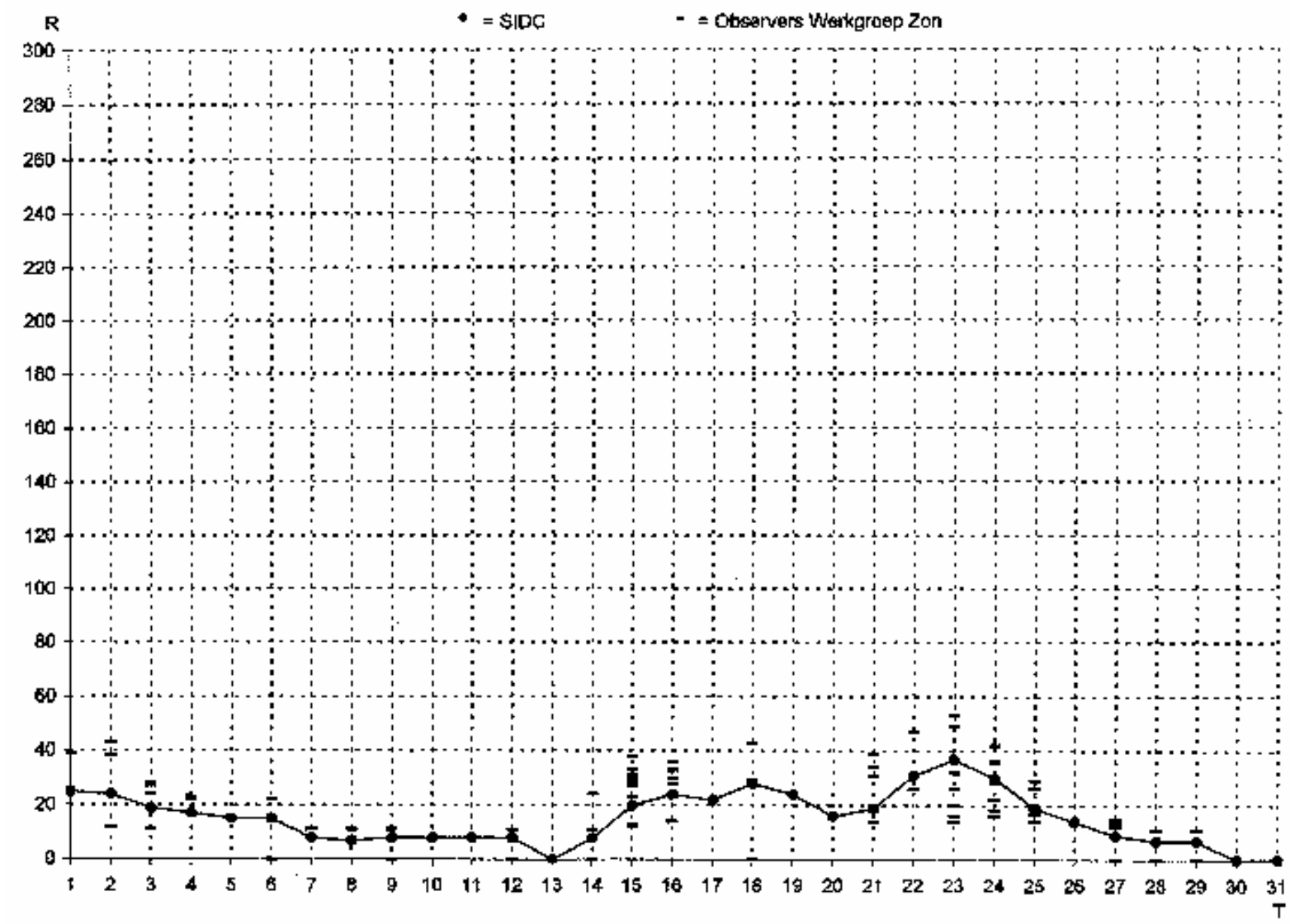
Bulletin Werkgroep Zon — Januari 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijni@planet.nl

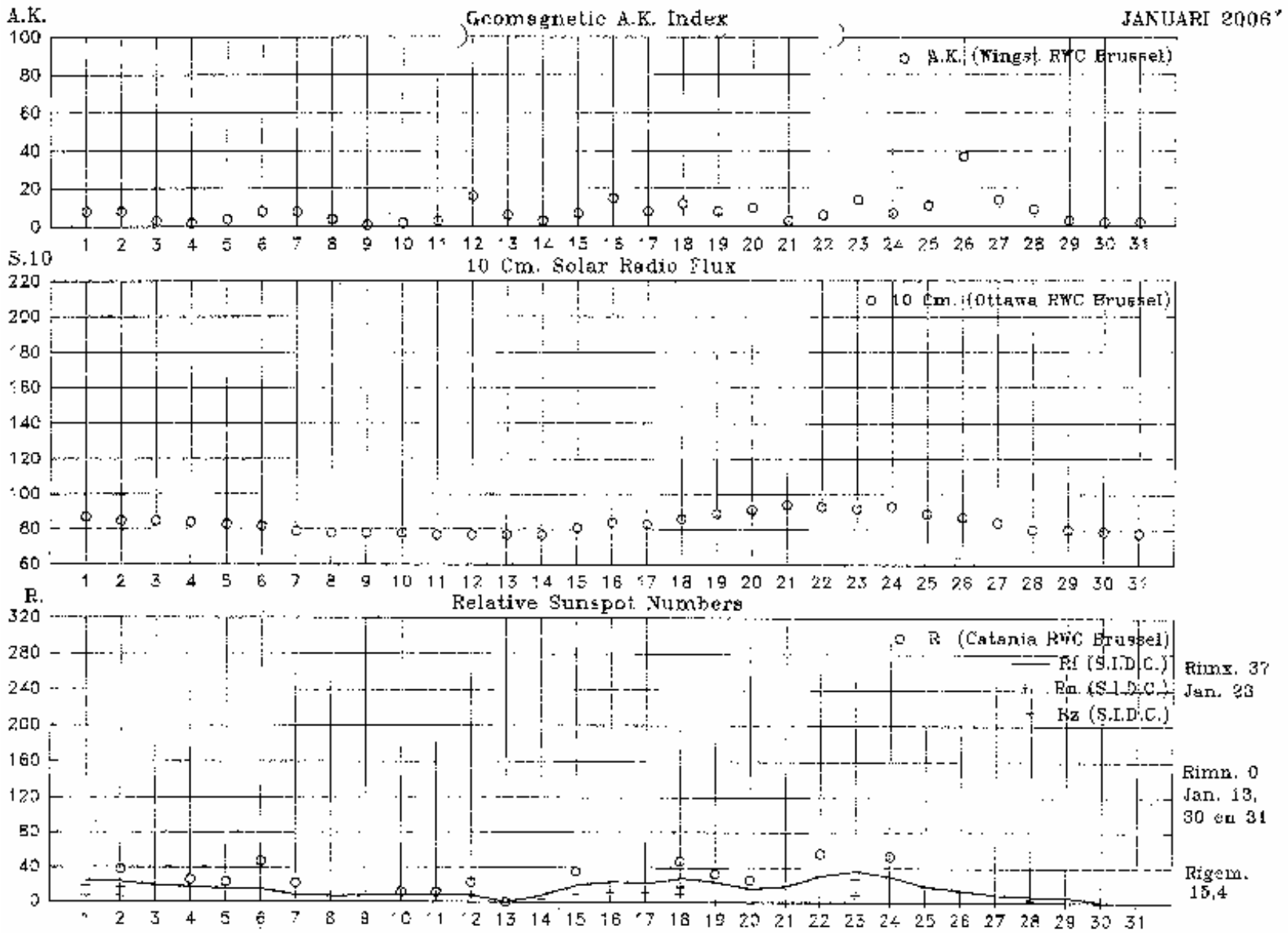
Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Gort	Gr60	Groe	Jn 9	Jn40	Kr80	vSlo	Son	Spa	Stam	Zans	Zijle
1	25									39				
2	24			43		12		12	38				24	
3	19	27	24			11				28	27		24	
4	17		23			22	22							
5	15													
6	15		0		0					0	22			
7	8	11	11							11	11			
8	7		11		11					11	11			
9	8	11	11			0				11				
10	8													
11	8													
12	8	11								0				
13	0	0	0	0		0			0				0	
14	8	11	0			0			0	0	11	0	0	24
15	20	29	13	33	26	12	23		30	30	30	27	31	36
16	24	36	14			23			36	33		28	30	
17	22													
18	28					0			43				29	
19	24													
20	16													
21	18					14		18	31	34	39	20		
22	31												26	47
23	37	49	20		16	14			53	32			26	
24	30	36				16	16	18	36	30	42	22	28	
25	18				17	14			26		29			
26	14													
27	9	14	0			0			12	14	13		15	
28	7	11	0			0			0	0	0	0	0	0
29	7	11	0	0		0			0	0	0			
30	0					0			0					
31	0	0				0			0	0				
observ		14	14	4	5	18	3	3	15	17	12	6	12	4
k		0,71	1,09	0,58	1,20	1,60	1,17	1,57	0,69	0,74	0,67	0,98	0,94	0,51
st.dev.		0,06	0,51	0,03	0,77	0,55	0,61	0,48	0,07	0,18	0,07	0,27	0,27	0,16
st.d./ k		0,09	0,47	0,06	0,65	0,35	0,52	0,30	0,10	0,24	0,11	0,28	0,28	0,32

Observers		[...] = Refractor, d = ... mm		[Rf...] = Reflector, d = ... mm	
Bals	= H.A.M. Balster [70]	Jn 9	= D. Jannink [9]	Son	= A.T. Son [Rf 150 Kutter]
Gort	= E.Gorter [90]	Jn40	= D. Jannink [40]	Spa	= T. Spaninks [75]
Gr60	= Mw G. Gravers [60]	Kr80	= K. Kroesen [80]	Stam	= R.Stammes [100]
Groe	= A.Groenewegen [102]	vSlo	= B. van Slooten [90]	Zans	= W. Zanstra [Rf 155]



Januari 2006


A.K.
Geomagnetic A.K. Index
JANUARI 2006
A.K. (Wingst RWC Brussel)
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
S.10
10 Cm. Solar Radio Flux
10 Cm. (Ottawa RWC Brussel)
220
200
180
160
140
120
100
80
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
R.
Relative Sunspot Numbers
R (Catania RWC Brussel)
Rf (S.I.D.C.)
Rn (S.I.D.C.)
Rz (S.I.D.C.)
Rimx. 37
Jan. 23
Rimn. 0
Jan. 13,
30 en 31
Rigem.
15,4
320
280
240
200
160
120
80
40
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

januari 2006

	S.I.D.C.		Balster		Janninkl4		v.Slooten		Son		Spaninks		Zanstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	18	7							39	0				
2	17	7					27	11					24	0
3	19	0	27	0					28	0	27	0	24	0
4	17	0			22	0								
5	15	0												
6	15	0							0	0	22	0		
7	8	0	11	0					11	0	11	0		
8	7	0							11	0	11	0		
9	8	0	11	0					11	0				
10	8	0												
11	8	0												
12	8	0	11	0					0	0				
13	0	0	0	0			0	0					0	0
14	4	4	0	11			0	0	0	0	0	11	0	0
15	10	10	15	14	22	11	15	15	30	0	15	15	16	15
16	12	12	17	19			16	20	33	0			16	14
17	11	11												
18	10	18					13	30					14	15
19	0	24												
20	0	16												
21	0	19					0	31	0	34	0	39		
22	0	31											0	26
23	9	28	13	36			14	39	0	32			0	26
24	0	30	0	36	0	16	0	36	0	30	0	42	0	28
25	0	19					0	26			0	29		
26	0	14												
27	0	9	0	14			0	12	0	14	0	13	0	15
28	4	3	0	11			0	0	0	0	0	0	0	0
29	0	7	0	11			0	0	0	0	0	0		
30	0	0					0	0						
31	0	0	0	0			0	0	0	0				

Eerstvolgende bijeenkomst van de Werkgroep Zon op 17 juni, Sonnenborgh, Utrecht .

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.eracnet.org onder observations

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
30	30	20	-	95	919	0	1/0	14	
1	49	66	-	98	923	1	0/0	19	
2	54	140	-	106	922	10	3/0	17	
3	60	136	-	101	918	12	0/0	18	
4	55	124	-	95	920	11	0/0	8	
5	55	82	-	92	922	0	0/0	2	
6	45	48	-	89	924	0	0/0	3	
7	23	20	-	89	922	1	0/0	0	
8	25	16	-	90	925	0	0/0	2	
9	23	13	-	89	927	0	0/0	6	
10	39	20	-	91	929	0	0/0	16	
11	38	31	-	93	922	0	0/0	24	
12	33	37	-	88	920	0	0/0	16	
13	38	56	-	88	918	0	0/0	6	
14	38	49	-	90	912	0	0/0	3	
15	36	68	-	87	909	0	0/0	2	
16	31	47	-	86	916	0	0/0	8	
17	26	46	-	85	916	0	0/0	4	
18	28	33	-	86	916	0	0/0	4	
19	43	71	-	90	920	0	0/0	14	
20	39	64	-	88	917	0	0/0	19	
21	42	37	-	87	918	0	0/0	12	
22	41	28	-	88	917	0	0/0	5	
23	36	46	-	93	919	0	0/0	6	
24	53	38	-	92	////	0	0/0	6	
25	43	29	-	92	921	2	0/0	6	
26	52	41	-	93	926	0	0/0	9	
27	51	48	-	92	925	0	0/0	26	
28	48	49	-	89	919	1	0/0	20	
29	45	58	-	90	920	0	0/0	16	
30	46	47	-	90	918	0	0/0	11	
31	41	47	-	87	853	0	0/0	14	

R'_i : provisional international sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10-5 w/m^2 : the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10.7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UCOSE Terre Adélie).

SFI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams – UGEOR, evaluation : 1 x Sn+10 x "1"+100 x ">1".

XI : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams – UGEOR, UGEOI).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

SEA : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

January 2006 was a noticeable-event-less month. From Jan 06 until Jan 14, solar activity was quasi-absent. The background X-ray radiation was even below the A-level from Jan 09 until Jan 14. We had three 'spotless' days when the provisional International Sunspot Number (ISN) was zero.

From the first day of the month, the background X-ray radiation decreased steadily until Jan 15. In that period only two C-flares occurred: one on Jan 01 (Catania group 86, NOAA AR 0838 near the west limb) and an impulsive C4.4 peak during a long duration B8.6 flare from Catania groups 89/90 (NOAA AR 0841/0843) around 60/80° west on Jan 05. A bright but narrow CME with no earthward component was observed with the latter event.

From Jan 06 until Jan 14, all activity was situated on the micro-flare level. An SIDC *all-quiet-alert* was declared from Jan 08 until Jan 13. The provisional ISN was zero on Jan 13. The other days of that period, the provisional ISN never exceeded 10.

From Jan 15, activity rose slightly, but not dramatically. Several sunspot groups emerged and grew rapidly: Catania sunspot groups 97, 98 and 99 (NOAA AR 0846, 0847 and 0848 respectively). Despite of their growth, group 97 and 98 did not produce any flaring activity stronger than the B-level. From Jan 18, they slowly decayed. That day, group 99 popped up at 45° east, grew fast and even had a βγδ-configuration of the photospheric magnetic field. It finally produced a series of 5 C-flares on Jan 22, one on Jan 23 and a last on Jan 24. The group was past its peak from that moment, producing flares in the B-category until Jan 28, its last day of presence on the solar disk.

Two coronal holes were visible in SOHO/EIT this month: a small trans-equatorial coronal hole, passing the central meridian on Jan 13 and a recurrent equatorial coronal hole with a tail in the south, passing the central meridian on Jan 21.

II. Geomagnetic Activity

CMEs did not play any role this month. The registered disturbances originated from the solar wind emerging from the coronal holes mentioned above. The most active period was the last week of the month, with minor storm conditions.

On Jan 16, the Earth entered an interaction region between a slow and a fast solar wind flow. The source of the fast flow was probably the small equatorial coronal hole passing the central meridian on Jan 13 and at that moment situated in the Western hemisphere. The IMF north-south component Bz was fluctuating, resulting in active geomagnetic conditions (Kp = 4 reported by NOAA late on Jan 16). On Jan 16-17, the actual fast solar wind speed of 450 km/s emanating from the coronal hole was measured at the L1 point by ACE. Although the 'fast' solar wind was not really fast (only 450 km/s), other characteristic features of a fast stream were present. Once the first ACE-signatures of the coronal hole passed, the IMF strength decreased down to 6nT leading to quiet geomagnetic conditions. On Jan 18, a second increase in the solar wind speed was seen: the speed went up to 550 km/s. However, the magnetic field magnitude and the density did not change. So, the quiet conditions persisted.

The signature of the second coronal hole in ACE data was seen late on Jan 22 when the total IMF and the density of the solar wind increased. The solar wind increased on Jan 23 from 350 km/s to 600 km/s. The IMF north-south component Bz went down to -10nT for a short period only. Geomagnetic conditions became active. A second disturbance related to this coronal hole, arrived on Jan 25: solar wind speed went from 400 km/s to 700 km/s. Bz was now for a longer period negative and gave rise to minor storm conditions. NOAA/Boulder estimated a Kp of 5/6.

III. Noticeable solar events

No M- or X-class flare occurred

IV. Halo CME list

No halo CMEs were reported

Kort verslag van de werkgroep bijeenkomst van 18 februari te Leiden.

De Werkgroep Zon was te gast bij de Leidse Sterrenwacht en de bijeenkomst vond plaats in de collegezaal.

13 personen waren aanwezig, waaronder twee gasten van de afdeling 't Gooi. 6 leden hadden afbericht.

Voorzitter **Ton Spaninks** opende de jaarvergadering. Na het vaststellen van de agenda (geen opmerkingen) en het doornemen van ingekomen stukken (geen), werd voorgesteld om het jaarverslag van de secretaris, plotseling verhinderd, naar de volgende bijeenkomst te verschuiven. De aanwezigen gingen hiermee akkoord.

De penningmeester, **Nico Heijblok**, hield zijn jaarverslag met het financiële overzicht van 2005 en de begroting van 2006.

De kascontrolecommissie, bestaande uit **Gerrit Nauta** en **Maarten Jansweijer**, verklaarden dat de boeken in orde bevonden waren, waarna decharge werd verleend aan de penningmeester.

Nieuwe leden voor de kascontrolecommissie werden gekozen: **Bob van Slooten** en **Gerrit Nauta.**

Het bestaande Bestuur, **Ton Spaninks** als voorzitter, **Kees Pauw** als secretaris en **Nico Heijblok** als penningmeester werden herkozen voor het komende jaar.

Als afgevaardigden voor de verenigingsraad van de KNVWS op 10 juni 2006 hebben **Nico Heijblok** en **Benno Houweling** zich aangemeld.

Data voor de volgende bijeenkomsten van de Werkgroep Zon werden vastgesteld:
17 juni, Sonnenborgh te Utrecht en 28 oktober, Schothorst te Amersfoort.

Bij de rondvraag kwamen geen aanvullende opmerkingen naar voren.

Gerrit Nauta hield een korte bespreking over de komende zonsverduistering op 29 maart. Hij lichtte zijn plannen toe betreffende het waarnemen te Side. **Gerda Gravers** en **Benno Houweling** gaven verdere informatie. Naar Turkije gaan: **Gerda Gravers, Gerrit Nauta, Ton Spaninks, Bob van Slooten** en **Harry Rutten**, terwijl **Maarten Jansweijer** naar Libië gaat.

Tussen de middag hebben we kunnen genieten van een geweldige rondleiding door Museum Boerhave. De leden hebben met volle teugen genoten en waren nauwelijks weg te slepen. De rondleidster hield een boeiend verhaal en mede door de vele reacties werd ze uitgenodigd om wat verder in te gaan op de diverse onderwerpen. Ook **Louw Pals** wist veel te vertellen over de diverse instrumenten en apparatuur. Uit de reacties bleek dat velen van plan zijn om nog eens terug te gaan.

's Middags werden de waarnemingen van de afgelopen maanden doorgenomen.

Nico Heijblok besprak de overzichten voor wat betreft Solar Radio Flux, zonnevlekkengetal en geomagnetische index van de maanden oktober, november, december, januari en een stukje februari.
Verder kwam hij nog even terug op de partiele eclips van 3 oktober met diagrammen van radiofluxen, waarbij duidelijk zichtbaar was dat er ook op radiogolflengten (1425 MHz en 407 MHZ) sprake was van een verduistering.

Ton Spaninks besprak specifieke waarnemingen op bijzondere dagen aan de hand van door leden ingezonden materiaal:

16 november, foto Zon van **Bob van Slooten** met detailfoto
17 november, overzichtsfoto van Bob
18 november, tekening **Gerda Gravers**. De aanwezigen roemden Gerda om haar uitstekende tekenkwaliteit.
18 november, foto's Bob, totaal en detail
19 november, tekening Gerda
19 november, foto's Bob
1 december, foto's Bob
11 december, tekening Gerda
11 december, tekening Gerda
11 december, magnetogram **Ton Spaninks**
19 december, magnetogram Ton
25 december, foto Ton met protuberans
31 december, **Rob Stammes** met magnetogrammen
31 december en 1 januari, magnetogrammen van **Rob Stammes** (Lofoten), **Nico Heijblok** Den Helder) en **Ton Spaninks** (Tilburg) werden vergeleken.
31 december, foto noorderlicht van **Rob Stammes** op de Lofoten
21 januari, foto **Bob van Slooten** met nieuwe lenskijker (f1200), met details
23 januari, foto Bob
27 januari, foto **Ton Spaninks** (zon totaal)
15 februari, foto protuberans van **Klaas Kroesen**
Tenslotte overzichtsgrafieken van de 23e cyclus van **Klaas Kroesen** en **Nico Heijblok**.

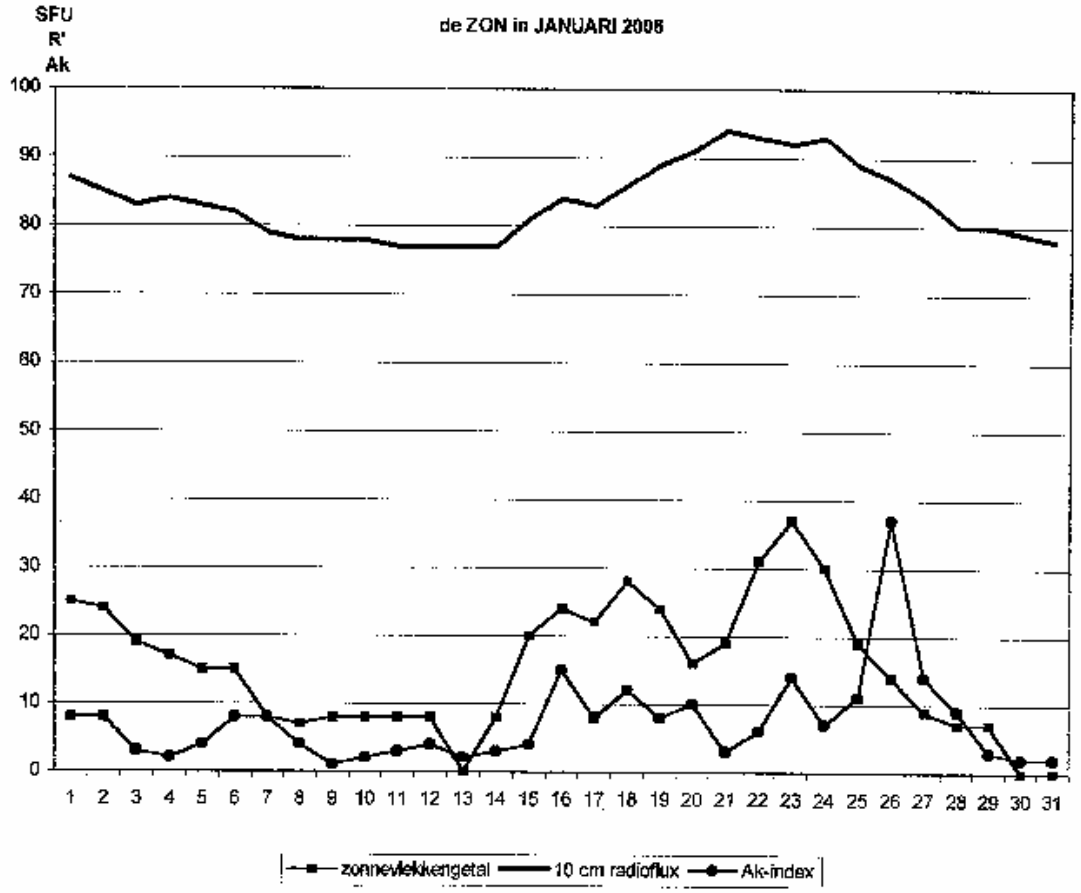
Later op de middag werden we door leden van de Leidse Sterrenwacht rondgeleid door het gebouw en de koepels.
Gedemonstreerd werden de 10-duims telescoop in de koepel, de fotografische kijker (Gauthier-Henry lenzenkijker uit 1897, diam 33 cm, f=524) en de spiegeltelescoop uit 1947, de zg Zunderman reflector van 45 cm diameter en f=5000mm.

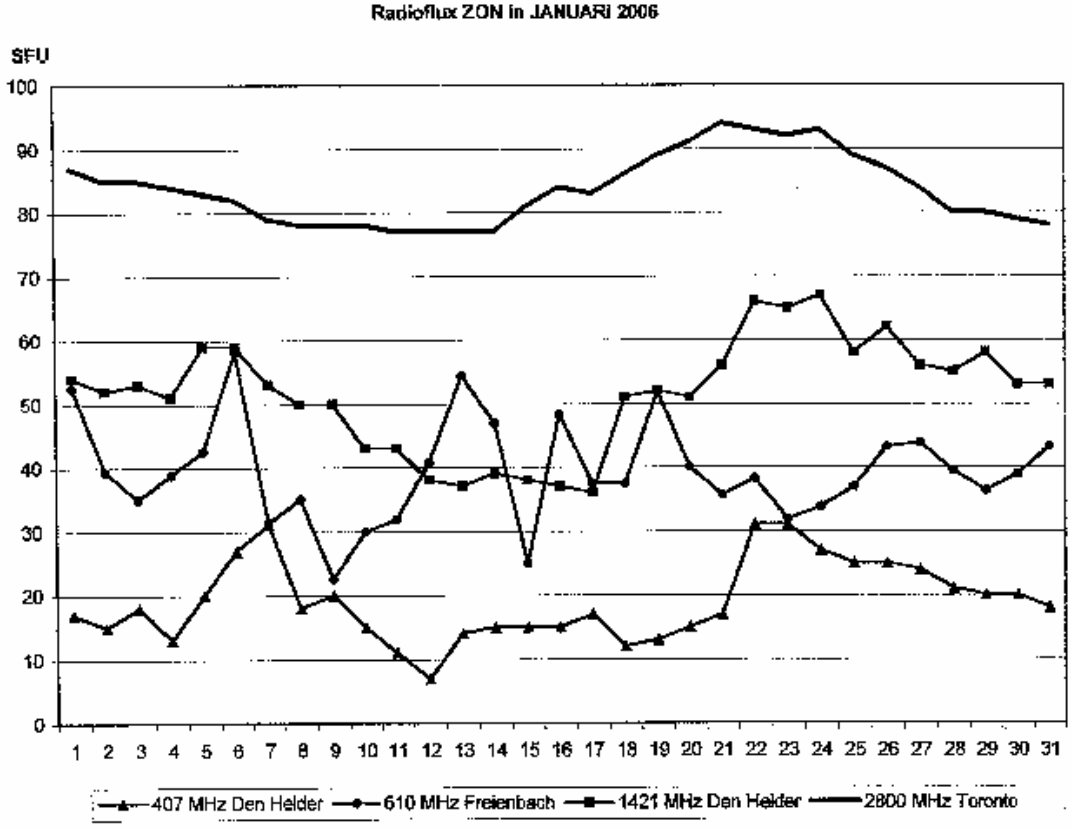
Het was boeiend om de geschiedenissen van deze kijkers te vernemen. De beide wereldoorlogen hebben een grote rol gespeeld in de al dan niet succesvolle levensloop van deze fraaie instrumenten. De Zunderman-reflector wordt nog veel gebruikt.

We kunnen terugzien op een interessante en gezellige dag, die door enkele leden en een tweetal uitgenodigde gasten later in een restaurant in Leiden werd voortgezet.

- 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -

Op de eerstvolgende bijeenkomst in Utrecht zal **Theo Dukers** zijn eerder opgeschoven lezing over het waarnemen van SID's houden.


SFU
R'
Ak
de ZON in JANUARI 2006
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in JANUARI 2006
SFU
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
407 MHz Den Helder
610 MHz Freienbach
1421 MHz Den Helder
2800 MHz Toronto

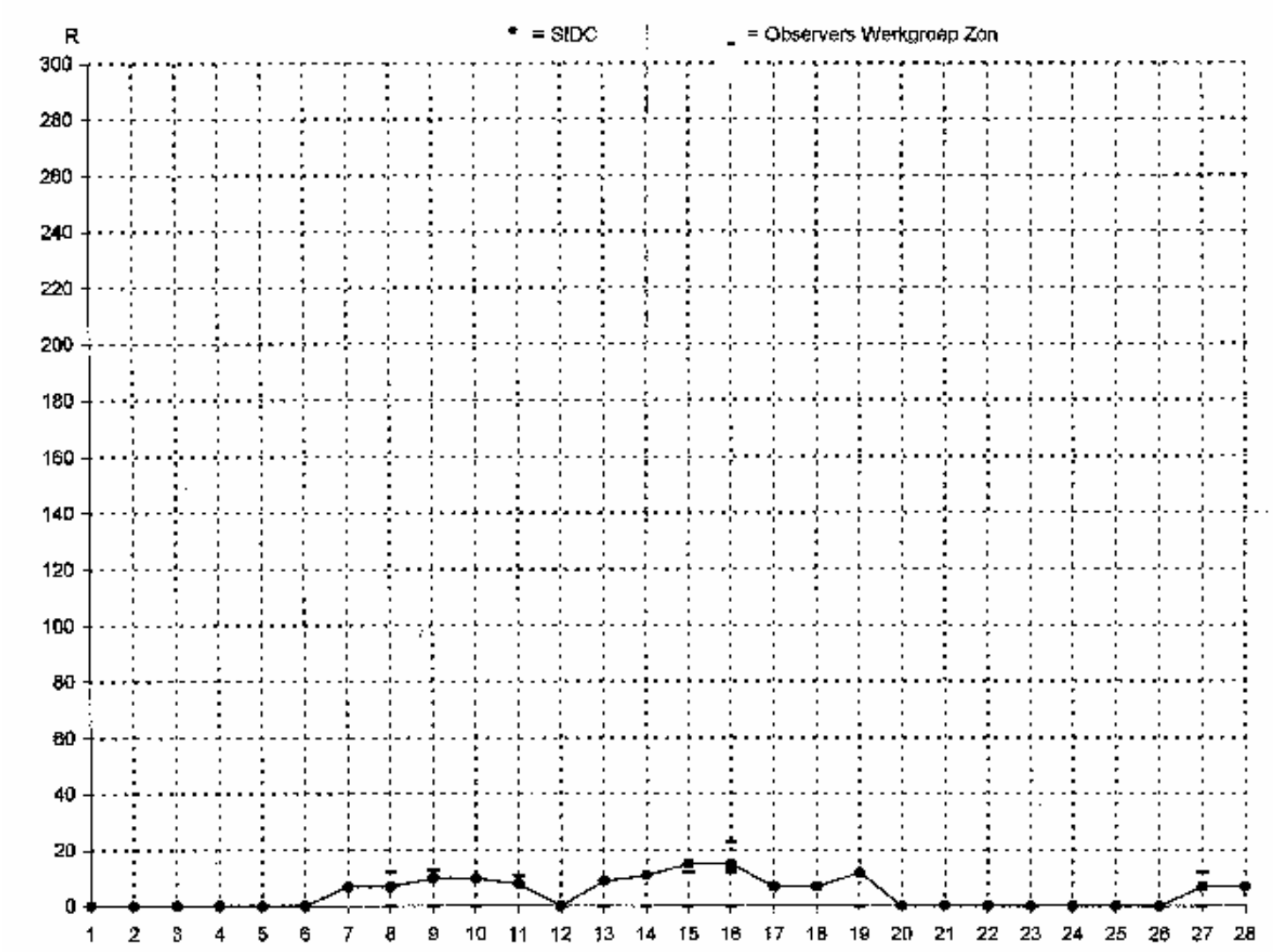
Bulletin Werkgroep Zon — Februari 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijbl@planet.nl

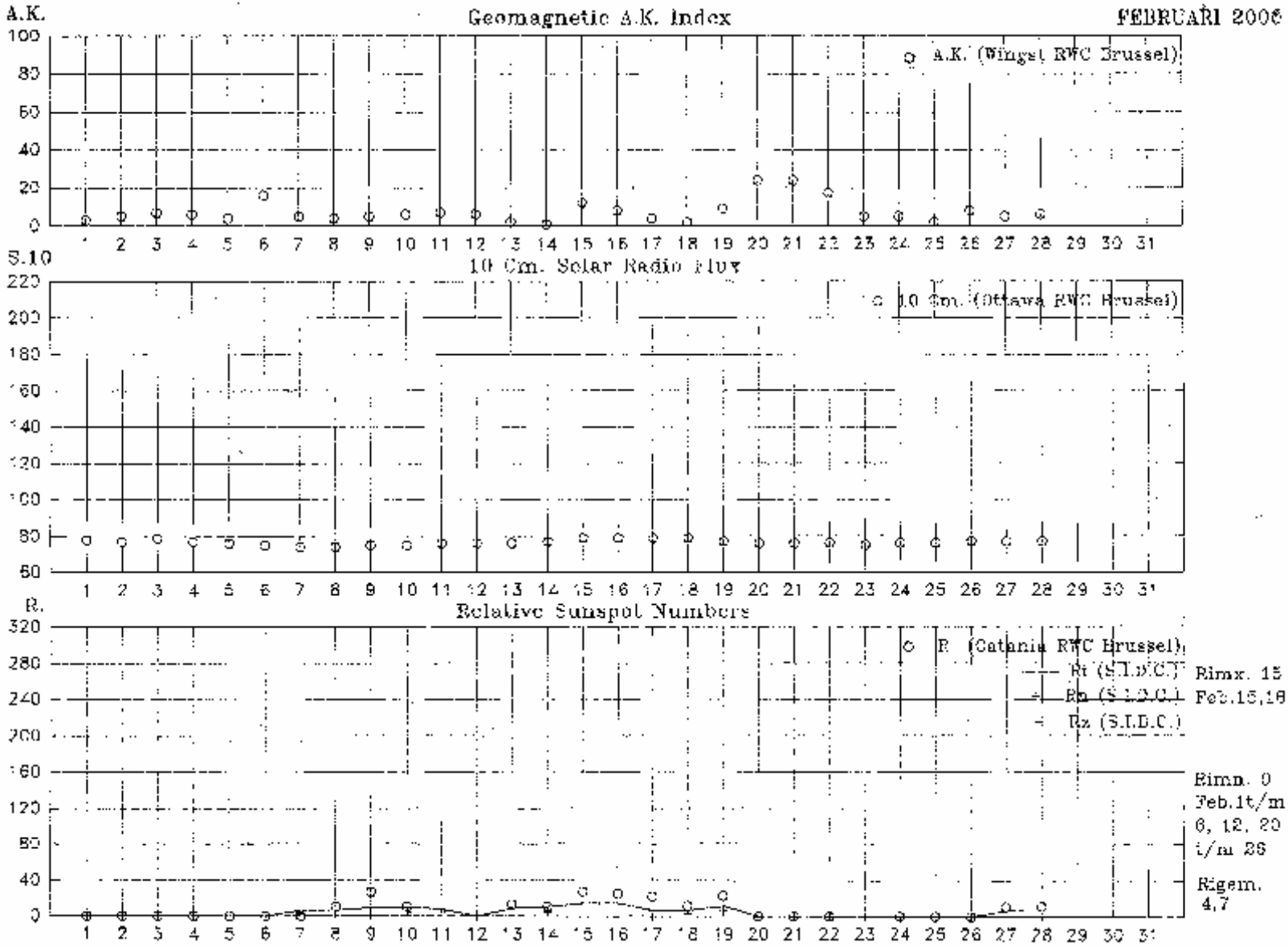
Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Gort	Gr60	Groe	Jn 9	vSlo	Son	Spa	Stam	Zans
1	0					0					
2	0										
3	0										0
4	0	0			0						
5	0										
6	0										
7	7										
8	7	0	0		0	0	12		12		
9	10	13	0			0	13	13			13
10	10				0						
11	8								11		
12	0										
13	9										0
14	11					0	11			0	
15	15				12	0				0	
16	15				12	0	23			13	
17	7										
18	7										
19	12	0				0	0				
20	0										
21	0										
22	0										
23	0	0	0		0	0	0				
24	0	0	0	0		0	0	0	0	0	0
25	0	0		0		0	0		0		
26	0	0	0	0		0	0		0	0	0
27	7					0	12			0	0
28	7										
observ	28	8	5	3	6	12	10	2	5	6	6
k	1,00	0,77	–	–	1,25	–	0.72	0,77	0,66	1,15	0,77
st.dev.	0,00	–	–	–	0,00	–	0.18	–	0,10	–	–
st.d./ k	0.00	–	–	–	0,00	–	0,24	–	0,16	–	–

Observers	[...] = Refractor, d = ... mm	[Rf...] = Reflector, d = ... mm
Bals = H.A.M. Balster [70]	Jn 9 = D. Jannink [9]	Spa = T. Spanjaks [75]
Gort = E.Gorter [90]	vSlo = B. van Slooten [90]	Stam = R.Stammes [100]
Gr60 = MW G. Gravers [60]	Son = A.T. Son [Rf 150 Kutter]	Zans = W. Zanstra [Rf 155]
Groe = A.Groenewegen [102]		



februari 2006


A.K.
Geomagnetic A.K. Index
FEBRUARI 2006
A.K. (Wingst RWC Brussel)
S.10
10 Cm. Solar Radio Flux
10 Cm. (Ottawa RWC Brussel)
R.
Relative Sunspot Numbers
R (Catania RWC Brussel)
Ri (S.I.D.C.)
Rb (S.I.D.C.)
Rz (S.I.D.C.)
Rimax. 15
Feb.15,16
Rimin. 0
Feb.1t/m
6, 12, 20
t/m 28
Rigem.
4,7

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

februari 2006

	S.I.D.C.		Balster		v.Slooten		Son		Spaninks		Zanstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	0	0										
2	0	0										
3	0	0									0	0
4	0	0	0	0								
5	0	0										
6	0	0										
7	4	3										
8	0	7	0	0	0	12			0	12		
9	0	10	0	13	0	13	13	0			0	13
10	5	5										
11	4	4							0	11		
12	0	0										
13	0	9									0	0
14	6	5			11	0						
15	0	15										
16	0	15			11	12						
17	0	7										
18	4	3										
19	6	6	0	0	0	0						
20	0	0										
21	0	0										
22	0	0										
23	0	0	0	0	0	0						
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0			0	0		
26	0	0	0	0	0	0			0	0	0	0
27	0	7			0	12					0	0
28	0	7										

In het januarinummer van het Bulletin staat een verkeerde datum vermeld voor de volgende bijeenkomst. De juiste tekst luidt:

Eerstvolgende bijeenkomst van de Werkgroep Zon op 17 juni, Sonnenborgh, Utrecht

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.eracnet.org onder observations

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	0	0	-	///	////	///	///	(//)	
1	0	0		78	946	0	0/0	3	
2	0	0	-	77	///	0	0/0	5	
3	0	0	-	79	949	0	0/0	7	
4	0	0	-	77	///	0	0/0	6	
5	0	0	-	76	///	0	0/0	4	
6	0	0	-	75	944	0	0/0	6	
7	7	2	-	74	011	0	0/0	5	
8	7	2	-	74	///	0	0/0	4	
9	10	4	-	75	950	0	0/0	5	
10	10	2	-	75	946	0	0/0	6	
11	8	0	-	76	945	0	0/0	7	
12	0	0	-	76	945	0	0/0	6	
13	9	1	-	76	945	0	0/0	2	
14	11	1	-	77	948	0	0/0	1	
15	15	5	-	79	952	0	0/0	12	
16	15	6	-	79	950	0	0/0	8	
17	7	3	-	79	///	0	0/0	4	
18	7	3	-	79	///	0	0/0	2	
19	12	4	-	77	///	0	0/0	9	
20	0	0	-	76	///	0	0/0	4	
21	0	0	-	76	///	0	0/0	4	
22	0	0	-	76	///	0	0/0	7	
23	0	0	-	75	///	0	0/0	5	
24	0	0	-	76	///	0	0/0	5	
25	0	0	-	76	///	0	0/0	2	
26	0	0	-	77	///	0	0/0	8	
27	7	0	-	77	///	0	0/0	5	
28	7	1	-	77	///	0	0/0	6	

R'_i : provisional international sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10-5 w/m^2 : the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10.7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UCOSE Terre Adélie).

