

SUPPORTING INFORMATION

Evaluating Regional Patterns in Nitrogen Sources to Watersheds in National Parks of the Rocky Mountains using Nitrate Isotopes

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This supporting information consists of 6 pages, including 4 figures, 2 tables, and literature cited.

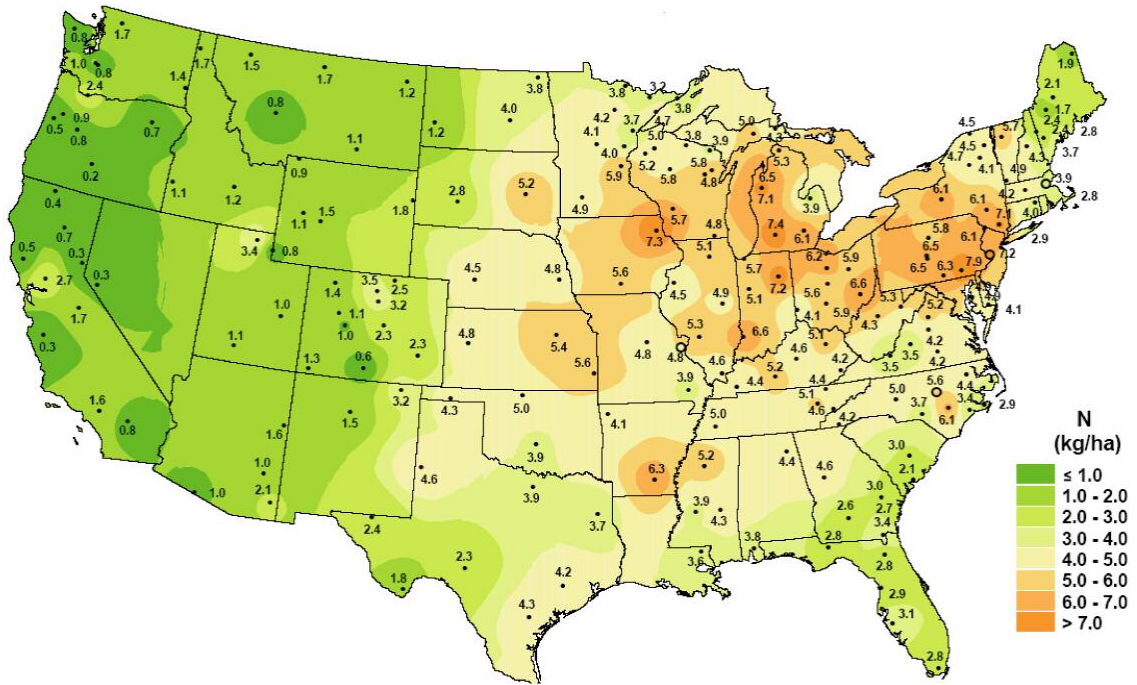


Figure SI-1. Inorganic nitrogen wet deposition from nitrate and ammonium, 2004 (1).



Figure SI-2. Location of National Parks included in study area and NADP/NTN (NADP) sites.

