SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING NOVEMBER, 1926

By HERBERT H. KIMBALL, Solar Radiation Investigations.

For a description of instruments and exposures and an account of the method of obtaining and reducing the measurements, the reader is referred to the REVIEW for January, 1924, **52**: 42, January, 1925, **53**: 29, and July, 1925, **53**: 318.

From Table 1 it is seen that solar radiation intensities averaged close to the November normals at all three stations.

Shortly after 9 a. m. on the 12th a dense smoke cloud passed over the American University, D. C. Although of but brief duration considerable absorption of solar radiation occurred as is shown by the values of 1.08, 0.56, and 1.08 gram calories obtained at air masses 3.0, 2.5, and 2.0, respectively. Atmospheric dust and sulphur content measurements made during the passage of the cloud show a three-fold increase in the number of dust particles and about double the sulphur content that was found at 8 a. m. Therefore most of the smoke cloud passed over the University instead of enveloping it, as was the case with the cloud of April 7, 1925, and which was described in the REVIEW for April, 1925, p. 147–148.

Table 2 shows a deficiency in the amount of radiation received on a horizontal surface from the sun and sky at all three stations for which normals have been determined.

TABLE 1.—*Solar radiation intensities during November, 1926*

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

Washington, D. C.

Date	Sun's zenith distance: 8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Nov. 1	4.57	0.90	1.02	1.16	1.32	1.46	0.92	1.00	0.93	0.83	3.45
2	3.81	0.88	1.02								3.63
4	3.99				1.04						2.87
5	4.75			0.92	1.12		1.14	0.93	0.80	0.68	3.99
6	4.57	0.72	0.80	0.93	1.22		1.21	0.97	0.85	0.75	5.56
10	4.17	0.75	0.85	1.05	1.35						3.00
11	2.26	0.64	0.76	0.90							2.36
12	2.87	0.89	1.01	1.08	1.08			1.06	0.94		2.62
17	4.37	0.92	0.95	1.12	1.30			0.94	0.86		5.16
19	3.30		0.85	0.97							3.15
22	3.15	0.66	0.79	1.18				1.04	0.88	0.76	3.30
Means		**0.80**	**0.89**	**1.03**	**1.20**	(1.46)	**1.09**	**0.99**	**0.88**	**0.76**	
Departures		+0.05	+0.04	+0.03	+0.02		−0.07	+0.01	+0.05	+0.03	

TABLE 1.—*Solar radiation intensities during November, 1926*—Con.

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

Madison, Wis.

Date	Sun's zenith distance: 8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Nov. 5	3.45			0.92							4.75
10	1.88		1.16	1.29	1.43	1.59					2.06
11	1.68		1.03	1.15	1.29	1.45					2.06
24	2.74			1.19					1.02		2.87
Means			(1.10)	**1.14**	(1.36)	(1.52)			(1.02)		
Departures			+0.08	−0.01	+0.06				−0.14		

Lincoln, Nebr.

Nov. 1	2.16		1.14	1.25	1.38	1.52			1.09	0.95	2.87
4	3.15	0.89	1.06	1.16	1.38			1.11	0.99	0.87	3.30
9	1.78	1.10	1.19	1.30	1.45	1.63					2.74
11	2.62	0.81	0.95	1.11	1.31		1.33				3.00
26	2.06	0.99	1.11	1.24	1.38	1.54					2.36
29	3.54		1.06	1.18					1.00	0.92	4.57
Means		**0.95**	**1.08**	**1.21**	**1.38**	**1.56**	(1.33)	(1.11)	**1.03**	**0.91**	
Departures		+0.02	+0.04	+0.02	+0.03	−0.01	−0.03	−0.08	−0.02	−0.03	

[1] Extrapolated.

At Washington skylight polarization measurements made on seven days give a mean of 62 per cent, with a maximum of 67 per cent on the 1st. At Madison, no measurements were obtained, as the ground was generally covered with snow on the days when the sky was clear.

TABLE 2.—*Solar and sky radiation received on a horizontal surface*

[Gram-calories per square centimeter of horizontal surface]

Week beginning—	Average daily radiation: Washington	Madison	Lincoln	Chicago	New York	Average daily departure from normal: Washington	Madison	Lincoln
1926	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Oct. 29	202	153	243	94	154	−43	−34	−5
Nov. 5	210	194	205	149	136	−13	+25	−27
12	169	61	129	50	122	−30	−87	−86
19	175	126	184	66	110	−1	−8	−18
26	145	127	201	42	103	−13	+2	+13
Deficiency since first of year on Dec. 2						−1,188	−2,016	−3,353

551.506 (261.1) (23)

WEATHER OF NORTH AMERICA AND ADJACENT OCEANS

NORTH ATLANTIC OCEAN

By F. A. YOUNG

The North Atlantic HIGH and Icelandic LOW were both unusually well developed during the greater part of the month, and, in consequence, the number of days with winds of gale force was considerably above the normal over the eastern section of the steamer lanes. Gales were also reported on from two to three days along the American coast between Nova Scotia and Florida, and on two days in the Gulf of Mexico.

The number of days with fog was apparently less than usual; judging from reports, it occurred on from five to six days over the Grand Banks, and on from three to five days along the American coast, north of Nantucket, while the middle and eastern sections of the steamer lanes were comparatively clear.