SFI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams – UGEOR, evaluation : 1 x Sn+10 x "1"+100 x ">1".

XI : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams – UGEOR, UGEOI).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

SEA : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

February 2006 was definitely a quiet month with no breaking news.

First, we report all signs indicating the absence of activity on the Sun. There were 14 spotless days (Provisional Daily International Sunspot Number equal to zero), only 3 days that there was no SIDC all-quiet-alert active, only 5 B-flares occurred, on 21 days the background X-ray radiation was below the A-level, the 10cm flux did not vary much and stayed between 74 and 79 sfu.

The little bit of activity worth mentioning is quickly described. On Feb 03, a prominence erupted from the east limb around 07:30UT. The associated CME was captured by LASCO with a speed around 300 km/s. On Feb 10, CACTus detected a halo CME around 23:30UT. It was identified as a backsided event and considered as a hint for a possible increase of solar activity once the source region would rotate on the solar disk. On Feb 13, Catania observatory identified one tiny sunspot group, numbered Catania 04, which disappeared again the next day. On Feb 14, sunspot group 05 was identified, to which group 06 was added the next day. On Feb 15, the background X-ray radiation did indeed increase up to the A-level for three days. No events from those groups were seen. The third noteworthy event started on Feb 25 as the background X-ray radiation was pushed up. This was caused by a new group at that moment still behind the east limb. On Feb 27, the new group became visible and was numbered Catania 09 (NOAA 0856). This group produced some B-flares.

The last things to mention are the coronal holes present this month. On Feb 08, a first small coronal hole in the north passed the central meridian. On Feb 12, a second, small, southern coronal hole passed, and a third small coronal hole on Feb 18. The latter one was located near the equator.

II. Geomagnetic Activity

All 4 interruptions of the SIDC all-quiet-alert were caused by an induced geomagnetic disturbance. Three of them originated from the coronal holes mentioned above.

1. On Feb 06, active conditions occurred associated with a southward rotation of the interplanetary magnetic field during several hours on that day. This event may be linked to the prominence eruption of Feb 03.
2. On Feb 10, the solar wind speed started to increase to a maximum near 500 km/s on Feb 12. However, the geomagnetic consequences of this first coronal hole remained limited to unsettled conditions.
3. The third disturbance, linked to the second coronal hole mentioned above, led to active conditions late on Feb 15.
4. The last interruption of the all-quiet-alert was caused by the coronal hole passing the central meridian on Feb 18. The hole became geo-effective on Feb 20 and caused active/minor storm conditions. The influence finished early Feb 22.

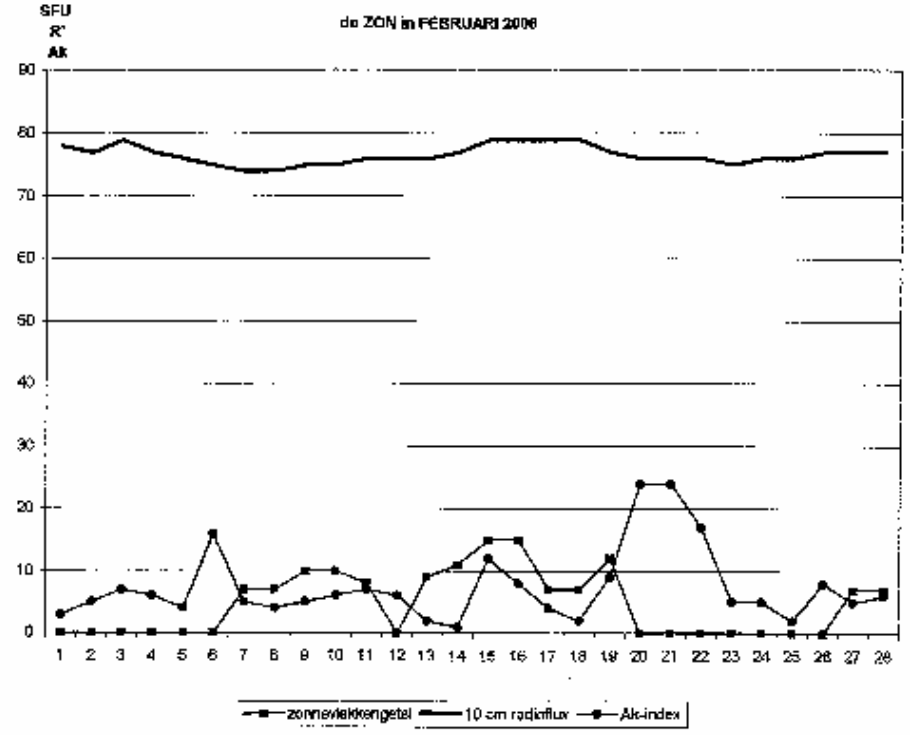
III. Noticeable solar events

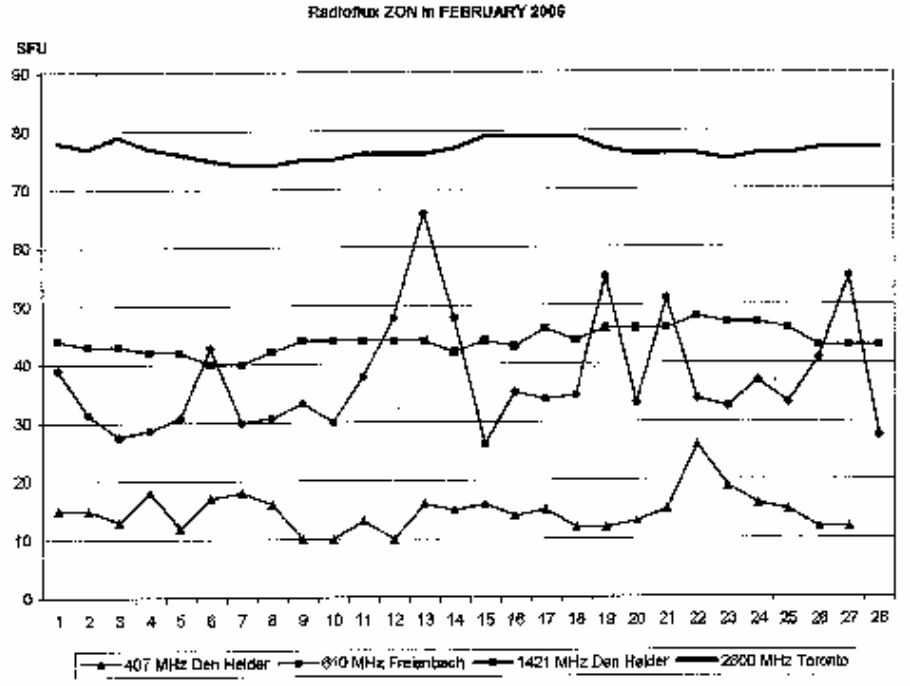
No M- or X-class flare occurred

IV. Halo CME list

onset time	e-mail time CACTus	da	e-mail time LASCO	e-mail time FF	Ass. Events	consequences
[illegible]	02/11 02:52	[illegible]	02/13 14:00	-	backsided	None

Onset time: Utime first visible in C2 field of view
CACTus: Computer Aided CME Tracking (software developed by the SIDC)
LASCO: SOHO-LASCO Operations, G. Stenburg
FF: Fearless Forecast (a NOAA trial service)
e-mail time CACTus/LASCO/FF: Utime alert e-mail sent by group
da: angular width of CME, measured by CACTus
Ass. Events: Associated Events, Long Duration Event, flare class


SFU
R'
Ak
de ZON in FEBRUARI 2006
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in FEBRUARY 2006
SFU
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
407 MHz Den Helder
610 MHz Freienbach
1421 MHz Den Helder
2800 MHz Toronto

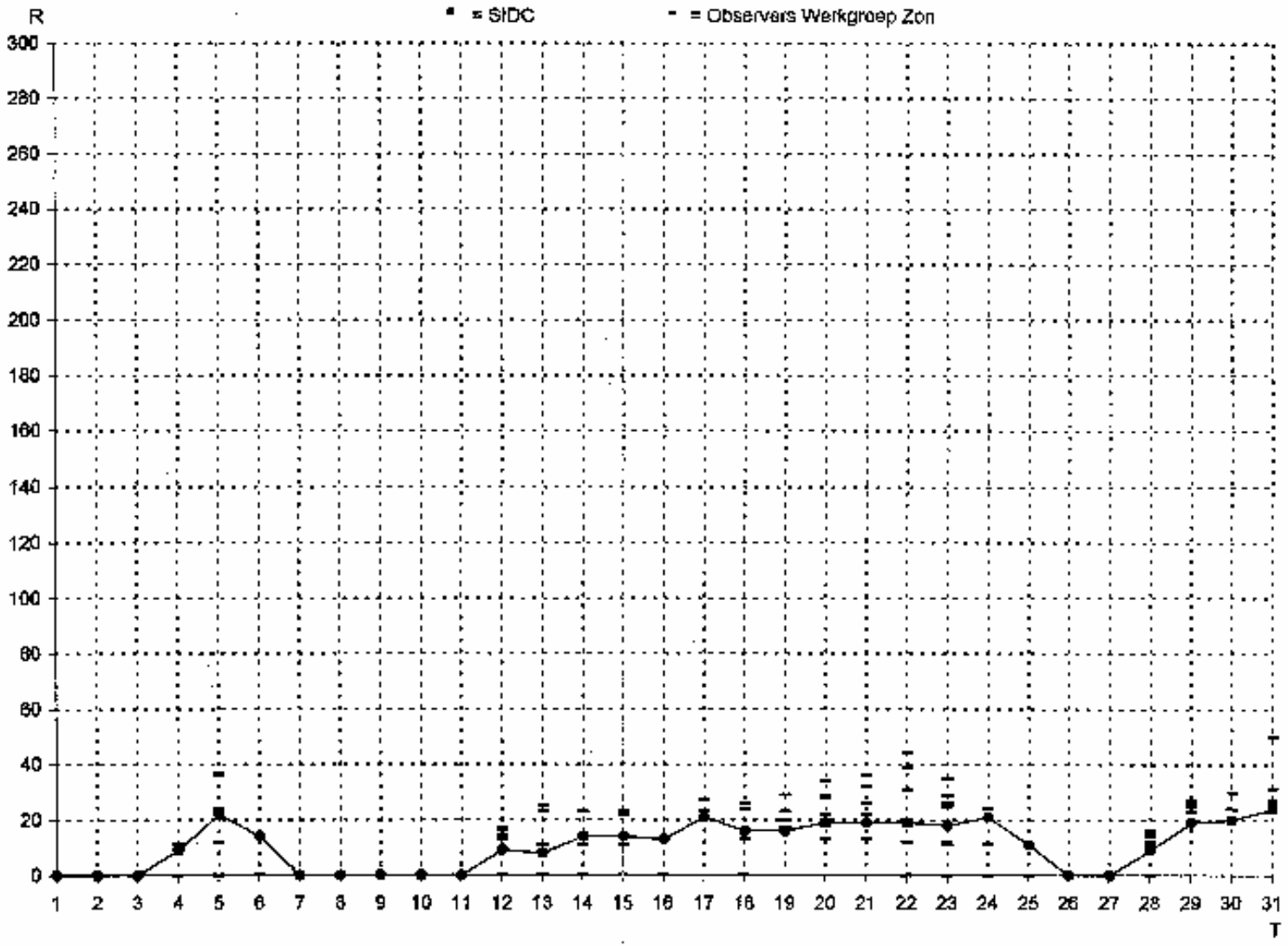
Bulletin Werkgroep Zon — Maart 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijpi@planet.nl

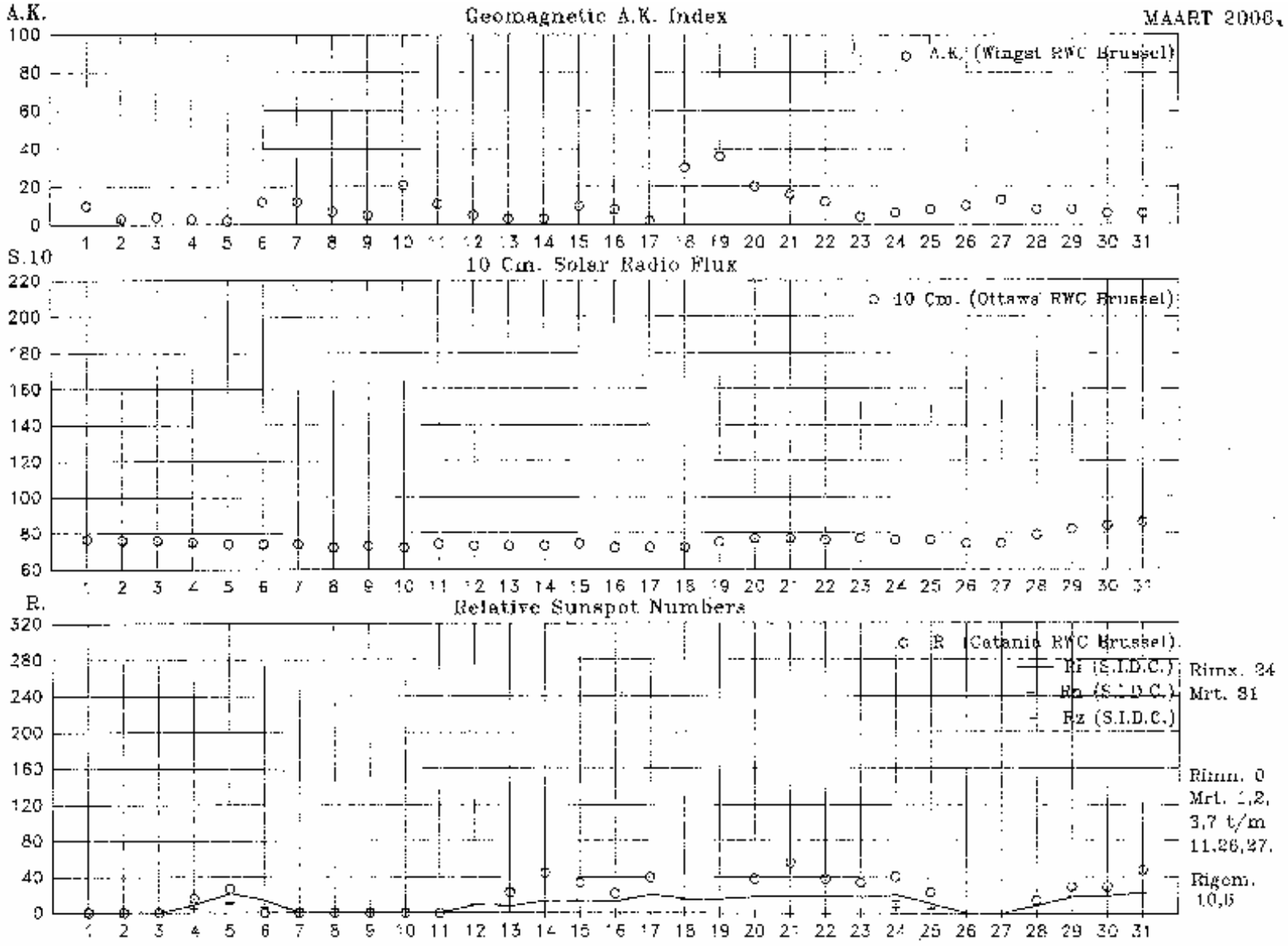
Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Gort	Gr60	Groe	Jn 8	Jn40	Kr60	vSlo	Son	Spa	Stam	Zans	Zijle
1	0		0			0			0	0	0			
2	0	0	0			0			0	0	0	0	0	
3	0					0			0			0	0	
4	9	11	0	0		0			11	0	0		0	
5	22	23	0			0			36	12	37		0	24
6	14		0			0			0	0			0	
7	0	0	0			0			0		0		0	
8	0													
9	0													
10	0								0			0		
11	0	0	0		0	0			0		0		0	
12	9	13	13	14		0			16	17	14	0	0	16
13	8	11	11		0	0			11	25	23		0	
14	14	23	0			0			11	11	23		0	
15	14	11	0			0			22	23	22		11	
16	13					0								
17	21								23	27				
18	16	24	13			0			26					
19	16	29	17							23	20			
20	19	28	16		18	13		29	20		34		22	
21	18	32				13	13		36	22	32		26	
22	19		18			12			39	44	31	0	20	
23	16	35	12		0	0			26	25	29	0	11	
24	21	24				0			11				0	
25	11	0				0								0
26	0	0	0			0							0	0
27	0	0	0			0							0	
28	9	14	11			0				12			15	16
29	19	26	25			23	23	23			27		27	
30	20					24							30	
31	24		27			23		31					28	50
observ		20	21	2	4	26	2	3	20	15	16	6	22	6
k		0,74	0,97	0,64	1,06	1,20	1,14	0,75	0,82	0,80	0,61	–	0,93	0,63
st.dev.		0,20	0,25	–	–	0,34	0,45	0,09	0,39	0,42	0,11	–	0,33	0,19
st.d./ k		0,27	0,26	–	–	0,28	0,39	0,12	0,47	0,53	0,18	–	0,36	0,31

Observers	[...] = Refractor, d = ... mm	[Rf...] = Reflector, d = ... mm
Bals = H.A.M. Balster [70]	Jn 8 = D. Jannink [8]	Son = A.T. Son [Rf 150 Kutter]
Gort = E.Gorter [90]	Jn40 = D. Jannink [40]	Spa = T. Spanjnks [75]
Gr60 = Mw G. Gravers [60]	Kr60 = K. Kroesen [60]	Stam = R.Stammes [100]
Groe = A.Groenewegen [102]	vSlo = B. van Slooten [90]	Zans = W. Zanstra [Rf 155]
		Zijle = W.A. Zijlema [90]


R
* = SIDC
- = Observers Werkgroep Zon
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
T

maart 2006


A.K.
Geomagnetic A.K. Index
MAART 2006
A.K. (Wingst RWC Brussel)
S.10
10 Cm. Solar Radio Flux
10 Cm. (Ottawa RWC Brussel)
R.
Relative Sunspot Numbers
R (Catania RWC Brussel)
Rz (S.I.D.C.)
Rimx. 34
Mrt. 81
Rimn. 0
Mrt. 1,2,
3,7 t/m
11,26,27.
Rigem.
1.0,5

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

maart 2006

	S.I.D.C.		Balster		Janninkh		v.Sloote		Son		Spanicke		Zenstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	0	0					0	0	0	0	0	0		
2	0	0	0	0			0	0	0	0	0	0	0	0
3	0	0					0	0					0	0
4	5	4	0	11			0	11	0	0	0	0	0	0
5	10	12	12	11			12	24	12	0	26	12	0	0
6	7	7					0	0	0	0			0	0
7	0	0	0	0			0	0			0	0	0	0
8	0	0												
9	0	0												
10	0	0					0	0						
11	0	0	0	0			0	0			0	0	0	0
12	9	0	13	0			16	0	17	0	14	0	0	0
13	8	0	11	0			11	0	14	11	12	11	0	0
14	0	14	0	23			0	11	11	0	0	25	0	0
15	0	14	0	11			0	22	12	11	0	22	11	0
16	0	13												
17	0	21					0	23	15	12				
18	0	16	0	24			0	26						
19	0	16	0	29					23	0	0	20		
20	0	19	0	28			0	20			0	34	0	22
21	0	19	0	32	0	13	11	25	22	0	0	32	0	26
22	0	18					13	28	32	12	0	31	0	20
23	0	16	12	23			11	15	14	11	12	17	0	11
24	7	14	0	24			0	11					0	0
25	6	5	0	0										
26	0	0	0	0									0	0
27	0	0	0	0									0	0
28	0	9	0	14					12	0			0	15
29	0	19	0	28	0	23							0	27
30	0	20											0	30
31	0	24											0	26

Harry Balster verrichte op 23 maart 2006 zijn 5000-ste waarneming aan de zon. Proficiat!

Eerstvolgende bijeenkomst van de Werkgroep Zon op 17 juni, Sonnenborgh, Utrecht

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.eracnet.org onder observations

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
28	7	1		77	////	0	0/0	6	
1	0	0		77	///	0	0/0	10	
2	0	0	-	76	///	0	0/0	3	
3	0	0	-	76	///	0	0/0	4	
4	9	4	-	75	////	0	0/0	3	
5	22	5	-	74	////	0	0/0	2	
6	14	///	-	74	///	0	0/0	2	
7	0	2	-	74	///	0	0/0	2	
8	0	4	-	72	///	0	0/0	7	
9	0	3	-	73	///	0	0/0	5	
10	0	1	-	72	///	0	0/0	1	
11	0	0	-	74	///	0	0/0	1	
12	9	4	-	73	////	0	0/0	5	
13	8	3		73	////	0	0/0	3	
14	14	2		74	////	0	0/0	3	
15	14	3		76	////	0	0/0	10	
16	13	4	-	72	////	0	0/0	8	
17	21	7	-	72	////	0	0/0	2	
18	16	8	-	72	////	0	0/0	30	
19	16	22	-	75	////	0	0/0	36	
20	19	28	-	77	////	2	0/0	20	
21	19	19	-	77	////	4	0/0	16	
22	19	8	-	76	////	0	0/0	12	
23	18	5	-	77	////	1	0/0	4	
24	21	4	-	76	////	0	0/0	6	
25	11	1		76	////	0	0/0	2	
26	0	0	-	74	////	0	0/0	10	
27	0	0	-	74	////	0	0/0	13	
28	9	1	-	79	////	0	0/0	8	
29	19	16	-	82	////	0	0/0	8	
30	20	28		84	////	2	0/0	6	
31	24	47	-	86	////	0	0/0	6	

R'_i : provisional international sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10-5 w/m^2 : the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10.7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UCOSE Terre Adélie).

SFI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams – UGEOR, evaluation : 1 x Sn+10 x "1"+100 x ">1".

XI : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams – UGEOR, UGEOI).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

SEA : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Once again, the Sun was quiet. An all-quiet-alert was issued by the SIDC for the periods from Feb 23 to Mar 08, from Mar 16 to Mar 18 and from Mar 26. The last all-quiet-alert has not ended yet. There were 10 days on which the Estimated and Provisional International Sunspot Numbers (EISN & PISN) were 0.

During the first half of the month, the only events worth mentioning were two long duration B-flares: a B2.1 flare on Mar 07 (peak at 16:14 UT) and a B3.4 flare on Mar 11 (peak at 14:00 UT). Both flares were caused by the same sunspot group Catania 010 / NOAA active region 0856. At the moment of the first long duration event (LDE), NOAA AR 0856 was located at 39° in the west. A coronal dimming and post-eruption arcade observed by GOES-12/SXI evidenced the eruption of a CME. There was no SOHO/LASCO data for this period due to spacecraft manoeuvres. Given the position of the active region at W39, the CME was not expected to arrive at earth. Indeed, ACE data didn't show any clear CME signature in the days after the eruption. At the moment of the second LDE, the active region was located at the far west. A CME was spotted in LASCO-pictures by the CACTus software. The CME had a speed of 480 km/s and was directed westward. Geomagnetic influences were not seen.

During the time intervals Mar 14-16 and Mar 18-22, the closely spaced Catania sunspot groups 13/15/16 produced some activity. NOAA identified them as AR 0860/0862/0861 respectively. Finally, 0862/015 pushed the X-ray radiation background up when it evolved to a magnetic β-γ configuration. On Mar 21, the group produced several C-flares, the strongest one being a C2.5 flare peaking at 09:44UT. One day later, the group started to decay.

From Mar 28, the background soft X-ray got a new boost from a source at the east limb. From Mar 23, several eastward CMEs were detected. On Mar 28, the magnetic imprint of an active region was visible in MDI magnetograms: Catania 19/NOAA AR 0865. Another sunspot group trailed behind and was visible on Mar 29: Catania 020/NOAA AR 0966. Up till now, both groups were only capable of producing A and B-flares with 19/0865 as the most active group.

II. Geomagnetic Activity

Once again, a similar story like previous months. If there is a geomagnetic disturbance, it originates from a coronal hole wind stream. Earth crossed 4 times a fast stream. From Mar 1 until Mar 18, SOHO/EIT was not available. We had no direct information about the coronal holes. We give a list of the periods with enhanced geomagnetic activity.

- Late Mar 06, early Mar 07, a coronal hole led to active conditions. The hole was not recurrent with only a small geo-effective part since the solar wind speed rose slightly above 400 km/s.
- Mar 09, ACE-data showed that the interaction region of a recurrent coronal had arrived at L1. Active conditions were recorded on Mar 10. The solar wind speed peaked at 550 km/s on Mar 11.
- A new fast stream was crossed by the Earth during a few hours on Mar 15, but the interplanetary magnetic field was oriented predominantly to the north, just causing the geomagnetic field to become temporarily unsettled.
- The major event of the month started late on Mar 18. After a first sharp rise to 550km/s, the solar wind accelerated further to 650 km/s, while the interplanetary magnetic field gained strength (10 nT) and turned southward. This triggered a moderate to major geomagnetic storm. This strong event was the response to a strong recurrent fast stream originating in a low-latitude coronal hole. The earth's magnetic field was subjected to the coronal hole output until Mar 22. Although the disturbance was announced, its magnitude largely exceeded the predictions based on the activity level recorded on the previous solar rotations.

III. Noticeable solar events

No M- or X-class flare occurred

IV. Halo CME list

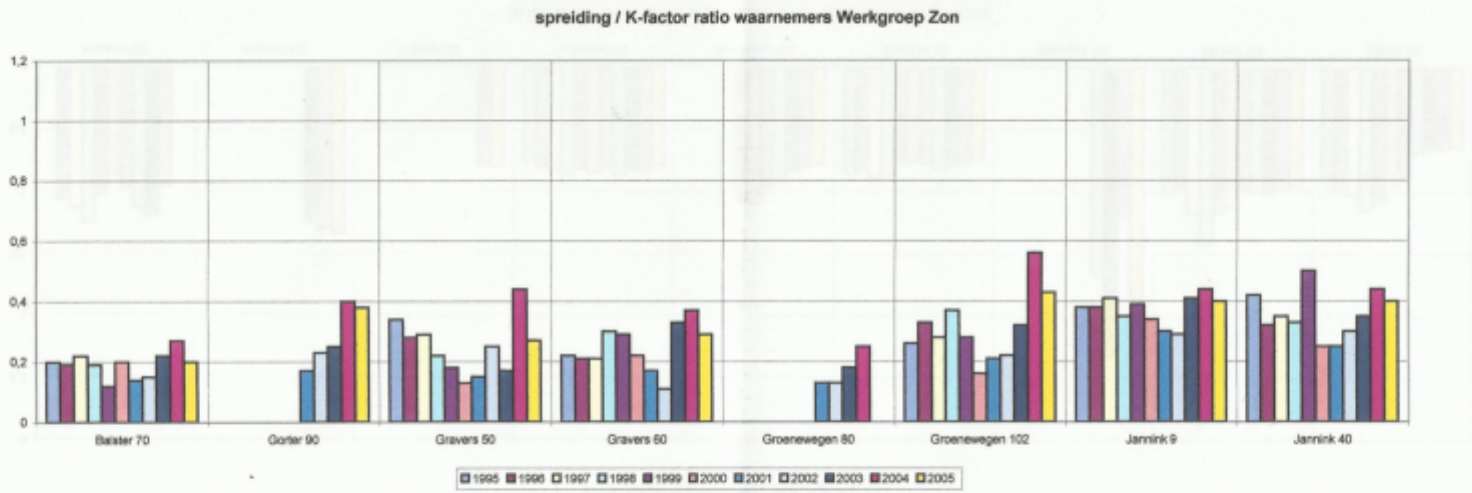
No CME alert was sent

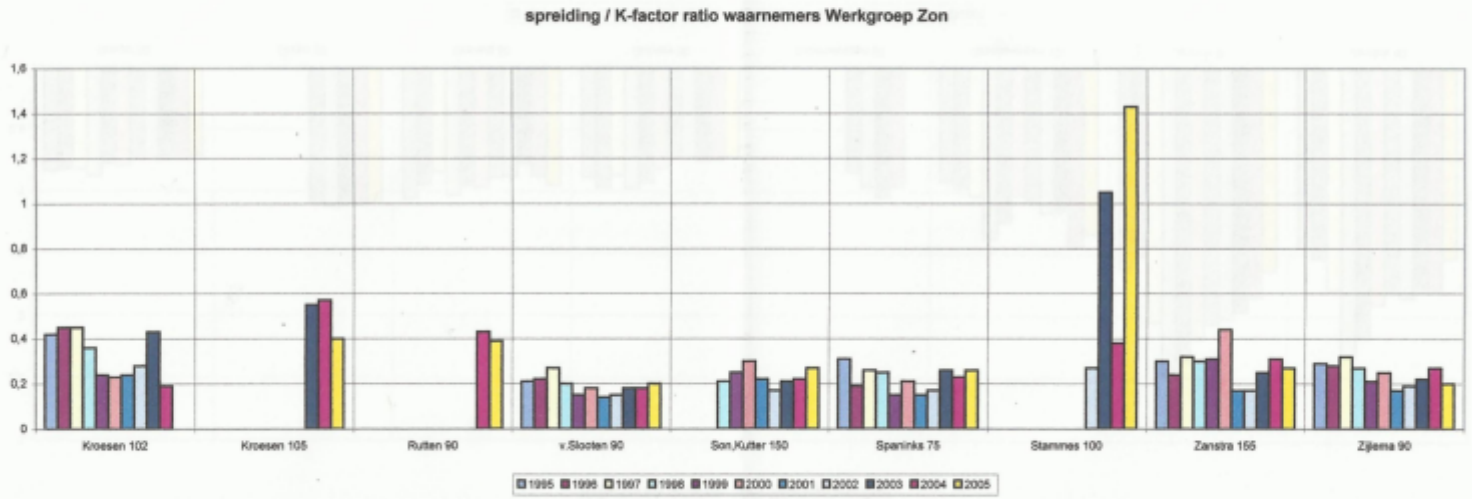
Berekening van de k-factor over 2005 m.b.v. de definitieve zonnevlekkengetallen van het SIDC.

Naam: Instrument		Balster 70	Gorter 90	Gravers 50	Gravers 60	Groenew. 102	Jannink 9	Jannink 40	Kroesen 105
Aantal waarn.	(N) =	212	220	27	30	31	296	41	100
waarvan R=0	(No) =	17	25	2	2	6	70	0	0
waarvan R>0	(Nj) =	195	195	25	28	25	226	41	100
k-factor	(k) =	0,717	1,083	0,950	0,720	1,339	1,632	1,528	1,342
Spreiding	(σ) =	0,14	0,42	0,26	0,21	0,58	0,65	0,61	0,53
Spreiding / k	(σ1) =	0,20	0,38	0,27	0,29	0,43	0,40	0,40	0,40

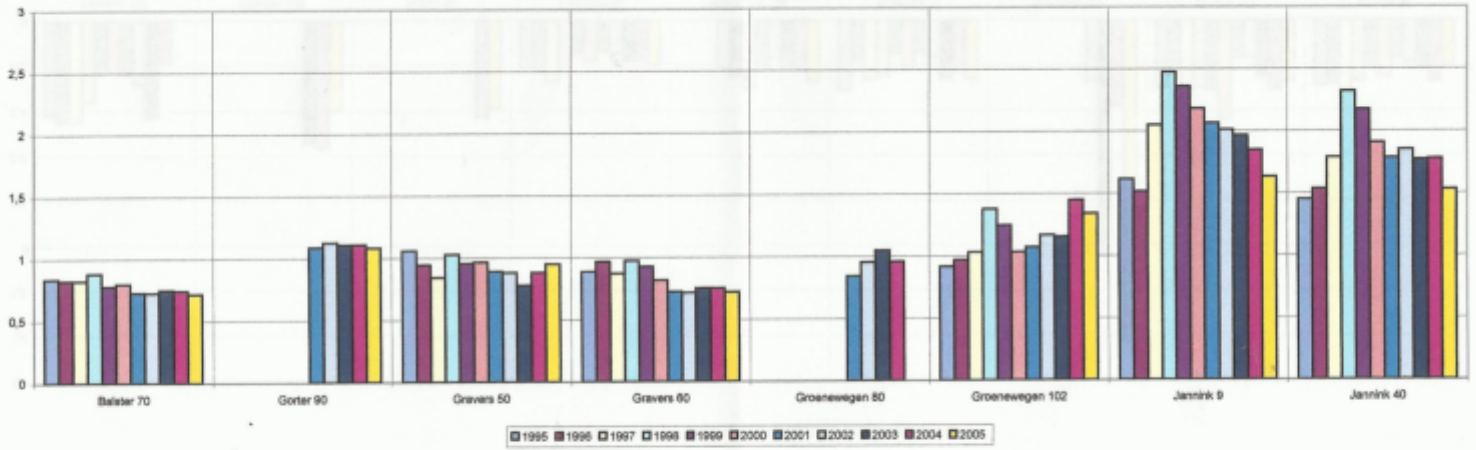
Berekening van de k-factor over 2005 m.b.v. de definitieve zonnevlekkengetallen van het SIDC.

