

SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING DECEMBER, 1926

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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 slightly above the normal for December at Washington, D. C., and Lincoln, Nebr., and close to normal at Madison, Wis.

Table 2 shows a deficiency for the month at the above-named stations in the amount of radiation received on a horizontal surface from the sun and sky. It also shows a deficiency at these three stations for the year, amounting to 1.7 per cent at Washington, 2.2 per cent at Madison, and 2.8 per cent at Lincoln.

Skylight polarization measurements made on three days at Washington give a mean of 65 per cent, with a maximum of 66 per cent on the 2d. These are slightly above the corresponding average values for December at Washington. No sky polarization measurements were made at Madison, as the ground was covered with snow throughout the month.

TABLE 1.—Solar radiation intensities during December, 1926

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

Washington, D. C.

Date	Sun's zenith distance										Local mean solar time	
	8 a. m.	78.7°	76.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		Noon
	75th mer. time	Air mass										
		A. M.					P. M.					
e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.		
Dec. 2	mm. 1.78	cal. 1.01	cal. 1.12	cal. 1.25	cal. 1.40	cal. 1.58	cal. 1.17	cal. 0.99	cal. 0.89	cal. 1.88	mm. 1.88	
6	1.60	0.98	1.12	1.28	1.42	1.60	1.10	1.07	0.96	1.78	1.78	
14	7.04						0.97	0.83	0.73	3.99	3.99	
16	1.12	0.85	0.97	1.17	1.35	1.57	1.20			1.07	1.07	
17	1.88						0.99			1.88	1.88	
18	d. 81	0.90	1.01	1.16	1.40		1.19	1.01	0.78	1.78	1.78	
23	3.45	0.50	0.70	0.85						2.87	2.87	
29	4.37			0.87						3.15	3.15	
30	2.16	0.68	0.84	1.04	1.20	1.38	1.04	0.84	0.68	1.96	1.96	
Means		0.82	0.96	1.09	1.35	1.53	1.12	0.96	0.81			
Departures		+0.04	+0.07	+0.04	+0.12		+0.10	+0.06	+0.03			

* Extrapolated.

TABLE 1.—Solar radiation intensities during December, 1926—Con.

Madison, Wis.

Date	Sun's zenith distance										Local mean solar time	
	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.					
e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e.		
Dec. 1	mm. 1.96	cal. 1.08	cal. 1.18	cal. 1.31	cal. 1.49	cal. 1.66	cal. 1.18	cal. 0.99	cal. 0.89	cal. 1.88	mm. 1.88	
14	0.43	1.08	1.16	1.29						1.18	1.18	
15	0.51	0.92	1.12	1.23						1.25	1.25	
24	0.74										0.74	
29	0.81	1.09	1.18	1.30							1.19	
30	2.16	0.79	0.90	1.03							3.30	
Means		0.97	1.11	1.23					1.22			
Departures		+0.01	+0.01	+0.01					-0.06			

Lincoln, Nebr.

Dec. 13	0.74									1.30	1.18	1.08	0.56
14	0.51	1.11	1.20	1.34	1.49	1.66				1.30			0.64
20	3.63	0.81	0.94	1.18									3.81
25	1.88		1.15	1.27		1.56					1.17	1.06	2.62
28	2.29									1.24	1.12	0.99	2.86
29	2.16		0.98	1.11							0.97	0.86	3.30
30	2.74	1.04	1.16	1.30		1.57				1.16	1.02		3.63
Means		0.99	1.09	1.24	1.49	1.60				1.28	1.12	1.00	
Departures		+0.05	+0.03	+0.01	+0.11					+0.07	+0.04	+0.03	

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

[Gram-calories per square centimeter of horizontal surface]

Week beginning—	Average daily radiation					Average daily departure from normal		
	Washington	Madison	Lincoln	Chicago	New York	Washington	Madison	Lincoln
	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Dec. 3 1926	98	92	105	38	99	-48	-29	-71
10	118	123	183	93	78	-25	± 0	+11
17	115	78	141	57	105	-28	-49	-33
24*	116	128	190	67	85	-30	-4	+12
Deficiency at end of year						-2,135	-2,594	-3,908

* 8-day mean.

551.506 (261.1) WEATHER OF NORTH AMERICA AND ADJACENT OCEANS

NORTH ATLANTIC OCEAN

By F. A. YOUNG

There was a great difference in the weather conditions over the western and eastern divisions of the North Atlantic during the month, as over the western section the number of days with gales was either near or above the normal, the maximum number occurring in the 5-degree square between the 40th and 45th parallels and the 55th and 60th meridians, where they were reported on ten days. East of the 30th meridian, however, there was a sharp decline in the number; reports to date have not shown more than three gales in any one square in this region, where anti-cyclonic conditions were unusually prevalent.

