FAIRMODE WG7

KoM - Composite mapping of emissions

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European Commission

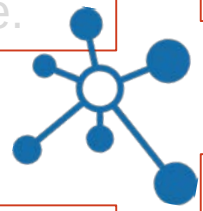
Overall purpose of the benchmarking exercise

- Best – practise through QA/QC

Identifying best practices through QA/QC approaches and drafting recommendations for the compilation of sectorial high resolution emission inventories that are relevant at the urban scale.

- Metadata recommendation

Elaborating recommendations for a common system to document the use of ancillary data and define the relevant meta-data that support each emission inventory at the urban scale.



- Benchmarking and Emission dashboard

Benchmarking and creating an emission dashboard (EU, bottom-up national and local inventories) to monitor progress and identify inconsistencies among inventories. Regular inter-comparisons will be carried out to support this objective.

- Use of Composite mapping platform

i) as spatial information support to evaluate specific sectors/ topics identified as inconsistency by the dashboard;
ii) to carry out emission evaluation in relation with activities of the composite mapping for assessment purposes

- Provide relevant feedback

To European inventories used for regulatory purposes (EMEP, CAMS-REG) and research project (e.g., REMI, RI-URBANS, NordicWelfAir, “Others”).

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Composite mapping of emissions

Aim: In addition to annual gridded concentration, we aim at assessing and comparing the underlying emissions to set up the basis for best-practices and recommendations for the compilation of emission inventories.

What it is needed: Annual emissions aggregated over pre-defined spatial areas (**non-gridded**):

→ NUTS3 that are covered by the modelling domain
→ predefined local areas; e.g., FUA (Functional Urban Area – a city and its commuting zone)

How: the screening methodology will follow Thunis et al. (2021) to flag main inconsistencies when compared with EU wide inventories.

Output: Having concentration and MQI as reference, identification of inconsistencies at i) pollutant; ii) sector; iii) type (national, sector share, spatial distribution) levels

Composite mapping of emissions

What it is needed: Annual emissions aggregated over pre-defined spatial areas (non-gridded):

→ NUTS3 that are covered by the modelling domain
→ predefined local areas; FUA

INPUT

Precursor considered	NO_x, NMVOC, NH_3, SO_2, PM25, PM10
Temporal	Annual totals
Year considered	Year used as basis for assessment
Sector considered	Traffic (GNFR F), commercial and residential (GNFR C), agriculture (GNFR K + L), industry (GNFR A + B), shipping (GNFR G), Solvents (GNFR E), Fugitive (GNFR D), Off-road (GNFR I + H), Waste (GNFR J)
Spatial aggregation	Emissions aggregated to NUTS3 covered by the modelling domain PLUS emissions over a series of smaller areas defined by shape files A pre-processing programme is made available by the JRC to aggregate emissions over the different areas starting from gridded data.
Data format	Spatially aggregated: 2 excel files (output of the JRC pre-processor): 1 for the NUTS3 entirely covered by the modelling domain, the second for all local areas (FUA). A template and additional information is provided in the annex of this document

Table 3: Requested data for spatially aggregated emissions

METADATA

Basic information	Inventory code (visualisation name)
	Inventory name (e.g. CAMS-REG)
	Inventory version
	Reference year
	Country (main country covered)
	Area (sub-national area – optional)

NOTE: In case of non-available sector, a zero value must be considered in the data whereas a note should be added in the metadata (other information field)

