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- *We removed Section 4.3 and shifted it contents to Data (Section 2) and the discussion (Section 4)*

Please find point-by-point answers to the comments below. The answers to the other referee and the editors note are separate comments.

Specific Editor comments

The first paragraph of the paper demonstrates some of the language that could be tightened and "Leads are created by dynamic motions of the sea ice (Miles and Barry,1998) and thus follow a linear-like shape" Please rephrase, this is not correct. *Revised.*

"For parametrization of the lead width lead-width distributions are used." This could be clarified somewhat. *Revised.*

"Shear and divergence rates, estimated from models and satellite observations, follow a power law for the Arctic sea ice (e.g. Girard et al., 2009; Marsan et al., 2004), which suggests that a power law can also be used for the statistical parametrization of the lead width." Perhaps this paragraph would read more clearly if the second part was before this sentence. *Revised.*

The mixing of observation types and models then makes the opening to the next paragraph confusing. There you want to clarify you are only talking about lead width observations, rather than "these studies". *We reorganized some parts of the introduction.*

Specify the wavelength of band 4. *Edited (665 nm)*

"For the simplification of the problem only cloud-free Level-1C products were used". Can you even use your method for cloudy images. I think the statement "For the simplification" is not the correct phrase here. *Indeed, the method only works for cloud-free cases. We removed "for the simplification... ".*

"The goal of the classification is to get thresholds for different surface types". I think "get" is not the correct word to use here. *Changed.*

What parameters are you identifying thresholds in? First state that the method is classification of surface types using x and y-data. Then point out that you look for thresholds in band 4 reflectance that distinguish different the surface types. *We rephrased and restructured the method section. Additionally, we created schematic figures to outline the process.*

"Therefore, nine out of 20 later used Sentinel-2". Therefore is not the correct word to use here. There is no follow on from the previous sentence. *We rephrased the sentence and restructured the text parts around it.*

I agree with the reviewers that the methods section would benefit from some additional figures to demonstrate the procedure and how thresholds are identified. *We added schematics to clarify the methodology.*

Some particular comments:

Where do the values in Table 1 come from?
The values are derived from the intersection points of the Gaussian curves for different surface types, as described in Section 3.1. We will include a more detailed reference to Table 1 in the text.

Is your Gaussian fit appropriate?
We fitted the Gaussian curves to histogram data, which indicated a Gaussian distribution or a combination of Gaussian distributions with several maxima.

Are the thresholds consistent across images with different sun and look angles?
We estimated the thresholds with images from January to April of 2017. Thus, the data for fitting the Gaussian curves includes several sun and look angles. Before estimating the thresholds we compared the TOA reflectance values for the the surface types within the each products and found no significant difference, but nevertheless used 9 products for the classification for a larger data base.

I also agree that you can clarify the methods description. For example you could describe what the apparent width is succinctly, and how this differs from the true width.
As suggested by the reviewers, we added a more detailed description.

Figures 4 and 5 lead me to wonder if the apparent lead width can be accurately measured down to 10m. There is an arc is the data points, with the gradient becoming less steep towards smaller lead widths, which could be indicative of white noise.
We have actually measured leads with a with of 10 m, but as stated, the amount of leads with a width of 10 m is less then maybe expected (see Figures 4 and 5). A reason therefore is the resolution itself, since capturing a 10 m lead is more difficult than a 30 m lead with a resolution of 10 m. To accurately capture a 10 m lead the lead needs to be directly in the same place as the "image pixel". This problem is also explained by Wernecke and Kaleschke (2015) "Compared to the power law, the found number of apparent lead width of 300 m is smaller than expected. This is a typical feature of the lower bound of the resolution as leads of this size are not always covered by a single measurement but partially by more, not necessarily leading to a detection". We included this discussion in the paper.

I echo the reviewers interest in a more detailed discussion of the errors introduced in the method.
We recalculated the lead-width distribution power law exponents and recalculated the errors. The whole procedure is explained in the paper With that, we have a more clear error estimation.

Can you describe the reasons for the differences in LF and MF fit based on their weighting of the data?
The linear fit (LF) method applies a least-square approach, which means that every data point has the same distance to the best fit. The MF method by Clauset et al. (2009) is based on a maximum likelihood approach.

It might be more interesting to consider if the fit is statistically significant.
In the current version of the paper, we recalculated the exponent 100 times with a random selection of 70% of the measured lead widths. The mean over the 100 exponents then is the final result. The final exponent has a small standard deviation for both thresholds and methods. Thus, we argue that the fit is statistically significant.

