

We thank the editor and the two reviewers for the time and efforts they spent in reviewing our manuscript. Please find below a discussion of the comments (italic). Changes/additions made to the text are underlined and given in quotes.

Thank you for submitting the revised manuscript. I am pleased to tell that both reviewers are generally satisfied with your responses and have recommended this paper's publication in TC. However, Anonymous referee #2 argues that a thorough language check is still necessary before its acceptance, which I agree with. Therefore, I have judged that this paper can be published after minor revisions.

In addition to the review comments by Anonymous referee #2, I have checked the manuscript (v3) and listed some suggestions below. Please consider them. Before you submit a revised version of the paper, it is nice to ask coauthors again to check the paper from the standpoint of English language. Once the revised version is accepted, you are asked to attend to additional English language copy-editing by the Copernicus Publications. See more in detail at: <https://www.the-cryosphere.net/submission.html#english> I believe this paper will be more readable through the above-mentioned processes.

Thank you for all your suggestions! We have taken them into account accordingly and made further changes to the text.

L. 1 ~ 2: Suggest adding "in the Arctic" at the end of this sentence.
Changed.

L. 3~5: Too many "during" in this sentence, which makes it difficult to read. Please reformulate.
Rephrased as follows: "The observations were conducted during five aircraft campaigns in the European Arctic at different times of the year between 2017 and 2022, one of them was part of the Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC) expedition in 2020."

L. 21: Suggest rephrasing "and therefore to" -> "and therefore forces"
Changed.

L. 21 ~ 22: Add "increase" after "enhances surface temperature".
Changed.

L. 24: "it relative impact": "its relative impact"? Also, I think "relative" can be removed.
Changed.

L. 36 ~ 38: "The parametrization of the albedo of the respective sea ice surface type (melt ponds, bare ice, snow) is usually based on a temperature-dependent transition between two extremes, which in the case of snow represent the albedo of dry and wet snow." The latter half of this sentence is difficult to understand. Do you mean "The albedo parametrization of the respective sea ice surface type (melt ponds, bare ice, snow) is usually based on a temperature-dependent transition between two extremes: For the case of snow, the parameterization describes a transition from the albedo of dry snow to that of wet snow."?

Changed as follows: "The parametrization of the albedo of the respective sea ice surface types is usually based on a temperature-dependent function describing the transition between dry and wet surface conditions."

L. 39: Suggest rephrasing “more complex surface albedo parametrizations” -> “other detailed surface albedo parametrizations”

Changed.

L. 62: “performed north of Svalbard” -> “performed at the north of Svalbard”

Changed.

L. 71: “temporal and spatial” -> “spatiotemporal”

Changed.

L. 102: “does not differ much” -> “does not differ so much”

Changed.

L. 103 ~ 104: “Station North” -> “Station Nord”?

Changed.

L. 106 ~ 107: “Tab. 1” -> “Table 1”

Changed.

L. 108: “MOSAIC-ACA. There,” -> “MOSAIC-ACA, where” ?

Changed.

L. 112: “referred as solar” -> “referred to as solar”

Changed.

L. 114: “both AWI aircraft” -> “both AWI aircrafts”

Aircraft is plural.

L. 135: “solar surface broadband albedo” -> “surface broadband albedo”

Changed as follows: “Since the RAMSES-ACC-VIS radiometers do not cover the entire solar spectral range, an empirical correction function was applied to convert the measured surface spectral albedo into the surface broadband albedo.”

L. 152: “Canon EOS 1D Mark III, Nikon D5” -> “Canon EOS 1D Mark III and Nikon D5”

Changed.

L. 156: “camera” -> “cameras”?

Changed as follows: “which were not observed by a fisheye camera due to instrumental failures...”

L. 228: “Temporal and spatial” -> “Spatiotemporal”

Changed.

L. 230: Suggest rephrasing “temporal development” -> “temporal evolution”

Changed.

