Atmos. Chem. Phys. Discuss., 14, C6170–C6171, 2014
www.atmos-chem-phys-discuss.net/14/C6170/2014/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Forest canopy interactions with nucleation mode particles" *by* S. C. Pryor et al.

Anonymous Referee #2

Received and published: 25 August 2014

In this manuscript, the authors analyzed two years of particle size distribution (PSD) data collected at three sampling heights within the canopy at a deciduous forest site Morgan Monroe State Forest (MMSF)) between March 2012 and March 2014. It was found that nucleation mode number concentrations at the bottom of the canopy are $\sim$ 16% lower than those at the top, indicating substantial capture of nucleation mode particles by the foliage. The authors also showed that growth rates of nucleation mode particles during a drought year (2012) were substantially lower than during a normal year with high soil water potential (2013), and argued that drought-induced limits on biogenic VOC emissions from forests may limit the effectiveness of the postulated organic aerosol – negative climate feedback mechanism. This is an interesting and potentially important paper. The content is suitable for ACP and the manuscript is well

written. Nevertheless, the following concerns/comments need to be addressed before I can recommend the publication of this manuscript in ACP.

1. The main data analyzed in this manuscript was the PSD measured at three levels between March 2012 and March 2014. In a couple of places in the manuscript, the authors mentioned that the PSD measurements were presented (i.e., line 13, page 18185; line 24, page 18186, etc.). However, I didn't find one single figure showing directly the PSD data. While the authors presented some results derived from PSD measurements, I consider it to be necessary to present direct PSD data. I highly recommend that the authors give the seasonally mean PSD measured at three levels during "A" events in 2012 and 2013, respectively. These curves will help the readers better understand the main findings of this manuscript.

2. One key objective and conclusion of this work is about the capture of nucleation mode particles by the foliage. In page 18185, the authors discussed the size-dependent collection efficiency (E). It will be helpful if the authors can present curves showing the dependence of E on particle sizes, under mean LAI values of different seasons.

3. Figure 5a. Any seasonal variations of the difference of nucleation mode particles measured at three sampling levels? Since LAI was small during November-March, I expect the difference to be small during this period compared to the months with high LAI.

4. Figure 2, the wall loss is significant for nucleation mode particles (20-90%). What is the uncertainty (or error bar) of the particle transmission efficiency? Could this impact the conclusion about the capture of nucleation mode particles by the foliage (16%)?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 18181, 2014.