Author’s response to the comments from Reviewer #1

Review of Mahagaonkar et al: Recent Evolution of Supraglacial Lakes on ice shelves in Dronning Maud Land, East Antarctica.

This study investigates the intra-seasonal and inter-annual evolution of supraglacial lakes in Dronning Maud Land, East Antarctica. The authors detect supraglacial lakes in Landsat-8 and Sentinel-2 satellite imagery from 2014-2021 for five ice shelf regions. They compare SGL area and volume with near-surface air temperature and positive degree days from the reanalysis model, ERA5 to climatologically explain SGL variability.

Overall, this manuscript is well-written and the figures are clear and informative. However, I have concerns about this paper’s contribution to the field. Generally, it does not provide new information that is not already presented in other studies. Given the more specific comments listed below, I believe that major revisions are required.

We thank the reviewer(s) for their efforts in reviewing the manuscript and providing constrictive feedback. We provide our responses to the specific comments below, including the concern about the novelty of the study (see Major Comments – Point 1).

Additionally, we have made some amendments to the sections pertaining to the relationship assessments between Supraglacial lakes and Climate, which is described below.

Initially, correlation calculations were performed using ‘actual’ SGL extents (SGL area and volume) and Mean DJF Temperatures. However, due to the large inherent differences in SGL extents between regions (e.g., Fimbulisen and Roi Baudouin East), the relatively good correlation for individual ice shelves was not reflected for the region as a whole. We have therefore normalized each annual maximum lake area/volume estimate with respect to their maximum for the whole study period. These normalized extents (values between 0 and 1) are now used to calculate correlations between lake extents and temperatures. This doesn’t change the regional correlation values but increases the overall Dronning Maud Land correlation, better reflecting the relatively good local correlations. These values have been updated in Table 2 and relevant text has been updated as well (Section 3.7, Section 4.3, and Section 5.4). A figure has also been added to the supplement (Figure S9), showing a scatterplot of normalized areas with respect to mean summer temperatures.

Major comments

1) There are many previous studies that present surveys of supraglacial lakes for a specific region (Stokes et al., 2019 does so for all of East Antarctica, including DML). As such, this work feels incomplete without further investigating the climatic controls on supraglacial lake evolution in DML, especially since this is listed as an objective of this study (L65).

Further, the discussion section reads more as a literary review, providing little new information and insight into SGL evolution. Authors mention several times that the climatic factors that explain SGL development and evolution differences are still unknown and should be further investigated (i.e. L336, L359, L447, L471). I believe that this study should be expanded to provide additional insight into these climatic controls, especially for regions where air temperature and positive degree days do not explain SGL variability. For example, in L310 – what is the common factor controlling melting throughout the region? Similarly, in line 320, what are the local processes that also influence melting and ponding? This study feels incomplete without a further investigation into these climatic controls and local processes that impact meltwater ponding in DML.

We agree that there are several studies reporting about SGLs in Dronning Maud Land, as part of their East Antarctic or Antarctic wide assessments. However, none of these have assessed long-term evolution of lakes on a multiyear basis covering the whole of Dronning Maud Land. The study by Dell et al. (2020) assesses the seasonal evolution of lakes over Nivlisen Ice Shelf for the 2016-2017 melt season only, whereas our study performs seasonal and interannual assessments over sizeable lakes of the entire Dronning Maud Land, found in five regions as discussed in the manuscript. Moreover, this study highlights the large variability of lakes within Dronning Maud Land and identifies years with similar relative extents (e.g., High – 2016-2017; Low – 2020-2021), which offer interesting insights into local and regional melting and ponding within Dronning Maud Land.

We think that the main result and novelty of this paper is the comprehensive information of SGL evolution in Dronning Maud Land between 2014 and 2021. This gives a good basis for further climatological analysis, and as a first step we have here investigated the basic relationships with surface air temperature. In a follow-up study, we are analyzing further climatic controls in more detail. Including such detailed analyses here would exceed space limitation of our already long manuscript. Therefore, we only briefly discuss other relevant processes in this manuscript, acknowledging their relevance and need for further analyses. Therefore, we think it would be best to not expand the current paper, but rather carry out further meteorological assessments (that includes several climatic components, e.g., solar radiation, wind, clouds etc.) in a separate, dedicated study.

