SUMMER LAND USE REGRESSION MODEL FOR PREDICTING $PM_{2.5}$ AIR QUALITY CONCENTRATIONS IN NOVI SAD, SERBIA

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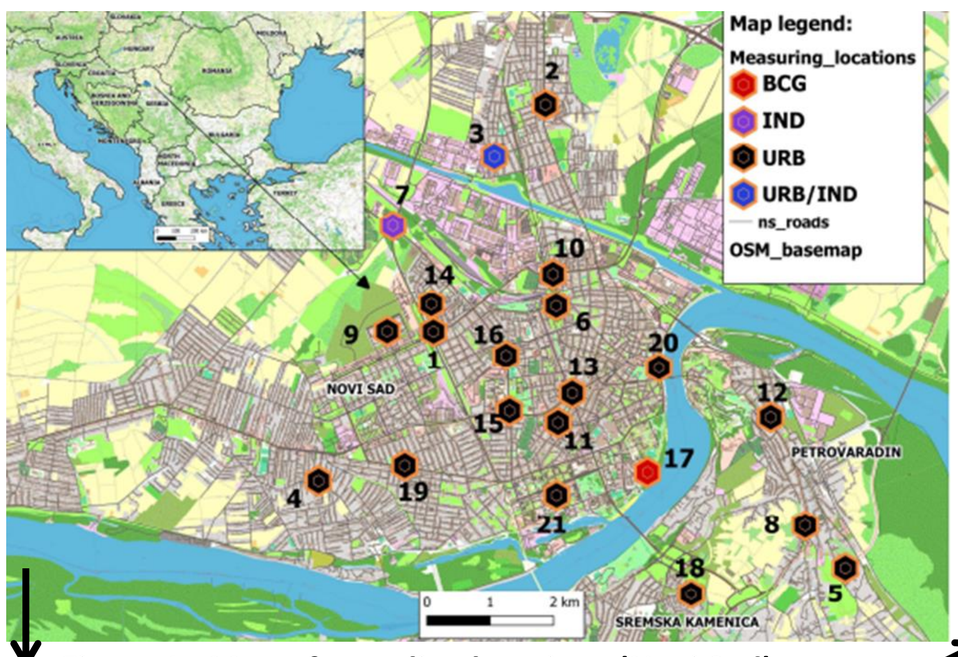
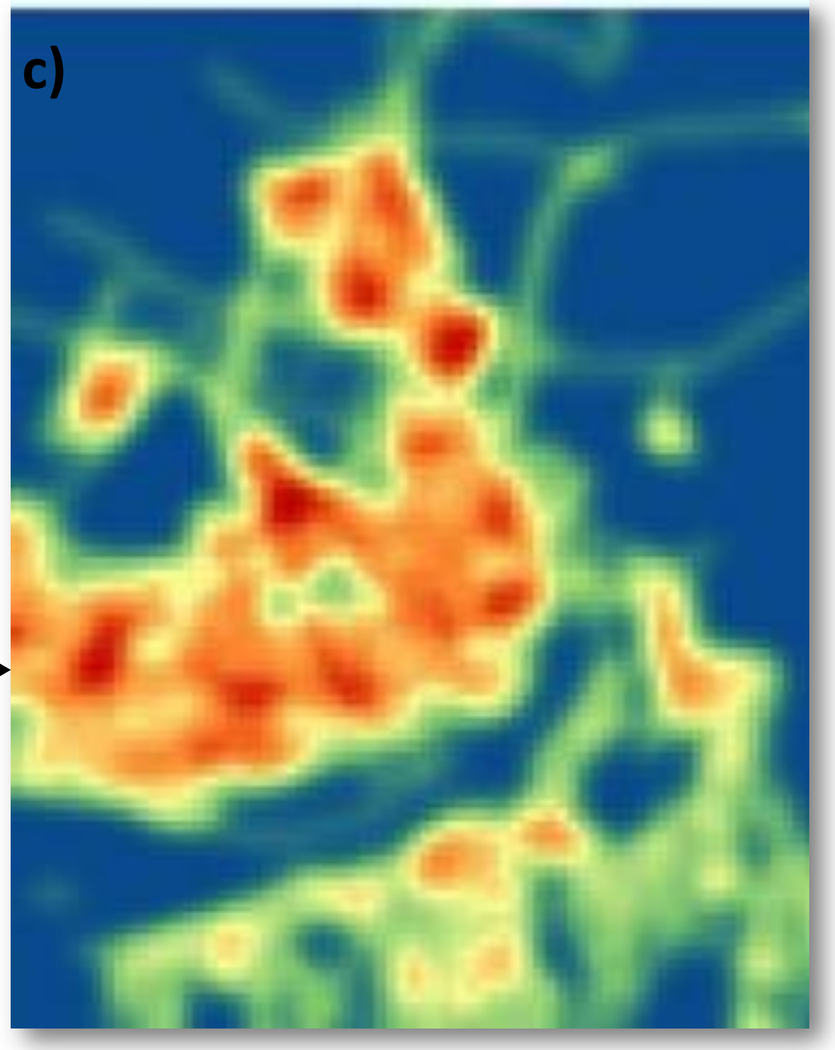
The assessment of air quality in urban areas has long been a priority due to significant variability in pollution levels. As a result, a range of air pollution modeling techniques is widely utilized to address this challenge.

