPCHEM 'Database Console'*

The data picking-up process allows for selecting from the entire database the data records of interest; these are selected by clicking (i.e. picking-up) on the check boxes of the corresponding rows or, clicking on the first check box on the top of the first column for multiple rows selection.

During the data picking-up selection, the overall number of the selected (picked-up) rows is displayed on the right part of the header; by clicking over, the selected data are transferred into the Basket (**Figure *7*Error! Reference source not found.**).

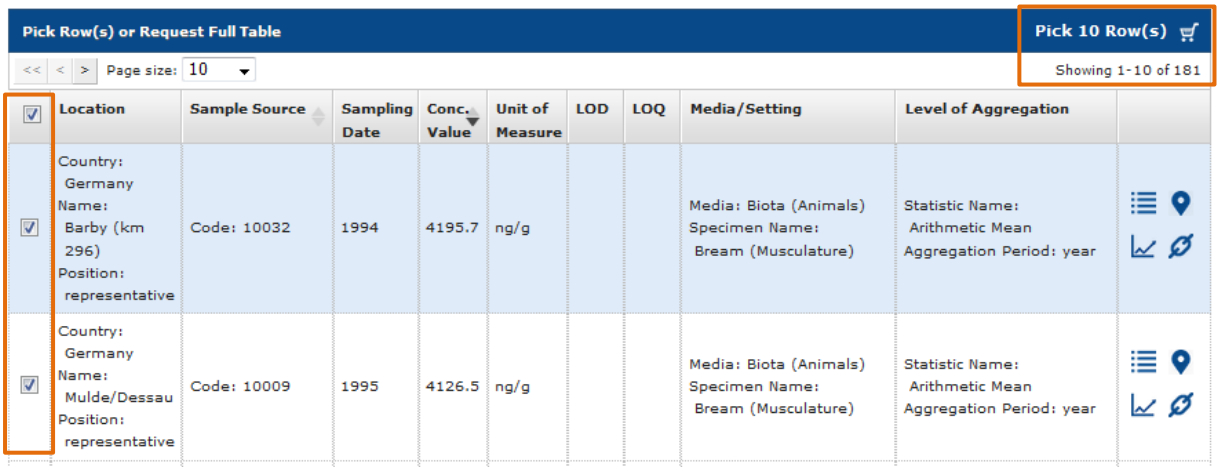


Figure 7: *Example of data picking-up for further processing*

The bulk transfer of data allows selecting the entire bunch of data that were resulted from the search performed for a specific chemical.

By clicking on the right part of the header (i.e. 'Request Full Table' function), the full table of data for the selected chemical are transferred into the 'Basket'.

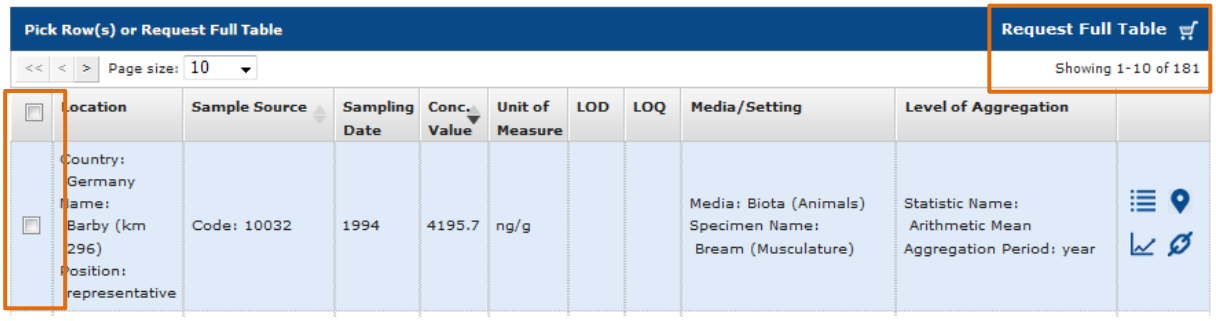


Figure 8: *Example of bulk transfer of data for further processing*

'Basket' tool

The 'Basket' tool allows performing different tasks. The first part of the 'Basket' page provides an organised overview of the selected data across the following attributes: the searched chemical name, the CAS number, the country in which the chemical monitoring was performed, the name of the source database, the selected filtering criteria that were chosen into the 'Database Console' and the status of the data selected (either picked-up data or full data table –bulk- transferred) (**Figure *9*Error! Reference source not found.**).

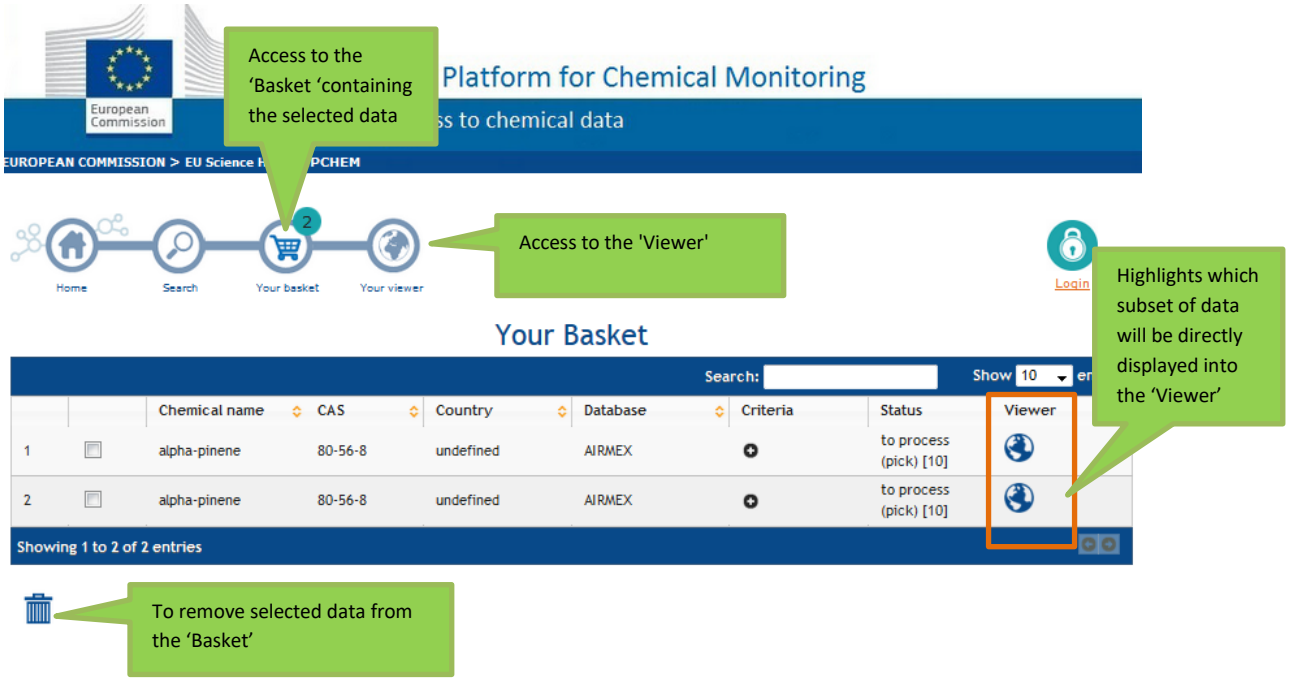


Figure 9: *Organised view of selected data in the 'Basket'*

Picked-up data are by default in "ready" status, meaning that they are ready to be directly displayed into the 'Viewer'. The data can be previewed also in tabular format and saved as PDF format (**Figure 10**).**Error! Reference source not found.**

