

Sunspot Relative Numbers and Sunspot Areas

2002

Cooperating Observatories to the International Sunspot Number :

AMATEUR SOUTHERN CROSS OBSERVATORY (BOLIVIA); ASTR. CENTRE ARDENNE (BELGIUM); ASTRO. DE REUX CINEY (BELGIUM); BARNES AUCKLAND (NEW-ZEALAND); BORTOLOTTI MAURO (ITALIA); CAMAGUEY (CUBA); CATANIA ITALY - USSPS code (31405); CENTRAL WEATHER BUREAU (CHINA); CLAEYS VEDRIN (BELGIUM); COURDURIE MARCQ EN BAROEUL (FRANCE); CULGOORA NARRABRI (AUSTRALIA); DE BACKER BOOM (BELGIUM); DRAGESCO JEAN (FRANCE); DUBOIS LANGEMARK (BELGIUM); E.O.S. SONARA (MEXICO); EDNILSON OLIVEIRA (BRASIL); EVANS INVERCAGILL (NEW-ZEALAND); FERNANDEZ RUIS SANTANDER (SPAIN); FERREIRA SAO FRANCISCO (BRASIL); FUJIMORI NAGANO (JAPAN); GERARD DINANT (BELGIUM); GERMAN MORALES COCHABAMBA (BOLIVIA); GUILLERY PULLIGNY (FRANCE); GYSEL LUC (BELGIUM); HAVANA SOLAR STATION (CUBA); HELWAN (EGYPT); HOLLOMAN (U.S.A); HURBANOVO (SLOVAKIA); HVEZDAREN KYSUCKE (SLOVAKIA); HVEZDAREN PRESOV (SLOVAKIA); ISEO (ITALIA); JAMBOL (BULGARIA); JOHNSTON GWYNEDD (ENGLAND); JORGE LUIS GARCIA (SPAIN); JURI GAGARIN EILENBURG (GERMANY); KANDILLI (TURKEY); KANZELHOHE TREFFEN (AUSTRIA); KAWAGUCHI (JAPAN); KISLOVODSK (RUSSIA); KLADNO (CZECH-REPUBLIC); LARISSA OBSERVATORY (GREECE); LEARMOUTH (AUSTRALIA); LOCARNO (SWITZERLAND); MAC KENZIE DOVER (UNITED-KINGDOM); MAHMOUD S MOSQUE SOCIETY (EGYPT); MILANO (ITALY); MIRA GRIMBERGEN (BELGIUM); MITAKA (JAPAN); MOCHIZUKI URAWA SAITAMA (JAPAN); MOJICA COCHABAMBA (BOLIVIA); MURMANSK (RUSSIA); NIJMEGEN (NETHERLANDS); OBS. COPERNICUS VARNA (BULGARIA); OBSERV. PAUL AHNERT COTTBUS (GERMAN); OBSERVATORY FRANTISKA (CZECH-REP.); OBSERVATORY PROSTEJOV (CZECH REPUBL); ONDREJOV OBSERV. (CZECH-REPUBLIC); PASTERNAK BERLIN (GERMANY); PHILIPPE WITTELSHEIM (FRANCE); PYONG YANG (KOREA); QUEZON (PHILIPPINES); RAMEY (PUERTO-RICO); SAN MIGUEL (ARGENTINA); SAN VITO (ITALY); SAUDI ARABIA (JEDDAH); SCHOTT LUTZ GERD (GERMANY); SKALNATE (SLOVAKIA); SLIVEN (BULGARIA); SMOLYAN (BULGARIA); SOBOTA (SLOVAKIA); SPANINKS TILBURG (NETHERLANDS); STEFANIKS OBS. PRAGUE (CZECH-REP.); SUZUKI (JAPAN); UCCLE (BELGIUM); VENTURA MOSTA (MALTA); ZAGORA (BULGARIA)