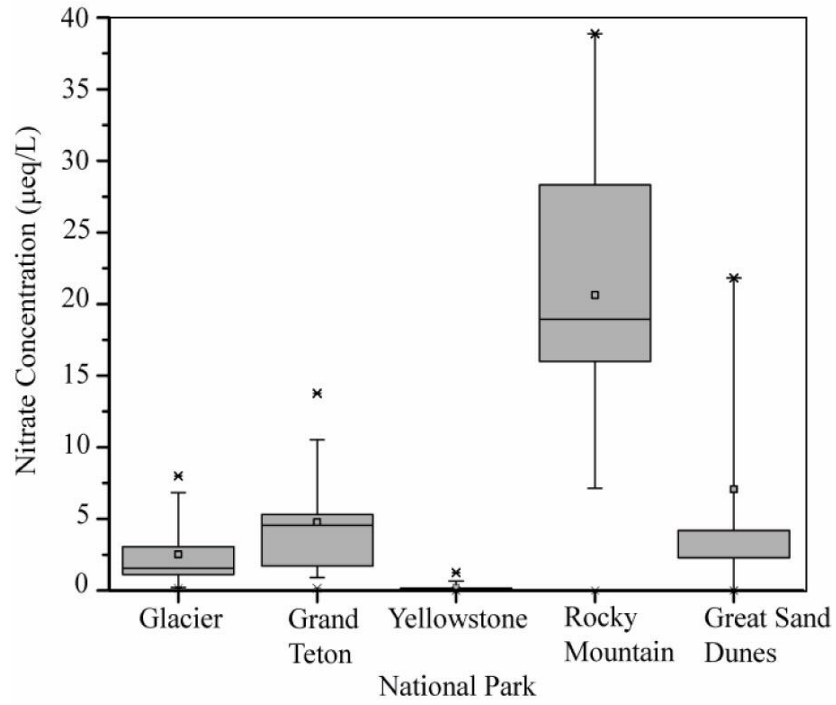


Figure SI-3. Nitrate Concentrations at 56 lakes sampled during late summer 2004, aggregated by National Park.

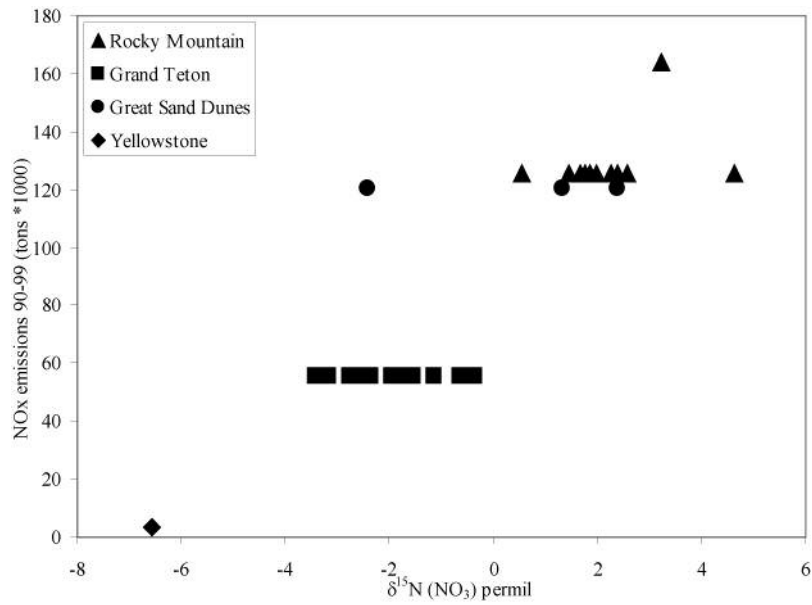


Figure SI-4. $\delta^{15}\text{N}(\text{NO}_3)$ values of lake waters compared with stationary source NO_x emissions within a 300-km buffer.

Table SI-1. NO₃ concentration, δ¹⁸O (NO₃) and δ¹⁵N (NO₃) values for National Park lakes.

