

## ***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**

Received and published: 9 May 2017

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

C1

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

C2

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

---

Interactive comment on Earth Syst. Dynam. Discuss., doi:10.5194/esd-2017-31, 2017.