POSITIONS AND AREAS OF SUNSPOTS

[Communicated by Capt. J. F. Hellweg, U. S. Navy (Ret.) Superintendent, U. S. Naval Observatory. Data from measurements at the U. S. Naval Observatory from plates obtained at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's visible hemisphere. For each day, below longitude, latitude, area of spot or groups, and spot count, are given respectively the assumed longitude of the center of the disk, assumed latitude of the center of the disk, total area of spots and groups, and total spot count]

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1939	*h m*		°	°	°	°				
June 1	13 27	6470	−38	77	−21	43	388	33	VG	U. S. Naval.
		6471	−35	80	+12	36	242	5		
		6471	−30	85	+11	32	24	9		
		6469	−23	92	−8	25	97	16		
		6466	−20	95	+9	22	73	25		
		6473	−19	96	−12	21	73	10		
		6468	−18	97	−18	25	36	5		
		6475	−9	106	−5	10	12	6		
		6465	−8	107	+6	11	388	40		
		6464	0	115	+23	24	6	5		
		6464	+4	119	+23	24	6	8		
		6474	+10	125	+15	18	6	3		
		6463	+12	127	−16	19	24	6		
		6457	+45	160	+20	49	97	10		
		6456	+50	165	−20	53	121	8		
		6456	+59	174	−20	61	145	7		
		6452	+69	184	+29	72	121	10		
		6452	+78	193	+24	79	145	4		
				(115)	(−1)		2,004	210		
June 2	9 37	6477	−84	20	+8	84	48	1	F	Mount Wilson.
		6470	−26	78	−22	33	364	15		
		6471	−25	79	+13	29	242	8		
		6469	−10	94	−8	13	145	4		
		6466	−10	94	+8	14	73	11		
		6473	−7	97	−12	13	73	3		
		6476	−4	100	+11	13	73	2		
		6465	+3	107	+7	8	388	12		
		6464	+11	115	+21	24	12	2		
		6474	+21	125	+16	27	12	1		
		6457	+58	162	+22	62	145	6		
		6456	+65	169	−19	66	145	5		
		6452	+80	184	+26	81	121	1		
				(104)	(−1)		1,841	71		
June 3	10 52	6478	−77	13	−13	79	6	1	P	Do.
		6477	−73	17	+9	74	97	2		
		6470	−13	77	−22	25	194	10		
		6471	−12	78	+14	18	267	10		
		6466	+3	93	+7	8	194	12		
		6469	+3	93	−8	9	109	2		
		6468	+5	95	−19	19	12	1		
		6473	+10	100	−11	15	24	1		
		6476	+10	100	+13	17	73	4		
		6465	+17	107	+7	18	339	15		
		6457	+73	163	+21	74	194	3		
				(90)	(0)		1,509	61		
June 4	10 43	6480	−75	2	+11	75	97	3	P	Do.
		6479	−68	9	+7	69	242	4		
		6477	−54	23	+8	55	73	6		
		6471	+3	80	+13	14	242	4		
		6470	+3	80	−22	22	194	4		
		6466	+16	93	+7	18	194	1		
		6476	+19	96	+10	22	97	2		
		6469	+19	96	−8	21	85	1		
		6465	+30	107	+8	31	291	8		
		6457	+85	162	+21	86	97	1		
				(77)	(0)		1,612	34		
June 5	10 59	6481	−70	354	+17	71	73	4	F	U. S. Naval.
		6480	−63	1	+10	64	194	30		
		6479	−57	7	+7	58	242	12		
		6477	−43	21	+8	44	61	9		
		6471	+13	77	+12	18	267	7		
		6470	+17	81	−22	27	97	6		
		6466	+29	93	+6	30	97	10		
		6476	+32	96	+11	34	48	7		
		6469	+32	96	−9	21	48	1		
		6465	+43	107	+6	44	267	13		
				(64)	(0)		1,394	99		
June 6	11 5	6484	−70	340	+7	71	12	2	VG	Do.
		6481	−65	345	+19	67	170	1		
		6481	−58	352	+17	60	170	10		
		6483	−52	358	−22	56	12	1		
		6480	−47	3	+11	48	388	15		
		6479	−44	6	+8	45	48	3		
		6479	−40	10	+5	40	194	2		
		6477	−29	21	+8	30	73	8		
		6482	+13	63	−26	28	48	5		
		6470	+29	79	−22	36	24	3		
		6471	+30	80	+12	33	339	10		
		6466	+37	87	+9	38	61	2		

