Supplementary Materials for "An 8-day Antarctic supraglacial lake dataset from MODIS"

Shuo Wei[1,2], Lei Zheng[1,2], Qi Liang[1,2], Teng Li[1,2], Xiao Cheng[1,2]

[1]School of Geospatial Engineering and Science, Sun Yat-sen University, and Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), Zhuhai 519082, China
[2]Key Laboratory of Comprehensive Observation of Polar Environment (Sun Yat-sen University), Ministry of Education, Zhuhai 519082, China

Correspondence to: Lei Zheng (zhenglei6@mail.sysu.edu.cn)

This file includes

1 Supplementary text

The threshold criteria proposed by Corr et al. (2022) are designed to extract pure water endmembers from Sentinel-2 and Landsat 8 imagery. In contrast, the objective of this study is to identify all potential lake-containing pixels in MODIS imagery, including both pure and mixed pixels. To meet this objective, the thresholds for NDWIice and NDWI are recalibrated (Fig. S1). Specifically, 10 m resolution lake classification results derived from Sentinel-2 imagery are aggregated to the MODIS pixel scale using a max-pooling approach to generate binary SGL labels. These labels are used as reference data to systematically evaluate combinations of NDWIice and NDWI thresholds. The optimal thresholds are determined by maximizing the F1 score. Given that the classification framework consists of two stages, the primary goal of the first stage is to identify as many potential lake pixels as possible to provide candidate inputs for the subsequent classification model. Therefore, in the F1 score calculation, recall is assigned a weight of 1.5 times that of precision, ensuring that potential lake pixels are preferentially detected while maintaining acceptable classification performance.

2 Supplementary figures

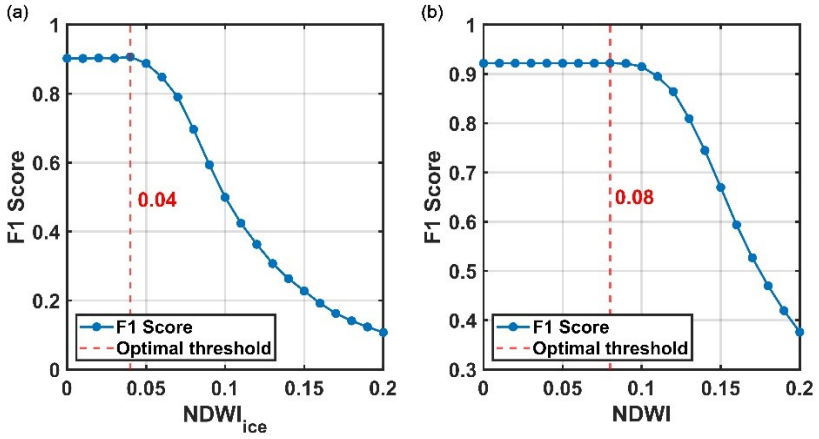

Figure S1: Optimal threshold determination curves for NDWIice and NDWI based on F1 score: (a) NDWIice; (b) NDWI.