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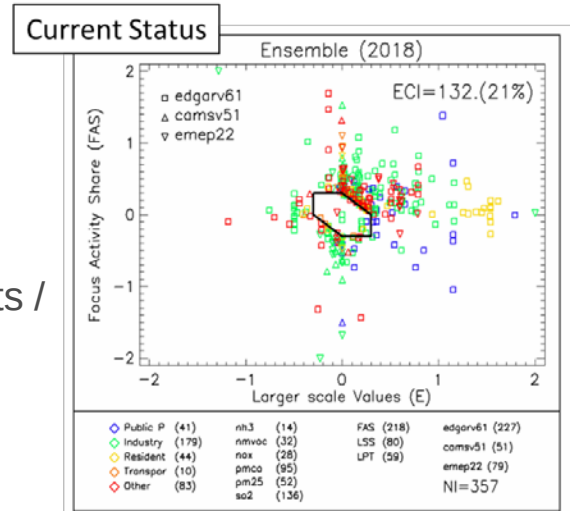
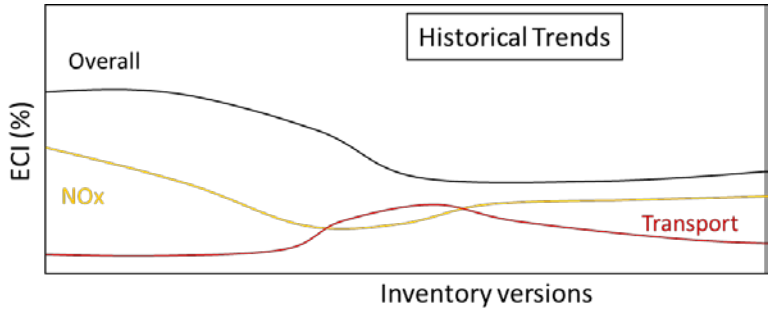
The Composite mapping (CM) platform (emissions)

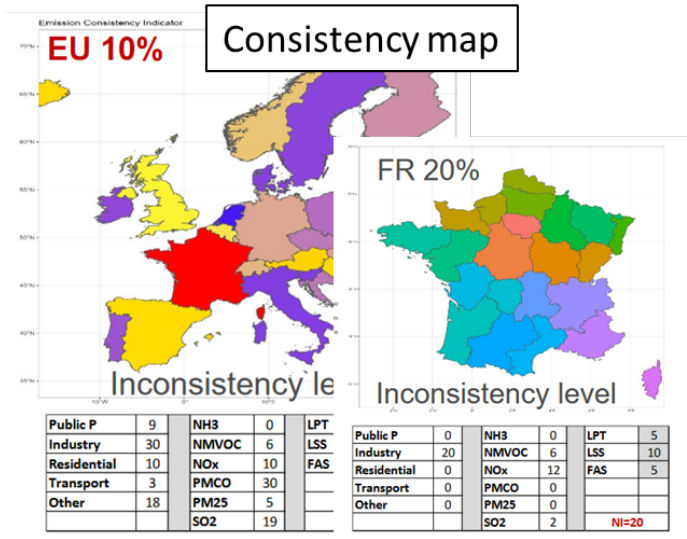
Funtionalities: i) **Dashboard:** EU wide emission inventories, EMEP, CAMS-REG, EDGAR;
ii) **Aggregated emission composite mapping:** emission evaluation for assessment purposes

DASHBOARD

1. Three main figures
   a. current status based on latest version and **latest reporting year**. Includes details inconsistencies in terms of sectors / pollutants / type / inventory.
   b. Historical trends (for inconsistency levels)
   c. Consistency map
2. User-free comparison interface







Public P	9	NH3	0	LPT	
Industry	30	NMVOC	6	LSS	
Residential	10	NOx	10	FAS	
Transport	3	PMCO	30		
Other	18	PM25	5		
		SO2	19		

Public P	0	NH3	0	LPT	5
Industry	20	NMVOC	6	LSS	10
Residential	0	NOx	12	FAS	5
Transport	0	PMCO	0		
Other	0	PM25	0		
		SO2	2	NI=20	