On the 1st an area of low pressure was central about 10° west of Malin Head, Ireland, accompanied by moderate to strong gales over the eastern section of the steamer lanes. This LOW moved northeastward, decreasing in intensity, and on the 2d and 3d moderate weather prevailed generally, except that on the 2d Julianehaab, Greenland, reported wind southeast, force 9, barometer 28.91 inches.

On the 4th an exceptionally severe disturbance was central near 50° N., 30° W., with winds of from force 10 to 12 in the southerly and westerly quadrants. The storm area was of limited extent however, covering only the region between the forty-fifth and fifty-first parallels and the fifteenth and thirty-fifth meridians. This LOW pursued the usual northeasterly course, and on the 5th was central off the north coast of Scotland; it had apparently

decreased somewhat in intensity, although on both the 5th and 6th land stations on the British Isles, as well as vessels in the vicinity, reported moderate to strong westerly gales.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, 8 a. m. (seventy-fifth meridian time), North Atlantic Ocean, November, 1926*

Stations	Average pressure	Departure [1]	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	[3] 29.26	(4)	29.69	17th	28.47	26th.
Belle Isle, Newfoundland	29.88	0.00	30.56	19th	29.08	11th.
Halifax, Nova Scotia	30.14	+0.14	30.64	14th [2]	29.66	10th.
Nantucket	30.12	+0.03	30.56	do	29.46	Do.
Hatteras	30.14	+0.02	30.46	12th	29.54	16th.
Key West	30.04	+0.01	30.20	22d [2]	29.84	7th.
Swan Island	29.87	−0.05	29.96	19th [2]	29.76	Do. [2]
New Orleans	30.16	+0.05	30.40	do	29.72	8th.
Turks Island	30.01	0.00	30.08	22d [2]	29.86	7th.
Bermuda	30.18	+0.10	30.36	29th	29.98	20th.
Horta, Azores	30.32	+0.20	30.54	28th	30.06	Do.
Lerwick, Shetland Islands	29.42	−0.28	30.16	29th [2]	28.47	14th.
Valencia, Ireland	29.53	−0.36	30.31	26th	28.54	20th.
London	29.61	−0.33	30.26	25th	28.51	Do.

[1] From normals shown on H. O. Pilot Chart, based on observations at Greenwich mean noon, or 7 a. m., seventy-fifth meridian.
[2] And on other dates.
[3] Mean of 23 observations; 7 days missing.
[4] No normal established.

On the 5th the barometric reading at Galveston, Tex., was 30.42 inches and at Swan Island, 29.86 inches. The resulting steep gradient was attended by a stiff "norther" in the Gulf of Mexico, as shown by report in table.

On the 6th a moderate depression was central near 55° N., 30° W., that drifted slowly eastward, increasing in intensity, and on the 11th was over the Irish Sea. This disturbance reached its greatest force on the 10th, when strong northerly to westerly gales swept the steamer lanes east of the twenty-fifth meridian.

On the 8th a well-developed LOW was central off the coast of northern Texas and southwesterly gales were reported by vessels in the western section of the Gulf of Mexico.

On the 11th a well-developed depression covered the Gulf of St. Lawrence, with moderate to strong gales as far south as the fortieth parallel.

On the 12th the second "norther" of the month was reported by vessels between the Bermudas and east coast of Florida, as shown by report in table from American S. S. *Yoro*.

On the 12th there was a comparatively slight depression near 53° N., 27° W., that afterward developed into a severe disturbance as it moved slowly eastward, and on the 13th and 14th westerly gales of almost hurricane force swept the steamer lanes east of the thirty-fifth meridian.

On the 14th Brownsville, Tex., was near the center of a moderate LOW that moved slowly eastward across the Gulf of Mexico, being central on the 15th near Pensacola. On the latter date moderate gales were reported by vessels along the coast between Hatteras and Jacksonville. Chart VIII shows this disturbance on the 16th, when the American coast between New York and Charleston was swept by southerly gales.

Charts IX to XI cover the period from the 17th to 19th, inclusive, when exceptionally severe weather prevailed over the eastern section of the ocean. The position of the LOW on the 20th and 21st differed but slightly from that of the 19th, although by the 21st it had begun to fill in, and on the 22d moderate weather was the rule over practically the entire ocean.

In addition to the storm report from the American S. S. *Endicott*, Captain Henderson, shown in table, the observer, Mr. Petersen, third officer, makes the following statement:

> The barometer registered 28.53 inches at 4 a. m. on the 20th, more than 24 hours after this blow had subsided. Barometer read below 29 inches until morning of the 21st. With these low readings of the barometer we had extra fine weather.

On the 23d a well-developed disturbance was central near 48° N., 42° W., with strong northwesterly gales near the center. This LOW apparently moved northeastward and on the 24th westerly gales were reported by vessels near 55° N., 30° W.

On the 25th Belle Isle was near the center of a LOW that took the usual northeasterly course, and on the 26th strong westerly gales occurred between the fortieth meridian and the coast of Greenland.

On the 27th and 28th the Province of Quebec was covered by an area of low pressure, attended by heavy weather along the American coast between Halifax and Hatteras.

On the 29th and 30th moderate weather was the rule, except that on the latter date northeasterly gales were reported by vessels near 38° N., 52° W., while a fresh northerly gale prevailed at the Scilly Islands.