

1
2
3
4
5
6
7
8
9
10
11
12
13

Supplement Material for

Homogenized century-long surface incident solar radiation over Japan

Qian Ma¹, Kaicun Wang*¹, Yanyi He¹, Liangyuan Su¹, Qizhong Wu¹, Han Liu¹, Youren

Zhang¹

¹State Key Laboratory of Earth Surface Processes and Resource Ecology, College of
Global Change and Earth System Science, Beijing Normal University, Beijing 100875,
China

Earth System Science Data, 2021

This supplementary material consists of two tables.

Table S1. The information of 156 stations over Japan, including the WMO-ID number, station name, latitude (°), longitude (°) and altitude (m).

ID	Name	WMO-ID	Lat	Lon	Alt	ID	Name	WMO-ID	Lat	Lon	Alt
1	WAKKANAI	47401	45.42	141.68	12	79	TATEYAMA	47672	34.99	139.87	7
2	KITAMIESASHI	47402	44.94	142.59	8	80	KATSUURA	47674	35.15	140.31	13
3	HABORO	47404	44.36	141.7	39	81	OSHIMA	47675	34.75	139.36	79
4	OMU	47405	44.58	142.96	15	82	MIYAKEJIMA	47677	34.12	139.52	37
5	RUMOI	47406	43.95	141.63	28	83	HACHIJOJIMA	47678	33.12	139.78	156
6	ASAHIKAWA	47407	43.76	142.37	116	84	CHIBA	47682	35.6	140.1	19
7	ABASHIRI	47409	44.02	144.28	43	85	YOKKAICHI	47684	34.94	136.58	56
8	OTARU	47411	43.18	141.02	26	86	NIKKO	47690	36.74	139.5	1294
9	SAPPORO	47412	43.06	141.33	26	87	SAIGO	47740	36.2	133.33	31
10	IWAMIZAWA	47413	43.21	141.79	51	88	MATSUE	47741	35.46	133.07	23
11	OBIHIRO	47417	42.92	143.21	43	89	SAKAI	47742	35.54	133.24	3
12	KUSHIRO	47418	42.99	144.38	16	90	YONAGO	47744	35.43	133.34	9
13	NEMURO	47420	43.33	145.59	39	91	TOTTORI	47746	35.49	134.24	16
14	SUTTTSU	47421	42.8	140.22	38	92	TOYOOKA	47747	35.54	134.82	4
15	MURORAN	47423	42.31	140.98	49	93	MAIZURU	47750	35.45	135.32	22
16	TOMAKOMAI	47424	42.62	141.55	11	94	HAGI	47754	34.41	131.41	7
17	URAKAWA	47426	42.16	142.78	37	95	HAMADA	47755	34.9	132.07	20
18	ESASHI	47428	41.87	140.12	12	96	TSUYAMA	47756	35.06	134.01	147
19	HAKODATE	47430	41.82	140.75	44	97	KYOTO	47759	35.01	135.73	46
20	KUTCHAN	47433	42.9	140.76	188	98	HIKONE	47761	35.28	136.24	89
21	MOMBETSU	47435	44.35	143.36	16	99	SHIMONOSEKI	47762	33.95	130.93	19
22	HIROO	47440	42.29	143.32	33	100	HIROSHIMA	47765	34.4	132.46	53

23	OFUNATO	47512	39.06	141.71	41	101	KURE	47766	34.24	132.55	5
24	SHINJO	47520	38.76	140.31	102	102	FUKUYAMA	47767	34.45	133.25	3
25	WAKAMATSU	47570	37.49	139.91	213	103	OKAYAMA	47768	34.66	133.92	18
26	FUKAURA	47574	40.65	139.93	67	104	HIMEJI	47769	34.84	134.67	40
27	AOMORI	47575	40.82	140.77	4	105	KOBE	47770	34.7	135.21	30
28	MUTSU	47576	41.28	141.21	5	106	OSAKA	47772	34.68	135.52	83
29	HACHINOHE	47581	40.53	141.52	28	107	SUMOTO	47776	34.34	134.91	112
30	AKITA	47582	39.72	140.1	22	108	WAKAYAMA	47777	34.23	135.16	18
31	MORIOKA	47584	39.7	141.17	155	109	SHIONOMISAKI	47778	33.45	135.76	69
32	MIYAKO	47585	39.65	141.97	46	110	NARA	47780	34.69	135.83	106
33	SAKATA	47587	38.91	139.84	4	111	YAMAGUCHI	47784	34.16	131.46	18
34	YAMAGATA	47588	38.26	140.35	154	112	IZUHARA	47800	34.2	129.29	19
35	SENDAI	47590	38.26	140.9	44	113	HIRADO	47805	33.36	129.55	59
36	ISHINOMAKI	47592	38.43	141.3	43	114	FUKUOKA	47807	33.58	130.38	15
37	FUKUSHIMA	47595	37.76	140.47	69	115	IIZUKA	47809	33.65	130.69	38
38	SHIRAKAWA	47597	37.13	140.22	357	116	SASEBO	47812	33.16	129.73	6
39	ONAHAMA	47598	36.95	140.9	5	117	SAGA	47813	33.27	130.31	32
40	WAJIMA	47600	37.39	136.9	7	118	HITA	47814	33.32	130.93	84
41	AIKAWA	47602	38.03	138.24	7	119	OITA	47815	33.24	131.62	13
42	NIIGATA	47604	37.89	139.02	6	120	NAGASAKI	47817	32.73	129.87	35
43	KANAZAWA	47605	36.59	136.63	34	121	UNZENDAKE	47818	32.74	130.26	679
44	FUSHIKI	47606	36.79	137.06	13	122	KUMAMOTO	47819	32.81	130.71	39
45	TOYAMA	47607	36.71	137.2	17	123	ASOSAN	47821	32.88	131.07	1144
46	NAGANO	47610	36.66	138.19	420	124	NOBEOKA	47822	32.58	131.66	21
47	TAKADA	47612	37.11	138.25	18	125	AKUNE	47823	32.03	130.2	45
48	UTSUNOMIYA	47615	36.55	139.87	140	126	HITTOYOSHI	47824	32.22	130.76	147

