IPCHEM - Information Platform for Chemicals Monitoring

Case study 2 – PM$_{10}$ in ambient air

Version 2 (December 2018)

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

To protect human health and the environment as a whole, it is particularly important to reduce emissions of pollutants at source and to identify and implement the most effective emission reduction measures at local, national and European level. Therefore, emissions of harmful air pollutants should be avoided, prevented or reduced and appropriate objectives set for ambient air quality taking into account relevant World Health Organisation standards, guidelines and programmes.

In the 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, the EU has set two limit values for particulate matter (PM\textsubscript{10}) for the protection of human health: the PM\textsubscript{10} daily mean value may not exceed 50 micrograms per cubic metre (µg/m\textsuperscript{3}) more than 35 times in a year and the PM\textsubscript{10} annual mean value may not exceed 40 micrograms per cubic metre (µg/m\textsuperscript{3}). These limit values are in force since 1\textsuperscript{st} of January 2005.

2 CASE STUDY 2

The case study is focused on the identification of areas in Romania in which the annual mean value for PM\textsubscript{10} has exceeded 40 µg/m\textsuperscript{3} in 2008. The analysis has been undertaken for rural, suburban and urban areas, using the data available in IPCHEM and the tools and functionalities of the platform.

<table>
<thead>
<tr>
<th>Compound (chemical)</th>
<th>PM\textsubscript{10}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>Ambient (outdoor) air</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area (region) of interest</th>
<th>Romania:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- rural</td>
</tr>
<tr>
<td></td>
<td>- sub-urban</td>
</tr>
<tr>
<td></td>
<td>- urban</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Limit value</th>
<th>40 µg m\textsuperscript{3}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time period of interest</td>
<td>2008</td>
</tr>
</tbody>
</table>
3 OPERATIONAL STEPS

3.1 Selection of chemical

Starting from the IPCHEM home page, click on the search tool ‘Search data by Chemical, Media and Country’

Then follow the steps described below:

→ Type the name of ‘particulate matter < 10 µm’ in the field called ‘Type chemical name/synonymous’, and select the name from the list box.

3.2 Selection of media

→ Click on the ‘Select media (optional)’ and choose ‘Outdoor air’ from the check box list under the check box category named ‘Atmosphere’.
3.3 Selection of country

→ Select 'Romania' by clicking directly on the map of Romania or by selecting from the drop-down list of countries.

The results of the query are displayed into the search page: all the data collections available in IPCHEM, which include data on PM$_{10}$ measured outdoors in Romania, are listed in the same page.
3.4 Selection of the database of interest

→ Select the 'AIRBASE–European air quality database' data collection to access the related data by clicking on the corresponding title in the databases list. By selecting the AIRBASE database, the specific Database Console appears.

→ Select 'Show all sample sites' to display all sampling data sources onto the map.
Concentration measurements data are displayed in tabular format (the so-called ‘Master Table’) and onto the map, where the coloured points represent the sampling source locations.

### 3.5 Selection of specific ‘filter criteria’

Choose some specific filter criteria of ‘AIRBASE’, available on the top-right part of the Database Console to narrow the data selection in the following order:

<table>
<thead>
<tr>
<th>Filter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of area</td>
<td>urban</td>
</tr>
<tr>
<td>Sampling matrix</td>
<td>aerosol</td>
</tr>
<tr>
<td>Statistic Name</td>
<td>annual mean</td>
</tr>
<tr>
<td>Statistics Average Group</td>
<td>day</td>
</tr>
<tr>
<td>Filter by concentration range</td>
<td>40.5 – 79.142 µg m⁻³</td>
</tr>
<tr>
<td></td>
<td>(40 is the limit value for PM₁₀ as annual mean)</td>
</tr>
</tbody>
</table>

### 3.6 Selection of data records

According to the performed spatial selection, change the number or data records displayed into the Master table from the ‘Page size’ pull down list. By default the page size is set to ‘10’ rows.

If the previous step is omitted only the first 10 rows will be by default selected to store and process their corresponding data into the Basket.

Setting the page size to 100 from the drop-down list, the 87 data records matching the filter criteria are displayed into the Master Table.
→ Select all 87 records to store them into the IPCHEM Basket by picking-up the top box of the first column (indicated by the red arrow in the figure below).

→ Click on ‘Pick 87 Row(s)’, the white text next to the small shopping basket icon:

![Pick 87 Row(s)](image)

that will turn into:

![Request Full Table](image)
The number '1' appears at the top of the screen, next to the shopping basket icon, indicating that one sub-set of selected (picked-up) data has been added to the IPCHEM Basket.

→ Repeat all steps from the beginning of section 3.6, this time changing only the filter 'Type of Area' on the top right of the screen first to 'sub-urban' and then to 'rural'. Each time the concentration filter should be set at 40 µg/m³.

Upon completion of these steps, the 3 selected picked-up data selections of the 'AIRBASE' database for each type of area (i.e. ‘Urban’, ‘Sub-urban’ and ‘Rural’) are stored into the IPCHEM Basket.

3.7 Visualisation of selected data

→ Select the shopping basket icon of the menu bar and enter into the IPCHEM Basket tool.

→ Pick up the three datasets and click on the 'Processing' icon (indicated by the red circle in the figure below) to process the selected data and prepare a zip folder to download for offline data analysis.
Select the 'Viewer/globe' icon to enter the IPCHEM Viewer tool:

Each of the selected data that were saved into the IPCHEM Basket tool is also available as spatial layer in the IPCHEM Viewer.
→ Pick-up the check-box in the 'Actions' column and then click on the “+” button to open the IPCHEM Editor Console.

→ By selecting 'EDIT' from the IPCHEM Editor Console it is possible to change the 'colour', 'size' and transparency of the data (points) which are displayed onto the map.
Edit the three layers and choose the desired colour for each type of area (e.g. for rural=green colour; for urban= blue colour; for sub-urban=red colour).

Select the time-period (2008) and fine tune the data selection by moving the time-slider accordingly.
The following results appear on the map:

To show the size of the spots proportionally to the concentration of PM$_{10}$, select the 'size' button in the right side of the IPCHEM Editor Console.

The following result appears on the map:
Choose 'Open Street Map' as Basemap layer in the tool bar menu of the IPCHEM Viewer, to identify the name of the specific sampling data source location of interest.

The outcome of this specific search performed in the context of Case Study 2 showed that:

- None of the monitored rural areas exceeded the annual mean of 40 µg/m³ of PM₁₀ in 2008.
- 8 urban areas exceeded the annual mean of 40 µg/m³ of PM₁₀ in 2008.
- 2 sub-urban areas exceeded the annual mean of 40 µg/m³ of PM₁₀ in 2008.