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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simulating orographic rainfall with a limited-area, non-hydrostatic atmospheric model under idealized forcing" *by* A. Pathirana et al.

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Interactive Comment on Simulating orographic rainfall with a limited-area, non-hydrostatic atmospheric model under idealized forcing Authors: A. Pathirana, S. Herath, and T. Yamada

Major Comment

Pathirana, Herath and Yamada used a modified operational 3-D, non-hydrostatic, limited-area atmospheric model (MM5), to perform high-resolution, idealized simulations of interaction of orographic features with a special wind-field. Different effects on the quantity and distribution of orographic rainfall were investigated. The authors got

some interesting results which show that as well as atmospheric parameters topography influence the accumulated rainfall . This is a very interesting topic because precipitation belongs to the most worst predictable forecast parameters. In the available work the simulations would be made with a system which can be seen as a compromise between simplified models and numerical models. This could be riched with physical simulations where some model parameters and boundary conditions are idealized. This is an interesting method with which it was possible to isolate the idealized parameters from the other atmospheric parameters. The authors present results of idealized numerical experiments over a mountain ridge. It is known that mountainous areas receive more rainfall than other regions and so it is important for disaster management to know as much as possible about the rain dependent from the orographical height. The authors also pointed out that the airflow over the objected terrain play a decisive role for the development of rain and analysed the influence of several atmospheric and topographic parameters which interact with winds by generating precipitation. The work of Pathirana, Herath and Yamada contributes to this important research topic.

Minor Comments

1: Statement in paragraph 3, page 5633, line 15: It should be explained why there is no precipitation formed.

2: Statement in paragraph 3, page 5634, line 1: Here it is a little bit unclear why the precipitation gets re-evaporated. In the conclusion it is better explained.

3: Statement in paragraph 3, page 5634, line 2: The statement in brackets belongs to which figure?

4: Statement in paragraph 4, page 5637, line 11: This statement is not clear. Why may it have negative influence on organ. of conv. cells.

5: Statement in paragraph 5, page 5638, line 15: What computersystem was used? Maybe with other system more results in shorter time possible?

ACPD

4, S1982–S1984, 2004

Technical Comments

1: Statement in paragraph 1, page 5626, line 4: => an infinitely ...

2: Statement in paragraph 2, page 5630, line 26: Explain that u is velocity in x-dir. and v in y-dir.

3: Statement in paragraph 2, page 5631, line 2: If the density is declared the other parameters should be declared too maybe in an Appendix.

4: Statement in paragraph 3, page 5632, line 24: A bracket too much.

5: Statement in paragraph 3, page 5633, line 10: clouds without ’

6: From page 5633 very often ’however’

7: Statement in paragraph 4, page 5635, line 3: Wind without ’s’. 8: Statement in paragraph 4, page 5635, line 4: After 20 also ’m/s’.

9: Statement in paragraph 4, page 5636, line 4: Indian Ocean.

10: Statement in paragraph 5, page 5638, line 13: ’was’ before used.

11: In figure 2: What can be seen in the lower picture?

12: In figure 9 the text is not good readable.

Altogether it is an interesting comprehensible paper with interesting results - most of the simulations agree with common observations. The numerical simulations with idealized terrain and atmospheric parameters exposed many important features of the rainfall and other atmospheric processes, related to the interaction of large-scale winds over orographic features. It was not sufficient to make only analytical studies to get these results.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 5625, 2004.

ACPD

4, S1982–S1984, 2004

Interactive Comment