

Interactive comment on “Quantifying the added value of high resolution climate models: A systematic comparison of WRF simulations for complex Himalayan terrain” by Ramchandra Karki et al.

Anonymous Referee #2

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The manuscript's goal to better understand the importance and effects of grid resolution on climate simulation in complex terrain is important. Especially, there is still a lack of studies with regional climate models in the convection permitting scale range. The manuscript is well designed and written in general too. I have two major issues (or better to say: wishes) and a few minor comments as given below. Therefore, I suggest a major revision.

The manuscript discusses simulations with 25, 5, and 1 km. One result is that the 25-km simulation misses the observed diurnal cycle and the authors explain this by a

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lack of ability of the simulation to resolve the complex orography. Another explanation might be that convection parameterisations have an issue in simulating a proper diurnal cycle. It would add value to the manuscript if the authors can do simulations with 5 or 1 km set-ups, but the orography smoothed to the 25-km simulation orography. This would strongly support the authors conclusion.

There is no shallow convection parameterisation applied in the 5-km set-up? Please, clarify. I assume simulations with or without shallow convection differ substantially in the case of the 5-km set-up.

Minor comments:

1. The first part of the title is too general and in the second part the reference of the comparison is missing (perhaps better to replace comparison with evaluation). I suggest the title to be revised.
2. Please, give a reference to the TREELINE project already in the introduction.
3. Sec. 2: decrease of the precipitation in the valleys with and because of north-south orientation?
4. Eq. 1 & 2: Index m missing at the O_s in the numerators?
5. You refer to Fig. S1 two times. If it is an important Fig. think about putting it in the main text.
6. Page 9, line 25: These are the mean observed temperatures probably?
7. At the end of Sec. 4.1 there is some speculation which should be avoided.
8. Page 12, line 23: Earlier in the manuscript it was mentioned that bias correction was applied for temperature. Why does the coarse simulation show smoothness after bias correction using the fine-scale orography?
9. Fig. 2 can be omitted. I think the text can be shortened quite a bit if carefully

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reconsidered. There are some minor language issues like missing “a”s, “s”s and “the”s.

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