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Comunicazioni astronomiche della Specola Solare Ticinese  
N° 16

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# **RELATIVE SUNSPOT NUMBERS AND SOLAR ACTIVITY 2006-2007**

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## 1. Mean and characteristic figures of solar activity

(numbers in parentheses refer to 2005 for comparison)

	2006	2007	(2005)
- Mean daily Sunspot Number (SIDC data)	15.2	7.6	(29.8)
- Lowest daily Sunspot Number (SIDC data)	0	0	(0)
- Highest Sunspot Number (SIDC data)	54	37	(107)
- Mean daily number of sunspot-groups*	1.4	0.7	(2.7)
- Total number of groups in the northern hemisphere*	18	11	(54)
- Total number of groups in the southern hemisphere*	73	33	(91)
- Mean latitude of the northern groups (cycle 23)*	+8.1	+6.3	(+10.8)
- Mean latitude of the southern groups (cycle 23)*	-9.1	-7.7	(-9.4)

\* observations at Locarno Station.

## 2. Relative Sunspot Numbers

The very simple definition of the Relative Sunspot Number R, given by Rudolf Wolf (1851 and 1858) :

$$R = k(10g + f)$$

were  $g$  is the number of observed sunspot-groups,  $f$  the total number of observed sunspots and  $k$  the reduction coefficient, contrasts with the relative complexity of their determination. The contrast is due to the precaution needed to preserve the calibration defined by Rudolf Wolf. Several criteria for the control of this calibration have been enounced by Max Waldmeier (1968, 1971).

At the level of the basic visual observation, a thorough experience is required to determine correctly the number of groups ( $g$ ), wich is not necessarily concordant with the physical grouping based on magnetic field polarities, and in wich, moreover, the limits set between A1 groups and pores may depend upon seeing quality and instrumental parameters. As to  $f$ , the weighting of large umbrae (e.g. M.Waldmeier, 1961), must be applied self consistently, even after minimum periods, in order to keep the link to the sunspot areas unchanged.

## 1. Daily Definitive Relative Sunspot Numbers for 2006 (Yearly mean 15.2)

Day	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
1	25	0	0	35	33	8	21	7	21	25	32	34
2	24	0	0	39	35	0	17	7	10	23	42	32
3	19	0	0	44	34	0	19	9	0	16	44	28
4	17	0	9	49	36	11	20	0	0	16	39	24
5	15	0	16	50	32	15	19	0	16	17	32	28
6	15	0	14	<b>54</b>	27	18	20	0	24	16	24	33
7	8	7	0	46	32	33	20	0	29	16	19	31
8	7	7	0	41	31	33	19	7	29	15	16	17
9	8	14	0	33	28	27	17	16	30	15	28	13
10	8	10	0	36	19	28	8	17	30	10	9	14
11	8	8	0	38	16	21	8	16	27	0	11	17
12	8	0	9	41	7	17	7	15	19	0	13	17
13	0	9	10	40	7	16	0	16	18	0	21	16
14	8	11	14	36	0	8	8	19	9	0	28	14
15	20	15	14	23	0	8	9	19	9	0	27	13
16	24	15	13	15	0	12	11	19	8	0	31	12
17	22	7	19	8	0	13	12	17	15	0	28	9
18	26	7	16	7	8	10	12	19	7	0	28	0
19	24	12	16	14	8	12	13	15	8	10	27	0
20	16	0	19	10	19	12	8	10	8	10	18	0
21	19	0	19	9	20	10	0	16	8	11	0	0
22	31	0	19	11	28	0	8	9	11	16	0	0
23	37	0	18	8	30	0	10	12	8	27	7	0
24	30	0	21	11	26	0	11	12	9	21	0	8
25	19	0	11	28	25	8	10	15	8	10	8	10
26	14	0	0	35	28	10	10	14	10	0	9	13
27	9	7	0	39	32	13	10	21	7	9	20	12
28	7	7	9	37	37	24	9	22	8	9	23	0
29	7	-	19	32	35	26	9	17	22	0	24	0
30	0	-	20	37	32	25	17	12	25	9	35	10
31	0	-	24	-	27	-	15	22	-	23	-	17
Mean	15.3	6.7	8.6	30.2	22.3	13.9	12.2	12.9	14.4	10.5	21.4	13.6

From January 1, 1981, the relative numbers are being calculated at the Royal Belgian Observatory and edited by the Sunspot Index Data Center, (now Solar Influences Data analysis Center, SIDC), according to a method which hardly differs from that used in Zürich, in order to preserve the homogeneity of the series.