The first column gives the definitive international Sunspot Numbers for the whole solar disk (R_i established by the Solar Influences Data analysis Center (Brussels, Belgium), the second gives the same quantity for the central zone (R_{ic}) on the basis of the observations of AMATEUR SOUTHERN CROSS OBSERVATORY (BOLIVIA); ASTRO. DE REUX CINEY (BELGIUM); CATANIA (ITALY); CENTRAL WEATHER BUREAU (CHINA); EVANS INVERCAGILL (NEW-ZEALAND); FUJIMORI NAGANO (JAPAN); GERMAN MORALES COCHABAMBA (BOLIVIA); HOLLOMAN (U.S.A); HVEZDAREN KYSUCKE (SLOVAKIA); HVEZDAREN PRESOV (SLOVAKIA); KANDILLI (TURKEY); KAWAGUCHI (JAPAN); KISLOVODSK (RUSSIA); LARISSA OBSERVATORY (GREECE); LEARMOUTH AUSTRALIA - USSPS code (81202); MIRA GRIMBERGEN (BELGIUM); MITAKA (JAPAN); MOCHIZUKI URAWA SAITAMA (JAPAN); MOJICA COCHABAMBA (BOLIVIA); NIJMEGEN (NETHERLANDS); OBS. COPERNICUS VARNA (BULGARIA); OBSERVATORY FRANTISKA (CZECH-REP.); OBSERVATORY PROSTEJOV (CZECH REPUBL); ONDREJOV OBSERV. (CZECH-REPUBLIC); RAMEY (PUERTO-RICO); SAN VITO (ITALY); SKALNATE (SLOVAKIA); SMOLYAN (BULGARIA); SOBOTA (SLOVAKIA); SPANINKS TILBURG (NETHERLANDS); STEFANIKS OBS. PRAGUE (CZECH-REP.); SUZUKI (JAPAN); UCCLE (BELGIUM);

The diameter of the central zone is half that of the solar disk.

The Sunspot areas A_c are from Catania, A_r from Roma, and A_i are mean quantities calculated by the SIDC on the basis of data from Roma, Helwan, Jeddah and ratched to Catania by a monthly scale factor. The apparent total area of the umbra plus penumbra is uncorrected for foreshortening and expressed in millionths of the solar disk.

I - 2 (2002)

JANUARY 2002						FEBRUARY 2002					
2002 JAN.	Ri	Ric	Ac	Ar	Ai	2002 FEB.	Ri	Ric	Ac	Ar	Ai
1	136	48	-	-	1001	1	113	62	4653	-	1551
2	135	52	1658	3162	1477	2	135	69	4498	4905	2480
3	136	54	-	2877	1059	3	159	86	4554	-	1518
4	142	61	1277	2362	751	4	153	80	2620	3920	1678
5	118	53	997	1955	757	5	151	61	2145	3173	1222
6	98	26	1053	-	351	6	125	53	1407	-	469
7	90	26	1132	-	533	7	104	44	-	1634	639
8	100	38	1146	1449	551	8	104	56	-	1315	542
9	121	53	2450	3456	1245	9	110	57	-	1587	868
10	115	56	3263	3961	1540	10	105	61	1469	-	489
11	129	51	3347	4175	1600	11	109	58	2758	3062	1451
12	129	45	3259	4153	1574	12	110	43	2593	3430	1508
13	124	33	-	-	0	13	104	42	2498	-	832
14	122	29	2323	-	1094	14	92	59	2444	-	814
15	104	41	-	3425	835	15	103	60	2297	-	978
16	87	57	-	2788	680	16	79	38	-	-	778
17	74	46	1714	2600	1021	17	91	14	-	-	0
18	86	53	2069	2727	1229	18	80	36	-	-	462
19	99	42	1592	2927	1168	19	78	64	-	2492	821
20	109	29	1560	-	520	20	95	75	1349	2256	862
21	118	47	2682	-	1209	21	81	58	935	-	311
22	120	45	2328	-	776	22	84	55	-	1821	444
23	140	55	2157	2444	986	23	94	33	1261	-	420
24	115	53	1680	-	818	24	99	32	1002	-	334
25	97	38	1419	2003	957	25	121	27	1426	2699	850
26	106	38	1856	-	881	26	123	54	1660	-	864
27	118	35	3278	-	1320	27	107	55	1723	2370	1030
28	121	34	2186	3815	1447	28	97	49	1392	-	662
29	116	47	2143	-	714						
30	119	64	2322	-	1389						
31	112	70	2675	-	1317						
MEAN	114.1	45.8	2060.2	2957.6	993.5	MEAN	107.4	52.9	2234.2	2666.5	888.5

