Comment on tc-2021-397

Anonymous Referee #3

General comments:

This manuscript describes the retrieval of broadband albedo using coupled machine learning and radiative transfer model. Although retrieved albedo was validated and compared, the methods and results part are not clear enough and inconsistent. I don't see novelties and advantages in methods and results section. The motivations and justifications should be more addressed before publication. For example, flowcharts, tables, explanation, Justification are needed.

Specific comments

Table 1: Please add advantages and disadvantages of each product in the table.

P4, L 104: Please Just give some short explanation, as we don't see the paper ready to submit

Please make data section and explain satellite used for the retrieval, validation dataset, comparison dataset before methodology.

Section 2.2: I would be merited to have a flowchart to understand better.

Section 2.4: The details of structure of MLANN must be addressed. For example, the number of layers, activation functions, weight initialization, input variables (should be synthetic dataset, SD), target variables, how to train and validate, accuracies.

P10, L251: the cloud screening method used MODIS bands? If it's right, how can it be used for SGLI?

Figure 2: This figure should go data section.

Figure 3: Can you explain what is the difference between c and d?

Section 3.4: I don't understand the link between surface metamorphism and two days (Morning-noon-early afternoon, late afternoon) albedo changes. Figure 8 is not mentioned in section 3.4. If they have some links please elaborate more.

Section 3.5: The retrieved albedo using SGLI is also comprehensively validated like a MODIS and analyzed with solar zenith angle, surface metamorphism. The retrieved albedo using SGLI should be validated and compared in parallel.

Section 4.1 and 4.2: In 4.1, albedo retrieval map against MCD is daily but in 4.2, 5-day mean albedo map against MERIS. Can you elaborate why they are different?

The retrieved albedo maps are only shown near Svalbard islands but Pan-Arctic retrieved albedo map should be shown and have to be compared with other comparison dataset.

Minor comments:

All captions in the table should be above table.

L 99, 100: Please mention SGLI MCD 43 full name

P4, L101-105: should go to the discussion section

3 validaiton: The authors mentioned MOSAiC. Have you used the data from MOSAiC for the validation?

L 497-499: should go comparison dataset