The manuscript introduced sequential Monte Carlo filters (SMC) to atmospheric chemistry field experiments and demonstrated its capability of enhancing the measured data qualities as well as estimating unmeasured variables. The paper is well-written, and the context is within the scope of AMT. I recommend minor revision before publication if the comments below are addressed.

1. My major concern is the robustness of SMC algorithm when applied to a more complicated system. The study only uses one experiment with 5 dimensions (O3, NO, NO2, JNO2, and gate variable). How does the performance of this algorithm change as the dimension of the system increases?

2. Introducing activity variable as a regularization term prevent the system from mode collapse. However, it is unclear how $p(\eta)$ is chosen even though it is discussed in section 4.4.

3. Line 285-290: Please specify that the results of χ^2 is shown in Figure S3.

4. Line 326: Figure A8 should be Figure S8