

Interactive comment on “Nordic Snow Radar Experiment” by J. Lemmetyinen et al.

Anonymous Referee #1

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The manuscript presents continuous time series of active and passive microwave observations at the Finnish Meteorological Institute Arctic Research Centre (FMI-ARC) in Sodankylä, Finland, from 2009 to 2013. In complement to microwave observations, several manual in situ data collection were acquired. An overview of the weather and snow condition as well as microwave signature with some description is then given. The radiative transfer model MEMLS is then used to model the TB for active and passive measurements. The dataset is available through European Space Agency and the Finnish Meteorological Institute

The study, present an impressive dataset of combined passive and active microwave observations. This kind of database, made available to the scientific community, could be of great use for radiative transfer model validation and cryosphere monitoring algorithm development. The manuscript is well written and concise. However, I do not see the interest of Section 5 on model analysis considering the limited analysis/discussion

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of the results.

Hence, I recommend publication in Geoscientific Instrumentation, Methods and Data System following some revisions as outlined in the following report.

1. From the title, we expected that the database is only on radar measurements. I proposed to change it to include passive microwave observations (it is a proposition).
2. In the abstract, I would include the name of the site.
3. Some dataset are mentioned, but not presented. It could be interesting to explain why some dataset are not presented and mentioned if the dataset are available to the scientific community.
4. p.3 - Line 12-13 : give references
5. p. 3 - Line 23 : give lat/lon of the site
6. Define in the text what is NosREx III and IV (year 3 and 4 ?)
7. line 26 : (10 minutes) Does it mean that sky measurement is taken for 10 minutes? Maybe clarify it in the text.
8. p.6 – Line 3 : What TB sky are considered at these frequencies and how many measurements were considered?
9. p. 7 – Line 15-17 : maybe add a Table of these data or just mentioned the data observed at the station.
10. p.7 – Line 7-8 : are these information come from automated stations or observations? In table 3, it could be very interesting to add air temperature information. It could significantly the temperature gradient in the snowpack and depth hoar formation.
11. p. 10 – Line 4-6 : Sentence is not clear.
12. Section 4.2 : The microwave signature could be explained more precisely and using literature. For example, “the sudden decrease in backscatter originating from

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snow melt” come from liquid water in snow (add reference for that). P.10 Line 28-29 (add reference).

13. p.11 – Line 21-26 : is there an explanation for the low E values?. The temperature gradient was low? (higher Tair). (see comment 10.)

14. I am not sure about the usefulness of section 5. Many hypotheses are made that reduce the analysis of the results (snow density constant [170 was considered low previously in the paper], constant temperature). I understand that the section is to “demonstrate the use of the NoSREx data in evaluation of icrowave emission and backscattering models”. However, to do so, I think the analysis and the discussion on the results should be improved. Why active and passive give different results. Is it related to grain size? A discussion on how to improve both models (active and passive) should be given.

15. In the discussion section, I think it could be interesting to discuss the usefulness of using combines active and passive observations for retrievals.

Minor:

p.9 - Line 2 : 2 “each” p.7 – Line 18 : cm³ Line 4 : define cal p.12 Line 10-11. Keep the same units for snow density? (kg m⁻³)

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