Quantifying the impact of traffic emissions on PM$_{2.5}$ over Delhi during the post-monsoon season

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Research Context

Delhi's air quality drops again to severe category; states meet to discuss strategy to check pollution

PTI / Nov 16, 2021, 21:04 IST
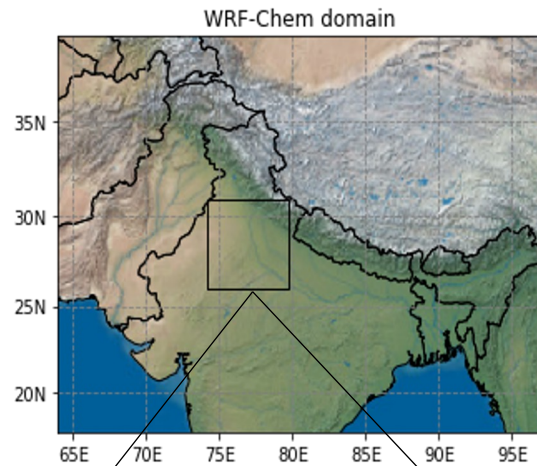
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Commuters travel through smog as the city's air quality remains in the 'Very Poor' category (Photo: ANI)

- **Delhi** suffers the most from unsafe levels of air pollution **during post-monsoon season**.

- Here we want to quantifying the **impact of the transport sector on PM$_{2.5}$** over Delhi during post-monsoon.
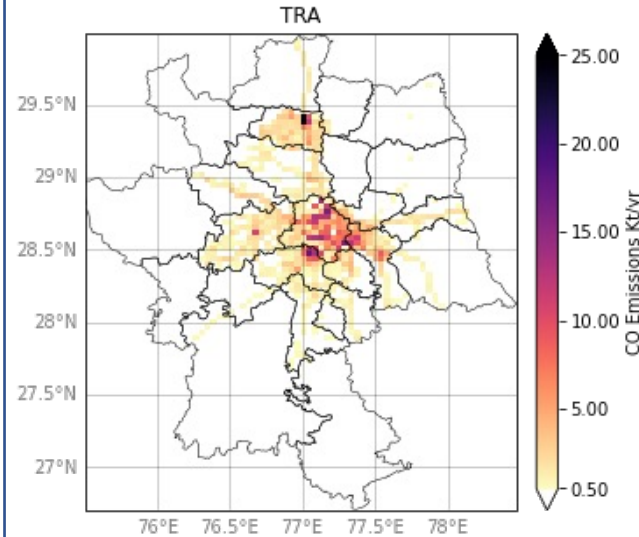
Methods