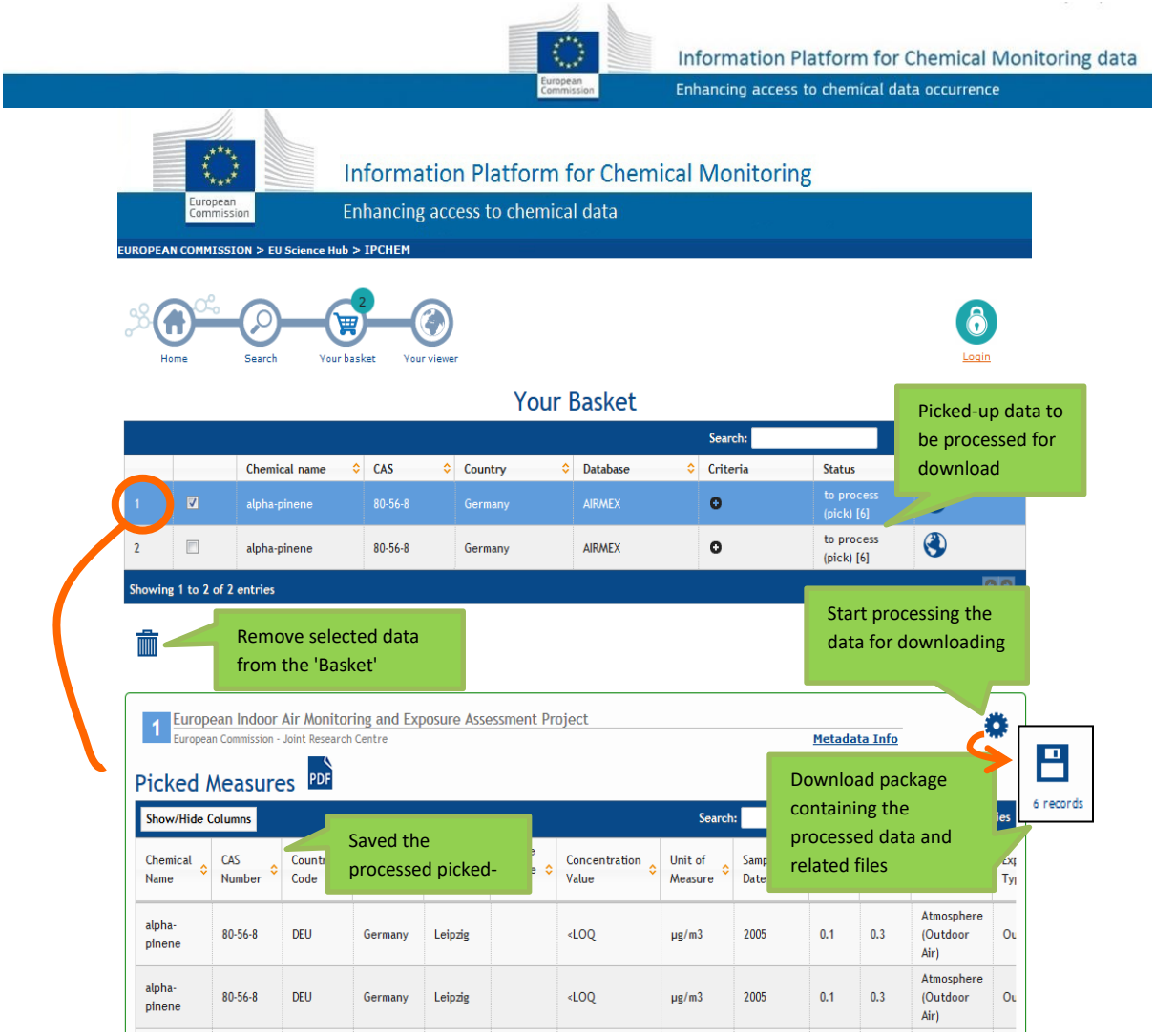


Figure 10: *Example of processed picked-up data*

Bulk transferred data (i.e. transfer of the full data table) is still in "to process" status and not yet processed; this data category cannot neither be displayed into the 'Viewer' nor be previewed in tabular format (**Figure *11*Error! Reference source not found.**).

By successively clicking on the 'processing' icon a zip folder is prepared for downloading. In case of picked-up data the zip folder contains: the picked-up data selected, the summary table reporting the filtering criteria, the basic statistics created from the data processed, the main elements of the Metadata for the specific database and the number of occurrences of the monitoring data that were selected and divided by media and country. All files contained in the zip folder are in CSV format which is compatible with widespread used statistical software. The selected data are also provided in GeoJson format (to be displayed into the 'Viewer' or further processed in GIS software). At the end of this step the basic statistics and the occurrences of the selected monitoring data are displayed into the same 'Basket' page.

A similar process can be followed for the bulk data. In this case the zip folder contains files of similar content as for the picked-up data, however, only basic statistics data can be displayed as geographic layer into the 'Viewer'. At the end of this step the globe icon changes colour (from grey to blue) to indicate the change of status (i.e. from 'to process' to 'ready') (**Figure *12*Error! Reference source not found.**).

These steps can be repeated to save into the 'Basket' the results of searching and selecting different subset of data for the same chemical found in different databases or for different chemicals found in the same or in different databases.

Any Subset of data that have been added into the 'Basket' can be removed at any time from it.

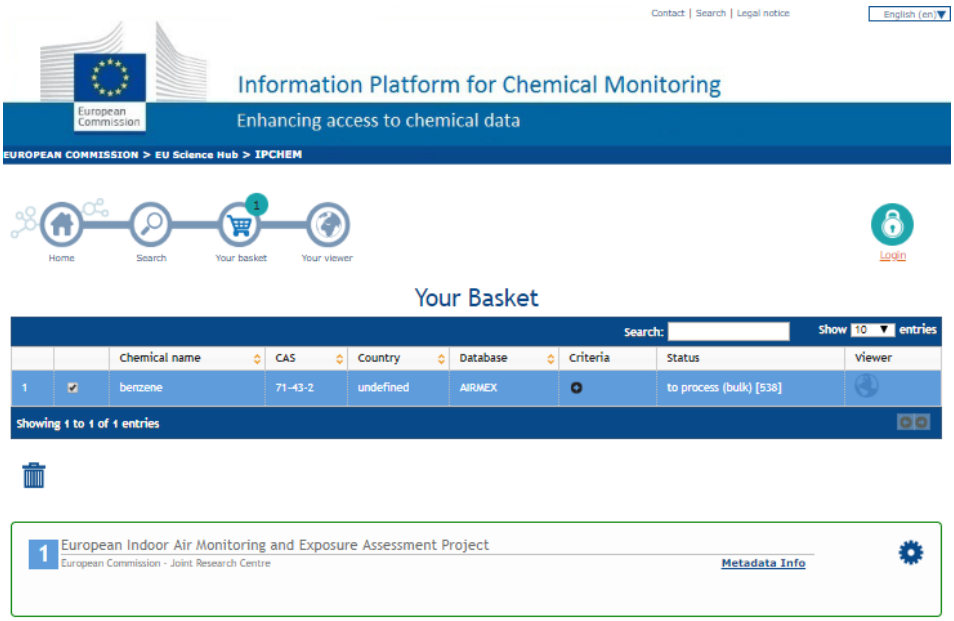


Figure 11: *Example of not processed bulk data*

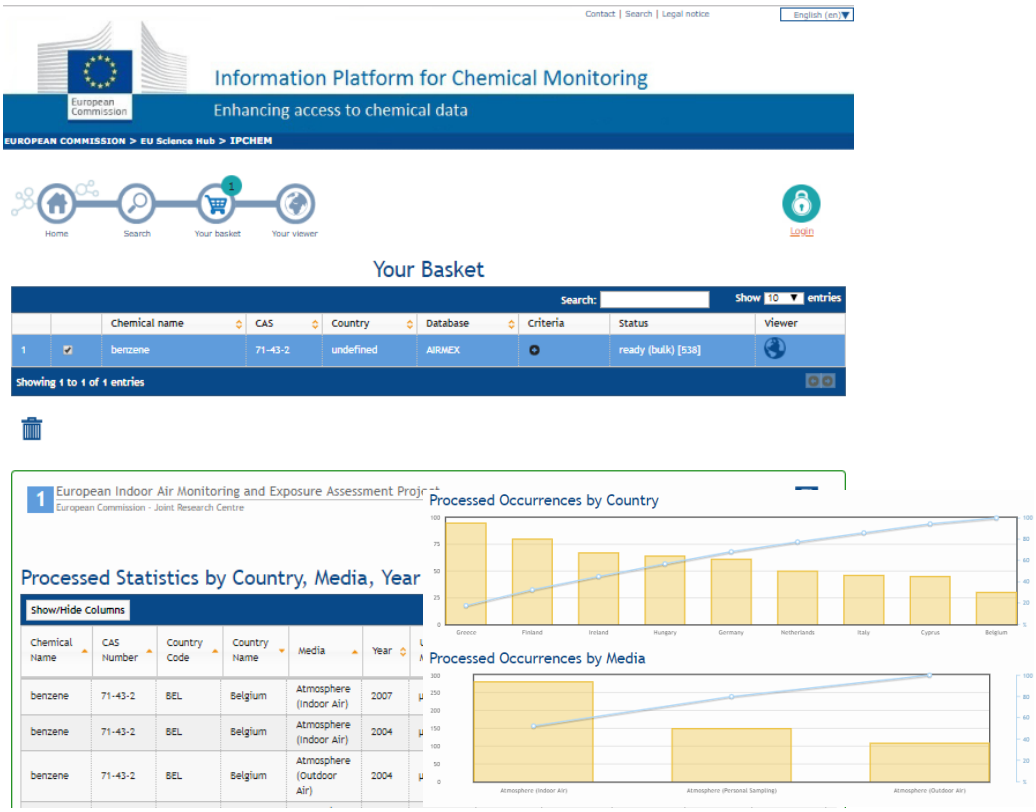


Figure 12*: Example of processed bulk data*

Viewer

The subsets of data, picked-up or bulked, are also available as spatial layers into the 'Viewer'. But while the picked-up data are directly displayed into the 'Viewer', showing the location of each measured sample (Figure 13), as explained above, the bulked data should be first processed before they are displayed in form of basic statistics by EU Country and media.

For example, it is possible to identify where and how concentration values of a specific chemical in multiple databases exceed a certain threshold value, or whether there is any correlation among chemical occurrences in space and time. Various chemicals from the same or different databases could be analysed in the same way.

End users may customise the map via the 'Editor Console' and save it as PDF file. It is also possible to change the base map or overlap pre-defined thematic maps to facilitate the data interpretation.