49	FUKUI	47616	36.06	136.22	17	127	KAGOSHIMA	47827	31.56	130.55	32
50	TAKAYAMA	47617	36.16	137.25	561	128	MIYAKONOJO	47829	31.73	131.08	156
51	MATSUMOTO	47618	36.25	137.97	611	129	MIYAZAKI	47830	31.94	131.41	15
52	SUWA	47620	36.05	138.11	762	130	MAKURAZAKI	47831	31.27	130.29	31
53	KARUIZAWA	47622	36.34	138.55	1004	131	ABURATSU	47835	31.58	131.41	15
54	MAEBASHI	47624	36.41	139.06	113	132	YAKUSHIMA	47836	30.39	130.66	38
55	KUMAGAYA	47626	36.15	139.38	32	133	TANEGASHIMA	47837	30.72	130.98	18
56	MITO	47629	36.38	140.47	31	134	USHIBUKA	47838	32.2	130.03	14
57	TSURUGA	47631	35.65	136.06	12	135	FUKUE	47843	32.69	128.83	26
58	GIFU	47632	35.4	136.76	17	136	MATSUYAMA	47887	33.84	132.78	34
59	NAGOYA	47636	35.17	136.97	56	137	TADOTSU	47890	34.28	133.75	5
60	IIDA	47637	35.52	137.82	529	138	TAKAMATSU	47891	34.32	134.05	10
61	KOFU	47638	35.67	138.55	282	139	UWAJIMA	47892	33.23	132.55	14
62	FUJISAN	47639	35.36	138.73	3773	140	KOCHI	47893	33.57	133.55	5
63	KAWAGUCHIKO	47640	35.5	138.76	861	141	TOKUSHIMA	47895	34.07	134.57	6
64	CHICHIBU	47641	35.99	139.07	234	142	SUKUMO	47897	32.92	132.7	11
65	TATENO	47646	36.06	140.13	31	143	SHIMIZU	47898	32.72	133.01	33
66	CHOSHI	47648	35.74	140.86	28	144	MUROTOMISAKI	47899	33.25	134.18	186
67	UENO	47649	34.76	136.14	161	145	NAZE	47909	28.38	129.5	8
68	TSU	47651	34.73	136.52	18	146	YONAGUNIJIMA	47912	24.47	123.01	36
69	IRAKO	47653	34.63	137.09	8	147	IRIOMOTEJIMA	47917	24.43	123.77	11
70	HAMAMATSU	47654	34.71	137.72	33	148	ISHIGAKIJIMA	47918	24.34	124.16	6
71	OMAEZAKI	47655	34.6	138.21	47	149	MIYAKOJIMA	47927	24.79	125.28	41
72	SHIZUOKA	47656	34.98	138.4	16	150	KUMEJIMA	47929	26.34	126.8	5
73	MISHIMA	47657	35.11	138.93	22	151	NAHA	47936	26.21	127.69	50
74	TOKYO	47662	35.69	139.76	36	152	NAGO	47940	26.59	127.97	7

75	OWASE	47663	34.07	136.19	27	153	OKINOERABU	47942	27.43	128.71	29
76	IROZAKI	47666	34.6	138.84	56	154	MINAMIDAITOJIMA	47945	25.83	131.23	20
77	AJIRO	47668	35.05	139.09	68	155	CHICHIJIMA	47971	27.09	142.19	8
78	YOKOHAMA	47670	35.44	139.65	43	156	MINAMITORISHIMA	47991	24.29	153.98	8

IDs marked with red color indicate the 41 stations on which the data were improved a lot after homogenization.