"Based on our current knowledge, previous studies (Table 2) focused on different regions in the Arctic and not on Antarctic regions." Here "Based on our current knowledge" is not needed in the sentence. *Revised.*

When comparing to other studies in the Arctic it should be clarified that you are not comparing like method for like. In particular the different sensors have different spatial resolution, which will constrain the range over which the power law fit is made.

Yes, as suggested by the reviewers, we clarified the differences of the sensors and methods used in the literature.

If you consider how there appears to be a decrease in exponent at smaller scales in your data, would this explain any of the differences to previous studies with lower resolution sensors?

We did not discuss a scale dependency in our data, since our data got cut off due to the lack of wider leads. Additionally, we only have some measurements of wide leads, which could also explain a decrease in the exponent.

Answer to Anonymous Referee #1

We thank the editors Jenny Hutchings and Yevgeny Aksenov and the two anonymous referees for the helpful comments and their efforts reviewing the paper.
The major changes within the second manuscript are the following:

• We restructured the introduction, discussion and conclusions of the paper
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• We removed Section 4.3 and shifted it contents to Data (Section 2) and the discussion (Section 4)

Please find point-by-point answers to the comments below. The answers to the other referee and the editors note are separate comments.

Anonymous Referee #1

The manuscript aims to compare lead-width distribution estimates from an Arctic set-ting to an Antarctic setting. Within the manuscript a set of lead-width distribution algorithm parameter estimates are being calculated using a set of Sentinel-2 images. The algorithm parameter was found to be lower compared to the estimates for the Arctic sea ice areas. As the Antarctic sea ice areas are significantly less investigated com-pared to the Arctic sea ice areas the subject is interesting and timely. Unfortunately, the manuscript is poorly written and it's very unclear what the overall aim and the novel scientific contribution is.

Specific comments

It would be beneficial if the method is also used on a set of images covering the Arctic sea ice to see if the change in parameter setting relates to the Antarctic conditions, the method or the satellite data. In the Abstract it is stated that you compare exponents from the Arctic sea ice that do not agree with each other to your estimates for the Antarctic sea ice. Why do the estimates from the Arctic sea ice not agree?
We agree that it would be interesting to analyze images from the Arctic. However, such an analysis was not within the scope of this study. We will include this point in the discussion an elaborate more on the (regional) differences of the exponents.
The estimates from the Arctic sea ice do not agree to each other as discussed in the manuscript. It is unclear if this is related to the fitting method or the underlying data set. For future comparisons the same fitting method should be applied to estimate the exponents.

As far as I can understand the nilas areas include both open water and nilas. Please confirm. It is unclear why these two lead types are not separated from each other, and if this separation was done in the scientific work by others that the lead parameter settings are compared to. This needs to be clarified.
*Yes, nilas is both open water **and** nilas. Therefore, we renamed the thresholds. We do not separate these from each other since the water in leads refreezes quickly depending on the surrounding temperatures.*
But even when leads are covered with thin ice like nilas, they have properties that are characteristic for leads with regard to heat exchange, ice production and also being navigable by several surface vessels (see "WMO Sea Ice Nomenclature (WMO No.259, volume 1", 7.3 Lead, https://library.wmo.int/index.php?lvl=notice_display&id=6772#.YAgyIsJ7mUk *(last access: 20.01.2021)*

Why are leads with dark-gray sea ice (up to 10cm thickness?) and light-gray (up to 30 cm thickness?) sea ice not included in the analysis? It is specifically stated in the methods section that you are investigating threshold for four different sea ice types. Dot he studies compared to within this paper include those other sea ice types?

The surface classification are not connected to any measured thicknesses, since the Sentinel-2 Level-1C product only provides optical data, which is why the names correspond to the "grayness" of the ice.
For the calculation of the lead with distribution we decided to focus on leads covered by open water or open water and nilas only – mainly because previous studies also investigated leads with these surface types. This is necessary to make the obtained results more comparable. The other surface types could be used for different applications. We will clarify this in the corresponding sections.

A schematic figure outlining the processing steps would aid the reader to understand the different steps within your method. How are the classified images validated? How many different individual leads were used in this study?

In total, the number of leads is 2024 for the open water threshold and 3799 for the open water and nilas threshold.
Thank you for the recommendation to include a schematic figure. We changed three figures in the paper. Figure 1 describes the selection of the data, Figure 2 the creation of the Gaussian curves used for obtaining the thresholds and Figure 3 the measurement of the lead widths.