POSITIONS AND AREAS OF SUNSPOTS—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1939	*h m*		°	°	°	°				
June 6	11 5	6476	+44	94	+9	35	6	1		
		6469	+44	94	−9	45	73	2		
		6466	+45	95	+6	46	48	8		
		(*)	+52	102	+11	54	6	2		
		6465	+58	108	+6	59	145	2		
				(50)	(0)		1,817	77		
June 7	11 25	6481	−51	346	+19	54	97	1	F	U. S. Naval.
		6481	−46	351	+17	49	194	14		
		6480	−35	2	+10	37	339	12		
		6479	−30	7	+8	31	48	6		
		6479	−27	10	+7	28	145	1		
		6477	−15	22	+9	18	36	1		
		6482	+26	63	−26	36	6	4		
		6470	+42	79	−23	47	6	1		
		6471	+42	79	+12	44	242	5		
		6466	+50	87	+10	51	36	1		
		6466	+59	96	+6	60	97	5		
		6465	+70	107	+7	71	145	2		
				(37)	(0)		2,782	53		
June 8	11 24	6485	−78	306	+24	80	339	6	F	Do.
		6481	−38	346	+19	43	48	5		
		6481	−33	351	+17	37	242	11		
		6483	−25	359	−21	33	24	1		
		6480	−21	3	+10	24	194	7		
		6479	−14	10	+7	15	121	3		
		6477	−4	20	+8	10	73	9		
		6471	+54	78	+13	56	170	3		
		6466	+63	87	+10	65	48	1		
		6466	+70	94	+7	71	97	4		
		6469	+73	97	−9	74	24	1		
		6465	+85	109	+7	86	12	1		
				(24)	(0)		1,392	52		
June 9	11 26	6486	−74	296	+3	74	242	3	VG	Do.
		6485	−64	306	+25	68	679	18		
		6481	−19	351	+17	26	339	33		
		6483	−19	351	−21	28	6	3		
		6483	−11	359	−21	24	12	6		
		6480	−8	2	+11	14	73	15		
		6479	0	10	+7	8	97	10		
		6477	+11	21	+8	14	73	10		
		6482	+54	64	−24	59	48	10		
		6471	+70	80	+13	71	194	4		
		6466	+83	93	+6	83	97	3		
				(10)	(0)		1,860	115		
June 10	10 51	6486	−67	291	+3	67	145	6	G	Do.
		6488	−64	294	−16	66	36	3		
		6486	−60	298	+3	60	206	10		
		6487	−55	303	−13	57	12	4		
		6485	−50	308	+24	54	630	40		
		6481	−6	352	+18	18	388	25		
		(*)	+11	9	−8	14	12	3		
		6479	+13	11	+7	15	97	8		
		6477	+25	23	+7	26	24	1		
		6482	+66	64	−24	69	12	5		
		6471	+84	82	+12	84	48	1		
				(358)	(0)		1,610	106		
June 11	12 7	6486	−53	291	+3	53	170	13	VG	Do.
		6488	−51	293	−15	54	36	4		
		6486	−46	298	+3	46	182	3		
		6487	−41	303	−11	43	6	3		
		6485	−37	307	+24	43	436	33		
		6481	+8	352	+18	19	339	25		
		6479	+27	11	+6	27	73	5		
		6489	+27	11	−7	28	48	4		
		6482	+81	65	−24	83	24	1		
				(344)	(+1)		1,314	91		
June 12	11 10	6491	−80	251	−17	82	97	3	VG	Do.
		6486	−39	292	+3	39	145	10		
		6488	−37	294	−15	40	109	10		
		6486	−33	298	+3	33	194	1		
		6487	−27	304	−12	29	12	3		
		6485	−25	306	+23	33	388	27		
		6481	+21	352	+17	26	145	9		
		6479	+40	11	+6	41	61	6		
		6489	+41	12	−7	42	34	2		
		6490	+64	35	−8	66	48	2		
				(331)	(+1)		1,223	73		
June 13	13 16	6492	−84	232	+12	86	242	6	VG	Do.
		6491	−61	255	−18	65	48	14		
		6488	−22	294	−15	27	97	13		
		6486	−19	297	+3	19	242	5		
		6487	−12	304	−12	17	24	2		
		6485	−10	306	−23	25	485	41		
		(*)	+32	348	−22	39	36	2		