Model

4x4 km, Oct 2019

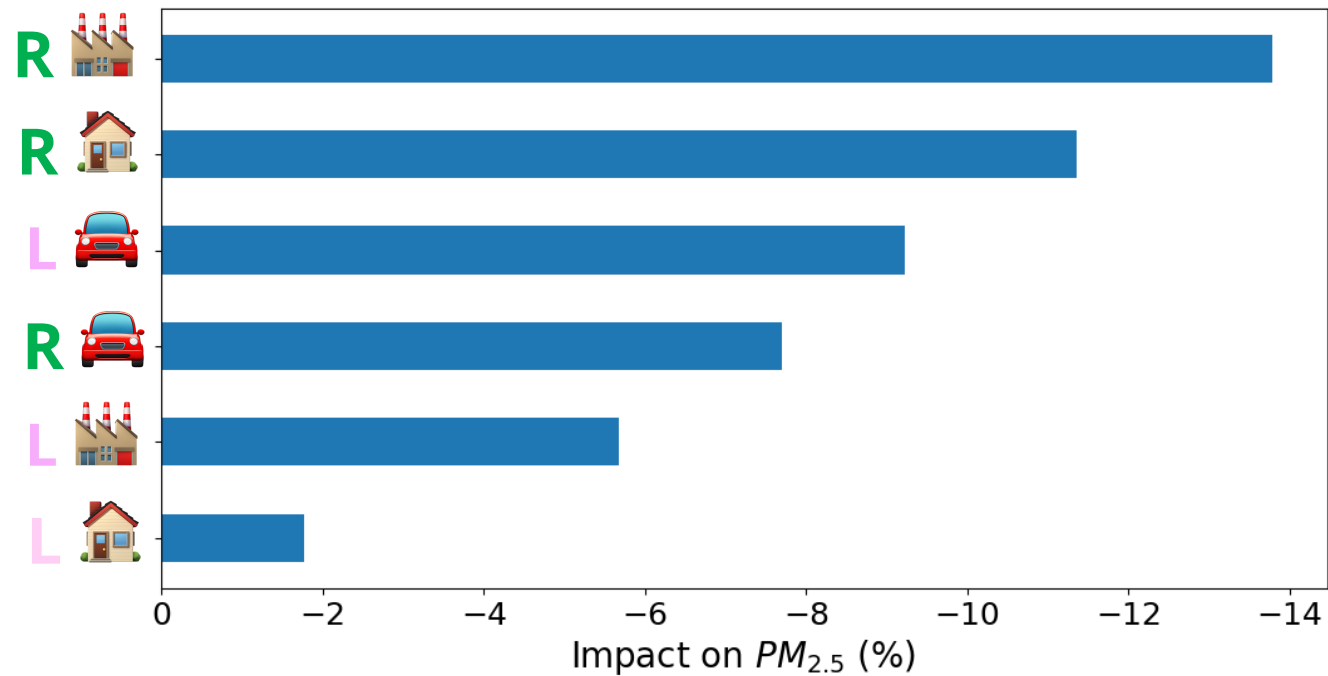## TERI/ARAI Emission inventory

+

- Resolution: 4x4 km

- All main anthropogenic sectors.

- Transport subsectors (vehicle types).

Quantify the impact

$$I(S) = \frac{PM_{base} - PM_{(s,\alpha)}}{\alpha}$$

+

