**Comments on hygroscopicity distributions for CCN data analysis by Cerully et al. (2011)**

Cerully et al. (2011) present very interesting results on aerosol hygroscopicity and CCN activation kinetics.

The hygroscopicity (kappa) distribution concept applied in the paper makes full use of the information from size-resolved CCN measurements, and the results are important for detailed investigations of CCN activation and cloud formation in the atmosphere. I would like to contribute the following specific comments to the discussion of the manuscript:

So far, very few studies have used and presented a hygroscopicity distribution concept for CCN data analysis. Within the EUCAARI project and special issue, a similar approach has been presented and applied by Su et al. (2010). Hygroscopicity distributions and parameters were reported by Su et al. (2010) for measurement campaigns in megacity environments (CAREBeijing 2006; Table 2 in Su et al., 2010). I would suggest comparing the hygroscopicity distribution properties determined in the current study for boreal forest aerosols with those previously published for rainforest and megacity aerosols (peak/mean values and spread of $\kappa$) (Lance, 2007; Su et al., 2010). Although the fitting approaches taken by Su et al. (2010) and Cerully et al. (2011) were different, it should still be possible to compare the characteristic parameters. To facilitate direct comparison, I would be happy to share data from Su et al. (2010).

In Eq (6) of Cerully et al. (2011), 0 and 1 were taken as limits for the integration of $\kappa$.

$$\sigma^2(\kappa) = \frac{\int_0^1 (\kappa - \kappa^*)^2 \, p^s(\kappa) d\kappa}{\int_0^1 p^s(\kappa) d\kappa} \qquad (6)$$

In practice, an upper limit of $\kappa = 1$ may be sufficient for the investigated aerosols. In principle, however, $\kappa$ can also exceed unity (e.g., $\kappa = 1.3$ for NaCl). For general applicability, I would thus suggest to leave interval of integration unlimited as was done in the paper of Su et al. (2010) as well as in the thesis of Lance (2007).

# Reference:

Lance, S.: Quantifying compositional impacts of ambient aerosol on cloud droplet formation, Doctoral Thesis, 2007.

Su, H. et al.: Hygroscopicity distribution concept for measurement data analysis and modeling of aerosol particle mixing state with regard to hygroscopic growth and CCN

activation, Atmos. Chem. Phys., 10, 7489-7503, doi:10.5194/acp-10-7489-2010, 2010.