NUTS3 / Urban

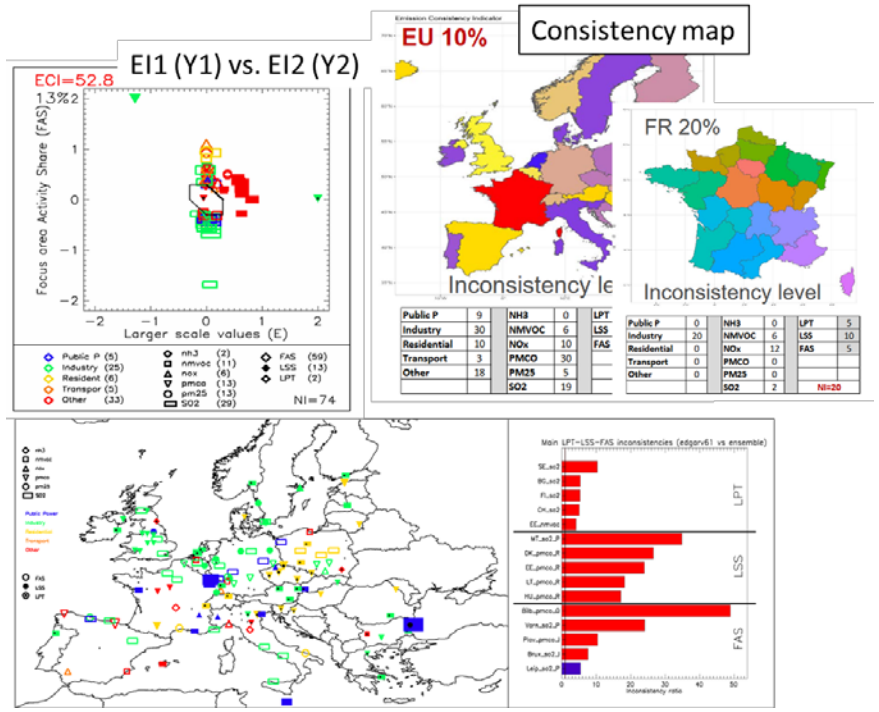
Zoom: EU / Country

The Composite mapping (CM) platform (emissions)

Funtionalities: i) **Dashboard:** EU wide emission inventories, EMEP, CAMS-REG, EDGAR;

ii) **Aggregated emission composite mapping:** emission evaluation for assessment purposes

DASHBOARD – User interphase



Sectors to visualize	Pollutants to visualize
Thresh. Relevance	Thresh. Inconsistency
NUTS3 / Urban	Zoom: EU / Country

Year 1	Year 2
EI 1	EI 2
CAMS X	CAMS X
CAMS Y	CAMS Y
…	…
EMEP X	EMEP X
EMEP Y	EMEP Y
…	…
EDGAR X	EDGAR X
EDGAR Y	EDGAR Y
…	…
ENS X	ENS X
ENS Y	ENS Y
…	…