POSITIONS AND AREAS OF SUNSPOTS—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1939	*h m*		°	°	°	°				
June 13	13 16	6481	+36	354	+17	39	24	10		
		6479	+55	11	+6	55	36	3		
		6490	+80	36	−7	81	485	15		
				(316)	(+1)		1,719	111		
June 14	11 37	6495	−78	226	−12	79	194	1	VG	Do.
		6492	−75	229	+12	75	388	10		
		6492	−68	236	+12	69	48	3		
		6491	−47	257	−18	50	97	15		
		6488	−9	295	−14	17	97	10		
		6486	−6	298	+3	70	242	18		
		6485	+4	308	+24	23	485	45		
		6494	+40	344	+24	45	12	1		
		6493	+47	351	−22	51	12	1		
		6481	+50	354	+17	52	36	4		
		6480	+59	3	+10	60	6	1		
		6479	+70	14	+7	70	6	1		
				(304)	(+1)		1,623	110		
June 15	11 22	6495	−64	227	−13	66	194	2	G	Do.
		6492	−61	230	+12	62	533	4		
		6491	−33	258	−18	38	170	11		
		6488	+7	298	−13	15	145	14		
		6486	+7	298	+2	7	170	10		
		6485	+16	307	+24	27	339	30		
		6497	+35	326	−5	36	12	2		
		6496	+45	336	+7	45	6	1		
		6481	+65	356	+16	66	12	1		
				(291)	(+1)		1,581	75		
June 16	11 7	6495	−49	229	−13	50	73	2	VG	Do.
		6492	−48	230	+12	49	436	11		
		6495	−45	233	−13	47	24	4		
		6498	−29	249	−6	30	12	4		
		6491	−20	258	−18	27	121	18		
		6486	+21	299	+3	20	170	15		
		6488	+21	299	−14	25	109	20		
		6485	+29	307	+24	36	109	13		
				(278)	(+1)		1,054	87		
June 17	10 56	6492	−40	225	+12	41	24	3	G	Do.
		6495	−36	229	−13	38	145	1		
		6492	−34	231	+12	35	364	16		
		6491	−7	258	−19	21	48	13		
		6488	+34	299	−14	37	194	9		
		6486	+35	300	+2	35	97	6		
		6485	+45	310	+24	49	97	8		
		6497	+65	330	−5	66	6	2		
				(265)	(+1)		975	58		
June 18	9 25	6492	−25	227	+13	27	242	9	P	Mount Wilson.
		6495	−23	229	−13	27	97	1		
		6491	+6	258	−18	20	97	1		
		6499	+40	292	−14	43	145	12		
		6486	+48	300	+3	48	97	5		
		6488	+51	303	−12	53	121	10		
		6485	+59	311	+25	63	121	7		
		6497	+78	330	−3	78	97	8		
				(252)	(+1)		1,017	53		
June 19	10 55	6501	−58	180	+24	61	24	4	P	Do.
		6500	−52	186	−17	55	24	1		
		6492	−10	228	+13	15	485	12		
		6495	−9	229	−13	17	25	3		
		6491	+19	257	−19	27	36	1		
		6499	+52	290	−14	54	145	4		
		6486	+61	299	+3	61	48	2		
		6488	+65	303	−13	67	97	6		
				(238)	(+1)		884	33		
June 20	11 7	6501	−44	181	+25	8	24	4	VG	U. S. Naval.
		6510	−38	187	−16	42	12	3		
		6502	−20	205	+15	24	36	6		
		6492	+3	228	+13	12	388	30		
		6495	+3	228	−13	15	109	1		
		6491	+30	255	−19	36	12	3		
		6499	+65	290	−14	67	194	11		
		6486	+75	300	+3	76	48	1		
		6488	+78	303	−13	80	145	4		
				(225)	(+2)		968	63		
June 21	10 58	6501	−29	183	+26	37	6	2	VG	Do.
		6502	−7	205	+15	15	12	6		
		6492	+17	229	+13	20	436	50		
		6495	+18	230	−13	23	109	5		
		6504	+36	248	+15	39	36	6		
		6503	+38	250	−16	42	24	12		
		6499	+79	291	−14	80	97	4		
				(212)	(+2)		720	85		
June 22	10 37	6501	−17	182	+25	28	48	7	VG	Do.
		6492	+31	230	+12	33	339	40		
		6495	+31	230	−14	34	73	4		
		6504	+50	249	+15	52	24	8		

