

## Sunspot Relative Numbers and Sunspot Areas

2003

## Cooperating Observatories to the International Sunspot Number :

AMATEUR SOUTHERN CROSS OBSERVATORY (BOLIVIA); ANDRIES SON (BELGIUM); ASTR. CENTRE ARDENNE (BELGIUM); ASTRO. DE REUX CINEY (BELGIUM); BARNES AUCKLAND (NEW-ZEALAND); BORTOLOTTI MAURO (ITALIA); BULLON VALENCIA (SPAIN); CAMAGUEY (CUBA); CAPRICORNO CAMPINAS (BRASIL); CATANIA (ITALY); 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); EBRO ROQUETES (SPAIN); EUROPLANETARIUM (BELGIUM); 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); HAZEL COLLETT (UNITED-KINGDOM); 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); KLDNO (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); OBSERV. PAUL AHNERT COTTBUS (GERMAN); OBSERVATORY FRANTISKA (CZECH-REP.); OBSERVATORY PROSTEJOV (CZECH REPUBL); ONDREJOV OBSERV. (CZECH-REPUBLIC); PASTERNAK BERLIN (GERMANY); PASTERNAK LEER (GERMANY); PHILIPPE WITTELSHEIM (FRANCE); PYONG YANG (KOREA); QUEZON (PHILIPPINES); RAMEY (PUERTO-RICO); ROBERTO de MANZANO (ITALIA); 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); CAPRICORNO CAMPINAS (BRASIL); CATANIA (ITALY); CENTRAL WEATHER BUREAU (CHINA); EUROPLANETARIUM (BELGIUM); EVANS INVERCAGILL (NEW-ZEALAND); FUJIMORI NAGANO (JAPAN); GERMAN MORALES COCHABAMBA (BOLIVIA); HELWAN (EGYPT); HOLLOMAN (U.S.A); HVEZDAREN KYSUCKE (SLOVAKIA); HVEZDAREN PRESOV (SLOVAKIA); KANDILLI (TURKEY); KAWAGUCHI (JAPAN); KISLOVODSK (RUSSIA); LARISSA OBSERVATORY (GREECE); LEARMOUTH (AUSTRALIA); MIRA GRIMBERGEN (BELGIUM); MITAKA (JAPAN); MOCHIZUKI URAWA SAITAMA (JAPAN); NIJMEGEN (NETHERLANDS); OBSERVATORY FRANTISKA (CZECH-REP.); OBSERVATORY PROSTEJOV (CZECH REPUBL); ONDREJOV OBSERV. (CZECH-REPUBLIC); RAMEY (PUERTO-RICO); SAN VITO (ITALY); SKALNATE (SLOVAKIA); SLIVEN (BULGARIA); SMOLYAN (BULGARIA); SOBOTA (SLOVAKIA); SPANINKS TILBURG (NETHERLANDS); STEFANIKS OBS. PRAGUE (CZECH-REP.); SUZUKI (JAPAN); UCCLE (BELGIUM);

The diameter of the central zone is half the size 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 Solar Influences Data analysis Center on the basis of observations of Roma, Helwan, Jeddah and rattached 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.

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JANUARY 2003						FEBRUARY 2003					
2003 JAN.	Ri	Ric	Ac	Ar	Ai	2003 FEB.	Ri	Ric	Ac	Ar	Ai
1	31	28	216	-	64	1	40	15	633	399	255
2	27	17	252	-	103	2	43	17	713	-	264
3	66	11	623	-	155	3	36	21	720	1174	448
4	65	12	1476	-	598	4	35	14	853	-	320
5	68	22	1588	-	830	5	50	24	676	1146	450
6	86	59	1688	-	795	6	68	26	787	1070	407
7	90	56	1199	1909	929	7	82	38	623	1038	371
8	108	73	1644	-	852	8	87	47	536	723	229
9	109	60	1853	-	463	9	93	60	-	-	160
10	117	22	-	2876	609	10	73	77	-	807	171
11	117	30	-	-	1140	11	73	59	478	735	220
12	104	49	1980	-	1193	12	71	55	637	694	245
13	94	62	-	-	1056	13	59	25	485	438	171
14	94	78	2054	2520	1100	14	45	24	-	-	0
15	84	57	1671	1907	871	15	31	13	-	179	37
16	84	41	1629	-	407	16	20	15	141	-	44
17	81	30	-	1694	358	17	10	0	58	72	28
18	77	42	-	-	482	18	20	0	-	141	50
19	87	29	1029	-	431	19	33	11	-	678	143
20	93	42	711	-	177	20	44	14	-	1215	431
21	68	27	1103	-	474	21	46	50	-	1425	450
22	86	27	717	-	179	22	34	46	-	-	248
23	70	30	819	-	491	23	28	27	-	-	241
24	76	36	994	-	681	24	28	0	-	850	331
25	59	46	-	-	348	25	32	13	-	518	109
26	72	54	-	-	530	26	30	11	-	277	114
27	85	46	1079	1247	641	27	43	9	-	306	64
28	85	47	1094	1167	508	28	34	10	-	325	199
29	84	39	1300	-	325						
30	62	17	908	-	227						
31	41	14	676	-	169						
MEAN	79.7	38.8	1179.3	1902.9	554.4	MEAN	46.0	25.8	564.6	676.7	221.4