2) The citations (especially in the introduction) are outdated and incomplete. Some specific examples are listed below:

- L30 – Is there a newer source that could be cited here? i.e. Johnson et al., 2022
  Added (Johnson et al., 2022)

- L34 – Banwell and MacAyeal 2015 is a more appropriate citation for ice shelf flexure and fracture.
  Added (Banwell and MacAyeal, 2015)
- L34 – Please replace the DeConto and Pollard 2015 citation with: Banwell et al., 2013 and Scambos et al., 2009
  Replaced (DeConto and Pollard, 2015) with (Banwell et al., 2013; Scambos et al., 2009)

- L35 - Please add a citation for "increased buttressing"
  Added (Glasser et al., 2011)

- L36 – This Kuipers-Munneke 2014 paper is on firn air depletion, not firn aquifers please cite (https://doi.org/10.1002/2013GL058389) instead.
  Replaced with (Kuipers Munneke et al., 2014)

- L41 – There are several newer studies that look at the pervasive meltwater ponding on the Antarctic Peninsula (Leeson et al., 2020, Banwell et al., 2021)
  Added (Leeson et al., 2020; Banwell et al., 2021)

- L46-48 - Langley et al., 2016 look at the seasonal evolution of supraglacial lakes on an outlet glacier in DML and should be mentioned here (also in L87-89).
  Good point. We also added a note on the existence of small lakes around mountain nunataks: 'Langley et al.(2016) found presence of supraglacial lakes on Langhovde Glacier, just east of our study region, at elevations as high as 670 m a.s.l. Perennially ice-covered lakes exist even higher

at the edges of nunataks in the inland mountains of Dronning Maud Land (e.g., Faucher et al., 2019)'. The study of Langley et al. is now also cited later in the manuscript.

And added later: '… and Langley et al. (2016) presented a multiyear assessment of SGLs over Langhovde Glacier for years between 2000 and 2013'

- Lenaerts et al., 2016 should be Lenaerts et al., 2017
  Corrected all instances in the manuscript.

- L53 – 60 – many citations are missing in this paragraph including: Leppäranta et al. 2013, Liston et al. 1999, Dunmire et al. 2020
  Added Riiser Larsen (Leppäranta et al., 2013)
  Added (Dunmire et al., 2020)
  Added ' Using field observations from Jutulgryta (near Fimbulisen), Liston et al. (1999) developed a model to understand the sensitivity of meltwater production in blue-ice areas to atmospheric forcing, highlighting the importance of subsurface solar radiation and melting in snow and ice.'

- L58 – Add Moussavi et al. 2020
  Added (Moussavi et al., 2020)

- L77 – Add Bell et al. 2017
  Added (Bell et al., 2017)

- L84 – Add Lenaerts et al. 2017
  Added (Lenaerts et al., 2017)

- Dunmire et al. 2020 should be cited in several places (L426 for "partial surficial freezing and subsequent insulation of deeper meltwater", L437-440 for DML lake drainage).

~L432: Added citation for 'partial surficial freezing and subsequent insulation of deeper meltwater' (Dunmire et al., 2020)

~L442-443: Added – 'Modelling experiment by Dunmire et al., (2020) demonstrates the sensitivity of surface freezing to snow accumulation and highlights the possibility for buried non-frozen lakes throughout the cold austral winter.'

~L447-451: Modified – 'Evidence of subglacial drainage of lakes though crevasses/cracks or englacial conduits in Dronning Maud Land is limited to one report by Dunmire et al. (2020) from the western part of Roi Baudouin, about 1km inland from the grounding line. Considering recent observations elsewhere in East Antarctica (e.g., over Amery Ice Shelf; Spergel et al., 2021 and Shackleton Ice Shelf; Arthur et al., 2020a), subglacial drainage could be a more important process than previously thought.'

~L510: Deleted 'We did not find any evidence of englacial drainage into crevasses/fractures, nor any indications of direct drainage to the oceans over any of the study areas.'

3) Finally, there are several other satellite and in-situ observations that could be utilized to expand this analysis. I believe that using microwave imagery (e.g., from Sentinel-1) would help paint a more complete picture of DML lakes. For example, in L379, can this be investigated with microwave imagery?

Additionally, does the seasonal evolution pattern you observe throughout the melt season match backscatter signals from Sentinel-1 indicating surface melting (L399)? Because the seasonal evolution is a large part of this paper, I believe it would be beneficial to compare with Sentinel-1, a satellite with year-round frequent observations. Sentinel-1 observations could be further used to see when/if lakes freeze completely (L430-435).