State	National Park	Site Name	Elevation (meters)	Nitrate Concentration (µeq/L)	δ ¹⁵ N(NO ₃) (permil)	δ ¹⁸ O(NO ₃) (permil)
MT	Glacier	Aikayan	2344	1.9	-2.4	21.3
MT	Glacier	Avalanche Lake	1190	3.1	0.7	9.7
MT	Glacier	Feather Woman	2298	1.6	-1.7	17.0
MT	Glacier	Grinnel Lake	1505	6.8	0.4	7.9
MT	Glacier	Gunsight Lake	1620	4.1	-0.4	12.2
MT	Glacier	Hidden Lake	1943	1.5	-0.6	10.4
MT	Glacier	Lake No Name-Siyeh Pass	2216	8.0	-1.1	12.9
MT	Glacier	Medicine Grizzly Lake	1696	1.1	-1.3	11.1
MT	Glacier	Oldman Lake	2026	1.1	-0.8	15.0
MT	Glacier	Ptarmigan Lake	2019	1.5	0.1	14.4
MT	Glacier	Snyder Lake Glac	1594	1.8	-1.0	-5.7
WY	Grand Teton	Arrowhead Lake	2790	5.3	-3.2	2.6
WY	Grand Teton	Bear Paw Lake	2088	1.7	-2.5	6.6
WY	Grand Teton	Bradley Lake	2141	10.5	-0.6	12.2
WY	Grand Teton	Lake No Name 44	2376	5.5	-1.8	0.9
WY	Grand Teton	Lake No Name 44A	2376	4.9	-0.4	2.0
WY	Grand Teton	Lake No Name 49	2967	13.8	-1.5	10.4
WY	Grand Teton	Lake No Name 89	2380	1.5	-2.4	11.1
WY	Grand Teton	Lake of the Craggs	2916	4.6	-2.8	10.1
WY	Grand Teton	Ramshead Lake	2894	4.5	-3.4	7.1
WY	Grand Teton	Taggart Lake	2104	5.0	-1.1	9.1
WY	Grand Teton	Trapper Lake	2107	3.6	-1.9	1.2
CO	Great Sand Dunes	Lower Sand Creek Lake	3496	4.2	1.3	6.2
CO	Great Sand Dunes	Medano Lake	3509	21.8	2.4	3.3
CO	Great Sand Dunes	Upper Sand Creek Lake	3580	2.3	-2.4	3.6
CO	Rocky Mountain	Chasm Lake	3592	38.9	2.4	9.8
CO	Rocky Mountain	Dream Lake	3035	26.4	2.0	12.5
CO	Rocky Mountain	Emerald Lake	3083	27.8	1.7	13.4
CO	Rocky Mountain	Lake Haiyaha	3111	30.0	1.8	12.5
CO	Rocky Mountain	Lake Helene	3226	17.6	1.7	8.8
CO	Rocky Mountain	Lawn Lake	3349	16.0	4.6	8.1
CO	Rocky Mountain	Loch Vale	3103	18.6	1.5	13.0
CO	Rocky Mountain	Sky Pond	3316	18.6	2.3	13.6
CO	Rocky Mountain	Spruce Lake	2942	7.1	0.6	10.3
CO	Rocky Mountain	Thunder Lake	3217	16.0	2.6	10.3
CO	Rocky Mountain	Ypsilon Lake	3234	19.0	3.2	7.6
WY	Yellowstone	Sylvan Lake	2564	1.2	-6.6	5.9

Table SI-2. NO₃ concentration, δ¹⁸O (NO₃) and δ¹⁵N (NO₃) values for NADP/NTN sites.

State	Site ID	Site Name	Elevation (meters)	Nitrate Concentration (µeq/L)	δ ¹⁵ N(NO ₃) (permil)	δ ¹⁸ O(NO ₃) (permil)
CO	CO00	Alamosa	2298	15.8	-4.1	75.1
CO	CO18	Ripple Creek Pass	2929	12.5	-3.0	71.1
CO	CO19	Rocky Mountain -Beaver Meadows	2490	17.7	-2.1	74.8
CO	CO91	Wolf Creek Pass	3292	16.5	-2.2	74.0
CO	CO98	Rocky Mountain -Loch Vale	3159	14.0	-3.6	71.2
MT	MT05	Glacier -Fire Weather Station	980	8.6	-5.1	74.5
WY	WY08	Yellowstone -Tower Falls	1912	9.3	-5.5	78.3

Supporting Information-Literature Cited

- (1) National Atmospheric Deposition Program: NRSP-3. NADP Program Office, Illinois State Water Survey, 2204 Griffith Dr., Champaign, IL 61820, 2008.