

Interactive comment on “Impacts of Horizontal Resolution and Air–Sea Flux Parameterization on the Intensity and Structure of simulated Typhoon Haiyan (2013)” by Mien-Tze Kueh et al.

Anonymous Referee #1

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GENERAL COMMENTS:

Through numerical simulation experiments and analysis, the authors present a study aimed at evaluating the influence of horizontal resolution and surface flux formulas on the development of Typhoon. The results show the increase of resolution and more reasonable surface flux formulas leads to an improvement of the typhoon intensity simulation. Although the innovation of the paper is not strong, the relevant conclusions of the paper have a positive impact on typhoon forecast.

It is clear a lot of effort has gone into this research. However, I question the design of the sensitivity experiments. As such, the recommendation is for major revisions, and

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this reviewer feels this manuscript will be improved by addressing the comments below.

SPECIFIC COMMENTS

1. On P8 line 5-9, “Because the simulation result of F2 is somewhat between those of F0 and F1 for other resolutions, we omitted the F2 test at 1-km resolution.” However, judging from the time evolution of typhoon intensity, the observed typhoon intensity is located between 1km F0 and 1km F1 experiments. Is there a better coincidence between 1km F2 and observation?

On P7 line 20-25, the author also mentioned that “F1 predicts larger CH and CQ at all wind speeds than F2 does, implying that F1 has a potentiality to gain larger enthalpy fluxes”, This may also be the reason why the simulated typhoon intensity of 1km F1 is higher than that observed.

Overall, I think the numerical test of 1 km F2 is very critical and cannot be omitted.

2. On P4 line 5, the horizontal grid spacing is 1, 3 and 6 km. So why do the authors still use the updated Kain-Fritsch convective scheme? If the convective scheme is not used, do the simulation results change?

3. On P8 line 10, the general simulation usually chooses to gradually increase the resolution through nesting, while all resolution simulations in this paper do not use nesting. Why?

4. Section 2 should be divided into subsections, such as 2.1 moisture roughness length, 2.2 momentum roughness length, 2.3 bulk transfer coefficients, 2.4 experimental designs.

5. On P8 line 16-17, please show the original resolution of GFS data used.

6. From Fig. 4a, it is difficult to distinguish the track difference between different sensitivity tests, and it is suggested to modify this figure.

7. On P9 Line 6, “The intensity is not very sensitive to the resolutions of 3 and 6 km. . .”,

while I think it is sensitive enough.

8. There is no observed typhoon structure in this article as a comparison, and it is suggested to add corresponding figures.

9. The authors can introduce the use of contoured frequency by altitude diagrams. Maybe some readers are not familiar to those figures.

10. In general, this quality of this paper is a little difficult to be understood by readers. I hope the authors can carefully revise some long sentences to make it easy to understand.

11. Why doesn't the positive effect of reasonable surface flux formulas be enhanced efficiently if the grid spacing is relatively large? It should explain more clearly in the paper.

TECHNICAL CORRECTIONS

1. Page 3, Line 27, change “reaches” to “reached”
2. Page 7, Line 29, change “were” to “was”
3. Page 7, Line 31, change “level-off” to “level-offs”
4. Page 8, Line 3, change “between” to “among”
5. Page 8, Line 4, this sentence is incomplete.
6. Page 9, Line 30, change “agree” to “agrees”
7. Page 11, Line 18, change “enhanced” to “enhancement”
8. Page 12, Line 29, change “increases” to “increase”
9. Page 13, Line 22, change “detail” to “detailed”
10. Page 13, Line 23, change “increase” to “increases”

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11. Page 15, Line 5, change “between” to “among”
12. Page 15, Line 13, change “consider” to “considering”
13. Page 15, Line 24, change “that” to “than”
14. Page 17, Line 26, change “represent” to “represents”
15. Page 18, Line 21, change “fluxes” to “flux”
16. Page 18, Line 32, change “later” to “layer”
17. Page 19, Line 19, change “as” to “for”

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