

Interactive comment on “The effect of local sources on particle size and chemical composition and their role in aerosol-cloud interactions” by H. Portin et al.

H. Portin et al.

harri.portin@fmi.fi

Received and published: 16 April 2014

We would like to thank Referee #1 for the comments about our manuscript. All comments have been taken into account. Below are the replies to the specific comments:

Titel: It should be taken into account to add the location of the study, e.g. in eastern Finland, Puijo etc. or the frame (PuCE)

-We modified the title as follows: “The effect of local sources on particle size and chemical composition and their role in aerosol-cloud interactions at Puijo measurement station”

C13346

Abstract: 1.) Very important information is missing. There is not a single word about the framework of the study, the location and site type nor about the measurement period (length, year, . . .).

-A sentence with the requested information was added to the beginning of the abstract: “Interactions between aerosols and liquid water clouds were studied in two intensive measurement campaigns during autumns 2010-2011 at a semi-urban measurement station on Puijo observation tower, located in Kuopio, Finland.” Some of the text was changed accordingly to avoid repetition.

2.) Give numbers! Terms as “contained more”, “were quite similar”, etc. should be replaced by concrete numbers. Also give number of GFs.

-We think that the first part of the abstract which deals with the analysis of the entire data set does not require numbers, since the main point is that the differences in various aerosol and cloud properties between the air mass types were small. This also makes the abstract a bit shorter and easier to read. However, for the second half of the abstract with the case study, we agree with the referee and added concrete numbers. They efficiently highlight the large variations of the various parameters observed during the cloud event.

Section 1 (and title): Specify “clouds” - this manuscript considers only one fraction of cloud types namely liquid water clouds.

-Cloud type is now specified in the beginning of the abstract and also in the end of section 1.

Section 2.1: Add when data was taken and length of campaigns, if necessary modify section 2.4 etc. accordingly.

-The requested information was added to the last paragraph of the introduction. Also, the date ranges were removed from section 2.4.

Section 2.3.5: Says the Htdma was connected to the total inlet and on scan is 15 min

C13347

long. Before you mentioned that the total and interstitial inlet were alternated in 6 min intervals. I'm confused, please explain.

-The Htdma was not connected to the valve system; instead, it was measuring from the total line all the time. The second sentence of section 2.3.5 (in the new version section 2.3.6) was modified to clarify this: "In order to measure dry aerosol, the device was connected directly to the total line, instead of switching between the two sampling lines."

Section 3.2.1 and elsewhere: You mention "air masses with marine characteristics" but you write in Section 2.3.4 that there is no chloride in aerosol. Does this exclude? Otherwise explain.

-The air masses arriving from the clean sector are probably of marine origin. However, they do spend time over the continent before arriving to Puijo, which removes almost all of the marine characteristics. The text in section 3.2.1 was modified as follows: "It is very likely that the air masses coming from sector 5 are cleaner and of marine origin (Portin et al., 2009). However, these air masses have spent some time over the continent, which has removed most of the marine characteristics, as indicated by e.g. the absence of chloride. The air masses from sector 3, on the contrary, are affected by the local sources."

Also, mentions about the marine characteristics of the aerosol are removed elsewhere from the text.

Section 3.2.2 and Figure 4: How significant are the differences, how large are uncertainties?

-We admit that the differences between the two sectors are small and that the uncertainties, as indicated by the standard deviations in table 3, are quite big. However, the results from the case study in section 3.3 support the conclusions presented in this chapter. We added an extra paragraph to the end of section 3.2.2 which shortly

C13348

discusses this issue: "It has to be emphasized that the differences in the properties of activated particles and cloud droplets between the two sectors are small. Also, there is a lot of variability in the data, as indicated by the high standard deviations (Table 3). This means that the interpretation of these data have to be made with caution and that more detailed studies, like the case study presented in section 3.3, are needed to support the conclusions presented here."