MARCH 2002						APRIL 2002					
2002 MAR.	Ri	Ric	Ac	Ar	Ai	2002 APR.	Ri	Ric	Ac	Ar	Ai
1	109	46	1502	-	500	1	116	73	3772	-	1719
2	78	33	1333	1775	658	2	130	119	3641	-	2289
3	112	10	1745	-	581	3	126	111	-	-	993
4	114	35	-	1777	433	4	127	87	3508	-	1628
5	106	27	-	1568	382	5	127	57	3158	4920	1855
6	112	40	926	1279	465	6	136	39	3269	-	1724
7	93	44	-	1199	292	7	138	36	2006	-	1243
8	79	39	-	-	0	8	134	48	2141	3441	1571
9	74	25	856	-	285	9	148	69	2428	-	1262
10	78	19	1248	-	416	10	142	78	1881	-	1054
11	103	9	-	2334	569	11	152	72	-	-	881
12	90	10	2005	3045	1058	12	162	70	-	-	1318
13	92	33	2398	3414	1224	13	144	62	4057	5652	2929
14	87	40	2542	3460	1268	14	150	55	5360	-	2472
15	100	44	2490	-	830	15	138	76	3392	-	1860
16	94	52	2308	3370	1193	16	113	59	2889	4233	1497
17	88	58	1757	-	585	17	94	39	2516	3642	1483
18	92	47	1487	2582	972	18	106	59	2547	3552	1753
19	76	27	1127	-	375	19	104	65	2072	2937	1188
20	85	18	1098	1778	599	20	102	70	1893	2497	1144
21	95	16	1071	1719	582	21	95	43	1640	-	546
22	93	40	1092	1676	579	22	93	38	-	2689	941
23	106	29	1178	1617	590	23	114	45	2346	2828	1307
24	111	41	1222	-	407	24	150	79	3027	3145	1332
25	109	54	1470	-	490	25	147	72	-	-	539
26	101	47	1513	-	504	26	101	49	1553	2386	824
27	115	55	1107	1753	597	27	88	62	2024	-	1104
28	107	42	2588	2128	1036	28	71	46	1248	-	1074
29	114	20	-	-	0	29	87	28	876	1497	620
30	111	17	2033	2706	1003	30	85	22	759	1158	584
31	125	41	3161	-	1053						
MEAN	98.4	34.1	1650.3	2176.7	629.9	MEAN	120.7	60.9	2560.1	3184.1	1357.8

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MAY 2002						JUNE 2002					
2002 MAY	Ri	Ric	Ac	Ar	Ai	2002 JUN.	Ri	Ric	Ac	Ar	Ai
1	102	28	1627	-	870	1	124	39	2512	3310	1382
2	114	32	1905	2096	859	2	129	64	2142	-	995
3	149	42	2607	3006	1201	3	133	65	1971	3665	1163
4	166	71	2819	-	1171	4	150	67	2877	3851	1424
5	172	105	3273	-	1091	5	126	65	3122	-	1040
6	149	97	2822	3475	1412	6	135	65	2051	2584	985
7	157	108	2850	-	950	7	135	67	-	-	0
8	142	90	-	-	720	8	127	72	1728	-	576
9	126	82	3128	4298	1568	9	113	64	-	-	0
10	133	59	3499	-	1166	10	88	35	1721	2630	911
11	138	63	3246	-	1331	11	68	14	1783	2411	887
12	130	48	2460	-	820	12	75	26	1561	1988	754
13	104	50	2603	2754	1154	13	55	22	915	1546	511
14	76	41	1608	2275	977	14	73	20	925	1040	421
15	74	42	1391	2313	771	15	70	20	870	1232	442
16	84	31	1682	2302	841	16	80	21	933	-	311
17	86	30	2742	2870	1210	17	60	26	935	1161	446
18	93	9	3007	3434	1859	18	87	44	1184	1446	560
19	93	24	3055	-	1018	19	79	35	1242	1548	593
20	107	44	2556	4272	1420	20	74	31	1255	1797	642
21	121	77	3283	4226	1594	21	57	24	1248	2078	692
22	137	97	2613	4315	1443	22	57	26	1715	2408	869
23	136	82	2862	-	954	23	65	42	1433	-	477
24	128	93	-	-	0	24	74	34	1561	2565	859
25	127	96	2420	-	1113	25	76	36	1832	2413	899
26	121	82	2391	-	1053	26	74	33	1624	2200	808
27	123	66	2168	2469	1174	27	66	33	1466	1655	669
28	119	44	1919	2067	858	28	60	30	1174	1220	516
29	114	34	1839	2789	970	29	66	31	1148	-	382
30	103	33	1974	3464	1127	30	72	35	1044	-	650
31	120	35	1981	3426	1122						
MEAN	120.8	59.2	2494.1	3102.8	1090.9	MEAN	88.3	39.5	1570.4	2130.9	695.5

