

## ***Interactive comment on “Source apportionment of particles at Station Nord, North East Greenland during 2008–2010 using COPREM and PMF analysis” by Q. T. Nguyen et al.***

**Anonymous Referee #1**

Received and published: 2 November 2012

This paper utilizes new aerosol chemistry measurements from the Station Nord in North East Greenland together with two source apportionment models, the Positive Matrix Factorization (PMF) and CONstrained Physical Receptor Model (COPREM). The paper is clearly written with solid data which support the conclusions. The main value of the paper is the new data from March 2008 to February 2010 together with a robust comparison of the two source apportionment models. However, other scientific findings offer little new compared to the earlier study made from the station data (Heidam et al., 2004). The other main findings seem to be that (1) an additional source factor is needed to explain the new data, and (2) natural Br is transported to the station on an anthropogenic media (sulfate-aerosols). I believe that if the authors expand a little on

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the new data (addressed below), the paper deserves to be published in ACP.

General comments:

I am curious about the original chemistry data in general, which has not been presented in the paper – only the source apportionment results are there. Heidam et al. (2004) observed many time dependent trends in their concentrations – do the new results, nearly a decade later, still support these trends? In particular, trends in lead and sulfur were identified by Heidam. I believe this aspect deserves investigation. Related to the above, I was missing more discussion about this new source factor (the Zn source), which is required to characterize the data. The authors state that the sources must be different from those identified by Heidam et al. (2004). Is this visible in the original data chemistry data (e.g. Zn concentrations being higher than previously)? Summer peaks in concentrations related to air masses from the Canadian Arctic are mentioned, has new industry or similar been built there between these two studies?

Detailed comments:

Page 24184: same citation with different notation, which one is correct?: “Wang and Wilhelmy, 2009” and “Wang and Sañudo Wilhelmy, 2009”

References: Skov 2004 is often cited in the text, but does not appear in the reference list.

Figure 2: please increase the font size on the legends and axis. Also, color scale is not explained.

Figure 6: please revise the figure caption, the first sentence gives an impression that the trajectory figures are some kind of averages from March 2008-February 2012.

Supplementary Table S1: please unify the format of the Soil and Marine profile values (some are scientific, others not).