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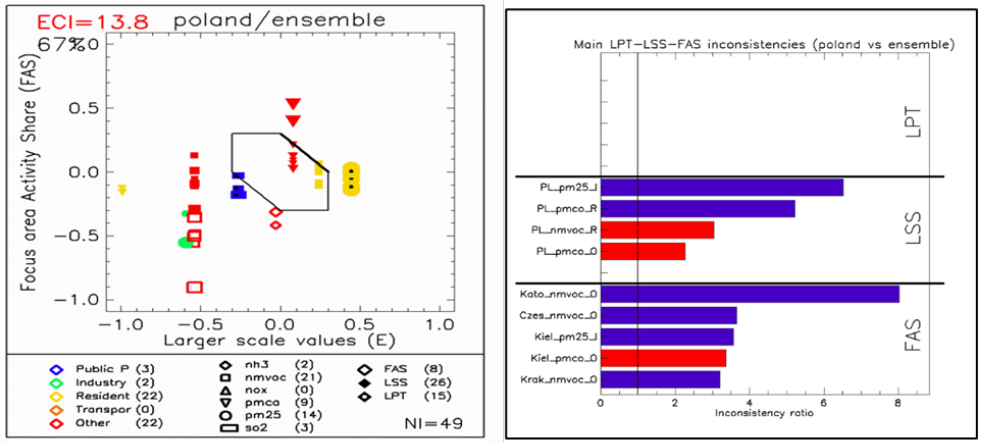
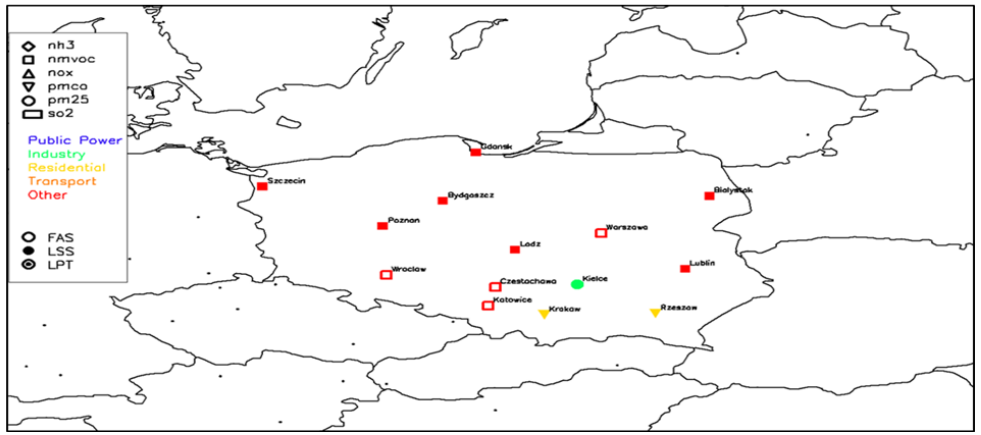
The Composite mapping (CM) platform (emissions)

Aggregated emission composite mapping; benchmark local emission inventories with EU wide inventories to assess inconsistencies.





Sectors to visualize | Pollutants to visualize

Thresh. Relevance | Thresh. Inconsistency

NUTS3 / Urban

Year

EI 1 | EI 2

Country 1
- BU 1
- BU 2
- …

Country 2
- BU 1
- BU 2

…

CAMS X
CAMS Y
…
EMEP X
EMEP Y
…
EDGAR X
EDGAR Y
…
ENS X
ENS Y
…

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- **What it is needed**: Annual emissions aggregated over pre-defined spatial areas: i) NUTS3 that are covered by the modelling domain; ii) predefined local areas; FUA

Deadline for submitting emissions / metadata: June 30th 2023

- **A pre-processing programme is made available by JRC** to aggregate emissions over the different areas starting from gridded. If **aggregated emissions already available**, see format in Annex in "FAIRMODE joint mapping benchmark exercise WG2 & WG7: Composite mapping of MQI and underlying emissions"

Link available in the pdf document "FAIRMODE joint mapping benchmark exercise WG2 & WG7: Composite mapping of MQI and underlying emissions"

- **Benchmarking activities** will be carried out with local inventories, EU wide inventories and the ensemble

First analysis of the results by the FAIRMODE technical meeting in October

Precursor considered	NO_x, NMVOC, NH_3, SO_2, PM25, PM10
Temporal	Annual totals
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Table 3: Requested data for spatially aggregated emissions

Format template if aggregated emissions are available

Pollutants: PM25, PM10, NOX, NMVOC, SO2, NH3

Sectors: GNFRAB, GNFRC, GNFRD, GNFRE, GNFRG, GNFRHI, GNFRJ, GNFRKL

NUTS/FUA_ID	CNTR_CODE	NUTS/FUA_NAME	pollutant	year	sector	Emis (kTons)
DE249	DE	Hof, Landkreis	NO2	2017	GNFRF	21586.23
AT311	AT	Innviertel	PM25	2017	GNFRIH	18000.01

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LET'S
DISCUSS