Dear editor and reviewers,

Thanks for your comments, recommendations and revisions. Every comment and suggestion from reviewers have been responded point by point, and corresponding modifications and explanation had been reflected in the revised manuscript based on reviewers' suggestions. The summary of the changes includes:

1) We added a photo link in figure A1 to make reader clearly see the grain photos.
2) We merged the time variables year, month, day, hour, minute and second into a variable "time".
3) We asked for an English edition to make the paper more easily read, and checked all references and citations to make them consistent.

Comments to the author:

After carefully reviewing the attached reviews and your manuscript, I think this paper can be acceptable for publication, but it needs to be revised according to the reviewers' comments:

(1) Before final acceptance, I suggest that the authors still make the figure A1 presentation changes. I am not sure if ESSD can accept the digital presentation. It would be more informative to present those snow grain size photos on a much larger scale (say one photo per page) so readers can see them clearly. Or add the photo link in the figure caption so that readers can access the original high-quality images.

Re: Thanks for the recommendation. We uploaded all grain photos, and added a photo link in the caption.

"Figure A1: Photos of grains and reference ruler in each layer on February 15, 2016, and in each photo the longest and shortest axis lengths of the chosen grains are labeled."

was revised to

Figure A1: Photos of grains and reference ruler in each layer on February 15, 2016. In each photo the longest and shortest axis lengths of the chosen grains are labeled. Original photos are in URL: http://arcticroute.tpdc.ac.cn/navigate/bmp

(2) It is very nice to combine several of the text files into NetCDF datasets. But the year/month/day/minute/second variables are redundant and can be removed because this information is contained in the 'time' coordinate.

Re: Thanks. We merged variables "year", "month", "day", "hour", "minute", "second" into a variable "time". For example: in "TBdata.nc", variables "year", "month", "day", "hour", "minute", "second" were merged as a variable "time" which was described as yyyy-mm-dd hh:mm:ss; in "Manual snow pit data.nc", variables year, month, day were merged as a variable "time" which was described as yyyy-mm-dd. Table 3 was also updated.

(3) The text is understandable but would benefit from English language editing.

Re: We asked for an English edition. Please see make-up manuscript.

(4) There are several in text citations missing from the reference list and referencing style is somewhat inconsistent.

Re: Thanks for the careful check. We checked the citations and references, removed the references not

cited in text, added the missing references, and completed all references according to journal guideline.

L52: Pulliainen et al., 2020

After English edition, Pulliainen et al., 2020 was not cited.

Moreover, we added:

Fierz, C., Armstrong, R.L., Durand, Y., Etchevers, P., Greene, E., McClung, D.M., Nishimura, K., Satyawali, P.K. and Sokratov, S.A.: The International Classification for Seasonal Snow on the Ground. IHP-VII Technical Documents in Hydrology N °83, IACS Contribution N °1, UNESCO-IHP, Paris, 2009.

In-text citations missing from reference list:

Aoki et al., 2003 and 2000

After English edition, Aoki et al., 2000 was not cited

Aoki, T., Hachikubo A., and Hori, M.: Effects of snow physical parameters on shortwave broadband albedos, J. Geophys. Res.,108 (D19), 4616, https://doi.org/10.1029/2003JD003506, 2003.

Tedesco and Kim 2006

Tedesco, M., and Kim, E.J.: Intercomparison of electromagnetic models for passive microwave remote sensing of snow, Ieee Transactions on Geoscience and Remote Sensing, 44, 2654-2666. https://doi.org/10.1109/TGRS.2006.873182, 2006

Royer et al. 2017

Royer, A., Roy, A., Montpetit, B., Saint-Jean-Rondeau, O., Picard, G., Brucker, L., and Langlois, A.: Comparison of commonly-used microwave radiative transfer models for snow remote sensing, Remote Sensing of Environment, 190, 247-259. https://doi.org/10.1016/j.rse.2016.12.020, 2017.

Zheng et al. 2021a and 2021b -> only Zheng et al. 2021 listed; however, there is a Zhang, Zheng et al. 2021.

One of Zheng et al., 2021 should be Zhang et al., 2021

Roesch et al. 1999

Roesch, A., Gilgen, H., Wild, M., and Ohmura, A.: Assessment of GCM simulated snow albedo using direct observations, Climate Dynamics, 15, 405– 418, https://doi.org/10.1007/s003820050290, 1999.

Mabuchi et al. 1997

Mabuchi, K., Sato, Y., Kida, H., Saigusa, N. and Oikawa, T.: A biosphere-atmosphere interaction model (BAIM) and its primary verification using grassland data, Papers in Meteorology and Geophysics, 47, 115– 140, https://doi.org/10.2467/mripapers.47.115, 1997.

In reference list but not cited in text:

Jordan, R.E.: A One-Dimensional Temperature Model for a Snow Cover: Technical Documentation for SNTHERM.89; U.S. Army Cold Regions Research and Engineering Laboratory: Hanover, NH, USA, 1991.

Yang, Z.L., Dickinson, R.E., Robock, A., and Vinnikov, K.Y. : Validation of the snow submodel of the biosphere-atmosphere transfer scheme with Russian snow cover and meteorological observational data. Journal of Climate, 10, 353-373, doi:

10.1175/1520-0442(1997)010<0353:Votsso>2.0.Co;2, 1997.
Zhang, P., Zheng, D., van der Velde, R., Wen, J., Zeng, Y., Wang, X., Wang, Z., Chen, J., and Su, Z.: Status of the Tibetan Plateau observatory (Tibet-Obs) and a 10-year (2009–2019) surface soil moisture dataset. Earth Syst. Sci. Data, 13, 3075–3102, https://doi.org/10.5194/essd-13-3075-2021, 2021.

Re: They were deleted, Zhang et al. 2021 remained.

Reference missing year:
Essery, R.: A factorial snowpack model (FSM 1.0). Geosci. Model Dev. 2015, 8, 3867–3876. [should be 2015]

Re: it was completed

Essery, R.: A factorial snowpack model (FSM 1.0), Geosci. Model Dev. 8, 3867–3876, https://doi.org/10.5194/gmd-8-3867-2015, 2015.

Duplicate references:
Roy, A., Picard, G., Royer, A., Montpetit, B., Dupont, F., Langlois, A., Derksen, C., and Champollion, N.: Brightness Temperature Simulations of the Canadian Seasonal Snowpack Driven by Measurements of the Snow Specific Surface Area. Ieee Transactions on Geoscience and Remote Sensing, 51, 4692-663 4704, doi: 10.1109/Tgrs.2012.2235842, 2013. 664

AND

Roy, A., Picard, G., Royer, A., Montpetit, B., Dupont, F., Langlois, A., Derksen, C., and Champollion, N.: Brightness Temperature Simulations of the Canadian Seasonal Snowpack Driven by Measurements of the Snow Specific Surface Area, IEEE T. Geosci. Remote, 51, 4692–4704, 667 doi:10.1109/TGRS.2012.2235842, 2013

Re: One of them remained and was modified to:

Roy, A., Picard, G., Royer, A., Montpetit, B., Dupont, F., Langlois, A., Derksen, C., and Champollion, N.: Brightness Temperature Simulations of the Canadian seasonal snowpack driven by measurements of the snow specific surface area, Ieee T. Geosci. Remote., 51, 4692-4704, https://doi.org/10.1109/Tgrs.2012.2235842, 2013.