Overall the manuscript is poorly focused, many sentences difficult to follow and references to appropriate work is missing. The presented aim is the lead-width distribution however, the manuscript focuses on the algorithm parameter setting and not on the outcome of the lead-width estimates. Please either change the aim of the manuscript or change the manuscript to reflect the aim.

We will revise the manuscript according to your detailed suggestions below.
Regarding the focus, we restructured some parts of the paper. The ice type and threshold detection is only a prerequisite, which is necessary to identify leads. The main aim is then to use these leads to obtain a lead width distribution.

Technical corrections

Why was the Weddell sea picked for this study? Does it have a high/low frequency of leads compared to other areas of the Antarctic sea ice areas? Work by e.g. Willmes and Heinemann (2016) have indicated that different parts of the Arctic Ocean have different regional characteristics.

The Weddell Sea was chosen for its special scientific importance, its size, the size of the sea-ice cover during November to April and availability of cloud free images in the Southern Ocean. Furthermore, Sentinel-2 is a land mission and images over ocean are only available in the vicinity of land which restrict the regional selection. We included a discussion of the results in regards to the possible limitations occurring from the area selection. We included the Willmes and Heinemann (2016) paper for comparisons and further assessment of our results, thank you for suggesting.

P1. R4-5. Unclear sentence please revise. *Changed*

P1. R7-8 after the comma is a repeat of what was said on row 4-5. Please remove. *Removed.*

P1. R12. Replace bigger with larger or greater than *Changed.*

P1 R21. Please insert a reference. *Reference added.*

P2 R34. How wide is a very narrow lead? *The "narrow lead" refers to the resolution of 10 m of our study.*

P3 R4-5. Unclear sentence please revise. *Section was restructured.*

P3 R6. Insert references to these studies. *Reference added.*

P3 R13-14. This is better suited in the discussion. *We agree and moved it.*

P3 R21. Are you using data from November to February or November to April? The way this is written now is confusing.
The sentence is changed. The data is always part of the months between November to April, while being from the overall time period of November of 2016 to February of 2018.

P4 R5. This section deals primarily with identifying thresholds and not classification of surface types. Consider changing the title. Moreover, the classification step is done in section 3.2 and should be reflected in the title there. I'm sorry but I could not follow how the lead width information was extracted from the images. Please clarify this.
The section 3.1. is renamed "Threshold identification". We also restructured and rewrote parts of the whole method section, so that it is clearer which steps are part of the threshold identification and then the lead measurement (see Figure 3).

P4 R9. Unclear sentence please revise. *Revised.*

P4 R16-18. Unclear sentence please revise. *Revised.*

P4 R28. Not only nilas but also open water. *Yes.*

P4. R30. What is apparent lead width? Please define.
The "true lead width" would be measured if every lead width was measured orthogonal to the lead. Our measurement grid can not guarantee that, which means that we sometimes measure not the shortest width but the width of a line across the lead with an angle other than 90 degree. That is why we call the lead width "apparent lead width" similar to Wernecke and Kaleschke (2015) .

Figure 2 Consider indicating the different TOA-reflectance areas that results in the different ice types, e.g. introduce a gray scale indicating classification areas. At the moment this figure is difficult to understand.
We use Figure 2 to highlight how we estimated the used thresholds. A gray scale would probably shift the focus of the image.

P5 Figure 3 text. What does "The swath does not cover the whole image area" mean? Either the Sentinel-2 image exist or not. Should image area be study area?
The Sentinel-2 Level-1C products are always 100 km x 100 km products, but the swath of the satellite represented in the product does not always cover the whole area of the product, which is why the bottom right corner in the upper Band 4 image has a solid white triangle.

P4 R30 -P5 R1. Unclear sentence please revise. *Revised.*

P6. R2. What is x_width? *x_width is the measured apparent lead width.*

P6 R3. Where did the values for parameter C come from? This needs to be clarified.
The parameter C is the offset at the y-axis of the function and is therefore related to the number of measurements. We included more information.

P6 R13-14. Please add the 10m to the equation, or specify how the 10m were added to the equation.
The 10 m were added for the variable "step size", since the 10 m indicate the step size of the measured lead widths. We revised the sentence describing the equation 3.

