

Supplementary materials

Integrated satellite monitoring and field validation of the periodically outbursting glacier-dammed lake Nedre Demmevatnet, Norway

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10 Table S1: Manual detection of GLOF events with Sentinel-1 and Sentinel-2 data validated with official records by NVE (2024) and our field observations.

Year	S2 before	S2 after	S1 before	S1 after	Combined center	NVE/ field validation	Uncertainty combined [± days]	Uncertainty S2 [± days]	UncertaintyS1 [± days]
2016	22-Aug	8-Sep	3-Sep	8-Sep	5-Sep	6-Sep	2.5	8.5	2.5
2017						27-Oct			
2018	30-Jul	3-Sep	6-Aug	11-Aug	8-Aug	10-Aug	2.5	17.5	2.5
2019	9-Aug	27-Aug	19-Aug	24-Aug	21-Aug	24-Aug	2.5	9	2.5
2020	2-Sep	17-Sep	5-Sep	6-Sep	5-Sep	6-Sep	0.5	7.5	0.5
2021	12-Jul	19-Jul	9-Jul	14-Jul	13-Jul	13-Jul	1	3.5	2.5
2022	28-Aug	31-Aug			29-Aug	29-Aug	1.5	1.5	
2023	17-Jun	24-Jun			20-Jun	22-Jun	3.5	3.5	
2024	1-Jun	11-Jun	29-May	5-Jun	3-Jun	4-Jun	2	5	3.5
2025						26-Apr			
AVERAGE:							2	7	2.33

Table S2: Impact of Sentinel-2 outline uncertainty on lake level and lake volume calculations.

Year	Level Arctic S2 [m]	Level Arctic PS [m]	Level diff. Arctic [m]	Level UAV S2 [m]	Level UAV PS [m]	Level diff. UAV [m]	Vol. Arctic S2 [mio m3]	Vol. Arctic PS [mio m3]	Vol. diff. Arctic [mio m3]	Vol. UAV S2 [mio m3]	Vol. UAV PS [mio m3]	Vol. diff. UAV [mio m3]
2020	1237.43	1237.20	0.23	1236.46	1237.08	-0.62	1.58	1.57	0.01	1.92	2.01	-0.1
2021	1235.30	1234.90	0.40	1234.96	1234.54	0.42	1.33	1.30	0.04	1.69	1.66	0.03
2022	1236.83	1238.07	-1.24	1236.16	1238.1	-1.94	1.51	1.68	-0.17	1.87	2.14	-0.27
2023	1224.26	1224.68	-0.42	1224.02	1224.16	-0.14	0.48	0.50	-0.02	0.75	0.76	-0.01
Average:			-0.25			-0.57			-0.03			-0.09

15 Table S 3: Summer melt days before drainage based on the Degree-Day melt model with a Degree-Day factor of 5.5 mm/C/day for each summer period. The timing of lake emptying is based on NVE data (Kjølmoen et al., 2025; NVE, 2026a)

Year	Summer melt days before drainage
2016	98
2017	136
2018	71
2019	85
2020	98
2021	43
2022	89
2023	22
2024	4
2025	0

