Comments on Delbeke et al.
The Impact of Aerosols on the Stratiform Clouds over southern West Africa: A Large-Eddy Simulation Study

In addition to the reviewers' comments, I have a number of important comments that I would like you to take into account before resubmission:

1) To begin with, the quality of the writing is not to up to par. I am sympathetic to the fact that the authors are probably not native English speakers but we cannot underestimate the importance of clearly written and sharp text that communicates the ideas effectively. Unfortunately, much work needs to be done in this regard.
2) On a scientific note, the authors do not seem to have strong familiarity with the literature on aerosol-cloud-radiation interactions and thus, while the results seem robust, some of the explanations are well-known and could be stated much more simply, with appropriate references. In many places this leaves the incorrect impression that the authors have discovered something new.

   Examples:
   - Liquid water path (LWP) and cloud fraction (CF) adjustments
     The notion that the Twomey effect is the dominant one has long been shown to be inadequate, especially given the much stronger control of N on LWP (2.5 x more important in a relative sense) and the dominance of CF, about which much less is known regarding aerosol effects. There is a very large body of literature on this topic and in various places, the text comes across as naïve (e.g., bottom of page 24, and bottom of page 25).
   - LWP adjustments are usually negative in stratiform clouds (https://doi.org/10.1175/1520-0469(2003)060<0262:TCALWT>2.0.CO;2 https://doi.org/10.5194/acp-19-5331-2019, doi:10.1029/2006GL027648
     This makes it a central variable for aerosol-cloud-radiation interactions, and yet other than the Table values, it's hard to get a good picture of LWP evolution and how N might be affecting LWP. The same is true for CF: the smaller the cloud fraction the smaller the radiative effect of the clouds, and the less leverage there is for aerosol effects on clouds. Aerosol effects on CF are less well quantified but this might be where some extra work gives you an opportunity to say something new.
   - On page 21, the discussion of the microphysical responses is long and not very informative because much is already anticipated. Is the POLLUTED case even needed given that REF is so polluted already and that at some point updraft/supersaturation production cannot activate any more aerosol?
   - Effect of drizzle: it has been proposed that weak drizzle can stabilize clouds (by preventing deepening https://doi.org/10.1175/1520-0469(1998)055<3616:LESOSP>2.0.CO;2) and if drizzle evaporates just below cloud base, can strengthen turbulence by destabilizing the BL (doi:10.1029/2001JD001502) When discussing drizzle, please engage in these ideas and see if they are relevant to your analysis (e.g., CLEAN, Fig. 10). In Fig. 10, a TKE profile would help to show

whether weak drizzle just below cloud base might be enhancing cloud turbulence/deepening. You could show divergence of the modeled drizzle flux to get a sense of evaporative cooling below cloud base.

- Where does the absorbing aerosol reside? This makes a significant difference to the dynamical response (e.g. doi: 10.1256/qj.03.61, doi:10.1029/2005JD006138, 10.1002/2015GL066544). And please convey the essence of knowledge already known from these papers, rather than simply providing lists of references. The current version of the text is not careful about using those references to provide context.

3) Missing information/other comments:
   - The cloud radar is mentioned but we aren't told its wavelength, which makes it hard to interpret what it sees. (See drizzle discussion above)
   - You mention supersaturation quite a bit but is it actually prognosed, or diagnosed based on a parametrization that includes updraft? And all diagnostic activation parameterizations depend on w (line 463). A problem is that it's not just vertical motion that drives supersaturation but the total effects of dynamics.
   - Model radiation: the model top is at 2 km. Does this mean you ignore the influence of the gases above the domain. If so, this is a serious omission. A column of atmosphere should be patched above for radiation calls so that the radiative effect of gases is included.
   - The low domain top might also explain why your modeled cloud deepens too much in the afternoon: If in fact there were upper-level clouds and the model doesn't see them then your cloud top cooling will be too strong and your cloud will deepen more than it should
   - Is hygroscopic growth included in the aerosol radiative effects and optical properties?
   - Typically, radiation is called much more often than 10 minutes (usually order 20 s). What effect is this having on simulations?
   - I was surprised that the aerosol model uses the 6^{th} moment as one of its moments. That's typically a choice for rain (radar reflectivity = 6^{th} moment)
   - Cloud void space is the 1-CF. Why not speak in terms of the familiar cloud fraction and make the reader's life easier?
   - As noted by a reviewer, the earlier part of the simulation is probably affected by spin-up. This is worth checking so that your discussion of the 0:00-04:00 UTC period is robust.
   - Bottom of page 11, other reasons include incorrect surface fluxes, and model weaknesses.
   - Caption Fig. 7h: why mention SWHR (no lines) at night
   - Lines 370-371: The increase in cooling with higher N is only true for clouds with LWP < 25 g/m2.
   - Line 595: references?