We agree that it could be beneficial to compare the observations from this study with Sentinel-1 data, especially over melt seasons where the optical coverage is not optimal. However, there are practically no high-resolution Sentinel-1 data (Interferometric Wide Swath – IW Mode) products over Dronning Maud Land available directly for use. Only Extra Wide Swath (EW) Mode data is available that is coarser in resolution compared to IW. Also, it should be noted that Sentinel-1 data products are different in many ways to optical satellite images and would require completely different methodology for their processing and interpretation, which is beyond the scope of this work. Optical products have been used by several studies in the past to map and assess SGL evolution over Greenland (e.g., Williamson et al., 2018) and Antarctica (e.g., Arthur et al., 2020, 2022; Dell et al., 2020; Tuckett et al., 2021; Stokes et al., 2019; Moussavi et al., 2020) implying their suitability in this work. Since most seasons and regions have good coverage of optical data, we believe our seasonal evolution patterns are adequately represented.

Added the following sentence to Section 1: Introduction

"Additionally, the lack of high-resolution Sentinel-1 (Interferometric Wide Swath – IW Mode) data over Dronning Maud Land limits the possibility for their usage for large scale temporal assessments in the region."

Further, extensive in-situ meteorological observations are available from Neumeyer station in DML. Why were these observations not utilized?

Meteorological data from the Neumayer station, located on the Ekström Ice Shelf which is the second ice shelf to the east of Riiser Larsen, would not directly represent climatic conditions for any of the lake areas of this study as the station is closer to the coastal edge of the ice shelf, whereas most lakes are found near the grounding zones of the ice shelves. However, we acknowledge that these in-situ data are relevant and plan to assess it further in a follow-on study with more detailed meteorological analyses.

Minor comments

L17 – Please specify which ice shelves showed "no significant meltwater lakes"
Since there are several ice shelves with no significant ponding, they have been listed in the results section (4.1: Spatial Distribution of SGLs).

L29 – Specify that runoff is not significant on Antarctica
Specified – 'Antarctic meltwater runoff...'

L49 – What do you mean by "major" ice shelves? Buttressing capacity? Size?
Amended throughout the paper: 'major' to 'large'

L59 – What do you mean by "simple configuration"?
This sentence is now removed.

L78 – 80 – No need to cite Trusel et al. 2013 twice in this same sentence.
Removed (Trusel et al., 2013) citation once.

L80 – 82: Please remove the sentence: “The ice shelves of Dronning… East Ragnhild Glaciers” as it is not necessary.
Removed the mentioned sentence.

L98 – 100: Please reword this sentence beginning with “We did not use the cloud detection…” as it is confusing.
Rephrased the entire sequence to improve clarity. ‘Filtration of scenes based on automatic cloud detection algorithms was avoided as it may also exclude useful scenes that have clear areas over lakes despite extensive clod cover elsewhere.’

Why were the 5 ice shelves used in this study chosen over other ice shelves in DML?
The study was not restricted to the 5 ice shelves, but covers the entire Dronning Maud Land, where sizeable lakes are only found near these 5 ice shelves. This has now been clarified in several places in the manuscript: Abstract (‘all ice shelves’), Section 3.1 on manually identifying areas with lakes. Section 4.1: ‘No significant meltwater ponding was observed on other ice shelves in Dronning Maud Land’.

Sections 3.2-3.3: It is unclear to me where you followed methods from other papers and where you did not. For example, in lines 117-22, was this still following Moussavi et al 2020 or did you use different thresholds? If the method is the same as work previously published, then the text can be simplified greatly. If not, please explain why you chose not to follow previously established methods. Also, are there any periods for which data is lacking? If so, please explain.
Section 3 has been entirely rewritten and simplified. References to Moussavi et al. (2020) have been added where applicable, and differences have been explained better.

L141 – Why do you use a threshold to exclude shallow lakes? I would think that by excluding shallow lakes you lead to an underestimation of SGLs as shallow lakes are still lakes!
Added – ‘to avoid overestimation of SGLs (Arthur et al., 2020; Dell et al., 2020) due to misclassification of slush and insignificant water pockets.’.

This threshold is also used by several other studies over Antarctica (e.g., Arthur et al., 2020; Dell et al., 2020) and Greenland (e.g., Williamson et al., 2018) for similar reasons.