Naam: Instrument		Rutten 90	v.Slooten 90	Son Rf 105 K	Spaninks 75	Stammes 100	Zanstra Rf 155	Zijlema 90
Aantal waarn.	(N) =	184	295	198	189	108	242	131
waarvan R=0	(No) =	25	23	16	15	16	30	9
waarvan R>0	(Nj) =	159	272	182	174	92	212	122
k-factor	(k) =	0,798	0,791	0,779	0,737	1,866	0,964	0,637
Spreiding	(σ) =	0,31	0,16	0,21	0,19	2,67	0,26	0,13
Spreiding / k	(σ1) =	0,39	0,20	0,27	0,26	1,43	0,27	0,20

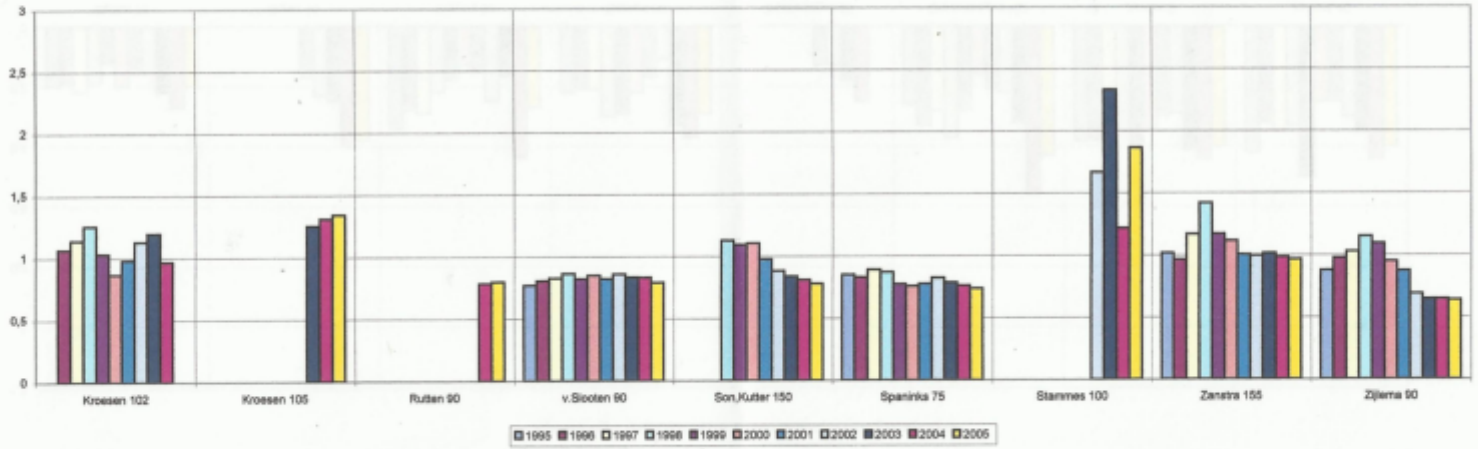

spreiding / K-factor ratio waarnemers Werkgroep Zon
1,2
1
0,8
0,6
0,4
0,2
0
Balster 70
Gorter 90
Gravers 50
Gravers 60
Groenewegen 80
Groenewegen 102
Jannink 9
Jannink 40
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005


spreiding / K-factor ratio waarnemers Werkgroep Zon
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
Kroesen 102
Kroesen 105
Rutten 90
v.Slooten 90
Son,Kutter 150
Spaninks 75
Stammes 100
Zanstra 155
Zijlsma 90
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

K-factoren waarnemers Werkgroep Zon



K-factoren waarnemers Werkgroep Zon



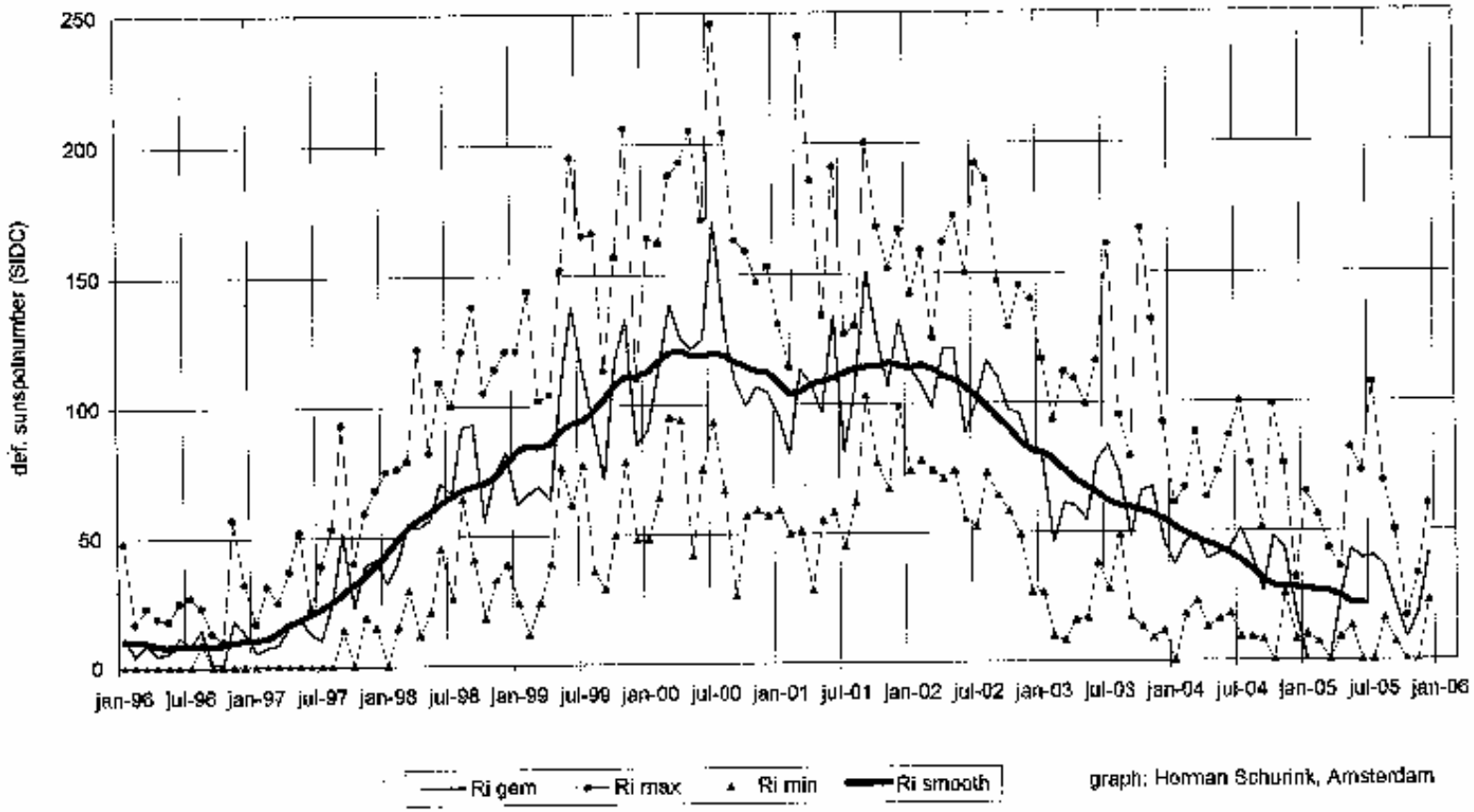
S I D C - *News*

2005 n° 4

SIDC DEFINITIVE INTERNATIONAL AND HEMISPHERIC SUNSPOT NUMBERS FOR 2005

	OCTOBER			NOVEMBER			DECEMBER		
Date	Ri	Rn	Rs	Ri	Rn	Rs	Ri	Rn	Rs
1	9	9	0	18	0	18	49	10	39
2	8	0	8	15	0	15	54	10	44
3	10	0	10	11	0	11	60	21	39
4	14	0	14	12	0	12	55	17	38
5	17	0	17	12	0	12	55	8	47
6	15	0	15	14	0	14	46	10	36
7	14	0	14	25	0	25	23	7	16
8	12	0	12	8	0	8	25	8	17
9	10	0	10	8	0	8	23	8	15
10	16	0	16	0	0	0	33	13	20
11	14	0	14	0	0	0	38	21	17
12	14	0	14	10	5	5	33	23	10
13	0	0	0	12	0	12	38	21	17
14	8	8	0	19	0	19	38	15	23
15	8	8	0	30	0	30	36	12	24
16	8	8	0	23	0	23	31	10	21
17	8	8	0	24	0	24	28	9	19
18	8	8	0	26	0	26	28	9	19
19	16	9	7	26	0	26	43	11	32
20	9	9	0	33	0	33	39	14	25
21	8	8	0	27	0	27	42	16	26
22	7	4	3	27	0	27	41	23	18
23	8	8	0	24	0	24	36	25	11
24	0	0	0	27	0	27	53	31	22
25	0	0	0	20	0	20	43	24	19
26	0	0	0	15	0	15	52	36	16
27	0	0	0	16	0	16	51	32	19
28	0	0	0	17	0	17	44	28	16
29	8	4	4	16	0	16	45	28	17
30	5	0	9	30	0	30	46	27	19
31	12	0	12				41	24	17
MEAN :	8.7	3.9	5.8	18.0	0.2	17.8	41.1	18.0	23.1

SOLAR CYCLE 23



S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_{12}	ppSI	600	2800	COS	SFI	XI	Ak	SEA
31	21	27		87	950	0	0/0	14	
1	23	30		87	908	0	0/0	8	
2	24	24	-	89	915	0	0/0	5	
3	19	19		85	////	0	0/0	3	
4	11	8		84	923	0	0/0	2	
5	15	5	-	83	922	1	0/0	4	
6	15	7		82	927	0	0/0	3	
7	6	5	-	79	927	0	0/0	4	
8	7	3	-	78	929	0	0/0	1	
9	3	3		78	921	0	0/0	1	
10	3	3	-	78	928	0	0/0	2	
11	8	2	-	79	930	0	0/0	3	
12	6	4		77	932	0	0/0	4	
13	0	999		79	931	0	0/0	3	
14	8	0	-	77	936	0	0/0	4	
15	20	10		81	935	0	0/0	7	
16	24	23		84	901	0	0/0	5	
17	22	18	-	83	926	0	0/0	6	
18	28	17		86	934	0	0/0	12	
19	24	27	-	85	936	0	0/0	8	
20	16	36	-	91	939	0	0/0	10	
21	10	43	-	94	922	0	0/0	2	
22	31	57		90	936	2	0/0	0	
23	27	46		90	901	0	0/0	4	
24	30	42	-	95	945	1	0/0	-	
25	19	25	-	89	////	0	0/0	11	
26	14	11		87	931	0	0/0	17	
27	9	4	-	84	954	0	0/0	14	
28	7	0		80	936	0	0/0	3	
29	2	1	-	80	////	0	0/0	3	
30	2	0	-	79	939	0	0/0	2	
31	0	0	-	///	////	///	///	////	

R'_{12} : provisional international sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10^{-5} w/m^2 : the quantity to be substracted from the quiet solar constant to accoun for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGIOOH). The 10.7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UGOOSH Terre Adelie).

SFI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams – UGFOOR.
explanation : 1 x Sn+10 x "1"+100 x ">1".

XI : X flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams – UGFOOR. UGIsOI).

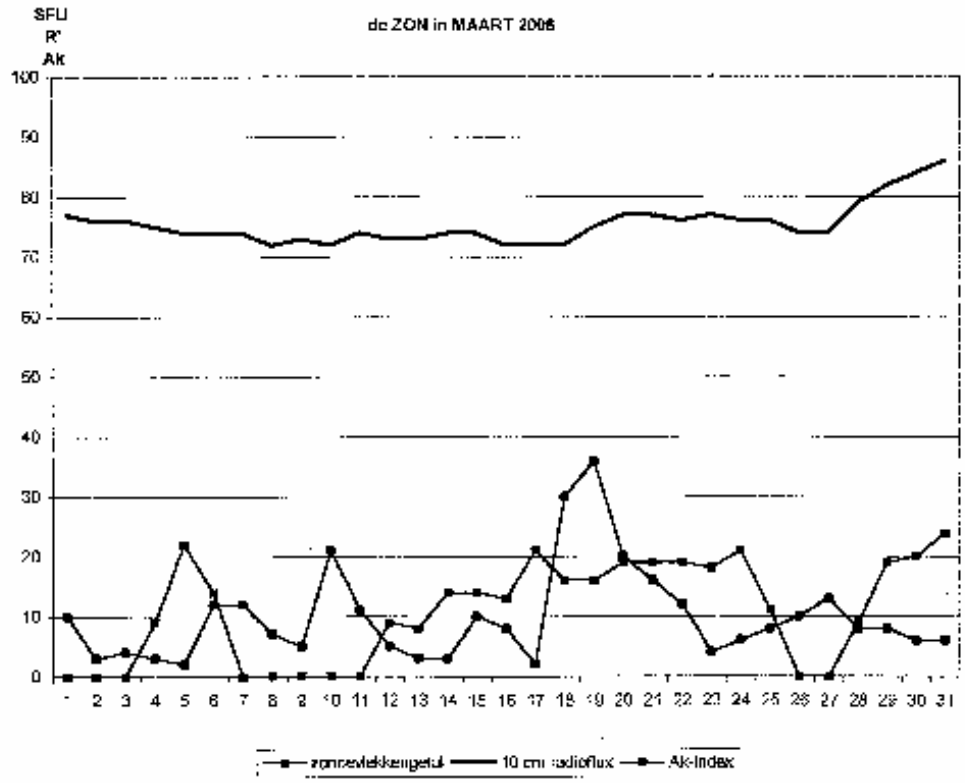
Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

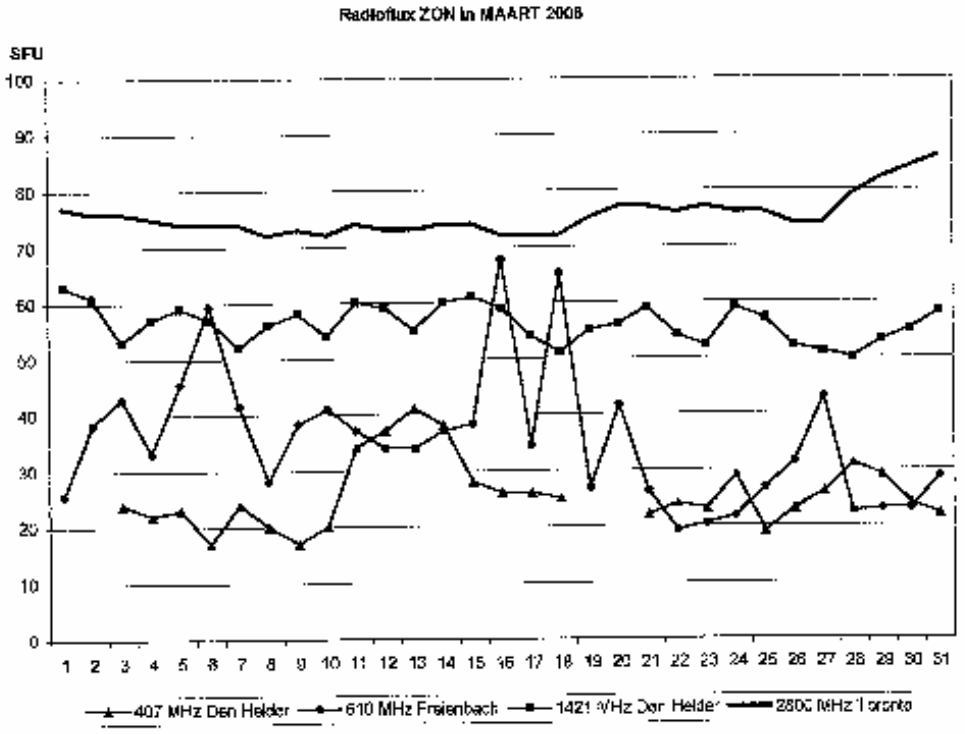
SEA : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

januari 2006.

Deze tabel komt in de plaats van de reeds eerder gepubliceerde. Het SIDC had per abuis die van december 2005 geplaatst. Met dank aan Klaas Kroesen, die deze vergissing ontdekt had.


SFU
R'
Ak
de ZON in MAART 2006
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in MAART 2006
SFU
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
407 MHz Den Helder
610 MHz Freienbach
1421 MHz Den Helder
2800 MHz Toronto

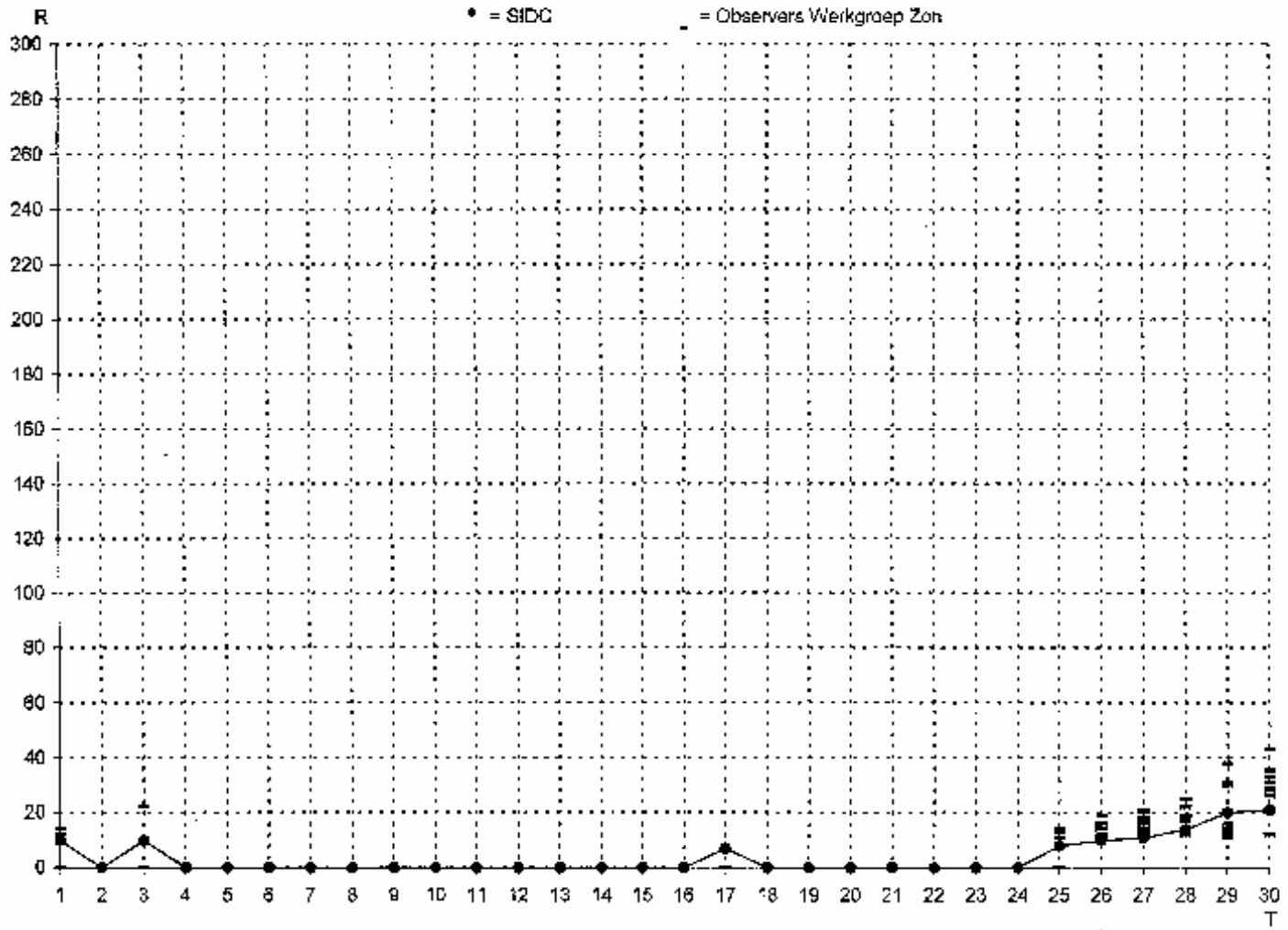
Bulletin Werkgroep Zon — April 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijpi@planet.nl

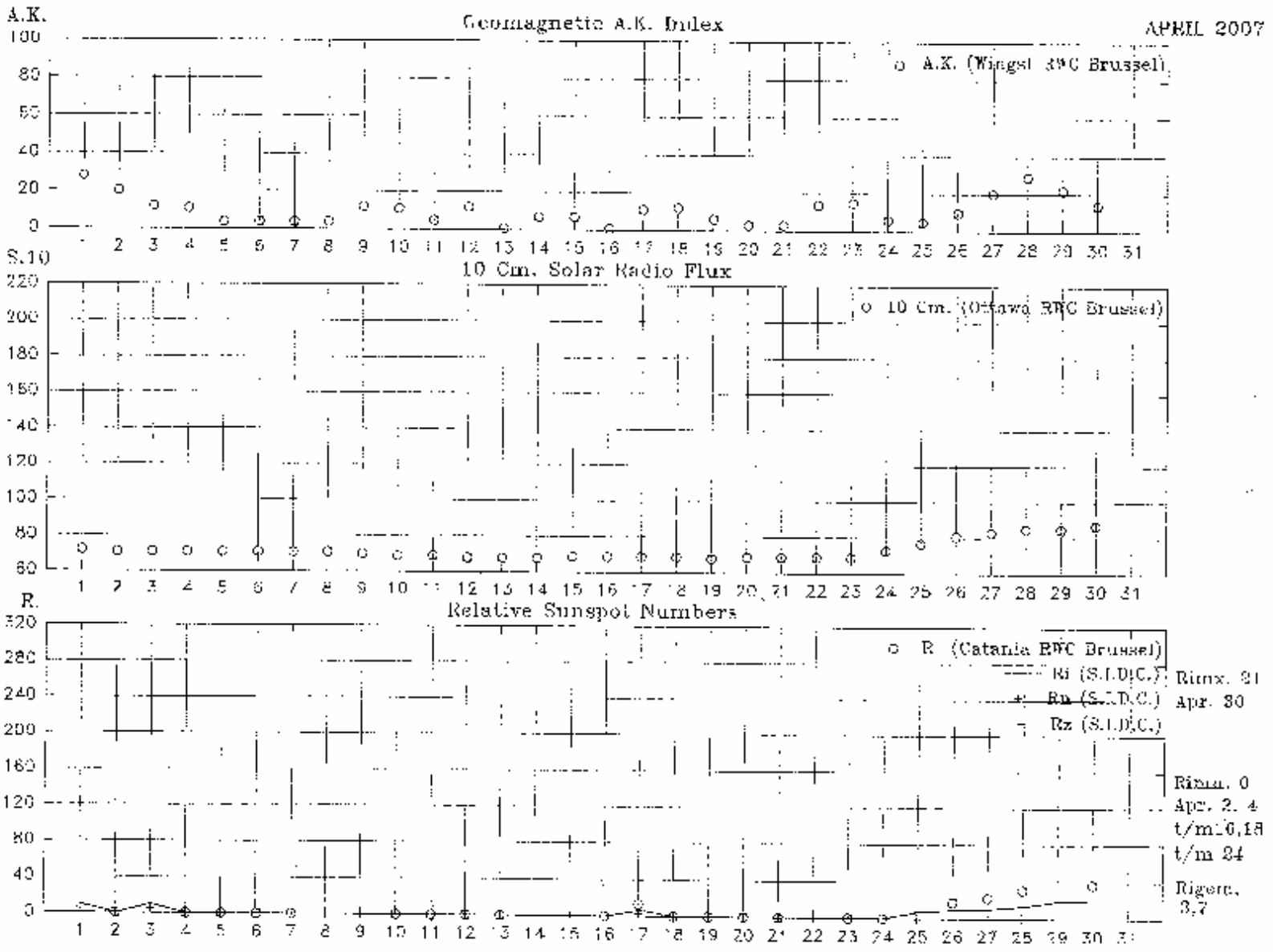
Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Gori	Gr60	Groe	Jn 9	Jn40	Kr60	vSlo	Son	Spa	Zane	Zijle
1	10	12	0	0		0			0	0	0	0	14
2	0	0	0		0	0			0		0	0	0
3	10					0			0	0	22	0	0
4	0	0	0			0			0	0	0	0	
5	0	0	0		0	0			0		0	0	0
6	0	0	0	0	0	0			0		0	0	0
7	0	0		0		0			0		0	0	0
8	0	0	0	0		0			0		0	0	0
9	0	0	0		0	0			0		0		
10	0	0				0			0		0	0	
11	0	0	0			0			0		0	0	
12	0	0	0			0			0	0	0	0	
13	0	0	0		0	0			0	0	0	0	
14	0	0	0	0		0			0			0	0
15	0	0	0	0		0			0	0	0	0	0
16	0	0	0		0	0			0	0	0	0	0
17	7	0	0			0			0	0	0	0	
18	0	0				0			0		0	0	0
19	0	0	0		0	0			0	0	0	0	
20	0	0	0	0		0			0	0	0		
21	0	0	0		0	0			0	0	0	0	0
22	0	0	0	0		0			0	0	0	0	
23	0	0	0			0			0	0	0	0	
24	0	0	0			0			0	0			
25	9	13	14		11	0			11		13	0	
26	10	14	19		14	11		12	16		16	16	19
27	11	16	17	20	12	11	11	11	13		18	14	21
28	14	22	19	22	14	13		12	19		17	18	25
29	20	30	21		30	11		12	13	16	31	14	38
30	21	36	33	35	29	12		12	26	31	28	28	43
observ		29	26	11	14	30	1	5	30	16	28	27	17
k		0,66	0,68	0,60	0,79	1,31	1,00	1,28	0,88	0,96	0,65	0,87	0,56
st.dev.		0,08	0,15	0,04	0,13	0,44	–	0,41	0,33	0,40	0,12	0,32	0,08
st.d./ k		0,12	0,22	0,07	0,17	0,33	–	0,32	0,38	0,42	0,18	0,36	0,14

Observers		[...] = Refractor, d = ... mm		[Rf...] = Reflector, d = ... mm	
Bals	= H.A.M. Balster [70]	Jn 9	= D. Jannink [9]	Son	= A.T. Son [Rf 150 Kutter]
Gori	= E.Gorter [80]	Jn40	= D. Jannink [40]	Spa	= T. Spanjaks [75]
Gr60	= Mw G. Gravers [60]	Kr60	= K. Kroesen [60]	Zane	= W. Zanstra [Rf 155]
Groe	= A.Groenewegen [102]	vSlo	= B. van Slooten [90]	Zijle	= W.A. Zijlema [90]


R
• = SIDC
- = Observers Werkgroep Zon
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
T

april 2007


A.K.
Geomagnetic A.K. Index
APRIL 2007
o A.K. (Wingst 39C Brussel)
S.10
10 Cm. Solar Radio Flux
o 10 Cm. (Ottawa RWC Brussel)
R.
Relative Sunspot Numbers
o R (Catania RWC Brussel)
Ri (S.I.D.C.)
Rn (S.I.D.C.)
Rz (S.I.D.C.)
Rimax. 21
Apr. 30
Rimin. 0
Apr. 2, 4
t/m 6,18
t/m 24
Rigem. 3,7

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

april 2007

	S.I.D.C.		Belster		Janzink		v.Sloten		Son		Spanninks		Zanstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	5	5	12	0			0	0	0	0	0	0	0	0
2	0	0	0	0			0	0			0	0	0	0
3	5	5					0	0			21	11	0	0
4	0	0	0	0			0	0	0	0	0	0	0	0
5	0	0	0	0			0	0	0	0	0	0	0	0
6	0	0	0	0			0	0			0	0	0	0
7	0	0	0	0			0	0			0	0	0	0
8	0	0	0	0			0	0			0	0	0	0
9	0	0	0	0			0	0			0	0		
10	0	0	0	0			0	0			0	0	0	0
11	0	0	0	0			0	0			0	0	0	0
12	0	0	0	0			0	0	0	0	0	0	0	0
13	0	0	0	0			0	0	0	0	0	0	0	0
14	0	0	0	0			0	0					0	0
15	0	0	0	0			0	0	0	0	0	0	0	0
16	0	0	0	0			0	0	0	0	0	0	0	0
17	4	3	0	0			0	0	0	0	0	0	0	0
18	0	0	0	0			0	0			0	0	0	0
19	0	0	0	0			0	0	0	0	0	0	0	0
20	0	0	0	0			0	0	0	0	0	0		
21	0	0	0	0			0	0	0	0	0	0	0	0
22	0	0	0	0			0	0	0	0	0	0	0	0
23	0	0	0	0			0	0	0	0	0	0	0	0
24	0	0	0	0			0	0	0	0				
25	0	8	0	13			0	11			0	13	0	0
26	0	10	0	14			0	16			0	16	0	15
27	0	11	0	16	0	11	0	13			0	16	0	14
28	0	14	0	22			0	19			0	17	0	16
29	0	20	0	30			0	13	0	16	0	31	0	14
30	0	21	0	36			0	26	0	31	0	28	14	14

Eerstvolgende bijeenkomst van de Werkgroep Zon op 16 juni 2007, Utrecht, Sonnenborgh.

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.eracnet.org onder observations

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	0	2	-	73	///	1	/0	6	
1	10	3	-	72	////	0	0/0	28	
2	0	999		71	///	0	/0	9	
3	10	2	-	71	////	0	0/0	12	
4	0	999	-	71	///	0	/0	1	
5	0	999		70	///	0	/0	4	
6	2	999	-	71	///	0	/0	4	
7	0	999		71	///	0	/0	4	
8	0	0	-	///	////	///	///	4	
9	0	0	-	70	////	0	0/0	12	
10	0	999	-	69	///	0	/0	4	
11	0	999	-	69	///	0	/0	5	
12	0	0	-	68	///	0	/0	2	
13	0	999	-	68	///	0	/0	1	
14	0	1	-	68	////	0	0/0	7	
15	0	999	-	68	////	0	0/0	7	
16	0	999		68	///	0	/0	1	
17	7	1	-	68	////	0	0/0	11	
18	0	.	-	68	///	0	/0	2	
19	0	999	-	68	///	0	/0	6	
20	0	*	-	68	///	0	/0	3	
21	0	999	-	69	///	0	/0	3	
22	0	0	-	69	////	0	0/0	14	
23	0	999	-	69	///	0	/0	5	
24	0	999	-	70	///	0	/0	4	
25	8	4	-	77	////	0	0/0	5	
26	10	17	-	81	////	0	0/0	10	
27	11	34	-	83	////	1	0/0	20	
28	14	54	-	85	////	0	0/0	29	
29	20	52	-	85	////	3	0/0	22	
30	21	77		87	////	1	0/0	14	

R'_i : provisional international sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10-5 w/m² : the quantity to be subtracted from the mean solar constant to account for the sunspot occultation.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10.7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UKXSB 'Terre Adélie) .

SFI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams - UGEOR, evaluation : 1 x Sn+10 x "1"+100 x ">1".

XI : X-flares index from the Ursigrams (M flares/X-flares) (origin : Ursigrams – UGEOR, UGEOI).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

SEA : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Flaring activity of any relevance was absent. Most of the time, the visible surface of the Sun was spotless. As usual in this phase of the solar cycle, several coronal holes transited the solar disk.

Flaring activity was totally absent until Apr 24. From Apr 01 until Apr 23, the X-ray

radiation curve was an almost straight line beneath the A-level. The Provisional International Sunspot Number was zero for 21 days between Apr 02 and Apr 24. From Apr 25 onwards, a new sunspot group was visible at the east limb: Catania 32 (NOAA AR 0953). A tiny trailing sunspot was visible on Apr 30. This group was assigned the number 33 (NOAA AR 0954). The X-ray background radiation increased to the A4 level and flaring activity became a little more agitated as a consequence of the appearance of these sunspot groups. GOES registered even a C2.8 flare late on Apr 24. From that day onwards, several B-flares were recorded with mainly Catania 32 as the source region.

We give a summary of all visible coronal holes (CH) influencing the solar wind and the geomagnetic field including the date when the most western border of the hole passes the central meridian (CM), location and recurrences.

1. A first recurrent hole passed early CM on Mar 29 and was located just beneath the equator.
2. On Apr 06, a recurrent southern hole was present centred around 30° latitude.
3. An elongated, skewed coronal hole, spanning 90° longitude and 60° latitude across the equator, passed the CM on Apr 16.
4. Early on Apr 25, a southern hole passed the centre of stage. This hole was the same as CH 3, but in comparison with the previous rotation, the hole had evolved significantly in a bigger size.

II. Geomagnetic Activity

All geomagnetic disturbances were caused by coronal holes except for one confined period of unsettled to active conditions.

We address the four periods of disturbances related to the coronal hole mentioned above. A co-rotating interaction region (CIR) is recognized in solar wind data by an elevated level of density and total magnetic field strength. A CIR is the precursor of the actual high solar wind speed emanating from the coronal hole. The CIR associated with the first coronal hole arrived at Earth late on Mar 31. The CH induced a minor geomagnetic storm for 2 days starting on Apr 01. The north-south (Bz) component of the interplanetary magnetic field (IMF) was predominantly negative for those two days. This induced a stronger coupling between the IMF and the Earth's magnetic field, responsible for the minor storm.

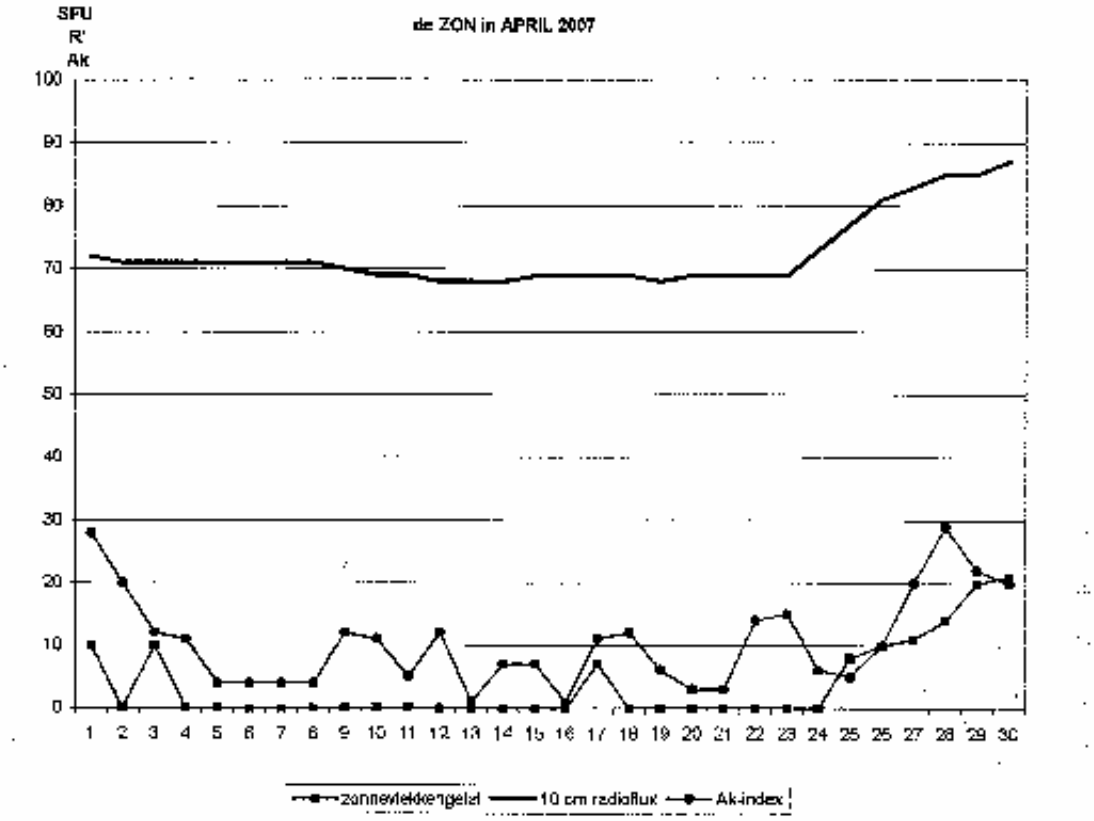
The next CIR arrived late on Apr 08. In first instance, the IMF strength was around 15 nT, but the Bz component was positive, reducing the geomagnetic effect. The result was one period of active geomagnetic conditions on Apr 09. Thereafter, Kp (estimated by NOAA, Boulder) fluctuated between 0 and 3. The next period of geomagnetic disturbances began on Apr 17. The geomagnetic field was only slightly disturbed with one period of Kp equal to 4 on Apr 18. These disturbances were related with an excursion of Bz to negative values and could not directly be linked to a CH fast stream. The solar wind speed was during that period not typical for a CH with an elevated value but flat curve. The next period of geomagnetic disturbances was related to the third elongated CH. The solar wind picked up speed from Apr 22; the associated CIR arrived slightly earlier on the same day. The north-south component of the IMF was strongly fluctuating between negative and positive values. On Apr 22, the conditions became unsettled and resulted finally in a short minor storm on Apr 23. The last geomagnetic disturbance was the strongest of this month and was induced by the last CH mentioned above. The CIR arrived on Apr 27. At the end of that day, the solar wind speed had reached values above 600 km/s. Several periods of minor storm conditions were measured on Apr 28, 29 and 30. At the beginning of the next month, May, we were still in the aftermath of this recurrent CH.

