

TABLE 3.—Daily totals and departures of solar and sky radiation during January, 1917.

[Gram-calories per square centimeter of horizontal surface.]

Day of month.	Daily totals.			Departures from normal.			Excess or deficiency since first of month.		
	Wash- ington.	Madi- son.	Lin- coln.	Wash- ington.	Madi- son.	Lin- coln.	Wash- ington.	Madi- son.	Lin- coln.
1917.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Jan. 1.....	99	207	211	-62	63	30	-62	63	30
2.....	218	193	186	57	48	4	-5	111	34
3.....	56	179	189	-105	33	6	-110	144	40
4.....	65	117	142	-96	-30	-42	-206	114	-2
5.....	19	217	220	-142	69	35	-348	183	33
6.....	220	187	180	58	37	-7	-280	220	26
7.....	138	212	170	-25	61	-18	-315	281	8
8.....	230	200	207	66	47	18	-249	328	26
9.....	109	178	174	-56	24	-17	-305	352	9
10.....	55	135	154	-111	-21	-38	-416	331	-29
11.....	206	230	192	39	73	-2	-377	404	-31
12.....	247	80	210	79	-79	15	-298	325	-16
13.....	61	260	256	-108	100	59	-406	425	43
14.....	198	262	200	28	100	1	-378	525	44
15.....	63	237	176	-108	73	-25	-486	598	19
16.....	170	239	172	-3	73	-32	-489	671	-13
17.....	220	220	172	46	52	-34	-443	728	-47
18.....	244	250	254	63	80	45	-375	803	-2
19.....	278	172	236	101	-1	24	-274	802	22
20.....	202	228	124	23	53	-91	-251	855	-69
Decade departure.....							165	524	-40
21.....	24	24	140	-186	-153	-78	-407	702	-147
22.....	114	260	252	-68	81	31	-475	783	-116
23.....	263	277	252	79	96	28	-396	879	-88
24.....	77	271	238	-109	87	11	-505	966	-77
25.....	203	253	150	15	67	-80	-490	1,033	-157
26.....	262	165	157	71	-24	-77	-419	1,009	-234
27.....	149	179	251	-44	-12	14	-463	997	-220
28.....	298	218	236	102	24	25	-361	1,021	-195
29.....	30	251	247	-168	54	3	-529	1,075	-192
30.....	284	188	264	83	-12	16	-446	1,063	-176
31.....	117	17	237	-86	-185	-24	-532	873	-200
Decade departure.....							-281	23	-131
Excess or deficiency/calories.....							-532	878	-200
since first of year. (Per cent.....)							-9.8	16.8	-3.1

2.23. By 1:25 p. m., the wind had gone to the south, the smoke cloud had passed away, and the intensity of direct solar radiation with air mass 2.5 had increased to 1.39 calories. From the Callendar pyrheliometer record we find that the radiation received on a horizontal surface from the sun and sky dropped from a rate of 0.67 calory per minute at 11:40 a. m. to 0.49 calory per minute at 12:10 p. m., a falling off of more than one-fourth, and returned to 0.66 calory at 1 p. m.

At the Weather Bureau office in Lincoln, where the smoke cloud was probably at about its maximum density, it was not noticed that the sky on this day presented any unusual appearance. At the State university farm the observer noticed the approach of the smoke cloud, and its passage over his station. He states that it gave the sky "a hazy or dirty appearance for a short time." From the above description it would seem that this was nothing more than the usual smoke cloud that is to be found over any city of moderate size where soft coal is burned on a day with light wind.

551.593

NOTES ON THE HORIZONTAL RAINBOW.¹

By SAEMONTARŌ NAKAMURA.

I pointed out in my last paper that the horizontal rainbow is due to water drops on a water surface, but I could not find the reason why water drops can float on a water surface.

It was my desire to explain how water drops are supported on a water surface. Unexpectedly I saw, one morning, the drops of water floating on a small pool in the garden of my house. The pool is so small—diameter is about 2 meters—that I had never expected to find any rainbow on it. In this pool actually I observed a rainbow and found out how the drops are supported.²

I found fine soot dust floating on the water and dew-drops were resting on the soot particles. Looking along the water surface I also perceived the water drops and their images in the water surface. It seemed to me that the distance between a water drop and its reflected image might be 1/100 mm. or so; the diameter of a drop lies between 1/10 mm. and 1.0 mm.

The observation was made on the morning of December 13, 1916, and at the time the water temperature was 4°C. while the vertical temperature distribution above the pool was as follows:

Altitude.....	100 cm.	50 cm.	10 cm.	2 cm.
Air temperature.....	7.2° C.	6.2°	5.6°	4.9°

The horizontal rainbow which occasionally appears in Tokyo may be explained as may be the rainbow seen this day in this pool. If there were rainfall or wind, such fine dust would be cleared away and no horizontal rainbows would be produced.

¹ Reprinted from Journal of the Meteorological Society of Japan, Jan. 1917, 36: 1.

² See in this connection: Junday, C. Horizontal rainbows on Lake Mendota, this REVIEW, Feb., 1916, 44:66 and 67.—C. A., Jr.

TABLE 4.—Solar radiation intensities for zenithal sun, reduced to mean solar distance of the earth, and approximate values of the solar constant.

[Gram-calories per minute per square centimeter of normal surface.]

Station.	Date.	Radiation intensity.		Solar constant.
		m=1	m=0	
	1917.	calories.	calories.	calories.
Madison, Wis.....	Jan. 5, p. m.....	1.60	1.79	1.87
Santa Fe, N. Mex.....	Jan. 8, a. m.....	1.59	1.73	1.82
	25, a. m.....	1.63	1.79	1.87
	27, a. m.....	1.66	1.77	1.85

A MEASUREMENT OF THE EFFECT OF CITY SMOKE.

January 5, 1917, was an unusually clear day at Lincoln, except that from the State university farm a heavy cloud of smoke was visible to the southwest over the city. The wind was about 6 miles per hour from the west or northwest until about noon, when it shifted to southwest, bringing the smoke directly over the university farm. As a result the direct solar radiation intensity dropped from 1.43 calories at 10:35 a. m., apparent time, with air mass 2.5, to 1.17 calories at 11:45 a. m., with air mass