Lake Lacawac, Bruce R. Hargreaves, Lehigh University (brh0@lehigh.edu, http://www.lehigh.edu/~brh0) 41° 22.5'N 75° 17.3'W elevation 428m

18 Apr 2014, 10:40-11:40am EDT: platform moved to lake center 10Nov 2014: platform move to dock 11:05-11:55 EDT

The water level sensor (referenced to dock) settles for several days after moving platform to lake center and thus underestimates water level during this period.

H310 sensor depth & Lake level are based on differential pressure
sensor with ca 0.1mm resolution & vertical position referenced to bottom of lake.
Sensor PSIG converted to depth using density of water at 4oC (1.43321 psi/m)
Lake level is referenced also to lower frame of dock at SE corner (2003-May2005)
(Actual water level at dock varies seasonally with density of water column and hourly from precip, runoff, evaporation, seepage & outflow. Outflow also varies with status of beaver dam).

5280 ft/mile
1609.3 m/mile

Std pressure at sea level =1 atm=760 mm Hg=29.92" Hg=1013.2 mbars
Std pressure at 428m elevation =724 mm Hg, 29.61 in. Hg, (965.2 mbars)

	Tair avg F	Tair max F	Tair min F		Rain-in	WS-mph	WS max mph					Tw 0.1m F	Tw 0.5m F	Tw 1m F	Tw 2m F	Tw 3m F	Tw 4m F	Tw 5m F	Tw 6m F	Tw 8m F	Tw 10m F	Tw 12m F					
	37.9	66.1	12.5		0.63	4.8	33					46.4	46.5	46.6	46.6	46.5	46.4	46.4	46.4	46.5	45.6	45.6					
Month summary avg Tw	Tair avg-C	Tair Hi-C	Tair Min-C	RHair-%	Rain-mm	WS-m/s	WS Max-m/s	WDIR-deg	Barom-mb	Sum Rad W/m2	Sum PAR uM/m2/s	Tw 0.1m	Tw 0.5m	Tw 1m	Tw 2m	Tw 3m	Tw 4m	Tw 5m	Tw 6m	Tw 8m	Tw11.0m	Tw12.3m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
7.9	3.3	19.0	-10.8	66.6	15.9	2.1	14.7	251.5	962.5	148646884	293	8.0	8.1	8.1	8.1	8.1	8.0	8.0	8.0	8.0	7.5	7.5	6.2	-107.7	15.9	12.3	44.0	13.3

month (All)

