

**Below we provide responses to reviewer #1 concerns and suggestions in blue font:**

- 1- Without direct measurements of actinic flux, I am not sure how sturdy the authors' conclusion are about the role the OH radical plays in the nucleation in this layer but previous studies seem to support this conclusion.

Response: Just as the reviewer said, we are using the literature references to support this conclusion. As a result, we do not make any changes to the manuscript with regard to this comment.

- 2- Another point to raise is the actual aerosol type that is found in the vicinity of the EIL be it smoke, dust, or pollution. Can the authors comment on what the dominant type is and how each can affect or influence particle enhancement in the EIL? There was not much emphasis on this since aerosol type is important when quantifying aerosol cloud-climate interactions.

Response: This is an excellent point made by the reviewer. The main aerosol types in the EIL and free troposphere, based on our sampling and analysis of remote sensing lidar data in previous studies, include exactly what the reviewer suggested: smoke, dust, polluted continental emissions. There also can be detrained aerosol from the marine boundary layer that is lofted up by cloud. The presence of these air mass types is now discussed in the manuscript:

“The sources of pollution impacting the study region vary in terms of the vertical layer being examined. More specifically, the predominant sources in the STBL are marine sea spray and biogenic emissions, and ship exhaust (e.g., Coggon et al., 2014; Modini et al., 2015), while the major sources impacting the FT originate from the continent, including biogenic emissions, wildfires, anthropogenic emissions, and crustal emissions (e.g., Crosbie et al., 2016; Wang et al., 2016). As it is challenging with the current dataset to separate the relative importance of the pollution type affecting the EIL, instead the focus of the subsequent discussion is on aerosol size distributions.”

It is too difficult to separate the relative importance of each emissions source in affecting the EIL. As a result, we do not add text to address that part of the reviewer comment.

The reviewer provided the following comments/suggestions in their Supplement file in PDF format:

- 3- Make sure to use proper citation format. Comma and period are reversed with a few of these author citations.

Response: Done.

- 4- EIL Thickness column is a bit confusing. Maybe should stick with the EIL thickness and comment on the range of base and top altitudes for the entire campaign.

Response: The table has been edited accordingly and the range of base and top altitudes is provided now.

5- Could just same "Same as Figure 5 but CPC" or something like that.

Response: Done.