

Review on E. Herrmann et al. (2013)

General comments

The paper presents 4.5 months of measurements from a site out of the city of Nanjing. This period is not very long and not very representative.

The paper does not contain real scientific conclusions. It is another analysis of new particle formation events, giving all the relevant parameters but why? What is this important for? If the authors do not state this clearly and understandable I cannot recommend this paper for publication. Taking a data set and processing this with a standard program is not sufficient. Thus, at first a clear motivation is needed. Secondly, the analysis needs to be extended: e.g., taking a longer data set (at least one year), estimating the effect on e.g. CCN-concentration, optically relevant parameters or other climatically relevant parameters.

Another option might be to state what it really new in this paper. To my opinion all the methods and programs have been applied to various data sets before and this is just one more set of number which is not automatically new science.

Thus, I recommend not publishing the paper in its current status, a publication requires major revisions and a second step of review to ensure a sufficient scientific quality of the journal ACP.

Comments in detail

Introduction:

This introduction is very general. The authors mention the direct and indirect effect of aerosols but they do not show the relation of these effect to the presented study, which focuses on new particle formation (NPF). NPF creates small particles, but under certain conditions they grow to larger sizes and might be relevant for the optical processes as well as the formation of clouds. This connection is not mentioned here. However, in China the conditions for particle growth are frequently in a way that favors relatively rapid growth. This was at least shown in one case study (Wiedensohler et al., 2009), but there are probably more papers showing this connection.

Page 22339, Line 17ff:

‘However, so far only few comprehensive studies have been published (e.g. Shen et al., 2011). Instead, many projects have had rather campaign character, presenting only a few weeks of observations...’

There are few studies published. Number size distribution measurements at PKU in Beijing started in 2004 and were the subject of several publications (later you cite Wu et al., 2007, but it should be mentioned here too. To my opinion, 4.5 months is also not very long and

representative and close to campaign length. It covers more or less only one season and no general conclusions are possible.

The introduction does not motivate the presented paper. What is it relevant for? Health, radiation balance, visibility, cloud formation, air quality, health? There are many potential aspects, but they should be addressed here. Without a real motivation this paper should not be published.

3. Results and discussion

The general description of meteorological conditions and aerosol characteristics is appropriate and well written. One can easily follow and it is very compact. Many of the features have been also observed at other sites in connection to NPF

Page 22347, line 6

The measurements were taken more or less during the winter months only, therefore one cannot say if there is a winter break or not. Furthermore, I recommend here to compare more with other studies from China. In the Beijing region the winter is cold and dry but cleaner as the summer, thus NPF is there more frequent in winter time or the events show completely different characteristics between winter and summer. But speculation about differences throughout the year is not possible with a 4.5 month-data set only.

Page 22347, line 8 ff.

I do not understand the difference between Figure 5a and 5b. I think they both display more or less the origin of incoming air during nucleation events?! Or what means a retroplume exactly? In Fig 5a, SE-directions are completely missing why in Fig 5b the nucleation probability is between 20 and 40% for this direction. Thus, there was nucleation observed? Please explain this!

4. Summary and conclusions

Page 22356, line 23

..NPF was observed on 26 days...20%...

What frequencies were found at other sites, such as Beijing, North China Plain, Shanghai for the winter months? Is this comparable? Are there any measurements for other months of the year available?

Again, the data are not representative and more data should be considered.

I fully agree with the authors that measurements apart from those in Europe are required and in particular China is an important location to obtain detailed measurements within the Megacities but also outside. These regions are not well characterized yet and they may also change their properties due to the rapid development of the country and the economic growth. Thus, basically I like the type of measurements, the location and instrumentation but they should be extended and analyzed in more detail with regard to climate effects.

References

Wiedensohler, A., Y. F. Cheng, A. Nowak, B. Wehner, P. Achtert, M. Berghof, W. Birmili, Z. J. Wu, M. Hu, T. Zhu, N. Takegawa, K. Kita, Y. Kondo, S. R. Lou, A. Hofzumahaus, F. Holland, A. Wahner, S. S. Gunthe, D. Rose and U. Pöschl (2009). "Rapid aerosol particle growth and increase of Cloud Condensation Nucleus (CCN) activity by secondary aerosol formation and condensation: A case study for regional air pollution in North-Eastern China." Journal of Geophysical Research (D) **114**(Campaigns of Air Quality Research in Beijing and Surrounding Region: 2006 (Special Issue CAREBeijing-2006)): D00G08, doi:10.1029/2008JD010884.