Responses to Referee #1

Our response is highlighted by blue below each Referee comment in black.

The preprint by Oue et al focuses on the choice of radar scanning strategies for campaigns aiming at investigating convection processes. The study is conducted using and Observing System Simulation Experiment referred to a 4-hours event. RHI sweeps are recommended to complement observation provided by a surveillance weather radar using a NEXRAD 5-minute volumetric scanning strategy. This recommendation is not new. Based on experience and know limitations of volume scanning (lack of time resolution, blind cone), many campaigns have adopted additional research radars performing RHI scanning (eg. those cited in the manuscript, but also others, like LPVEX or IFLOODS) to track instrumented aircrafts, to analyze precipitating structure, or to obtain high resolution measurements along privileged direction, such that along instrumented sites. The step ahead is however the use a high-resolution simulator and a forward radar operator to quantify the advantage of RHI, depending also on the geometry of observations (eg the distance between radar and a convective cell).

Thank you for the referee's review and suggestions. We have referred to the studies listed above in the introduction and highlighted the advantage of the present study regarding the use of high resolution simulations in the abstract and introduction.

It is not clear to me, if, having at disposal one or two research radars, how the sector where RHI sweeps are performed, is identified. Typically, to this purpose, data from volume scans of an operational radar are used by an operator and likely optimal sector is subject to varying in time. Are tools like tobac helpful for an operator? Is it possible to switch to an unsupervised scanning? I think highlighting these points will improve the significance of the manuscript.

Thank you for giving a practical suggestion. In the present study, tobac was applied as a post processing. In the simulated scan strategies, tracking cells was guided by tobac using the VIL estimate from the model full grid every 1 minute. We have clearly mentioned this in Sect. 2.4.2 in the revised manuscript. For the real observations, to guide the RHI tracking for a convective cell, our group has developed an Multi Sensor Agile Adaptive Sampling (MAAS) flamework based on Kollias et al. (2020). The new MAAS has incorporated a cell-tracking algorithm using a watershed technique and predicts the future location of convective cells using multi sensors (e.g., satellite). This has been applied to the TRACER field campaign using the NEXRAD radar at Houston, TX and GOES-16 and showed good performance. We are preparing a separate paper focusing on the new MAAS flamework. In the revised paper, we have mentioned the MAAS in the summary section.

Specific comments.
L 54. Past experiences with PAWR should be better cited.

We have cited a few examples of studies using phased array radar systems (Billam and Harvey 1987; Heinselman and Torres 2011; Mahre et al. 2018; Griffin et al. 2019; Adachi and Mashiko, 2020; Moroda et al. 2021) in the introduction.

L 81. Spatial resolution of CR-SIM is not mentioned.

CRSIM outputs the same grid as the input model grid. We have added the information to Sections 2.1 and 2.4-1).

L 94. Although described in a different paper, could authors explain which radar measurement errors are included in the simulator?

The simulator does not simulate measurement errors that the real radar observations may have (e.g., noise-related error, accuracy, nonuniform beam filling effect), but it accounts for minimum detectable reflectivity as a function of distance. The simulator rather includes uncertainties associated with assumptions in the simulator such as hydrometeor particle shape (aspect ratio).

L 258. “Large rain”>Large raindrops

We have changed it to “Large Dm for raindrops.”

L 382. Please explain IOP

We rephrase this to read “a short-term term intensive observation period where such special scan strategies are performed”.

L 464. The data availability statement should be more specific about accessing data used by the authors.

We have uploaded the VIL product from the two different environment simulations that was used for the cell tracking in this study to Stony Brook University Academic Commons. The data link is (https://commons.library.stonybrook.edu/somasdata/16. We have included this in the revised manuscript.

L 606. Is not clear if tobac identifies splitting and merging and how they are considered in Fig. 2

tobac can identify multiple convective cores embedded in a larger precipitation region and track the multi cores individually. The history record of the trackings does not include whether the tracked cell (core) split or merge, but we can identify it by checking the NetCDF file of cell regions with cell ID (at each timestep). Given the isolated, scattered nature of convection and the limited shear in these case studies (See Figure 2a,b), we expect that the impacts of splits and mergers would be minimal. Future versions of tobac (V1.5) will incorporate mergers and splits, but this was not available for our analyses.

L 627. It is not clear why the peak of Zdr (around 22) is not reflected in any features of Kdp

The larger ZDR shown at the height of ~4 km at around 22:00 UTC could reflect a fewer number of large oblate raindrops. In this region, the total liquid water content is small (<0.5 g m^{-3}) compared to the other

regions. Because KDP is proportional to the water content, the KDP values are small. I have added this discussion to Sect. 3.2.