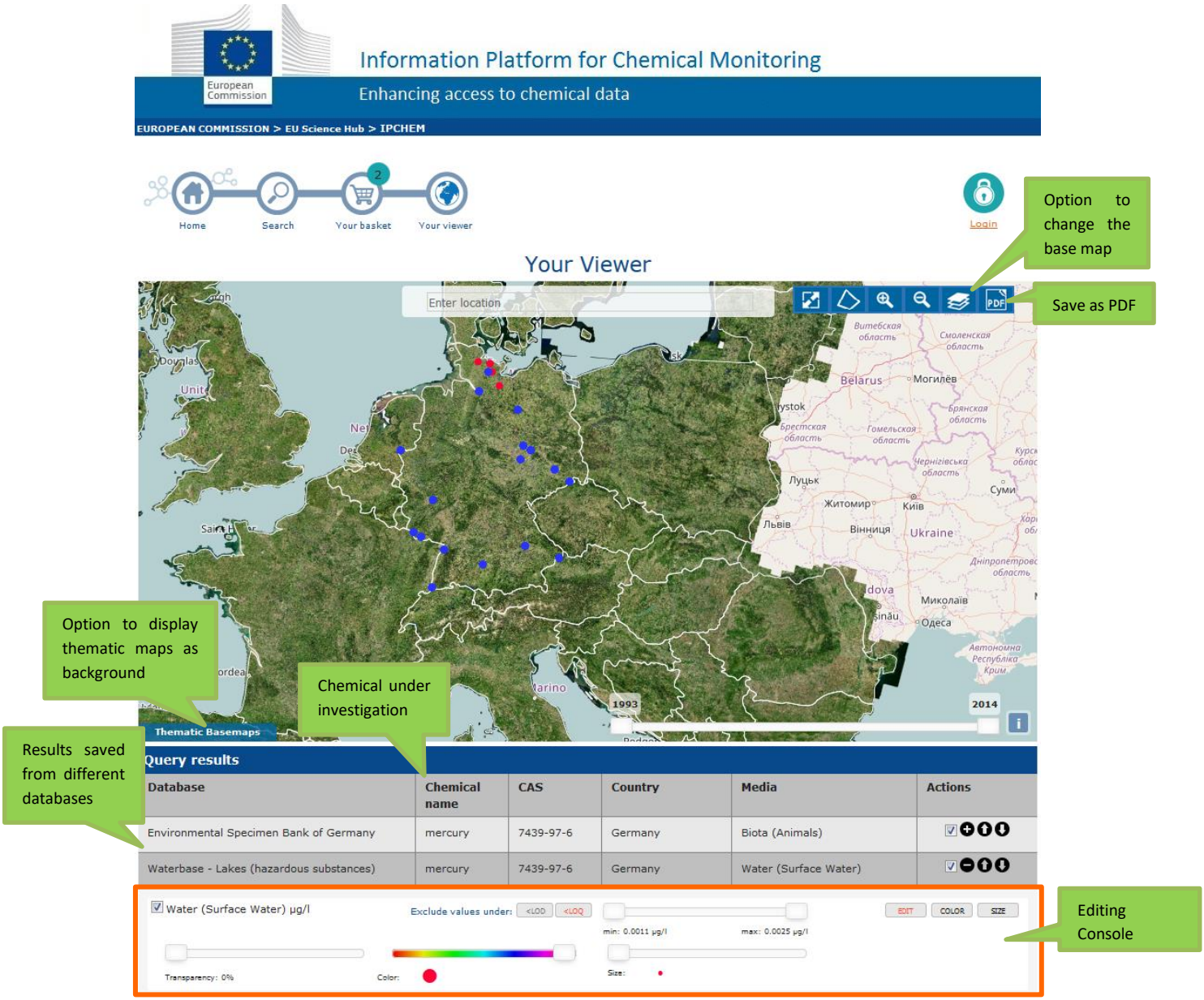


Figure 13: *Data (picked-up) as displayed into the 'Viewer'*

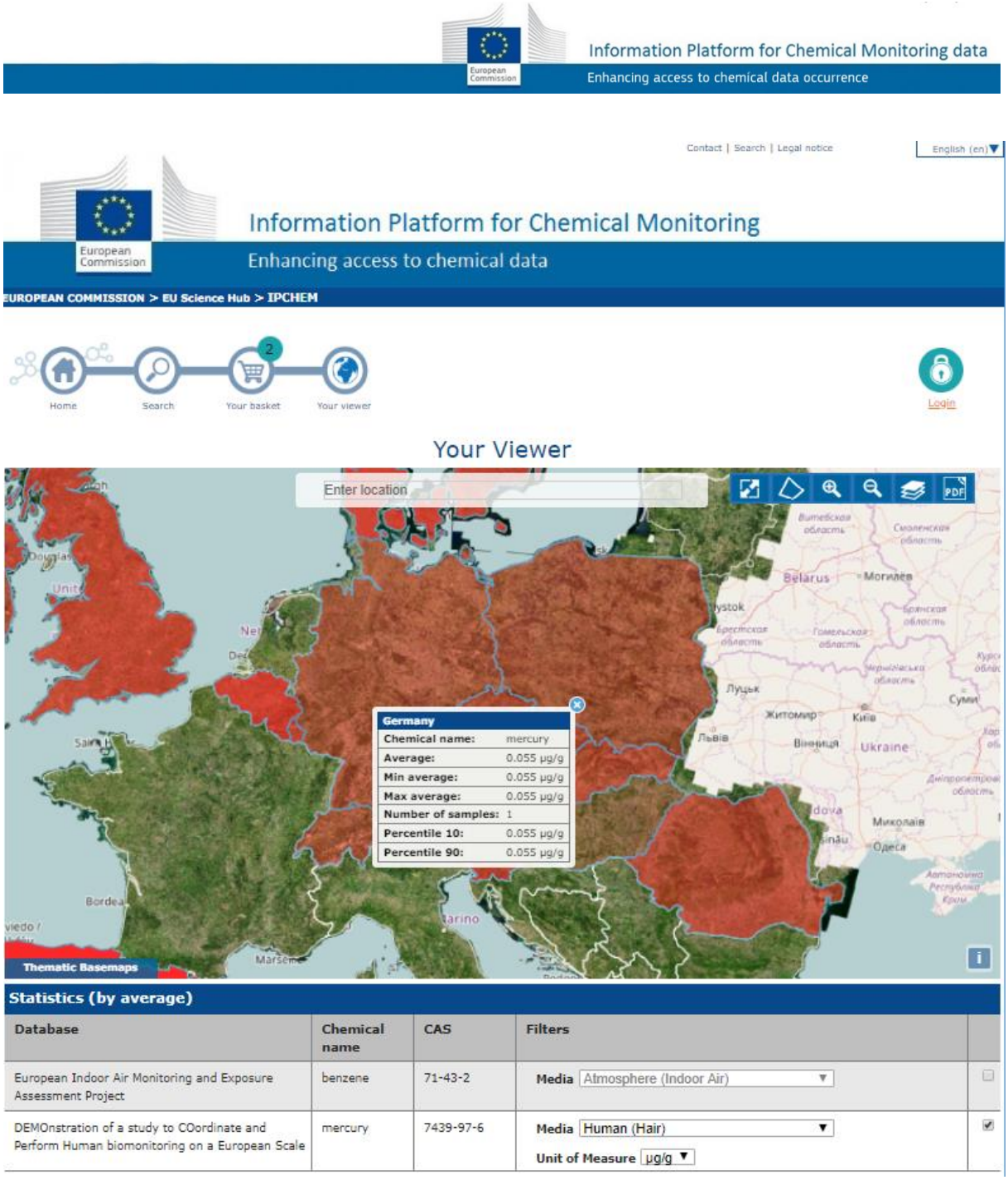


Figure 14: *Basic statistics of bulked data as displayed into the 'Viewer'*

5 IPCHEM ADVANCED MAP VIEWER

Background

The IPCHEM 'Advanced Map Viewer' was created with the aim to integrate into the IPCHEM platform an advanced search functionality for monitoring data of chemicals based on geo-location, to facilitate/support (among others) the risk assessment of chemical mixtures. Namely: "Search Multi-Chemical by location (Pilot)" and/or nearby and further refine the search by chemical, data collection and media.

This tool allows searching for all concentration measurements available in a specific location that is defined by the end-user without any further refinement. It works independently from the "Search data by Chemical, Media and Country" tool and in a step-wise approach interactively with the end-user.

Through this interface the end-user will be able to:

- Search for a specific location or navigate into the map;
- Draw a specific area of interest (a circle, or a polygon, or a rectangle);
- Display all chemicals measured inside the area of interest.

Having defined the area of interest it is possible to narrow down the number of retrieved concentration measurements/chemicals by restricting the search by:

- Chemical;
- Database;
- Media.

The IPCHEM Advanced Viewer has three main components:

1. The Search panel (the element located on the left)
2. The Map (located in the centre)
3. The Filter panel (the element located on the right)

Figure 15 shows the interface of the IPCHEM Advanced Viewer.