L. 231: Suggest rephrasing “Spring time (Figs. 3a-f) was dominated by flight sections over” -> “Spring flight sections (Figs. 3a-f) were dominated by”

Changed as follows: Flight sections in spring (Figs. 3a-f) were mostly carried out over snow or white ice (ice with a highly scattering layer on top) with surface skin temperatures below -15°C.

L. 243: "increase" -> "increases"

Changed as follows: "In general, the surface albedo decreases over time as a consequence of an increase of surface grain size and melt pond fraction, which are both related to the increase of skin temperature during ALOUD (Fig. \ref{fig_frac_albedo})."

L. 244: Suggest rephrasing "The first flight was dominated by sections" -> "Surface sections during the first flight were dominated by"

Changed.

L. 260 ~ 261: Intention is unclear. Please reformulate the sentence.

The sentence is removed.

Figure 3 caption: Suggest rephrasing "Temporal development of" -> "Temporal changes in"

Changed.

L. 294: "However, " Is it necessary?"

Removed.

L. 295: Remove "represented by"

Changed.

L. 303: Suggest rephrasing "Corresponding to the maps," -> "As shown in Fig. 5b,"

Changed as follows: "As shown in Fig. 5b, we observe greater variability in the higher resolution satellite data."

L. 306: "As the modeled surface albedo is cloud cover dependent" -> "As the modeled surface albedo depends on cloud cover"

Changed.

L. 315: "as might occur" -> "as they might occur"

Changed.

L. 318: "With that, " -> "Therefore, "

Changed.

L. 323: "no significant change of the surface albedo within the time frame of the campaign were observed" -> "no significant change of the surface albedo within the time frame of the campaign were simulated"?

Changed.

L. 332: "Tab. 3" -> "Table 3"

Changed.

Figure 5 caption: Suggest rephrasing "(b) Surface albedo derived from the OLCI measurements by the MPD retrieval for 25 March 2018 (same color code as in (a))" -> "(b) Surface albedo under cloudless conditions derived from the OLCI measurements by the MPD retrieval for 25 March 2018 (same color code as in (a))"

Changed.

Figure 5 caption: *“The aircraft measured mean surface albedo (single squares) and standard deviation (vertical bars) are given in addition.”* -> *“The aircraft measured mean surface albedo (single squares) and standard deviation (vertical bars) are given together.”*
Changed.

Figure 5 caption: *“AMSR” should be defined and introduced in Sect. 2.2*
The AMSR2 data are only used as auxiliary data (representation of the large-scale conditions). The sea ice concentration from AMSR2 has already been presented in Section 1.1 (Fig. 1).

L. 346: *“spatial and temporal”* -> *“spatiotemporal”*
Changed.

L. 347: *“due to”* -> *“attributed to”*
Changed.

L. 351: *“area-averaged measured surface albedo”* -> *“area-averaged surface albedo”*
Changed.

L. 352: *“standard variation”* -> *“standard deviation”*?
Changed.

L. 352: *“different to”* -> *“different from”*
Changed as follows: *“This differs from ...”*

L. 353: *“Both, ”* -> *“Both ”*
Changed.

L. 355 ~ 356: *“significant”* -> *“significantly”*
Changed.

L. 359: *“play a role in”* -> *“affect”*?
Changed.

L. 361: *“either because of insufficient modeled snow depth or because of the relationship itself”* -> *“because of either insufficient modeled snow depth or the relationship itself”*
Changed.

L. 362: Suggest rephrasing *“to more deeply analyze the cause of the differences”* -> *“to look into the cause of the differences”*
Changed.

L. 363: *“significant”* -> *“significantly”*
Changed.

L. 369: *“in particular allow the observation of the”* -> *“allow to observe the”*
Changed.

L. 373: "solar surface" -> "surface"
Changed.

L. 377: Suggest rephrasing "as wet snow occurred" -> "as wet snow condition prevailed"
Changed.

L. 387: Suggest rephrasing "which considered a higher fraction of melt ponds lowering the surface albedo" -> "which captured a higher fraction of melt ponds with lower surface albedos"
Changed.