MARCH 2003						APRIL 2003					
2003 MAR.	Ri	Ric	Ac	Ar	Ai	2003 APR.	Ri	Ric	Ac	Ar	Ai
1	48	21	-	-	335	1	93	52	-	3637	1221
2	59	11	-	-	582	2	103	45	-	2701	975
3	57	21	-	-	450	3	90	44	-	-	583
4	80	35	-	2024	783	4	72	25	-	2919	618
5	65	51	-	2160	781	5	60	12	-	2263	935
6	63	54	-	1792	572	6	52	9	-	-	804
7	79	48	-	1667	572	7	48	9	-	1777	709
8	66	64	-	-	709	8	34	9	841	1578	718
9	89	37	-	-	954	9	42	11	-	-	585
10	71	10	-	2382	1095	10	38	12	-	-	342
11	69	25	-	2646	965	11	25	13	725	1306	492
12	56	34	-	2530	536	12	37	18	789	-	497
13	45	34	-	2327	754	13	38	9	793	-	467
14	58	47	-	2638	785	14	35	17	481	825	356
15	63	52	-	2916	617	15	29	9	284	517	206
16	62	32	-	-	563	16	16	8	-	229	88
17	41	20	-	2900	979	17	19	9	-	212	89
18	43	0	1743	2262	1102	18	27	8	227	331	124
19	39	0	1520	1146	602	19	34	9	486	639	349
20	29	8	-	337	120	20	45	9	708	-	464
21	23	10	-	32	15	21	58	11	-	-	374
22	8	9	57	-	11	22	75	29	-	1524	489
23	27	9	-	-	16	23	73	32	1698	1910	870
24	33	11	206	266	86	24	73	32	1407	1661	674
25	52	18	-	439	93	25	89	21	1444	-	680
26	70	37	-	972	205	26	86	31	2452	2583	1261
27	81	50	-	2464	857	27	103	28	2640	-	1102
28	91	55	-	3034	1061	28	100	41	2370	3939	1492
29	112	87	-	3728	1363	29	109	52	2680	4496	1497
30	112	69	-	-	1383	30	98	44	2785	5256	2074
31	102	63	-	3733	1635						
MEAN	61.1	33.0	881.5	2018.0	663.9	MEAN	60.0	21.9	1341.8	2015.2	704.5