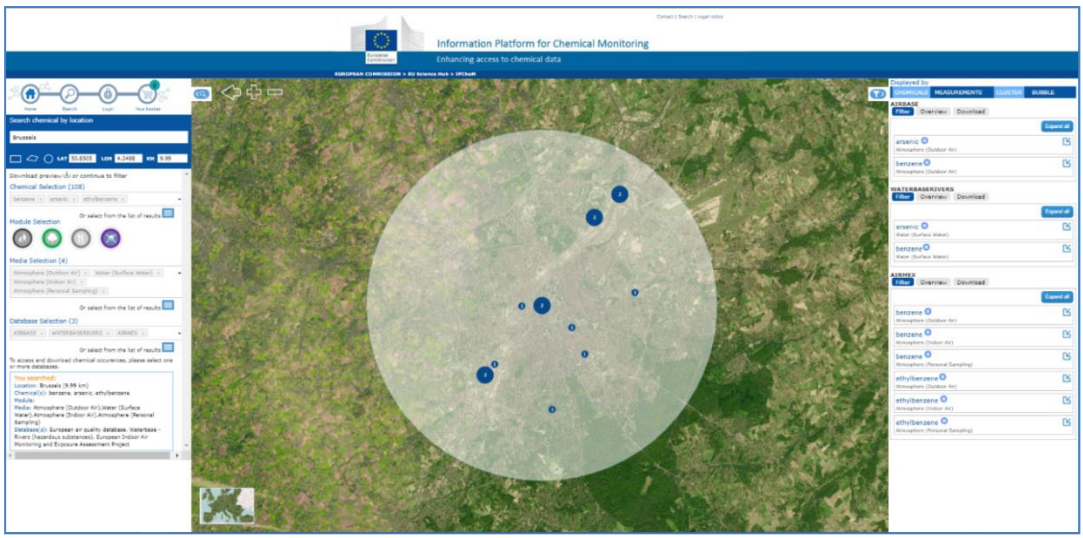


Figure 15: *The interface of the IPCHEM advanced viewer*

Operational steps

1. Structure and content of the Search panel

1.1 *Spatial selection*

When choosing the geo-location there are three alternatives:

→ Search for a specific location by typing the name (in the original language of the country) in the *'Enter a location'* box.

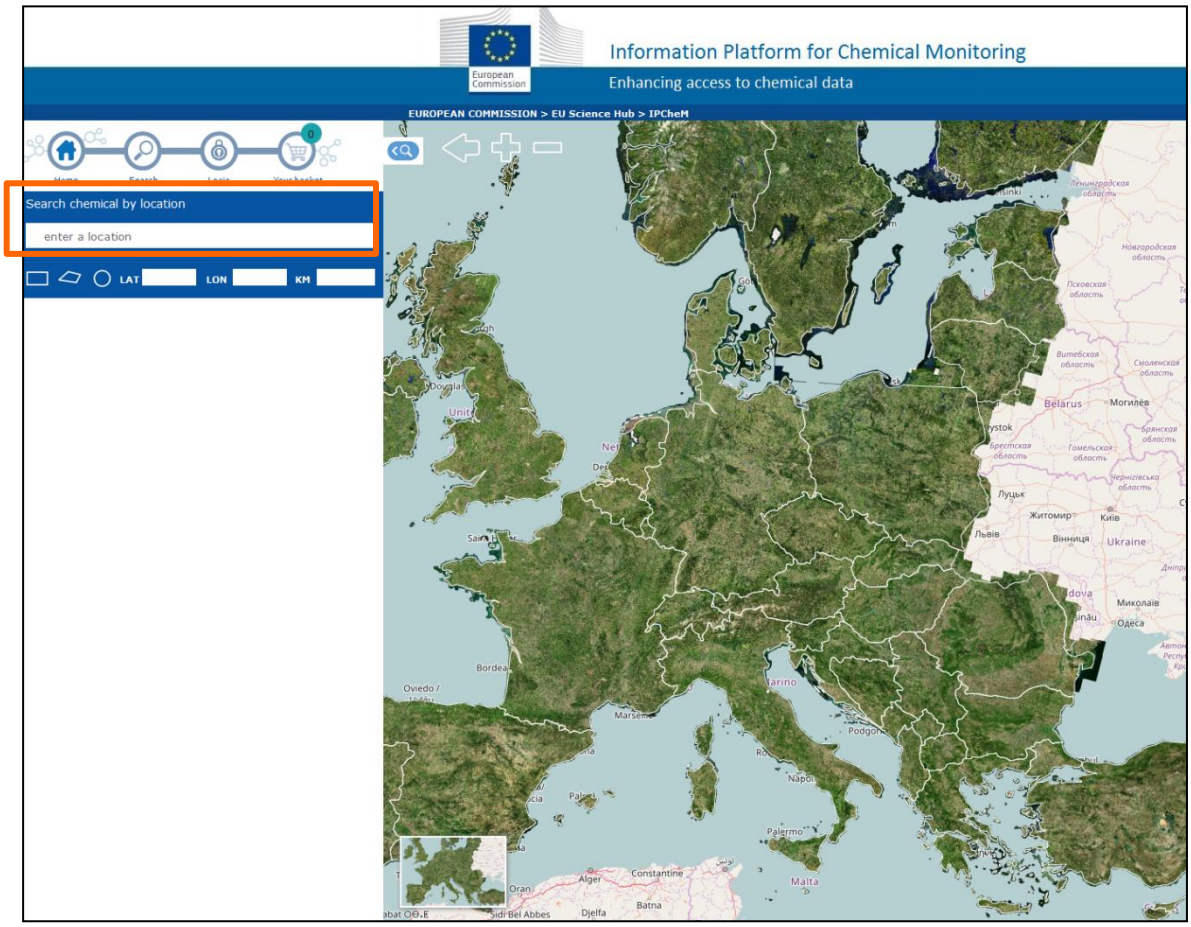


Figure 16: *Selection of the area of interest by entering a specific location name*

→ Enter the Geographical coordinates of the area of interest in the *'LAT' and* 'LON' boxes.

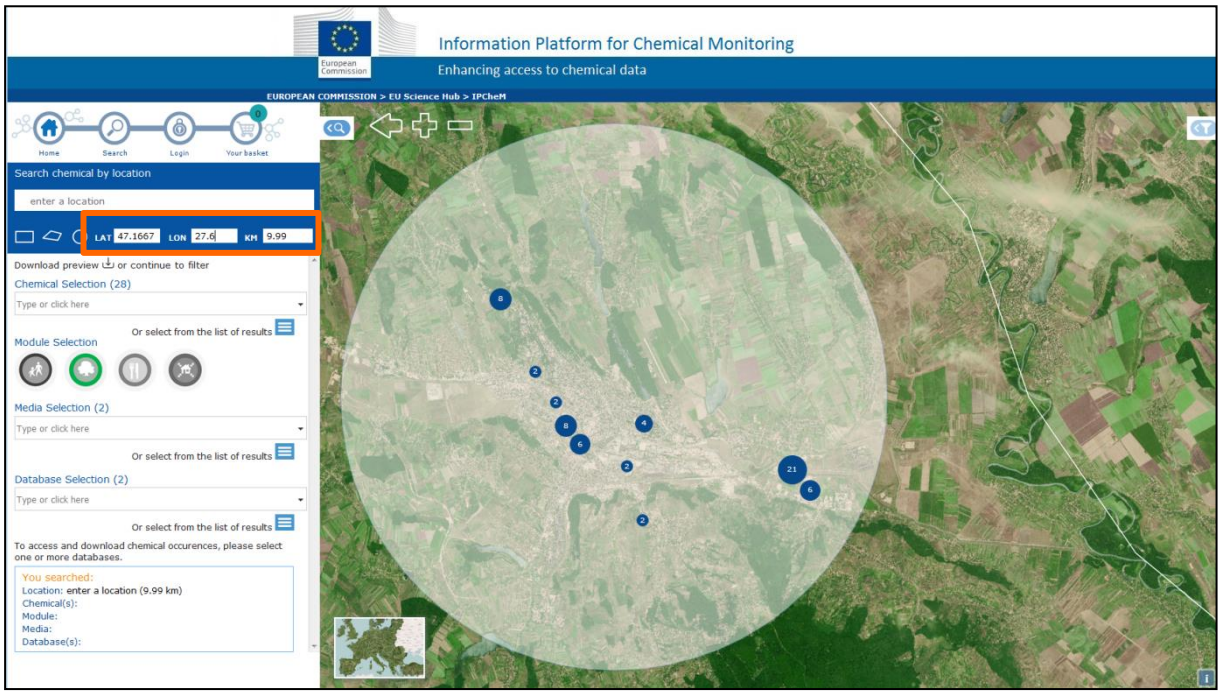


Figure 17: *Measurement points in an area defined by geographical coordinates*

→ Draw a specific area of interest (a circle, or a polygon, or a rectangle).

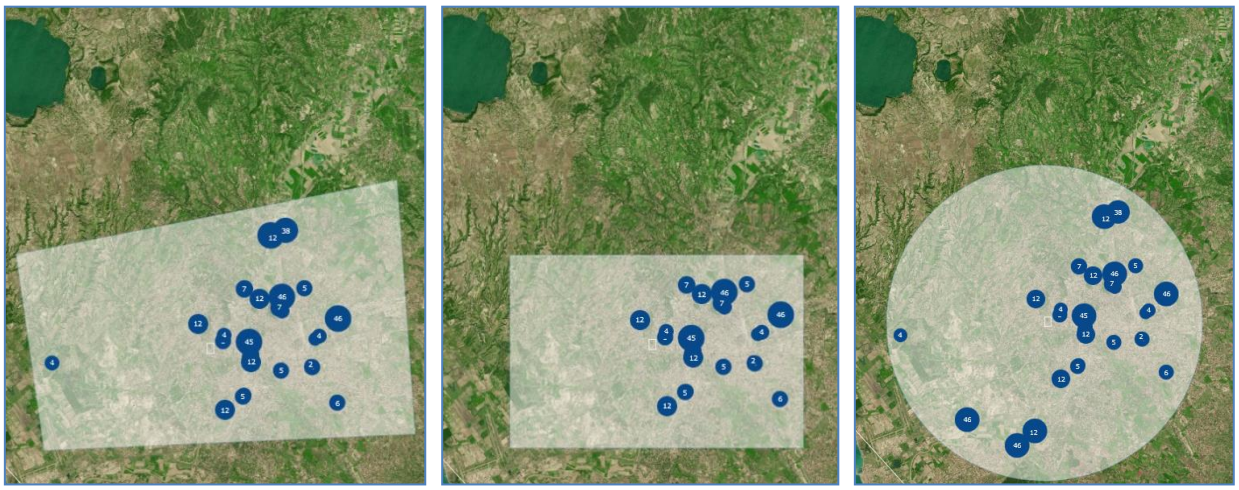


Figure 18: *Total measurement points in the specific area of interest (drawn via a polygon, rectangle or circle)*

Concentration measurements data are displayed into the map, where points represent the sampling source locations.