Section 3.4 – It is my understanding that the estimation of lake depth and volume is largely based off previously published methods? If so, this section can be greatly reduced.
Agreed. The Section 3 has been entirely rewritten and simplified.

Figure S1 – Why does Landsat 8 estimate greater depth for deeper lakes?

We have not been able to identify why Landsat 8 appears to estimate higher depths than Sentinel-2, however we added an explanation for how the differences could arise.

Section 3.6: ‘However, depths estimated by Landsat 8 appear to be slightly higher than Sentinel-2 estimates. Such differences could arise from cloud adjacency effect (Pope et al., 2016; Williamson et al., 2018) or due to the difference in their original spatial and spectral resolutions.’

Figure S1 Text - ‘The difference between Landsat-8 and Sentinel-2 depths (Mean Bias = 0.08 m, RMSE ~ 0.21) could be due to cloud adjacency effect (Pope et al., 2016; Williamson et al., 2018) or due to the difference in their original spatial and spectral resolutions. However, the depths estimated by Sentinel-2 fall within the error range of Landsat-8 estimated depths (0.28 m. for red band; Pope et al., 2016).’

Section 3.6 – why do you use ERA5 here?
Added: 'Due to absence of any long-term in-situ meteorological observations covering the expanse of the study area, we use ERA5 climate reanalysis data'

L219 – How were the manually digitized lake boundaries created? Were they created completely independently from the automatic lake masks?
Yes, the manual digitization was carried out independently of the automatically generated lake masks. Landsat-8/Sentinel-2 scenes were used as a background while mapping lake boundaries.

L228 – I believe that uncertainty with depth calculations should be considered as well in the uncertainty range for lake volume.
Agreed. Added '…a depth uncertainty of 0.21 m determined from the RMSE difference between separate Landsat 8 and Sentinel-2 depth estimates.'.

L240 – 250 – This section is a bit confusing to me and I think could be reworded for simplicity.
We have made an attempt to simplify.

Table 1 – What is the vertical curve on the left-hand side of the table (over the ponding/advection phases column)?
The curve has been removed.

L 258 – Refer to Figure 3 for the different ice shelf regions.
Added (Figure 3) at the end of the sentence.

L265 – What do you mean by "viz."? (also L507)
The abbreviation 'viz.' has been replaced with 'namely'.

L266 – Specify what are the years with high melting.
Added: '(2016-2017 and 2019-2020)'

L268-269 – Please include error when quantifying lake depths.
Added error range in all instances.

Figure 3 – I think it would be nice to also include the blue ice areas in this figure.
Updated the figure by including blue ice areas and a legend entry indicating blue ice areas.

Line 280 – More specifically, what is different about the Fimbulisen/Muninisen firn pack? Less blue ice? More firn air content?
Due to lack of high-resolution Firn Air Content (FAC) dataset, we are unable to state what the differences in FAC over different regions of DML could be. Looking at the 27 km FAC product from IMAU-FDM Model, the differences seem to be insignificant over our areas of interest, however we are not confident due to the resolution of the product. Due to this lack of knowledge, we removed the statement '…, likely due to percolation into the unsaturated firn pack that surrounds the meltwater ponds.'

Figures 4 and 5 – Please change the color of the dot used on the Antarctica map to show the ice shelf location to something that stands out more clearly.
Changed the color of the dot to red in both images (and in Figure S4 and Figure S5)

Section 4.3 – Is ERA5 not too coarse to resolve local katabatic wind effects?
We agree that ERA5 (~31 km) is too coarse to resolve katabatic winds. This limits us from using ERA5 products in our further meteorological assessments; for which we are working closely with MAR Group for high resolution climate products ~5.5kms.

L364 – Please include a citation after “relict lakes”.
Added citation – (Lenaerts et al., 2017)

L370 – Specify which region you are referring to – DML or the grounded ice sheet?
Specified – grounding zone, primarily above the grounding line.

L385 – 389 – Please quantify the “limited meltwater production compared to snow accumulation”
Rephrased to “a relatively small meltwater production compared to snow accumulation (having melt-over-accumulation ratio < 0.7; van Wessem et al., 2023; Pfeffer et al., 1991)*”*

L406 – What “feedback mechanisms”? Larger differences in the extents of ponding compared with what?
Added ‘snow-ice-albedo feedback mechanisms’
Modified second sentence to ‘larger extents of ponding compared to the average.’

