

Supporting Information: Mississippi River Nitrate Loads from High Frequency Sensor Measurements and Regression-Based Load Estimation

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Contains 4 pages, Tables SI-S1 and S2, Figure SI-S1.

Table SI-S1. Discrete data from the USGS National Water Information Systems for the Mississippi River at Baton Rouge during the study period. Data are publically available from: http://waterdata.usgs.gov/usa/nwis/uv?site_no=07374000 Parameters codes and descriptions are as follows:

P00631: Nitrate plus nitrite, water, filtered, milligrams per liter as nitrogen

P00613: Nitrite, water, filtered, milligrams per liter as nitrogen

P00608: Ammonia, water, filtered, milligrams per liter as nitrogen

P00602: Total nitrogen, water, filtered, milligrams per liter

Discrete Sample Concentrations (mg N/L)					Sensor Concentrations (mg N/L)	
Date/Time (CDT)	Nitrate + Nitrite (mg N/L)	Nitrite (mg N/L)	Ammonia (mgN/L)	Total Dissolved Nitrogen (mg N/L)	Date/Time (CDT)	Nitrate + Nitrite (mg N/L)
12/6/2011 13:00	0.87	0.01	0.01	1.2	12/6/2011 13:00	0.96
1/17/2012 13:00	1.00	0.01	0.03	1.2	1/17/2012 13:00	1.07
2/6/2012 13:00	1.09	0.01	0.03	1.3	2/6/2012 13:00	1.14
3/5/2012 14:00	1.12	0.01	0.02	1.4	3/5/2012 14:00	1.22
3/19/2012 13:00	0.99	0.02	0.01	1.2	3/19/2012 12:00	1.09
4/2/2012 13:00	1.04	0.01	< 0.010	1.3	4/2/2012 12:00	1.09
4/16/2012 12:00	0.98	< 0.001	0.01	1.3	4/16/2012 12:00	1.13
4/30/2012 13:00	0.95	0.00	< 0.010	1.3	4/30/2012 12:00	1.07
5/14/2012 13:00	1.41	< 0.001	< 0.010	1.6	5/14/2012 12:00	1.52
6/11/2012 13:00	1.57	0.00	< 0.010	1.9	6/11/2012 12:00	1.67
8/6/2012 13:00	0.67	0.01	< 0.010	1.1	8/6/2012 12:00	0.74
10/22/2012 13:00	0.44	0.00	< 0.010	0.7	10/22/2012 12:00	0.54
12/3/2012 11:00	0.76	0.00	< 0.010	1.0	12/3/2012 12:00	0.85
1/14/2013 12:00	0.83	0.01	0.03	1.1	1/14/2013 9:00	0.96
2/21/2013 8:00	1.20	0.01	0.03	1.5	2/21/2013 8:00	1.33
3/4/2013 13:00	1.18	0.01	0.03	1.6	3/4/2013 12:00	1.36
3/18/2013 11:00	1.47	0.01	0.03	1.8	3/18/2013 12:00	1.57
4/8/2013 13:00	1.39	0.02	0.03	1.7	4/8/2013 12:00	1.54
4/22/2013 13:00	1.45	0.03	< 0.010	1.8	4/22/2013 12:00	1.61
5/6/2013 13:00	1.95	0.03	< 0.010	2.4	5/6/2013 12:00	2.12
5/20/2013 13:00	1.89	0.03	0.01	2.3	5/20/2013 12:00	1.92
6/3/2013 13:00	1.88	0.00	< 0.010	2.3	6/3/2013 12:00	1.98
6/17/2013 13:00	2.54	0.00	< 0.010	2.9	6/17/2013 12:00	2.57
7/15/2013 13:00	2.76	0.00	< 0.010	3.2	7/15/2013 12:00	2.89
8/19/2013 13:00	1.03	< 0.001	< 0.010	1.4	8/19/2013 12:00	1.07

Table SI-S2: Monthly NO_3^- loads (kg N) from sensor measurements and regression-based models (LOADEST, Composite Method, WRTDS). Error in sensor loads is described in the text.

Month	Measured Load ($\times 10^{-6}$ kg N)	% error	Modeled Loads ($\times 10^{-6}$ kg N)			
			LOADEST	Composite Method	WRTDS	Linear Interpolation
Nov-11	19.4	1.6	22.1	20.1	22.7	14.4
Dec-11	48.0	1.3	45.9	48.2	60.5	50.1
Jan-12	52.4	1.2	47.5	47.9	55.1	47.4
Feb-12	54.5	1.2	52.1	53.8	61.7	54.1
Mar-12	50.9	1.2	56.5	48.7	65.8	48.9
Apr-12	42.8	1.3	61.6	42.8	60.8	43.9
May-12	51.2	1.1	44.7	41.4	48.3	43.5
Jun-12	29.4	1.1	21.0	27.6	27.1	26.7
Jul-12	17.7	1.1	13.5	15.7	15.1	13.6
Aug-12	5.9	1.9	10.3	6.7	7.8	7.4
Sep-12	4.6	2.3	9.7	5.7	6.3	6.5
Oct-12	6.1	2.0	8.6	6.2	8.4	6.2
Nov-12	9.2	1.6	10.5	9.4	11.6	8.4
Dec-12	14.1	1.4	14.0	13.8	18.8	13.5
Jan-13	38.2	1.3	39.7	39.4	49.1	37.3
Feb-13	51.9	1.2	49.8	50.8	52.9	49.7
Mar-13	66.4	1.1	68.8	70.9	57.4	59.1
Apr-13	71.6	1.1	85.6	73.4	67.5	69.6
May-13	139.0	1.0	138.0	131.0	111.6	136.3
Jun-13	147.0	1.0	115.0	136.0	107.5	148.2
Jul-13	122.0	1.0	80.7	112.0	85.6	125.6
Aug-13	36.9	1.1	37.0	35.5	34.8	39.8
Sep-13	9.8	1.6	15.8	12.2	12.2	16.2
Oct-13	9.6	1.5	11.5	9.4	11.7	12.6

Figure SI-S1: Relationship between mean daily discharge (m^3/s) and mean daily NO_3^- load ($\text{kg N} / \text{day}$) based on discrete data (1980-2013, $n=361$) and high frequency sensor data (2011-2013).