Table S2. The information of date when data inhomogeneity occurred due to changes in instrument, observational methods and/or site relocation for sunshine duration (SunDu) data, surface incident solar radiation (R_s) data and cloud amount (CA) data at each station.

ID	SunDu			Rs	Cloud	ID	SunDu			Rs	Cloud
	site relocation	measurement method	site relocation	change of instruments	measurement method		site relocation	measurement method	site relocation	change of instruments	measurement method
47401		198601		197207		47672		198601		nodata	
47402		198801			199504	47674		198901		nodata	
47404		198801		nodata	198104	47675		198601	199112	197208	
47405		198901		nodata	198104	47677		198701		nodata	
47406		198601		197305		47678		198601	200308	197105	
47407		198601	200405	197207		47682		198701		nodata	
47409		198601		197301		47684		198901	200003	nodata	199204
47411		198601		nodata	199204	47690		198901		nodata	199104
47412		198601		197104		47740		198701		197501	
47413		198701		nodata		47741		198701		197501	
47417		198601		197405		47742		199001		nodata	199404
47418	191001	198701	200010	nodata		47744		198601		197205	
47420		198601		197104		47746		198701		197501	

47421	198601	197305		47747	198701		nodata	
47423	198601	197305		47750	197407	198601	197408	
47424	198701	nodata		47754	198701	200603	197501	198104
47426	198601	197305		47755	198601		197305	
47428	198701	nodata		47756	198701		nodata	199404
47430	198601	197206		47759	198701		197501	
47433	198701	197501		47761	198601		197305	
47435	198701	nodata		47762	198601		197305	
47440	198901	nodata	199204	47765	198601	198801	197205	
47512	198701	197501		47766	198901		nodata	198104
47520	198511	nodata	199204	47767	198801		nodata	199404
47570	198701	197501		47768	198201	198701	197501	
47574	198701	nodata		47769	198701		nodata	199404
47575	198601	197207		47770	198601	200703	197501	
47576	198801	nodata	198104	47772	198601		197102	
47581	198601	197307		47776	198701		nodata	199404
47582	198601	197106		47777	198701		197501	
47584	198601	197208		47778	198601	201111	197103	
47585	198601	197204		47780	198601		197305	
47587	197003	197307		47784	198701	201210	197501	
47588	198601	197307		47800	198601	199109	197207	
47590	198601	197207		47805	198801		197501	198104
47592	198701	nodata	199504	47807	198601		197107	
47595	198601	197306		47809	198901		197501	198104
47597	198701	nodata	199204	47812	198601	200203	197501	199304
47598	198601	197205		47813	198601	199510	197306	

47600	198601		197104		47814	198601		197501	199304
47602	198701		nodata		47815	198601		197308	
47604	198601	200806	197204		47817	198601		197107	
47605	198701	199110	nodata		47818	199001	197701		
47606	198901		nodata	198104	47819	198601		197207	
47607	198601		197305		47821	199001		197501	
47610	198701		196701		47822	198701	201807	197501	199504
47612	198601		197309		47823	198801		197501	198104
47615	198601		197305		47824	198601		197501	199304
47616	198601		197305		47827	198601		197107	
47617	198701		197501		47829	198901		197501	198104
47618	198601		197206		47830	198601	200005	197207	
47620	198601		197501	198104	47831	198601		197501	199504
47622	198901	201411	nodata	200804	47835	198601		197204	199504
47624	198601		197107		47836	198601	197504	197501	
47626	198701		197501		47837	198701	200412	197501	
47629	198701		197501		47838	198601		197304	199304
47631	198701		nodata		47843	198601		197501	
47632	198701		nodata		47887	198601		197205	
47636	198601		197207		47890	198901		nodata	198104
47637	198701	200205	197501		47891	198601		197205	
47638	198601		197309		47892	198901	199302	nodata	
47639			200408	nodata	47893	198701		197307	
47640	198801		nodata	199104	47895	198701		197501	
47641	198801		nodata	199104	47897	198901		nodata	198104
47646	199001			199004	47898	198601		197105	

47648	198601		197204		47899		198701		197312	
47649	198601		nodata	199104	47909		198601		197107	
47651	198701		nodata		47912		198601		nodata	
47653	198901		nodata	198104	47917		199001	200303	nodata	
47654	198701	201211	nodata		47918		198601		197308	
47655	198601		197205		47927		198601		198103	
47656	198601		197309		47929		198601		nodata	199504
47657	198901		nodata	199204	47936	192705	198601		197201	
47662	198701	200711	197204		47940		198701	199001	nodata	
47663	198701		nodata		47942		198601		nodata	
47666	198701		nodata	199104	47945		198601		197306	201604
47668	198901		nodata	199504	47971		198601		197404	
47670	198701		197501		47991		198701		197404	

