Dear Editor,

We thank you for the support during peer-review process and comprehensive technical comments on language editing. We have made all these technical corrections accordingly. Additionally, we have shorten the abstract within 250-word limit and revised the conclusion accordingly. Lastly, we have uploaded the data used in the article to the designated location. Thanks！

Your sincerely,

Xiaohong

Prof. Xiaohong Yao (Ph.D)

Ocean University of China

Response to Reviewer 2

Response: The authors thank very much for the reviewer's comments on language editing. We have made revision accordingly. All revisions are highlighted in yellow. The parts are too large to be elaborated. We only list a few key issues here.

5 *Since R and number of data points have been provided, two-tailed probabilities, P2, can also be shown in many figures and in the text. This would better demonstrate the high values of many R. I have done my best to suggest more appropriate wording that in most cases reduces the text. After these changes this manuscript should be ready to proceed to publication.*

10 **Response:** Thank you for your constructive suggestions on improving our manuscript. We have revised the relevant sections according to your advice and add P values accordingly.

General comments

15 *1.Page 10. L4. Explain residual layer.*

Response: The "residual layer" refers to a relatively stable and less dynamically mixed layer that forms above the surface during nighttime cooling, resulting in a reduction in the height of the Planetary Boundary Layer (PBL). This layer retains some of the characteristics of the daytime PBL, such as higher temperatures and

20 potentially higher concentrations of pollutants.

In the revision, it reads "As reported in the literature, New Particle Formation (NPF) events tend to occur initially in the residual layer, which is formed above the PBL at night, due to high oxidation capacity, low condensation sink, and abundant precursors." in Page 9, L27-L29.

25 *2.Page 10. L38. How could preexisting particles replace?*

Response: In the revision, it reads "The modeling results suggested that the new particles were mostly moved out of the observation zone". The part has been revised in Page 10, L23-L24.

Response to Reviewer 3

The manuscript entitled "Investigating the contribution of grown new particles to cloud condensation nuclei with largely varying preexisting particles - Part 2: Modeling chemical drivers and 3-D NPF occurrence" has been reviewed by two referees. Both referees suggested "accepted subject to minor revisions" and listed a detailed list of required improvements. The authors considered or replied to all the comments of the two reviewers and got the paper up to a level where a publication in ACP is acceptable and recommended.

This manuscript is easy to read and to follow. The results presented in the text and figures are plausible and interesting for the community. The paper mentions the uncertainties or missing knowledge when applying a regional model like WRF-CHEM to study the phenomena of new particle formation and points to improvements or different methods that should be considered to tackle this topic. Following the statement mentioned under reviewer 2, "All models are wrong, but some are useful." this manuscript will initiate new research on NPF.

Response: The authors thank very much for the reviewer's comments on language editing. We have made revision accordingly. All revisions are highlighted in yellow. The parts are too large to be elaborated. We only list a few key issues here.

General comments

1. One of the major comments from reviewer 2 was the use of objective statements throughout the paper. The authors have considered this carefully; however, in the abstract, you should still change the second sentence to: "The model replicated the occurrence of NPF and the growth pattern of newly formed particles, and the performance to meet the benchmark, i.e., 25 absolute mean fractional bias ≤50% and mean fractional error ≤75%, in replicating number concentration of particles in the size range of 10–40 nm in five events between June 29 and July 6."

Response: Agree. In the revision, it reads as "The model replicated the occurrence of NPF and the growth pattern of newly formed particles, and the performance to meet the benchmarks, i.e., absolute mean fractional bias ≤50% and mean fractional error ≤75%, in replicating number concentrations of particles in the 10–40 nm range in five events between June 29 and July 6, 2019." in Page 1, L22-L25.

2. Page 4, line 17: Please change the sentence to: "For measurements took place between June 14 and 30, 2019. ..."

Response: The part has been revised as you suggested in Page 4, L2.

3. Page 5, line 9: It would be helpful for the readers to provide the names, or the physical characteristics of the organics applied.

Response: In the revision, it reads "…low-volatility organic compounds with a saturation mass concentration of 10^{-5}-10^{-8} μg m^{-3}, respectively" in Page 4, L32.

4. Page 5, line 20: I would change this sentence to: "The simulated CN10–40 showed a higher agreement with the observations during June 29 – July 6 (unshaded area in Fig. 2a) than that …"

Response: The part has been revised as you suggested in Page 5, L5-L6.

5. Page 7, line 13: It would be interesting to include the observed and simulated growth characteristics of the events here in the text or in a small table.

Response: The size resolution of modeled results were still too low to conduct a quantitative comparison. In the revision, we added "Moreover, the model partially captured the growth characteristics of new particles while the low size resolution of modeled results cannot allow a quantitative comparison of the growth parameters." in Page 5, L33-L35.

6. Page 7, line 31: Delete the word "successful" as it is very subjective and not meaningful in this context.

Response: The part has been revised as "Based on the reasonable model predictions of NPF events from June 29 to July 6, …" in Page 7, L17.