General comments:

In this article the authors investigates the impact of horizontal grid spacing on aerosol mass budget, aerosol-cloud interactions, and effective radiative forcing of anthropogenic aerosols by comparing the nudged simulation results for 2016 from the low-resolution model (LR) and the regional refinement model (RRM).They show that a remarkable difference in simulated emissions of natural dust, sea salt, and marine organic matter between in the RRM than in the LR due to larger surface wind speeds, more frequent strong surface winds, or drier soil in the RRM than in the LR. Increasing model horizontal resolution affects the partitioning between large-scale and convective precipitation, and then leads to increased (decreased) aerosol wet scavenging by large-scale (convective) precipitation in the RRM.

As the authors apply nudging globally in the LR and RRM simulations, which used nudging only on the low-resolution meshes but not the high-resolution grids in CONUS, it is better to compare the simulated surface winds and precipitation in the RRM and the LR to the observations in 2016. That is helpful to understand the differences for aerosols simulations are directly caused by circulation and precipitation variation from the LR to the RRM.

Minor comments:

In the section “E3SMv1 model description”, whether the vertical transport processes of aerosols by deep convection have been included needs to be mentioned.