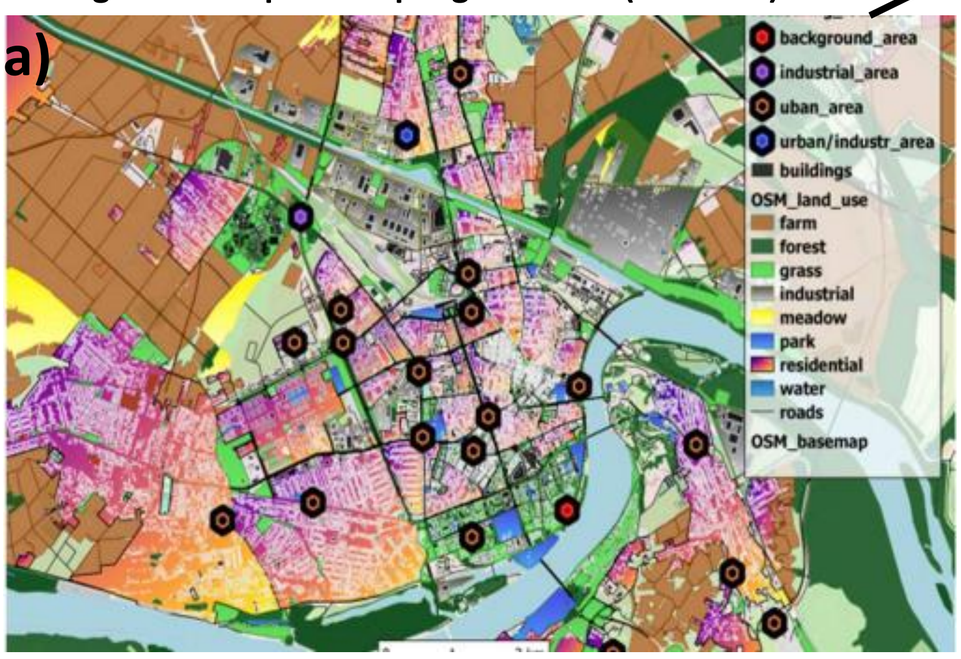
- Quality of ambient air in Novi Sad during summer is under influence of pollution emitted from traffic, present in various densities and vehicle structures depending on the road classes (primary, secondary, tertiary or residential).
- Beside this primary emission source, pollution can also be transported through the atmosphere from nearby areas or greater distances.
- Within presented study, seasonal Land Use Regression (LUR) model focused on predicting summer $PM_{2.5}$ levels in Novi Sad, was developed for the first time in Serbia.





- *As a final step in the development process, a summer $PM_{2.5}$ prediction surface was created for the City of Novi Sad, reflecting the model's achieved efficiency (Figure 2c).*

Figure 1. Map of sampling locations (Novi Sad)



- $PM_{2.5}$ data were collected from 21 sites in the City Novi Sad during the summer using reference gravimetric pumps, with microfiber filter replacements every 48 hours.
- The assessed summer $PM_{2.5}$ concentrations ranged from 10.49 to 22.31 μg/m³.
- The developed summer Land Use Regression (LUR) model explained 40.3% of $PM_{2.5}$ variability, using total road length within a 50 m buffer as a proxy for traffic intensity.

$$PM_{2.5}\_LUR_{summer} = 12.43 + road\_length\_50m + 0.020$$

- Evaluation tests confirmed the model's validity, with Cook's distance values below 1 and the White test showing equally distributed residual variance. The residual distribution was treated as approximately normal.
- Leave-One-Out Cross Validation (LOOCV) revealed adjusted R^2 values between 31.2% and 45.3% and RMSE values from 2.74 to 3.01 μg/m³, with mean absolute errors ranging from 2.36 to 2.68 μg/m³.
- These results further validate the effectiveness of the summer model in predicting $PM_{2.5}$ concentrations.

Figure 2. Maps: a) predictors, b) traffic counters, c) $PM_{2.5}$ prediction surface

- *The evaluation tests confirmed the model's robustness and that the data structure was suitable for regression analysis, validating the results of the summer model.*
- *This seasonal model is an effective tool for predicting $PM_{2.5}$ concentrations at unmonitored sites, offering valuable insights into air quality.*

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