1.2 Selection of chemical(s)

→Under the "Chemical Selection" section, the name of one or more chemicals can be typed either using the cell 'type or click here' or clicking the blue icon which opens the window with the list of chemicals to be selected.

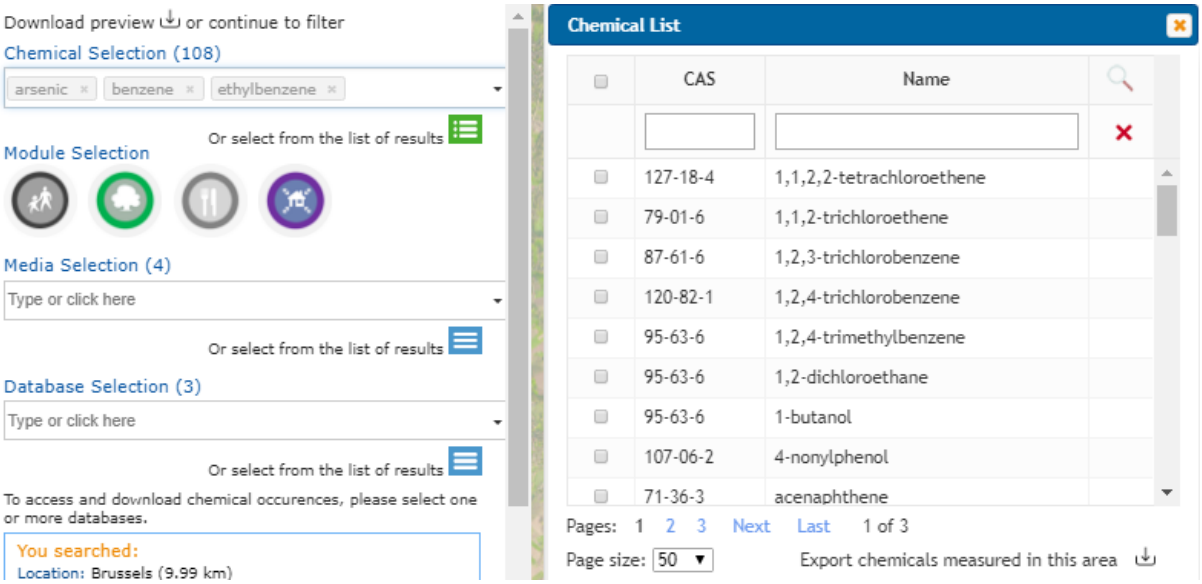


Figure 19: *'Chemical selection' feature*

1.3 Selection of a module

→The search can be refined by choosing among the four IPCHEM thematic modules (Human Biomonitoring Data, Environmental Monitoring Data, Food and Feed Monitoring Data Product and Indoor Air Monitoring Data) using the four dedicated icons (**Figure *20***). By pressing a single icon, the user can automatically select the databases belonging to the corresponding IPCHEM thematic module.

Figure 20: *'Module selection' feature*

1.4 Selection of media

→In order to further refine the search, measured media specific for each chemical collected in that sampling location can be selected either using the cell 'type or click here' or clicking the blue icon which opens the window with the list of media to be selected.

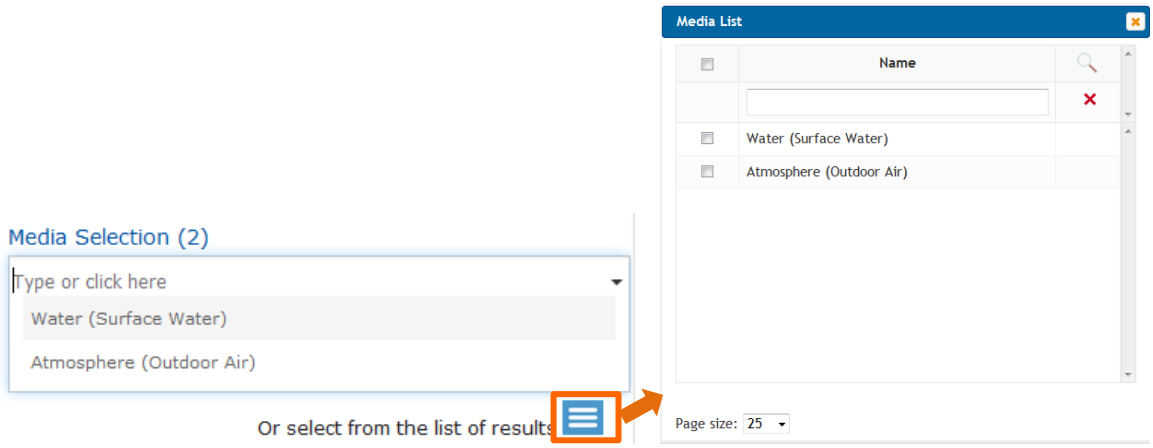


Figure 21: *'Media selection' feature*

1.5 Selection of the database of interest

→ Select one or more databases using the cell 'type or click here' or clicking the blue icon which opens the window with the list of databases to be selected.

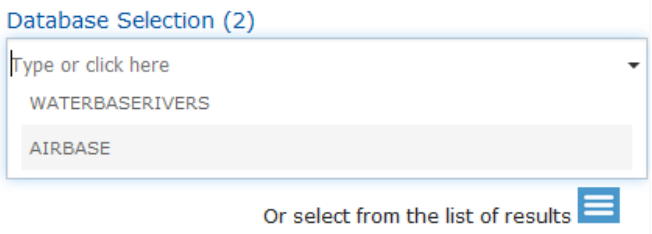


Figure 22: *'Database selection' feature*

In the lower part of the Search panel (the element located on the left side of the IPCHEM Search Viewer page), a list of all the search parameters selected by the user (location, chemicals, module, media, and databases) is available (**Figure *23***).

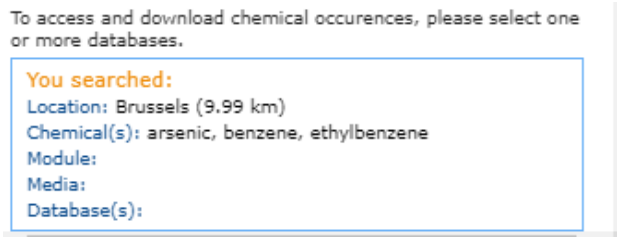


Figure 23: *List of all search parameters selected by the user*

1.6 Download sampling points information

It is possible to download sampling points information detected in a specific area (Figure 24), but not the occurrence data for which additional steps and web services requests are needed.

The main available information is:

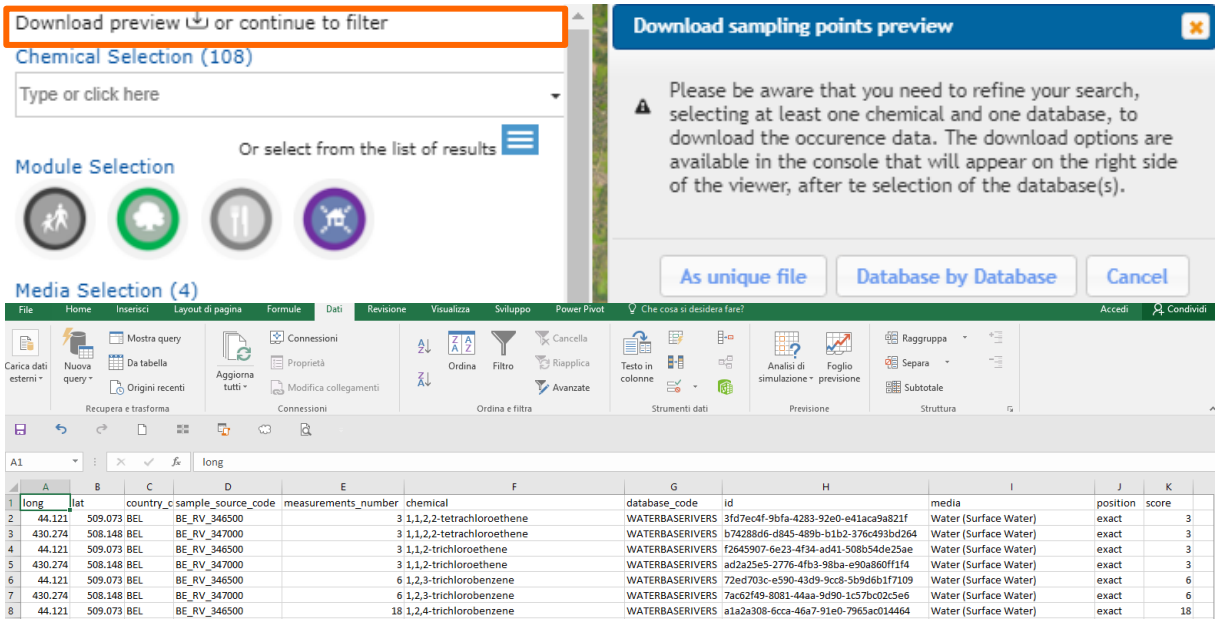
- Longitude/latitude of the sampling
- Code/unique identifier of the sampling
- List of the chemicals collected in that sampling location
- Number of samples collected
- Measured media (specific for each chemical monitored in that sampling location)
- Name of the database (specific for each chemical monitored in that sampling location)

