**Atmospheric
Measurement
Techniques**
Discussions

Interactive comment on "Multi-modal analysis of aerosol robotic network size distributions for remote sensing applications: dominant aerosol type cases" by M. Taylor et al.

Anonymous Referee #2

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The manuscript by Taylor et al. 2013, "Multi-modal analysis of aerosol robotic network size distributions for remote sensing applications: dominant aerosol type cases", presents two new methods (optimized equivalent-volume bi-lognormal fitting and Gaussian mixture model multi-modal fitting) to fit AERONET-retrieved size distributions. The findings of their study are interesting and relevant and therefore the manuscript should be published in AMT.

General comments:
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In my opinion, the authors selected their four cases somewhat arbitrarily, assuming that the global model would well represent the aerosol conditions in each site in daily temporal resolution. The cases would have been more representative, if monthly averages were used.

I glanced through Lanai for an extended period around 21 January 2002 and indeed the "double hump" is not very typical. Therefore, it would have been equally justified to include also other interesting and reported cases of interesting AERONET-retrieved size distributions. Now the challenging cases included bi-modality or "shoulder" in the coarse mode. Eck et al. 2012 reported interesting cases of bi-modality or "shoulders" in the accumulation mode. It would be likely interesting and relevant to see how those kind of reported cases were fitted by the new methods proposed by the authors.

Specific comments:
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Block 10579, line 10, "of of" -> of

In couple of occasions, you write "AOD extinction". Seems repetition, perhaps better and more precise nomenclature would be only AOD or only columnar extinction, or something like that.

Block, 10585, line 1, "statistically-significant exceptions"? You did not assess whether these cases are statistically-significant or not, right? But it would have been certainly very interesting (this is also related to my general point above). Perhaps this sentence could be clarified.

Block 10594, line 14, "In this work, it was found". This is also somewhat misleading statement. I think you could simply say that you used GOCART to select the cases, since there were no results showing how well the spatial and (daily) temporal resolution used really could capture the aerosol conditions in each site.

Text for the Table 1. Mention that these are from GOCART model data.

Text for the Figure 1. "next paragraph". The reference cannot likely be this specific; the place of this figure in the final layout may not be the same as in the current manuscript.

Eck, T. F., et al. (2012), Fog- and cloud-induced aerosol modification observed by the Aerosol Robotic Network (AERONET), J. Geophys. Res., 117, D07206, doi:10.1029/2011JD016839.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 10571, 2013.