P6 R17-18. This section is not results but should be put in the method or data section.
In Section 4.1 we use the thresholds determined using the method described in 3.1 and compare the resulting reflectances to albedo values from the literature. Thus, this is rather a discussion part - which we decided to combine with the Results section to improve the readability of the manuscript.

P6 R30. References missing. *Reference added.*

P6 R29-30. Do the TOA values reported here also correspond to the values for the Arctic sea ice? The comparison here appears to be only for Antarctic data.
As we stated above, this would be interesting to investigate in the future but is beyond the scope of this study.

P7 R6. Compared to what? Figure 5 is difficult to see. As the discussion primarily revolve around the for the two different methods for the two different mediums, why not combine the open water areas in one figure and indicate the different methods in the legend? Or better yet combine everything into one figure for easier interpretation. Consider also changing the color scheme as the colors are too similar and it makes it difficult to analyze the figure.
We disagree with putting everything (4 lines, two data sets) into one plot, since the lines then tend to overlap and the figure is crowded and it becomes difficult to understand the fine differences. We changed the colors of the figures, so that both figures use the same color for the same line.
We decided to create 2 figure panels for each of the two question of the problem. 1) The influence of the applied fitting method on the same data set, which is Figure 4. Figure 4 shows the combination of both methods only for the open water threshold (left figure) and only for the open water and nilas threshold (right figure). 2) The influence of the used threshold on slightly different data sets, where we can see that for example the influence of the data set for the ML method is really small. These nuances would be more difficult to highlight in one combined image.

P8 R7-8. Unclear sentence please revise. *Revised.*

P9 R6-8. Unclear what you are trying to say here. Please discuss why different results are achieved and what this means.
Here, "results" refers to the different power law exponents in the literature. We revised the sentence and extended the discussion of the differences of the results and what this can mean for future investigations.

P9 R24-26. According to Table 2 the resolution of the Wadhams papers are 5m. It is unclear what you are saying here. Please revise.
The Wadhams studies did not use satellites, but submarine missions, thus their possible spatial coverage is smaller. The advantages of satellite data are the increased spatial coverage and repeated overpasses. Here, we wanted to highlight the high spatial resolution of Sentinel-2 and the possible advantages compared to other satellite products.

P9 R34-35. Please specify what these other data sources could be.
Since Sentinel-2 only provides optical information a combination with field measurements for the validation of the surface types would be beneficial.

Section 4.3. This section does not belong in the results but should be moved to the data section instead.
We deleted section 4.3 and rearranged the content into the data section.

Table 2. The table needs to be updated so that it is clear to the reader that the two values reported in the present study are for open water and nilas+open water areas. It is unclear from the present manuscript what the other reported values have used as criteria for their power law estimates? Are these values reflecting values for open water, nilas or leads generally? For the two different thresholds used in Marcq and Weiss (2012), do they also separate into two different lead types or are the two values a result of two different methods? If it is the latter please separate the values reported in the same way as is done with the present study results.
We updated the table to make the differences between the results more obvious. Marcq and Weiss (2012) used two different thresholds for leads (with open water) based on two different luminescence thresholds.

Reference
Willmes S. and Heinemann G, (2016), Sea-Ice Wintertime Lead Frequencies and Regional Characteristics in the Arctic, 2003–2015, Remote Sensing, 8(1),4, https://doi.org/10.3390/rs801

Answer to Anonymous Referee #2

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Anonymous Referee #2

While the study provides interesting statistics about leads in the Weddell Sea, it does not offer details about the uncertainties implied in the data or the methodology (i.e. setting the thresholds). The subject is certainly timely and will have immediate implications, given the impacts of climate change on the polar regions, but I think with such as short manuscript it suits more a letter-style paper. I am not sure if TC allows this.
By including the suggestions by the referees, the paper became more detailed and a bit longer than before. Thus, we want to continue to handle the manuscript as a full paper and not change it into a letter.

The manuscript is fairly well written though I found some sentence structure can be improved, e.g. "we noticed that on products with wide leads ...." or "The goal of the classification is to get thresholds . . .". A better word would be "to identify thresholds". The "amount of lead" should be "the number of leads", and so on. I am not including more details but the authors and the site editor(s) can adjust the style.
Thank you, we checked the paper again and rephrased several sentences.

