Supplementary Material:
Increasing seasonal variation in the extent of rivers and lakes from 1984 to 2022

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Supplementary Figures and Tables

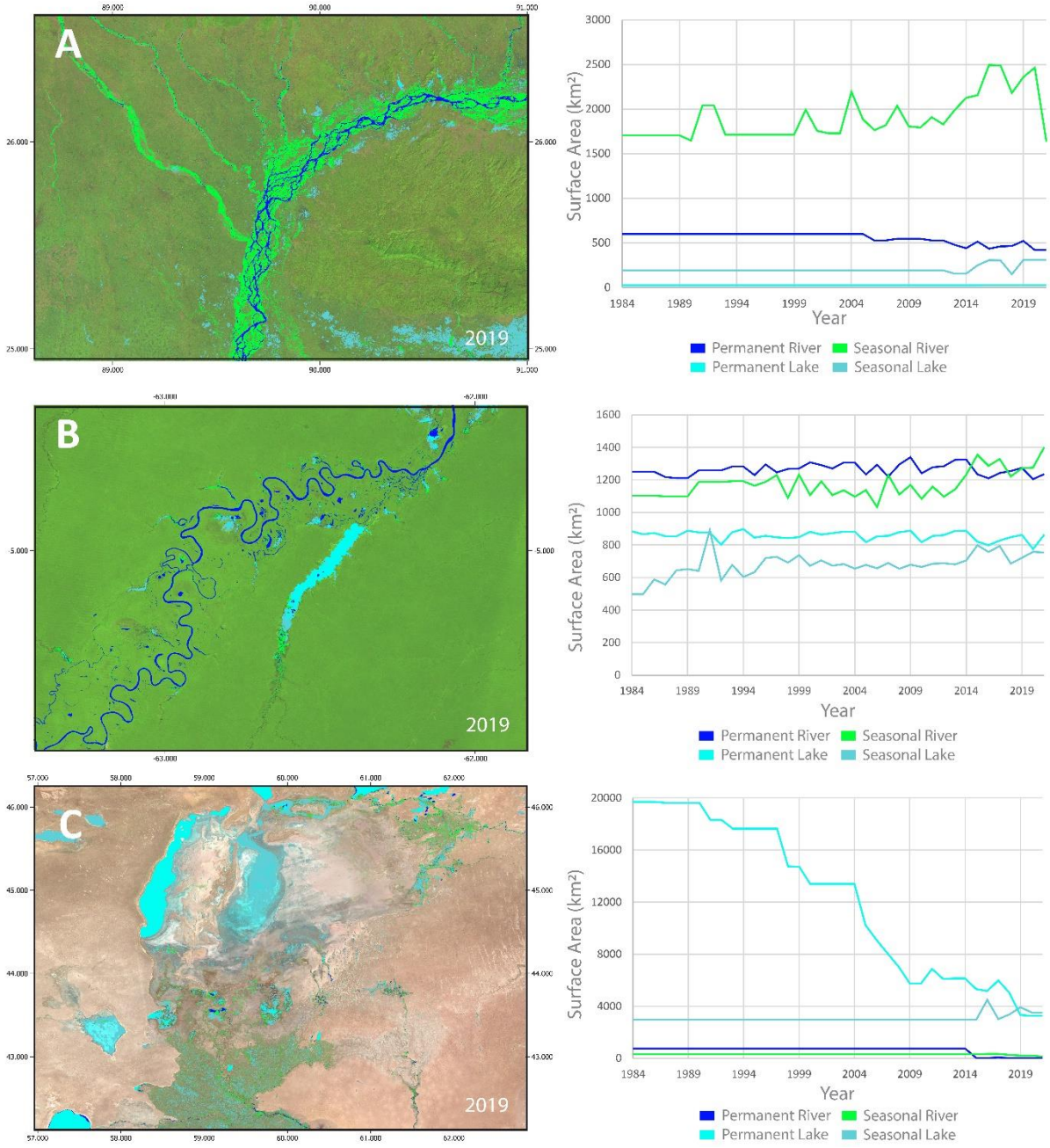

Figure S1: Examples of Water Surface Area Change - Examples of the changing water surface area of lakes and rivers over the past 38-years subdivided in permanent and seasonal water extent. See interactive map for time-series images.