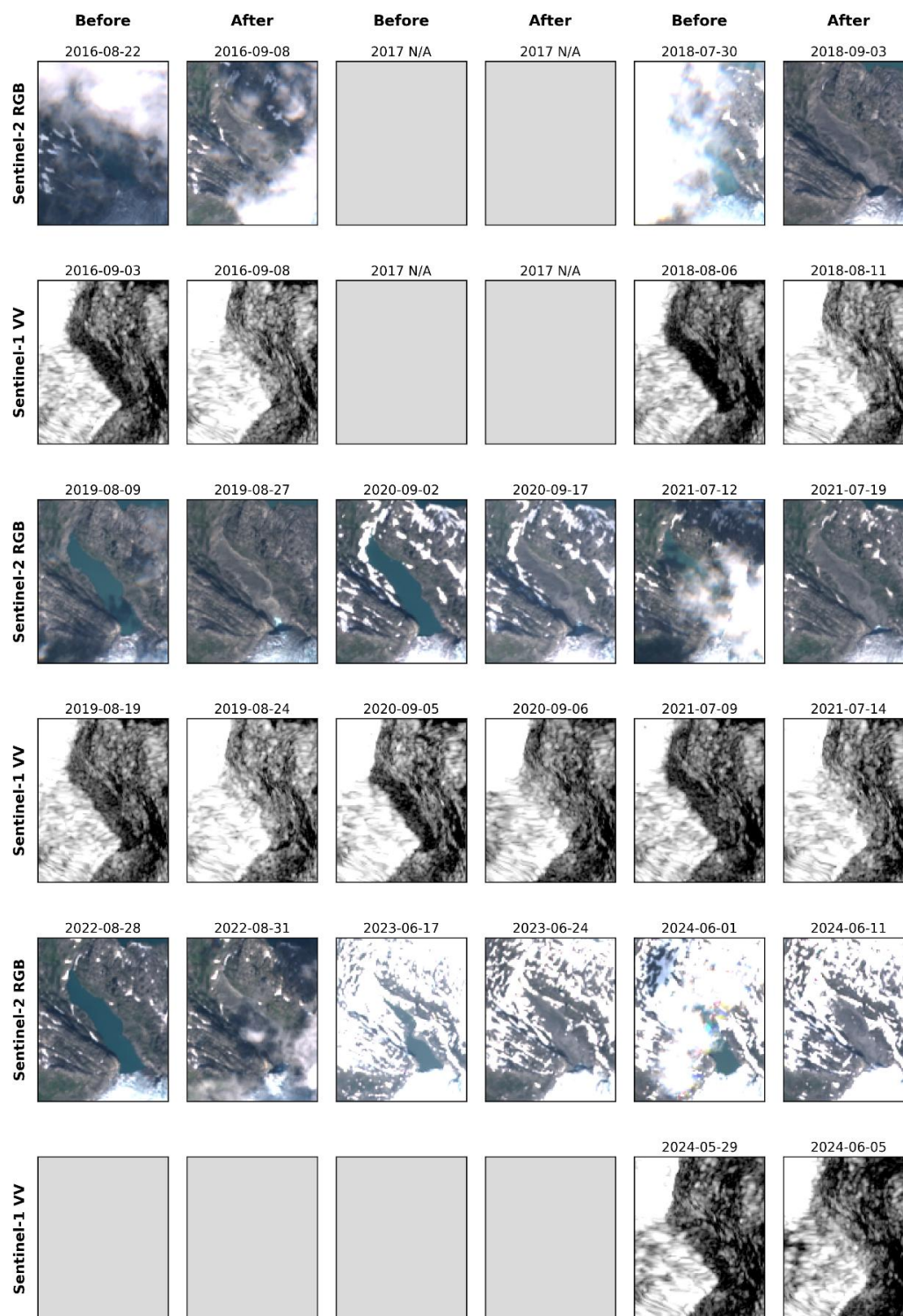


Figure S1: Manual screening of Sentinel-2 and Sentinel-1 imagery to detect GLOF events at Nedre Demmevatnet between 2016 and 2024.

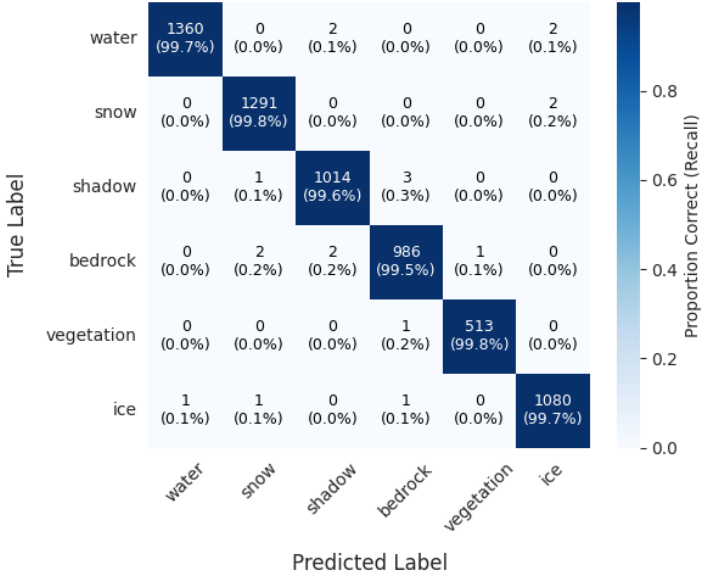


Figure S2: Confusion matrix for random forest classification.