POSITIONS AND AREAS OF SUNSPOTS—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1939	*h m*		°	°	°	°				
June 22	10 37	6503	+51	250	−18	55	194	16		
		6505	+68	267	−8	70	12	2		
				(199)	(+2)		690	77		
June 23	11 11	6507	−80	105	−6	80	97	3	G	U. S. Naval.
		6508	−77	108	+4	77	194	1		
		6517	−73	112	−6	74	97	12		
		6506	+36	221	+17	39	24	7		
		6492	+44	229	+12	45	339	30		
		6495	+45	230	−14	47	73	1		
		6503	+65	250	−18	68	170	5		
				(185)	(+2)		994	59		
June 24	11 4	6509	−77	95	−7	78	194	1	F	Do.
		6507	−67	105	−6	68	121	1		
		6508	−63	109	+5	64	194	3		
		6507	−61	111	−5	62	121	15		
		6506	+52	224	+17	54	18	1		
		6492	+57	229	+13	59	388	17		
		6495	+58	230	−14	60	61	1		
		6503	+78	250	−18	80	48	2		
				(172)	(+2)		1,145	41		
June 25	12 20	6514	−81	77	−22	82	145	7	G	Do.
		6509	−63	95	−7	64	194	1		
		6507	−53	105	−5	54	97	10		
		6508	−48	110	+5	48	194	2		
		6507	−46	112	−5	47	121	12		
		6513	−1	157	+23	21	24	3		
		6512	+25	183	+26	34	24	2		
		6510	+37	195	+19	40	18	4		
		6506	+66	224	+16	68	6	1		
		6495	+70	228	−15	72	97	1		
		6492	+71	229	+12	72	339	18		
				(158)	(+2)		1,259	61		
June 26	11 0	6517	−79	67	−21	81	194	1	G	Do.
		6514	−70	76	−23	73	145	10		
		6509	−50	96	−7	57	194	1		
		6507	−41	105	−6	42	97	4		
		6508	−36	110	+5	36	194	1		
		6507	−31	115	−6	32	97	6		
		6513	+11	157	+23	25	24	6		
		6516	+27	173	+8	27	12	2		
		6515	+40	186	−18	44	48	5		
		6510	+49	195	+19	51	97	8		
		6492	+84	230	+12	85	97	6		
				(146)	(+2)		1,119	50		
June 27	14 47	6520	−80	50	+20	81	36	8	G	Do.
		6517	−64	66	−21	67	242	97		
		6514	−54	76	−23	59	194	4		
		6509	−35	95	−8	36	242	12		
		6508	−31	99	+7	31	61	7		
		6519	−29	101	−13	33	24	4		
		6507	−21	109	−5	22	194	15		
		6508	−20	110	+5	20	194	2		
		6518	−1	129	−15	17	61	5		
		6513	+23	153	+23	30	48	3		
		6516	+44	174	+8	45	97	6		
		6515	+57	187	−18	61	73	4		
		6510	+63	193	+19	66	48	5		
				(130)	(+2)		1,514	172		
June 28	8 48	6522	−81	39	−8	81	218	9	VG	Mount Wilson.
		6520	−70	50	+22	73	36	8		
		6517	−53	67	−21	58	291	7		
		6514	−43	77	−22	49	194	20		
		6509	−24	96	−7	26	194	9		
		6508	−22	98	+7	28	48	6		
		(*)	−22	98	+8	23	12	12		
		6519	−18	102	−14	25	145	50		
		6507	−10	110	−3	12	194	55		
		6521	−10	110	+12	14	12	7		
		6508	−10	110	+6	10	194	8		
		(*)	−6	114	+2	6	24	1		
		6518	+9	129	−13	18	24	8		
		6513	+36	156	+25	42	6	4		
		6516	+56	176	+9	57	170	16		
		6515	+67	187	−16	69	36	3		
		6510	+72	192	+21	75	12	3		
				(120)	(+3)		1,810	226		
June 29	8 35	6522	−65	42	−8	66	242	5	G	Do.
		6520	−56	51	+23	59	24	3		
		6517	−39	68	−21	45	242	4		
		6514	−35	72	−22	42	97	8		
		6514	−25	82	−22	35	97	9		
		6509	−11	96	−7	15	145	18		
		(*)	−9	98	+11	13	12	3		
		6519	−5	102	−13	16	533	60		
		6507	−3	104	−3	6	48	6		
		6521	+2	109	+14	12	12	5		
		6508	+3	110	+5	4	145	9		

