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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Enhanced toxicity of aerosol in fog conditions in the Po Valley, Italy" *by* Stefano Decesari et al.

**Anonymous Referee #2**

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Decesari et al. present a very interesting and novel analysis of Reactive Oxygen Species (ROS), including examinations of ROS in aerosol and fog and the effects of fog scavenging and chemistry on aerosol ROS. The design of the experiment, which takes advantage of differential fog scavenging of different aerosol ROS components (e.g., metals vs. WOC), is particularly clever. The manuscript is well written, concise and even spare in its style, effectively conveying a lot of information in a compact form. I have a few, mostly minor, comments that should be addressed:

1. In performing mass balances of ROS and other components across aerosol and fog over time, the authors are assuming that there are no significant changes due to factors such as changes in boundary layer depth and fog drop deposition. Nocturnal cooling of the top of a fog layer typically leads to entrainment of air from above the boundary layer and associated growth in boundary layer depth. The entrained air is likely to have very



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different composition than the air originally in the boundary layer. This entrainment of air of differing composition can alter the mass balance. Likewise, significant deposition of fog water over the course of an episode can substantially cleanse the boundary layer of scavenged particles, again altering the mass balance. These factors need to be clearly outlined as sources of possible error in the mass balance analysis that is central to the paper.

2. Lines 9-12 of abstract: this sentence should be rewritten to more clearly distinguish primary and secondary particle source contributions that the authors are referring to.

3. Section 2.2: more information should be presented concerning cleaning of the fog sampler and any contamination contained in collector blanks.

4. P3, line 12: This should be the PVM-100 not PVM-10.

5. P.3, lines 15-16: I suggest you explain to the reader that multiplying by LWC yields "air equivalent concentrations"

6. Section 2.3: Please explain to the reader why you chose to filter the fog samples. Suspended particulate matter inside fog drops is also scavenged material that should be considered as part of the overall system ROS mass balance.

7. P.3, line 25: change "chromatographers" to "chromatographs"

8. P. 4, lines 9-10: I am confused why the authors would extract fog water with Milli-Q water. Is this statement in error?

9. P. 5, line 29: change "what observed" to "what is observed"

10. P. 5, line 30: change "ammonia" to "ammonium" since you are discussing ionic species here

11. P. 6, line 15: change "adsorbed" to "absorbed"

12. P. 6, lines 35-36: The statement "fog scavenging denudes particles of WS compo-

nents" is misleading. It sounds like material is being stripped off particles while what is really happening is that the fog is selectively scavenging some particles and leaving others intact in the aerosol. Please rephrase.

13. P. 9, lines 3-5: This sentence needs to be rewritten to improve the grammar.

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