PAR & PYR Integration period=15min instead of 60min after 11am on 9/11/2013

Data

Location	% records	Date	Day of Yr	Tair avg-C	Tair Hi-C	Tair Min-C	RHair-%	Rain-mm	WS-m/s	WS Max m/s	WDIR-deg	Barom-mb	Sum Rad J/m2	Sum PAR Mol/m2	Tw 0.1m	Tw 0.5m	Tw 1m	Tw 2m	TW3m	TW4m	TW5m	TW6m	TW8m	TW H310-C	TW12m	H310 depth-m (4oC)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
LC	100%	11/1/2014	305	5.4	6.4	2.7	73.7	0.0	3.4	9.2	142	959.1	3302751	7.1	11.03	11.11	11.15	11.09	11.17	11.03	11.09	10.98	10.77	7.3	7.08	11.0	-96.7	0.000	12.4	53.9	12.6
LC	100%	11/2/2014	306	1.8	4.6	0.4	65.7	0.2	5.4	14.7	331	962.0	9153163	17.9	10.17	10.25	10.28	10.23	10.31	10.22	10.27	10.20	10.27	7.5	7.53	11.0	-99.2	0.200	12.3	55.4	13.4
LC	100%	11/3/2014	307	6.5	13.7	0.2	44.7	0.0	3.4	10.2	292	966.5	13484189	26.0	9.31	9.38	9.41	9.35	9.44	9.36	9.38	9.30	9.42	8.3	8.59	11.0	-103.0	0.200	12.5	53.7	12.6
LC	100%	11/4/2014	308	13.5	19.0	9.9	28.7	0.0	1.9	7.9	242	966.4	10582739	21.4	9.32	9.36	9.37	9.32	9.35	9.22	9.22	9.14	9.28	8.5	8.57	11.0	-105.8	0.200	12.5	52.8	11.4
LC	100%	11/5/2014	309	12.1	14.8	7.0	45.3	0.0	2.0	8.1	261	965.8	4534074	9.4	9.36	9.42	9.45	9.47	9.45	9.32	9.29	9.18	9.27	8.5	8.54	11.0	-107.7	0.200	12.4	52.8	11.7
LC	100%	11/6/2014	310	6.8	7.9	5.6	87.4	2.4	1.1	5.0	206	958.5	1565856	3.5	9.24	9.30	9.33	9.37	9.36	9.25	9.27	9.18	9.29	8.6	8.57	11.0	-107.3	2.600	12.3	52.8	12.5
LC	100%	11/7/2014	311	3.1	6.2	-0.3	83.2	1.1	3.7	9.6	316	954.0	5626979	11.4	8.99	9.06	9.09	9.14	9.12	9.04	9.07	9.01	9.17	8.6	8.63	11.0	-106.0	3.700	12.3	55.2	13.2
LC	100%	11/8/2014	312	1.9	5.7	-1.9	64.5	0.0	2.2	6.7	259	960.4	11515205	22.7	8.59	8.67	8.69	8.72	8.68	8.58	8.56	8.47	8.60	8.4	8.24	11.0	-107.5	3.700	12.3	55.6	13.3
LC	100%	11/9/2014	313	4.7	7.4	0.9	67.9	0.0	1.4	5.8	265	960.5	6991988	14.1	8.37	8.45	8.47	8.51	8.47	8.37	8.38	8.31	8.43	8.2	8.04	11.0	-109.6	3.700	12.5	54.3	13.0
LC	100%	11/10/2014	314	7.5	15.6	0.2	63.7	0.0	0.7	5.3	228	965.9	11655044	23.3	8.52	8.36	8.34	8.34	8.30	8.26	8.32	8.28	8.32	8.3	8.16	6.3	-110.2	3.700	12.5	54.9	12.5
ND	100%	11/11/2014	315	9.8	14.0	4.6	87.8	0.0	0.6	4.6	209	963.9	5272543	10.9	8.53	8.36	8.35	8.36	8.32	8.35	8.38	8.37	8.35	8.3	8.37	1.9	-110.8	3.700	12.6	53.6	12.1
ND	100%	11/12/2014	316	9.3	13.5	2.3	78.8	0.0	1.8	10.0	250	961.5	5012528	10.4	8.54	8.58	8.60	8.63	8.59	8.63	8.62	8.62	8.65	8.6	8.66	1.9	-111.1	3.700	12.5	56.2	12.3
ND	100%	11/13/2014	317	0.6	2.9	-1.9	79.7	0.1	0.9	4.8	192	964.4	4499672	9.2	8.10	8.19	8.22	8.24	8.21	8.25	8.26	8.26	8.20	8.2	8.16	1.9	-112.4	3.800	12.4	54.7	13.8
ND	100%	11/14/2014	318	-1.4	0.4	-4.3	70.1	0.9	2.5	8.6	285	964.2	8347416	16.6	7.54	7.64	7.67	7.65	7.59	7.56	7.55	7.59	7.59	7.6	7.61	1.9	-112.2	4.700	12.4	55.1	14.2
ND	100%	11/15/2014	319	-2.0	1.3	-4.4	63.3	0.0	2.1	6.9	301	971.7	11243719	21.1	7.04	7.14	7.16	7.15	7.08	7.02	7.00	7.07	7.09	7.2	7.10	1.9	-113.2	4.700	12.5	45.8	14.4
ND	100%	11/16/2014	320	-0.6	2.4	-5.4	67.0	0.0	0.8	5.2	252	970.0	3676830	7.6	6.63	6.73	6.77	6.80	6.78	6.79	6.73	6.86	6.83	6.9	6.87	1.9	-113.5	4.700	12.4	16.5	14.2
ND	100%	11/17/2014	321	2.1	5.2	0.1	95.1	11.2	1.1	7.8	181	954.2	1341790	3.1	6.40	6.48	6.52	6.55	6.54	6.51	6.47	6.61	6.60	6.6	6.69	2.0	-107.4	15.900	12.3	13.2	13.4
ND	100%	11/18/2014	322	-6.0	2.3	-9.3	57.7	0.0	3.5	11.4	279	956.2	10948003	20.1	5.71	5.83	5.84	5.80	5.72	5.55	5.62	5.76	5.72	5.8	5.83	2.0	-103.5	15.900	12.3	14.7	15.2
ND	100%	11/19/2014	323	-7.3	-3.1	-10.8	54.4	0.0	2.3	8.8	273	965.2	10641696	19.7	4.69	4.86	4.86	4.83	4.74	4.48	4.63	4.77	4.71	4.9	4.86	2.0	-107.2	15.900	12.5	14.7	15.6
ND	75%	11/20/2014	324	-2.4	1.3	-5.8	53.3	0.0	2.2	9.4	269	959.1	9250699	17.2	4.08	4.25	4.26	4.26	4.22	3.99	4.14	4.30	4.23	4.4	4.49	1.9	-110.0	15.900	12.5	13.7	14.6
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Lake water & energy budget daily summary from hourly data (negative values: loss from lake; runoff & seepage term is residual after adjusting lake level change for all others)

Ratio of lake watershed to lake area= 2.6176758 Runoff & seepage as % of watershed area precip: 56%

Grand sum/avg	3.28	8.02	8.08	8.10	8.10	8.08	8.00	1.9	148646884	-31650	-15.9	15.9	23.2	-43.3	0.0	0.0
																SumTerrevap2=AirVPD,mbar*WS,m/s*s

Data

DATE	DOY	AvgTair C	AvgTw 0.1m	\\	Avg Tw1m	Avg Tw2m	Avg Tw3m	Avg Tw4m	AvgWS m/s	CSI	SumRad J/m2	SumH Evap (*0.9=KJ/m2)	Sum Lk_lvl chg (mm)	SumRain mm	Sum Runoff & seepage, mm	SumLake evap (mm)	Sum Terrevap2
11/1/2014	305	5.53	11.05	11.13	11.17	11.10	11.18	11.04	3.1		3302865	-2460	-2.285	0.0	1.6	-3.4	0.0
11/2/2014	306	1.84	10.21	10.28	10.31	10.26	10.34	10.26	5.1		9151469	-4650	-3.241	0.2	3.5	-6.4	0.0
11/3/2014	307	6.20	9.32	9.40	9.43	9.36	9.45	9.37	3.2		13485496	-2908	-3.537	0.0	1.0	-4.0	0.0
11/4/2014	308	13.40	9.31	9.36	9.36	9.31	9.34	9.22	1.8		10583582	-1476	-2.096	0.0	0.5	-2.0	0.0
11/5/2014	309	12.34	9.36	9.42	9.46	9.47	9.45	9.32	1.8		4532960	-1183	-1.764	0.0	0.5	-1.6	0.0
11/6/2014	310	6.83	9.25	9.31	9.34	9.38	9.36	9.25	0.9		1565768	-414	2.562	2.4	1.3	-0.6	0.0
11/7/2014	311	3.32	9.01	9.07	9.11	9.15	9.13	9.06	3.5		5626657	-2041	-0.203	1.1	2.1	-2.8	0.0
11/8/2014	312	1.79	8.60	8.68	8.69	8.73	8.68	8.59	2.0		11515747	-1766	-2.347	0.0	0.7	-2.4	0.0
11/9/2014	313	4.76	8.38	8.45	8.48	8.52	8.47	8.37	1.3		6990616	-1026	-1.658	0.0	0.3	-1.4	0.0
11/10/2014	314	7.28	8.52	8.37	8.34	8.35	8.30	8.26	0.5		11656751	-569	-0.101	0.0	1.3	-0.8	0.0
11/11/2014	315	9.65	8.52	8.35	8.34	8.35	8.31	8.34	0.3		5272514	-105	-0.601	0.0	0.1	-0.1	0.0
11/12/2014	316	9.57	8.55	8.58	8.61	8.64	8.60	8.64	1.6		5011824	-593	-0.923	0.0	0.5	-0.8	0.0
11/13/2014	317	0.73	8.11	8.20	8.23	8.25	8.22	8.26	0.8		4500139	-997	0.403	0.1	2.3	-1.4	0.0
11/14/2014	318	-1.39	7.56	7.66	7.69	7.67	7.61	7.59	2.3		8346828	-2021	-2.311	0.9	0.2	-2.8	0.0
11/15/2014	319	-1.91	7.06	7.16	7.18	7.16	7.10	7.03	2.0		11243546	-1866	0.870	0.0	4.0	-2.5	0.0
11/16/2014	320	-0.80	6.64	6.74	6.78	6.81	6.79	6.80	0.6		3677570	-927	-1.531	0.0	0.3	-1.3	0.0
11/17/2014	321	2.06	6.41	6.49	6.53	6.56	6.55	6.53	0.8		1341370	-466	11.860	11.2	1.9	-0.6	0.0
11/18/2014	322	-5.67	5.74	5.87	5.87	5.84	5.76	5.60	3.1		10947552	-2722	-2.629	0.0	1.7	-3.7	0.0
11/19/2014	323	-7.45	4.72	4.88	4.88	4.84	4.75	4.49	2.0		10641778	-1937	-3.382	0.0	-0.1	-2.6	0.0
11/20/2014	324	-2.54	4.08	4.26	4.27	4.26	4.22	3.99	1.8		9251852	-1522	-3.023	0.0	-0.4	-2.1	0.0
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1.000 <=SCALE ADJ (1.0=no adjustment)

4.184 joule/calorie (= joule/degree for 1cm3)

Nominal diffuse %R from water=7%

	#N/A	#N/A	#N/A		8	8.1	-6.9		#N/A	-11.0	
				4.184	<=CONVERT HEAT TO DEGREES				4.184	slope	
7%	0.9			6000000	cm3/m2 (for 0-4m integrated depth)				6000000	intercept	r2

Solar Heat input (absorbed from solar rad), KJ/m2)	Sum H evap (KJ/m^2)	solar heat absorbed - evap loss (kJ/m^2)	% of absorbed solar heat lost via evap	Solar Heat input (absorbed from solar rad), Tw 0-6m)	starting Tw (0-6m)	ending Tw (0-6m)	actual dTw, 0-6m	RESID1: NON-SOLAR FLUX (Heat flux to offset absorbed solar to match dTw)	evap loss (degC 0-6m)	RESID2: NON-SOLAR FLUX to offset absorbed solar to match dTw LESS EVAP (degC 0-6m)
3072	-2214	858	72.1%	0.12	11.31	10.82	(0.49)	(0.61)	-0.09	(0.52)
8511	-4185	4326	49.2%	0.34	10.82	9.70	(1.13)	(1.46)	-0.17	(1.30)
12542	-2617	9924	20.9%	0.50	9.70	9.27	(0.43)	(0.93)	-0.10	(0.83)
9843	-1328	8514	13.5%	0.39	9.27	9.38	0.11	(0.28)	-0.05	(0.23)
4216	-1065	3151	25.3%	0.17	9.38	9.41	0.03	(0.14)	-0.04	(0.10)
1456	-373	1083	25.6%	0.06	9.41	9.25	(0.16)	(0.21)	-0.01	(0.20)
5233	-1837	3395	35.1%	0.21	9.25	8.84	(0.41)	(0.62)	-0.07	(0.55)
10710	-1590	9120	14.8%	0.43	8.84	8.58	(0.26)	(0.69)	-0.06	(0.62)
6501	-923	5578	14.2%	0.26	8.58	8.37	(0.21)	(0.47)	-0.04	(0.43)
10841	-512	10328	4.7%	0.43	8.37	8.39	0.02	(0.41)	-0.02	(0.39)
4903	-94	4809	1.9%	0.20	8.39	8.60	0.22	0.02	0.00	0.03
4661	-533	4128	11.4%	0.19	8.60	8.25	(0.35)	(0.54)	-0.02	(0.52)
4185	-898	3287	21.4%	0.17	8.25	8.07	(0.19)	(0.35)	-0.04	(0.32)
7763	-1819	5944	23.4%	0.31	8.07	7.36	(0.71)	(1.02)	-0.07	(0.94)
10456	-1680	8777	16.1%	0.42	7.36	6.94	(0.42)	(0.84)	-0.07	(0.77)
3420	-834	2586	24.4%	0.14	6.94	6.62	(0.32)	(0.46)	-0.03	(0.42)
1247	-420	828	33.6%	0.05	6.62	6.29	(0.33)	(0.38)	-0.02	(0.36)
10181	-2449	7732	24.1%	0.41	6.29	4.89	(1.39)	(1.80)	-0.10	(1.70)
9897	-1744	8153	17.6%	0.39	4.89	4.41	(0.48)	(0.88)	-0.07	(0.81)
8604	#N/A	#N/A	#N/A	#N/A				#N/A	#N/A	
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