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Interactive comment on "ASAM v2.7: a compressible atmospheric model with a Cartesian cut cell approach" *by* M. Jähn et al.

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Thank you for your response and critical remarks. Note that some of your questions might already be answered in our response to Referee#1.

reg. 1) We are aware of these articles and will cite them. A Rosenbrock citation with application to the incompressible Navier-Stokes equation is included. We mention an old own paper with respect to this subject.

reg. 2) This is the first description of the model ASAM in the literature. Part of the numerics and some model application are already described in the literature.

reg. 3) We will add a term representing some type of Reynolds stress, depending on the application.

reg. 4) We did some notation changes and tried to improve the representation of the main cut cell.

reg. 5) Most of the formulas describing the spatial discretization involve the cut cell information, like free face area and free volume. No other tricks are used in the code.

reg. 6) There was a typo and we corrected it.

reg. 7) Total mass and the mass of water substances are conserved by construction. Regarding other properties like total energy we do not expect any exact conservation. We will add a bubble experiment where the bubble interacts with the topography to demonstrate "good" energy conservation. We have added a short note how surface fluxes are distributed in the vicinity of a cut cells.

reg. 8) We will add the valley example from the inter-comparison paper by Schmidli et al. (2011), which includes part of the soil-vegetation model to compute surface fluxes and turbulence parameterization amongst others.

reg. 9) We have changed the number and field of values for the contour plot. The viscosity is switched on and is taken as a part of the viscous tensor with the prescribed fixed diffusion coefficient. See also our new energy test.

reg. 10) We follow the description of the original paper of Bryan and Fritsch (2002) in full detail. In your recommended moist test case with cut cells the main flow evolves in the undisturbed part of the domain. Hence we see no benefit from this exercise. To "shorten" the paper we can also remove this test case.

reg. 11) Note that we have added a second mountain test case, now with moisture and a steeper hill.

reg. 12) We would like to keep this "real" test case in the paper, but in a re-worked and condensed version. It will be a simple sensitivity study with 1) a flat island surface and 2) the real island orography to demonstrate terrain effects and that the inclusion of real topographical structures works well. Extensive analyses regarding this topic will be postponed to future papers. The authors think that this is still a good and meaningful test case since it shows how the numerics, the discretization and the model physics interact (even if there is no possibility to compare with other studies [yet]). For this test case, we will now use the BOMEX (Barbados Oceanographic and Meteorological Experiment) profile, which is extensively described in the literature, cf. Siebesma et al. (2003). It also includes a realistic wind profile. Surface drag will be directly modeled by the momemtum flux parameterization. Issues with variable vertical grid spacing will be addressed in the valley example (cf. point 8).

References: Juerg Schmidli, Brian Billings, Fotini K. Chow, Stephan F. J. de Wekker, James Doyle, Vanda Grubišić, Teddy Holt, Qiangfang Jiang, Katherine A. Lundquist, Peter Sheridan, Simon Vosper, C. David Whiteman, Andrzej A. Wyszogrodzki, and Günther Zängl (2011): Intercomparison of Mesoscale Model Simulations of the Daytime Valley Wind System. Mon. Wea. Rev., 139, 1389–1409.

A. Pier Siebesma, Christopher S. Bretherton, Andrew Brown, Andreas Chlond, Joan Cuxart, Peter G. Duynkerke, Hongli Jiang, Marat Khairoutdinov, David Lewellen, Chin-Hoh Moeng, Enrique Sanchez, Bjorn Stevens, and David E. Stevens (2003): A Large Eddy Simulation Intercomparison Study of Shallow Cumulus Convection. J. Atmos. Sci., 60, 1201–1219.

Interactive comment on Geosci. Model Dev. Discuss., 7, 4463, 2014.