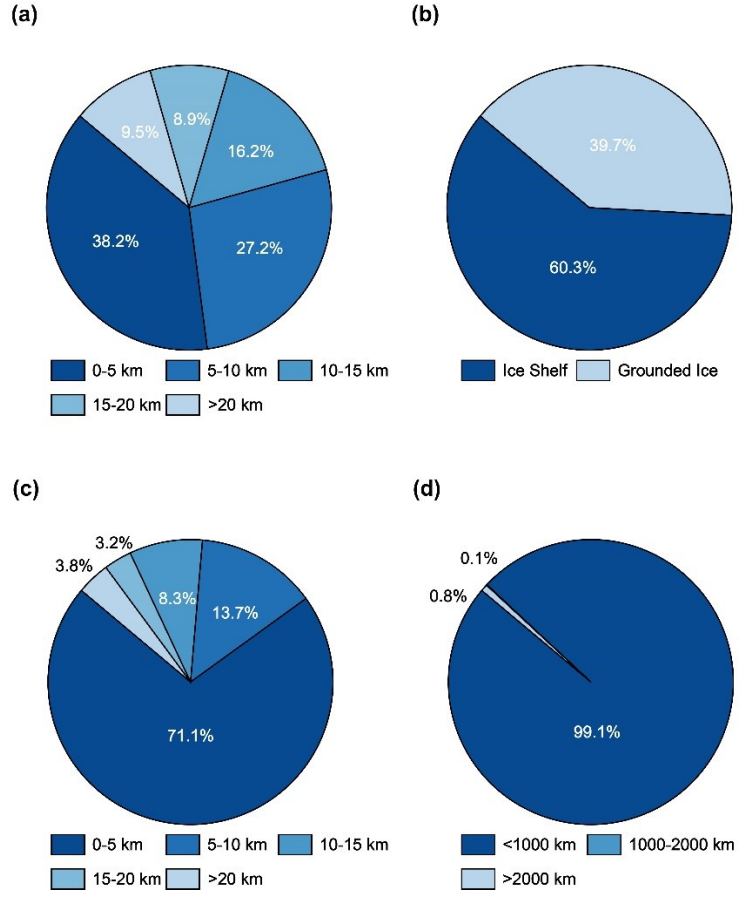

Figure S2: Percentage distribution of the mean maximum SGL area across different regional classifications. (a) Distance to grounding lines; (b) Ice shelves and grounded ice; (c) Distance to blue ice and rock; (d) Elevation.

3 Supplementary table

Table S1. Summary of Sentinel-2 images used in this study

Scene ID	Date	Tile	Satellite	Purpose
20210123T131909_20210123T131908_T18DXF	01/23/2021	T18DXF	2B	Training and validation
20210123T131909_20210123T131908_T19DDA	01/23/2021	T19DDA	2B	Training and validation
20180204T124901_20180204T124902_T19DEA	02/04/2018	T19DEA	2A	Training and validation
20200119T131859_20200119T131902_T19DEB	01/19/2020	T19DEB	2B	Training and validation
20200119T131859_20200119T131902_T19DEA	01/19/2020	T19DEA	2B	Training and validation
20210123T131909_20210123T131908_T19DEB	01/23/2021	T19DEB	2B	Training and validation
20200217T034629_20200217T034623_T42DWF	02/17/2020	T42DWF	2B	Training and validation
20190113T034629_20190113T034626_T42DWF	01/13/2019	T42DWF	2B	Training and validation
20190222T034629_20190222T034626_T42DXG	02/22/2019	T42DXG	2B	Training and validation
20190222T034629_20190222T034626_T42DXH	02/22/2019	T42DXH	2B	Training and validation
20190222T034629_20190222T034626_T43DDB	02/22/2019	T43DDB	2B	Training and validation
20190222T034629_20190222T034626_T43DDC	02/22/2019	T43DDC	2B	Training and validation
20190217T094019_20190217T094019_T28CFE	02/17/2019	T28CFE	2B	Training and validation
20190217T094019_20190217T094019_T29CMV	02/17/2019	T29CMV	2B	Training and validation
20190217T094019_20190217T094019_T28DFF	02/17/2019	T28DFF	2B	Training and validation
20190217T094019_20190217T094019_T29DMA	02/17/2019	T29DMA	2B	Training and validation
20200129T063819_20200129T063818_T35DPC	01/29/2020	T35DPC	2B	Training and validation
20200129T063819_20200129T063818_T36DVH	01/29/2020	T36DVH	2B	Training and validation
20180206T064741_20180206T064738_T35DPC	02/06/2018	T35DPC	2A	Training and validation
20180206T064741_20180206T064738_T36DVH	02/06/2018	T36DVH	2A	Training and validation
20200118T070839_20200118T070839_T35DNB	01/18/2020	T35DNB	2B	Training and validation
20170127T041721_20170127T041717_T41CPV	01/27/2017	T41CPV	2A	Independent test
20170127T041721_20170127T041717_T41DPA	01/27/2017	T41DPA	2A	Independent test
20170127T041721_20170127T041717_T42CVE	01/27/2017	T42CVE	2A	Independent test