- $I(S)$ = impact of sector S.

- α emissions reduction for sector S (%).

- PM_{base}: base run all emissions.

- $PM_{(s,\alpha)}$: run with emissions sector S reduced of α.
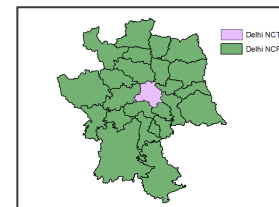
Results: impact on daily PM$_{2.5}$
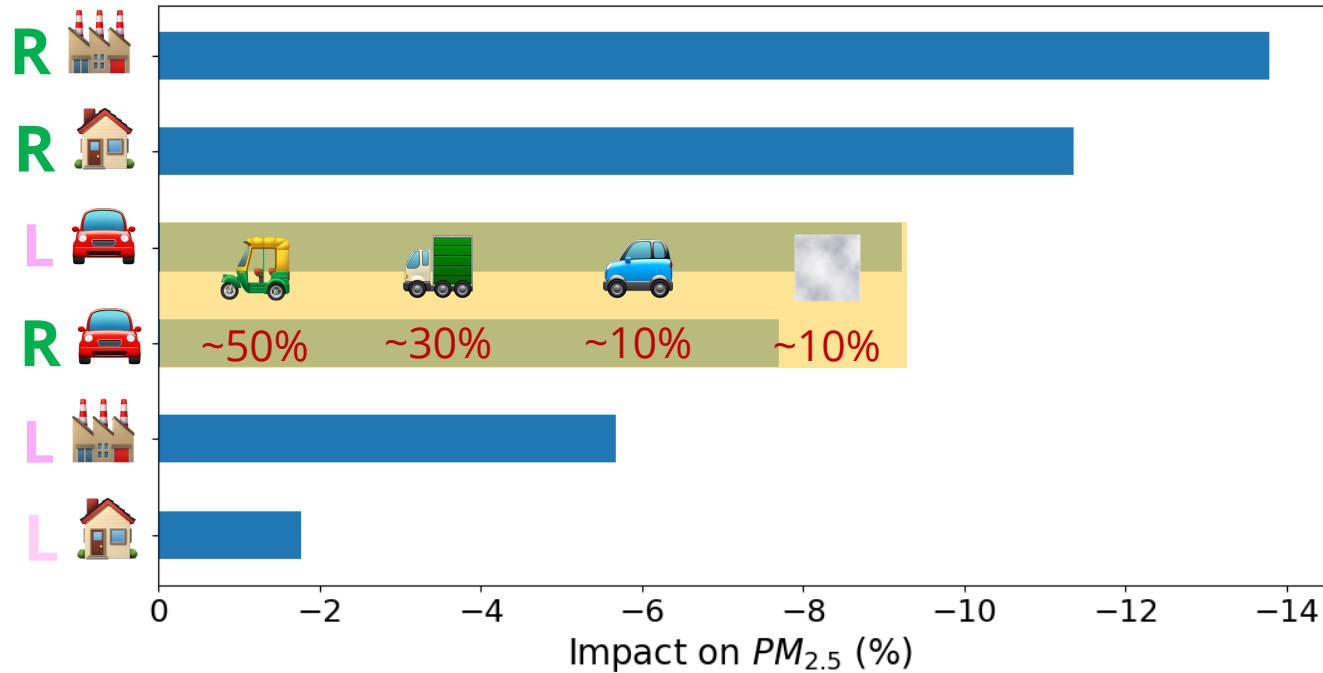