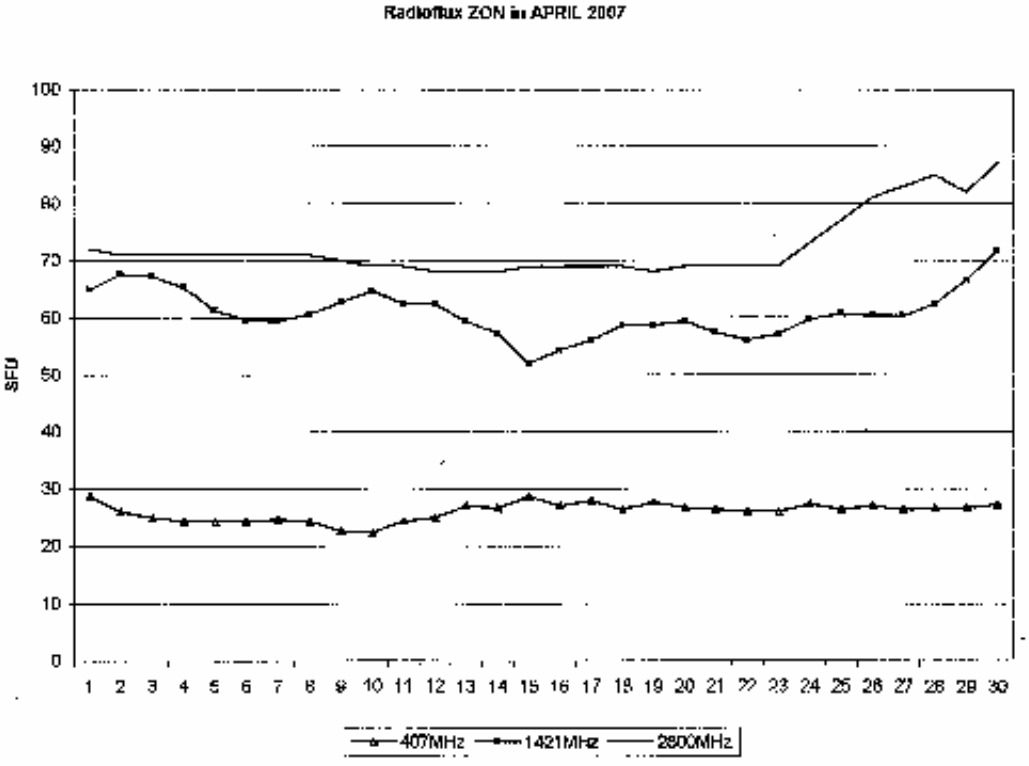
III. Noticeable solar events

No M- or X-class flares occurred.

IV. Halo CME list

No CME alert was sent.


SFU
R'
Ak
de ZON in APRIL 2007
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in APRIL 2007
SFU
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
407MHz
1421MHz
2800MHz

Bulletin Werkgroep Zon — Mei 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijpi@planet.nl

Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Gort	Gr50	Groe	Jn 9	Jn40	Kr60	vSlo	Son	Spa	Stam	Zans	Zijle
1	33								43				43	
2	35		51		24	35	35		52	43	58		40	44
3	34		38		34	35		14	41	44	53		39	54
4	36	53	51			33			50	55	61		53	54
5	32	49	46	52		22		22	48	48	48		50	48
6	27	36	35	39		11		11	37	36	36		24	39
7	32	48	28			11			46	49	38		37	57
8	26	38	37			24		35	42	46	44	15	38	45
9	28		26	36		24	23	26	41	28	55		29	42
10	19		27			22		35	27	27	31	14	27	32
11	16		23			0		11	24	12			24	27
12	7		11			0			23	11			11	24
13	7		0			0			11	12	22		0	12
14	0			0	0	0			0	0	0		0	11
15	0					0			0	0				0
16	0		0			0			0	0	0		0	
17	0				0	0			0		0		0	
18	8		0	0		0			0	0	0	0	0	11
19	8		0			0			13					
20	19		15			0		12	28	15	20			
21	20	27	15			11		12	31				46	
22	28		19			11			43	32	43	0	45	
23	30		18	24	17	11			45	20	47		32	60
24	26	39	30			11			32	32	40		31	
25	25		25											
26	28													
27	32					0								
28	37	51	37		37	0			71		58	14	40	
29	35	60	48		44	0			51		49		51	
30	32	46	33			0			46		37	13	35	
31	27													
observ	31	10	24	6	7	27	2	9	27	20	21	6	24	16
k	1,00	0,69	0,97	0,82	1,20	1,73	1,11	1,50	0,67	0,85	0,66	2,08	0,78	0,61
st.dev.	0,00	0,05	0,31	0,29	0,40	0,78	0,15	0,65	0,10	0,28	0,14	0,59	0,16	0,12
st.d./ k	0,00	0,07	0,32	0,35	0,33	0,44	0,14	0,44	0,15	0,33	0,21	0,28	0,21	0,19

Observers

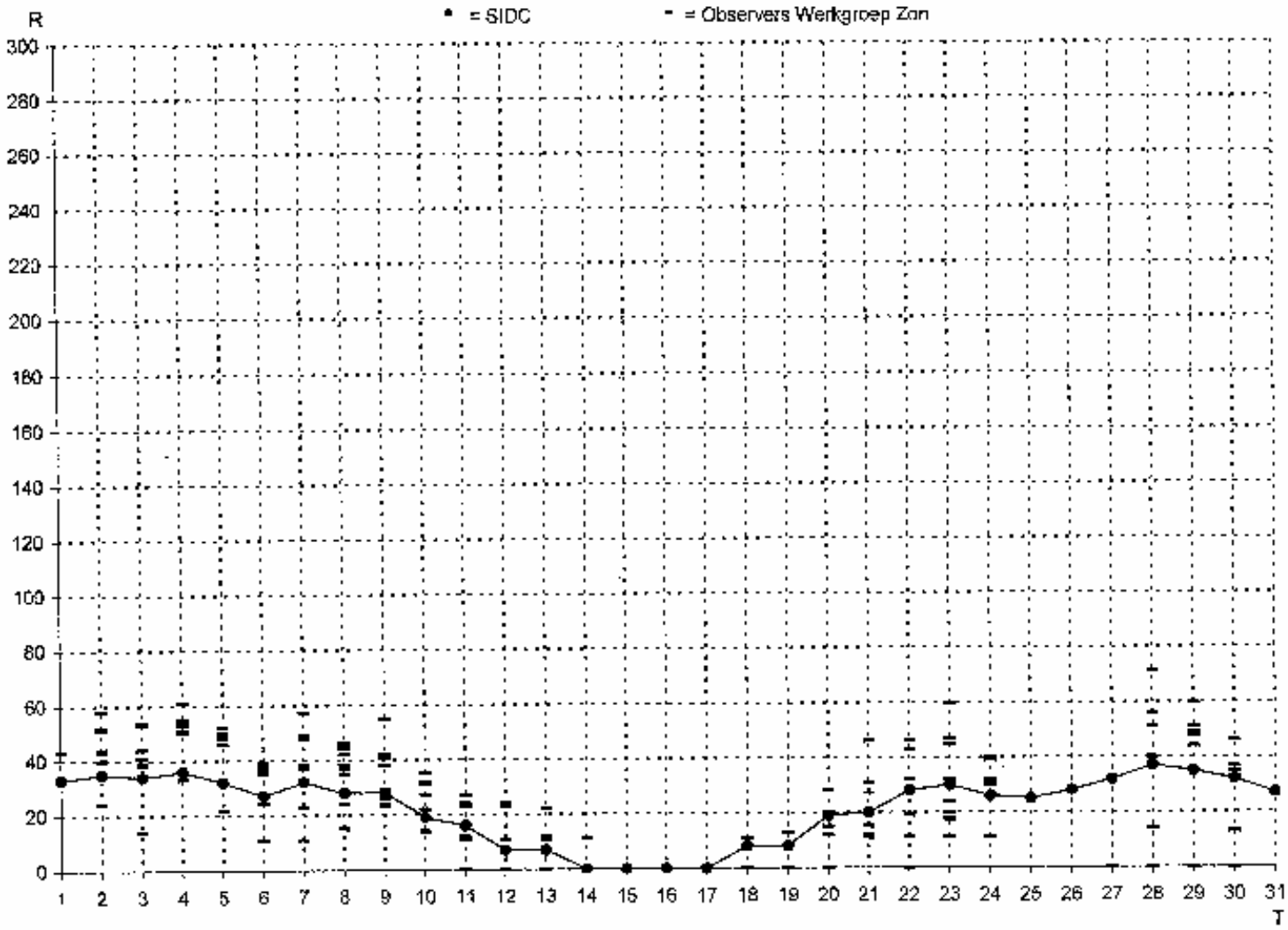
Bals = H.A.M. Balstar [70]
Gort = E.Gorter [90]
Gr50 = Mw G. Gravers [50]
Groe = A.Groenewegen [102]
Jn 9 = D. Jannink [9]

[...] = Refractor, d = ... mm

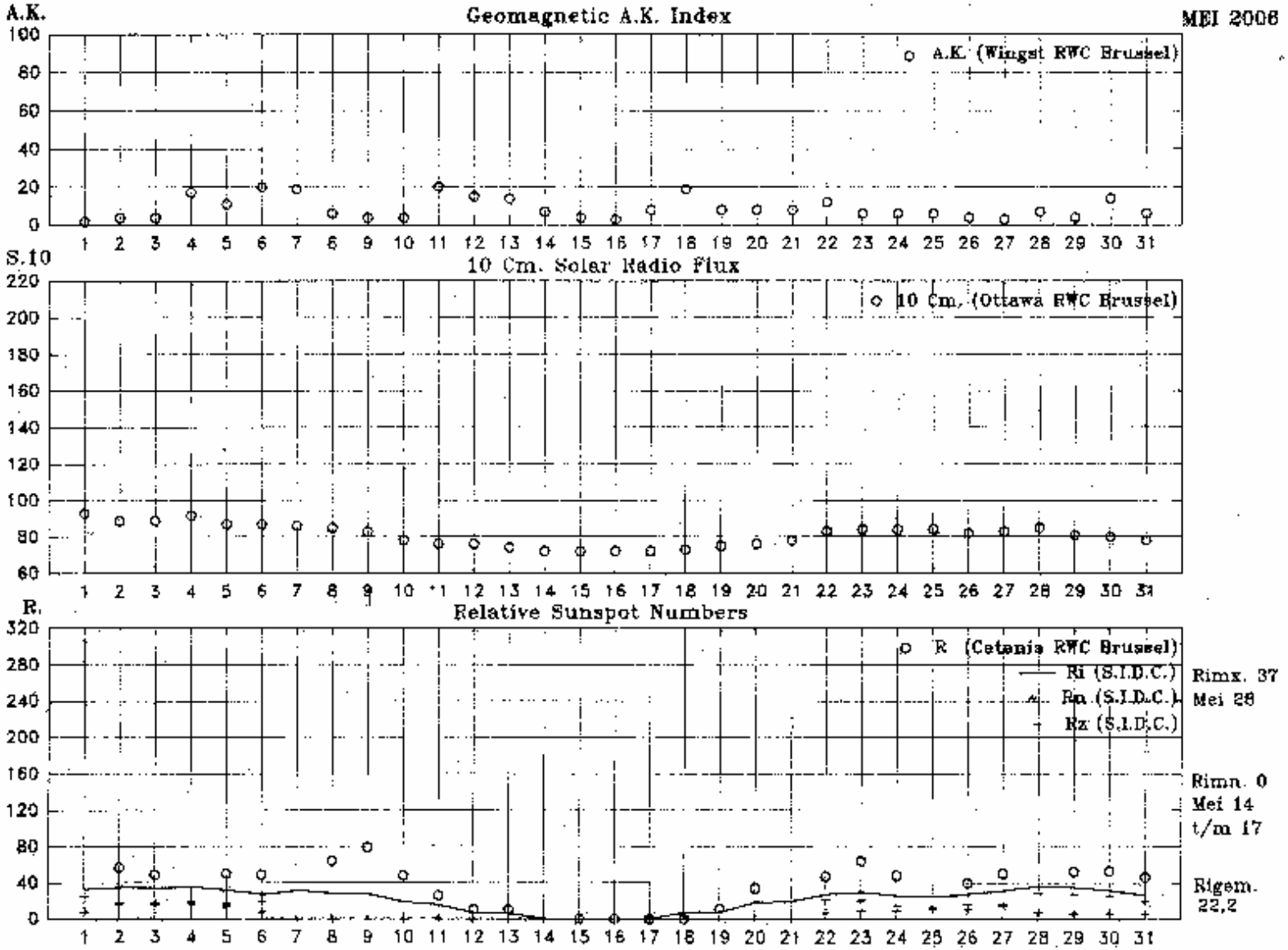
Jn40 = D. Jannink [40]
Kr60 = K. Kroesen [60]
vSlo = B. van Slooten [90]
Son = A.T. Son [Rf 150 Kutter]

[Rf...] = Reflector, d = ... mm

Spa = T. Spaninks [75]
Stam = R.Stammes [100]
Zans = W. Zanstra [Rf 155]
Zijle = W.A. Zijlema [90]


R
• = SIDC
- = Observers Werkgroep Zon
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
T

mei 2006


A.K.
Geomagnetic A.K. Index
MEI 2006
A.K. (Wingst RWC Brussel)
S.10
10 Cm. Solar Radio Flux
10 Cm. (Ottawa RWC Brussel)
R.
Relative Sunspot Numbers
R (Cetania RWC Brussel)
Ri (S.I.D.C.)
Rn (S.I.D.C.)
Rz (S.I.D.C.)
Rimx. 37
Mei 28
Rimn. 0
Mei 14
t/m 17
Rigem.
22,2

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond
(Hemispheric sunspot numbers)
met 2006

	S.I.D.C.		Balster		Jannink4		v.Slooten		Sol		Soninks		Zanstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	6	25					11	32					12	31
2	17	18			22	13	26	26	27	16	30	28	24	16
3	18	16					27	14	29	15	28	25	24	15
4	19	17	22	25			27	23	31	24	27	34	27	26
5	17	15	25	24			25	23	24	24	24	24	24	26
6	8	19	11	25			11	26	11	27	12	26	12	12
7	0	32	0	48			0	46	0	49	0	38	0	37
8	0	28	0	38			0	42	0	46	0	41	0	38
9	0	26			0	23	0	41	0	25	0	55	0	29
10	0	19					0	27	0	27	0	31	0	27
11	0	16					0	24	0	12			0	24
12	0	7					0	23	0	11			0	11
13	0	7					0	11	0	12	0	22	0	0
14	0	0					0	0	0	0	0	0	0	0
15	0	0					0	0	0	0				
16	0	0					0	0	0	0	0	0	0	0
17	0	0					0	0			0	0	0	0
18	4	4					0	0	0	0	0	0	0	0
19	0	8					0	13						
20	0	19					0	26	0	15	0	20		
21	0	20	0	27			0	31					0	48
22	7	21					11	32	0	37	11	32	0	46
23	9	21					13	34	0	20	13	34	15	17
24	10	16	13	26			15	17	15	17	16	22	15	16
25	12	13												
26	11	17												
27	17	15												
28	8	29	12	39			24	47			12	44	13	27
29	7	28	12	48			11	40			11	38	12	39
30	7	25	12	34			11	35			11	26	12	23

Tijdens de laatste jaarvergadering van de KNvWS is ons werkgroeplid Peter Louwman benoemd tot erelid van de vereniging. Namens Bestuur en leden van de werkgroep: van harte gefeliciteerd met deze eervolle benoeming.

Eerstvolgende bijeenkomst van de Werkgroep Zon op zaterdag 28 oktober te Utrecht, Museum Sterrenwacht Sonnenborgh.

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.eracnet.org onder observations

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Although sunspots were present during almost the whole month with the exception of a few days from May 14 until May 17, only 2 C-flares were recorded. The background X-ray radiation was situated in the A-level except for May 01, 04 and 05. During the quietest days, the X-ray radiation curve measured by GOES was even situated at the bottom of the A-level. Once again, we are forced to describe 'quiet-Sun' events.

The two C-class events were recorded in the beginning of the month. The first peaking at 15:35 UT on May 01, was a long duration (LD) C1.0 event from Catania sunspot group 31 (NOAA AR 0875) around S17W29, accompanied by a faint, slow earth-directed CME. A coronal dimming was noticed. The second, a LD C1.1 event peaking at 17:45 UT on May 04 originated right on the east limb from Catania sunspot group 36 (NOAA AR 0881). A third LD event took place on May 11: it was a B3.9 sub flare with source region at disk center in the active region with NOAA number 0885 (former Catania sunspot group 38). This event was associated with a small filament eruption, but no corresponding halo CME was detected in LASCO coronagraph images. On May 22, a coronal dimming starting around 19:35UT was visible in EIT195 images in the neighbourhood of sunspot group 42 (the cluster of NOAA AR 0884-0885) located at the moment on the eastern hemisphere. A B6.4 flare was recorded by GOES around that time together with a type II radio burst. The corresponding CME had no earth-directed component. On May 25, two coronal dimmings and rapidly rising loop structures were visible in EIT195 in the environment of the same group. The first dimming was located around 18:23UT, the second one just before midnight. A LD B1.4-flare peaking at 19:05 UT and a second more confined B5.4 flare was recorded. Two small filaments located at that position disappeared as can be seen in Catania H-alpha pictures. The corresponding CME was cactized by CACTus and split in at least two parts.
On May 03, a prominence at the east limb erupted. No evidence was seen in EIT195 images.
We have to mention a beautiful prominence eruption at the east limb on May 11. In a sequence of EIT304 images, you can see a lifted arcade, followed by the breaking of one of the legs and the final eruption.

Many coronal holes (CH) were seen crossing the disk. We list them with the times of passage at the central meridian:
1) May 03: a recurrent equatorial CH.
2) May 09: an equatorial CH with a larger trailing northern part, both holes are recurrent.
3) May 14: an equatorial CH with a southern part in front of it. On the previous rotation, this hole was further to the south.
4) May 17: a returned small sun CH.
5) May 22: a returned CH, almost not detectable in EIT 284.
6) May 26: a northern CH. A large trailing part is located more close to the equator.

From May 26, no EIT images were available.

II. Geomagnetic Activity

All geomagnetic activity of this month was caused by fast solar wind streams emanating from coronal holes, with one exception. Apart from the Apr 30 event, none of the CMEs leaving the Sun reached Earth, or, if they did, they didn't have a clear signature in ACE-data.

A faint, slow earth-directed CME visible from early Apr 30 was observed by ACE from midway through May 4th leading to a single period of Kp=4 as a result of a significant period of a strong, southward IMF (Bz ~ -10nT).
The following geomagnetic disturbances were associated with the CHs mentioned in the section 'Solar Activity'.

On May 06-07, prolonged minor storm conditions prevailed with 3 periods of Kp=5 (though not continuous) due to the arrival of the fast stream emanating from CH1. The solar wind speed peaked around 600km/s late May 07. Geomagnetic conditions became again quiet since the interplanetary magnetic field (IMF) had already weakened at that time. After a sector boundary crossing, the solar wind speed rose again, starting on May 11 around 00:00UT and reached a new maximum of 670 km/s on May 12. This recurrent stream was associated with CH2. As the associated interplanetary magnetic field (IMF) remained weak (<10nT) with limited southward excursions of Bz, this stream only induced temporarily unsettled geomagnetic conditions at low latitude, and active to minor storm conditions only at high latitudes, mainly on May 12. Another sector boundary crossing was visible in ACE data late May 16. A new fast flow emanating from CH3 arrived on May 18. NOAA SEC has reported one interval of Kp=5 on May 18, i.e. minor storm conditions. The fast flow contained rather weak IMF, so the geomagnetic conditions quickly returned to quiet and unsettled conditions. The imprint of CH4 in ACE data could not be clearly distinguished from CH3. It is possible that the unsettled conditions following the minor storm were also caused by CH4. CH5 also did not have a clear fingerprint in the IMF data of ACE. The Co-rotating Interaction Region (CIR) of CH6 arrived late May 27. Since Bz was not strongly negative, the geomagnetic conditions stayed quiet to unsettled.

III. Noticeable solar events

No M- or X-class flare occurred.

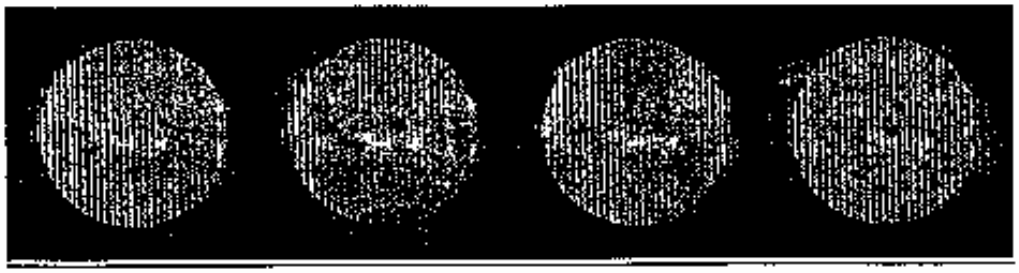
IV. Halo CME list

Onset Time	e-mail time CACTus	dir	e-mail time LASCO	e-mail time VT	Ass. Events	consequences
05/01 [illegible]			05/02 11:30	05/02 [illegible]	[illegible] C1.0	May 3 [illegible] caused by CH2
05/12 9:54	05/12 01:12	85°	-	-	-	-
05/23 23:37			05/24 11:43		Eruption on E limb	-
05/25 21:26	-	-	05/26 12:15	05/26 [illegible]	1 DF B1.4, B5.4	
05/28 07:26	05/28 08:30	142	-	-	-	-

Onset time. Time first visible in C2 field of view
CACTus: Computer Aided CME Tracking (software developed by the SIDC)
LASCO: SOHO LASCO Operations, G. Stenborg

FF: Fearless Forecast (a NOAA trial service)
e-mail time CACTus/LASCO/FF: Time that e-mail sent by group
dir: angular width of CME, measured by CACTus
Ass. Events: Associated Events, Long Duration Event, flare class

V. Picture of the Month



A sequence of four SOHO/EIT304 pictures dating from May 11, 2000, at 01:17UT, 07:16 UT, 13:16 UT and 19:16 UT respectively. The sequence shows a filament eruption at the NE limb of the solar disk.

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_I	PPSI	600	2800	COS	SFI	XI	Ak	SEA
30	37	94		100	////	-	0/0	0	
1	93	41		93	////	3	0/0	2	
2	35	36		99	////	0	0/0	4	
3	34	35	-	93	////	0	0/0	4	
4	36	26		92	////	0	0/0	17	
5	32	15	-	87	////	0	0/0	21	
6	27	14	-	87	////	0	0/0	20	
7	32	17		86	////	0	0/0	19	
8	20	33	-	85	////	0	0/0	6	
9	28	31	-	83	////	0	0/0	4	
10	19	15		78	////	0	0/0	4	
11	16	6		76	////	1	0/0	20	
12	7	3	-	76	////	0	0/0	15	
13	7	1	-	74	////	0	0/0	14	
14	0	1	-	72	////	0	0/0	7	
15	0	0	-	72	////	0	0/0	4	
16	0	0	-	72	////	0	0/0	3	
17	0	0	-	72	////	0	0/0	6	
18	8	0	-	73	////	0	0/0	9	
19	8	2		75	////	0	0/0	8	
20	19	13	-	76	////	0	0/0	8	
21	20	14		76	////	0	0/0	8	
22	20	20	-	83	////	0	0/0	12	
23	30	21	-	84	////	0	0/0	6	
24	26	28		84	////	0	0/0	0	
25	25	20	-	84	////	0	0/0	6	
26	28	20	-	82	////	0	0/0	4	
27	32	19		83	////	0	0/0	3	
28	37	28	-	85	////	0	0/0	7	
29	30	14	-	81	////	0	0/0	4	
30	32	12		80	////	0	0/0	14	
31	27	6	-	78	////	0	0/0	0	

R'_I : provisional international sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10^{-5} w/m^2 : the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10.7cm flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UCOSI: Terre Adélie).

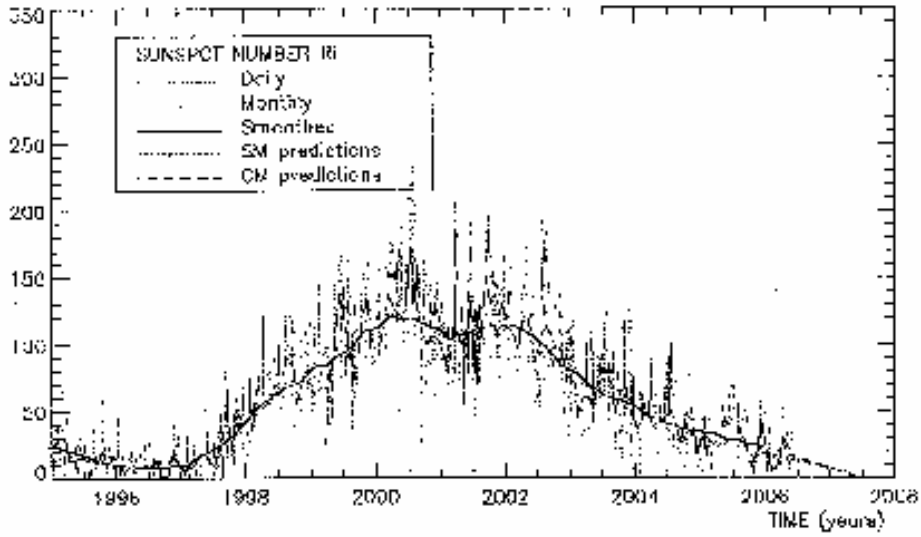
SFI : From October 1992, Solar Flux Index from the S.I.D.C. (origin : Ursigrams – UGEOR, evaluation : [x Sn+10 x "F"+100 x ">1".

XI : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams – UGEOR, UGEOI).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

SEA : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for November 2005 : 24.9 (± 5%)

	SM	CM		SM	CM		SM	CM
2005 Dec	22	24	2006 Jun	16	16	2006 Dec	10	8
2006 Jan	19	22	Jul	15	15	2007 Jan	10	6
Feb	20	21	Aug	14	13	Feb	9	5
Mar	19	20	Sep	13	11	Mar	8	5
Apr	18	19	Oct	12	10	Apr	7	2
May	17	17	Nov	11	9	May	6	2

SM : SIDC classical method : based on an interpolation of Waldmeier's standard curves; the estimated error ranges from 7% (first month) to 35% (last month)
CM : Combined method : the combined method is a regression technique coupling a dynamo-based estimator with Waldmeier's idea of standard curves, due to K. Denkmayr.
ref. : K. Denkmayr, P. Cugnon, 1997 : "About Sunspot Number Medium-Term Predictions", in "Solar-Terrestrial Prediction Workshop V", eds G. Heckman et al., Hiraiso Solar Terrestrial Research Center, Japan, 103

Brussels, June 1, 2006 09:52 UT

Ed. Ronald Van der Linden, Ass. Ed. Petra Vanlommel
Editing contributions from various members of the SIDC team

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http://sidc.oma.be

Beknopt verslag van de bijeenkomst van de Werkgroep Zon op 17 juni te Utrecht.

Voorzitter Ton Spaninks opende de bijeenkomst na enige vertraging. Er waren problemen met de toegang tot Sonnenborgh, evenals technische problemen met het aansluiten van de laptop en de beamer. 14 leden waren aanwezig.

Peter Louwman werd op de afgelopen jaarvergadering van de Koninklijke Nederlandse Vereniging voor Weer- en Sterrenkunde benoemd tot erelid. Tijdens de bijeenkomst werd hierbij stilgestaan en werd Peter van harte gefeliciteerd door de aanwezige leden.

Theo Dukers hield een lezing over SID's (Sudden Ionospheric Disturbances). Aangezien het een vervolg was op een eerder voordracht, begon Theo met een korte herhaling en bouwde vervolgens het betoog uit: -De zon als elektromagneet.- Dipoolveld en veldlijnen- De zon als bol geïoniseerd gas met losse elektronen en protonen.- Geleidbaarheid van geïoniseerd gas. Magnetische veldlijnen die over en net onder het zonoppervlak lopen. – Door differentiële rotatie: opwinden van de veldlijnen. – Neiging tot uitstulping van de veldlijnen. – In de eindfase: opheffing van de veldlijnen en omkering van de polariteit.- Solar flares. Voetpunt magneetveld. Eruptie van deeltjes en straling (harde en zachte X-rays, radiostraling, elektronen, protonen, CME's, schokgolven). - Interactie hiervan met de atmosfeer van de aarde en het aardmagnetisch veld. - Geïoniseerde lagen in de atmosfeer (D, E, F1 en F2 lagen). F1 overdag en F2 's nachts. – Het plotseling wegvallen van lange afstand radioverbindingen, veroorzaakt door flares. Alle lagen worden dikker, gaan beter reflecteren.- De D-laag als spelbreker, deze wordt voor hogere frequenties doorzichtiger, bij lagere frequenties betere reflecties. – Ontvangst van tijdseinzenders. – Directe en gereflecteerde signalen die ontvangen worden. – Interferentieverschijnselen. – Registratie van SID's.
Een en ander werd aangevuld met mooie beelden uit de radiokamer van Theo met een schat aan apparatuur.

Vervolgens kwam de zonsverduistering van 29 maart 2006 aan de orde. Gerda Gravers hield een mooie dialezing over haar bezoek aan Turkije. Ook het gebeuren rondom de eclips kreeg ruim de aandacht. Verder zagen we fraaie opnames van Gerrit Nauta, Bob van Slooten van Turkije van de verschillende stadia van de eclips, en van Klaas Kroesen die de partiele verduistering vanuit Nederland had vastgelegd. Ton Spaninks had naast foto opnames ook metingen verricht van temperatuur en lichtsterkte.

Ton Spaninks deed verslag van zijn bezoek aan de Duitse zustervereniging tijdens de Sonnenagung. Uitwisselingsmogelijkheden werden aangekaart m.b.t. lichtbruggen, poolfakkels, vlekkentellingen, het uitwisselen van periodieken en het centraal verzamelen en verwerken van de waarnemingen.

De waarnemingen van de afgelopen periode werden besproken. Omdat we nu in een rustige fase zitten, werden enkele gebeurtenissen op de zon besproken met maandoverzichten van Nico Heijblok en Klaas Kroesen, foto's van Bob van Slooten, Ton Spaninks, Evert Gorter, protuberansopnames van Evert, Klaas, H-alfa opnames van Evert, magnetogrammen van Nico en Ton en tekeningen van Gerda Gravers, Harry Balster en Ton.

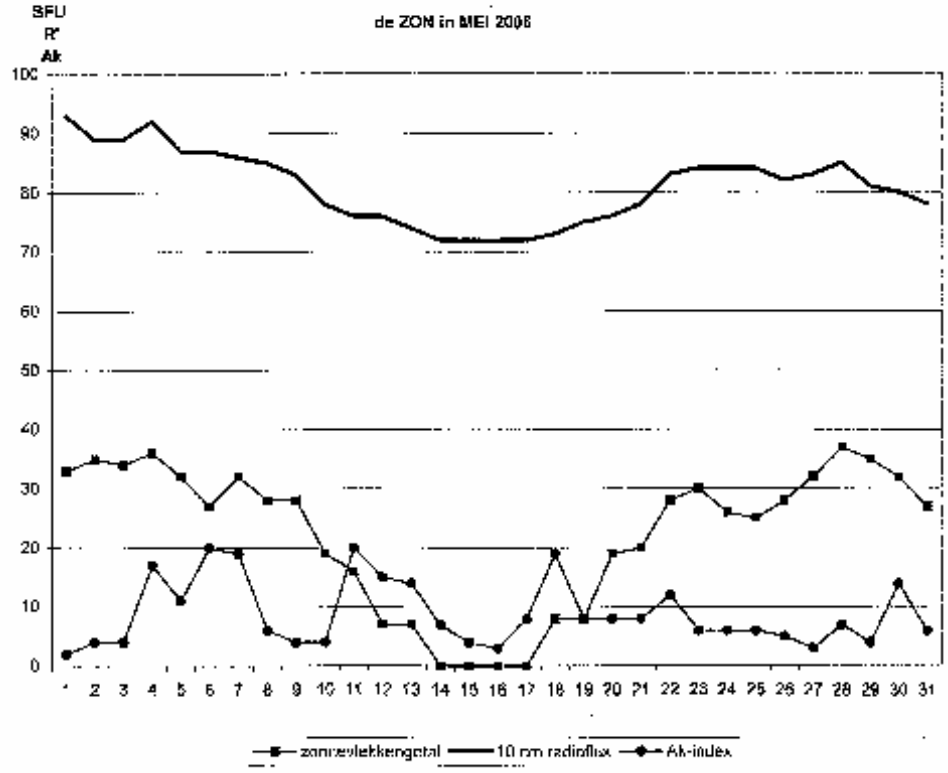
Harry Balster verrichtte zijn 5000-ste waarneming. Hij gaf een kort historisch overzicht vanaf de eerste waarneming op 2 mei 1977, aanvankelijk binnen een groep, later als solist.

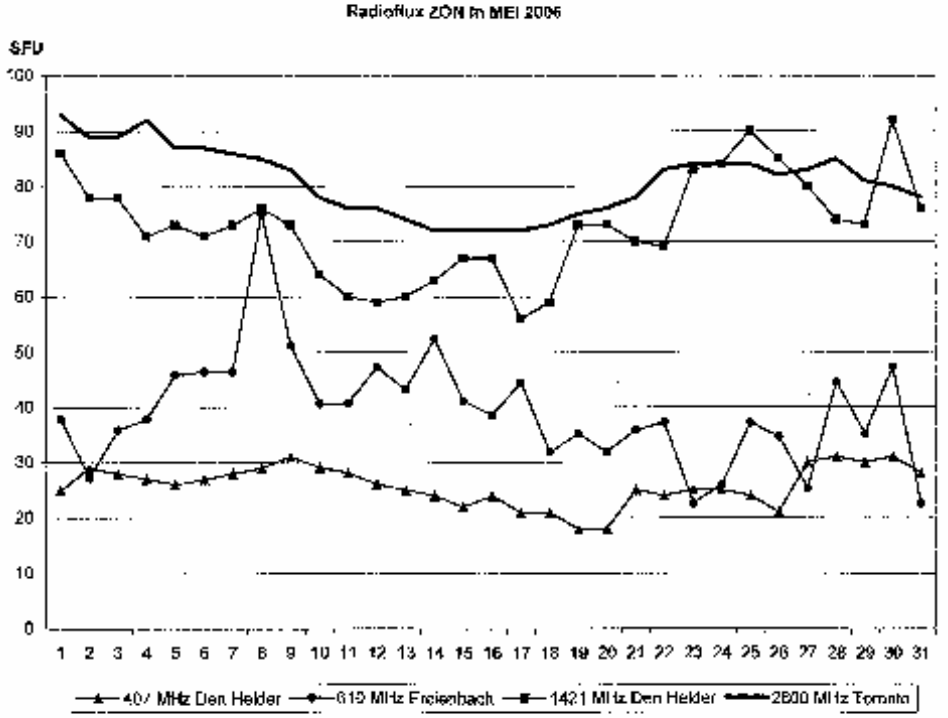
Rob Brotherhood memoreerde het feit dat de werkgroep, sinds de oprichting ongeveer 25 jaar geleden, zich met veel meer projecten bezighoudt dan alleen het tellen van vlekken. Hiervan had men vroeger nooit kunnen dromen. Hij complimenteerde de leden van de werkgroep met hun activiteiten.

Volgende bijeenkomst: 28 oktober te Utrecht .