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MAY 2003						JUNE 2003					
2003 MAY	Ri	Ric	Ac	Ar	Ai	2003 JUN.	Ri	Ric	Ac	Ar	Ai
1	99	55	2996	-	1678	1	42	13	550	-	372
2	86	52	2785	4893	1956	2	38	23	979	-	324
3	95	37	2272	3877	1680	3	40	23	1016	1357	662
4	96	23	2159	-	1464	4	47	20	1514	1634	849
5	93	7	3284	3198	1666	5	59	21	1520	1703	592
6	78	7	2282	2194	1311	6	86	38	2305	2782	932
7	65	26	1472	-	713	7	98	46	3031	3362	1794
8	33	19	613	-	235	8	101	59	3131	-	1779
9	20	8	513	-	193	9	111	71	3327	5663	2250
10	17	0	434	-	231	10	111	42	3422	6124	2444
11	36	10	491	-	208	11	116	68	3142	-	1701
12	38	11	299	418	217	12	115	57	2696	-	1032
13	41	23	230	362	190	13	96	51	1741	-	632
14	43	27	374	681	265	14	81	35	808	1455	590
15	50	29	283	-	142	15	63	16	608	-	331
16	51	25	301	-	119	16	57	9	973	634	441
17	39	17	268	-	152	17	56	12	1106	797	476
18	44	18	-	-	73	18	68	26	1402	1135	636
19	48	28	586	882	346	19	76	22	1619	1411	625
20	61	19	919	951	448	20	74	47	1704	2002	745
21	50	15	597	685	315	21	62	44	1869	2292	996
22	65	13	564	493	270	22	61	53	1372	-	647
23	57	17	448	402	220	23	66	44	1006	1532	714
24	37	17	389	420	203	24	68	40	1210	1568	676
25	39	17	957	-	489	25	76	32	1062	1582	743
26	52	42	969	1821	754	26	82	26	1014	1655	720
27	57	44	-	-	536	27	93	28	930	1536	626
28	62	42	-	3197	1325	28	93	51	1290	2080	790
29	56	20	1631	2926	822	29	94	45	1380	-	1010
30	44	8	1292	2393	991	30	92	37	2535	2638	1450
31	42	9	778	1330	789						
MEAN	54.6	22.1	1078.1	1729.1	645.2	MEAN	77.4	36.6	1675.4	2140.1	919.3

  

JULY 2003						AUGUST 2003					
2003 JULY	Ri	Ric	Ac	Ar	Ai	2003 AUG.	Ri	Ric	Ac	Ar	Ai
1	100	25	2266	2708	1065	1	49	37	856	-	348
2	97	45	2059	2847	1046	2	56	24	724	1220	535
3	80	35	2063	-	1018	3	76	32	1408	-	740
4	67	40	2564	-	1237	4	73	39	1604	2725	1023
5	56	44	2475	4607	1767	5	87	24	2224	3057	1222
6	63	38	2538	-	979	6	83	40	2154	3259	1163
7	85	22	1763	-	765	7	78	44	2219	3296	1345
8	89	22	1599	2553	890	8	69	46	2388	3574	1332
9	90	18	1120	1888	752	9	70	38	2595	3331	1498
10	74	27	664	1138	374	10	72	16	2909	-	919
11	61	28	464	948	309	11	72	16	1430	1929	796
12	68	42	505	994	349	12	71	0	1153	1404	594
13	96	30	813	-	447	13	70	29	973	1650	599
14	96	23	907	1468	604	14	63	38	1239	2459	786
15	105	31	940	-	552	15	67	53	1520	-	647
16	105	29	1046	-	590	16	73	54	1264	2006	708
17	112	67	1537	-	763	17	74	23	1104	-	381
18	121	72	1507	2806	866	18	67	21	649	927	355
19	128	77	1714	-	857	19	58	9	1170	-	398
20	161	99	2891	-	1023	20	62	21	871	439	318
21	146	71	3065	5566	1927	21	58	44	590	891	269
22	123	34	2599	4348	1256	22	69	51	1234	1342	474
23	100	18	1905	2742	845	23	76	60	1021	-	461
24	78	15	1463	1129	573	24	82	70	1063	-	502
25	47	8	564	555	279	25	82	49	892	1424	528
26	28	0	422	525	193	26	89	46	663	-	304
27	33	10	460	-	134	27	90	66	851	1234	495
28	50	14	491	-	200	28	95	56	1268	-	409
29	43	8	1340	-	562	29	85	57	1394	-	444
30	38	8	1142	-	432	30	74	52	1057	-	383
31	42	15	963	-	380	31	65	15	822	-	325
MEAN	83.3	32.7	1479.0	2301.4	743.0	MEAN	72.7	37.7	1332.5	2009.3	654.9

