

We express our sincere thanks to P. Huybrechts for his comments that helped to improve the quality of our manuscript. In the following, we answered his comments and short comments. They appear in bold while our answers are written in normal font.

Based on the comments from one solicited reviewer, one unsolicited CROCUS user, and my own reading of the manuscript, I recommend that this paper eventually be accepted for publication in GMD. The CROCUS model is used quite extensively within the French meteorological community and has evolved substantially from 1990s papers by Brun and co-workers. More recent developments and improvements have often been described in institutional reports that are not always readily accessible to the wider scientific community. The recent implementation of Crocus in SURFEX v7 is therefore a welcome opportunity to more fully document the current state of the snowpack scheme. This is a useful paper and GMD is well suited for this type of publications. My own editorial comments, to which the authors should respond, include:

p. 2366, l. 13: ‘insure’ should be ‘ensure’. Insure may be correct in American spelling but refers to ‘insurance’ rather than the intended ‘make sure that’. Insure also appears elsewhere in the manuscript.

Correction included

p. 2367-2368, and elsewhere: I am not particularly fond of bullet lists in scientific publications. This should be avoided and be replaced by a fluent text, if necessary by creating additional subdivisions. Also applies to pp. 2369-2370.

The two bullets list were removed and replaced by fluent text. Three paragraphs replace the three items of the first bullet list (pp. 2367 and 2368) while a single paragraph includes the three items of the bullet list at pp. 2369-2370.

p. 2367, l. 24: parametrize: again , this is American spelling, and one would prefer parameterize or parameterise. Personally I dislike the American spelling but as long as it is used in the manuscript in a consistent way, that is acceptable.

We systematically corrected the text and used the UK spelling (to parameterize, parameterization).

p. 2367, l. 26: aging: again, this is the American equivalent of ageing. This is my last comment on American vs,. UK spelling.

We systematically corrected the text and used the UK spelling (ageing).

p. 2369, l. 15: ‘term’ should be ‘terms’

Correction included

p. 2369, l. 15: SWE is not defined at its first appearance but should be. As a general remark, this applies to all abbreviations. For the specialist, it is clear SWE should be snow water equivalent, but not to the general reader. It would equally be helpful to include an appendix with the explanation of all abbreviations.

SWE is now defined at its first appearance. We also checked the rest of the paper and defined abbreviations when they first appear.

p. 2372, l. 9-13: replace the bullet list by a fluent text, perhaps by using (i), (ii), (iii),

A fluent text replaces the bullet list.

p. 2375, l. 17: ‘thoses’ should be ‘those’

Correction included

p. 2381, l. 1-2: ‘resistances’ should be ‘resistance’. A better word is perhaps friction?

We clarified the term ”resistance” and used ”aerodynamic resistance” instead.

p. 2384, l. 2: ‘to’ should be ‘from’ Correction included.

p. 2384, l. 26: ‘contribution’ should be ‘contributions’. Correction included

p. 2387, l. 5: ‘such file’ should be ‘such a file’. Correction included

p. 2388, l. 9: add ‘N’ and ‘E’ to the geographical coordinates of Col de Porte. Correction included

p. 2388, l. 25 ‘in’ should be ‘of’ Correction included

p. 2389, l. 23: ‘satisfyingly’ should be ‘satisfactorily’ Correction included

p. 2390, l.5: ‘We here’ should be ‘Here we’. Correction included

p. 2390, l. 13: separate ‘300’ from ‘m’. Correction included

p. 2391, l. 6-7: what is a ‘two-moment scheme’?

Snow is transported in the atmosphere using a double moment scheme. The model simulates the evolution of the number concentration and density of blowing snow particles in the atmosphere. This approach is similar to double moment scheme used to simulate cloud processes. However, this sentence is not part anymore of the paper since we decided to remove the section describing the coupling between Meso-NH and Crocus (see comment 8 of reviewer 1).

p. 2391, l. 20: ‘ongoing’ should be ‘progress’ Correction included

p. 2392, l. 21: ‘implementing’ should be ‘implemented’. Correction included

p. 2392, l. 15: ‘term’ should be ‘terms’. Correction included

p. 2392, l. 27: remove ‘a’ before ‘stand alone’. Correction included

p. 2393, l. 3, remove ‘,’ after ‘including’. Correction included

p. 2393, l. 17: ‘in order’ should be ‘envisaged’ or ‘planned’. Correction included

p. 2394, Appendix A: the list of symbols and units is by no means complete. Why are most of the symbols mentioned in the text not included?

Appendix A has been completed by adding all the symbols mentioned in the text.

References

I did not check the one-to-one correspondence between the reference list and the text, but noted the following:

I don’t think it is necessary to include at which page a certain reference is cited – however ignore this comment if this was done by the typesetting office. This has been included by the typesetting office.

Check whether ‘in press’ references have already been published. We update the reference to refer to the work of Decharme et al (2011).

Gordon et al (2006): which journal is Atmos.-Ocean? "Atmos.-Ocean" refers to the journal "Atmosphere Ocean", a publication of the Canadian Meteorological and Oceanographic Society.

Loth and Graf (1998): more details required on the subject of this JGR (is it A,B,C,D,: : :?) Correction included

Masson (in prep.): remove 'in prep.' publications if not already submitted/ accepted. This paper is still in preparation. Therefore, we removed it from the list of references and used instead a reference to the Scientific Documentation of SUREFX:

Le Moigne, P., Boone, A., Calvet, J.-C., Decharme, B., Faroux, S., Gibelin, A.-L., Lebeaupin, C., Mahfouf, J.-F., Martin, E., V., M., Mironov, D., Noilhan, J., P., T., and Van Den Hurk, B.: SUREFX Scientific Documentation, Note de centre du Groupe de Météorologie à Moyenne Echelle, 87, Météo-France, online available 660 at: <http://www.cnrm.meteo.fr/surfex/>, last access: April 2012, CNRM, Toulouse, France, 211 pp., 2009.

Noilhan and Planton (1989): are the funny symbols really part of the doi? The doi was not properly interpreted. We therefore decided to remove it.

Vionnet et al. (2011): IUGG did not produce proceedings. This is only an abstract and should not be included in the reference list. This reference is not included anymore.

Vionnet et al. (in prep.): what is the status of this paper? Remove when not accepted or in press. This paper is now accepted. A sentence refers to this study : "In alpine environments, this parameterization is needed to capture satisfactorily the occurrence of blowing snow events and mass fluxes during those events (Vionnet et al., accepted)"

p. 2410, fig. 4: labels and lettering are much too small to read. The size of labels and lettering has been increased.

p. 2415, caption of Fig. 9: 'top meter' should be 'the top 1 meter'. Correction included