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***Interactive comment on* “Size distributions of mineral aerosols and dust emission flux observed over Horqin Sandy Land area in northern China” by X. Li and H. S. Zhang**

**Anonymous Referee #1**

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This paper presents measurements of dust fluxes during dust storms in China. Although the measurements are interesting, there is a flaw in the methodology, and a discussion of what these measurements actually contribute to our knowledge of dust emissions is lacking. Therefore, I unfortunately cannot recommend the paper for publication.

Main comments:

- The authors measure the size-resolved concentration at only one height, and then assume that the size distribution at the other height, where they only measure the total flux, is identical. However, the size-resolved concentration profile is a sum of advection

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and emission, and the relative contribution of each varies with height. Consequently, the size distribution is expected to change at least somewhat with height (e.g., Figure 1 in Gillette et al., 1972). For this reason, every previous study that I am aware of has obtained the size-resolved vertical dust flux by making size-resolved concentration measurements at two different heights, or through eddy co-variance (Fratini et al., 2007). I thus consider the authors' methodology of deriving the size-resolved dust flux by assuming similarity between the size distributions at two different height flawed. - This paper describes measurements of dust events, but does not adequately interpret the results. What gap in the literature do these measurements address? How do their measurements compare against similar measurements and theories? Do they find a dependence of the dust size distribution on wind speed? In other words, there is little or no discussion of any new information or important insights that is obtained from these measurements.

Other comments:

- On page 2674, line 10 – 13: Fratini et al. (ACP, 2007) recently provided size-resolved measurements of the dust flux in China and would be good to cite here.
- Page 2676, line 5-7: Please add a reference for this description of shortcomings of the QCM cascade impactor.
- Some critical information about the measurements is missing. What was the size distribution of the parent soil? Were non-erodible elements, such as rocks or vegetation, present?

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