→ Clicking on 'Database preview or continue to filter' will pop out a window called 'Download sampling points preview' (

Figure *24*), that allows you to download the information in 2 ways:

1. As a unique file (“All scores”) – the output file is a list of observations available in CSV format;

2. Divided by 'Database by Database'. In this latter case, it is a .ZIP folder containing some CSV files, depending on the number of the databases returned by the search result.



long	lat	country_c	sample_source_code	measurements_number	chemical	database_code	id	media	position	score
44.121	509.073	BEL	BE_RV_346500	3	1,1,2,2-tetrachloroethene	WATERBASERIVERS	3fd7ec4f-9bfa-4283-92e0-e41aca9a821f	Water (Surface Water)	exact	3
430.274	508.148	BEL	BE_RV_347000	3	1,1,2,2-tetrachloroethene	WATERBASERIVERS	b74288d6-d845-489b-b1b2-376c493bd264	Water (Surface Water)	exact	3
44.121	509.073	BEL	BE_RV_346500	3	1,1,2-trichloroethene	WATERBASERIVERS	f2645907-6e23-4f34-ad41-508b54de25ae	Water (Surface Water)	exact	3
430.274	508.148	BEL	BE_RV_347000	3	1,1,2-trichloroethene	WATERBASERIVERS	ad2a25e5-2776-4fb3-98ba-e90a860ff1f4	Water (Surface Water)	exact	3
44.121	509.073	BEL	BE_RV_346500	6	1,2,3-trichlorobenzene	WATERBASERIVERS	72ed703c-e590-43d9-9cc8-5b9d6b1f7109	Water (Surface Water)	exact	6
430.274	508.148	BEL	BE_RV_347000	6	1,2,3-trichlorobenzene	WATERBASERIVERS	7ac62f49-8081-44aa-9d90-1c57bc02c5e6	Water (Surface Water)	exact	6
44.121	509.073	BEL	BE_RV_346500	18	1,2,4-trichlorobenzene	WATERBASERIVERS	a1a2a308-6cca-46a7-91e0-7965ac014464	Water (Surface Water)	exact	18

Figure 24: *Download of the sampling points information retrieved in a specific area*

2. Structure and content of the Map

→ Select one of the possible map based web service options to display as background map of the viewer by using the horizontal scroll element placed on the left side of the map

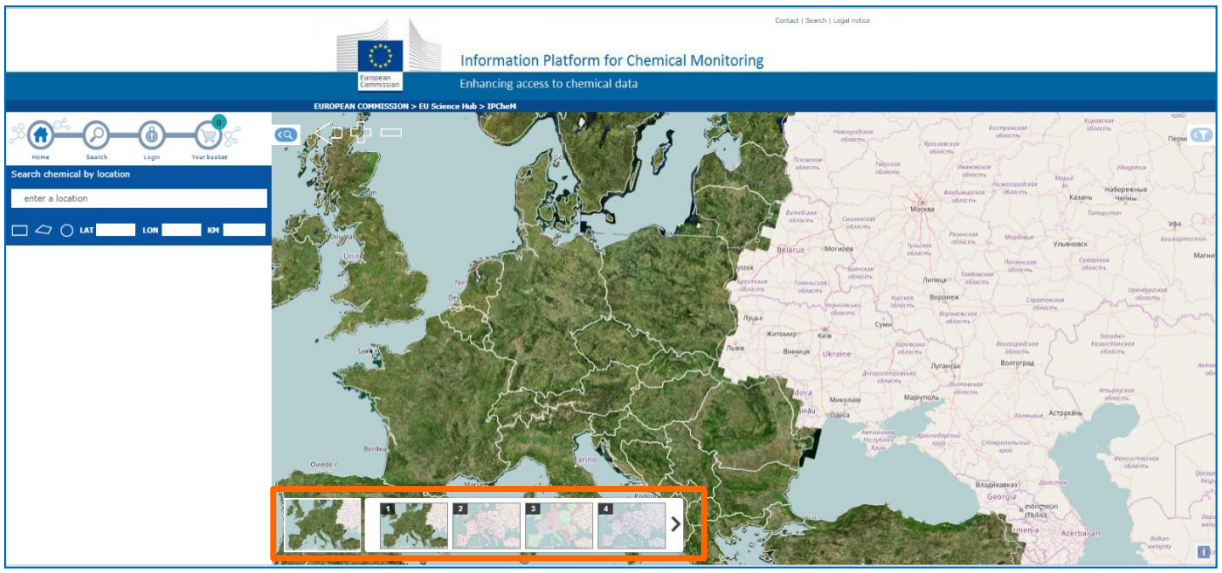


Figure 25: Overview of the map based web service options to display as background map

For some maps, when available and useful, the related legend is available (**Figure *26***)

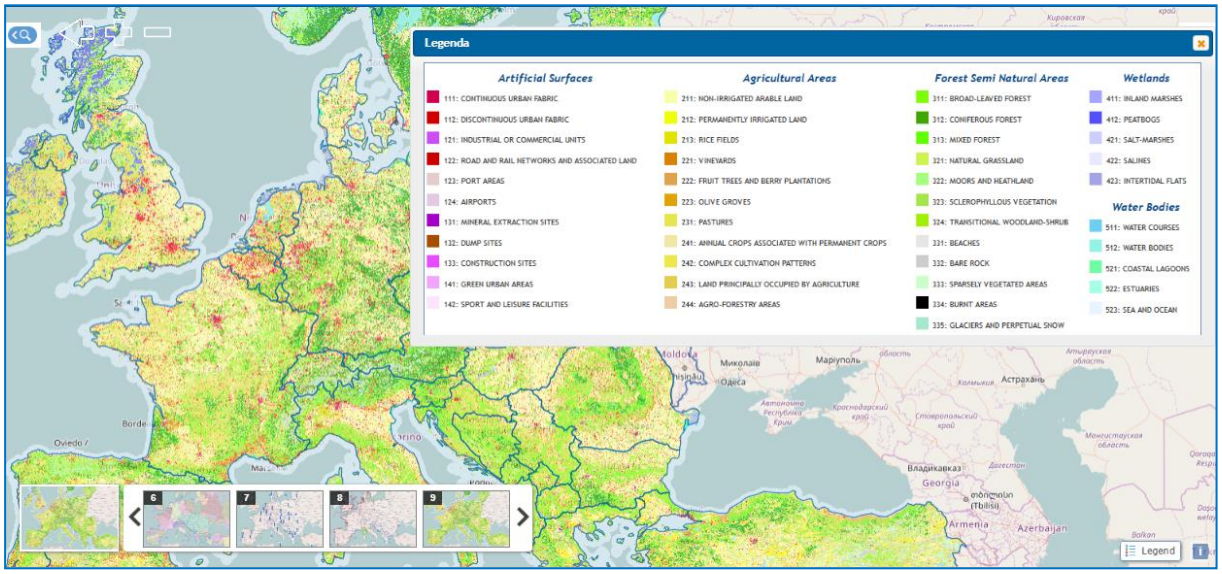


Figure 26: *The map selector and maps 'Legend'*

→ The zoom of the map can be modified by choosing one of the following control elements:

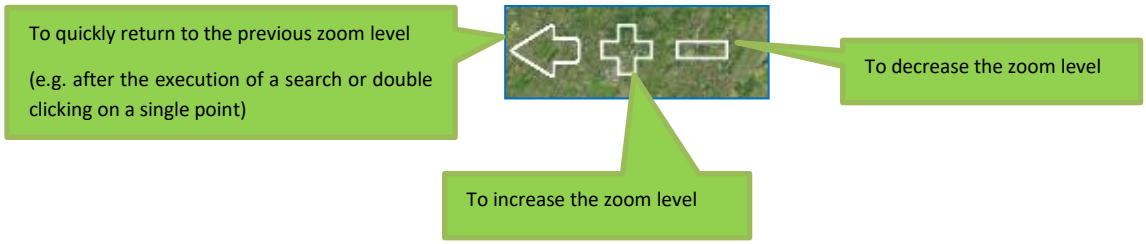
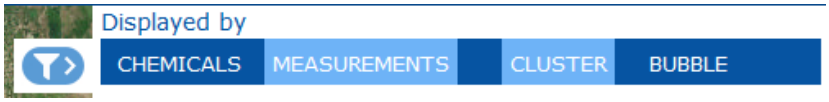


Figure 27: *The map zooming options*

3. Structure and content of the Filter Panel

3.1 Visualisation of selected data

→ Choose the viewing mode, either by chemical compound or measurement.