MAJOR ISSUES:

The title suggests that results of lead distribution apply to the Antarctic ice cover. I don't think this would true. The authors concentrate on the Weddell Sea as a case study. There are two features in this region that make it unique, the dominant old ice and the gyre (Weddell Sea gyre). That should make the leads in this area unique. Perhaps a better title should specify Weddell Sea only.
The title should imply that this is the first lead-width distribution for an area (the Weddell Sea) of the Antarctic sea ice, therefore the label case study. We included more information on the study area.

The authors admit that in presence of snow, the reflectance measurement will not an indicator of the underlying ice cover. I don't see how they addressed this problem. Please clarify.
We assume that nilas has no or only a really thin snow cover, since snow would brighten the appearance of the surface. Additionally, snow has an insulating effect and therefore inhibits the heat exchange for an example which would reduce the "lead effect" of an area where nilas is covered with snow.

This is also the reason, why the names of our surface categories do not indicate any age of the ice or thickness of the ice, since – as you stated – the ice in the category "sea ice covered with snow" can be really different. But since we use the thresholds from the classification only for measuring lead widths, we are confident in the thresholds.

While leads are mostly covered with open water or thin ice, they also serve as a path for broken thick ice. The authors set thresholds on reflectance to identify the surface of the lead, OW, nilas, grey ice, etc. If I understand it correctly, the authors calculate the lead statistics for each type separately (Fig. 5 shows OW and nilas), but a lead may have all types of ice plus OW. What if the lead in your data is composed of the five ice types you referred to? Would that be included in the lead statistics? The answer is still not clear to me after reading the entire manuscript.

We only investigate leads with open water or leads with nilas and open water (OW and OWN threshold in the current version of the paper). The other surface categories are not used for the lead-width estimation. Also, the nilas threshold contains areas covered with nilas and open water. This then covers for example also the case of a lead, where one area starts to refreeze while the other part is still open. Thus, in that case we measure the whole lead width. We decided to omit leads that are covered by brighter (thicker) ice, since this has been common practice in many other studies (e.g. Marcq and Weiss (2016) and Lüpkes et al. (2008)) and thus makes our results more comparable.

Lüpkes, Christof, et al. "Influence of leads in sea ice on the temperature of the atmospheric boundary layer during polar night." Geophysical Research Letters 35.3 (2008).

The authors use Reflectance to set thresholds to identify surface types. However, Reflectance is angular-dependent measurement, therefore it is not a property of the surface. Albedo is a property of the surface because it is the integration of the angular reflectance. The comparison between albedo and reflectance on page 6 lines 24-26 cannot be used to confirm the reflectance thresholds. To proceeds with the reflectance in this study, all leads must be viewed with the same angle from the different satellite orbits.

This is an appropriate simplification because it is not practical to restrict the observed reflection angle. The reflectance anisotropy could in principle be estimated using many observations over rather static scenes (e.g. Roy et al, 2017). However, we do not expect a significant influence of a potential anisotropy on the resulting lead with distribution.

Roy, David P., et al. "Examination of Sentinel-2A multi-spectral instrument (MSI) reflectance anisotropy and the suitability of a general method to normalize MSI reflectance to nadir BRDF adjusted reflectance." Remote Sensing of Environment 199 (2017): 25-38.

MINOR ISSUES:

INTRODUCTION: There are many more references that can be used to review the work on lead width geometry and width distributions. The authors should check and quote more than the 2 references used here. Moreover, the Introduction jumps too much between different themes. I would recommend the authors to re-write while grouping themes in separate paragraphs.
Thank you for the suggestion, we rewrote the introduction.

P 1 L18: leads may not always form in linear shape. *We replaced "thus" by "often" to also include other possible shapes.*

P2 L1: what is "coupled climate models"? *"coupled climate models" commonly refers to models consisting at least of an ocean or land and an atmosphere component which are coupled to each other.*

P2 L15: "Reiser et al. (2020) introduced a retrieval algorithm for lead fraction in the Antarctic, but these studies indicate that knowing about lead-width distributions is beneficial when estimating heat transfer". It is not clear how this can be a conclusion from a lead identification study. For one thing, it can only be a conclusion from a heat flux study but more importantly is a logical conclusion. It does not need a study.
The mention of Reiser et al. (2020) was supposed to highlight that there are lead-fraction products available, also for the Southern Ocean, but that the lead width is still missing. And that other studies (the ones named before) have indicated, that the lead width is important.

