

Interactive comment on “Comparative assessment of ecotoxicity of urban aerosol” by B. Turóczy et al.

Anonymous Referee #4

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The paper presented by Turoczi et al. concerns the assessment of the toxicity of urban aerosols. This topic is very important as the evaluation of air quality is only based on the size of the aerosols which is not sufficient to determine their real toxicity, and thus their real impact on human health. The authors propose a method based on a well known bioassay (V. fisheri bioluminescence inhibition), that could be used as an indicator of air pollution. They apply this technique to compare different types of aerosol samples. The paper is clearly written and easy to understand. Although the idea of using an ecotoxicological normalized test, quick and easy to handle, sounds very attractive and of great interest, I have some major concerns as it might be not relevant to assess the toxicity of aerosols in humans.

1) The choice of the test This bioassay based on V. fisheri bioluminescence inhibition is a normalized test (Microtox) used in ecotoxicology, and more precisely for the impact of pollutants on natural ecosystems (rivers, soils, sea...). It is often used to assess

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pesticides or heavy metals for instance. It could be thus useful to test the ecotoxicity of chemicals present on aerosols towards natural ecosystems as they can be deposited in the environment (wet or dry deposition). However this test is not relevant for assessing the impact on human health which is the main goal of this paper. Many tests exist which are currently used in pharmacology to assess the toxicity of drugs on human health, they are based on enzymatic assays, human cells in culture or animal models. I am convinced that these types of test should be used for aerosols instead of Microtox. The authors should comment on this point and change the objectives and conclusions of the manuscript.

2) Discussion on the method The test used is usually performed on homogenous liquid phase. Here the authors are using a heterogeneous liquid/solid phase and this might induce some problems concerning the interpretation of the data. Toxic compounds which are at the surface of the particles may have various solubilities, and thus can dissolve more or less in the aqueous phase. Only solubilized compounds will enter in contact with the bacteria and will contribute to the bioluminescence inhibition. This could explain some “surprising results” obtained in this paper. P5 line 22: Diesel engine emission samples have higher EC50 Values than biomass some samples. This could be easily explained by the difference of solubilities of very hydrophobic diesel compounds compared to more soluble compounds such as sugars (levoglucosan). This test could reflect the solubility of the compounds in water and not their real toxicity; it could thus give false results. In addition, if human health is considered, the small particules (PM2.5-10) reach the lung cells and can be directly in contact with the cells, hydrophobic molecules can directly penetrate the human cell membrane. In that case the toxicity results could be very different. The authors should comment on these remarks. The authors should also check (at least for some samples) the content of the aqueous phase. They should measure a quick MS fingerprint or measure the Kow value that gives the lipophilicity of the solution. Kow values are indicators of the solubility in tissues. These data could help them to give a more accurate interpretation of their results.

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3) Comparison Summer/Winter samples P6 line 3-16: Winter samples proved to be more ecotoxic than summer ones. The authors interpret the data mainly by the result of photooxidation which is more intense in summertime. However, many other factors could be responsible for these differences. To prove that photooxidation is a main factor, the authors should compare samples collected during the days and the nights of the same period. Alternatively they could perform laboratory experiments where they could expose the collected aerosols to light. Then they could perform the biotests on the photooxidized and non photooxidized particles

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