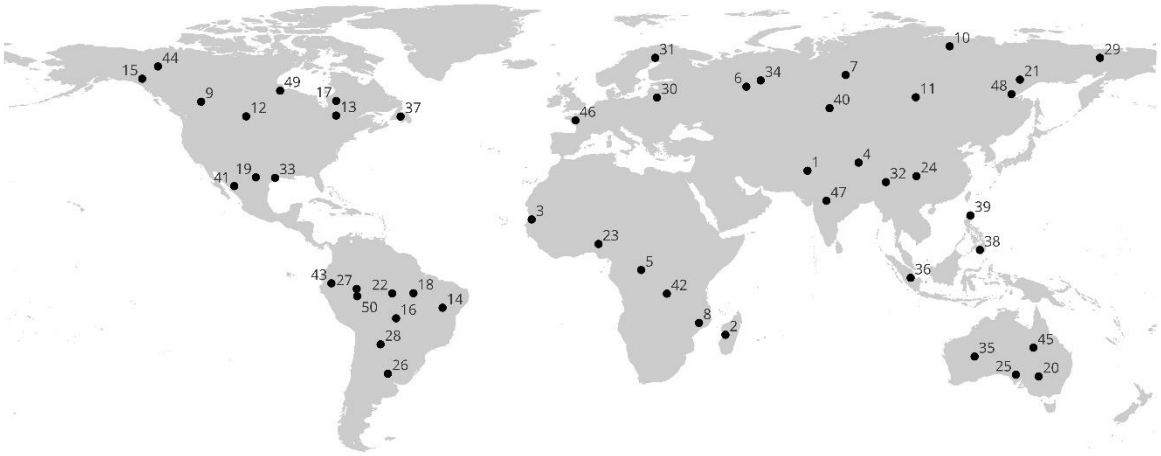

Figure S2: Sampled Validation Localities - Location of the 50 random locations that were manually interpreted over the 38-year timeframe. Numbers show the unique ID that correspond to the table in supplementary table S1.