Section 3.3.3: How reliable is the Htdma data (15min scan) for this period (30 min)? How many complete scans do you have for the interval? It should be underlined, that there are significant uncertainties.

-We agree with the referee here. This is something that should have been mentioned. The following sentence was added to the end of section 3.3.3: "It has to be noted, though, that only one or two hygroscopicity measurements for each particle size were available for this very short period, so the GFH values likely have large uncertainties and have to be treated with caution."

Section 4: Again give numbers, avoid expressions as "higher", "more", etc.

-Numbers added.

Figure 1: Little information; leave or combine with Figure 2.

-Figures 1 and 2 are now combined.

It is very difficult to read Figure 8, please change, e.g. use different markers for the different sizes or add a line.

-Figure 8 (in new version figure 7) was updated, different markers for different sizes are now used. Also lines were added.

In general: When you mention fractions in the text (e.g. inorganic fraction), why not as %?

-The fractions are now presented as %.

C13349

C13350

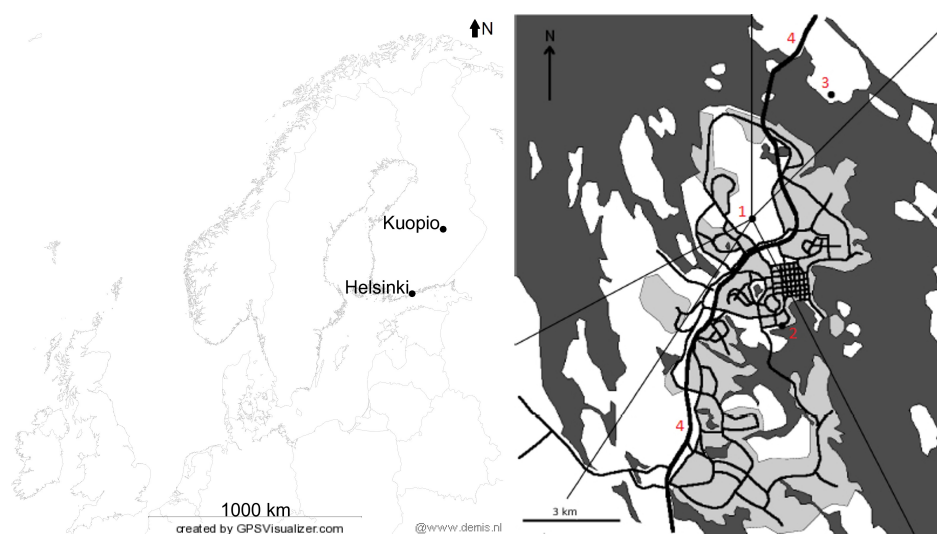


Fig. 1.

C13351

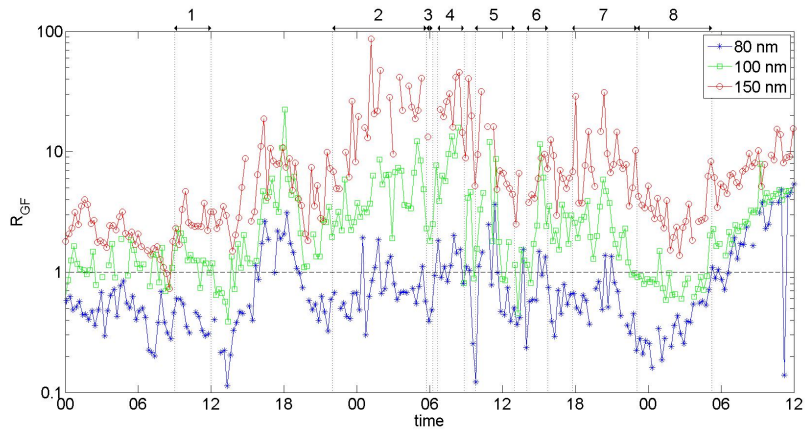


Fig. 2.

C13352