L437 – “No evidence of subglacial drainage of lakes…”. This statement is incorrect (Dunmire et al. 2020)
Modified to add reports of Dunmire et al. (2020).
“Evidence of subglacial drainage of lakes though crevasses/cracks or englacial conduits in Dronning Maud Land is limited to one report by Dunmire et al. (2020) from the western part of Roi Baudouin, about 1km inland from the grounding line.”

L440 – “Direct drainage into the ocean…” Are you referring to horizontal overflow drainage? If a lake drains vertically on an ice shelf it will likely drain to the ocean.
Modified to ‘Direct horizontal overflow (runoff over the calving edge of the shelves)’

L444-445 – “r = ~0”. Is there a figure for this? I have a hard time believing there is no correlation! From what region are you taking the near-surface temperature from? i.e. just areas where melt occurs or a larger area including upstream grounded ice or ocean?
Thanks for pointing this out. After the changes made to the way correlation is calculated (by Normalizing SGL extents; explained at beginning of this document), the DML wide correlation indeed increases. This is also presented in the new Figure S9.

The ERA5 grid points from where the near-surface temperature is taken are presented in Figure S2. As explained in the revised text in Section 3.7, these points are chosen to best represent the location of origin of SGLs (typically the area near the grounding line).

L455 – “high-resolution climate modeling over Dronning Maud Land”. What about RACMO (ie Lenaerts et. al 2017)?
We were informed by the RACMO group that currently, RACMO2.3p2 products are only available at 27 km resolution, like that of ERA5, for Dronning Maud Land. Higher resolution products that were generated were found to have a melt bias and precipitation bias due to which the simulations were not extended/continued. Therefore, not included here.

L463 – Unnecessary to mention Fohn winds since they do not form in DML.
Deleted respective sentences.

L483 – “Such shelves…” Which shelves? Do these shelves align with where melt is observed?
Amended to ‘Such vulnerable shelves are also present in Dronning Maud Land (Figure 4 from Lai et al. (2020)) and coincide with the regions where melt ponding is observed, highlighting the importance… ‘

Technical corrections

L9 – “can cause firn air depletion” → “can potentially lead to firn air depletion”
Modified.

L15 – move “ice shelves” after “Riiser Larsen, Nivlisen, and Roi Baudouin”
Moved.

L17 – Please rephrase the sentence beginning with “Despite large interannual…” as it is a bit confusing
Deleted the sentence.

L21 – remove “in total, it”
Removed.

L23 – Add “, ice-shelves…” after “Fimbulisen and Nivlisen”
Added ‘areas’ instead, as melt ponds in Fimbulisen area are not exactly on the ice shelf but over the grounded ice.

L24 – Please change “the region” to “Dronning Maud Land” and “Dronning Maud Land” to “this region” in L25.
Amended.

L35 – “destabilizing the ice sheet upstream” → “increasing upstream ice velocity”
Amended.

L55 – “simpler” → “possible”
Amended.

L56 – Add a comma after “clouds”
Added.

L127 – “pixel configuration” → “resolution”
Changed.

L127 – “As in case of Landsat-8” → “Again,”
Changed.

L160 – Add “However,” before “Since Sentinel-2…”
Added.

L199 – Replace “near-surface” with “2 m” and remove “, measured 2 m above the ground” in the next line.
Replaced, also added ‘and Positive Degree Days (PDD)’.

L206 – “melt seasons” →“melt season”
Changed.

L223 – Add a comma after “size”.
Added.

L233 – Remove “Judging”
Removed.

L234 – Please reword this sentence to: “From the climate reanalysis data (Figure 2a), air temperature peaks around mid-January,…”
Modified.

Table 2 caption: “ices helves” → “ice shelves”
Corrected.

L423 – Replace “draining” with “horizontally overflowing”
Replaced.

L475 – Move the Kuipers Munneke 2014 citation after “ice shelves” on the next line.
Moved.

L482 – “liner” → “linear”
Corrected.

References

Arthur, J. F., Stokes, C. R., Jamieson, S. S. R., Carr, J. R., and Leeson, A. A.: Distribution and seasonal evolution of supraglacial lakes on Shackleton Ice Shelf, East Antarctica, Cryosph., 14, 4103–4120, https://doi.org/10.5194/tc-14-4103-2020, 2020.