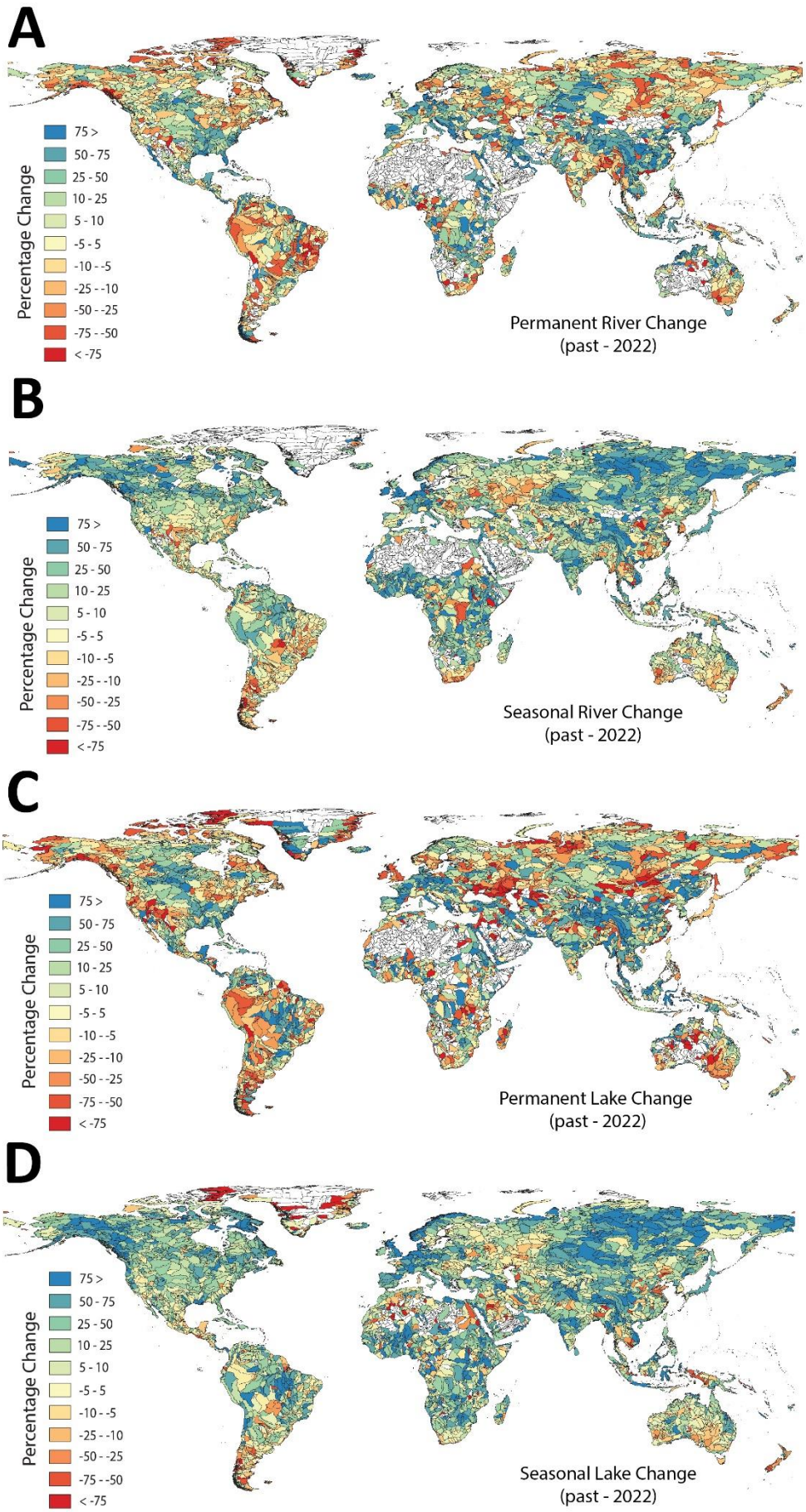
A
Percentage Change
75 >
50 - 75
25 - 50
10 - 25
5 - 10
-5 - 5
-10 - -5
-25 - -10
-50 - -25
-75 - -50
< -75
Permanent River Change
(past - 2022)
B
Percentage Change
75 >
50 - 75
25 - 50
10 - 25
5 - 10
-5 - 5
-10 - -5
-25 - -10
-50 - -25
-75 - -50
< -75
Seasonal River Change
(past - 2022)
C
Percentage Change
75 >
50 - 75
25 - 50
10 - 25
5 - 10
-5 - 5
-10 - -5
-25 - -10
-50 - -25
-75 - -50
< -75
Permanent Lake Change
(past - 2022)
D
Percentage Change
75 >
50 - 75
25 - 50
10 - 25
5 - 10
-5 - 5
-10 - -5
-25 - -10
-50 - -25
-75 - -50
< -75
Seasonal Lake Change
(past - 2022)

Figure S3: The Distribution of Water Surface Area Change - The spatio-temporal change in permanent and seasonal water surface area of rivers and lakes from first recorded observations to 2022.

