

## ***Interactive comment on “Complexities in the First Aerosol Indirect Effect over the Southern Great Plains” by Sam Pennypacker and Allison L. Steiner***

**Anonymous Referee #3**

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The authors present an effort to discern the first indirect effect (FIE) in springtime cloud statistics over the Southern Great Plains (SGP) region in US by using PM<sub>2.5</sub> concentration data and MODIS cloud optical properties. They also discuss the effect of MODIS retrieval uncertainties and meridional flow on FIE. I believe the method followed by the authors is not solid and I cannot recommend the paper's publication. Please find my major concerns below.

In general I agree with the comments of the other two reviewers.

1. I personally do not agree with the method followed by the authors. The aerosol-cloud data are not directly spatially and temporally collocated and the discussion is based on the comparison of distributions. This kind of analysis is expected to have a large uncertainty resulting into comparing noise with noise rather than aerosol concentrations

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with cloud optical properties.

2. A large part of the recent aerosol-cloud interactions literature is missing. The references list should be substantially updated.

3. The type of the aerosols should be taken into account. We know that different types of aerosols may behave in a different way as far as indirect effects are concerned.

4. Do PM<sub>2.5</sub> measurements coincide with AOD observations? The PM data should be compared to data from MODIS to make sure that the ground PM concentrations are a good proxy of the tropospheric aerosol burden in the area.

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