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SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING AUGUST, 1929

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, 1929, 57:26.

Table 1 shows that solar radiation intensities averaged below the normal values for August at all three stations.

Table 2 shows an excess in the total solar radiation (direct + diffuse) received on a horizontal surface at Washington, Madison, and Chicago, the excess at Washington exceeding 13 per cent. A deficiency is shown at Lincoln and New York.

Skylight polarization measurements obtained on four days at Washington give a mean of 54 per cent and a maximum of 58 per cent on the 2d. At Madison, measurements obtained on seven days give a mean of 51 per cent and a maximum of 63 per cent on the 15th. The values obtained at Washington are close to the August averages for that station. Those for Madison are nearly 10 per cent below the corresponding August averages, no doubt principally due to smoke from forest fires.

TABLE 1.—*Solar radiation intensities during August, 1929*

[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 meridian time	Air mass									Local mean solar time
		A. M.					P. M.				
	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.*
Aug. 1	17.96					1.03					15.11
Aug. 2	10.97					1.28					7.87
Aug. 5	8.81		0.84								6.50
Aug. 16	10.21	0.44	0.55	0.70	0.90						9.14
Aug. 17	12.24	0.41	0.50	0.62	0.82						12.24
Aug. 20	7.87	0.61	0.74	0.91	1.09	1.33	1.01	0.83	0.78		7.57
Aug. 21	10.59				0.86	0.93					7.04
Aug. 26	13.13			0.85	1.01	1.25	1.01	0.75	0.58	0.45	9.14
Aug. 31	10.21	0.60	0.68	0.82	1.06						7.57
Means		**0.52**	**0.66**	**0.78**	**0.96**	**1.16**	**(1.01)**	**(0.79)**	**(0.68)**	**(0.45)**	
Departures		**−0.10**	**−0.01**	**+0.03**	**+0.04**	**−0.06**	**−0.01**	**−0.08**	**−0.05**	**−0.18**	

Madison, Wis.

Aug. 7	11.81				0.91	1.14					10.97
Aug. 10	15.65			0.59	0.82						17.37
Aug. 15	8.48			1.04	1.19	1.37					8.48
Aug. 19	8.48			0.97	1.12	1.29					9.47
Aug. 23	10.97					1.19					10.59
Aug. 24	12.24			0.63	0.84	1.16					14.10
Aug. 27	9.14			0.86	1.03	1.38					8.48
Aug. 31	11.38			0.62	0.79	1.20					12.24
Means				**0.78**	**0.96**	**1.25**					
Departures				**−0.16**	**−0.14**	**−0.06**					

[1] Extrapolated.

TABLE 1.—*Solar radiation intensities during August, 1929*—Contd

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

Lincoln, Nebr.

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 meridian time	Air mass									Local mean solar time
		A. M.					P. M.				
	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.*
Aug. 5	11.38						0.89	0.78	0.62		13.61
Aug. 23	15.65					1.31	0.92	0.72	0.88	0.48	17.37
Aug. 24	15.65					1.28					14.10
Means						**(1.30)**	**(0.90)**	**(0.75)**	**(0.60)**	**(0.48)**	
Departures						**±0.00**	**−0.17**	**−0.14**	**−0.16**	**−0.22**	

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	Twin Falls	Fresno	La Jolla	Washington	Madison	Lincoln	Chicago	New York
1929	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
July 30	558	494	492	361	381	556	687	394	+109	+31	−29	−5	+11
Aug. 6	394	463	450	374	307	----	658	459	−40	+7	−54	+18	−39
Aug. 13	529	464	527	415	298	----	585	449	+97	+24	+32	+53	−33
Aug. 20	522	433	499	362	359	----	609	460	+109	−2	+14	−6	+45
Aug. 27	436	416	468	351	303	----	606	443	+11	+8	+6	−6	−14
Excess or deficiency since first of year on Sept. 2									+5,152	−672	−2,050	−441	−4,109

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. C. S. Freeman, Superintendent U. S. Naval Observatory. Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, and Mount Wilson observatories. The differences of longitude are measured from central meridian, positive west. The north latitudes are plus. Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere. The total area, including spots and groups, is given for each day in the last column]

Date	Eastern standard civil time		Heliographic			Area		Total area for each day
			Diff. long.	Longitude	Latitude	Spot	Group	
1929								
Aug. 1 (Naval Observatory)	*h.*	*m.*	°	°	°			
	10	59	−62.5	288.8	−3.5	--------	185	--------
			−9.0	342.3	+21.5	--------	37	--------
			+30.0	21.3	+9.0	--------	15	--------
			+42.0	33.3	−21.0	--------	154	--------
			+46.5	37.8	−11.0	9	--------	--------
			+64.0	55.3	−11.0	--------	62	--------
			+76.5	67.8	+7.0	31	--------	493
Aug. 2 (Naval Observatory)	11	32	−48.0	289.7	−3.5	--------	154	--------
			−19.0	318.7	+12.5	--------	9	--------
			+6.5	344.2	+21.0	22	--------	--------
			+11.0	348.7	−12.5	--------	25	--------
			+33.0	10.7	+9.0	3	--------	--------
			+46.0	23.7	+9.0	6	--------	--------
			+56.0	33.7	−21.0	--------	123	--------
			+79.0	56.7	−11.5	46	--------	388