Legend for sectors:

🏭 Industry + Power

🏠 Domestic

🚗 Transport

R = regional
L = local

Results: impact on daily PM$_{2.5}$

Legend for sectors:
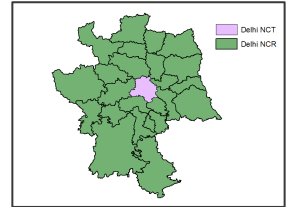
🏭 Industry + Power

🏠 Domestic

🚗 Transport

🛺 2 + 3 wheelers

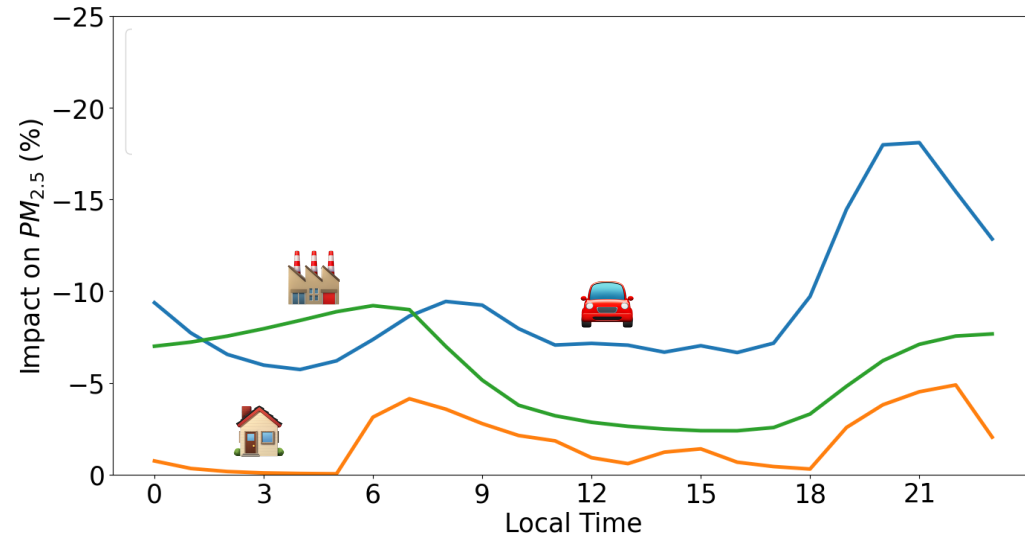🚙 cars + light commercial

🚚 heavy duty

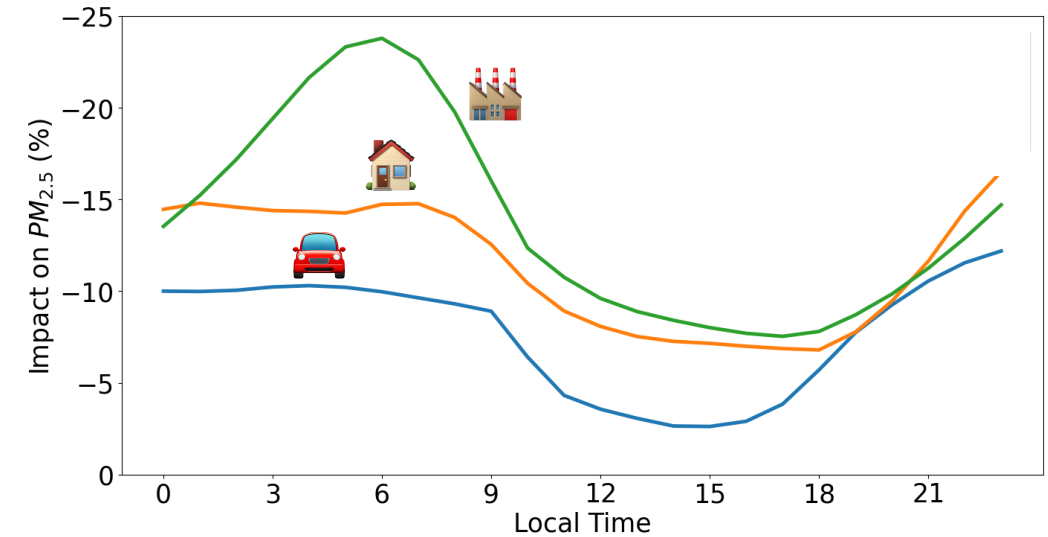▨ resuspended dust

R = regional
L = local

- Industry and power sectors from regional NCR have highest impact on PM$_{2.5}$ concentrations.

- 2 and 3 wheelers and heavy-duty vehicles dominate the total transport impact.

Results: impact on PM$_{2.5}$ dyno-cycle

- Industry and power sectors from NCR dominate nighttime and almost all daytime PM$_{2.5}$ levels.
- PM$_{2.5}$ evening peak is dominated by local traffic.