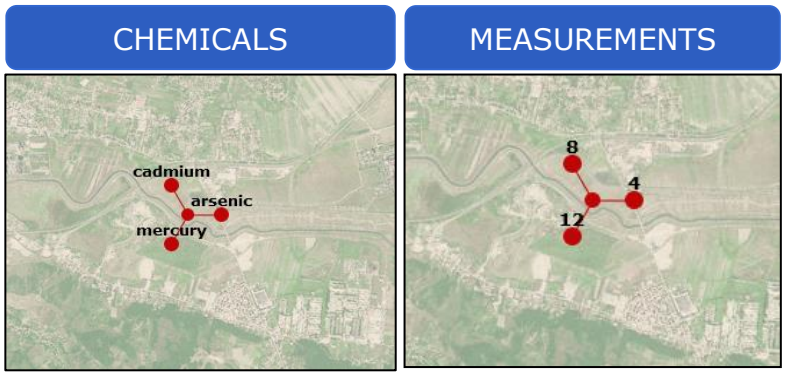


Figure 28: *Data visualisation as 'Chemicals' or 'Measurements'*

In a specific sample collection point there might be more than one compound that has been monitored. For that reason 'Cluster' and 'Bubble' visualisation options might be used to help visualize them all together or separately.

→ Select the data viewing mode, either in a 'cluster' or as individual 'bubble'.

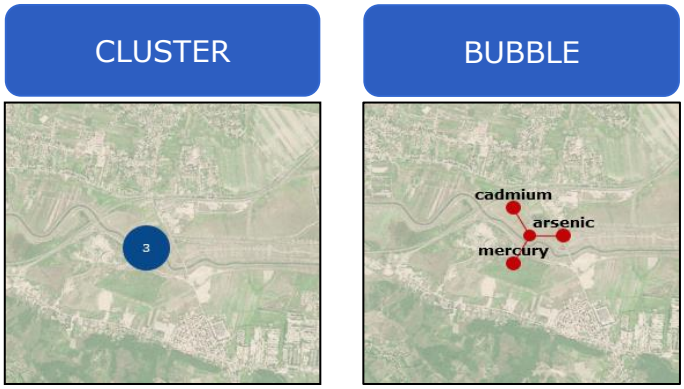


Figure 29: *Chemical data visualisation mode: as 'Cluster' (all chemicals together in one sampling location) or as 'Bubble' (individual chemicals separately)*

3.2 The Database's Tabs

Once selected the chemicals, the databases and (optionally) the media of interest using the Search panel features on the left of the Viewer, the Filter panel on the right will be displayed. From this panel and for each database it is possible to refine the search, display and ultimately download the results (i.e. occurrence data) using three different Tabs (**Figure *30***):

- Filter
- Overview
- Download

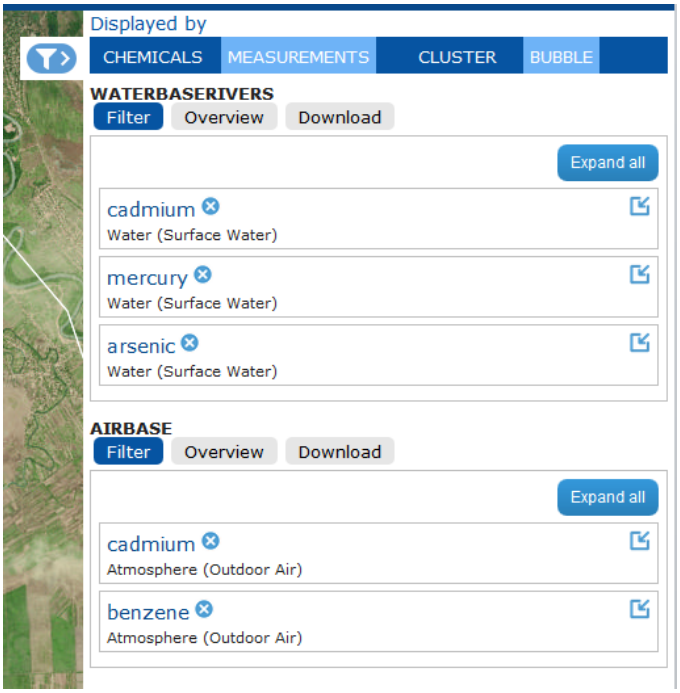


Figure 30: *Overview of the structure and content of the 'Filter' Panel*

The 'Filter' tab:

→ Additional filters specific for each database (e.g. type of area, sampling matrix, statistic name etc.), can be set and apply in order to narrow the results obtained from the queries applied in the 'Search Panel' (left side of the map).

Figure 31: *The Filter Tab – data filtering tool*

→ To propagate the same settings on all other chemicals shown in the same database, press the button with the label 'Apply all' that will appear once all the filter fields for one specific chemical are filled in.

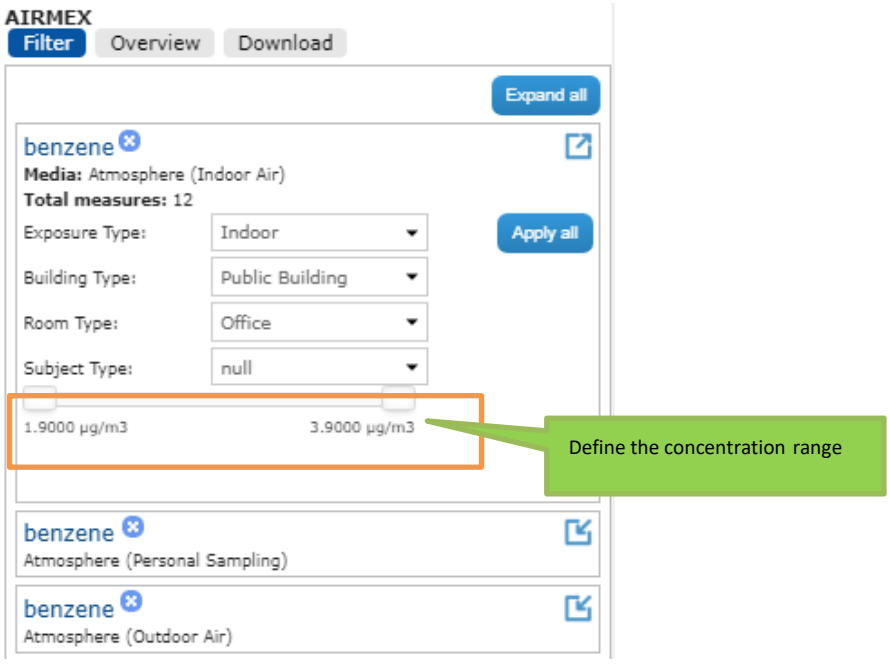


Figure 32: *The Filter tab – 'Apply all' option*

→ To improve the visualisation, especially when dealing with many chemicals, it is possible to 'Collapse all' the chemicals and working only with specific chemicals by clicking on the 'Expand all' icon (**Figure *33***).

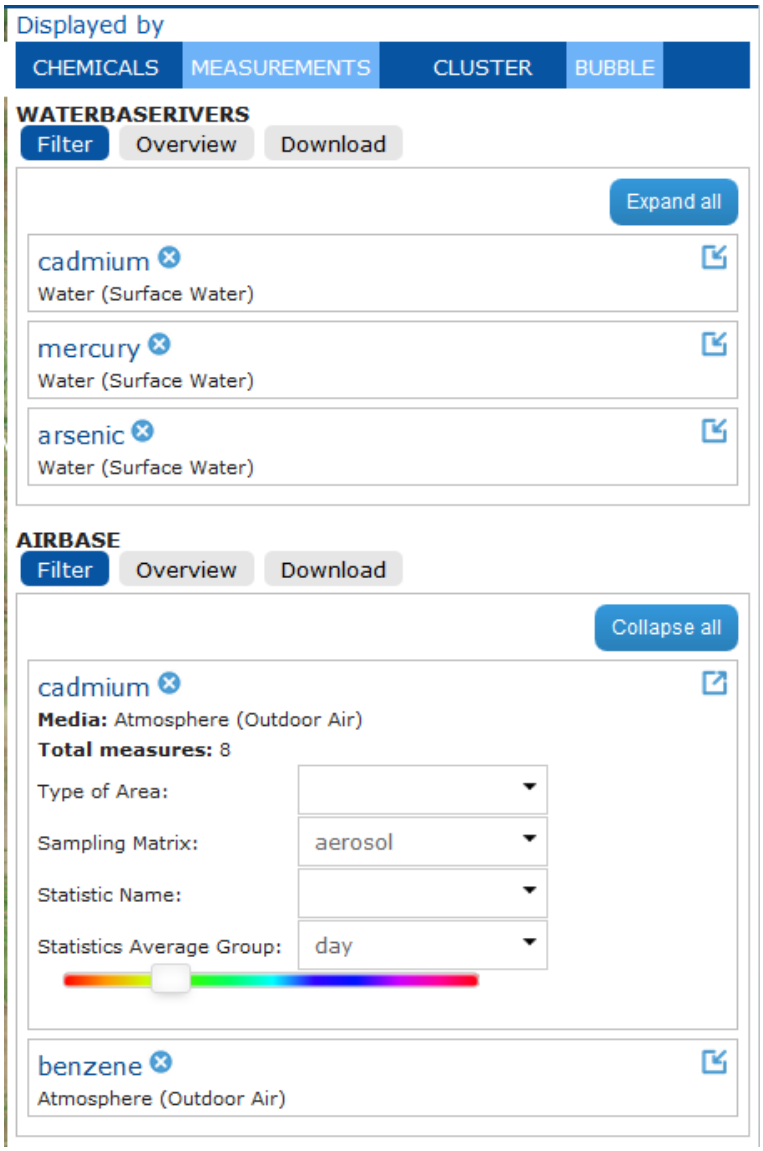


Figure 33: *The Filter tab – 'Expand all' and 'Collapse all' options*

The 'Overview' tab:

→ All the data filtered from the database, including the concentration measurements can be displayed as a table (**Figure *34***).