JULY 2002						AUGUST 2002					
2002 JULY	Ri	ic	Ac	Ar	Ai	2002 AUG.	Ri	Ric	Ac	Ar	Ai
1	58	9	1048	1551	750	1	137	29	4216	4982	2147
2	61	12	1609	-	879	2	132	49	2906	3563	1755
3	80	12	2052	2566	982	3	121	51	1751	-	1222
4	82	20	1785	2086	828	4	95	28	1259	-	968
5	88	30	1735	1804	763	5	84	25	1168	2180	949
6	75	24	1570	1958	923	6	87	35	1116	1618	948
7	66	19	1671	-	808	7	88	26	1270	1716	954
8	63	13	1570	1208	613	8	76	51	988	1580	706
9	64	7	824	848	361	9	73	54	926	1729	705
10	58	9	952	1041	428	10	73	32	1016	-	850
11	61	21	1180	1303	533	11	99	39	1159	-	811
12	52	21	1424	2041	729	12	117	26	3000	3010	1415
13	72	23	1419	2318	866	13	134	44	3568	3966	2004
14	78	52	1429	-	653	14	177	96	5042	5670	2763
15	96	66	2654	3956	1387	15	185	111	5063	-	2453
16	99	63	3813	4810	1833	16	174	109	2343	7371	2857
17	91	61	3953	-	1317	17	186	125	2309	8251	2938
18	92	33	4129	5691	2073	18	179	126	4914	-	1638
19	83	20	4692	5465	2173	19	164	107	5546	8120	2872
20	77	52	4288	5090	1934	20	140	44	4825	6560	2942
21	77	58	3709	-	1361	21	127	29	5112	4920	2178
22	91	61	2595	4266	1429	22	114	41	3931	3996	1951
23	121	54	3772	4887	1837	23	123	68	2433	3763	1530
24	129	39	4566	-	1522	24	99	62	2415	3413	1419
25	133	33	4518	5231	2086	25	98	30	2505	-	1248
26	164	61	3976	6943	2264	26	79	27	2674	3203	1553
27	182	118	5180	7259	2641	27	80	29	1953	2912	1202
28	192	129	6018	-	2257	28	81	41	1926	-	905
29	181	157	5616	8896	2972	29	82	54	1170	-	613
30	174	113	5010	7997	2639	30	97	48	1769	2284	991
31	148	37	4862	-	1743	31	106	15	2177	2907	1523
MEAN	99.6	46.0	3020.0	3878.9	1405.9	MEAN	116.4	53.3	2659.7	3987.0	1581.0