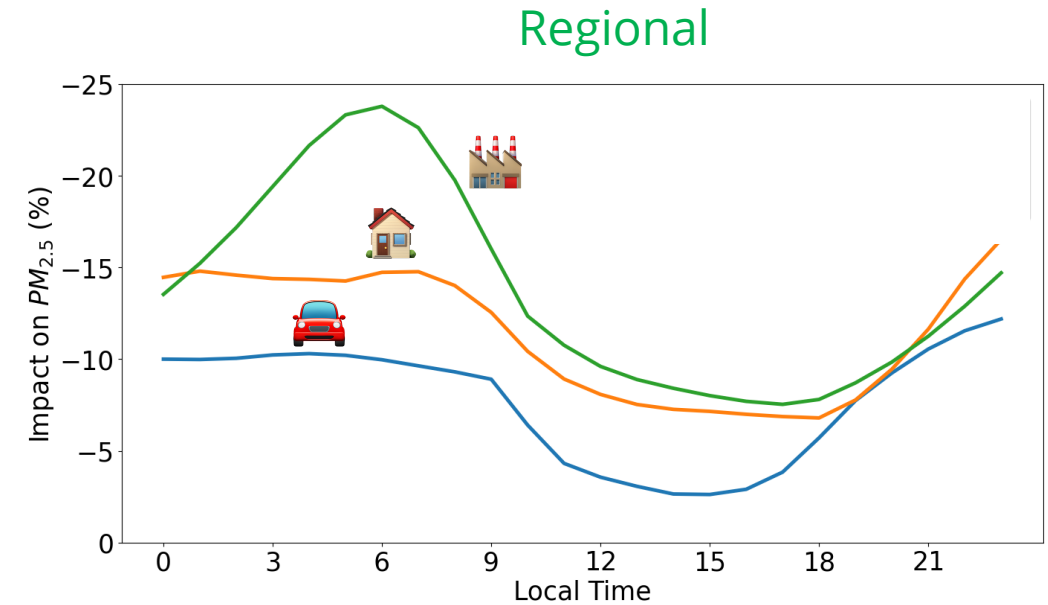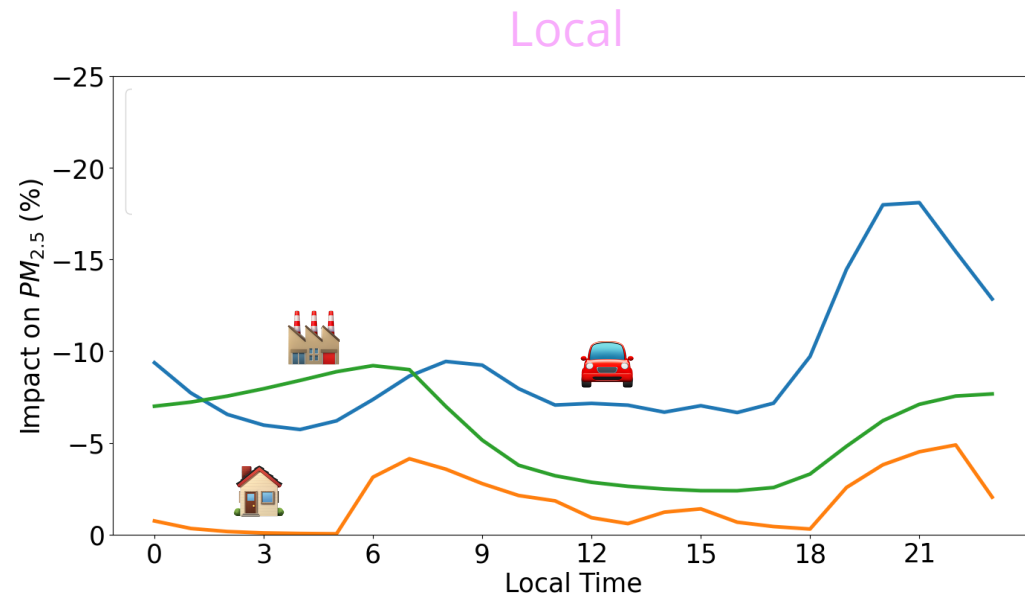# Results: impact on PM$_{2.5}$ dyno-cycle

Local

Regional

- Industry and power sectors from NCR dominate nighttime and almost all daytime PM$_{2.5}$ levels.
- PM$_{2.5}$ evening peak is dominated by local traffic.

Within the total transport sector 🚗 (L+R):

L 🛺 dominates contribution during daytime (up to 40%)

🛺 + 🚚 : accounting for 60% -70% of the total impact at any hour of the day.

Key Messages

🛺🚚

To reduce transport impact on $PM_{2.5}$ over Delhi:

target emissions from **2 and 3 wheelers and heavy-duty vehicles**, especially for reducing **evening concentrations of $PM_{2.5}$**

🎯🤝

To significantly improve $PM_{2.5}$ levels over Delhi to reach WHO interim target 1 (75 µg m^{-3}): promote **regional cooperation** aiming at stringent emissions reductions (50-75%) across **all anthropogenic sectors.**

Images Credits

- Slide 1: Image generated through AI generative art Wombo Art: https://www.wombo.art
- Slide 2: news article The Times of India: https://timesofindia.indiatimes.com/city/delhi/delhis-air-quality-drops-again-to-severe-category-states-meet-to-discuss-strategy-to-check-pollution/articleshow/87742810.cms
- Slide 3: Delhi NCT and NCR administrative downloaded from GADM DATA: https://gadm.org

Thank you!

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