

Geosci. Model Dev. Discuss., author comment AC3
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Reply on RC2

Stefan Hergarten and Jörg Robl

Author comment on "The linear feedback precipitation model (LFPM 1.0) – a simple and efficient model for orographic precipitation in the context of landform evolution modeling" by Stefan Hergarten and Jörg Robl, Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-179-AC3>, 2021

Dear Sebastian Mutz,

thanks a lot for your encouraging comments!

You are definitely right that we should clarify the focus of the model development already in the title. There is a huge gap between regional climate models and these oversimplified models such as the linear model originally proposed by Smith and Barstad. So our goal was indeed to develop a model that is a bit better than the simple linear model.

One thing that we will definitely include in a revised version is a more detailed comparison to the linear model. Such a comparison can even be done on a semi-quantitative level, so by analyzing which phenomena are captured "realistically" by which model. The discussion paper mentioned some aspects only theoretically, and it would be helpful for the readers to see some examples.

While we wrote the manuscript, we also did some comparison with TRMM data at the Himalayas, where our model was able to reproduce the large-scale precipitation patterns reasonably well. The match was, however, by far not perfect, and we arrived at a point where we could not tell whether the simple precipitation model or the assumption of a uniform flow field with a single source of moisture are more severe. We will point out more clearly that there is still a huge gap to regional climate models and will also look at our previous attempts to "validate" the model again.

Discussing the potential caveats, e.g., that large changes in topography may not only change the precipitation pattern, but also the circulation pattern, is also a good point. For the moment, there are still "enough" open questions that can be addressed on a rather generic level (with artificial topographies), but this will require further developments as soon as we proceed towards the evolution of real orogens.

Concerning the code, I already developed a commented standalone version (approx. 200 lines C++ code), which will be made available in a few days at the OpenLEM page and also in the code and data repository of the revised version.

Best wishes,
Stefan