The number of days with fog was apparently considerably below the normal over the Grand Banks and slightly above over the middle and eastern sections of the steamer lanes, while it was observed on two days in the Gulf of Mexico.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level, 8 a. m. (75th meridian), North Atlantic Ocean, December, 1926

Stations	Average pressure	Departure ¹	Highest	Date	Lowest	Date
Julianaabaab, Greenland	Inches 29.47	Inch (0)	Inches 30.54	25th	Inches 28.71	6th
Belle Isle, Newfoundland	29.74	+0.04	30.45	5th	28.94	20th
Halifax	29.91	-0.07	30.46	5th	29.44	29th
Nantucket	30.03	-0.05	30.52	5th	29.52	29th
Hatteras	30.13	-0.01	30.55	19th	29.58	11th
Key West	30.09	0.00	30.24	30th	29.94	12th ⁴
New Orleans	30.13	+0.01	30.46	30th	29.74	13th
Swan Island	29.91	-0.07	30.00	30th	29.50	13th
Turks Island	30.08	+0.05	30.16	26th	30.00	24 ⁴
Bermuda	30.14	-0.01	30.36	8th	29.82	2d
Horta, Azores	30.23	+0.12	30.70	3d	29.74	19th
Lerwick, Shetland Islands	29.99	+0.27	30.96	24th	29.22	17th
Valencia, Ireland	30.43	+0.49	30.89	24th	30.07	4th
London	30.31	+0.29	30.70	23d	29.82	3d

¹ From normals shown on H. O. Pilot Chart based on observations at Greenwich mean noon, or 7 a. m., 75th meridian.

² Mean of 22 observations—nine days missing.

³ No normal established.

⁴ And on other dates.

The unusually large positive departure at the stations on the British Isles was due to periods of abnormally high pressure that will be referred to later. The lowest reading at Valencia was 0.13 inch above the monthly normal for that station.

At the time of observation on the 1st, moderate conditions prevailed over practically the entire ocean. Later in the day, however, a depression appeared off the American coast that on the 2d and 3d was in the vicinity of Nova Scotia and Newfoundland, respectively. On the 2d, New York reported wind southwest, force 9, and on the 3d moderate to strong gales were encountered by vessels between the 35th and 45th parallels and 55th and 65th meridians. On the 4th the storm area covered the territory between the 40th and 50th parallels and the 30th and 45th meridians. From the 2d to 4th an area of low pressure was over the North Sea, where moderate weather prevailed, although on the 4th northwest gales were reported in the English Channel.

On the 5th, St. Johns, Newfoundland, was near the center of a low, while unusually high pressure prevailed off the New England coast, the barometer at Portland reading 30.70 inches. Strong southwesterly gales, accompanied by comparatively high barometric readings, were reported by vessels between the 40th parallel and Newfoundland. On the same day there was a disturbance of limited extent and intensity in southern waters, as shown by report in table from the Japanese S. S. *Keifuku Maru*.

The pressure then fell rapidly along the American coast, and on the 6th a well-developed low was central about 200 miles south of Halifax, with heavy winds of various directions west of the 55th meridian, while westerly gales were also reported over the middle sections of the steamer lanes. The northern disturbance moved slowly northeastward, and on the 7th was central near St. Johns, Newfoundland, while the storm area now covered the region between the 50th and 70th meridians, extending as far south as the Bermudas.

On the 8th southerly gales prevailed over the steamer lanes between the 20th and 35th meridians, and northerly winds, force 7, between the 30th and 40th parallels and 50th and 55th meridians.

On the 9th St. Johns was again near the center of a moderate depression that moved rapidly eastward, and on the 11th was central near 50° N., 40° W. On the 11th there was also a low near Hatteras; it increased in intensity as it moved northeastward along the coast, its center reaching the vicinity of Sable Island by the 12th.

From the 9th to 11th gale reports were received from vessels in widely scattered positions, while on the 12th

the storm area was confined to the region between the 30th and 50th parallels, west of the 45th meridian. During this period anticyclonic conditions prevailed over the eastern section of the steamer lanes, and on the 11th barometric readings of slightly over 30.70 inches were recorded at stations in the British Isles.

From the 13th to 17th there were no well-defined storm areas, although during this period reports of moderate gales were received from vessels in different sections of the ocean.

On the 18th a shallow depression was over the west coast of Newfoundland that moved but slightly during the next 48 hours, although increasing in intensity, as on the 19th strong northwesterly gales prevailed between the 35th and 50th parallels, west of the 55th meridian, while by the 20th the storm area had contracted considerably in extent.

On the 19th there was also a moderate low off the northern coast of Scotland, which by the 20th had moved over the North Sea, where moderate southwesterly gales occurred.

On the 21st Belle Isle was near the center of a low, although moderate weather conditions were the rule in that vicinity as well as over the greater part of the ocean.

Charts VIII to XI cover the period from the 22d to 25th, inclusive, and give an idea of the area of high pressure that spread over the coast of Europe, reaching its maximum on the 24th, when the barometer at Stornoway, Scotland, read 31.03 inches. These charts also show the disturbance that on the 22d was central near 42° N., 45° W.

On the 26th a low was off the Virginia Capes, with moderate southwest gales west of the 65th meridian, that moved rapidly eastward, and on the 27th was central near 43° N., 53° W. On that date winds of force 7 and 8 occurred along the 40th parallel, between the 40th and 60th meridians. On the 26th southerly gales were also reported between the Azores and the 35th meridian, accompanied by comparatively high barometric readings.

On the 29th a well-developed depression was central near Eastport, Maine, with southerly gales between Nova Scotia and the 35th parallel. On the 30th the center of this low was near Belle Isle, and on the 31st near 53° N., 45° W. On the former date southeasterly gales were encountered in the vicinity of the Azores, and on the latter, the storm area covered the region between the 35th and 55th parallels and the 30th and 45th meridians.