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SEPTEMBER 2002						OCTOBER 2002					
2002 SEP.	Ri	Ric	Ac	Ar	Ai	2002 OCT.	Ri	Ric	Ac	Ar	Ai
1	120	20	4475	-	1491	1	58	29	1440	2113	987
2	136	62	3236	4432	1620	2	70	50	1684	2422	1258
3	147	84	3121	-	1518	3	67	33	1573	-	524
4	144	91	2836	4159	1751	4	60	20	-	-	667
5	132	109	2705	3333	1501	5	76	12	1785	2804	1480
6	118	80	2264	2924	1348	6	81	37	1694	-	1295
7	120	62	1627	-	702	7	79	42	2516	3168	1622
8	124	47	1712	-	858	8	101	47	2468	3008	1739
9	116	40	2879	3499	1519	9	106	58	2761	-	1640
10	118	50	1623	-	1124	10	129	81	-	-	1018
11	109	62	4110	5472	2029	11	121	54	3176	4007	1725
12	109	90	4379	5815	2626	12	122	42	3709	3983	2208
13	109	104	4106	5385	2012	13	119	48	3923	-	1881
14	87	77	3141	4742	2024	14	114	50	2631	3339	1826
15	97	73	3205	-	1888	15	116	66	2141	3217	1870
16	99	40	2249	3720	1243	16	128	69	2310	3504	1846
17	116	40	2502	3729	1799	17	110	68	1448	3318	1361
18	121	51	2307	3583	2015	18	118	63	2396	3107	1499
19	112	57	2109	3295	1299	19	120	60	2604	-	1566
20	114	73	2225	-	1423	20	122	40	3326	-	1719
21	106	62	2797	4386	2016	21	93	15	2880	3365	1857
22	108	55	-	-	1131	22	88	10	-	3821	1843
23	112	53	1949	-	1387	23	77	43	2573	-	1986
24	103	41	2800	3403	1658	24	73	48	2601	3823	1614
25	111	51	2391	-	1124	25	77	46	-	3580	1239
26	90	26	1936	2490	1167	26	81	38	2331	-	1618
27	90	24	1375	1875	852	27	84	10	1790	-	1311
28	80	40	1380	1600	770	28	87	15	-	2580	1519
29	76	33	1316	-	778	29	114	26	-	-	890
30	64	36	1184	2092	770	30	120	34	-	1984	1019
						31	110	34	-	-	539
MEAN	109.6	57.8	2549.6	3680.7	1448.1	MEAN	97.5	41.5	2424.3	3174.6	1457.0

NOVEMBER 2002						DECEMBER 2002					
2002 NOV.	Ri	Ric	Ac	Ar	Ai	2002 DEC.	Ri	Ric	Ac	Ar	Ai
1	124	45	-	-	642	1	72	21	-	-	0
2	115	46	-	2787	1315	2	66	29	1079	1600	562
3	123	59	-	-	1130	3	64	38	-	1580	385
4	107	42	2558	-	1817	4	80	66	-	-	0
5	122	97	3231	4960	2576	5	82	56	1364	1652	643
6	137	111	2875	4940	2137	6	82	35	-	-	0
7	145	100	2862	5146	1747	7	79	34	-	-	0
8	122	95	-	-	0	8	98	21	859	-	286
9	129	43	2355	3803	1774	9	107	35	841	-	280
10	126	54	3007	-	1504	10	94	43	955	-	318
11	114	39	-	-	1020	11	74	38	-	-	0
12	100	19	1854	-	1180	12	65	35	-	-	0
13	94	65	2021	2862	1408	13	75	36	972	-	324
14	104	67	1834	-	1325	14	124	37	1327	1979	693
15	102	52	2848	-	1694	15	119	44	-	-	0
16	89	48	3432	-	2712	16	129	33	2754	-	1695
17	91	15	-	-	2352	17	140	94	2886	-	1983
18	83	14	-	-	2213	18	134	113	2298	-	1973
19	74	29	2983	-	1986	19	134	85	3044	5250	1721
20	94	61	2721	3492	2116	20	124	85	2694	4323	1464
21	82	74	2105	-	1286	21	112	81	3049	-	1758
22	79	51	2166	-	722	22	104	52	2992	-	1458
23	77	37	2255	2793	1570	23	75	17	1545	-	841
24	67	22	-	-	1314	24	57	16	691	-	458
25	56	9	1106	-	803	25	35	0	379	-	274
26	49	10	-	-	480	26	32	10	300	-	100
27	68	9	-	-	584	27	29	10	225	-	75
28	70	24	740	812	333	28	27	16	167	-	94
29	61	17	660	-	363	29	31	13	104	-	78
30	61	18	-	-	0	30	29	22	190	-	153
						31	33	32	401	-	195
MEAN	95.5	45.7	2295.4	3510.6	1336.8	MEAN	80.8	40.2	1352.9	2730.7	574.5