Ledenlijst Werkgroep Zon . Juni 2006

Voornaam	Achternaam	Straat	Postcode en plaats	Telefoon	E-mail	Bijzonderheden	Aanvang
	1. Gewone leden						
Harry	Belster	A. Schweitzerstraat 8	6562 XA Groesbeek	024-3973483	belster@sci.kun.nl		1982
Erik	Bellaard	Het Gareel 5	8256 DM Biddinghuizen	0321-330782	bellaard@wega.nl		2001
Henk	Bril	Burg. F.A. Cortenplein 28	6116 GA Nieuwstadt	046 4858466	h.j.bril@hccnet.nl		2004
Rob	Brotherhood	Leeuwenlaan 25	2566 JC Den Haag	070-3644095			1980
C.	Cock	Donau 127	2911 HB Nieuwerkerk a.d. IJssel				2001
Peter	Croockewit	Petruslaan 17	6564 AJ H. Landstichting	024-3281190			1982
Wim	Dam	Postbus 104	1630 AC Wormer	06-51828669			1999
Theo	Dukers	Voerweg 6	7213 LG Gorssel	0575-490630	theo.dukers@12move.nl		2000
J.J.	Engelen	Cornelis Koomanweg 5	1862 GG Bergen				2004
Evert	Gorter	Upese Vliet 3	5032 BZ Tilburg	013-4584464			2001
mw. Gerda	Gravers	Poelenburg 394	1504 NT Zaandam	075-6159838	g.gravers@chello.nl		1982
Aad	Groenewegen	v.d. Spiegelstraat 48	4461 LM Goes	0113-221845			1981
Nico	Helblok	Wezenstraat 70	1781 GM Den Helder	0223-624130	helpl@planet.nl	penningmeester/wasma	1988
Math	Heijen	Akkerwinde 22	6374 RD Landgraaf	045-5718585	info@backyard-astro.com		2004
Benno	Houweling	Veenenburg 36	2804 WZ Gouda	0182-539082	benno.houweling@planet.nl		1980
Martin van	Ingen	Lingedijk 27	4191 VA Geldermalsen	0345-578461	martin.ingen@wxs.nl		2006
Dennis	Jansink	François Mauriacweg 117	3731 BB De Bilt	030-2204270			1981
Maarten	Janeweijer	Ganzemwag 14	1021 CP Amsterdam	020-6386564	mjensw@xs4all.nl		1983
Klaas	Kroesen	C.H. Moesstraat 35	1942 EB Beverwijk	0251-214277	kkroesen@nervnet.nl		1984
Peter	Louwman	Hogtisan 2	2243 CB Wassenaar	070-5178855	louwman.historicaltelescopes@worldonline.nl		1980
Arie	Mak	Amersfoortsestr.weg 8, flat 301	1412 KB Naarden	035-6940614			1980
mw. Siets	Mak-v.d. Hoeven	Amersfoortsestr.weg 9, flat 301	1412 KB Naarden	035-6940614			1980
G.	Meijer	Zuylenburg 6	3904 JT Veenendaal	0318-562373	gravity.without.metaphysics@planet.nl		2002
Koen	Miskotte	De La Reystraat 92	3861 BK Ermelo	0341-566729	k.miskotte@wxs.nl		2004
Gerrit	Nauta	Dissenteesedrift 33	3436 AH Nieuwegein	030-6090628	nautape@planet.nl		2003
Geert	Ottenhalm	Kerkhoflaan 139	5931 LM Tegelen				2003
Leo	Oudshoorn	Hyacintstraat 21	2252 VD Voorschoten	071-5612537			1982
Louw	Pels	Gemeenschapspolderweg 503	1382 GM Weesp	0294-414842			1985
Kees	Pauw	Kleine Kreek 12	3823 JX Amersfoort	033-4554836	keespauw@planet.nl	secretaris	1998
Harrie	Ruttan	Boerenweg 32	5944 EK Arcen	077-4731347	hruttan@plex.nl		2001
Bob van	Slooten	Kootwijkerzand 8	3823 ZB Amersfoort	033-4559818	vanslooten@xscall.nl		1980
Andries	Son	Veldstraat 1	B-3910 Neerpelt (België)	0032-11664363	andries.son@belgacom.net		1999
Ton	Spaninks	Gen. de Wetstraat 31	5021 TK Tilburg	013-5422534	tspaninks@zonnet.nl	voorzitter	1980
Rob	Stammes	Middenweg 34 A	1746 EA Dirkshorn	0224-552092			1987
W.	Terlouw	Laan van Insulinde 36	2103 TB Heemstede	023-5288362			1992
Dees	Verschuuren	Burg. Winenstraat 38	5721 AG Asten	0493-693897	dijm.verschuuren@tiss.nl		1983
Jan	Vlieter	De Els 38	7482 BC Haaksbergen	053-5723620	jhg.vlieter@hccnet.nl		1993
Cees	Wolvekamp	Aurora 22	5581 PM Heeze	040-2264244	cees.wolvekamp@wxs.nl		1999
Wim	Zanstra	Spilkerlaan 13	9903 BB Appingedam	0596-625617	wimzanstra@zonnet.nl		1987
Wim	Zijlema	Hoofdweg 67 C	9815 AB Kolham	0598-422264	w.a.zijlema@freeler.nl		


SFU
R'
Ak
de ZON in MEI 2006
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in MEI 2006
SFU
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
407 MHz Den Helder
610 MHz Penticton
1421 MHz Den Helder
2800 MHz Toronto

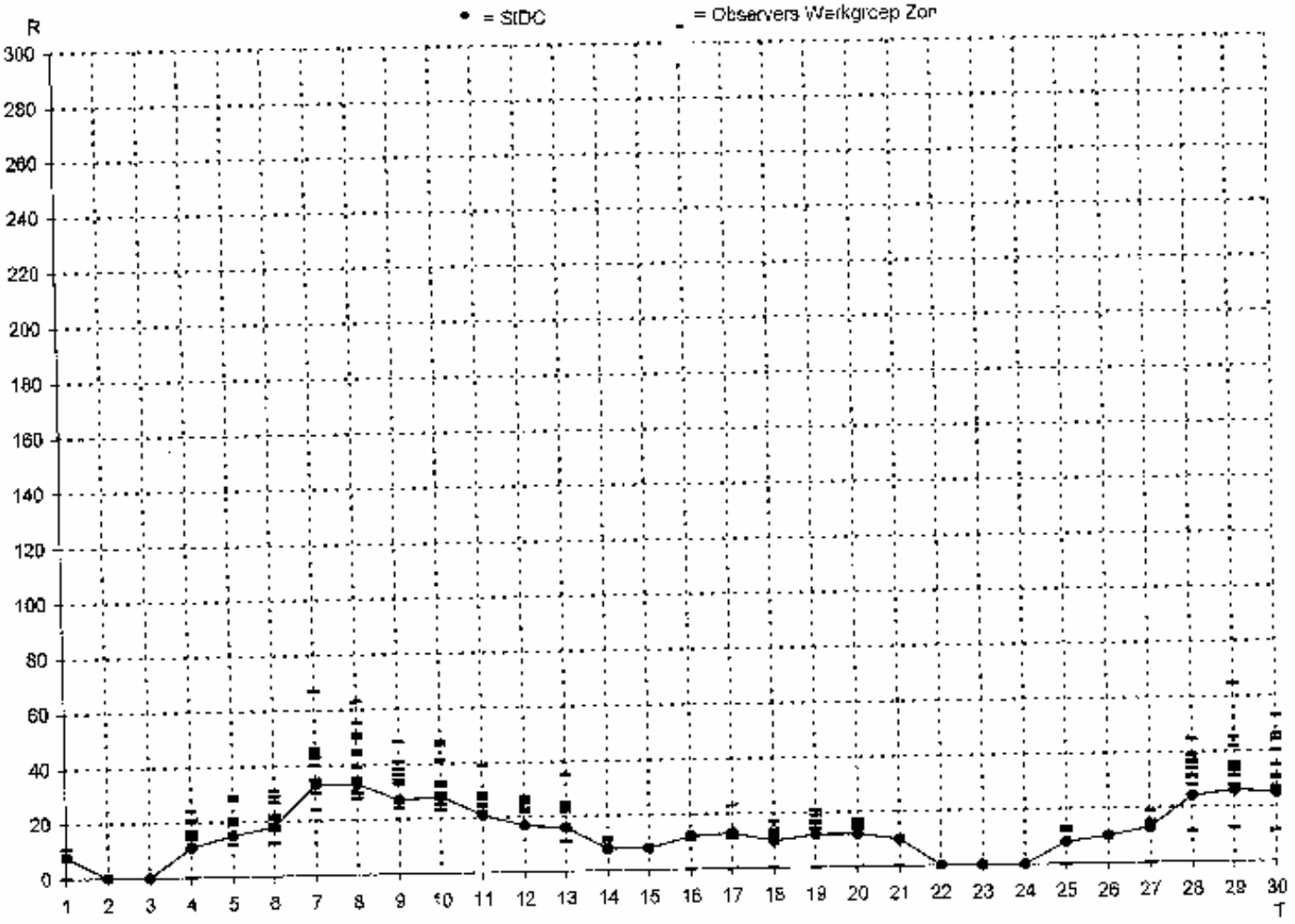
Bulletin Werkgroep Zon — Juni 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijpi@planet.nl

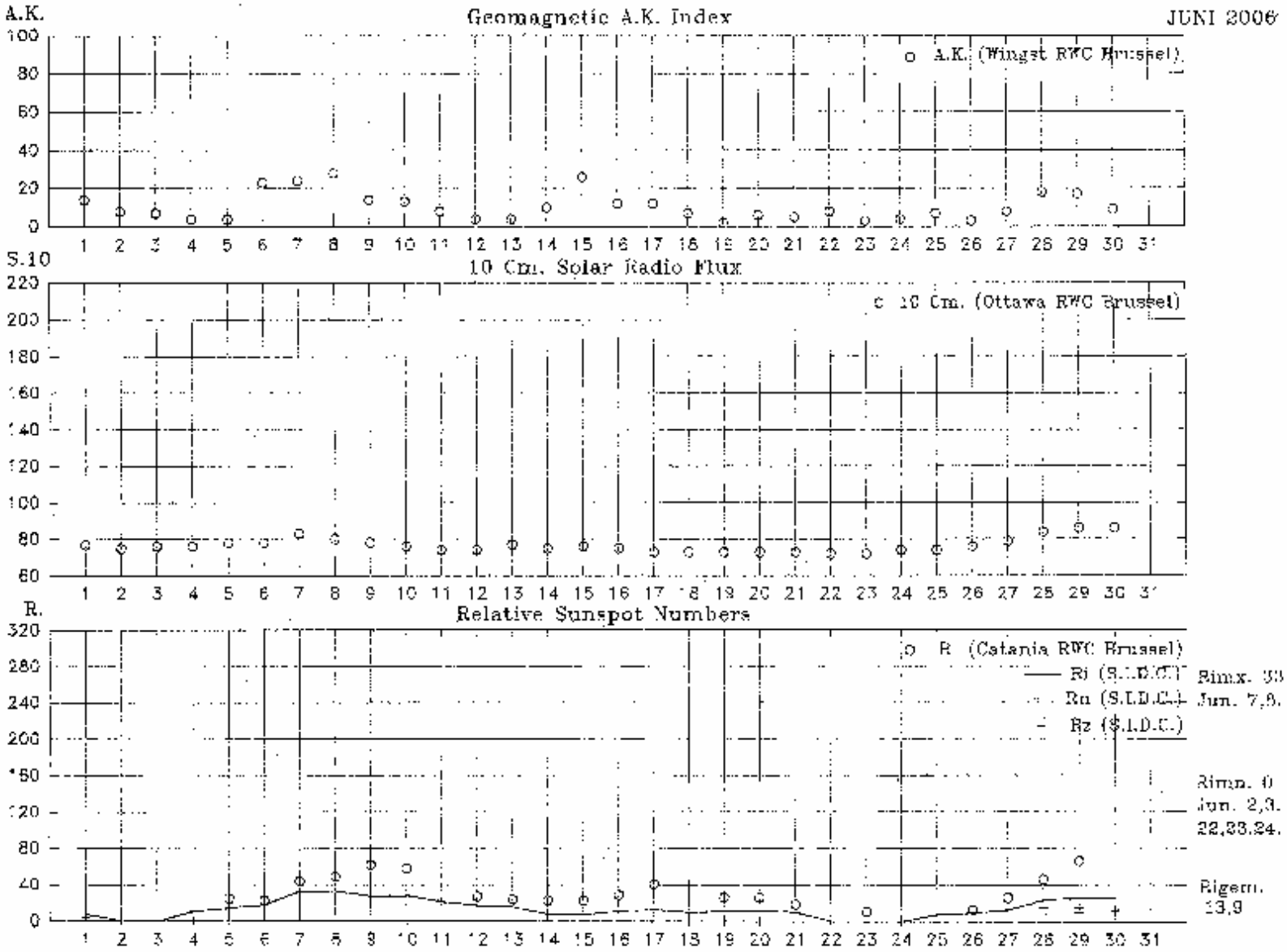
Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Gort	Gr50	Groe	Jn 9	Jn40	Kr80	vSlo	Son	Spa	Zans	Zijle
1	8		0			0			11			0	
2	0	0	0			0			0		0	0	
3	0	0	0	0		0			0		0	0	0
4	11	24	0	21		0			14	16	17	15	20
5	15	29	19			12		28	20	21	19		
6	18	31	17			12	12	27	19	22	21	29	
7	33	43	35		30	24			40	46	45	44	67
8	33	34	35	44	30	28		39	51	50	55	45	63
9	27	34	33	38		24		33	36	36	36	41	48
10	25	32	33	27		23		25	47	41	48	29	32
11	21	39	24	29		22		22	24	27	28	25	39
12	17	27	23	26	22	22		22	25	23	25	23	23
13	16	25	22	25		22		11	24	24	35	22	23
14	8	12	11									11	
15	8												
16	12	0	0		0	0			11		13		
17	13	11	0			0			12		23		
18	10	12	11			0			14		13	0	17
19	12	17	16		0	0			14	19		14	21
20	12	16	14			0			15			17	
21	10					0			0	0			
22	0		0			0			0	0	0	0	
23	0		0			0			0	0	0	0	
24	0	0	0			0			0		0	0	
25	8	13				0			12			0	
26	10												
27	13	15				0		14	19				
28	24	39	34	31	28	11		37	45	36	38	34	
29	28	42	28	31		12		34	45	35	36	33	65
30	25	44	31	27		11	11	11	46	40	35	30	53
observ		24	25	11	6	27	2	12	27	17	21	28	13
k		0,71	0,84	0,76	0,96	1,39	1,69	0,96	0,75	0,71	0,70	0,76	0,58
st.dev.		0,17	0,10	0,15	0,17	0,54	0,55	0,47	0,16	0,06	0,11	0,09	0,13
st.d./ k		0,25	0,12	0,19	0,18	0,39	0,29	0,48	0,21	0,08	0,16	0,11	0,22

Observers		[...] = Refractor, d = ... mm		{Rf...} = Reflector, d = ... mm	
Bals	= H.A.M. Balster [70]	Jn 9	= D. Jannink [9]	Son	= A.T. Son [Rf 150 Kutter]
Gort	= E.Gorter [90]	Jn40	= D. Jannink [40]	Spa	= T. Spaninks [75]
Gr50	= Mw G. Gravers [50]	Kr80	= K. Kroesen [80]	Zans	= W. Zanstra [Rf 155]
Groe	= A.Groeneweger [102]	vSlo	= B. van Slooten [90]	Zijle	= W.A. Zijlema [90]


• = StDC
= Observers Werkgroep Zon
R
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
T

juni 2006


A.K.
Geomagnetic A.K. Index
JUNI 2006
o A.K. (Wingst RWC Brussel)
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
S.10
10 Cm. Solar Radio Flux
c 10 Cm. (Ottawa RWC Brussel)
220
200
180
160
140
120
100
80
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
R.
Relative Sunspot Numbers
o R (Catania RWC Brussel)
Ri (S.I.D.C.)
Rn (S.I.D.C.)
Rz (S.I.D.C.)
Rimx. 33
Jun. 7,8.
Rimn. 0
Jun. 2,3.
22,23,24.
Rigem.
13,9
320
280
240
200
160
120
80
40
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

juni 2006

	S.I.D.C.		Bellaterra		Jannink4		v.Slooten		Son		Spaninks		Zanstra	
Day	Rn	Rs	Rn	Ra	Rn	Rs	Rn	Ra	Rn	Rs	Rn	Rs	Rn	Ra
1	4	4					11	0					0	0
2	0	0	0	0			0	0			0	0	0	0
3	0	0	0	0			0	0			0	0	0	0
4	0	11	0	24			0	14	0	16	0	17	0	15
5	0	15	0	29			0	23	0	21	0	19		
6	0	18	0	31	0	12	0	19	0	22	0	21	0	29
7	0	33	0	43			0	49	0	46	0	45	14	30
8	0	33	0	34			0	51	0	50	0	55	14	31
9	0	27	0	34			0	36	0	36	0	33	13	28
10	0	28	0	32			16	31	0	41	0	43	12	17
11	0	21	0	39			0	24	0	27	0	28	13	12
12	0	17	0	27			0	25	0	23	0	25	11	12
13	0	16	0	25			0	24	0	24	0	35	11	11
14	0	5	0	12									0	11
15	0	8												
16	0	12	0	0			11	0			0	13		
17	0	13	0	11			0	17			0	23		
18	0	10	0	12			0	14			0	15	0	0
19	0	12	0	17			0	11	0	19			0	14
20	0	12	0	16			0	15					0	17
21	0	10					0	0	0	0				
22	0	0					0	0	0	0	0	0	0	0
23	0	0					0	0	0	0	0	0	0	0
24	0	0	0	0			0	0			0	0	0	0
25	5	0	13	0			12	0					0	0
26	10	0												
27	13	0	15	0			19	0						
28	16	8	28	11			34	11	23	13	25	11	22	12
29	15	10	28	14			31	14	21	14	22	14	20	13
30	13	12	30	14	0	11	30	19	20	20	18	17	16	14

Eerstvolgende bijeenkomst van de Werkgroep Zon op 28 oktober, Sonnenborgh, Utrecht.

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.craonet.org onder observations

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Solar activity was far from being spectacular this month. Two sunspot groups produced some small flares on their journey over the solar disk.

On June 04, Catania sunspot group 52 (NOAA AR 0892) came into sight at the east limb. Although this group was rather extended and had a βγ magnetic configuration, it showed no significant activity. Only at the end of its passage over the solar disk (June 15-16), it fired 3 C-class flares.
The day after -June 17- three sunspot groups were still present. Nevertheless, the X-ray background radiation measured by GOES dropped even below the A-level and solar activity was completely absent. Late June 23, some coronal loops of a newly approaching active region became visible over the east limb. From June 24 onwards, several B-flares were recorded. The responsible sunspot group was Catania 59 (NOAA AR 0897) but the group stayed quiet during the rest of the month.
There were no (partial) halo CME's captured by CACTus this month. There was a nice prominence eruption in the southern hemisphere near the central meridian on June 25. The corresponding slow CME did not have an Earth-directed component.
In the first half of the month, no EIT images were available. Only from June 15, we had again a view on coronal holes in the 28.4nm band pass of EIT. After June 15, only two coronal holes were observed with EIT. A recurrent coronal hole passed the central meridian on June 25. Part of it was located at the equator, the rest in the northern hemisphere. The second CH was located 45° to the east of the central meridian on June 30.

II. Geomagnetic Activity

The absence of EIT hampered the forecast. Predictions were therefore largely based recurrence arguments. Once again, it were coronal holes causing all the geomagnetic disturbances this month.

On June 01, NOAA/Boulder announced an active period (Kp=4) due to the presence of a large recurrent coronal hole in the southern hemisphere.
On June 06, again a recurrent northern coronal hole put its imprint in the solar wind data of the ACE spacecraft at L1. The solar wind speed increased up till 700 km/s. On June 06, 07 and half of June 08, we had active geomagnetic conditions, with two periods of Kp=5. The solar wind slowed down from June 09 onwards down to 350 km/s on June 13. Soon thereafter, early June 14, a co-rotating interaction region was observed at L1. The interplanetary magnetic field (IMF) became 10nT. The solar wind emanating from the coronal hole reached a maximum value of 600 km/s from June 15 onwards. On May 15, Kp was 5 for two periods. June 17, Kp reached a value of 4 once. This short living geomagnetic disturbance was caused by the z-component of the IMF that fluctuated to more negative values for quarter of a day. The solar wind carrying this magnetic field orientation had still an enhanced speed. On June 21, the speed reached the value of 300 km/s. On June 28, active conditions were measured. These were caused by the coronal hole passing the central meridian on June 25.

III. Noticeable solar events

No M- or X-class flare occurred

IV. Halo CME list

No CME alert was sent

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_s	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	27	6	-	98	////	0	0/0	6	
1	8	-		97	////	0	0/0	14	
2	9	0	-	75	////	0	0/0	8	
3	9	0	-	76	///	0	/0	/	
4	11	8	-	76	////	0	0/0	4	
5	15	13	-	75	////	0	0/0	4	
6	12	24	-	78	////	0	0/0	23	
7	33	48	-	83	////	-	0/0	24	
8	33	65		80	////	0	0/0	28	
9	27	82	-	78	////	0	0/0	14	
10	28	31	-	76	////	0	0/0	12	
11	22	28	-	74	////	0	0/0	8	
12	17	16	-	74	////	0	0/0	4	
13	16	14		77	////	0	0/0	4	
14	8	6	-	75	////	0	0/0	10	
15	8	2		76	////	0	0/0	26	
16	12	6	-	75	////	0	0/0	12	
17	13	5	-	75	////	0	0/0	12	
18	10	3		73	////	0	0/0	7	
19	12	7	-	75	////	0	0/0	2	
20	12	8	-	75	////	0	0/0	6	
21	10	11	-	73	////	0	0/0	2	
22	6	3	-	72	////	0	0/0	8	
23	6	1		72	////	0	0/0	3	
24	0	0	-	74	////	0	0/0	4	
25	8	1	-	77	////	0	0/0	7	
26	10	2		76	////	0	0/0	3	
27	13	6	-	79	////	0	0/0	8	
28	24	19	-	84	////	0	0/0	10	
29	26	33	-	86	////	0	0/0	17	
30	25	46	-	86	////	0	0/0	9	

R'_s : provisional international sunspot numbers from the S.I.D.C

PPSI : provisional photometric sunspot index from the S.I.D.C. in 10-5 w/m^2 : the quantity to be substracted from the mean solar constant to account for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium)

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10.7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UGOSE Terre Adélie).

SFI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams - UGEOR, evaluation : 1 x Sn+10 x "1"+100 x ">1".

XI : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams - UGEOR, UGEOI).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

SEA : sudden enhancements of atmospherics from Ukkel & Dourbes (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

Langetermijnveranderingen in de lengte van de zonnecyclus

Michael L. Rogers, Mercedes T. Richards en Donald St. P. Richards

Vertaling en samenvatting: Jan Janssens

Abstract - Op basis van zonnevlekkengetallen sinds 1610 en -oppervlakten sinds 1874 vinden de onderzoekers een periode van 188 +/- 38 jaar in de lengte van de zonnevlekkencyclus.

1. *Inleiding*

In 1843 meldde Schwabe dat de zon mogelijk een activiteitscyclus van 10 jaar onderging. 5 jaar later introduceerde Wolf het relatieve zonnevlekkengetal (R) en verfijnde de gemiddelde duur van de zonnecyclus tot ongeveer 11 jaar.

Naast R bestaan er nog andere parameters om de evolutie van de zonneactiviteit te volgen, zoals het aantal zonnevlekkengroepen, de oppervlakte van zonnevlekken en de breedte waarop de groepen verschijnen. Onderzoek in combinaties van deze parameters heeft tot interessante inzichten geleid. Zo ontstaat uit de combinatie tussen zonnevlekken en de breedte waarop deze verschijnen het beroemde Vlinderdiagram (Maunder, 1904). Hieruit blijkt dat opeenvolgende zonnecycli elkaar gedurende 1 à 2 jaar overlappen: De vlekken van de nieuwe cyclus verschijnen op hoge breedten terwijl de vlekken van de uitstervende cyclus nog steeds verschijnen vlakbij de zonne-evenaar.

Zonnevlekkendata voor 1700 zijn schaars. Ondersteund door poollichtwaarnemingen en boomringdata concluderen de meeste waarnemers toch dat er in het verleden perioden zijn geweest waarop de zonneactiviteit opvallend laag was. Naast het Maunderminimum (1642-1705) waren er bijvoorbeeld ook het Spörerminimum (1420-1530) en meer recentelijk het Daltonminimum (1795-1823).

Vandaag de dag kan het verloop van een zonnecyclus pas voorspeld worden als deze al een tijdje bezig is. De modellen maken echter geen gebruik van het feit dat de lengte van de zonnecyclus varieert tussen 7 en 17 jaar. Met dit artikel willen de onderzoekers eventuele veranderingen in de duur van de zonnecyclus bestuderen en nagaan of deze duur niet aan langdurige perioden onderhevig is.

2. *Dataverzameling*

Dagelijkse, maandelijkse en jaarlijkse zonnevlekkengetallen (1700-2005) zijn afkomstig uit catalogi samengesteld door het National Geophysical Data Center (NGDC). De data voor de oppervlakte van de zonnevlekken werd op 9 mei 1874 begonnen door het Royal Greenwich Observatory en sinds 1976 door USAF/NOAA voortgezet. De onderzoekers gaan er vanuit dat eventuele verschillen tussen de dataverzamelingen zichtbaar zullen worden in de analyses.

3. *De lengte van de zonnevlekkencyclus uit zonnevlekkengetallen en -oppervlakten*

De onderzoekers gebruiken dezelfde techniek als deze die ze toepasten in hun studie over het uitbarstingsgedrag van magnetisch actieve, nauwe dubbelsterrensystemen in het radiogebied.

3.1 *Energiespectrum en PDM-analyses*

In de eerste methode wordt een energiespectrum bepaald uit de toepassing van een "Snelle Fourier Transformatie" (FFT) op de data. Echte periodiciteiten worden dan zichtbaar als pieken in de resultaten. Tevens werd een methode gebruikt die rekening houdt met de onregelmatige spreiding van de data.

De tweede methode is onafhankelijk van de eerste. Ze berekent met behulp van de "Faze Dispersie Verkleining" (PDM) technisch de meest gepaste overeenkomst met de data. Ze houdt rekening met het eventuele niet-sinusoïdale karakter van een dataset en produceert dan betere resultaten dan de FFT.

De resultaten van beide technieken werden gecontroleerd op eventuele numerieke relaties (spiegelfrequenties,...). Voor de PDM-techniek werd de maximum testperiode op 260 jaar geplaatst, behalve voor de jaarlijkse zonnevlekkengetallen (350 jaar). Omwille van consistentie met de zonnevlekkengetallen, werden deze maxima ook voor de oppervlakten van zonnevlekken gebruikt, ondanks de kortere tijdreeks.

3.2 *Resultaten van het energiespectrum en de PDM-analyses*

Zowel de FFT als de PDM-techniek leveren vergelijkbare resultaten op. Voor de Schwabe-cyclus wordt een gemiddelde periode van 10,8 +/- 0,50 jaar gevonden (10,95 jaar voor de Wolfgetallen, en 10,65 jaar voor de oppervlakten). Uit de PDM-methode kwam eveneens een periode van 21,9 +/- 0,66 jaar tot uiting. Er werden ook langere perioden geïdentificeerd die een duur hebben tussen 90 en 260 jaar. Ze zijn minder expliciet dan de Schwabe-cyclus. Het zijn deze periodiciteiten die het onderwerp uitmaken van verder onderzoek.

4. Veranderingen in de lengte van de zonnevlekkencyclus in cyclusminima en –maxima

Het is niet gemakkelijk om het precieze tijdstip van cyclusmaxima en –minima te bepalen. De onderzoekers gebruikten data van het NGDC. Er blijkt een grote veranderlijkheid te bestaan in de duur van de zonnecyclus over de laatste 4 eeuwen (tussen 7 en 15 jaar). De cycluslengten werden geanalyseerd volgens twee methoden: De *mediaan*[1] spoormethode en het energiespectrum voor de O-C residu's (= verschillen tussen geobserveerde en berekende waarden).

4.1 De mediaan spoormethode

Het mediaan spoor is een grafiek van de mediaan voor alle datavensters binnen een gegevensreeks. Voor de bepaling van het optimale datavenster werden 3 statistische methodes gebruikt. Tevens werden 3 gegevensreeksen gebruikt: cycluslengten gebaseerd op enkel de cyclusminima, op enkel de cyclusmaxima, en op beide. Als optimale datavensters kwamen waarden tussen 60 en 120 jaar naar voren. De onderzoekers gebruikten optimale datavensters van 40, 50, 60, 70, 80 en 90 jaar en berekenden voor de gegevensreeksen het mediaanspoor waardoor ze een best passende sinusoïde lieten lopen. Het blijkt dan dat enkel voor de datavensters van 50 en 60 jaar het mediaanspoor voor de gegevensreeks van zowel de cyclusminima als de cyclusmaxima in fase zijn.

4.2 Resultaten van de mediaan spoormethode

De duur van de Schwabe-cyclus bedraagt gemiddeld ongeveer 11 jaar. Hier zit echter een grote spreiding op van respectievelijk 1,5 en 2 jaar afhankelijk of het gemiddelde gebaseerd is op cyclusminima of cyclusmaxima. De veranderlijkheid van de cyclusduur neemt ook sterk af na 1818 (convergeert meer naar 11 jaar). Dit is mogelijk te wijten aan de moeilijkheid om het precieze tijdstip vast te stellen van het cyclusminimum en –maximum tijdens lage zonneactiviteit. Echter, ook nadat de data accurater werden, bleef de spreiding ongeveer 1,5 jaar. Dit resultaat is meteen een suggestie voor langetermijnvariabiliteit in de Schwabecyclus.

Voor het datavenster van 50 jaar wordt een periode gevonden van 183 jaar, en met het datavenster van 60 jaar komt een periode van 243 jaar overeen. Er is geen verband tussen de datavensters en de gevonden periode. Aangezien de datareeks slechts 385 jaar lang is, wordt de voorkeur gegeven aan de kortere periode van 183 jaar. Deze laatste is ook in lijn met resultaten uit eerdere studies.

4.3 Analyse van de O-C data

Deze methode bestaat erin om het energiespectrum te bepalen op de verschillen tussen de waargenomen en berekende cycluslengten voor de 3 datareeksen. Ze maakt hiervoor gebruik van de periode van 10,95 jaar zoals eerder gevonden met de FFT en PDM-technieken uit de Wolfgetallen. De data werden ook genormaliseerd (= verminderen met de lineaire trend).

4.4 Resultaten van de O-C data analyse

Er worden perioden gevonden van 188 +/- 38 jaar, van 86,6 +/- 12,5 jaar, en tevens een kortere periode van ongeveer 40 jaar. De periode van 86,6 jaar is de bekende Gleissberg-cyclus.

5. Discussie en conclusies

De lengte van de zonnecyclus kan variëren tussen 7 en 17 jaar, met typische waarden tussen 10 en 12 jaar. Het doel van de onderzoekers was om na te gaan of er een langdurig patroon zat in deze variatie.

NGDC-data voor de periode 1610 tot 2000 werden gebruikt. Deze werden geanalyseerd volgens 2 onafhankelijke benaderingen, omwille van de moeilijkheden om het precieze tijdstip van het cyclusminimum en vooral –maximum vast te stellen. De gelijkaardige resultaten gevonden door beide methodes wijst erop dat dit probleem geen significante invloed had op de analyse.

De mediaan spoormethode bracht periodiciteiten aan het licht van 183 tot 243 jaar. Deze vallen binnen de periodiciteitenband van 90 tot 260 jaar die vooraf bepaald werd met de FFT en PDM-technieken. De analyse van het energiespectrum van de O-C residu's leverde de meest nauwkeurige perioden op, met resp. 188, 87 en +/-40 jaar. Gezien de datareeks bijna 400 jaar lang is, hebben elk van deze perioden minstens 2 volledige cycli doorlopen, wat bijdraagt aan de betrouwbaarheid van de resultaten.

Een vergelijking werd ook gemaakt met langdurige tijdreeksen gebaseerd op koolstof-14 data van boomringen (Solanski et al., zie bijgevoegde figuur). De zonneactiviteit over de laatste 70 jaar was uitzonderlijk sterk. De periode van 188 jaar (Wolfgetal) ligt ook heel dicht bij de 205 jaar durende De Vriess-Seuss cyclus (koolstof-14).

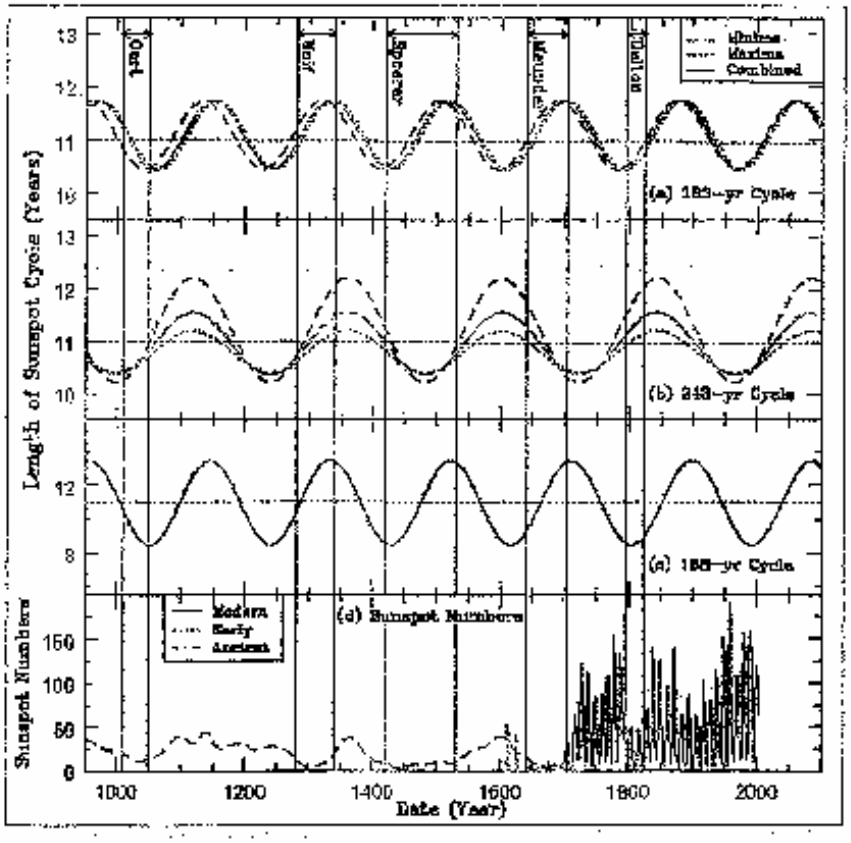
---

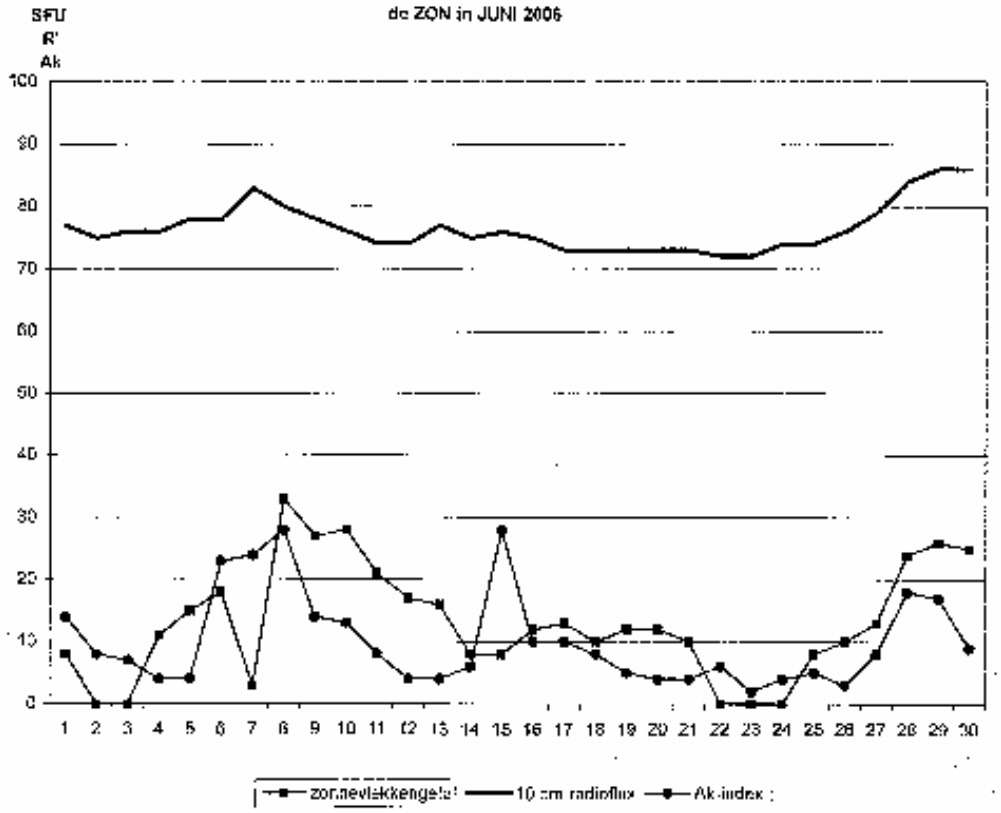
[1] In een reeks getallen gerangschikt van klein naar groot is de mediaan het middelste cijfer uit de reeks (bij een oneven aantal) of de halve som van de twee middelste cijfers (bij een even aantal)

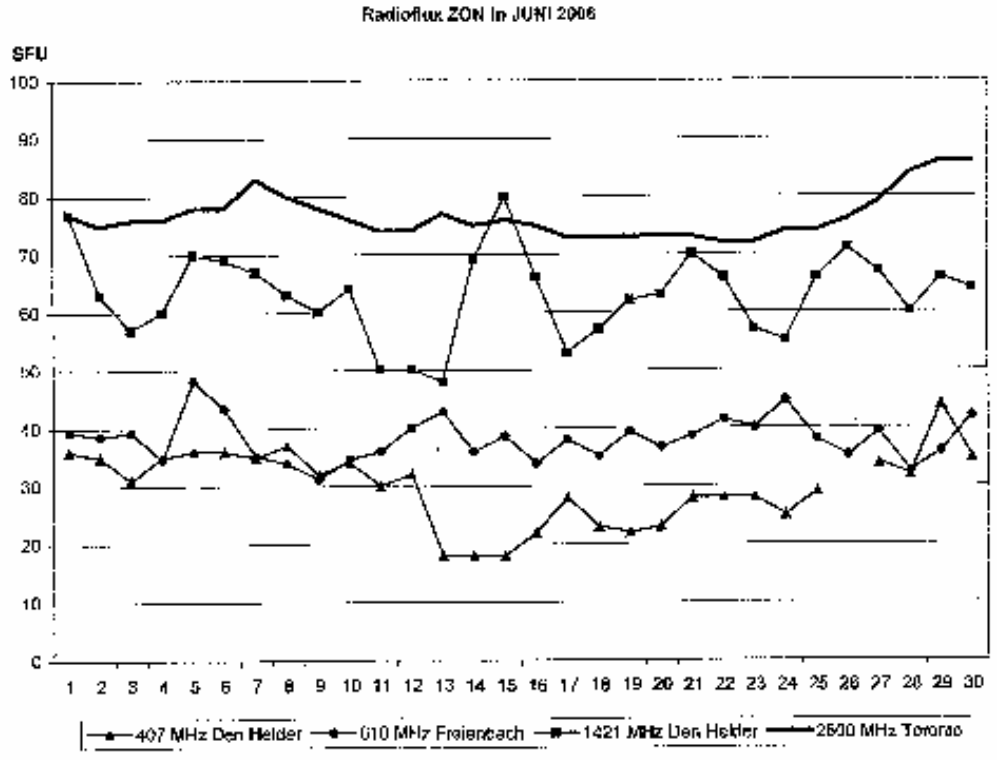
Er blijkt een grote consistentie te zijn tussen de cyclus van 188 jaar en de perioden waarin grote minima optraden in de zonneactiviteit. De 4 grote historische minima (Wolf, Spörer, Maunder en Dalton) hebben telkens plaats op het moment dat de duur van de zonnevlekkencyclus aan het verlengen was.