20170127T041721_20170127T041717_T42CWE	01/27/2017	T42CWE	2A	Independent test
20170127T041721_20170127T041717_T42DVF	01/27/2017	T42DVF	2A	Independent test
20170127T041721_20170127T041717_T42DWF	01/27/2017	T42DWF	2A	Independent test
20170126T080921_20170126T080920_T32DNG	01/26/2017	T32DNG	2A	Independent test
20170126T080921_20170126T080920_T32DNH	01/26/2017	T32DNH	2A	Independent test
20170126T080921_20170126T080920_T32DPG	01/26/2017	T32DPG	2A	Independent test
20170126T080921_20170126T080920_T32DPH	01/26/2017	T32DPH	2A	Independent test
20200126T080919_20200126T080920_T32DNG	01/26/2020	T32DNG	2B	Independent test
20200126T080919_20200126T080920_T32DNH	01/26/2020	T32DNH	2B	Independent test
20200126T080919_20200126T080920_T32DPG	01/26/2020	T32DPG	2B	Independent test
20200126T080919_20200126T080920_T32DPH	01/26/2020	T32DPH	2B	Independent test
20200126T080919_20200126T080920_T33DVB	01/26/2020	T33DVB	2B	Independent test
20200126T080919_20200126T080920_T33DVC	01/26/2020	T33DVC	2B	Independent test
20190102T041719_20190102T041722_T41CPV	01/02/2019	T41CPV	2B	Independent test
20190102T041719_20190102T041722_T41DPA	01/02/2019	T41DPA	2B	Independent test
20190102T041719_20190102T041722_T41DPB	01/02/2019	T41DPB	2B	Independent test
20190102T041719_20190102T041722_T42CVE	01/02/2019	T42CVE	2B	Independent test
20190102T041719_20190102T041722_T42CWE	01/02/2019	T42CWE	2B	Independent test
20190102T041719_20190102T041722_T42DVF	01/02/2019	T42DVF	2B	Independent test
20190102T041719_20190102T041722_T42DVG	01/02/2019	T42DVG	2B	Independent test
20190102T041719_20190102T041722_T42DWF	01/02/2019	T42DWF	2B	Independent test
20190102T041719_20190102T041722_T42DWG	01/02/2019	T42DWG	2B	Independent test
20190103T034629_20190103T034625_T42CWE	01/03/2019	T42CWE	2B	Independent test
20190103T034629_20190103T034625_T42DWF	01/03/2019	T42DWF	2B	Independent test
20190103T034629_20190103T034625_T42DWG	01/03/2019	T42DWG	2B	Independent test
20190103T034629_20190103T034625_T42DXF	01/03/2019	T42DXF	2B	Independent test
20190103T034629_20190103T034625_T42DXG	01/03/2019	T42DXG	2B	Independent test
20191228T005509_20191228T005509_T51DWF	12/28/2019	T51DWF	2B	Independent test
20191228T005509_20191228T005509_T51DWG	12/28/2019	T51DWG	2B	Independent test
20190129T022559_20190129T022553_T47DNG	01/29/2019	T47DNG	2B	Independent test

20190129T022559_20190129T022553_T47DNH	01/29/2019	T47DNH	2B	Independent test
20190129T022559_20190129T022553_T47DPG	01/29/2019	T47DPG	2B	Independent test
20190129T022559_20190129T022553_T47DPH	01/29/2019	T47DPH	2B	Independent test

References

35 Corr, D., Leeson, A., McMillan, M., Zhang, C., and Barnes, T.: An inventory of supraglacial lakes and channels across the West Antarctic Ice Sheet, Earth System Science Data, 14, 209–228, https://doi.org/10.5194/essd-14-209-2022, 2022.