POSITIONS AND AREAS OF SUNSPOTS—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1939	*h m*		°	°	°	°				
June 29	8 35	6507	+7	114	−3	9	121	20		
		(*)	+8	115	+25	25	6	2		
		6518	+25	132	−14	29	18	7		
		6516	+67	174	+8	68	121	11		
				(107)	(+3)		1,863	170		
June 30	11 57	6522	−50	42	−9	51	242	6	F	U. S. Naval.
		6517	−22	70	−22	32	242	2		
		6514	−19	73	−23	32	24	3		
		6514	−10	82	−23	26	61	2		
		6509	+4	96	−7	10	170	21		
		6519	+7	99	−17	20	194	12		
		(*)	+7	99	+9	10	36	8		
		6519	+15	107	−12	20	291	3		
		6508	+19	111	+5	19	170	2		
		6507	+20	112	−3	21	73	11		
		6518	+38	130	−12	40	6	2		
		6516	+81	173	+9	82	12	1		
				(92)	(+3)		1,521	73		

Mean daily area for 30 days, 1,430.

* = Not numbered.
Plate quality: P, poor; F, fair; G, good, VG, very good.

PROVISIONAL SUNSPOT RELATIVE NUMBERS FOR JUNE 1939

[Dependent alone on observations at Zurich]

[Date furnished through the courtesy of Prof. W. Brunner, Eidgen. Sternwarte, Zurich, Switzerland]

June 1939	Relative numbers	June 1939	Relative numbers	June 1939	Relative numbers
1	129	11	*Ec* 119	21	68
2	*a* 120	12	----------	22	74
3	*ad* 113	13	*d* ---	23	*dd* 65
4	*a* 97	14	*a* ---	24	74
5	*d* 104	15	*a* 101	25	61
6	124	16	97	26	*c* 84
7	127	17	----------	27	*Ec* 109
8	*d* 113	18	*MWcc* 91	28	*d* 137
9	*ad* 116	19	89	29	*aa* 134
10	*a* 104	20	*aa* ---	30	*a* 118

Mean, 25 days = 102.7

a = Passage of an average-sized group through the central meridian.
b = Passage of a large group through the central meridian.
c = New formation of a group developing into a middle-sized or large center of activity: E. on the eastern part of the sun's disk; W. on the western part; M, in the central-circle zone.
d = Entrance of a large or average-sized center of activity on the east limb.