Langdurige zonnecycli zijn al langer bekend, maar hun oorzaak blijft nog even mysterieus. Deze studie bracht perioden van 188 en 87 jaar aan het licht, met de periode van 188 jaar duidelijk de dominante. Indien dit resultaat correct is, kan worden verwacht dat de zonnecyclus de komende 75 jaar geleidelijk aan langer zal worden, en de overeenkomstige zonneactiviteit lager.

Originoel artikel : ***Long-term variability in the length of the solar cycle*** , http://arxiv.org/PS_cache/astro-ph/pdf/0606/0606426.pdf , 27 juni 2006




SFU
R'
Ak
dc ZON in JUNI 2006
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in JUNI 2006
SFU
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
407 MHz Den Helder
610 MHz Freienbach
1421 MHz Den Helder
2800 MHz Toronto

Bulletin Werkgroep Zon Augustus 2006

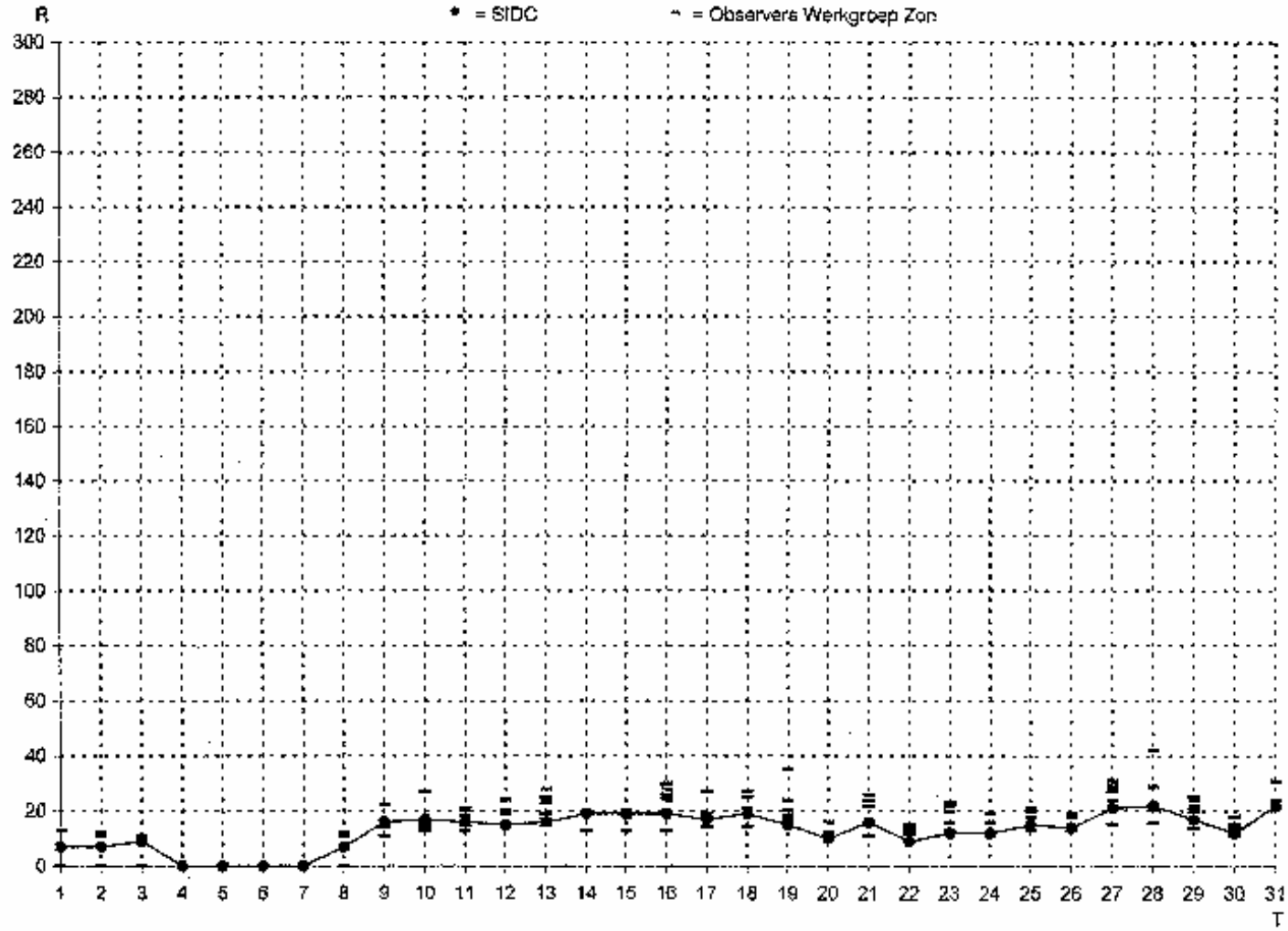
Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijpl@planet.nl

Zonnevlekkengetallen (Sunspot numbers)

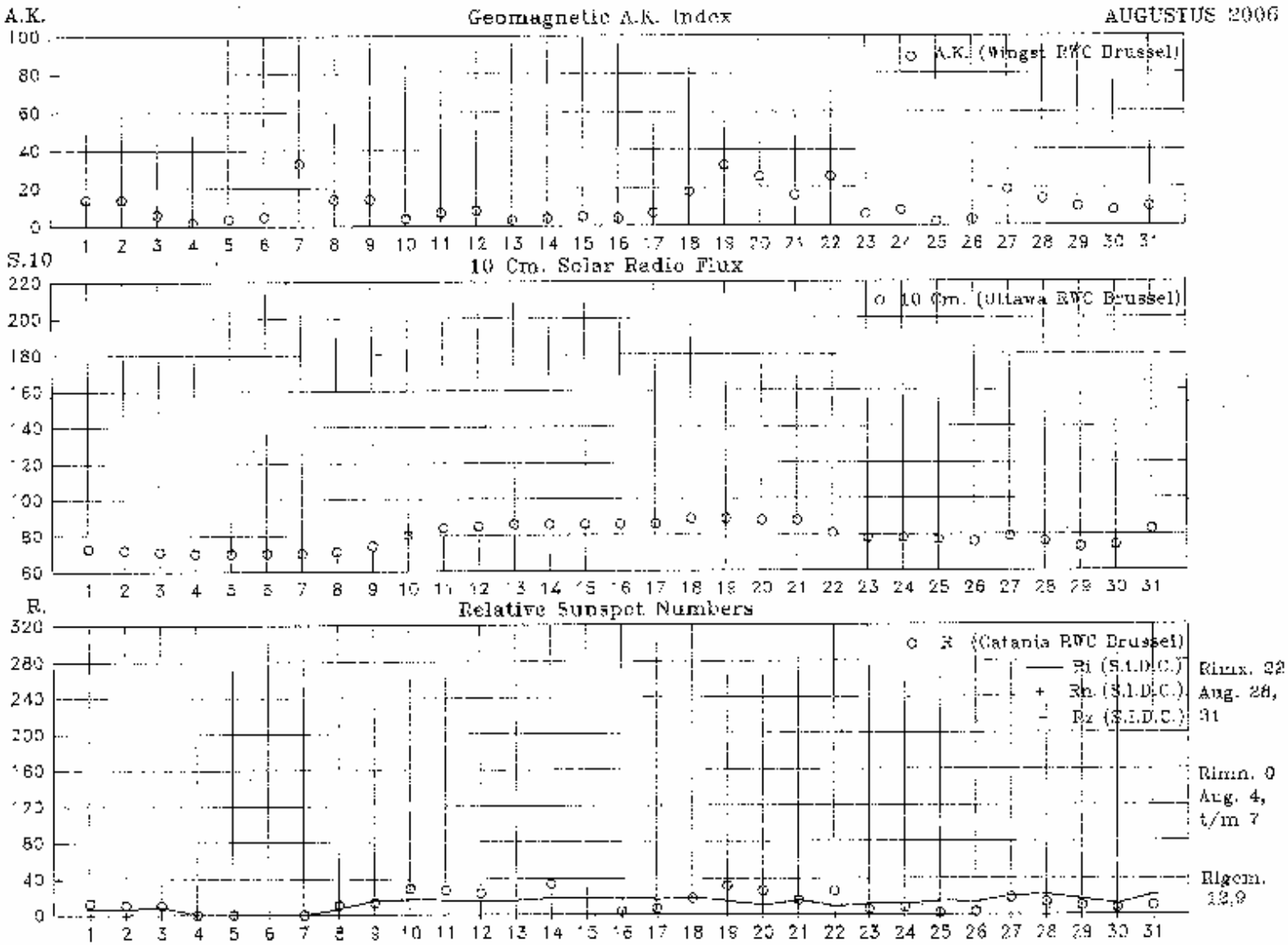
Day	SIDC	Bals	Gr80	Groe	Jn 9	Jn40	K105	vSlo	Son	Spa	Zans	Zijle
1	7		0		0			13				
2	7	12	11		0			11	0			
3	9	0	0		0			11				
4	0		0		0			0				
5	0	0	0		0			0	0	0		0
6	0	0	0	0	0			0	0	0		0
7	0	0	0		0			0	0	0		
8	7	11			0			0	11	12		
9	16	14	11		11			22				
10	17		14		18			15	16	27		
11	16	21	15		13			15	20	18		
12	15	20			14		24	15	19			
13	16	25	19		15		24	17	23	23		28
14	19				15							
15	19		20		13			18				
16	19	26	25		13	13	26	19	24	28		30
17	17	27	18		14			17	17	19		
18	19	25	21		14			25	25	27		
19	15	35	18	15	14		15	17	18	20		24
20	10	16			12			11		12		
21	16	28	11		22			22				24
22	9	15	12	13	12			12	12	14		
23	12	18	13		12		22	16	20	23		
24	12	19		16	12				16			
25	15	20		15	13			21	18	20		
26	14	19			13			19	18	18		
27	21	31	24		15	15	27	26	29			
28	22		29		16		16			42		
29	17	21	24	17	14			22	20	25		
30	12		14		11			18			15	
31	22				24						31	
observ		25	23	6	31	2	7	27	20	18	2	6
k		0,70	0,94	0,89	1,16	1,43	0,81	0,83	0,79	0,70	0,75	0,62
st.dev.		0,14	0,24	0,15	0,23	0,04	0,29	0,16	0,12	0,12	0,08	0,04
st.d./ k		0,20	0,25	0,17	0,20	0,03	0,36	0,19	0,15	0,16	0,08	0,06

Observers	[...] = Refractor, d = .. mm	[Rf...] = Reflector, d = ... mm
Bals = H.A.M. Balster [70]	Jn 9 = D. Jannink [9]	Son = A.T. Son [Rf 150 Kutter]
Gr80 = E.Gorter [80]	Jn40 = D. Jannink [40]	Spa = T. Spaninks [75]
Groe = A.Groenewegen [102]	K105 = K. Kroesen [105]	Zans = W. Zanstra [Rf 155]
	vSlo = B. van Slooten [90]	Zijle = W.A. Zijlema [90]

Evert Gorter is per 1 augustus 2006 overgestapt naar een andere telescoop: 80 mm apo refractor f=560 mm



augustus 2006


A.K.
Geomagnetic A.K. Index
AUGUSTUS 2006
A.K. (Wingst RWC Brussel)
S.10
10 Cm. Solar Radio Flux
10 Cm. (Ottawa RWC Brussel)
R.
Relative Sunspot Numbers
R (Catania RWC Brussel)
Ri (S.I.D.C.)
Rn (S.I.D.C.)
Rz (S.I.D.C.)
Rimax. 32
Aug. 28,
31
Rimin. 0
Aug. 4,
t/m 7
Rigem.
12.9

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

augustus 2006

	S.I.D.C.		Belster		Jabronk4		v.Stoeser		Son		Sparkaks		Zanstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	0	7					0	13						
2	0	7	0	12			0	17	0	0				
3	0	9	0	0			0	11						
4	0	0					0	0						
5	0	0	0	0			0	0	0	0	0	0		
6	0	0	0	0			0	0	0	0	0	0		
7	0	0	0	0			0	0	0	0	0	0		
8	0	7	0	11			0	0	0	11	0	12		
9	0	16	0	14			0	22						
10	0	17					0	15	16	0	0	27		
11	0	16	0	21			0	15	20	0	0	18		
12	0	15	0	20			0	15	0	19				
13	0	16	0	25			0	17	0	23	0	23		
14	0	19												
15	0	19					0	16						
16	0	19	0	26	0	13	0	19	0	14	0	28		
17	0	17	0	27			0	17	0	17	0	19		
18	0	19	0	25			0	25	0	25	0	27		
19	0	15	0	35			0	17	0	18	0	20		
20	0	10	0	16			0	11			0	12		
21	0	16	0	26			0	22						
22	0	9	0	15			0	12	12	0	0	14		
23	0	12	0	16			0	16	20	0	0	29		
24	0	12	0	19					16	0				
25	0	15	0	20			0	21	18	0	0	20		
26	0	14	0	19			0	19	0	15	0	18		
27	0	21	0	31	0	15	0	28	0	29				
28	0	22									0	42		
29	0	17	0	24			0	22	0	20	0	25		
30	0	12					0	18					0	15
31	0	22											0	31

Eerstvolgende bijeenkomst van Werkgroep Zon: 10 februari 2007 te Utrecht, Sonnenborgh.

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.eracnet.org onder observations

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_i	PPSI	600	2800	COS	SFI	XT	Ak
31	13	2		72	////	0	0/0	17
1	7	4		75	////	0	0/0	14
2	7	2	-	72	////	0	0/0	14
3	8	3	-	71	////	0	0/0	6
4	0	0		70	////	0	0/0	2
5	0	0	-	70	////	0	0/0	4
6	1	0	.	70	////	0	3/0	5
7	0	0	.	70	////	0	0/0	3
8	7	2	-	7	////	0	0/0	12
9	10	10		74	////	0	0/0	14
10	11	21	-	80	////	1	0/0	4
11	16	142	-	84	////	1	0/0	7
12	25	236	-	83	////	0	0/0	8
13	0	140	.	82	////	0	0/0	3
14	20	404	-	88	////	0	0/0	4
15	19	///	.	86	////	0	0/0	5
16	19	431	-	82	////	1	0/0	4
17	17	288	-	81	////	0	0/0	7
18	19	275		80	////	0	0/0	14
19	15	289	-	84	////	0	0/0	32
20	10	230		86	////	1	0/0	20
21	16	10	-	86	////	0	0/0	10
22	9	29		81	////	0	0/0	20
23	12	82		78	////	1	0/0	6
24	12	172	-	78	////	0	0/0	8
25	19	289		77	////	0	0/0	7
26	14	380	-	76	////	1	0/0	5
27	21	433	-	79	////	0	0/0	19
28	22	211		76	////	0	0/0	14
29	17	96	-	73	////	0	0/0	10
30	12	61		74	////	0	0/0	6
31	22	197	.	83	////	0	0/0	10

R'_i : provisional International sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10^{-5} w/m^2, the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

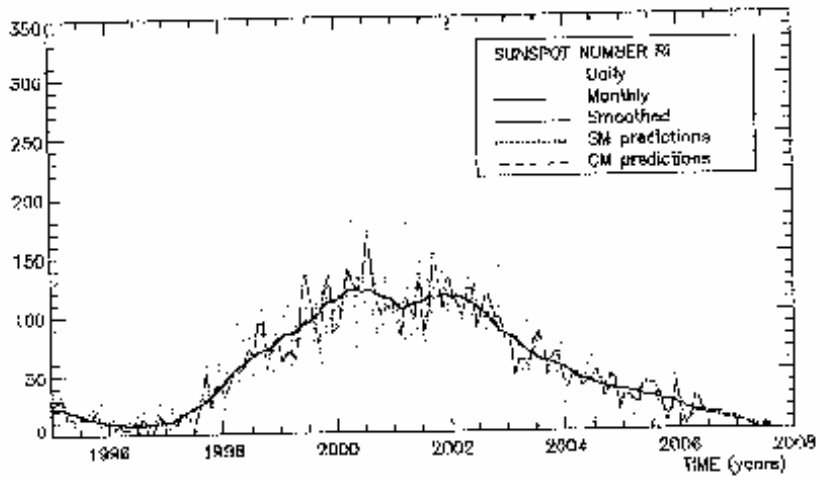
2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - DGEOD. The 10.7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UCOSB Terre Adélie).

SFI : from October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams - UGEOR. evaluation : $1 \times S_n + 10 \times 1' + 100 \times 1''$.

XT : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams - UGEOR, UGEOD).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for March 2006 : 17.3 (1.5%)

	SM	CM		SM	CM		SM	CM
2006 Apr	18	17	2006 Oct	13	10	2007 Apr	6	3
May	15	16	Nov	12	9	May	7	2
Jun	17	15	Dec	12	8	Jun	6	2
Jul	16	14	2007 Jan	11	7	Jul	5	2
Aug	15	14	Feb	10	7	Aug	4	2
Sep	14	13	Mar	9	5	Sep	3	2

SM : SIDC classical method : based on an interpolation of Waldmeier's standard curves; the estimated error ranges from 7% (first month) to 35% (last month)
CM : Combined method : the combined method is a regression technique coupling a dynamo-based estimator with Waldmeier's idea of standard curves, due to K. Denkmayr.
ref. : **K. Denkmayr, P. Cugnon, 1997 :** "About Sunspot Number Medium-Term Predictions", in "Solar-Terrestrial Prediction Workshop V", eds G. Heckman et al., Hiraiso Solar Terrestrial Research Center, Japan, 113

Brussels, October 1, 2006 09:45 UT

Ed. Ronald Van der Linden, Ass. Ed. Petra Vanlommel
Others contributions from various members of the SIDC team

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ftp anonymous : omaftp.oma.be, directory dist/astro/sidc/data
http://sidc.oma.be

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

There were only two sunspot groups that dominated the solar disk this month: Catania sunspot group 69 (NOAA AR 0904) and 72 (NOAA AR 0905). SOHO/EIT had a CCD-camera bake out from Aug 19 onwards.

On Aug 08 Catania sunspot group 69 (NOAA AR 0904) appeared on the east limb causing a significant increase of the background X-ray radiation. In the neighbourhood of the group, evidence of plasma eruptions was seen three times in SOHO/EIT 195. The first such sign of a CME was a coronal dimming seen on Aug 14. The corresponding CME was too weak and vague to be captured by LASCO. A second eruption could be identified on Aug 16 around 07:00 UT. The accompanying partial halo CME was rather slow and not earth-directed. The main event in this sunspot group, a long duration C3.6-class flare, peaked at 16:17UT on Aug 16. The group was at that moment located at the central meridian in the southern hemisphere. A coronal dimming and post-flare loops were visible in SOHO/EIT 195. The corresponding CME had an angular width of 210° and an apparent speed of 1078 km/s. From Aug 19 until Aug 21, the group still produced several confined C-flares.

At the time of the disappearance of Catania 69 at the west limb on Aug 22, a new group turned on the solar disk in the east: Catania 72 (NOAA AR 0905). The main achievement of this group was a C2.5 flare on Aug 26, which was accompanied by a partial halo CME observed by SOHO/LASCO. GOES-12/SXI showed a coronal dimming and a post-eruption arcade in the active region. At that time, the group was situated near the disk center. CACTUS reported the CME speed around 480 km/s.

We counted 4 coronal holes (CH) this month influencing the earth's magnetosphere. Three of them were visible in EIT pictures. The first CH passed the central meridian on Jul 29, the second slightly southern CH passed on Aug 03 and the third rather small southern CH passed on Aug 18. The last CH was not visible anymore because of the CCD bake out.

II. Geomagnetic Activity

We counted 7 periods of geomagnetic activity this month. Different from previous months, several ICMEs caused most of the disturbances.

The first week of the month suffered only a small geomagnetic disturbance: the estimated Kp reached 4 twice on Aug 01. The cause of this disturbance was a CH, the first one mentioned in the section 'Solar Activity'. On Aug 07, the solar wind emanating from the second CH was measured by ACE to be 700 km/s. This pushed the estimated Kp up to 5 and 6, i.e. minor to major storm. Later on Aug 08, conditions settled again to quiet.

On Aug 18 19, two shocks were seen in ACE data. The shock of Aug 18 passed the L1 point around 15:30UT and was probably driven by the interplanetary coronal mass ejection (ICME) corresponding to the eruption observed by SOHO/EIT on Aug 14 emanating from Catania sunspot region 69 (NOAA AR 0904). The plasma cloud itself seems to have missed earth and only the shock heading in front of the cloud arrived. The second shock was detected by ACE around 10:50UT on Aug 19 by ACE and was followed by an ICME probably corresponding to the full halo CME of Aug 16. The ICME resulted in a geomagnetic storm with a NOAA estimated Kp of 6. The interplanetary magnetic field carried by the solar wind turned positive again on Aug 20, which hallmarked the end of the storm. One day later, Aug 21, another disturbance was on its way. This time, the source was the third CH with an imbedded Bz component, fluctuating from positive to negative values resulting in active conditions for two days.

The last period of disturbed geomagnetic conditions was from Aug 27 until Aug 28 and was again induced by the solar wind stream emanating from the last coronal hole.

During Aug 31, the earth passed through a slow ICME produced by a halo CME observed on Aug 26. Although the ICME was directed southward for some time, only weak geomagnetic disturbances were reported (peak K index of 3 by Dourbes and NOAA, 4 by Tromsø).

III. Noticeable solar events

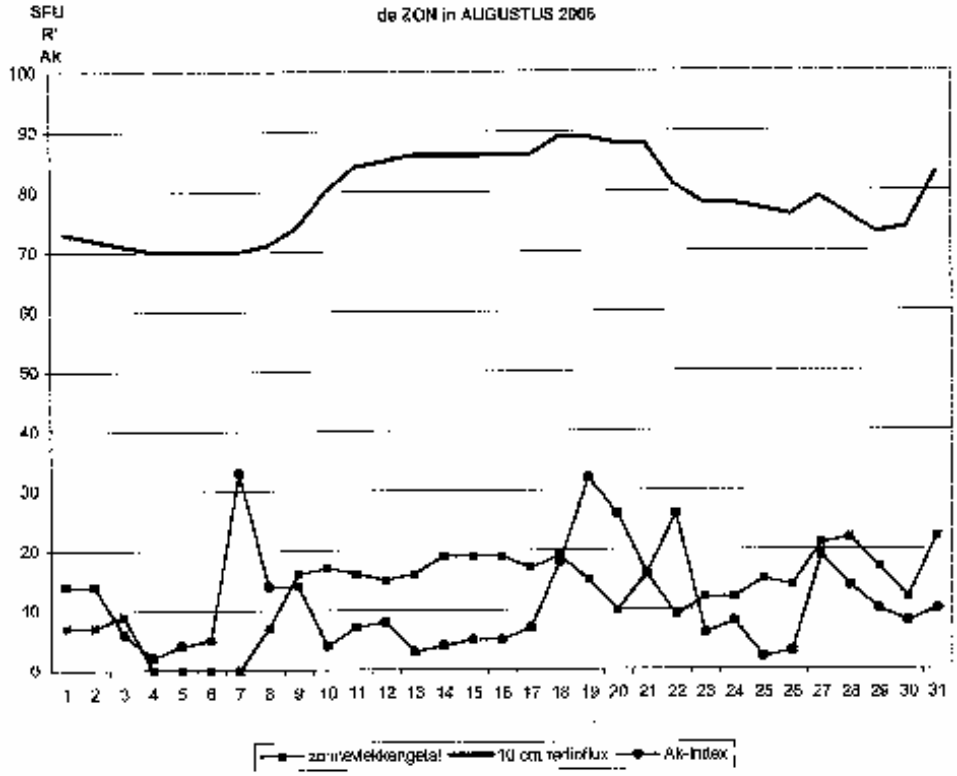
No M- or X-class flare occurred.

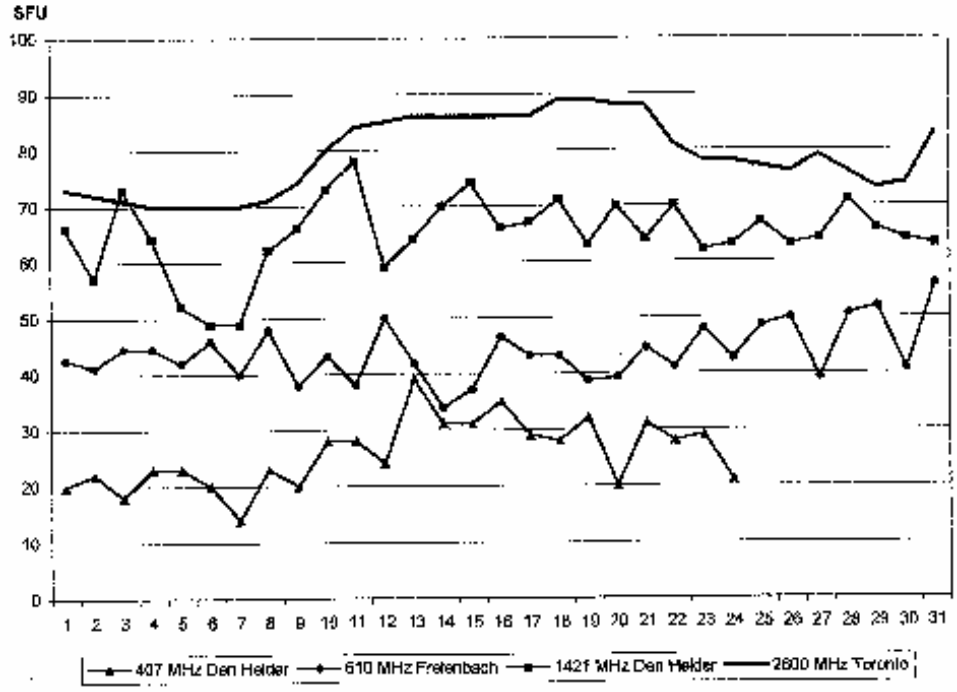
IV. Halo CME list

onset time	e-mail time CACTus	dg	e-mail time LASCO	e-mail time IP	Ass. Events	consequences
08/05 21:54	08/05 [illegible]:33	214	-	-	-	
08/07 21:54	-	-	08/08 15:05	-	backside	-
08/ 6 07:54		-	08/16 18:40		B-flare @ 0054	
08/26 18:30	08/26 21:31	210	08/27 12:30	08/29 02:00	LDE C2.6 @ 0603	08/29, minor storm
08/26 20:48	08/27 22:48	204	08/28 18:40	08/31 18:45	C5.3 @ 0934	09/01, active/minor/G1 storm

Onset time: Time first visible in C2 field of view
CACTus: Computer Aided CME Tracking (software developed by the SIDC)
LASCO: SOHO-LASCO Operations, G. Stenborg

IP: Real-time Forecast (a NOAA trial service)
e-mail time CACTus/LASCO/IP: Time alert e-mail sent by group
dg: angular width of CME, measured by CACTus
Ass. Events: Associated Events, Long Duration Event (LDE), flare data


SFU
R'
Ak
de ZON in AUGUSTUS 2006
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in AUGUSTUS 2006
SFU
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
407 MHz Den Helder
610 MHz Fretenbach
1421 MHz Den Helder
2800 MHz Toronto

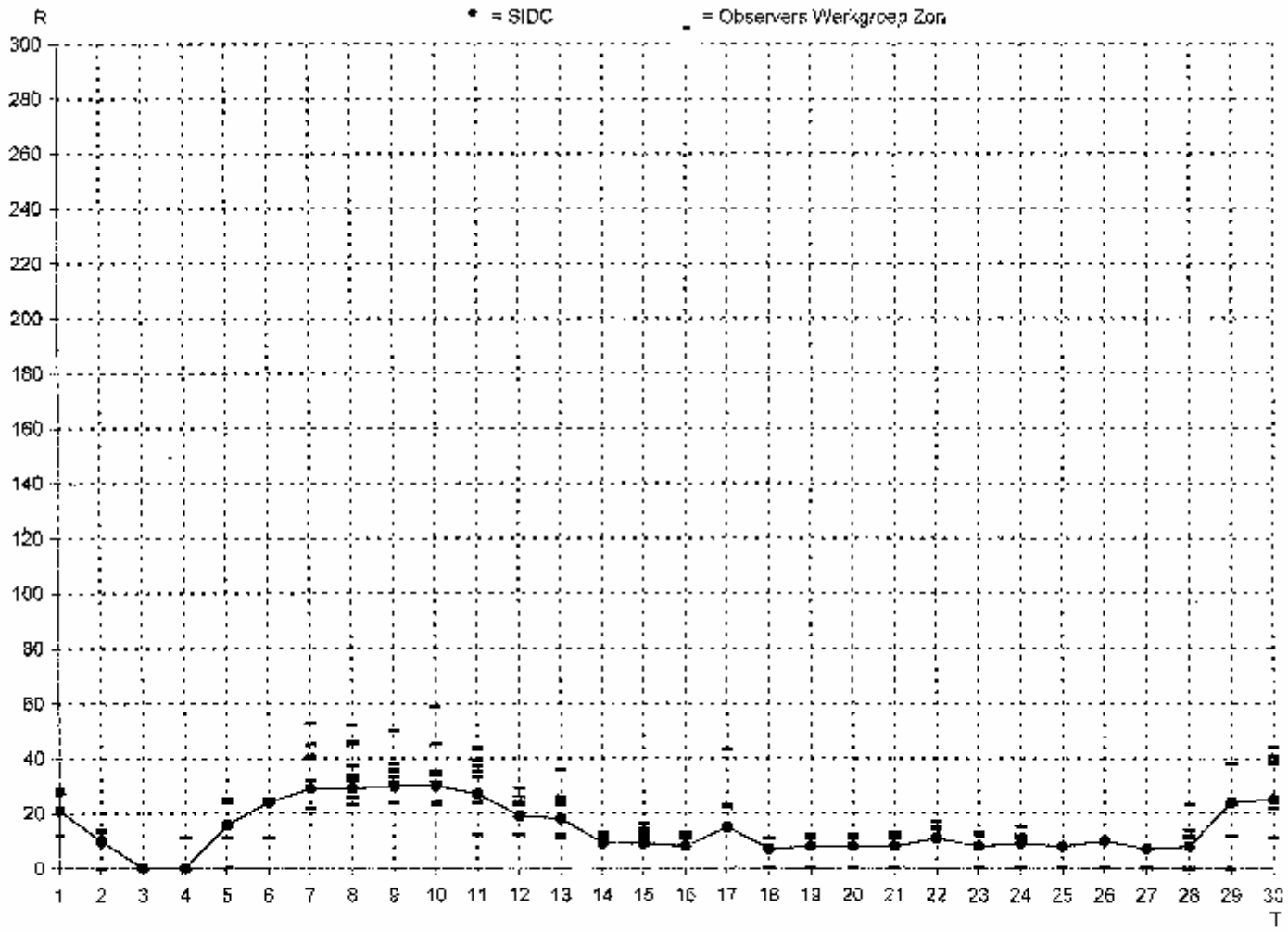
Bulletin Werkgroep Zon September 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijni@planet.nl

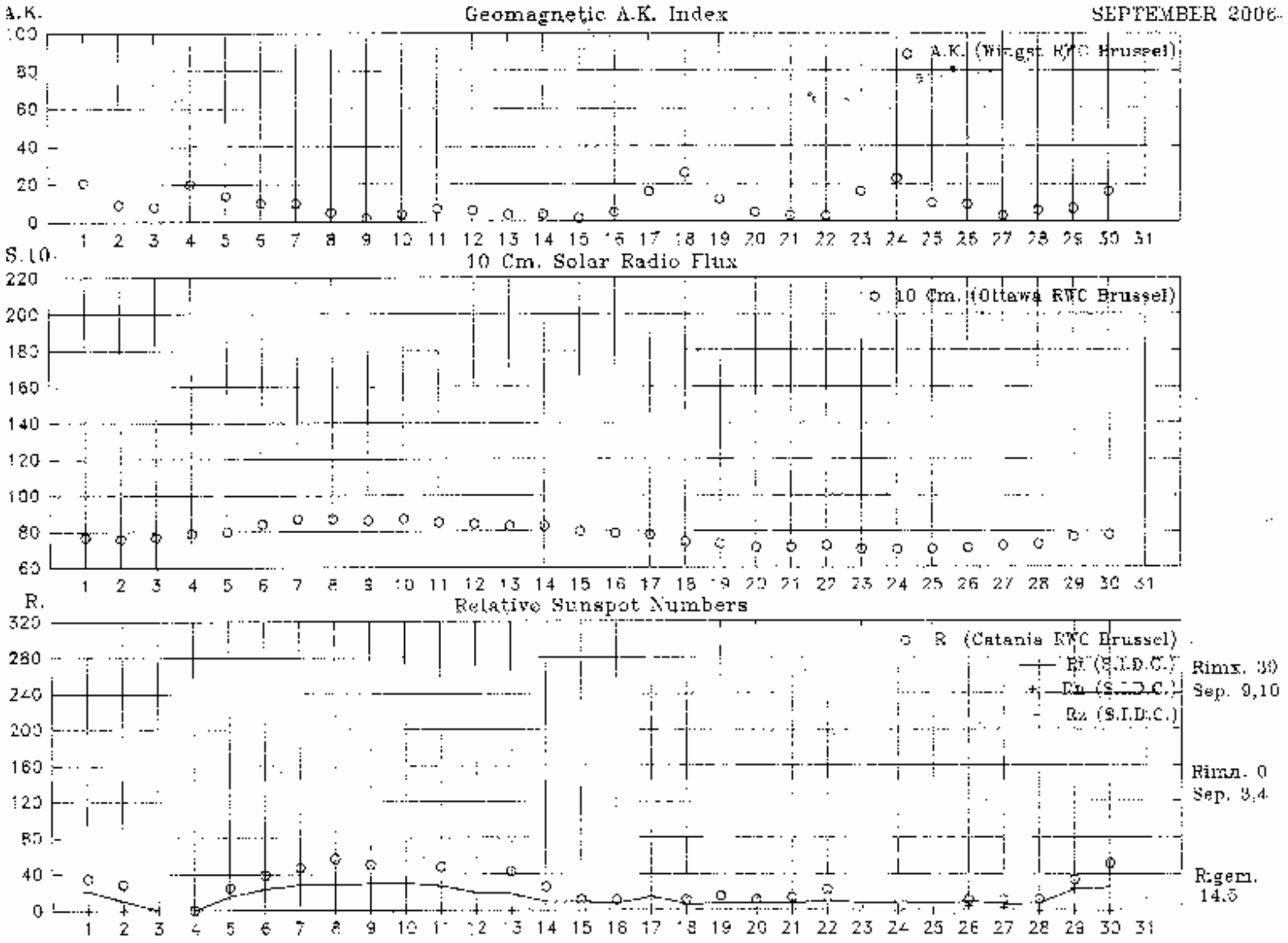
Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Go80	Gr60	Groe	Jn 9	Jn40	Kr80	vSlo	Son	Spa	Zans	Zijle
1	21					12			28			27	29
2	10					0			14		13	14	
3	0		0			0					0	0	
4	0		0			0			0		0	0	11
5	16					11			25		24	0	
6	24		25		25	11			24		25	25	
7	29		32			22			41		45	40	53
8	29	46	37	34	26	23	23	34	45	52	33	32	
9	30	35	31	33		24		36	30	38	33		50
10	30	34	30	35		23		24	30	30	45	31	59
11	27	39	39		24	12		35	37	33	43	28	44
12	19	26	24		23	12		12	24	26	26	12	29
13	18	36	23			11		12	25	26	26	24	23
14	9	13	13			11		12	12	12	13	12	
15	9	14		16		11		12	12	13	13	11	
16	8	13				11			12	13	13	11	11
17	15	23							22			22	43
18	7					0			11				
19	8		11			0			11	12	12	11	11
20	8	12	11			0			11	11	12	11	
21	8	11				0			11	11	12	11	13
22	11	15	17	15		11			15			14	
23	8					0			12			13	
24	9					0			11			12	15
25	8		0			0						0	
26	10					0			0				
27	7	0	0			0			0			0	
28	8	23	11	14		0			12		28	12	
29	24	24	23			0			23		38	12	
30	25			44		11	22		38	41		39	39
observ		16	18	7	4	29	2	8	28	13	20	27	14
k		0,69	0,82	0,72	1,01	1,44	1,20	1,04	0,76	0,72	0,70	0,88	0,62
st.dev.		0,15	0,13	0,15	0,14	0,51	0,09	0,35	0,12	0,11	0,13	0,32	0,11
st.d./ k		0,22	0,16	0,21	0,14	0,35	0,07	0,34	0,16	0,15	0,19	0,37	0,18

Observers	[...] = Refractor, d = ... mm	[Rf...] = Reflector, d = ... mm
Bals = H.A.M. Balster [70]	Jn 9 = D. Jannink [9]	Son = A.T. Son [Rf 150 Kutter]
Go80 = E.Gorter [80]	Jn40 = D. Jannink [40]	Spa = T. Spaninks [75]
Gr60 = Mw G. Gravers [60]	Kr80 = K. Kroesen [80]	Zans = W. Zanstra [Rf 155]
Groe = A.Groenewegen [102]	vSlo = B. van Slooten [90]	Zijle = W.A. Zijlema [90]



september 2006


A.K.
Geomagnetic A.K. Index
SEPTEMBER 2006
A.K. (Wingst RWC Brussel)
S.10
10 Cm. Solar Radio Flux
10 Cm. (Ottawa RWC Brussel)
R.
Relative Sunspot Numbers
R (Catania RWC Brussel)
Rimx. 30
Sep. 9,10
Rimn. 0
Sep. 3,4
Rgem.
14.5

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond
(Hemispheric sunspot numbers)
september 2006

	S.I.D.C.		Balster		Jennink4		v.Slooten		Son		Spaninks		Zanstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	0	21					0	28					0	27
2	0	10					0	14			0	13	0	14
3	0	0									0	0	0	0
4	0	0					0	0			0	0	0	0
5	0	16					0	26			0	24	0	0
6	0	24					0	24			0	25	0	25
7	0	29					0	41			0	45	0	40
8	0	29	0	48	0	23	0	45	0	52	0	53	0	32
9	0	30	0	35			0	30	0	38	0	33		
10	0	30	0	34			0	30	0	30	0	45	0	31
11	0	27	0	39			0	37	0	33	0	43	0	28
12	0	19	0	26			0	24	0	26	0	26	0	12
13	0	18	0	36			0	25	0	26	0	28	0	24
14	0	9	0	13			0	12	0	12	0	13	0	12
15	0	9	0	14			0	12	0	13	0	13	0	11
16	0	8	0	13			0	12	0	13	0	13	0	11
17	0	15	0	23			0	22					0	22
18	0	7					0	11						
19	0	8					0	11	0	12	0	12	0	11
20	0	8	0	12			0	11	0	11	0	12	0	11
21	0	8	0	11			0	11	0	11	0	12	0	11
22	0	11	0	15			0	15					0	14
23	0	8					0	12					0	13
24	0	9					0	11					0	12
25	0	8											0	0
26	5	6					0	0						
27	4	3	0	0			0	0					0	0
28	0	8	11	12			0	12			12	11	0	12
29	0	24	0	24			0	23			0	38	0	12
30	0	25			0	22	0	38	0	41			0	39

.Eerstvolgende bijeenkomst werkgroep Zon: 10 februari, Sonnenborgh, Utrecht.

