

## ***Interactive comment on “Overview of the synoptic and pollution situation over Europe during the EUCAARI-LONGREX field campaign” by T. Hamburger et al.***

**Anonymous Referee #2**

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The paper has been written as an overview paper on the meteorological situation over Europe, during May 2008, related to temporal and spatial variations of particulate pollution inside BL and FT. (i) The meteorological situation is well described and should serve the EUCAARI community working on the IOP period data as a reference and synthesis paper. (ii) The related pollution situation is described utilizing key measurements from 6 EUSAAR stations. In general the manuscript is well written, the meteorological situation with anticyclonic blocking situation dominating the first half of May is described in sufficient details. Also the meteorological details given for the second half of the month are sufficient. From the pollution point of view the synthesis given in the manuscript is somewhat poorer. The authors have to think about an adequate solution

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to present main features of spatiotemporal pollution trends over Europe during May 2008 (in a rather condensed manner, since there will be accompanying papers going much more into details). The manuscript might be published after additional work and refinements due to the below general and more specific comments.

### General Comments

- The authors use a limited set of 6 EUSAAR stations to give, from the experimental point of view, an overview of observed pollution levels within the domain of F20 and BAe-146 LONGREX flights performed during May 2008. Observational pollution parameters (stations, aircraft), discussed in the manuscript, were unfortunately limited to particle number concentrations and BC content. It is somewhat regrettable that observational parameters and number of stations have been so small despite the ambitious objective to present a synthesis paper. Of course then the paper has to be limited with respect to the amount of information presented. The approach to describe the pollution situation from aerosol concentration and BC data collected at 6 EUSAAR stations is somewhat poor, since stations might be more subject to small scale pollution (including predominant diurnal cycle, see MPZ), rather than being affected by long range transport. Moreover particle deposition (particularly cloud scavenging) may play an important role, thus affecting particulate matter (see authors' argumentation for SMR station) etc. . .
- The authors claim their paper being a reference or synthesis paper relating meteorology and particulate pollution. We suggest that authors take into account more inert pollution tracers (CO, etc.) to better settle their conclusions from experimental measurements of particulate matter. It may turn out that particulate pollution is well correlated to more inert gaseous tracers of pollution. However, it may turn out that removal processes significantly influenced the presented results, which might be particularly true for the 2nd half of the month.
- Another question arises: are 6 stations sufficient to describe the pollution situation

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related to meteorology over Europe during May 2008? The paper quality could be strengthened, adding more information from model results as done in Fig. 3. This should improve the quality of a synthesis paper and thus, the comprehension of the pollution situation during May 2008. In favor of supplementary material from FLEX-PART model output, the discussion of single station measurements could be reduced significantly.

- Chapter 4 is not really needed here, since no climatological work is presented in this context. For this reason, the chapter might be skipped. The idea, however, is exiting, but could be mentioned elsewhere (outlook etc. . .). I encourage the authors to materialize the above idea in a separate paper.

#### Specific Comments

- Avoid redundancy in the entire text. Sentences are repeated without being modified, this is not necessary. For example: 1. 'Abstract' and 'Introduction' start with same two sentences. . . 2. Aerosol measurements are presented in chapter 2 and thus, should not be presented already in chapter 1 (page 19133: skip line 11-15, this is extensively presented in chapter 2)

- Page 19135 line 4: What is T799/L91?

- Page 19140 (Chapter 5.1.1): Figure 5 is not referenced

- Page 19141 (Chapter 5.1.2): Figures 6 and 7 not referenced

- Page 19147 (line 23-25): To be checked with CO data for example

- Page 19149 (line 12-15): What is the cause of the highly scattered BC signal? Is it local pollution from Rotterdam sources, rather than transported pollution on a meso-scale? Why there are no particulate data at Cabauw for first half of May, what about the French aircraft ATR and the helicopter platform operated around Cabauw ?

- Page 19149 (line 27ff): What is your definition of CN number concentration? Larger

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10 nm? Is there a risk that you included nucleation particles already grown beyond 10 nm that then appear in the EUCAARI profiles, thus, pretending high pollution level (which may not necessarily be the case)?

- Figure 11 and corresponding chapter 5.2: The correlation in figure 11 is not that strong. In contrast, the figure is simultaneously demonstrating the difficulties to relate HPB ground-based station observations to aircraft vertical profiles. The correlation is certainly a function of the meteorological situation (wind direction, etc. . .). The high aerosol concentrations seen in the Falcon profiles may be due to precedent nucleation events of aerosol particles. In contrast the potential for nucleation at HPB might have been different (as compared to Falcon airport) as a function of environmental conditions. HPB shows quite some precipitation after May 15th, thus cleansing the air from particles, difficult to argue that at F20 airport the situation was identical. The authors should be more careful extrapolating station data into the BL and beyond. Measurements on ground-based stations may highly depend on small scale processes and meteorology.

- Using the European lidar network EARLINET would be another idea (i) to gain insight into the pollution situation over Europe during May 2008 and (ii) on an even smaller scale to relate ground-based in situ data to aircraft data.

#### Conclusions

The manuscript is worth being published. Claiming it a synthesis paper for meteorology and related pollution, the paper needs significant additional work on the spatiotemporal distribution of (particulate) pollutants. This could be done for example by a model approach or by using extended networks (EARLINET, AERONET...) yielding if possible information on a vertical scale. The description of meteorology is fine.

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 19129, 2010.

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