L. 389: "Different to" -> "In contrast to"

L. 389 ~ 390: "only the transition to wet snow due to sea ice temperatures above T_d leads to a drop of the surface albedo": Intention is unclear. Please reformulate.

Changed as follows: "While the radiometer measurements showed a decrease in surface albedo due to a first melt pond event, the modeled albedo only decreased due to the transition to wet snow."

L. 394: "covered" -> "simulated"
Changed.

L. 397: "surface drainage.The": Add a space between these two sentences.
Changed.

L. 398: "modeled (20%)" modeled what?

Changed as follows: "The MPD OLCI satellite retrieval also determines the melt pond fraction, which was about 25 % on June 30 {Niehaus et al., 2023} and thus higher than modeled melt pond fraction (20 %)."

L. 404: "The net solar irradiance is" -> "The net solar irradiance at the surface is"
Changed.

L. 412: "The correlation ($R = 0.80$) between the net irradiances shows a RMSE of 30.2 Wm^{-2} ," -> "The correlation R between the measured and modeled net irradiances is 0.80 and RMSE of the model is 30.2 Wm^{-2} ,"
Changed.

L. 420: "below clouds F_{\downarrow} " -> " F_{\downarrow} under cloudy conditions"
Changed.

L. 441 ~ 442: Suggest rephrasing "allows a reduction in the dependencies" -> "allows to consider reduced dependencies"
Changed.

L. 445: "Radiative transfer simulations" -> "Radiative transfer simulations (Appendix A)"
Changed.

L. 447: "were matched to" -> "matched"
Changed.

L. 459: "observed" -> "obtained"

Changed.

L. 460: "compared to the HIRHAM-NAOSIM run": Can be removed.

Changed.

L. 464: Suggest rephrasing "a surface albedo that is dominated by wet snow" -> "low surface albedo due to wet snow"

Changed.

L. 470 ~ 472: Suggest rephrasing "This means that greater effects on the solar radiation balance between solar incoming and outgoing irradiance due to the surface albedo model bias can be observed in summer, but these are less likely than in spring." -> "This means that the bias of modeled surface albedo can have greater effects on the simulated net solar irradiance at the surface in summer compared to spring."

Changed.

L. 482 ~ 483: Suggest adding "applied in the Arctic" at the end of this sentence.

Changed.

L. 493 ~ 494: "values between 0.8 and 0.9 are reported" -> "ranges between 0.8 and 0.9"

Changed.

L. 496: "in cases of clouds" -> "under cloudy conditions"

Changed.

L. 504: "this approach, uses COD": Comma should be removed.

Changed.

L. 510 ~ 511: Suggest rephrasing "we found that it was primarily the uncertainties in the parametrization of the surface types that affected the outcome of the modeled surface albedo" -> "we found that the error of modeled surface albedo was primarily attributed to the uncertainties in the surface type parametrization"

Changed.

L. 514: Suggest rephrasing "Larger surface albedo differences (more than 0.1) were observed after the drainage of the observed melt ponds end of June." -> "Larger surface albedo differences (more than 0.1) were obtained after the drainage of the observed melt ponds at the end of June."

Changed.

L. 518: "surface scattering layer" -> "surface scattering layer (SSL)"

Changed.

L. 521: Remove "pretty", as it sounds subjective

Changed.

L. 529: "less well observed" -> "less captured"

Changed.

L. 531: Remove "quite", as it sounds subjective.

Changed.

L. 535 ~ 536: "This we primarily attribute to differences in surface albedo, but also partly to uncertainties in the modeled cloud cover as derived from the ranking of the standardized regression coefficients.": Difficult to understand. Please reformulate.

Changed as follows: "This error can be primarily attributed to differences in surface albedo. However, the ranking of the standardized regression coefficient suggests coefficient suggests that uncertainties in the modeled cloud cover also contribute to the model bias in net irradiance."