For each chemical, it is possible to obtain the concentration measurement, all the details available in the source database and show the geolocation of the sampling in the map. The main and secondary tables are responsive to and updated each time changes are applied into the Filter Tab.

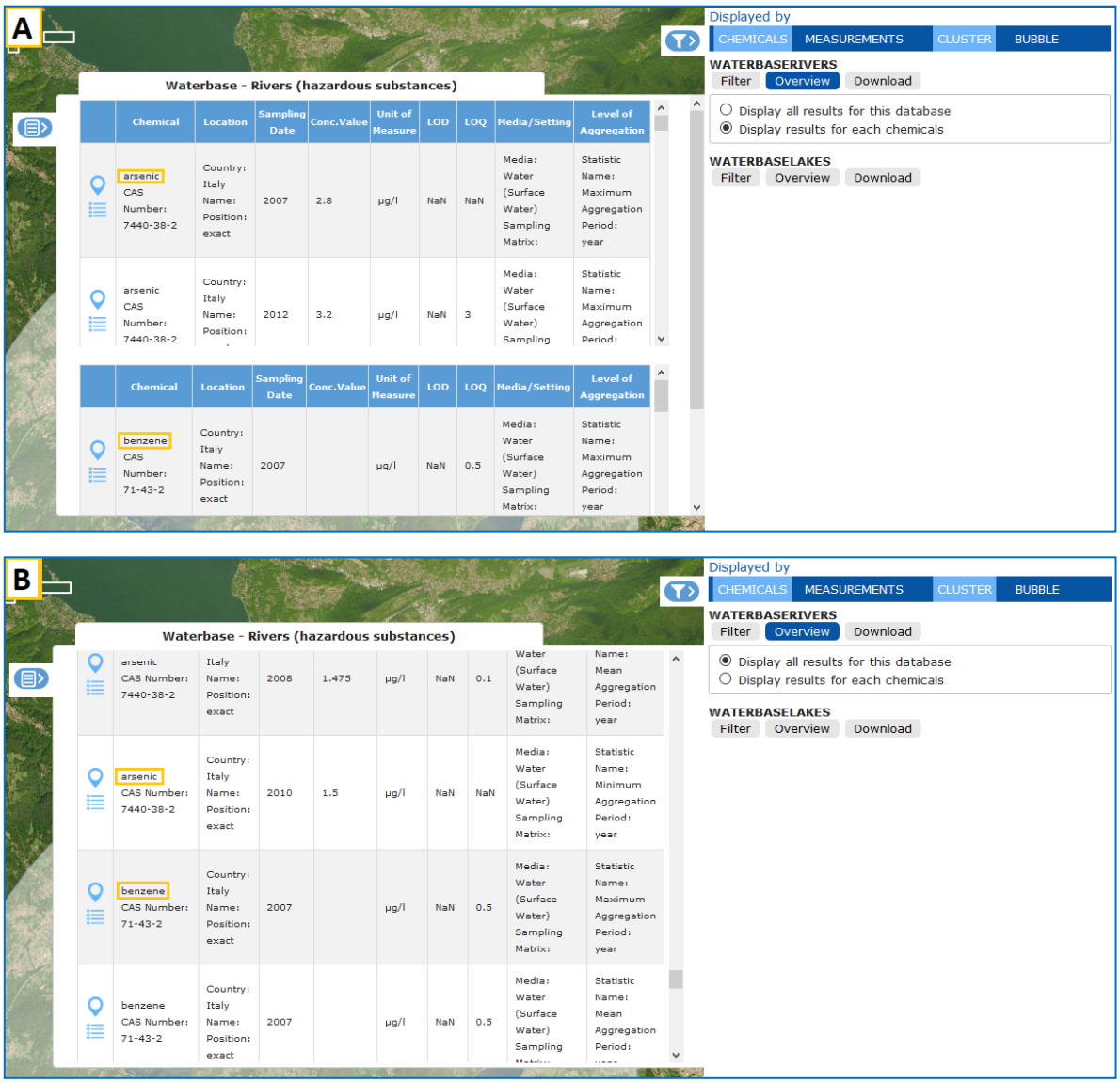


Figure 34: *The 'Overview' tab*
A) Display the results divided by chemical (and by media in case of multiple media)
B) Display the results with all chemicals in the same table

The 'Download' tab:

→ All the data obtained after the filtering process can be downloaded as results coming from the database or as results for each chemical. Various download file formats are available: CSV, XML, JSON and .ZIP folder (**Figure *35***).

→ If chosen 'Download all results for this database', then clicking on the format icon name (e.g. CSV) an excel file containing all data will be generated for the 'database' of interest.

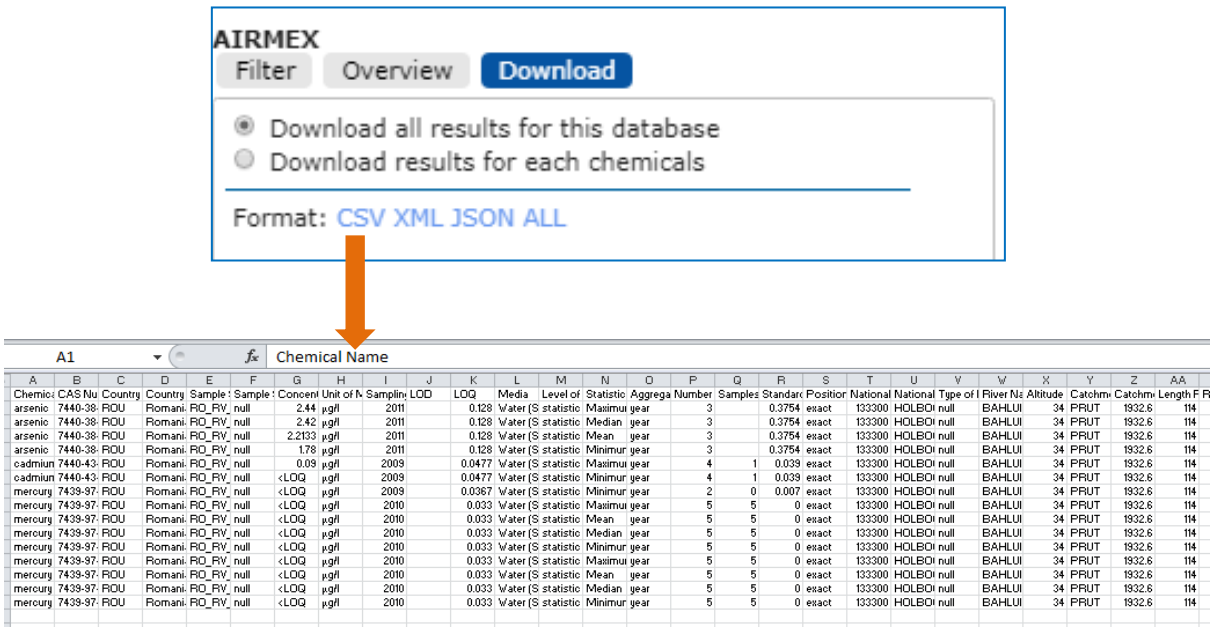


Figure 35: *'Download' tab options*

6 CASE STUDIES

Case studies have been prepared with a two-fold objective: to demonstrate the usefulness of the IPCHEM Platform and also to provide guidance to end users for the competence use of the various IPCHEM tools and functionalities via a number of hands-on working examples.

The cases studies that were identified and included here represent typical situations that are often encountered in real-life practices which will help showing how they can be supported by the available IPCHEM datasets, tools and functionalities.

Case study #1, Benzene-concentrations in a northern Italian city – Compliance against regulatory/guideline limit value

Using the available data in IPCHEM, identify the city in Northern Italy which did not meet in 2011 the established regulatory/guideline limit value for benzene of 5 µg/m^3.

[IPCHEM_Case_Study_1_Benzene_in_air_V2.docx]

Case study #2, Particulate Matter (PM_{10}) concentrations in Romania – Compliance against regulatory/guideline limit value

Using the available data in IPCHEM, identify those locations in Romania in which the annual mean value for PM_{10} exceeded 40 µg/m^3 in 2008 in rural, suburban and urban areas. Visualize this information for each area (rural, sub-urban and urban) separately with different colours but on the same map. Scale the size of the dots on the map relative to their respective PM_{10} concentration.

[IPCHEM_Case_Study_2_PM10_in_air_V2.docx]

Case study #3, Mercury concentrations in bream fish – Compliance against regulatory/guideline limit value

Using the available data in IPCHEM, identify those source locations in Germany, where mercury concentrations in bream fish exceeded the EU Environmental Quality Standards (EQSs) aimed for protecting against secondary poisoning of predators or the maximum levels allowed for human consumption.

[IPCHEM_Case_Study_3_Mercury_in_fish_V2.docx]

CREDITS

The IPCHEM Team

- Stylianos Kephalopoulos (*Coordinator*)
- Alberto Cusinato
- Dorelia Lipsa
- Vittorio Reina

Contact point:

jrc-ipchem-support@ec.europa.eu

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TABLE OF FIGURES: