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 16Nov 2013: platform move to dock 11:45-13:00 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					
	65.3	83.5	48.8		3.01	3.5	28				73.6	73.4	73.2	72.7	71.6	66.1	56.3	50.9	45.3	43.9	43.7					
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	Tw11.1m	Tw12.4m	H310_z (m)	Lakelevel-mm (4oC)	cumul. rain-mm	Batt min-V	RH% CR10 enc	RH% MUX enc
15.4	18.5	28.6	9.4	77.3	76.5	1.6	12.6	229.5	966.5	554901480	1144	23.1	23.0	22.9	22.6	22.0	18.9	13.5	10.5	7.4	6.6	6.5	11.1	-68.1	76.5	12.4	31.0	25.2

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%	8/1/2014	213	20.3	25.7	16.8	80.1	5.8	1.2	6.1	181	971.2	16484184	33.8	23.74	23.50	23.47	23.21	22.51	17.25	12.36	10.01	7.27	6.5	6.38	11.1	-55.2	5.800	12.5	24.2	22.3
LC	100%	8/2/2014	214	19.4	23.4	17.1	84.2	0.0	1.0	5.4	144	970.3	13913405	29.2	23.75	23.70	23.67	23.33	22.44	17.44	12.44	10.06	7.29	6.5	6.40	11.1	-52.7	5.800	12.5	25.4	27.5
LC	100%	8/3/2014	215	19.5	23.1	16.8	83.1	0.0	1.2	4.6	182	968.3	16508132	34.4	23.89	23.81	23.75	23.47	22.40	17.54	12.47	10.06	7.29	6.5	6.39	11.1	-55.1	5.800	12.5	25.9	24.1
LC	100%	8/4/2014	216	20.0	24.6	16.8	80.3	0.0	1.4	5.9	269	967.8	19390679	40.5	24.02	23.96	23.96	23.59	22.46	17.63	12.51	10.09	7.29	6.5	6.39	11.1	-58.0	5.800	12.5	26.7	23.3
LC	100%	8/5/2014	217	20.4	26.9	14.4	75.5	0.0	1.2	5.5	256	966.2	21687151	44.5	24.86	24.33	24.09	23.76	22.55	17.76	12.58	10.13	7.31	6.5	6.41	11.1	-61.0	5.800	12.4	26.8	21.8
LC	100%	8/6/2014	218	18.6	23.4	14.6	74.5	0.0	2.1	7.5	303	963.2	22765563	46.9	24.36	24.34	24.38	24.09	22.59	17.85	12.65	10.16	7.33	6.5	6.43	11.1	-65.0	5.800	12.4	26.9	21.6
LC	100%	8/7/2014	219	17.2	22.4	11.5	67.5	0.0	2.3	8.1	302	965.0	23479889	47.6	23.84	23.83	23.92	23.89	22.81	17.95	12.69	10.19	7.32	6.6	6.45	11.0	-70.3	5.800	12.5	25.6	19.8
LC	100%	8/8/2014	220	16.9	22.7	10.9	71.8	0.0	1.7	6.5	285	968.6	22465426	44.1	23.52	23.49	23.56	23.39	23.00	18.04	12.74	10.19	7.32	6.6	6.44	11.0	-75.5	5.800	12.5	25.2	19.5
LC	100%	8/9/2014	221	18.2	25.2	11.0	70.1	0.0	1.1	5.1	211	969.7	24020949	48.8	23.89	23.74	23.46	23.21	22.79	18.12	12.85	10.21	7.32	6.6	6.44	11.0	-79.4	5.800	12.5	26.4	20.7
LC	100%	8/10/2014	222	19.5	25.7	11.6	68.2	0.0	0.8	4.9	217	970.1	23221591	47.7	24.41	23.98	23.62	23.33	22.74	18.25	12.89	10.25	7.33	6.6	6.46	11.0	-83.1	5.800	12.5	27.0	20.4
LC	100%	8/11/2014	223	20.4	25.1	13.9	67.0	0.0	1.5	8.6	202	969.4	18653552	37.9	24.10	24.02	23.97	23.59	22.74	18.35	12.97	10.29	7.35	6.6	6.46	11.0	-86.6	5.800	12.4	28.1	20.5
LC	100%	8/12/2014	224	19.0	20.4	17.8	87.9	9.4	2.6	10.4	174	964.5	5434459	12.2	23.24	23.24	23.33	23.31	22.77	18.44	13.02	10.29	7.38	6.6	6.46	11.0	-85.0	15.200	12.4	28.9	24.6
LC	100%	8/13/2014	225	19.3	22.8	16.2	85.4	12.0	1.9	8.9	216	958.0	13854492	29.2	22.94	22.88	22.94	22.85	22.65	18.59	13.11	10.36	7.36	6.6	6.47	11.0	-73.1	27.200	12.4	31.8	33.7
LC	100%	8/14/2014	226	15.8	20.6	11.4	72.1	0.1	2.1	7.8	290	960.6	19697980	39.9	22.47	22.45	22.52	22.39	22.16	18.92	13.22	10.38	7.38	6.6	6.47	11.0	-73.3	27.300	12.4	30.3	25.5
LC	100%	8/15/2014	227	13.4	16.3	9.6	77.1	0.0	1.7	8.1	276	963.2	11850615	24.5	21.77	21.78	21.87	21.84	21.80	19.29	13.28	10.43	7.39	6.6	6.48	11.0	-77.4	27.300	12.5	27.7	22.3
LC	100%	8/16/2014	228	15.6	20.5	9.9	69.7	0.0	1.5	7.9	253	964.3	20086849	40.0	21.41	21.39	21.41	21.22	21.07	19.59	13.35	10.45	7.39	6.6	6.47	11.0	-81.1	27.300	12.4	28.8	22.3
LC	100%	8/17/2014	229	17.9	21.9	14.1	70.3	0.3	2.2	8.8	298	962.1	19162833	39.5	21.38	21.37	21.45	21.37	21.01	19.67	13.41	10.47	7.41	6.6	6.48	11.0	-84.4	27.600	12.5	30.6	24.1
LC	100%	8/18/2014	230	16.2	21.7	11.3	76.6	0.0	1.7	6.6	295	962.4	20952287	43.0	21.44	21.42	21.46	21.26	21.06	19.77	13.52	10.49	7.39	6.6	6.48	11.0	-88.0	27.600	12.5	30.5	23.5
LC	100%	8/19/2014	231	17.8	24.9	10.3	75.5	0.1	0.9	4.2	207	962.4	22706178	46.5	22.33	21.69	21.50	21.28	21.10	19.79	13.61	10.53	7.41	6.6	6.48	11.0	-91.2	27.700	12.5	30.8	22.8
LC	100%	8/20/2014	232	21.4	25.4	17.4	76.1	1.8	1.6	7.2	222	964.7	20606562	42.8	22.79	22.64	22.22	21.52	21.17	19.72	13.69	10.57	7.40	6.6	6.49	11.0	-93.6	29.500	12.5	33.2	25.0
LC	100%	8/21/2014	233	20.4	24.9	16.9	85.7	41.7	1.9	12.6	204	966.0	14513404	30.3	23.17	23.08	23.04	21.83	21.29	19.72	13.84	10.63	7.44	6.6	6.49	11.0	-89.2	71.200	12.5	34.6	29.3
LC	100%	8/22/2014	234	18.1	20.1	16.8	92.4	0.3	1.4	4.7	150	966.3	5668497	12.3	22.71	22.71	22.79	22.10	21.35	19.81	14.19	10.73	7.52	6.6	6.54	11.1	-44.9	71.500	12.4	35.0	38.5
LC	100%	8/23/2014	235	16.8	18.2	16.1	91.5	4.5	1.3	4.0	118	968.4	6000768	13.0	22.11	22.12	22.20	22.14	21.36	19.73	14.28	10.81	7.49	6.6	6.52	11.1	-44.3	76.000	12.4	35.3	32.9
LC	100%	8/24/2014	236	18.1	23.1	14.5	82.1	0.0	1.0	5.0	158	970.6	20430582	41.8	22.52	22.39	22.07	21.82	21.45	19.69	14.37	10.83	7.50	6.6	6.52	11.1	-43.6	76.000	12.4	36.3	31.0
LC	100%	8/25/2014	237	18.6	25.6	11.5	78.3	0.1	0.8	4.6	223	971.4	22689208	46.8	23.31	22.64	22.33	22.05	21.53	19.74	14.45	10.92	7.52	6.6	6.52	11.1	-46.2	76.100	12.4	36.1	28.2
LC	100%	8/26/2014	238	20.3	27.2	13.2	73.1	0.1	1.0	6.1	253	970.3	23465769	49.7	23.71	23.13	22.78	22.35	21.66	19.72	14.56	10.94	7.52	6.6	6.53	11.1	-49.1	76.200	12.5	36.4	27.1
LC	100%	8/27/2014	239	22.1	28.6	16.0	74.3	0.0	1.4	6.1	252	965.4	20979065	44.4	24.22	23.69	23.39	22.66	21.83	19.75	14.62	11.01	7.53	6.6	6.53	11.1	-52.3	76.200	12.5	36.6	27.3
LC	100%	8/28/2014	240	16.8	20.9	13.2	67.8	0.0	3.1	9.3	326	963.9	18717893	38.0	23.30	23.29	23.35	23.00	21.93	19.77	14.70	11.04	7.55	6.7	6.57	11.1	-56.8	76.200	12.4	37.6	26.2
LC	100%	8/29/2014	241	15.8	22.0	9.4	72.5	0.0	1.2	5.2	195	970.0	24652444	50.2	22.93	22.79	22.60	22.32	22.13	19.78	14.75	11.07	7.56	6.7	6.56	11.1	-62.1	76.200	12.5	36.1	25.0
LC	100%	8/30/2014	242	17.9	20.7	14.0	79.6	0.0	1.8	6.6	207	971.1	12508235	26.1	22.43	22.44	22.52	22.38	22.02	19.87	14.78	11.11	7.58	6.7	6.57	11.1	-65.7	76.200	12.5	36.7	25.7
LC	75%	8/31/2014	243	21.9	25.3	19.8	84.8	0.3	1.6	7.0	248	966.6	8332841	18.1	22.42	22.37	22.43	22.27	22.07	19.90	14.84	11.13	7.56	6.7	6.57	11.1	-67.9	76.500	12.5	38.5	29.3

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: 36%

1.000 <=SCALE ADJ (1.0=no adjustment)

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

Grand sum/avg	18.52	23.13	22.98	22.91	22.61	22.01	18.95	1.4	554901480	-79370	-12.5	76.5	72.8	-109.9	0.0	0.0	Nominal diffuse %R from water=7%	-70560.0	437748.5	16%		19	19.5	0.5		-2.8	-16.9

SumTerrevap2=AirVPD,mbar*WS,m/s*s

4.184 <=CONVERT HEAT TO DEGREES 4.184 slope

7% 0.9 6000000 cm3/m2 (for 0-4m integrated depth) 6000000 r2

Data

DATE	DOY	AvgTair C	AvgTw 0.1m	AvgTw0.5m	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	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)
8/1/2014	213	20.29	23.72	23.48	23.45	23.21	22.51	17.23	1.1	16484029	-1861	4.008	5.8	2.3	-2.6	0.0	15330	-1675	13655	10.9%	0.61	19.19	19.40	0.20	(0.41)	-0.07	(0.34)
8/2/2014	214	19.41	23.75	23.70	23.68	23.33	22.44	17.45	0.9	13913294	-1738	-2.154	0.0	1.9	-2.4	0.0	12939	-1564	11375	12.1%	0.52	19.40	19.33	(0.06)	(0.58)	-0.06	(0.52)
8/3/2014	215	19.52	23.88	23.80	23.75	23.46	22.39	17.54	1.0	16507890	-1929	-2.689	0.0	1.7	-2.7	0.0	15352	-1736	13616	11.3%	0.61	19.33	19.42	0.09	(0.52)	-0.07	(0.45)
8/4/2014	216	19.98	24.01	23.95	23.95	23.59	22.46	17.62	1.3	19390083	-2237	-2.887	0.0	1.9	-3.1	0.0	18033	-2013	16020	11.2%	0.72	19.42	19.58	0.16	(0.56)	-0.08	(0.48)
8/5/2014	217	20.42	24.84	24.31	24.09	23.76	22.54	17.75	1.0	21688032	-2464	-3.468	0.0	1.6	-3.4	0.0	20170	-2217	17953	11.0%	0.80	19.58	19.74	0.16	(0.64)	-0.09	(0.56)
8/6/2014	218	18.65	24.38	24.36	24.38	24.08	22.59	17.86	2.0	22764604	-3957	-4.874	0.0	2.3	-5.5	0.0	21171	-3561	17610	16.8%	0.84	19.74	19.75	0.02	(0.83)	-0.14	(0.68)
8/7/2014	219	17.29	23.86	23.85	23.94	23.90	22.79	17.93	2.2	23479991	-4815	-5.619	0.0	2.7	-6.7	0.0	21836	-4334	17503	19.8%	0.87	19.75	19.68	(0.07)	(0.94)	-0.17	(0.77)
8/8/2014	220	16.90	23.52	23.50	23.56	23.40	23.02	18.03	1.6	22465660	-3600	-4.291	0.0	2.4	-5.0	0.0	20893	-3240	17654	15.5%	0.83	19.68	19.58	(0.11)	(0.94)	-0.13	(0.81)
8/9/2014	221	18.22	23.87	23.72	23.45	23.22	22.78	18.11	0.9	24020866	-2727	-3.627	0.0	1.8	-3.8	0.0	22339	-2454	19885	11.0%	0.89	19.58	19.62	0.05	(0.84)	-0.10	(0.75)
8/10/2014	222	19.43	24.39	23.96	23.62	23.33	22.75	18.23	0.8	23221971	-2547	-3.462	0.0	1.7	-3.5	0.0	21596	-2292	19304	10.6%	0.86	19.62	19.79	0.17	(0.69)	-0.09	(0.60)
8/11/2014	223	20.35	24.13	24.05	23.97	23.58	22.73	18.38	1.3	18654470	-3084	-4.108	0.0	1.8	-4.3	0.0	17349	-2775	14573	16.0%	0.69	19.79	19.70	(0.09)	(0.78)	-0.11	(0.67)
8/12/2014	224	19.04	23.27	23.27	23.36	23.34	22.77	18.43	2.3	5433781	-2707	7.378	9.4	3.4	-3.7	0.0	5053	-2436	2617	48.2%	0.20	19.70	19.41	(0.29)	(0.49)	-0.10	(0.39)
8/13/2014	225	19.39	22.94	22.88	22.94	22.85	22.66	18.59	1.7	13853336	-2045	10.861	12.0	3.4	-2.8	0.0	12884	-1840	11043	14.3%	0.51	19.41	19.37	(0.04)	(0.56)	-0.07	(0.48)
