Page 7:
- “frost”-enhanced JSBACH model (page 7)
I suggest to replace “frost” with permafrost or “freeze thaw”.

We are using permafrost now.

- http://arcticlcc.org/products/spatialdata/show/simulated-mean-annual-ground-temperature
Please provide a citation if available.

There was no reference given to the dataset but we included this citation which should be the right reference to GIPL 1.3.

Marchenko, S.; Romanovsky, V. & Tipenko, G. Numerical modeling of spatial permafrost dynamics in Alaska Proceedings of the Ninth International Conference on Permafrost, Fairbanks, Alaska, USA, 29 June–3 July 2008.

-"..respective GTN-P Thermal State of Permafrost (TSP) snapshot data has been dowloaded from the National Snow and Ice Data Center (NSIDC)…”
Please provide the link and potential citation.

We believe it is important to cite the scientific papers behind this compilation of borehole measurements: Romanovsky et al., 2010; Christiansen et al., 2010; Smith et al., 2010. In addition we further included URL and citation of the specific dataset that has been downloaded from the NSIDC:

“The respective GTN-P Thermal State of Permafrost (TSP) snapshot data (International Permafrost Association (IPA), 2010) has been dowloaded from the National Snow and Ice Data Center (NSIDC) at http://nsidc.org/data/G02190#”

- You are using °C and deg C, please unify throughout the paper

Many thanks, that is corrected.

Page 10:
-“Under these climate conditions, it is raining more often a little bit and air temperature are not extreme resulting in more moist conditions for lichens and bryophytes, hence higher thermal diffusivity.”
Please correct sentence (air temperature is)

Thank you

Page 11:
- The increasing differences in the variability of meteorological variables under conserved long-term averages leads
Please correct sentence (lead)

Thank you

Page 12:
- “the direction of the conclusions are carefully inverted in this discussion section.”
Please rephrase, it is not clear what this sentence means (as already suggested by the reviewer).
Why is this text bolded and highlighted? I suggest to remove this format.

Bold text format has been removed. The sentence has been revised as follows; hopefully better understandable:

“However, for interpreting the results in terms of future ecosystem responses to {\itshape increasing} climate variability \cite[]{Seneviratne2012}, the results of the CNTL model run are compared against the results of the REDVAR model run in this discussion section (CNTL-REDVAR).”

For the discussion it makes more sense to discuss what would be the effect of increasing variability and hence treat REDVAR as the control model run.

Page 22: Figure 4: Please correct format (a and b should be aligned)?

This is corrected

Page 23: Figure 6: Please align figures.
This is corrected

None of your figures have a- d labeling, but captions refer to a-d. Please add.
The labelling of subfigures is done automatically by latex in the sub-captions. We hope this is in line with publisher and journal specifications.

Page 14: Conclusion
-Overall, the soil temperature response to increasing climate variability and extreme event frequency (soil cooling) will be opposite to the response of soil temperature to gradually increasing air temperature (soil warming). This shows the importance of representing dynamically snow and lichen and bryophyte functions in Earth system models for projecting future permafrost soil states and land-atmosphere interactions, hence future climate.

I do not understand why these sentences are connected (“This shows..”). Please add an explanatory sentence connecting these two sentences.

We restructured (one sentence moved) and slightly rephrased the conclusions section as follows. Hopefully, this is better understandable now:

“Artificial model experiments have been used in order to quantify the impact of the variability of meteorological variables on the long-term mean of mean annual ground temperature in permafrost-affected terrestrial ecosystems. In future, the soil temperature response to increasing climate variability and extreme event frequency (soil cooling) will be opposite to the response of soil temperature to gradually increasing air temperature (soil warming). Is has been shown that snow and near-surface vegetation dynamics are the underlying mechanisms for this. Therefore, dynamics of snow and lichen and bryophyte functions need to be represented in Earth system models for validly

projecting future permafrost soil states and land-atmosphere interactions, hence future climate. Our findings also point to the need to represent changes in short-term variability of meteorological variables in bias-corrected climate data of future periods."