For the years 2006 and 2007 the daily definitive data are reported in Tables 1 and 2.

## 2. Daily Definitive Relative Sunspot Numbers for 2007 (Yearly mean 7.6)

Day	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
1	22	22	7	10	20	17	19	0	14	0	0	10
2	24	22	7	0	20	25	11	0	8	0	0	9
3	25	21	7	10	12	31	9	7	8	0	0	7
4	25	17	8	0	11	34	9	7	8	0	0	9
5	28	16	17	0	10	35	9	7	8	0	0	8
6	27	15	14	0	9	33	9	8	0	11	8	16
7	26	15	0	0	8	<b>37</b>	8	8	0	9	0	15
8	30	8	0	0	9	34	10	9	0	7	0	25
9	27	7	0	0	11	12	14	9	0	0	0	26
10	24	7	0	0	12	9	17	9	0	0	0	24
11	23	0	9	0	14	9	17	8	0	0	0	24
12	16	0	8	0	13	8	15	8	0	0	0	28
13	17	0	7	0	11	8	26	8	0	0	0	30
14	11	0	0	0	18	0	27	0	0	0	0	24
15	11	0	0	0	18	0	25	0	0	0	0	22
16	11	0	0	0	17	0	20	0	0	0	10	18
17	9	8	0	7	24	0	11	0	0	0	9	11
18	10	8	0	0	25	0	9	0	0	8	0	7
19	8	20	0	0	22	0	8	0	0	7	0	0
20	18	17	0	0	14	0	0	0	0	0	0	0
21	11	10	0	0	11	8	0	9	0	0	0	0
22	12	16	0	0	9	0	0	8	0	0	0	0
23	10	15	8	0	14	0	0	8	0	0	0	0
24	11	8	8	0	9	0	0	8	0	0	10	0
25	8	8	8	8	0	7	0	8	0	0	8	0
26	7	15	9	10	0	8	0	8	0	0	7	0
27	7	15	8	11	0	8	0	8	0	0	0	0
28	8	8	8	14	0	9	9	8	9	0	0	0
29	18	-	8	20	7	18	9	8	9	0	0	0
30	20	-	7	21	7	18	9	8	9	0	0	0
31	20	-	0	-	7	-	10	17	-	0	-	0
Mean	16.9	10.6	4.8	3.7	11.7	12.3	9.7	6.0	2.4	0.9	1.7	10.1

The reduction factors (k) effective at Locarno station, resulting from the comparison with the observations of more than 70 collaborating stations of SIDC over the world, are reported at their average monthly values in table 3.

Table 3: Monthly k coefficient of the Locarno Station for 2006-2007 (SIDC values)

Month	Nr. of observation		k	
	2006	2007	2006	2007
Jan .	26	26	0.607	0.586
Feb.	23	23	0.602	0.619
Mar.	25	29	0.641	0.614
Apr.	26	29	0.638	0.602
May	27	27	0.614	0.597
June	30	28	0.601	0.607
July	30	31	0.584	0.609
Aug .	29	30	0.604	0.614
Sep .	26	27	0.612	0.608
Oct .	25	28	0.609	0.587
Nov.	22	23	0.611	0.703
Dec .	24	31	0.643	0.586
Total	313	332	Mean 0.613	0.604
Average quadratic error			± 0.018	± 0.031

Our observations are made with the Zeiss coudé-refractor (D=150 mm) on projected image . The drawing of the sunspots and the determination of the relative numbers are carried out with the projection of the solar disk of 250 mm in diameter, with the same method utilized in these last 51 years by our observation station.

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#### References

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1998, Astronomische Mitt. N°387 (Comunicaz. Specola Solare Ticinese N°11)  
2000, Astronomische Mitt. N°388 (Comunicaz. Specola Solare Ticinese N°12)  
2002, Astronomische Mitt. N°389 (Comunicaz. Specola Solare Ticinese N°13)  
2004, Astronomische Mitt. N°390 (Comunicaz. Specola Solare Ticinese N°14)  
2006, Astronomische Mitt. N°391 (Comunicaz. Specola Solare Ticinese N°15)

### Il 24° ciclo dell'attività solare (grafico SIDC)

