Author's response to Editor's comments on 15 May 2025:

Editor:

»Thank you for addressing the reviewers' comments. This article is now publishable, however I would ask that the abstract conform to ACP's style guidelines (https://www.atmospheric-chemistry-and-physics.net/policies/guidelines_for_authors.html). Currently, no explicit research gap is identified here; if the authors could modify the abstract accordingly, this will be more accessible to nonspecialists. I'm hoping that this will not take too much work.«

AC: We would like to thank the Editor for the constructive input. We have rewritten the abstract to include all ACP guidelines:

Abstracts should have fewer than **250 words** and provide a concise and accessible summary of the purpose, results, and implications of the research. ACP expects that abstracts will normally include the following components:

1. The **topic** of the article and why it is important;
2. The **status** of scientific understanding;
3. The **gap** in knowledge being addressed;
4. The **objectives**, questions, or hypotheses of the study;
5. The **approach** such as modelling, measurements, machine learning, etc.;
6. The main **results** with important quantitative information, if appropriate;
7. The **importance** and implications of the results.

The abstract now reads as:

Real-world vehicle emission measurement methods were developed to bridge the gap between laboratory tests and actual on-road emissions, including the variability in vehicles, drivers, and environmental conditions. The on-road chasing method is a cost-effective approach, capable of capturing emissions from numerous vehicles. While it has been extensively used to measure truck emissions, it has not been systematically applied to diesel- and gasoline-powered cars. This study addresses that gap by comparing data from three on-road chasing campaigns conducted in 2011, 2017, and 2023 to evaluate the impact of emissions control technologies and regulatory policies on diesel- and gasoline-powered vehicles. Results show that Diesel Particulate Filters (DPFs) reduce black carbon (BC) emission factors by 88% compared to pre-DPF Euro 4 diesel-powered cars, while Real Driving Emissions (RDE) regulations lower nitrogen oxides (NO_x) emissions by 86% relative to pre-RDE Euro 6b diesel-powered cars. This is the first study to apply the chasing method over a decade to a representative sample of

European vehicles and to report real-world BC emission factors for Euro 5b–6d compliant cars. Lorenz curve analysis reveals a growing influence of high-emitting vehicles (“super-emitters”) on total fleet emissions, suggesting that targeting super-emitters could yield substantial reductions in traffic-related pollution. Despite methodological variability, the results are consistent across campaigns and align with major regulatory milestones, thus confirming the chasing method’s utility as a robust tool for super-emitter identification and fleet-wide emissions monitoring. By providing real-world evidence of regulatory effectiveness, this work supports scientific understanding and confidence in emissions policy.