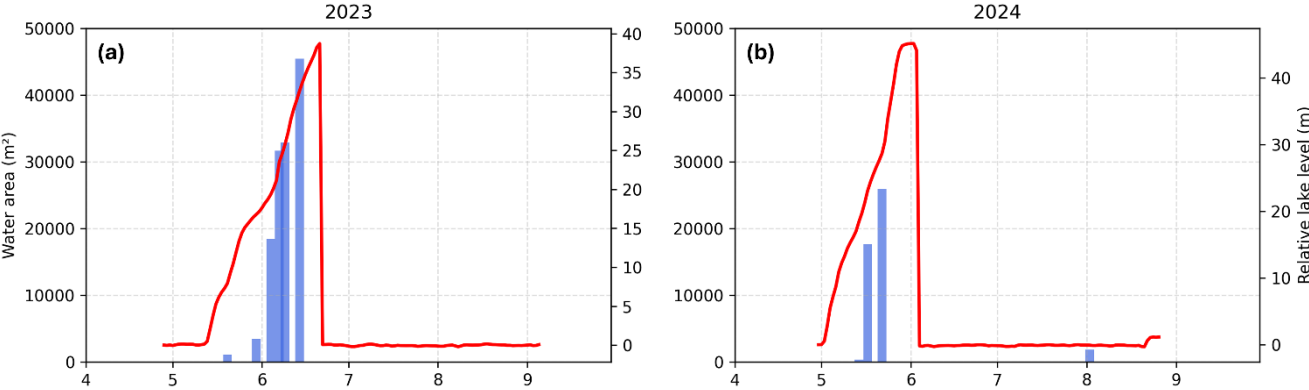


Figure S3: Comparing S2 lake refilling with level logger field data recorded in 2023 and 2024.

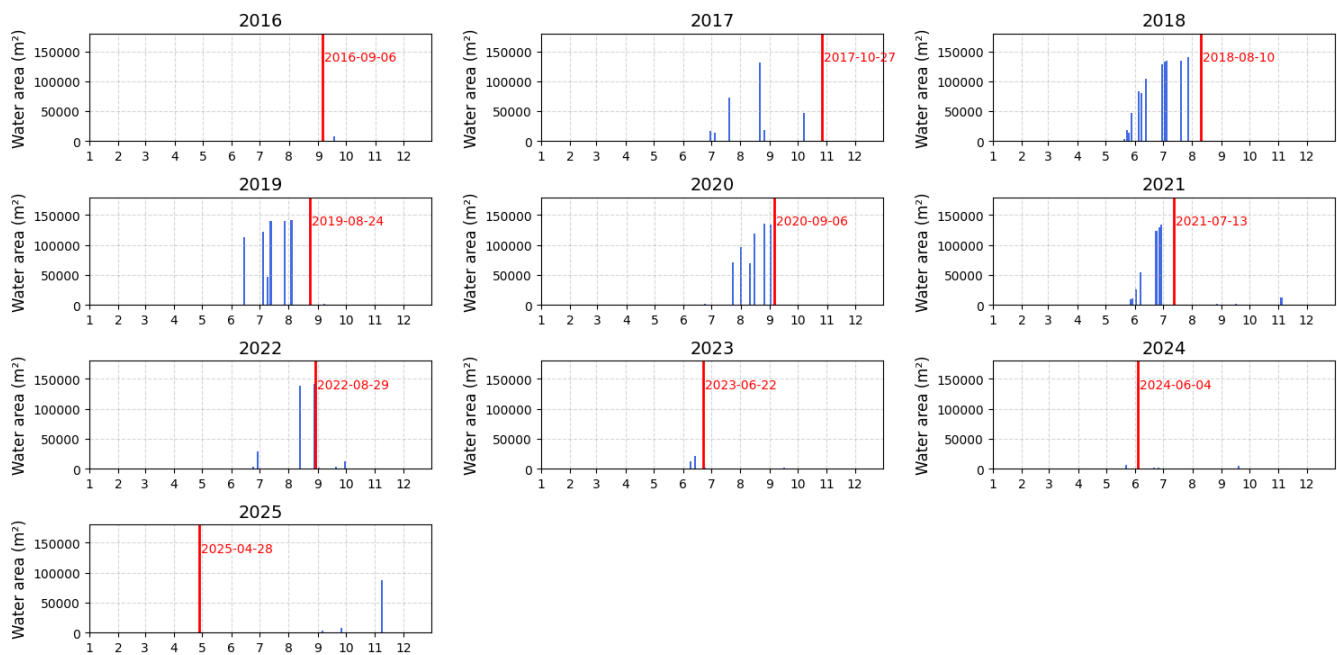


Figure S4: Refiling time-series between 2016-2025 showing classified water area in each acquisition based on the Dynamic World (Brown et al., 2022) classification (blue bars) and the drainage timing from the NVE GLOF inventory (red bars).