

## Reply to Referee #1

We thank Referee #1 for positive evaluation of the manuscript. All suggested technical corrections have been made in the revised manuscript. Also English and punctuations have been checked through the paper. The changes made in the manuscript are below written by [blue color](#).

### General comments

The paper by Enroth et al., titled "Chemical and physical characterization of traffic particles in four different highway environments in the Helsinki metropolitan area" addresses a relevant topic for air quality. Traffic-related pollution in urban centers is likely the largest sources of harmful emissions especially at the global level. Even in North America and Europe, where the air quality has improved immensely in the last decades due to stringent emissions controls and overall more efficient, cleaner vehicles, particle and gas pollutants from traffic still represent a health hazard. This paper presents a comprehensive summary of gas phase and particle measurements of roadside pollution made with state-of-the-art techniques using a mobile laboratory facility. Despite the topic and the technique used for the study are not new, the paper still reports useful data and it does address relevant scientific questions within the scope of ACP. The study shows pollution gradients at four different sites within the Helsinki metropolitan area, and both particles and gases are reported. The particles are speciated with a high-resolution mass spectrometer (the Aerodyne Research SPAMS) that has the additional capability of measuring black carbon via laser vaporization. Both mass concentrations and particle size distributions are reported.

The most novel aspect of this paper, compared to other similar studies, is the section reporting measurements of metals associated with traffic emissions. In addition, the results regarding the increased fleet average emission factor for NO<sub>2</sub> are worth noting, because, as the authors suggest, they are very much a consequence of the increase of diesel cars in Europe over the last decade.

The paper is well written and the results are presented in a straightforward manner, with an appropriate amount of references to previous work, figures and supplementary material. The experimental methods are explained clearly and the amount of data is sufficient to support the statements and conclusions of the paper. I do not see any flaw with the data or the methods used, therefore I recommend publication after minor technical corrections, listed below. English and punctuation should be checked through the paper.

### Specific comments

**Page 2, line 9: remove year before 2012**

Done

**Page 2, line 15: rewrite part of the phrase**

**"...to background levels 300-500 m downwind from the roadside".**

The sentence was rephrased: "[Generally, all of these studies showed that the pollutant concentrations were higher near highway than further from the roadside, sharply decreasing to background levels within 300-500 m downwind.](#)"

**Page 3, line 29: remove 'were'**

This part of the sentence was rephrased "[and \(4\) background measurements for each environment at a suitable remote location approximately 500 m away from the highway.](#)"

**Page 8, line 12: rewrite as: "Similarly, Massoli et al. (2012) did not....."**

Done

### Figures

**Figure S6: I suggest to add the mass spectrum of BC as well (at least from C1 to C5)**

As suggested, the mass spectrum of rBC (from C1 to C7) was added in Fig. S6a where gradient refers to the average concentration over all distances. Note different scales of the y-axes.

