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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical Note: In-situ quantification of aerosol sources and sinks over regional geographical scales" *by* G. Buzorius

Anonymous Referee #1

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General comments

In the manuscript, airborne eddy covariance measurements of aerosol particle fluxes made in marine and continental environments are presented. Paper is also a technical note concerning the improvements is the spatial scale of the airborne EC measurements. These kinds of measurements are rare, and provide a possibility to measure fluxes in larger scales and in changing environments contrary to traditional flux towers. The data in interesting but there are, however, corrections which should be applied on the manuscript in order to publish it in ACP.

First of all, the language is partly poor and some of the sentences are hard to follow. I found this problematic especially in Introduction part (Page 1303, Lines 1-25) which

should be written again. Authors should also give special attention to past/present forms.

Text in Section 4.4 (Polluted Environment) is partly incoherent with same sentences repeated and thus the text could be condensed. E.g. the upward heat fluxes caused by sun radiation are mentioned in both Page 1315 lines 19-20 and in Page 1316 lines 24-25. In page 1315, line 21, dry deposition is pointed out to be a reason on downward fluxes. This is again repeated in page 1316 lines 23-24. The dry deposition and its references were also repeated in Page 1313 line 5, Page 1314 line2. The text in pages 1316(last line)-1317(lines 1-3) should be mentioned in the same place where the author comments on the possible sinks and sources (Page 1315, Lines 19-27). Unsystematically, traffic is mentioned as only urban source there. Also the information concerning the re-suspension is irrelevant because the author tells that the sources are impossible to identify.

Concerning the overall presentation, I would suggest that in results the clean marine environment should be before the plume ones. Then there would be a systematic change from clean marine environment to more polluted environments.

Below more specific comments concerning the manuscript are presented.

Specific comments

The abstract should be written more compactly. Lines 8-10 and 13-15 duplicate each other. Is the information "highway segments, city blocks" relevant since they are not studied in the paper? Could the text in lines 15-18 be condensed to e.g. "The improved spatial resolution airborne flux measurements were conducted from clean and partly polluted marine environments to heavily polluted continental environment with low mixed boundary heights"

Page 1303, lines 14-16: Reference needed.

Page 1303: lines 23-25: The sentence "Sources than can be quantified with the EC in-

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clude" seems rather strange. In theory you should be able to distinct all kind of sources with EC if you just know the footprint functions. Or is the purpose of the sentence to say that sea spray and dust have been well quantified with EC measurements.

Page 1306, line 12: The abbreviation CPC should be mentioned when Condensation Particle Counter is mentioned for the first time in Experimental setup section.

Page 1306, line 18: "The Webb correction will be presented..." could be removed

Page 1306, line 21: Why only sea surface in "The sea surface fetch contributing to the flux is defined as a footprint". Also reference on the footprints would be nice.

The text in Section 3.3 (Page 1307, lines 18-25) is hard to follow, and it is misleading to say "Moreover, this fluctuation is correlated with the vertical wind speed, and manifests as an artificial particle flux as measured by EC",since if there is an upward particle flux, WPL correction actually increases the flux. Assuming, of course, upward heat flux.

Page 1308, line 23: Should be explained from what SST is abbreviated.

Page 1309, line 4: I would add "since" in front of the "Heat flux is primary driven..." to make the sentences more connected.

The long text concerning coagulation on Page 1310, lines 3-9 is unnecessary. If the author wants to mention coagulation is should be made somewhere in introduction part but not in results.

Page 1310, lines 19-20: I would remove "This plume was encountered on the 12 August 2006 flight" and add the information on the same page line 17 "...from a ship on 12 August 2006” to get the text more fluent.

Page 1311, lines 16-18: "The increase causes a reduction in value of c'=c-c_mean..." is incorrect. Increase in average concentration does not affect the fluctuating part unless c is constant, which is not the case when compared with urban and clean areas.

Vertical soundings were mentioned in the text (e.g. page 1312 line 1) but who made

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them, where were they made and at what time.

The point of the text concerning the CCN at the end of Section "Multiple plumes" is unclear, since the manuscript does not present any data where they would try to determine CCN flux from the total concentration and fluxes.

Page 1316, lines 2-3: "The aerosol number concentration was sampled at 10 Hz" was already mentioned in methods part where it belongs.

The sentences "Using the wind direction data ..." on page 1317, lines 4-7 are unclear.

Page 1317, lines 15-16: Other contributors to the aerosol particle concentrations are also other sources than traffic and long-range transport.

Traffic as main source for particles in urban areas is commonly know, but how could you distinguish that from your data (Page 1318, lines 22-23 "...traffic being one of the main particle sources"), since previously it was mentioned that the sources are impossible to distinguish (Page 1315, lines 1-3).

Figure 1 and 4: What was the measurement day

Technical comments:

In many parts of the text, units are presented as X/Y, while they should be X Y-1.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 1301, 2009.

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