P2 L28: "To narrow down the effect of the fitting methods, we applied …". Please change the sentence as the purpose of applying the two methods is not clear. *Changed.*

P3 L4:"The determined thresholds for leads covered with open water .." Threshold on what? Reflectance? *Yes, the threshold is a TOA reflectance threshold.*

P3 L5: the sentence "Two threshold are applied to identify .." is not understood. Please rephrase. *Revised.*

Figure 1: I find some of marked frames of the satellite images odd (with 3 or 5 sides instead of 4). Why is that? Also, in the caption, instead of "with shelf ice" it is better to use "including shelf ice border measured with . . ." then specify the satellite radar sensor
The form of the products is due to the differences of the satellite swath and the processing grid of the ESA which results in areas without a satellite measurement in the image (as explained and shown in Figure 3 with the missing corner in the bottom right corner in the upper image). We decided to use the "real image outlines" for the map to show the product size.

DATA:

P3 L10: attach the spatial resolution to the band. *The resolution of each band is not directly indicated, because it is irregularly distributed, and we only use the 10 m resolution of Band 4. See:* https://sentinel.esa.int/web/sentinel/user-guides/sentinel-2-msi/resolutions/spatial

P3 L11: please include the spectral band for channel 4 (665 nm). *Included.*

Also, in Line 12, provide a reference to support your statement - that it is best for thin detection. I am not sure about the reason. Please specify. *We manually compared Band 2 – 4 and 8 with each other in areas, where we expected thin ice in leads. After visual inspection we and decided to use Band 4. We included the statement in the text.*

P3 L13: which Landsat? When I read this statement, I expect to see use of the coincident SPOT and LANDSAT data to support your finding. But they are mentioned here only to refer to their future use. Using these data will add value to the manuscript.
This information is a citation from Drusch et al. (2012), but at least Landsat 8 crosses the Equator every day at 10 a.m., while Sentinel-2 crosses the Equator at 10:30 am.
The scope of the study was only to use Sentinel-2, this statement is just an outlook and is moved to the end of the paper – according to the suggestion by reviewer #1.

Table A1: why A1? It is not in an appendix? I would recommend inserting in the main text at the end of Section 2. *We decided to put the table in the appendix due to its size, but we changed it for the current version.*

METHODS:

The use of n=2 and n-3 in Equation 1 for light-grey ice and dark-grey ice is not clear to me. I see clearly the use of n=1 for the other types in Figure 2. I don't think there is something wrong here. It is just my failure to understand. Please re-phrase.
The n indicates the number of Gaussian curves which were combined to one function for fitting the histograms. By using n>1 we can account for multiple maxima within a distribution. We rephrased the explanation of n.

Also, according to my information, what you call dark-grey and light-grey ice, should be grey ice (10-15 cm thick) and grey-white ice (15-30 cm thick). These are nomenclature set by WMO and used in operational ice centers. You can refer to the document that defines ice types, published by the Canadian Ice service: MANICE (2005), "Manual of Standard Procedures for Observing and Reporting Ice Conditions", Canadian Ice Service – Environment Canada, ISBN 0-660-62858-9, Catalogue No. EN56-175/2005.
Since we only have information about the brightness of the ice and not of the thickness, we created our own terminology to indicate the brightness of the ice. However, we likes your suggestion of using the WMO standard nomenclature and renamed our categories.

Figure 3: in the caption "The upper border of every image is 50 km wide". This is not the swath. Please clarify what you mean by upper border.
We mean that the width of the figure corresponds to 50 km.

This figure shows the OW in the lead. What about other ice cover, nilas, grey ice, etc.?
Figure 3 is used to illustrate the lead detection algorithm described in Section 3.2. The figure on the right shows the leads for the open water and nilas (OWN) threshold. The other surface types are not used for lead-width measurements, which is why we do not show them to not confuse the readers.

RESULTS

P6 L21: the sentence "the TOA reflectance is only measured passively in the absence of clouds ..." is not clear. Please rephrase. *Rephrased.*

P7 L5: Nilas threshold cover also open water? Why? There is overlap between nilas and OW, but the threshold does not cover both.
The nilas threshold covers both, which is why we renamed it to open water and nilas (OWN) threshold.

P7 L6-21: it would be better to expand on the difference between lead statistics in the Arctic and Antarctic in a separate sub-section. Most of the lead studies in the Arctic are conducted in the Beaufort Sea area. Some organized presentation should show the differences in the results, with related reasons if possible, and then comparison with findings from the Weddell Sea area.
We restructured the discussion and added more in regards to the regional influences.

CONCLUSION

Before you mention about the method, you should mention the data used in the study. Ok