Referee comment on "Roles of the Inner Eyewall Structure in the Secondary Eyewall Formation of Simulated Tropical Cyclones" by Nannan Qin et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-147-RC4, 2021

Overall Evaluation:

I recommend major revision. In short, I am concerned about the use of two grid configurations to study secondary eyewall formation (SEF) in tropical cyclones. That a simulation with smaller grid spacing produces SEF vs the coarser simulation is not surprising considering other studies on the topic. However, grid spacing fundamentally impacts the nature of turbulence and convection, thereby making the investigation of SEF a more complex problem experimentally. I suggest fixing grid spacing and either a small ensemble approach or set of well designed sensitivity experiments. The paper does a nice job examining the formation of a moat in the control simulation, but it is not clear how valuable the coarser resolution experiment is in comparison for fundamentally understanding SEF. With a small ensemble, or sensitivity experiments with fixed grid spacing, assuming there's a wide enough variance in SEF properties, then more emphasis can be put into getting into the valuable questions on the importance of mesoscale and microphysical impacts on moat formation, descending inflow jets, etc in SEF. At the moment, it is difficult to determine whether the current manuscript adds to our existing knowledge of SEF and moat formation.