Review of revised version of Jäkel et al 2023

The authors improved the paper and I very much appreciate that they diligently addressed all my comments and concerns. The language corrections were, however, insufficient. There are still grammatical and logical errors. I strongly recommend that one of the coauthors who is proficient in English will do a language check of the paper before approval for publication.

I will pick few sentences as example of badly formulated text and grammatical errors:

lines 252-253: "In general, we observed a higher albedo for cloudy conditions compared to cloudless situations, which becomes more pronounced when there is a high fraction of sea ice." This sentence is grammatically wrong: I guess "which" does not refer to "cloudless situations" as the sentence construction would imply, but to the difference in albedo between cloudy and cloudless conditions, right? Please reformulate the sentence

We changed it as follows: "In general, we observed a higher albedo for the same amount of sea ice under cloudy conditions than under cloudless conditions. This effect was more pronounced when a high proportion of sea ice was present."

lines 304-306: "The smaller second modeled mode (0.77) can be attributed to grid points with a low modeled cloud coverage, such that the snow-covered ice parameter representing cloudless conditions was applied." Same problem as above: the subordinate sentence is not logically linked to the main sentence. Moreover, the expression "such that" is used 7 times in the paper, I believe all 7 times in the wrong way. It means "to the extent that", but it seems that it is used to mean "so that", or "hence" Changed from "such that" → "hence". "such that" has also been replaced everywhere else.

line 352: please replace "This is different to ..." with "This differs from..."
Changed.

line 389: please replace "Different to" in "Different to the radiometer measurements" with "Unlikely ..." or "Differently from what showed by radiometer measurements"

Changed as follows: "While the radiometer measurements showed a decrease in surface albedo due to a first melt pond event, the modeled albedo only decreased due to the transition to wet snow."

lines 391-392: Please correct as "Three days after the formation of the second melt pond in the field measurements, ..."

Changed as follows: "Three days after the observed formation of the second melt pond, ..."

line 395: "albedo was significantly lower than that observed by the satellite and even more lower than that measured by the RAMSES station"

Changed as follows: "After the formation of melt ponds, however, the modeled surface albedo was significantly underestimated compared to the observations by the satellite and the ground-based RAMSES station."

line 467-472: "The maximum impact of the albedo bias on ΔF_{net} is derived for cloudless summer conditions ($\Delta F_{net} = \pm 80 \text{ W m}^{-2}$). For the same range of $\Delta\alpha$ in spring, ΔF_{net} is found to be less than half of its magnitude in summer ($\Delta F_{net} = \pm 35 \text{ W m}^{-2}$). In spring, however, we observed from the flight measurements an increased albedo bias with a wider distribution ($\Delta\alpha = 0.02 \pm 0.07$) than in summer ($\Delta\alpha = 0.00 \pm 0.04$). This means that greater effects on the solar radiation balance between solar incoming and outgoing irradiance due to the surface albedo model bias can be observed in summer, but these are less likely than in spring."

The last sentence refers to the larger ΔF_{net} in summer than in spring for the same range of $\Delta\alpha$, and not to the immediately preceding sentence. So, I would move the sentence starting with "This means

that...” before the sentence starting with “In spring...”. Also, I would add few words to explain “...but these are less likely in spring”: I guess you imply “as cloudless skies are rare in summer”.

Changed as follows: “For the same range of $\Delta\alpha$ in spring, ΔF_{net} is found to be less than half of its magnitude in summer ($\Delta F_{\text{net}} = \pm 35 \text{ W m}^{-2}$). This means that the bias of modeled surface albedo can have greater effects on the simulated net solar irradiance at the surface in summer compared to spring. In spring, however, we observed from the flight measurements an increased albedo bias with a wider distribution ($\Delta\alpha = 0.02 \pm 0.07$) than in summer ($\Delta\alpha = 0.00 \pm 0.04$). The deviation from...”