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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Evaluating intense precipitation in high-resolution numerical model over a tropical island: impact of model horizontal resolution" *by* N. Yu

Anonymous Referee #4

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The authors simulate one weather situation with an intense precipitation event over the island of Reunion using grid spacings of 4km and 2km in a rectangular domain of 360km length and fo 1km and 500m in a domain of 180 km lngth. They conclude that the 1km resolution is needed to simulate correctly the precipitation event.

1. General comments

The domain selected and the case discussed are appropriate to discuss the impact of model resolution on the simulation. However, the conclusion is based on (limited) observations of that particular case and plausibility arguments rather than a sound sci-

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entific proof. The simulation concept is inappropriate to draw such conclusions without further simulations and/or theoretical analysis. There are different alternative hypotheses which have not been excluded.

1. The difference in simulation results might be related to the domain size and the change of the method of nesting from 1-way to 2-way and not to the spatial resolution of the models grid.

2. Each change in the configuration can be regarded as a disturbance experiment or another realisation. Due to sensible dependence on initial conditions this might lead to another weather situation. This has not been excluded.

3. In general, the physical parameterisations of turbulence and convection are not independent on the spatial resolution of the model. The relation of grid scale and physical parameterisations is not discussed and not proof is given that the results shown are not dominated by differences in model physics.

4. The frequency of the update of the boundary conditions every 6h and the constant vertical resolution might have an impact on the simulation results, in particular for small domains and high resolutions.

The vertical crossection shown in Fig. 11 exhibits a typical space scale of the convective cells of 10-20 km. The grid scale of 2km should resolve these structures. A scale analysis of the processes necessary to be simulated explicitely is missing and a proof that this cannot be represented by a 1km grid scale resolution.

Therefore it is recommended to reject the article in the present form for publication

2. Specific scientific comments

A summary of results already published is found in the section conclusions rather than in the introduction.

At many places qualities like "precise" or "reliable" are used instead of quantities.

NHESSD

2, C1732–C1734, 2014

The difference between grid scale and effective model resolution is not considered at all. Thus the grid scale of 50m needs not to resolve turbulence and 1km the convective motion.

The effect of the domain size on the simulation results is not discussed. In particular the domain for the 1km and 500m simulations is very small.

The update of the boundary conditions every 6h is inappropriate for convection permitting and resolving simulations.

A reference for the the 2-way-coupling mode is missing.

3. Technical corrections

The language needs to be improved.

The Figure captions and axis descriptions are not always complete

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