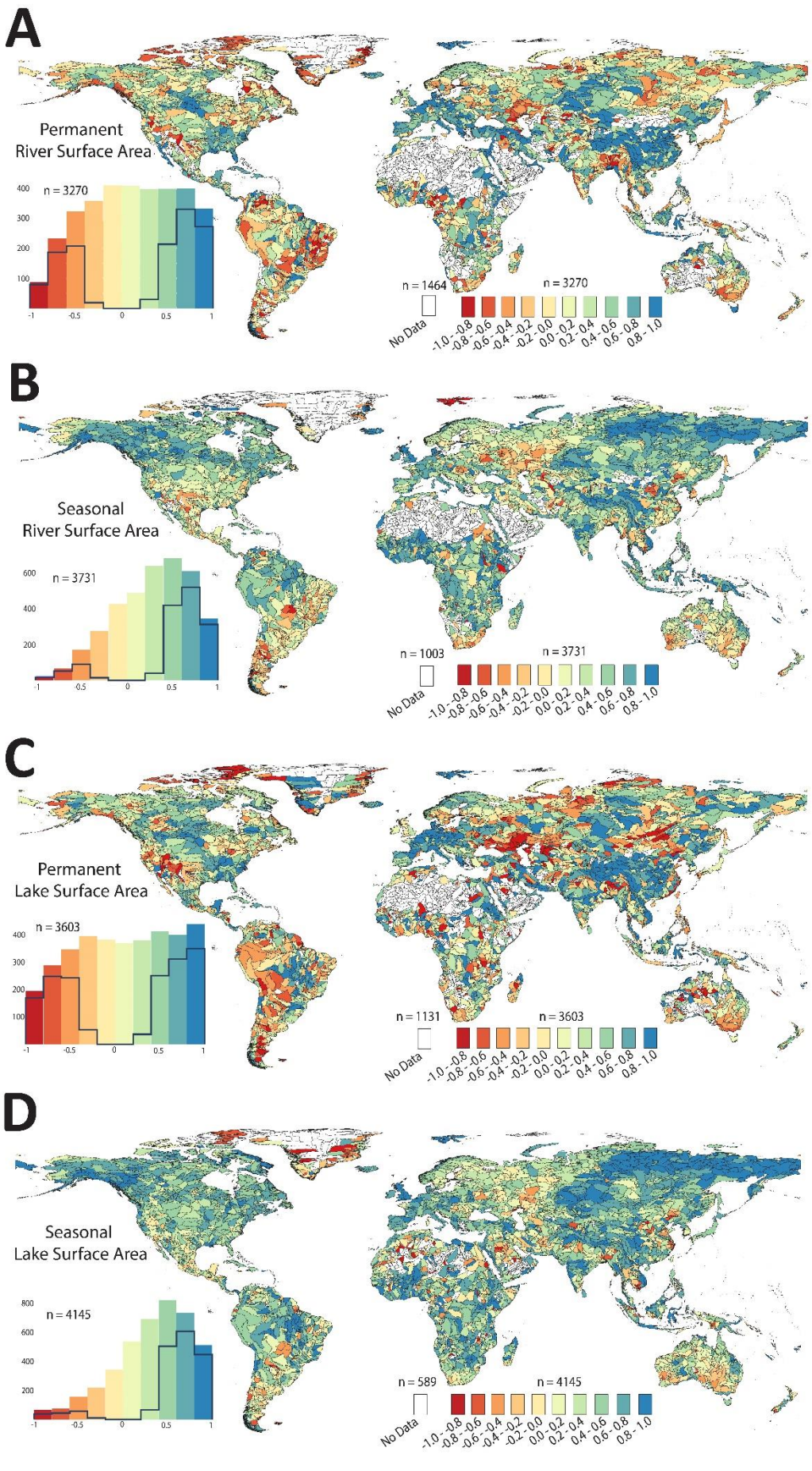
A
Permanent
River Surface Area
n = 3270
400
300
200
100
-1
-0.5
0
0.5
1
n = 1464
n = 3270
No Data
-1.0 - -0.8
-0.8 - -0.6
-0.6 - -0.4
-0.4 - -0.2
-0.2 - 0.0
0.0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1.0
B
Seasonal
River Surface Area
n = 3731
600
400
200
n = 1003
n = 3731
C
Permanent
Lake Surface Area
n = 3603
n = 1131
n = 3603
D
Seasonal
Lake Surface Area
n = 4145
800
600
400
200
n = 589
n = 4145

Figure S4: Show maps of catchments with statistically significant change in seasonal and permanent water surface area since 1984 for rivers and lakes. Spearman rank correlations are shown ranging from -1 to 1. The histogram for each map shows the spearman correlations with the line indicating the distribution of the statistically significant samples (n > 9).