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.eracnet.org onder observations

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Once again, flaring activity was very low indeed. There were in total 5 C-flares, but no M- or X-flare. Several sunspot groups crossed the solar disk, all of them showing relatively calm.

The most striking event was the birth of C-class sunspot group 85 (NOAA AR 0915) on Sep 29 in the west. The group evolved immediately to a magnetic beta configuration. Its flaring activity was however rather low and did not exceed the B7.0-level.

The CCD bake out that started in August lasted until Sept. 6. Since during this period SOHO/EIT was not available, forecasts was often used to predict coronal hole influences based on solar wind data and the geomagnetic K-index of previous rotation. On Sep 21, a small recurrent coronal hole passed the central meridian. A second and a third hole, both smaller, passed the central meridian on Sep 26 and Sep 29.

Further, the CACTus software detected a rather big CME on Sep 26 coming out of the field of view of LASCO/C2 at 01:31UT. This plasma cloud was associated with a bright flaring on the eastern side of the solar disk and had a rather low speed of 314 km/s. At almost the same time, another event took place. A dimming was visible in EIT195 at 00:11UT in the neighborhood of NOAA AR 0930, located at S20E55. LASCO/C3 shows a very faint full halo CME, almost not detectable. This halo CME was not reported by CACTus, nor by real-time SOHO LASCO operators.

II. Geomagnetic Activity

At four times, on Sep 04, 10, 16 and 23, a clear sign of a co-rotating interaction region (CIR) was visible on ACE data. A fifth disturbance was initiated by a CME arrival.

A CIR is the compressed, dense plasma between the slow and fast solar wind emanating from a coronal hole. The magnetic field imbedded in the CIR is strong compared with the magnetic field carried with the coronal hole wind. Early on Sep 04, the Bz component of the interplanetary magnetic field (IMF) made an excursion to negative values up to -10nT leading to a minor geomagnetic storm. The duration of this storm was short as a few hours later the strength of the IMF decreased together with the density of the solar wind taking away the potential storm conditions. The coronal hole influence of Sep 10 was rather minimal, Kp reached only a maximum value of 3. The CIR of Sep 16 and the typical trailing coronal hole wind signature was stretched over a longer time period. On Sep 18, the storm reached its maximum with 3 hours an estimated Kp index of 5. ACE data from Sep 23 up to a few days later showed a typical coronal hole signature: as soon as the solar wind speed starts to increase, the density drops. The solar wind caused a minor geomagnetic storm on Sep 24.

The last geomagnetic disturbance on Sep 30 and Oct 01, was atypical for solar minimum. Early on Sep 30, the faint full halo CME of Sep 26 arrived. ACE measured the arrival. Once the shock had passed, the total IMF carried by the plasma cloud itself became almost 20nT. One could clearly see the slow rotation of the Bz component from positive to negative values. The last phase of the rotation led to a minor storm. The influence of the coronal hole passing the central meridian on Sept. 26 was masked by the arrival of the CME. From 08:00UT on Oct 01, a coronal hole signature was visible in the solar wind measurements with e.g. decreased density and a high temperature level.

III. Noticeable solar events

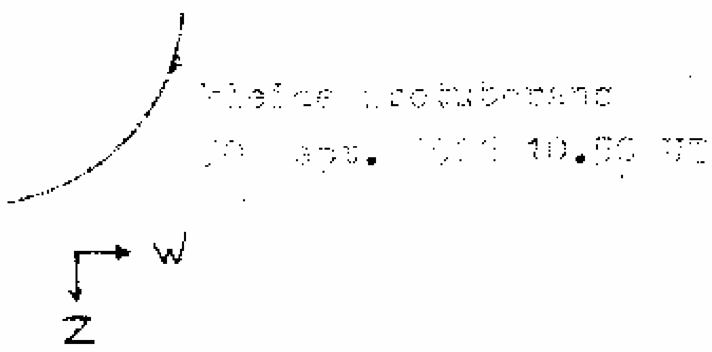
No M- or X-class flare occurred.

IV. Halo CME list

Onset time	e-mail time CACTus	da	e-mail time LASCO	e-mail time FF	Ass. Events	Consequences
[illegible]	-	-	[illegible]		-	-

Onset time: UTime first visible in C2 field of view
CACTus: Computer Aided CME Tracking Software developed by the SIDC
LASCO: SOHO-LASCO Operations, G. Stenborg

FF: Fearless Forecast (a NOAA [illegible] service)
e-mail time CACTus/LASCO/FF: UTime alert e-mail sent by group
da: angular width of CME, measured by CACTus
Ass. Events: Associated Events, Long Duration Event (LDE), flare class



tekening : Dennis Jannink

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'i	PPSI	600	2800	COS	SPI	XI	Ak	SEA
31	23	107		83	////	0	0/0	10	
1	21	9	-	77	////	0	0/0	21	
2	10	3		76	////	0	0/0	9	
3	0	0	-	77	////	0	0/0	8	
4	0	0		79	///	0	0/0	0	
5	16	8	-	80	////	0	0/0	14	
6	24	26	-	84	////	0	0/0	10	
7	29	34		87	////	0	0/0	10	
8	29	43		87	////	0	0/0	5	
9	36	55	-	86	////	0	0/0	2	
10	50	53	-	87	////	0	0/0	4	
11	39	40	-	85	////	1	0/0	7	
12	19	38	-	84	////	0	0/0	6	
13	18	38	-	83	////	0	0/0	4	
14	9	20	-	83	////	1	0/0	4	
15	3	14		80	////	0	0/0	2	
16	8	8	-	79	////	0	0/0	5	
17	15	4	-	78	////	0	0/0	16	
18	7	2		74	////	0	0/0	26	
19	8	3	-	73	////	0	0/0	12	
20	8	3		71	////	0	0/0	5	
21	8	3	-	71	////	2	0/0	3	
22	11	7		72	////	2	0/0	3	
23	8	6	-	70	////	0	0/0	10	
24	9	4	-	70	////	1	0/0	23	
25	6	1		70	////	1	0/0	18	
26	10	0		71	////	0	0/0	9	
27	7	1	-	72	////	0	0/0	3	
28	8	2	-	73	////	0	0/0	6	
29	24	8	-	77	////	0	0/0	7	
30	25	14	-	70	////	1	0/0	16	

R'i : provisional International sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10-5 w/m^2 - the quantity to be substracted from the mean solar constant to account for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Dourbes (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOOI). The 10.7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UCOSE Terre Adélie).

SPI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams UGEOOR, evaluation : 1 x Su+10 x "1"+100 x ">1".

XI : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams - UGEOR, UGEOI).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams)

SEA : sudden enhancements of atmospherics from Uccle & Dourbes (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

Kort verslag van de bijeenkomst van Werkgroep Zon op 28 oktober 2006. Sonnenborgh, Utrecht.

Voorzitter Ton Spaninks mocht veertien leden verwelkomen.
Direct na de opening volgde de bespreking van eigen waarnemingen van leden van de afgelopen vijf maanden. Een groep uit de belangrijkste waarnemingen die besproken werden:

Maandoverzichten zonnevlekkengetal, 10.7 cm radioflux en Ak-factor door Nico Heijblok
4 en 28 juni: tekeningen zon van Gerda Gravers
30, 1 en 2 juni: foto's Bob van Slooten
2 juni: protuberans foto en weheam opnamen van Evert Gorter
6 juli: foto Bob van Slooten en magnetogram van Nico Heijblok
10 en 25 juli: protuberans opnamen van Evert Gorter
7 augustus: magnetogram Nico Heijblok
13 augustus: foto vlekken van Evert Gorter
19 augustus: protuberansopname van Evert Gorter, magnetogrammen van Ton Spaninks en Nico Heijblok
21 augustus: SID van Ton Spaninks
22 augustus: protuberans, witlicht en H-alfa opname van Evert Gorter
28 augustus: foto van Bob van Slooten
6 september: tekening Ton Spaninks, foto's van Klaus Kroesen en protuberans- en weheamopname van Evert Gorter
8, 9 en 10 september: drie tekeningen van Gerda Gravers
9 en 10 september: foto's van Evert Gorter
15 september: tekening Ton Spaninks
18 september: tekening Ton Spaninks en magnetogrammen van Nico Heijblok en Ton Spaninks
28 en 30 september: tekeningen van Gerda Gravers. In twee dagen toonde de zon een compleet ander beeld
8, 10, 11,13 en 15 oktober: protuberansen van Evert Gorter
13 oktober: magnetogrammen van Ton Spaninks en Nico Heijblok
24 oktober: magnetogram Ton Spaninks

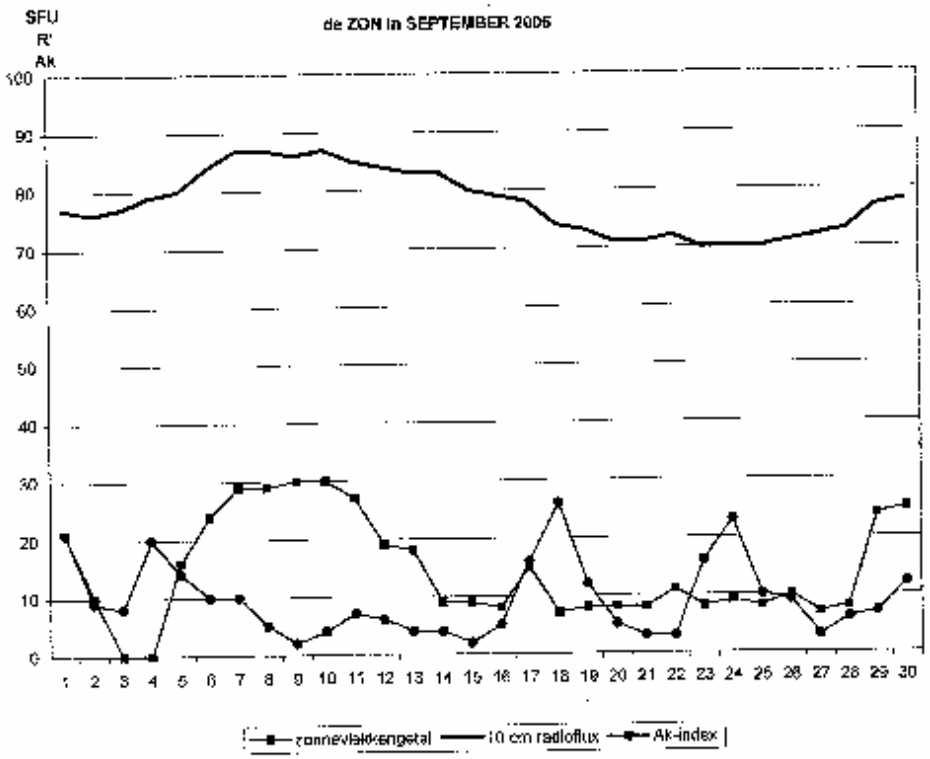
Jan Janssens hield een voordracht over zonnevlammen en Solar Cycle 23.
Onderwerpen die hij besprak:
Ontstaan van zonnevlammen – herstructurering van magnetische velden – vrijkomende energie door het gehele elektromagnetische spectrum – vrijkomende materie – CME's
Zonnevlekken – magnetische velden vlak bij elkaar – kortsluiting – zonnevlam
H-alfa flares – de verdeling ervan over de cycli 21, 22 en 23 plus voorbeelden – classificatie van flares – de X17,2/4B-flare van 28 oktober 2003 – Speciale flares: (double) ribbon en Hyder-flare – flare-index (maat duur en intensiteit) – Röntgen flares (A, B, C, M, X-flares) – correlatie piekwaarden X-flares met impacts op aarde – onderscheid Röntgen flares in hoogenergetische (>M5), geïntegreerde flux (totale energie) en impulsieve flares (< 1 uur)
Proton- flares - plotselinge toename van de protonenflux met een factor 100 a 10.000 – gevaar voor satellieten en astronauten – relativistische snelheid van de protonen – 23-ste cyclus met flares even actief als de 22-ste en actiever dan cyclus 21.
Gamma flares en White Light flares (zeldzaam, ontstaan bij hoogenergetische X-ray-flares)
Radioflares op 10.7 cm golflengte – radio sweeps – radiospectrogrammen

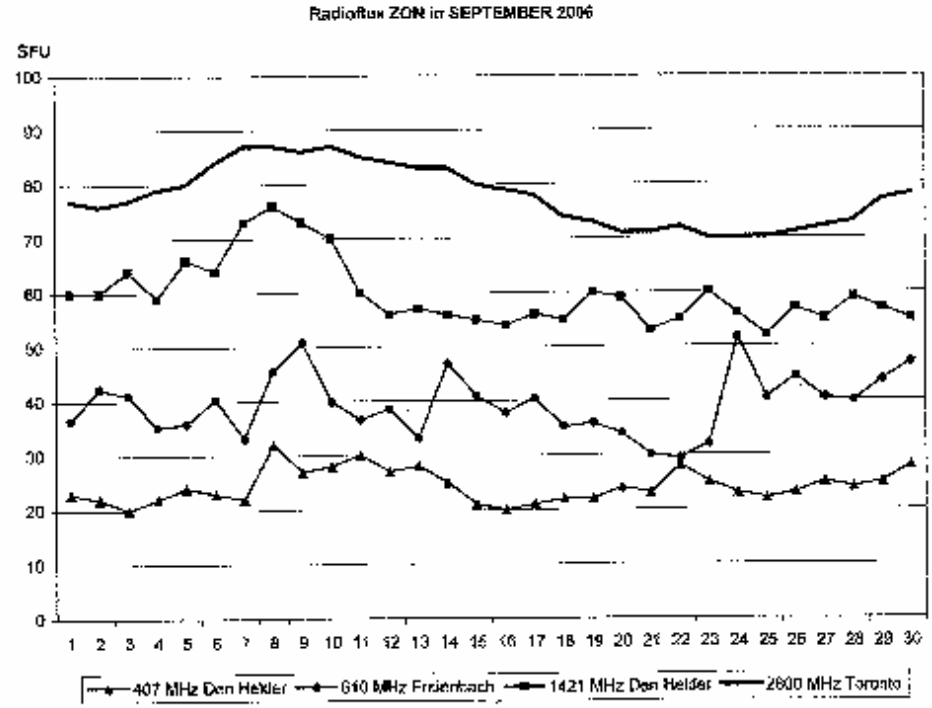
Rob Stammes vertelde met lichtbeelden over de vorderingen met zijn onderkomen, resp. observatorium op de Lofoten

Theo Dukers hield een korte voordracht over zijn SID-registraties, waarbij hij op 23 maart 2003 een positieve correlatie vond met Gamma Ray Burst GRB030329 om 11.40 GMT.

Nico Heijblok vertelde o.e.a. over het 4e congres van de European Radio Astronomy Club in Heidelberg begin september. Rob Stammes, Theo Dukers en Nico hielden ieder een voordracht over over resp. aurora op de Lofoten, SID-registraties en Pulsar Dispersion Measure.

Gerrit Naura vertoonde nieuwe beelden over de eclips in Turkije op 29 maart 2006, als aanvulling op eerdere voordrachten.


SFU
R'
Ak
de ZON in SEPTEMBER 2006
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in SEPTEMBER 2006
SFU
100
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
407 MHz Den Helder
610 MHz Frienstadt
1421 MHz Den Helder
2800 MHz Toronto

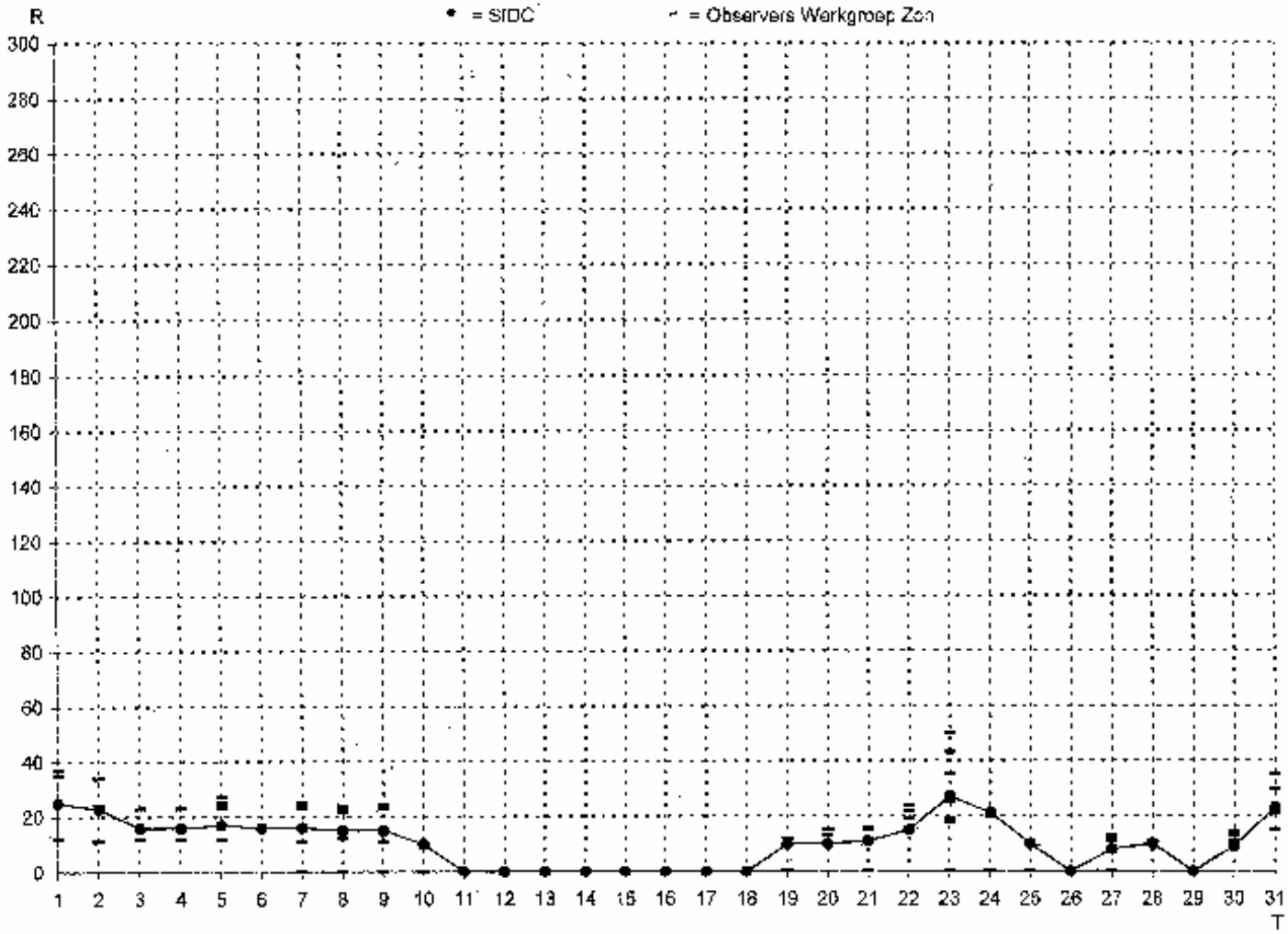
Bulletin Werkgroep Zon — Oktober 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijpi@planet.nl

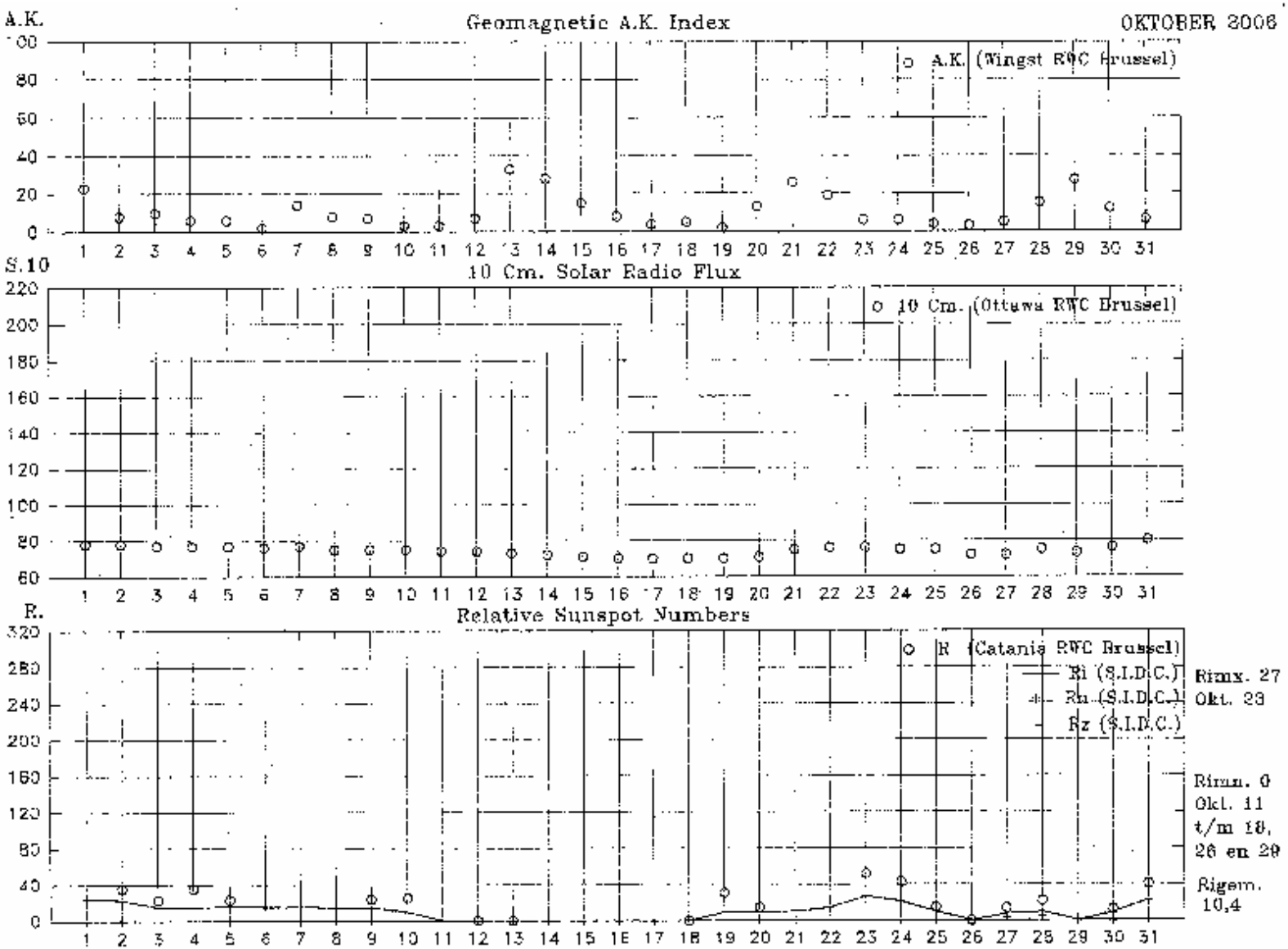
Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Gort	Groe	Jn 9	Kr80	vSlo	Son	Spa	Zans
1	26		35		12		35			37
2	23	24			11		34			23
3	18				12	23	23			23
4	16		23		12		23	23		23
5	17	25	23		12		24	27	25	23
6	18									
7	18	25	23	11	0		23	24		23
8	15	24	22		0		22	23	22	12
9	15	24	0		0		11	0	23	0
10	10							0		0
11	0	0	0	0	0		0	0	0	0
12	0	0	0		0		0	0		0
13	0		0		0		0	0		0
14	0	0			0		0			0
15	0	0	0		0					
16	0	0	0	0	0		0	0		0
17	0	0	0	0	0		0	0		0
18	0	0			0		0	0		
19	10				0		12			0
20	10	13	13				13	15		13
21	11		15		0		15	16	16	15
22	15	24					22	18		22
23	27	50	25	19	0	28	43		35	18
24	21				0		20			
25	10				0		11	11		0
26	0	0	0		0		0	0		0
27	8	11	13		0		12	0	13	11
28	10						11			
29	0	0	0		0		0		0	0
30	9	14	13	13	11		13	13	13	
31	23	35			15		30			21
observ	30	20	19	6	28	2	28	19	9	25
k	–	0,68	0,74	1,19	1,52	0,83	0,78	0,71	0,68	0,87
st.dev.	–	0,11	0,13	0,43	0,45	0,19	0,18	0,09	0,05	0,26
st.d./ k	–	0,16	0,17	0,36	0,30	0,23	0,22	0,12	0,07	0,31

Observers	[...] = Refractor. d = ... mm	[Rf...] = Reflector. d = ... mm
Bals = H.A.M. Balster [70]	Jn 9 = D. Jannink [9]	Son = A.T. Son [Rf 150 Kutter]
Gort = E.Gortar [80]	Kr80 = K. Kroesen [80]	Spa = T. Spaninks [75]
Groe = A.Groenewegen [102]	vSlo = B. van Slooten [90]	Zans = W. Zanstra [Rf 155]



oktober 2006


A.K.
Geomagnetic A.K. Index
OKTOBER 2006
A.K. (Wingst RWC Brussel)
S.10
10 Cm. Solar Radio Flux
10 Cm. (Ottawa RWC Brussel)
R.
Relative Sunspot Numbers
R (Catania RWC Brussel)
Ri (S.I.D.C.)
Rn (S.I.D.C.)
Rz (S.I.D.C.)
Rimx. 27
Okt. 23
Rimn. 0
Okt. 11
t/m 18,
26 en 29
Rigem.
10,4

Zonnevlekkengetallen noordelijk- en zuidelijk

(Hemispheric sunspot numbers)

oktober 2006

	S.I.D.C.		Beisler		v.Slooten		Son		Spaninks		Zanstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	0	25			0	35					0	37
2	0	23	0	24	0	34					0	23
3	0	16			0	23					0	23
4	0	16			0	23	0	23			0	23
5	0	17	0	25	0	24	0	27	0	25	0	23
6	0	16										
7	0	16	0	25	0	23	0	24			0	23
8	0	15	0	24	0	22	0	23	0	22	0	12
9	0	15	0	24	0	11	0	0	0	23	0	0
10	0	10					0	0			0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0			0	0
13	0	0			0	0	0	0			0	0
14	0	0	0	0	0	0					0	0
15	0	0	0	0	0	0						
16	0	0	0	0	0	0	0	0			0	0
17	0	0	0	0	0	0	0	0			0	0
18	0	0	0	0	0	0	0	0				
19	0	10			0	12					0	0
20	0	16	0	13	0	13	0	15			0	13
21	0	11			0	15	0	16	0	16	0	15
22	0	15	0	24	0	22	0	19			0	22
23	0	27	11	39	11	32			11	24	0	18
24	0	21			0	20						
25	0	10			0	11	0	11			0	0
26	0	0	0	0	0	0	0	0			0	0
27	4	4	0	11	0	12	0	0	0	13	0	11
28	5	5			0	11						
29	0	0	0	0	0	0			0	0	0	0
30	0	9	0	14	0	13	0	13	0	13		

Eerstvolgende bijeenkomst Werkgroep Zon: 10 februari 2007, Sonnenborgh, Utrecht.

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.craonet.org onder observations

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

The activity level in October did not deviate from that in other recent months. The Sun is still heading for solar minimum and showed almost no flaring activity. No C, M or X-flares occurred this month.

In the first part of the month, the solar disk was occupied by 2 to 3 sunspot groups. NOAA registered two active regions, 0913 and 0914. The transit over the solar disk of those groups involved only some A and B-flares. This pair of active regions rotated off the solar disk on Oct 09. The GOES X ray curve became monotonously flat in the period between Oct 06 and 21 except on Oct 13 14 when 5 isolated A/B flares occurred, originating from plage near 0906 in the west. From Oct 21, the X-ray background radiation rose to A2-A3. Sunspot group 88 (NOAA AR 0917) emerged at the disk center on Oct 19 and grew rapidly, pushing up the X-ray radiation. Its size remained limited, resulting in only a few B-flares on Oct 22, despites its magnetic beta-gamma configuration. On the last day of the month, sunspot groups 93 and 94 (NOAA AR 0921, 0922) appeared on the eastern side and were responsible for new A and B flaring activity from that side of the disk.

Four geo-effective coronal holes transited across the solar disk. A first small, northern coronal hole passed the central meridian on Oct 04. The second equatorial coronal hole passed this line on Oct 10. The third coronal hole was clearly visible in EIT images as a rather big hole, mainly situated in the northern hemisphere. This recurrent feature passed the central meridian on Oct 17. The last hole, also recurrent, had the shape of an upside down 'y', noticeable from EIT pictures of Oct 23. A first part passed the central meridian on that day.

On Oct 11 a filament erupted in the SE. EIT304 captured this coronal activity (see picture of the month). Another filament located around NOAA AR 0917 erupted. The evidence was given by two subsequent Ha pictures on Oct 21 and Oct 22 from Kanzelhöhe Observatory in Austria in which the filament disappeared. The associated slow and faint CME was directed to the SW. Another remarkable event took place on late 22/early 23 Oct. A faint halo CME was captured by LASCO but it was established to be a back sided event. The CME was not noticed by CACTus, nor by real-time SOHO LASCO operations.

II. Geomagnetic Activity

October 2006 was a typical month in solar minimum: geomagnetic disturbances were all caused by enhanced solar wind speed emanating from coronal holes.

In the beginning of the month, the Earth was situated in a fast flow of a coronal hole passing the central meridian on Sep 26. The influence was masked by the arrival of a CME on Sep 30. From 08:00 UT on Oct 01, a coronal hole signature was visible in the solar wind measurements of ACE with e.g. decreased density and a high temperature level.

The second disturbance was associated with the second coronal hole mentioned above.
The interaction region between the fast and slow wind flow with enhanced density arrived on Oct 07. It was followed by the fast flow itself on Oct 07-08. Geomagnetic consequences were limited: on Oct 07 one interval of K 4 was reported by Dourbes, NOAA estimated also only one interval of Kp=4, Izmiran reported two K=4 periods.

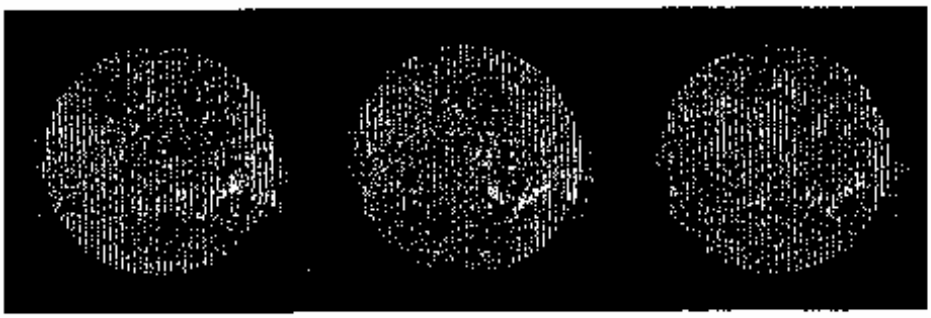
Late Oct 19, Earth entered a recurrent fast stream originating from the third coronal hole mentioned above. The strong southward fluctuation of the Bz component of the interplanetary magnetic field resulted in unsettled geomagnetic conditions. Only on Oct 21 and early Oct 22, one active and one minor storm period occurred.

The last period of geomagnetic disturbances was caused by the fourth coronal hole. The fast stream from this coronal hole encountered Earth from Oct 27. Initially, the Bz peaked only briefly around -10nT. Except from this period, Bz was weak and only intermittent southwards.
The Kp index reached only 4 on Oct 28 and 29 for 6 periods.

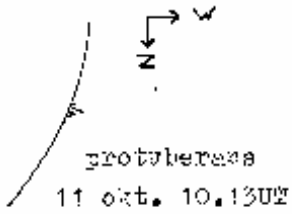
III. Noticeable solar events
No M- or X-class flare occurred.

IV. Halo CME list
No CME alert was sent.

V. Picture of the Month



A sequence of three SOHO/EIT304 pictures dating from Oct 11, 2006, at 07:12UT, 11:20 UT and 19:18 UT respectively. The sequence shows a filament eruption on the SE limb of the solar disk. .



Tekening: Dennis Jannink

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_I	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	25	14	-	78	////	2	0/0	18	
1	25	17	-	78	////	0	0/0	23	
2	23	12	-	78	////	0	0/0	9	
3	16	11	-	77	////	0	0/0	13	
4	18	12	-	77	////	0	0/0	6	
5	17	11		77	////	1	0/0	5	
6	16	4	-	76	////	0	0/0	2	
7	16	8	-	77	////	0	0/0	14	
8	15	3	-	75	////	0	0/0	4	
9	15	4	-	75	////	0	0/0	7	
10	12	5	-	75	////	0	0/0	3	
11	8	6	-	74	////	0	0/0	3	
12	8	2		74	////	0	0/0	4	
13	8	6	-	74	////	0	0/0	8	
14	8	5	-	74	////	0	0/0	25	
15	8	5		71	////	0	0/0	11	
16	5	1	-	70	////	0	0/0	6	
17	0	3	-	70	////	0	0/0	4	
18	0	5		73	////	0	0/0	5	
19	10	6	-	70	////	0	0/0	4	
20	10	6		71	////	1	0/0	13	
21	11	15		75	////	0	0/0	16	
22	15	20	-	76	////	0	0/0	19	
23	17	19	-	76	////	0	0/0	6	
24	21	7	-	78	////	0	0/0	6	
25	10	1	-	75	////	0	0/0	4	
26	9	3	-	77	////	0	0/0	3	
27	8	2		72	////	0	0/0	5	
28	10	4	-	75	////	0	0/0	15	
29	0	0	-	75	////	0	0/0	27	
30	9	3		76	////	1	0/0	12	
31	23	17		80	////	0	0/0	9	

R'_I : provisional international sunspot numbers from the S.I.D.C.