8/14/2014	226	15.86	22.49	22.47	22.53	22.41	22.18	18.90	1.9	19698541	-3874	-4.792	0.1	2.2	-5.4	0.0	18320	-3487	14833	19.0%	0.73	19.37	19.27	(0.10)	(0.83)	-0.14	(0.69)
8/15/2014	227	13.42	21.80	21.81	21.90	21.87	21.82	19.29	1.6	11850667	-3422	-3.864	0.0	2.5	-4.7	0.0	11021	-3080	7942	27.9%	0.44	19.27	18.86	(0.41)	(0.85)	-0.12	(0.73)
8/16/2014	228	15.51	21.41	21.39	21.41	21.22	21.09	19.57	1.4	20087166	-2598	-3.796	0.0	1.5	-3.6	0.0	18681	-2338	16343	12.5%	0.74	18.86	18.92	0.06	(0.68)	-0.09	(0.59)
8/17/2014	229	18.01	21.38	21.37	21.45	21.36	21.01	19.68	2.1	19162424	-2951	-3.243	0.3	2.2	-4.1	0.0	17821	-2656	15165	14.9%	0.71	18.92	18.93	0.01	(0.70)	-0.11	(0.59)
8/18/2014	230	16.27	21.43	21.41	21.46	21.26	21.06	19.77	1.6	20951917	-2731	-3.289	0.0	2.2	-3.8	0.0	19485	-2458	17028	12.6%	0.78	18.93	18.95	0.01	(0.76)	-0.10	(0.67)
8/19/2014	231	17.64	22.29	21.66	21.50	21.28	21.10	19.79	0.8	22706847	-1878	-2.801	0.1	1.4	-2.6	0.0	21117	-1691	19427	8.0%	0.84	18.95	19.05	0.11	(0.73)	-0.07	(0.67)
8/20/2014	232	21.37	22.78	22.62	22.18	21.51	21.17	19.73	1.5	20607631	-1728	-2.123	0.0	2.0	-2.4	0.0	19165	-1556	17610	8.1%	0.76	19.05	19.31	0.25	(0.51)	-0.06	(0.45)
8/21/2014	233	20.55	23.18	23.09	23.04	21.82	21.29	19.71	1.6	14512433	-1782	49.081	43.5	9.7	-2.5	0.0	13497	-1604	11893	11.9%	0.54	19.31	19.61	0.30	(0.24)	-0.06	(0.18)
8/22/2014	234	18.14	22.72	22.72	22.81	22.09	21.35	19.81	1.3	5668968	-1561	-0.009	0.3	3.5	-2.2	0.0	5272	-1405	3868	26.6%	0.21	19.61	19.44	(0.17)	(0.38)	-0.06	(0.32)
8/23/2014	235	16.88	22.13	22.14	22.22	22.15	21.36	19.73	1.2	6000619	-1708	3.024	4.5	2.6	-2.4	0.0	5581	-1538	4043	27.6%	0.22	19.44	19.31	(0.13)	(0.35)	-0.06	(0.29)
8/24/2014	236	18.15	22.49	22.35	22.05	21.82	21.44	19.69	0.9	20430117	-1733	-2.376	0.0	1.7	-2.4	0.0	19000	-1559	17441	8.2%	0.76	19.31	19.47	0.16	(0.60)	-0.06	(0.54)
8/25/2014	237	18.60	23.29	22.64	22.32	22.04	21.52	19.74	0.7	22689505	-1832	-2.656	0.1	1.5	-2.5	0.0	21101	-1649	19453	7.8%	0.84	19.47	19.62	0.15	(0.69)	-0.07	(0.63)
8/26/2014	238	20.29	23.71	23.10	22.77	22.34	21.65	19.72	0.8	23464860	-1969	-3.343	0.1	1.0	-2.7	0.0	21822	-1772	20050	8.1%	0.87	19.62	19.86	0.24	(0.62)	-0.07	(0.55)
8/27/2014	239	22.04	24.19	23.68	23.36	22.65	21.84	19.73	1.3	20980186	-1919	-3.025	0.0	1.3	-2.7	0.0	19512	-1727	17784	8.9%	0.78	19.86	20.11	0.25	(0.53)	-0.07	(0.46)
8/28/2014	240	17.07	23.37	23.34	23.38	23.01	21.91	19.78	2.9	18716445	-5641	-6.283	0.0	3.2	-7.8	0.0	17406	-5077	12329	29.2%	0.69	20.11	19.85	(0.26)	(0.95)	-0.20	(0.75)
8/29/2014	241	15.69	22.92	22.78	22.59	22.33	22.13	19.78	1.0	24653824	-2901	-3.802	0.0	1.9	-4.0	0.0	22928	-2611	20317	11.4%	0.91	19.85	19.82	(0.03)	(0.95)	-0.10	(0.84)
8/30/2014	242	17.78	22.46	22.47	22.54	22.38	22.02	19.87	1.6	12508161	-2462	-3.304	0.0	1.8	-3.4	0.0	11633	-2216	9417	19.0%	0.46	19.82	19.70	(0.11)	(0.58)	-0.09	(0.49)
8/31/2014	243	21.84	22.42	22.37	22.43	22.27	22.07	19.90	1.5	8333158	-970	-1.003	0.3	1.7	-1.3	0.0											