Table S1: Accuracy of Sampled Localities for 4 decades – Accuracy of the SARL database by locality in Figure S1 for the selected years of 1990, 2000, 2010 and 2020.

ID	Lat	Long	1990	2000	2010	2020
1	70.894	31.732	84.50	89.48	77.52	76.58
2	45.292	-19.403	89.15	87.42	91.05	90.26
3	-15.161	16.560	86.79	88.47	92.74	92.53
4	86.865	34.271	96.27	95.28	93.40	88.20
5	18.991	0.785		99.80	99.74	99.62
6	51.818	57.946	68.33	89.24	93.31	78.31
7	82.833	61.577	95.92	98.36	98.14	95.99
8	37.058	-15.690	98.91	98.96	99.07	94.79
9	-118.343	53.260	90.79	91.86	90.99	90.76
10	115.271	70.535		91.40	92.03	91.81
11	104.699	54.645	66.46	65.77	65.68	66.01
12	-104.278	48.685	97.36	97.34	96.48	96.64
13	-76.205	48.936	99.48	99.51	99.49	99.47
14	-42.990	-10.964	90.79	91.64	90.23	91.29
15	-136.732	60.437	95.82	96.80	96.23	95.59
16	-57.497	-14.276	85.13	89.38	87.55	79.40
17	-76.198	53.523	99.63	99.77	99.67	99.66
18	-52.084	-6.434	98.23	98.38	98.38	97.92
19	-101.260	29.691	96.07	96.84	97.14	97.25
20	143.060	-32.410	70.67	76.40	72.57	77.59
21	137.212	60.154		85.20	86.42	82.34
22	-58.713	-6.511	99.49	99.51	99.51	99.48
23	5.667	8.902		92.97	94.58	95.83
24	104.919	30.056	98.02	97.62	97.11	96.55
25	135.950	-31.859	99.70	99.62	99.65	99.71
26	-60.033	-31.538	76.25	74.60	75.25	76.04
27	-69.799	-5.097	95.28	95.67	95.69	96.12
28	-62.332	-22.368	98.73	91.80	93.01	96.23
29	162.189	66.953		98.70	98.91	97.90
30	23.939	54.574	91.59	92.20	91.83	91.56
31	23.377	66.951	84.94	84.46	84.91	84.66
32	95.372	28.205	97.39	99.01	98.73	99.23
33	-95.283	29.537	87.49	86.66	86.02	85.39
34	56.299	59.916	91.85	91.12	93.39	90.87
35	123.057	-26.172	91.37	91.91	92.53	80.77
36	103.097	-1.632	94.41	94.52	98.91	92.03
37	-56.085	48.638	99.31	99.15	99.34	99.13
38	124.712	7.056		80.51	84.00	82.01
39	121.756	17.828	97.04	96.90	97.12	94.13

40	77.791	51.266	97.05	96.39	96.26	94.97
41	-108.008	26.964	85.24	93.54	93.51	92.17
42	27.017	-6.580	93.67	95.52	95.70	92.64
43	-77.695	-3.356	96.72	97.34	98.32	97.49
44	-131.809	64.267	49.04	50.65	51.02	50.57
45	141.417	-23.426	86.32	89.10	89.11	86.47
46	-1.515	47.446	97.67	96.78	96.57	96.46
47	76.800	22.362	92.86	93.84	89.54	88.21
48	134.582	55.612		72.17	73.79	70.74
49	-93.701	56.710	98.44	98.50	98.51	98.41
50	-69.636	-7.377	74.56	76.94	78.91	78.47