Atmos. Chem. Phys. Discuss., 15, C9179–C9181, 2015
www.atmos-chem-phys-discuss.net/15/C9179/2015/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Towards a first classification of aerosol shrinkage events" *by* E. Alonso-Blanco et al.

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Received and published: 11 November 2015

The authors acknowledge the dedication and interest of the referee#2 to improve the manuscript. In the following, we address all the comments made.

General comments:

The manuscript is well written and worthy of publishing in ACP. However, the shrinkage of atmospheric particles is debatable in research community. A few researchers may argue that the particle shrinkage could be due to changing air mass rather than "real" particle shrinkage. To be fair, the argument is of course applicable for the growth of atmospheric particles reported in literature. To convince research community rather than this reviewer, the authors are encouraged to present the analysis of air mass back

trajectories before, onset, in the mid and the end of shrinkage at 100 m, 500m and 1000m altitudes if possible. This is because a few new particle formation events may occur at height rather than at ground level (Meng et al., A.E., 2015, 102, 366-375).

Reply - The number of works which focus on shrinkage processes is very scarce. The numerous conditions that should coincide in the triggering of shrinkages hinder their occurrence. It is thus necessary to continue working on the study of these processes in order to develop a complete methodology for their identification which prevents any discussion on their occurrence. Moreover, in this work, and as it is indicated in the section 3.2.1, Identification of shrinkage events, the aerosol size distributions and the atmospheric conditions have been taken into account in order to discard the apparent particle shrinkages.

Although it is not indicated in the text, backtrajectories of 72 h (3 days) at 750 m, 1500 m and 3000 m agl were calculated, as well as the pressure field at synoptic scale analyzed through two models, the corresponding to the UK's national meteorological service (Met Office: http://www.metoffice.gov.uk/) and the German Meteorological Service (http://www.wetterzentrale.de/). As a result of this meteorological analysis we have not found a pattern during the course of these processes. For the record in the paper, the following sentences are now included in the text:

"In addition, the 72-h (3 days) backward trajectories have been computed to identify the air mass transport at 500 m, 1500 m and 3000 m agl with the HYSPLIT model - HYbrid Single-Particle Lagrangian Integrated Trajectory Model- by NOAA (Draxler and Rolph, 2015; Rolph, 2015) as well as the pressure field at synoptic scale was analyzed through two models, the corresponding to the UK's national meteorological service (Met Office: http://www.metoffice.gov.uk/) and the German Meteorological Service (http://www.wetterzentrale.de/) during the course of these processes and no pattern has been observed."

In relation to the paper mentioned above (Meng et al., A.E., 2015, 102, 366-375), the

authors consider that it is relevant for this work and its reference is now included in the introduction as follows:

“Also, particle size reduction has been seen in traffic emissions (Dall’Osto et al., 2011) and during NPF (Meng et al. 2015) as a consequence of the atmospheric vertical dispersion processes.”

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 25231, 2015.