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SEPTEMBER 2003						OCTOBER 2003					
2003 SEP.	Ri	Ric	Ac	Ar	Ai	2003 OCT.	Ri	Ric	Ac	Ar	Ai
1	46	22	649	-	269	1	76	21	2129	-	532
2	46	25	565	492	291	2	68	26	1885	1452	623
3	47	21	305	-	140	3	62	9	1477	1074	477
4	50	19	-	445	155	4	49	33	1322	-	427
5	39	12	835	807	364	5	50	38	-	-	255
6	37	10	315	-	165	6	41	40	831	940	469
7	30	10	88	-	66	7	41	40	752	-	265
8	25	11	100	151	45	8	43	28	858	1188	373
9	17	16	174	-	43	9	47	9	613	1043	299
10	25	26	493	713	294	10	45	14	507	692	218
11	34	31	476	877	243	11	44	14	585	-	164
12	29	10	529	523	194	12	25	10	169	-	94
13	30	9	423	505	249	13	13	9	15	-	3
14	33	12	268	-	142	14	13	10	10	-	2
15	42	9	-	129	84	15	13	11	-	-	0
16	46	28	-	161	112	16	19	9	-	150	31
17	58	14	-	727	248	17	30	12	-	-	0
18	58	13	1143	886	400	18	41	11	-	-	0
19	52	21	-	-	133	19	41	0	863	-	215
20	46	8	628	-	268	20	47	15	2236	-	1338
21	50	18	1186	-	467	21	59	21	2772	-	693
22	57	9	872	1298	570	22	58	49	2792	-	698
23	65	8	1634	1900	813	23	61	46	3944	-	986
24	64	38	1461	-	808	24	75	47	-	-	0
25	67	53	2697	2771	1203	25	88	41	6038	8423	2635
26	77	72	1917	-	742	26	89	27	4113	-	1028
27	79	74	1789	2747	1074	27	133	56	1814	-	1213
28	71	63	-	-	629	28	165	142	9037	-	2793
29	74	21	2010	-	691	29	167	126	-	-	1250
30	66	0	1788	1564	712	30	167	139	10906	-	2726
						31	160	59	9779	1187	2157
MEAN	48.7	22.8	931.0	982.1	387.1	MEAN	65.5	35.9	2727.0	1794.3	708.5

NOVEMBER 2003						DECEMBER 2003					
2003 NOV.	Ri	Ric	Ac	Ar	Ai	2003 DEC.	Ri	Ric	Ac	Ar	Ai
1	124	34	-	-	1913	1	92	8	1602	-	551
2	112	37	-	-	1709	2	72	30	1522	1391	603
3	72	11	2527	3357	1365	3	72	45	1453	1432	614
4	52	8	455	432	261	4	66	41	-	-	0
5	12	0	200	228	88	5	59	40	936	-	234
6	9	0	106	-	26	6	45	20	602	1217	413
7	12	0	-	-	0	7	32	12	439	-	217
8	21	19	41	-	14	8	26	10	-	-	0
9	39	17	284	-	104	9	16	0	211	-	110
10	39	11	455	658	202	10	25	0	242	-	60
11	30	0	-	-	0	11	25	0	-	-	0
12	11	0	174	-	43	12	25	0	-	431	91
13	21	0	-	-	0	13	28	0	539	611	266
14	23	0	677	-	169	14	31	13	629	-	248
15	33	10	482	-	120	15	30	22	560	692	229
16	42	8	693	-	173	16	39	25	492	739	294
17	34	10	-	-	0	17	68	20	491	760	227
18	52	16	1079	1414	455	18	71	16	896	814	317
19	70	15	2012	-	503	19	71	17	1086	-	271
20	90	13	2866	3633	1189	20	74	24	-	-	314
21	97	19	-	-	0	21	60	31	1228	-	524
22	83	22	3687	4951	1576	22	74	44	-	1889	653
23	109	37	3268	-	817	23	76	67	1976	-	783
24	107	72	2832	-	708	24	59	49	1361	2444	686
25	123	50	3834	4309	1497	25	44	33	1626	-	406
26	119	64	-	-	0	26	40	33	1399	-	349
27	132	62	3358	-	839	27	31	12	1282	1745	754
28	121	33	2036	-	509	28	34	13	-	-	323
29	113	40	-	2283	483	29	26	8	-	-	195
30	116	27	1215	-	419	30	17	7	433	-	154
						31	12	7	84	-	43
MEAN	67.3	21.2	1537.2	2362.8	506.1	MEAN	46.5	20.9	916.9	1180.4	320.3