Arthur, J. F., Stokes, C. R., Jamieson, S. S. R., Rachel Carr, J., Leeson, A. A., and Verjans, V.: Large interannual variability in supraglacial lakes around East Antarctica, Nat. Commun., 13, https://doi.org/10.1038/s41467-022-29385-3, 2022.

Banwell, A. F. and MacAyeal, D. R.: Ice-shelf fracture due to viscoelastic flexure stress induced by fill/drain cycles of supraglacial lakes, Antarct. Sci., 27, 587–597, https://doi.org/10.1017/S0954102015000292, 2015.

Banwell, A. F., MacAyeal, D. R., and Sergienko, O. V.: Breakup of the Larsen B Ice Shelf triggered by chain reaction drainage of supraglacial lakes, Geophys. Res. Lett., 40, 5872–5876, https://doi.org/10.1002/2013GL057694, 2013.

Banwell, A. F., Datta, R. T., Dell, R., Moussavi, M., Brucker, L., Picard, G., Shuman, C. A., and Stevens, L. A.: The 32-year record-high surface melt in 2019/2020 on the northern George VI Ice Shelf, Antarctic Peninsula, Cryosph., 15, 909–925, https://doi.org/10.5194/tc-15-909-2021, 2021.

Bell, R. E., Chu, W., Kingslake, J., Das, I., Tedesco, M., Tinto, K. J., Zappa, C. J., Frezzotti, M., Boghosian, A., and Lee, W. S.: Antarctic ice shelf potentially stabilized by export of meltwater in surface river, Nature, 544, 344–348, https://doi.org/10.1038/nature22048, 2017.

Dell, R., Arnold, N., Willis, I., Banwell, A. F., Williamson, A., Pritchard, H. D., and Orr, A.: Lateral meltwater transfer across an Antarctic ice shelf, Cryosphere, 14, 2313–2330, https://doi.org/10.5194/tc-14-2313-2020, 2020.

Dunmire, D., Lenaerts, J. T. M., Banwell, A. F., Wever, N., Shragge, J., Lhermitte, S., Drews, R., Pattyn, F., Hansen, J. S. S., Willis, I. C., Miller, J., and Keenan, E.: Observations of Buried Lake Drainage on the Antarctic Ice Sheet, Geophys. Res. Lett., 47, https://doi.org/10.1029/2020GL087970, 2020.

Faucher, B., Lacelle, D., Fisher, D. A., Andersen, D. T., and McKay, C. P.: Energy and water mass balance of Lake Untersee and its perennial ice cover, East Antarctica, Antarct. Sci., 31, 271–285, https://doi.org/10.1017/S0954102019000270, 2019.

Glasser, N. F., Scambos, T. A., Bohlander, J., Truffer, M., Pettit, E., and Davies, B. J.: From ice-shelf tributary to tidewater glacier: continued rapid recession, acceleration and thinning of Röhss Glacier following the 1995 collapse of the Prince Gustav Ice Shelf, Antarctic Peninsula, J. Glaciol., 57, 397–406, https://doi.org/10.3189/002214311796905578, 2011.

Johnson, A., Hock, R., and Fahnestock, M.: Spatial variability and regional trends of Antarctic ice shelf surface melt duration over 1979–2020 derived from passive microwave data, J. Glaciol., 68, 533–546, https://doi.org/10.1017/jog.2021.112, 2022.

Kuipers Munneke, P., M. Ligtenberg, S. R., van den Broeke, M. R., van Angelen, J. H., and Forster, R. R.: Explaining the presence of perennial liquid water bodies in the firn of the Greenland Ice Sheet, Geophys. Res. Lett., 41, 476–483, https://doi.org/10.1002/2013GL058389, 2014.

Lai, C. Y., Kingslake, J., Wearing, M. G., Chen, P. H. C., Gentine, P., Li, H., Spergel, J. J., and van Wessem, J. M.: Vulnerability of Antarctica's ice shelves to meltwater-driven fracture, Nature, 584, 574–578, https://doi.org/10.1038/s41586-020-2627-8, 2020.

Langley, E. S., Leeson, A. A., Stokes, C. R., and Jamieson, S. S. R.: Seasonal evolution of supraglacial lakes on an East Antarctic outlet glacier, Geophys. Res. Lett., 43, 8563–8571, https://doi.org/10.1002/2016GL069511, 2016.