AEROLOGICAL OBSERVATIONS

[Aerological Division, D. M. LITTLE in charge]

By B. FRANCIS DASHIELL

The 646 upper-air observations of atmospheric pressure, temperature, and humidity made by airplanes and radiosondes in the United States, Canada, Bermuda, the north Atlantic, Canal Zone, and Hawaii, during the month of June 1939, are shown in tables 1 and 1a. The pressures and temperatures, as well as resultant-wind directions and forces, are indicated on charts VIII, IX, X, and XI. Isentropic data for June are shown on chart XII. Tables 2 and 3 present certain upper-air wind observations, and table 4 shows the mean height of the tropopause during the month. A complete description of these charts and tables will be found in the January 1939 issue of the MONTHLY WEATHER REVIEW.

In the lower levels of the atmosphere (up to 5 kilometers) where observations are obtained both by airplanes and radiosonde, all stations but one computed monthly means at 5 kilometers. Of all radiosonde observations launched at the surface 40 percent reached 19 kilometers and 5 stations were able to compute means for 21 kilometers. Individual ascents to 23 kilometers were made at all stations, and one flight over the north Atlantic reached 24 kilometers.

A great area of low mean atmospheric pressure prevailed during June north of the United States across southern Canada and stretched indefinitely northeast of the Hudson Bay region. This pressure distribution is shown on charts VIII, IX, X, and XI. In the United States, however, the lowest mean pressure at the 5,000-foot level (1,524 meters—chart VIII) was recorded on Mount Washington, N. H., while relatively low mean pressures prevailed over the northern Rocky Mountain region. At 3, 4, and 5 kilometers, lowest mean pressures were noted over Spokane, Wash., and highest pressures over the Southeast, particularly Pensacola, Fla., and Norfolk, Va. This distribution varied somewhat from that noted during the preceding spring and winter months when Sault Ste. Marie, Mich., recorded the lowest pressures in the United States.

Above 5 kilometers, where only radiosonde observations are made, lowest mean pressure occurred over Fargo, N. Dak., and highest pressure over Nashville, Tenn., at all levels from 6 to 19 kilometers. Mean pressures at Washington, D. C., and St. George's, Bermuda, were nearly the same for all levels. The latter, however, averaged slightly lower. Over the north Atlantic ocean, between 40° and 43° N. and 47° and 53° W., mean pressures at all levels were slightly higher than those recorded over Halifax, Nova Scotia, but considerably lower than the pressures noted at St. George's, Bermuda.

Charts VIII, IX, X, and XI show the mean temperatures for June at 1.5, 3, 4, and 5 kilometers, respectively. Mean low temperatures occurred over the same areas where lowest mean pressures were noted within the United States. Mean temperatures were highest over El Paso, Tex., at 1.5, 3, and 4 kilometers, and over Pensacola, Fla., at 5 kilometers. San Diego, Calif., was warmer than Pensacola, Fla., at 1.5 and 3 kilometers. At 5 kilometers the lowest mean free-air temperature was —14.4° C. over Spokane, Wash. This was slightly colder than in the preceding month and decidedly lower than in the corresponding month of 1938.

The lowest free-air temperatures for June were recorded over Sault Ste. Marie, Mich., at the surface; over Seattle, Wash., from 0.5 to 2.5 kilometers; Spokane, Wash., at 3, 4, and 5 kilometers; Fargo, N. Dak., from 6 to 12 kilometers; Washington, D. C., at 13 and 14 kilometers; Oklahoma City, Okla., from 15 to 18 kilometers; and over Washington, D. C., at 19 kilometers. The lowest mean temperatures for June were recorded over St. George's, Bermuda, at 12, 13, 14, 15, and 16 kilometers.

While all stations (tables 1 and 1a) were warmer in June than during the preceding month of May in the lower levels, the current month was colder in the higher levels. This was particularly noticeable above the 13-kilometer level over all stations except Fargo, N. Dak.