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# Determination of car on-road black carbon and particle number emission factors and comparison between mobile and stationary measurements

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## Abstract

We have used two methods for measuring emission factors (EF) in real driving conditions on five cars in a controlled environment: the stationary method, where the investigated vehicle drives by the stationary measurement platform and the composition of the plume is measured; and the chasing method, where a mobile measurement platform drives behind the investigated vehicle. We measured EF of black carbon and particle number concentration. The stationary method was tested for repeatability at different speeds and on a slope. The chasing method was tested on a test track and compared to the portable emission measurement system. We further developed the data processing algorithm for both methods, trying to improve consistency, determine the plume duration, limit the background influence and facilitate automatic processing of measurements. The comparison of emission factors determined by the two methods showed good agreement. EFs of a single car measured with either method have a specific distribution with a characteristic value and a long tail of super emissions. Measuring EFs at different speeds or slopes did not significantly influence the EFs of different cars, hence we propose a new description of vehicle emissions that is not related to kinematic or engine parameters, rather we describe the vehicle EF with a characteristic value and a “super emission” tail.

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## 1 Introduction

Regulation of the particulate air pollution addresses the health and climate effects of aerosolized matter (Ferrero et al., 2014; Ramanathan and Feng, 2009; Pope et al., 2009). One of the main sources of air pollution is traffic. To estimate the traffic contribution to air pollution different methods can be used (Perrone et al., 2014; Moroni et al., 2012; Wang et al., 2011; Kuhns et al., 2004). The bottom-up approach attempts to calculate the emissions from the vehicle fleet composition and vehicle emission factors (EF); however the difficulty of these methods lies in the details of different vehicle

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