FAIRMODE
CT6: Near real time assessment with low-cost sensors

Data fusion with sensor data

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INE-RIS
maîtriser le risque
pour un développement durable

Fairmode Technical meeting – October 18-20, 2022.

Data fusion for AQ mapping

SESAM (data fusion with SEnSor for Air quality Mapping)

Geostatistical approach → **universal kriging with an external drift**

> **Merge fixed and mobile sensor data with model outputs at hourly resolution**

Take into account uncertainty and variability of sensor data by introducing the **Variance of Measurement Errors (VME):**

$$VME= \left[(\frac{\sigma}{\sqrt{N}})^2 + \frac{v_r^2}{N} \sum_{j=2}^{N}(C_j)^2 \right]_i$$

- σ is the standard deviation of the pollutant observations at the position i;
- N is the number of observations at the position i;
- v_r is the constant relative type uncertainty (which depends on the type of sensor: **50% fixed sensor observations** and **75% mobile sensor observations**);
- C_j is the jth pollutant concentration at the position i.
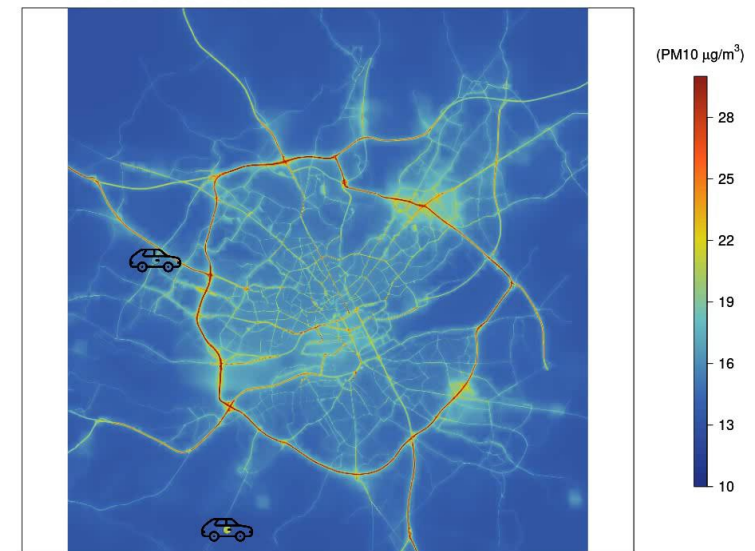
Environment International
Volume 143, October 2020, 105965

Data fusion for air quality mapping using low-cost sensor observations: Feasibility and added-value

Alicia Gressent [a], Laure Malherbe [a], Augustin Colette [a], Hugo Rollin [a], Romain Scimia [b]

https://github.com/AliciaGressent/SESAM

(PM10 µg/m³)

Application in Nantes (French city) for PM_{10} based on AtmoTrack sensors and ADMS-Urban simulations.
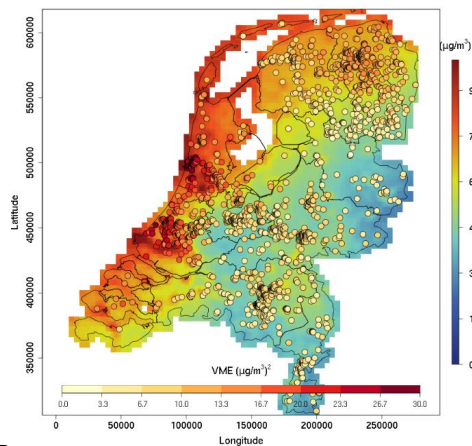
Data fusion for AQ mapping

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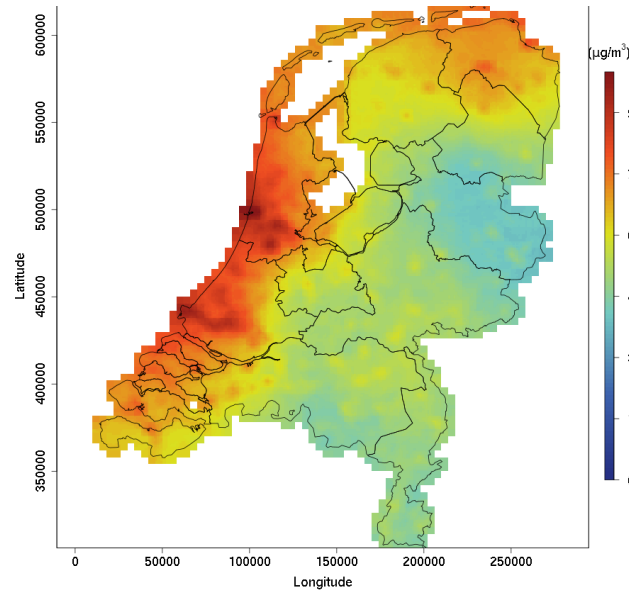**RIO + calibrated synthetic sensor data**
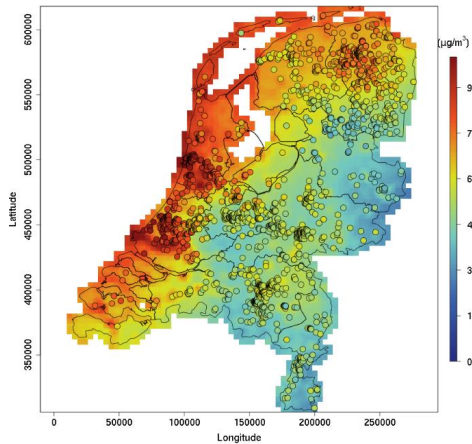
RIO + VME

Data fusion on 2021-01-05 15:00:00 based on RIO estimation and synthetic sensor data

Fused map

Model – Fused map

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