Leeson, A. A., Forster, E., Rice, A., Gourmelen, N., and Wessem, J. M.: Evolution of Supraglacial Lakes on the Larsen B Ice Shelf in the Decades Before it Collapsed, Geophys. Res. Lett., 47, https://doi.org/10.1029/2019GL085591, 2020.

Lenaerts, J. T. M., Lhermitte, S., Drews, R., Ligtenberg, S. R. M., Berger, S., Helm, V., Smeets, C. J. P. P., Broeke, M. R. van den, van de Berg, W. J., van Meijgaard, E., Eijkelboom, M., Eisen, O., and Pattyn, F.: Meltwater produced by wind–albedo interaction stored in an East Antarctic ice shelf, Nat. Clim. Chang., 7, 58–62, https://doi.org/10.1038/nclimate3180, 2017.

Leppäranta, M., Järvinen, O., and Mattila, O.-P.: Structure and life cycle of supraglacial lakes in Dronning Maud Land, Antarct. Sci., 25, 457–467, https://doi.org/10.1017/S0954102012001009, 2013.

Liston, G. E., Bruland, O., Winther, J.-G., Elvehøy, H., and Sand, K.: Meltwater production in Antarctic blue-ice areas: sensitivity to changes in atmospheric forcing, Polar Res., 18, 283–290, https://doi.org/10.3402/polar.v18i2.6586, 1999.

Moussavi, M., Pope, A., Halberstadt, A. R. W., Trusel, L. D., Cioffi, L., and Abdalati, W.: Antarctic Supraglacial Lake Detection Using Landsat 8 and Sentinel-2 Imagery: Towards Continental Generation of Lake Volumes, Remote Sens., 12, 134, https://doi.org/10.3390/rs12010134, 2020.

Pfeffer, W. T., Meier, M. F., and Illangasekare, T. H.: Retention of Greenland runoff by refreezing: Implications for projected future sea level change, J. Geophys. Res., 96, 22117, https://doi.org/10.1029/91JC02502, 1991.

Pope, A., Scambos, T. A., Moussavi, M., Tedesco, M., Willis, M., Shean, D., and Grigsby, S.: Estimating supraglacial lake depth in West Greenland using Landsat 8 and comparison with other multispectral methods, Cryosphere, 10, 15–27, https://doi.org/10.5194/tc-10-15-2016, 2016.

Scambos, T. A., Fricker, H. A., Liu, C. C., Bohlander, J., Fastook, J., Sargent, A., Massom, R., and Wu, A. M.: Ice shelf disintegration by plate bending and hydro-fracture: Satellite observations and model results of the 2008 Wilkins ice shelf break-ups, Earth Planet. Sci. Lett., 280, 51–60, https://doi.org/10.1016/j.epsl.2008.12.027, 2009.

Spergel, J. J., Kingslake, J., Creyts, T., van Wessem, M., and Fricker, H. A.: Surface meltwater drainage and ponding on Amery Ice Shelf, East Antarctica, 1973–2019, J. Glaciol., 67, 985–998, https://doi.org/10.1017/jog.2021.46, 2021.

Stokes, C. R., Sanderson, J. E., Miles, B. W. J., Jamieson, S. S. R., and Leeson, A. A.: Widespread distribution of supraglacial lakes around the margin of the East Antarctic Ice Sheet, Sci. Rep., 9, 1–14, https://doi.org/10.1038/s41598-019-50343-5, 2019.

Tuckett, P. A., Ely, J. C., Sole, A. J., Lea, J. M., Livingstone, S. J., Jones, J. M., and Van Wessem, J. M.: Automated mapping of the seasonal evolution of surface meltwater and its links to climate on the Amery Ice Shelf, Antarctica, Cryosphere, 15, 5785–5804, https://doi.org/10.5194/tc-15-5785-2021, 2021.

van Wessem, J. M., van den Broeke, M. R., Wouters, B., and Lhermitte, S.: Variable temperature thresholds of melt pond formation on Antarctic ice shelves, Nat. Clim. Chang., 13, 161–166, https://doi.org/10.1038/s41558-022-01577-1, 2023.

Williamson, A. G., Banwell, A. F., Willis, I. C., and Arnold, N. S.: Dual-satellite (Sentinel-2 and Landsat 8) remote sensing of supraglacial lakes in Greenland, Cryosphere, 12, 3045–3065, https://doi.org/10.5194/tc-12-3045-2018, 2018.