

We thank both reviewers for reading the revised version and the editor for handling the manuscript. Please find below our responses in italic and blue.

Report # 1

I feel that the authors have answered my concerns adequately. The addition of Figures 11 and 17 probably justifies keeping the word 'clouds' in the title. The qualitative nature of the paper (as also commented on by the other reviewer) remains, although there have been a few small improvements in this regard. Overall I think it is in a publishable state now, particularly since the authors state in the 'response to reviewer comments' that this paper presents the first non-idealised COSMO simulations in the literature at the 250-500m scale. If the authors are confident of this fact, I recommend mentioning it in the abstract.

We are not aware of any non-idealised COSMO simulations in the peer-reviewed literature at these resolutions so far. We therefore added this fact in the abstract as suggested.

Overall I can recommend to publish once the minor revision outlined below is addressed.

L324-331 This section isn't particularly clear.

If I have understood correctly, I suggest changing this:

“The point where the individual spectra decrease stronger than the $-5/3$ slope determines the effective resolution of the model. It was found to be approximately between 6–7 times the horizontal grid spacing in the literature (e. g. Bryan et al., 2003; Skamarock, 2004; Petrik, 2012). Our simulations also show this characteristic behaviour as the region where the spectra differ from the $-5/3$ slope (marked by the gray shaded areas), lies between 6–7 x”.

to this:

“The point where the gradients (in log-space) of the individual spectra decrease below $-5/3$ determines the effective resolution of the model. Previous studies have suggested that this occurs at length-scales between 6 and 7 times the horizontal grid spacing (e. g. Bryan et al., 2003; Skamarock, 2004; Petrik, 2012). Our simulations show the same behaviour; the gradient of the spectra decreases below $-5/3$ between 6-7 x (marked by the gray shaded areas).”.

We changed our text to the one suggested by the reviewer.

I didn't follow the last part, so please revise:

“Another feature evident here is that the runs with 250m grid spacing possess a slightly weaker decrease before reaching the point of the effective resolution. This might be explained by shorter wavelengths aliases to longer wavelengths (Skamarock, 2004).”

We rephrases this part to:

Another feature evident here is that the runs with 250 m grid spacing possess a region with slightly increased energy density (when compared to the $-5/3$ slope) before reaching the point of the effective resolution. This might be explained by energy from shorter wavelengths aliased to longer wavelengths (Skamarock, 2004).

Report # 2

The revised version of the manuscript contains considerable improvements in comparison to the first version. The paper is in a publishable format and only two minor comments remain which I would kindly ask the authors to address before submitting the final version of the paper.

Minor comments:

- Line 174: Is there a reference available where the relation between the parameterization of shallow convection and moisture transport is discussed?

There is no reference available for these high resolutions, but the original Tiedtke-paper and COSMO model documentation of the physical parameterizations (including the parameterization of shallow and deep convection) could be cited here. We included both references.

- Conclusion Section: In section 2.1 the authors discuss the need for changes in the number of vertical levels and time-stepping to cope with orographic effects. Nevertheless, an increase in vertical resolution can significantly improve the representation of inversion layers or the vertical structure of the atmosphere in general. This can under certain conditions have effects on the initialization of convection or the convective inhibition, respectively. Within the conclusions section, the authors should briefly discuss or at least mention the effect of increased vertical resolution on the representation of (capping) inversions.

We mentioned this as suggested by the reviewer. The comparison of simulated profiles to observations is part of ongoing work.

Technical

comments:

- Figure labels and text within figures are in general very small. Perhaps the authors can increase font size to improve readability.

Some of the figures were resized by the technical editor. We adjusted some of the figure sizes again for better readability.