PPSI : provisional photometric sunspot index from the S.I.D.C. in 10^{-5} w/m^2 : the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOH). The 10.7cm flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UCOSE Terre Adélie).

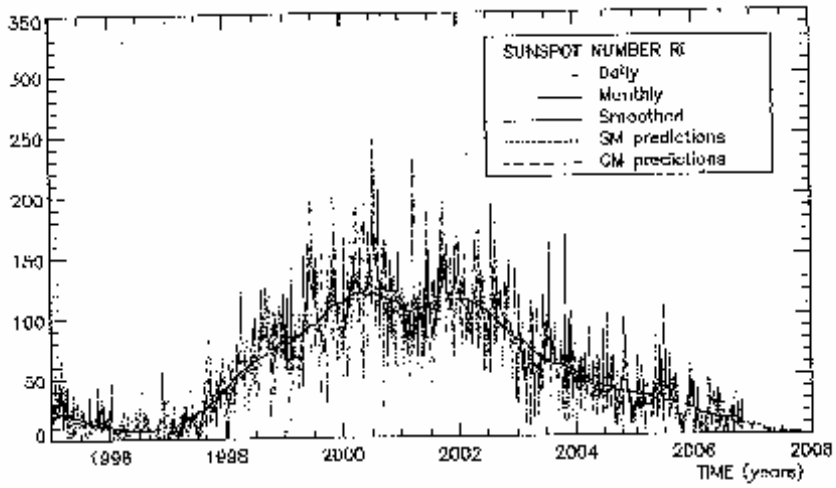
SFI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams – UGEOR, evaluation : $1 \times SI + 10 \times "1" + 100 \times "2+"$)

XI : X-flares index from the Ursigrams (M-flares/X flares) (origin : Ursigrams – UGEOR, UGTOD).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

SEA : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for April 2006 : 17.1 (± 5%)

	SM	CM		SM	CM		SM	CM
2006 May	16	16	2006 Nov	12	9	2007 May	7	2
Jun	16	15	Dec	12	8	Jun	6	2
Jul	16	14	2007 Jan	11	7	Jul	4	2
Aug	15	14	Feb	10	7	Aug	4	2
Sep	14	13	Mar	9	5	Sep	3	2
Oct	13	10	Apr	8	2	Oct	2	3

SM : SIDC classical method : based on an interpolation of Waldmeier's standard curves; the estimated error ranges from 7% (first month) to 35% (last month)
CM : Combined method : the combined method is a regression technique coupling a dynamo-based estimator with Waldmeier's idea of standard curves, due to K. Denkmayr.
ref. : **K. Denkmayr, P. Cugnon**, 1997 : "Almost Sunspot Number Medium-Term Predictions", in "Solar-Terrestrial Prediction Workshop V", eds G. Heckman et al., Hiraiso Solar Terrestrial Research Center, Japan, 103

Brussels, November 1, 2006 10:10 UT

Ed. Ronald Van der Linden, Ass. Ed. Petra Vanlommel
Editing contributions from various members of the SIDC team

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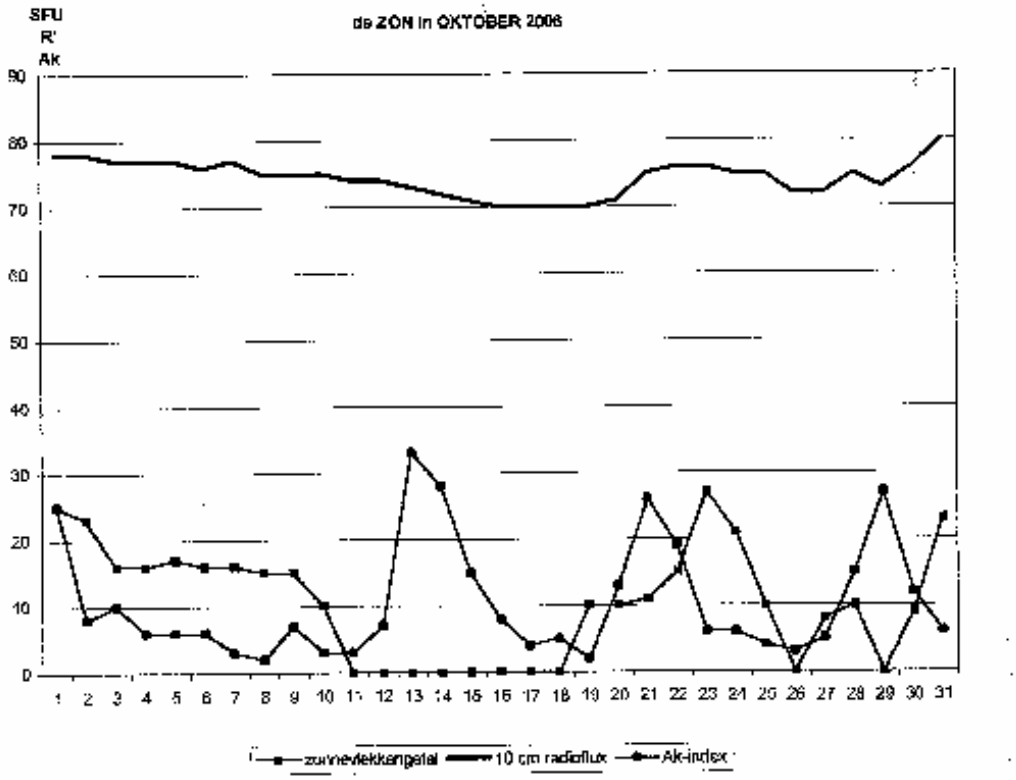
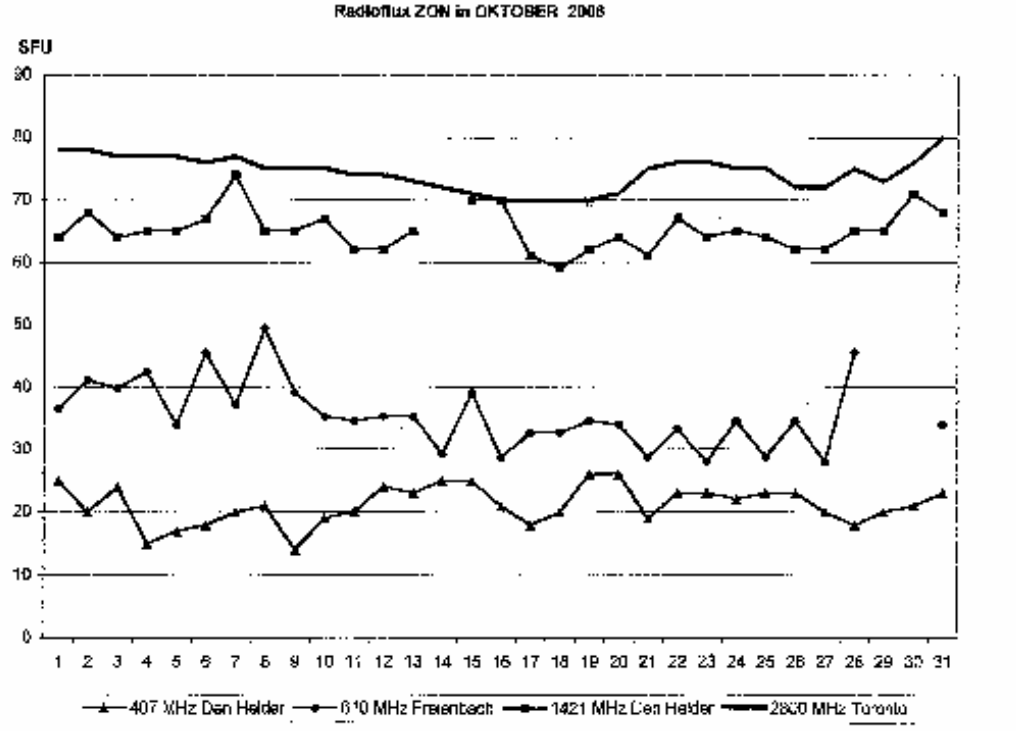
http://sidc.oma.be


SFU
R'
Ak
de ZON in OKTOBER 2006
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in OKTOBER 2006
SFU
90
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
407 MHz Den Helder
610 MHz Freiental
1421 MHz Den Helder
2800 MHz Toronto

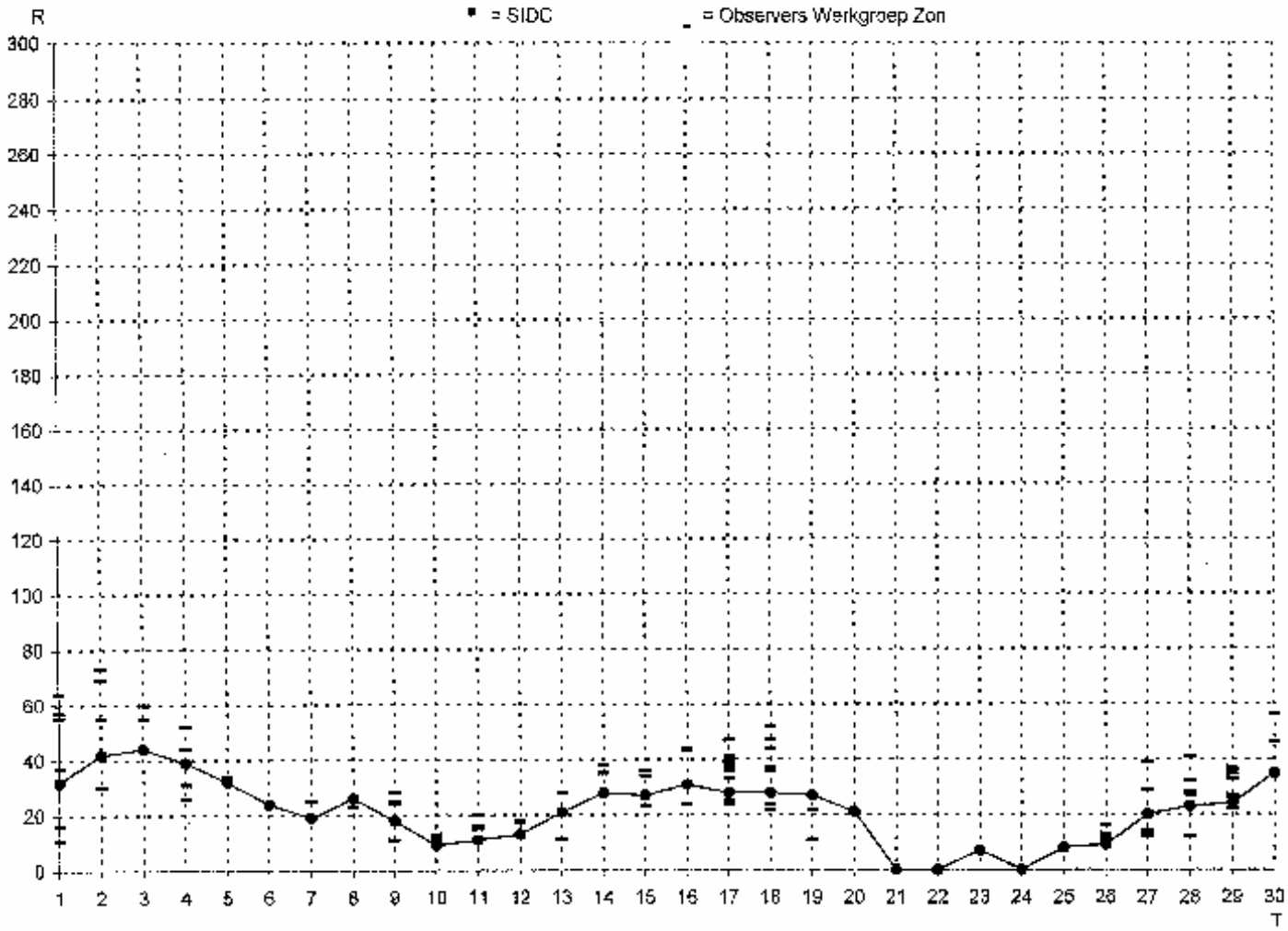
Bulletin Werkgroep Zon — November 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijpi@planet.nl

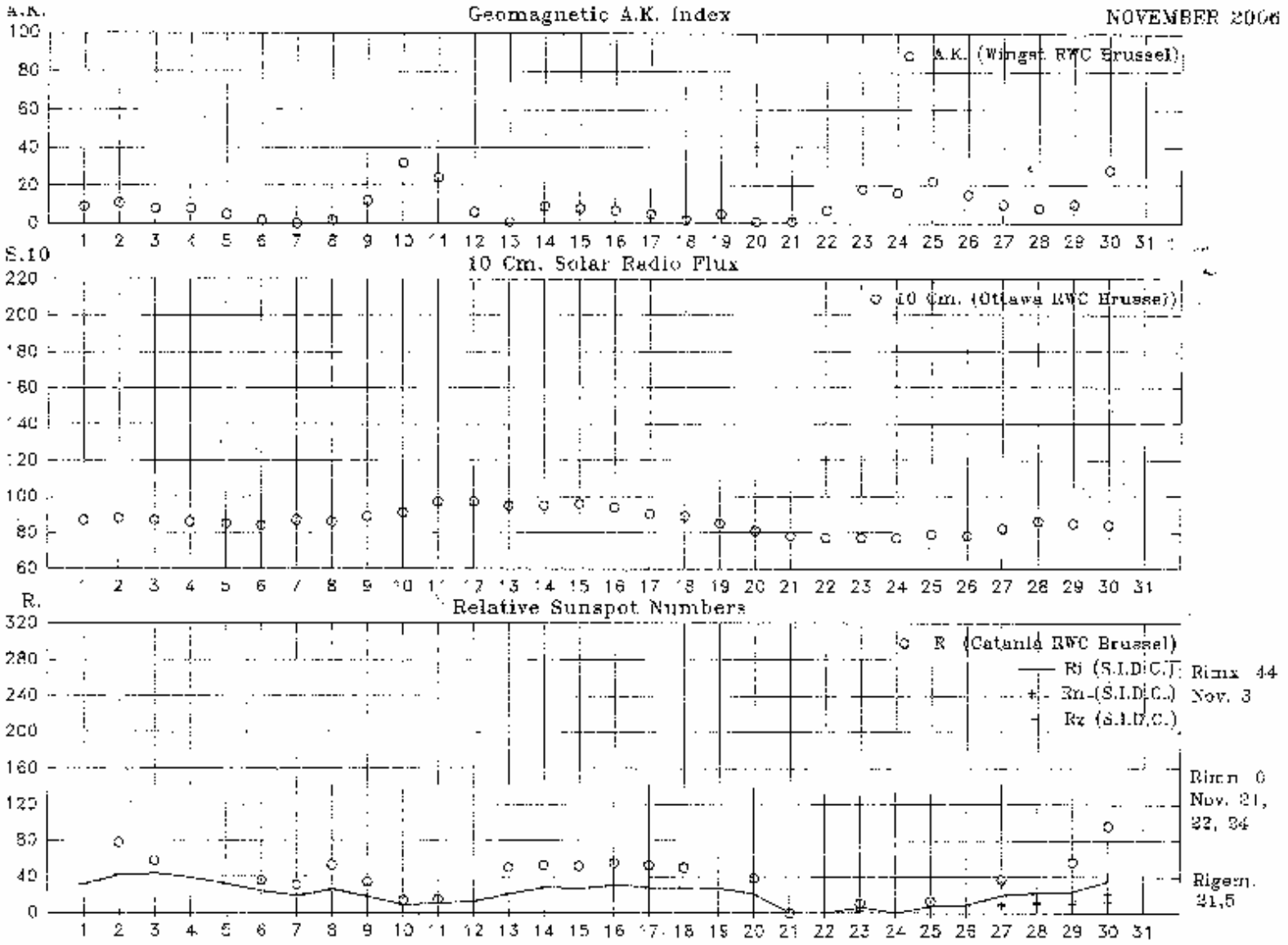
Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Gort	Gr60	Groe	Jn 9	Jn40	Krö0	vSlo	Son	Spa	Zans
1	32	64	37			16	16	11	55	57		37
2	42	73	55		41	30		42	69			55
3	44			80						55		
4	39	44			31	26			52			
5	32											34
6	24											
7	19											25
8	26					23						
9	18	25	11		11	11	11	11	24	28	25	24
10	9	13	11			11			11	12		11
11	12	16				11		11	11		20	15
12	13					13					18	17
13	21					11		11	28			
14	28	38							27			35
15	27					23			36	34		
16	31					24				43		44
17	28	39	36	47	26	24		33	40	41	38	37
18	28	52	36	47		24		22	37		44	37
19	27							11				22
20	21											
21	0		0			0				0		0
22	0				0	0						0
23	7											
24	0	0		0		0			0			0
25	6											
26	9	13	12	16	12	11		11	13	11		13
27	20	39	14			12	12		29	29		13
28	23	41	27			12			32			28
29	24	33	26		26	22		27	37	35		38
30	35									56		46
observ		14	11	5	7	20	3	10	16	12	5	21
k		0,66	0,96	0,62	1,12	1,33	1,77	1,47	0,75	0,71	0,67	0,84
st.dev.		0,11	0,31	0,08	0,31	0,38	0,20	0,74	0,12	0,08	0,08	0,21
st.d / k		0,17	0,32	0,12	0,27	0,28	0,11	0,50	0,17	0,11	0,12	0,25

Observers	[...] = Refractor, d = ... mm	[Rf...] = Reflector, d = ... mm
Bals = H.A.M. Balster [70]	Jn 9 = D. Jannink [9]	Son = A.T. Son [Rf 150 Kutter]
Gort = E.Gorter [80]	Jn40 = D. Jannink [40]	Spa = T. Spaninks [75]
Gr60 = Mw G. Gravers [60]	K105 = K. Kroesen [105]	Zans = W. Zanstra [Rf 155]
Groe = A.Groenewegen [102]	vSlo = B. van Slooten [90]	



november 2006


A.K.
Geomagnetic A.K. Index
NOVEMBER 2006
A.K. (Wingst RWC Brussel)
S.10
10 Cm. Solar Radio Flux
10 Cm. (Ottawa RWC Brussel)
R.
Relative Sunspot Numbers
R (Catania RWC Brussel)
Ri (S.I.D.C.)
Rn (S.I.D.C.)
Rz (S.I.D.C.)
Rimx 44
Nov. 3
Rimn 0
Nov. 21, 22, 24
Rigem. 21,5

Zonnevlekkengetallen noordelijk- en zuidelijk halfro

(Hemispheric sunspot numbers)

november 2006

	S.I.D.C.		Balster		Jansink4		v Sloten		Son		Spaninks		Zanstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	0	32	0	64	0	16	0	55	0	57			0	37
2	0	42	2	73			0	69					0	55
3	0	44							0	56				
4	0	39	0	44			0	62						
5	0	32											0	34
6	0	24												
7	0	19											0	25
8	0	26												
9	0	18	0	25	0	11	0	24	0	28	0	25	0	24
10	0	9	0	13			0	11	0	12			0	11
11	0	11	0	16			0	11			0	20	0	15
12	0	13									0	16	0	17
13	0	21					0	28						
14	0	28	0	38			0	27					0	35
15	0	27					0	36	11	23				
16	0	31							13	30			0	44
17	0	28	0	39			0	40	0	41	0	38	0	37
18	0	28	0	52			0	37			0	44	0	37
19	0	27											0	22
20	0	21												
21	0	0							0	0			0	0
22	0	0											0	0
23	0	3												
24	0	0	0	0			0	0					0	0
25	0	8												
26	0	9	0	13			0	13	0	11			0	13
27	9	11	14	25	0	12	13	14	14	15			0	13
28	12	11	16	28			17	15					15	13
29	13	11	18	15			19	18	21	14			20	16
30	13	22							34	22			19	27

Eerstvolgende bijeenkomst Werkgroep Zon: 10 februari 2007, Sonnenborgh, Utrecht

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.eracnet.org onder observations

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
30	25	74	-	78	////	1	0/0	16	
1	25	21	-	78	////	0	0/0	23	
2	23	12	-	78	////	0	0/0	8	
3	16	11	-	77	////	0	0/0	10	
4	16	12		77	////	0	0/0	6	
5	17	11	-	77	////	1	0/0	6	
6	16	8	-	76	////	0	0/0	2	
7	16	6	-	77	////	0	0/0	14	
8	15	3	-	75	////	0	0/0	8	
9	15	3		75	////	0	0/0	7	
10	14	3	-	75	////	0	0/0	3	
11	0	5	-	74	////	0	0/0	3	
12	0	999	-	74	///	0	/0	7	
13	0	999	-	73	///	0	/0	3	
14	0	999	-	72	////	0	0/0	28	
15	0	0	-	71	////	0	0/0	15	
16	0	1	-	70	////	0	0/0	8	
17	0	0	-	70	////	0	0/0	4	
18	0	999	-	70	///	0	/0	5	
19	10	6	-	70	////	0	0/0	2	
20	10	6	-	71	////	1	0/0	13	
21	11	13		75	////	0	0/0	26	
22	15	22	-	76	////	0	0/0	19	
23	27	19	-	76	////	0	0/0	6	
24	21	7	-	75	////	0	0/0	6	
25	10	1	-	75	////	0	0/0	4	
26	0	999	-	72	///	0	/0	3	
27	8	2	-	72	////	0	0/0	5	
28	10	4	-	75	////	0	0/0	15	
29	0	3	-	73	////	0	0/0	27	
30	9	3	-	76	////	1	0/0	12	
31	23	17	-	80	////	0	0/0	6	

R'_i : provisional international sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10^{-5} w/m^2 ; the quantity to be subtracted from the mean solar constant to recount for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10.7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UCOSE Terre Adélie).

SFI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams – UGEOR, evaluation : 1 x Sn+10 x "1"+100 x ">1".

XI : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams – UGEOR, UGEOI)

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

SEA : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Compared with previous months, November 2006 was a little more active with a total of 12 C-flares and 1 partial halo CME.

In the first week, a pair of sunspot groups, Catania 93 and 94 (NOAA AR 0921 and 0922) was present. They were responsible for the C-flares on Nov 02 and Nov 05-06. On Nov 07, a new group appeared at the east limb: Catania 96 (NOAA AR 0923). The sunspot group was rather big but simple: unipolar with a penumbra; in first instance it had a magnetic α configuration, later it became a β. The period of increased activity of Nov 05-06 initiated by the sunspot groups 93 and 94 with β-γ and β configuration was prolonged by Catania sunspot group 96 on Nov 07. The X-ray radiation measured by GOES showed the most elevated profile of this month during that period. Sunspot group 96 was the source of more C-flares on Nov 12 and 13. Thereafter the group's activity cooled down. This period was followed by a limited revival on Nov 20 with an extended series of B flares just before the group rotated behind the solar disk. The last C-flare of this month was measured on Nov 29. Catania 02 (NOAA AR 0926), which rotated on the disk on Nov 26, was the source.

Only two prominent coronal holes were present during the month. A southern, non-recurrent coronal hole passed the central meridian on Nov 06. A second southern, recurrent hole passed the central meridian on Nov 20. On Nov 25, a faint partial halo CME was detected by the LASCO C2 coronagraph.

II. Geomagnetic Activity

The two coronal holes and the partial halo CME could be linked to three periods of clear geomagnetic disturbances. A period with less pronounced geomagnetic disturbances gave the kick off.

A first small disturbance on Nov 02-03 was linked with a moderate coronal hole passing the central meridian at the end of October. The geomagnetic conditions stayed quiet. The coronal hole signature was clearly present in ACE-data, but limited: solar wind speed increased only to 450 km/s.

On Nov 09 around 11:45UT, a small shock in the solar wind marked the onset of a recurrent fast solar wind stream emanating from the coronal hole passing the central meridian on Nov 06. The solar wind speed rose to a maximum of 600 km/s on Nov 10 and it started to decline on Nov 12. The disturbance triggered a minor geomagnetic storm late on Nov 09 and on Nov 10. The geomagnetic field remained unsettled to active until early Nov 12.

On Nov 16, Kp reached 5 for a single 3-hour-period following a sector boundary crossing. This disturbance was confined in time. A week later, on Nov 22, the interplanetary magnetic field carried by the solar wind increased to 10nT. The density of the solar wind increased accordingly. The solar wind sped up from early Nov 23. It was the fast wind emanating from the second southern coronal hole mentioned above. On Nov 23 and 24, we experienced minor storm conditions. The next two days, active disturbances were measured.

On Nov 29, an ICME arrived near earth. The solar wind speed did not show any clear sign of a cloud passing the L1 point. But the z-component of the magnetic field in the cloud itself rotated slowly from positive to negative values. This was a clear indicator of an ICME. It probably corresponded to the partial halo CME of Nov 25.

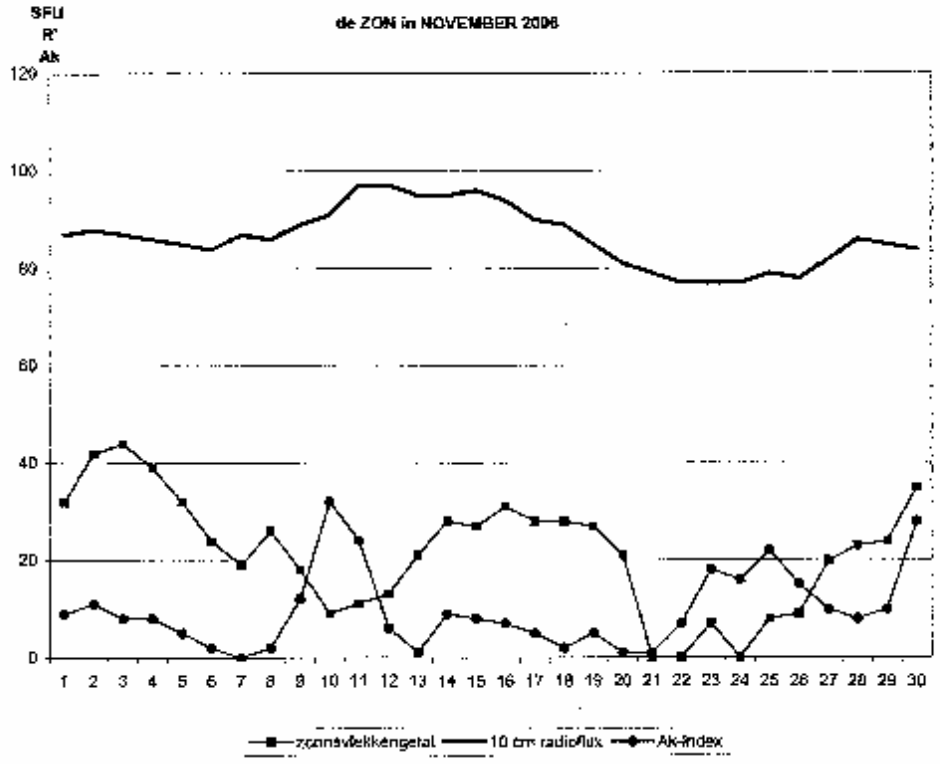
III. Noticeable solar events

No M- or X-class flare occurred.

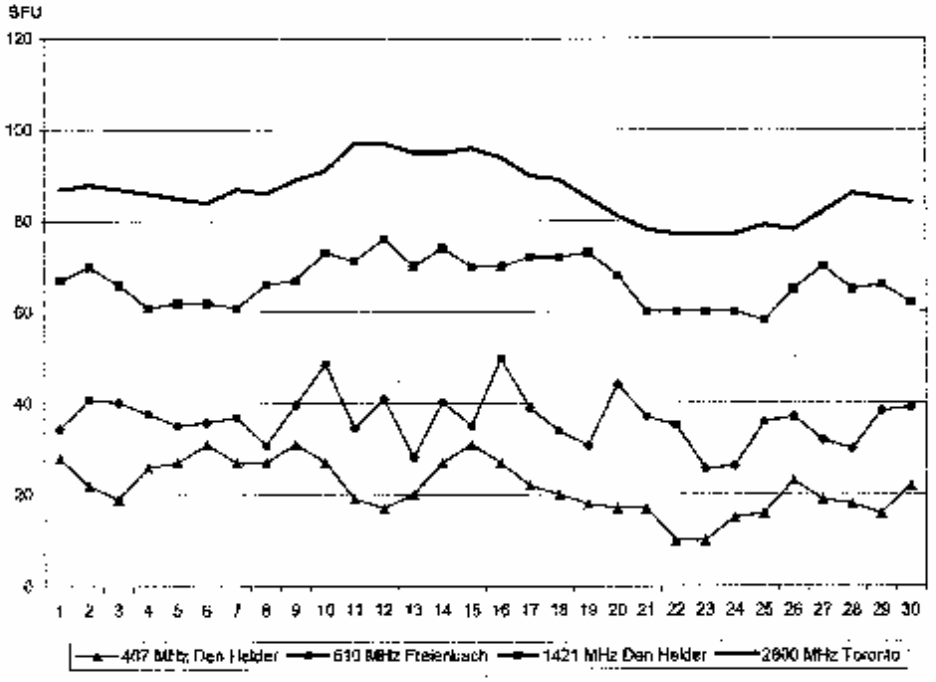
IV. Halo CME list

No CME alert was sent.

de ZON in NOVEMBER 2006



Radioflux ZON in NOVEMBER 2006



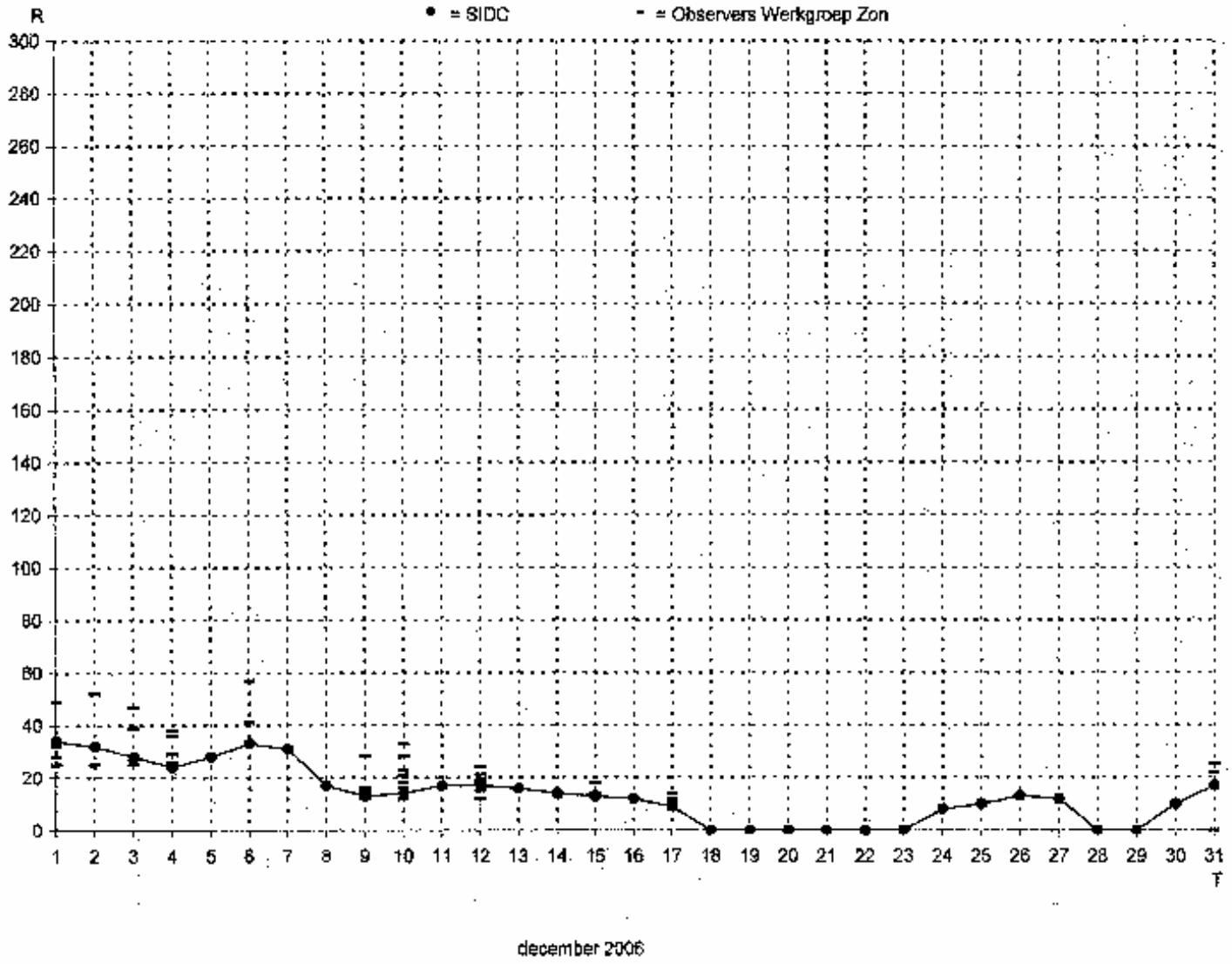
Bulletin Werkgroep Zon December 2006

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
tel: 0223-624130 E-mail: heijpi@planet.nl

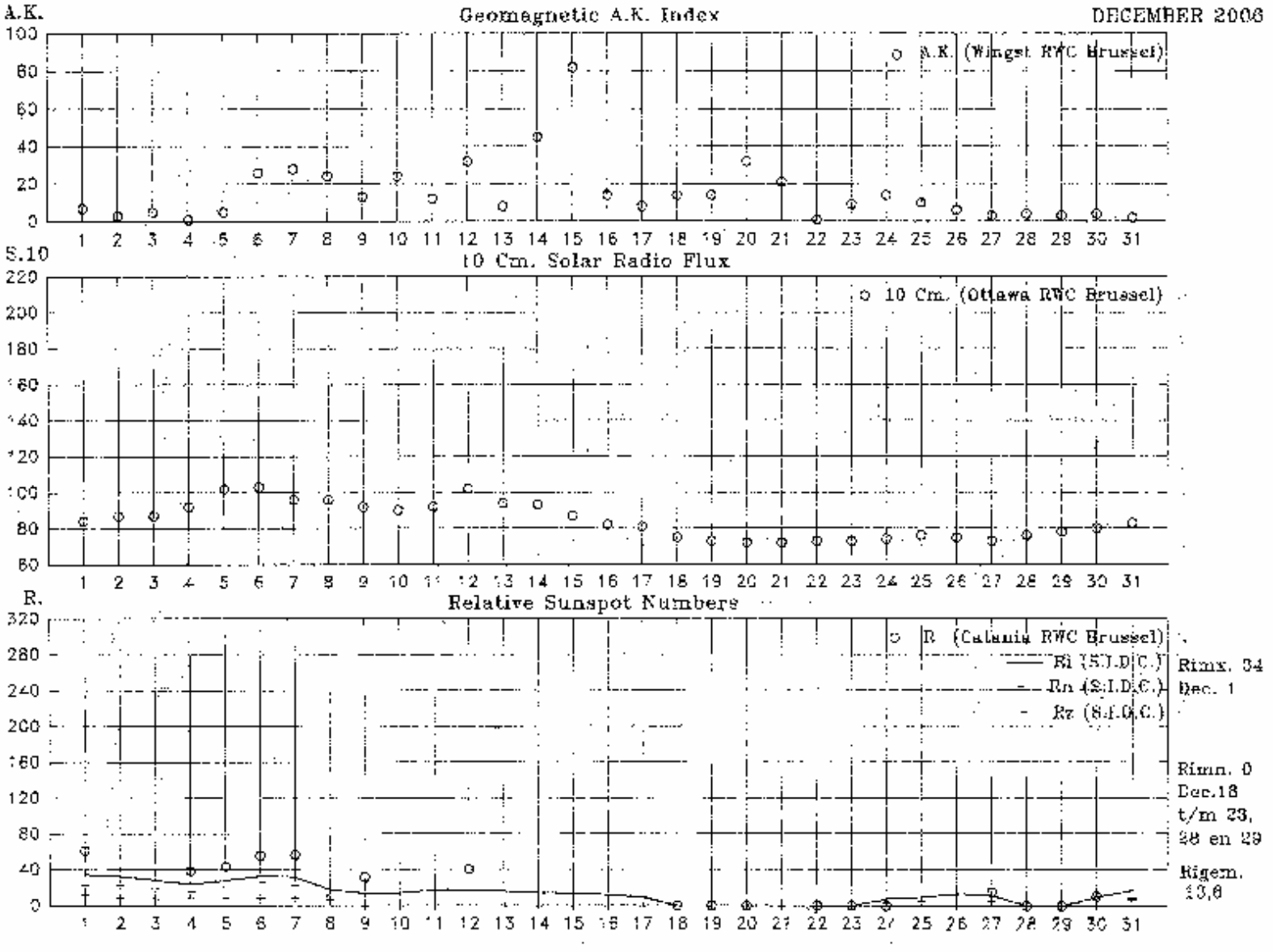
Zonnevlekkengetallen (Sunspot numbers)

Day	SIDC	Bals	Gort	Gr60	Groe	Jn 9	Jn40	Kr80	vSlo	Son	Spa	Zans	Zijle
1	34	32	28			25				49			
2	32	52				25							
3	28	47	27			25						39	
4	24		26			25		36	29			38	
5	28												
6	33		41									57	
7	31												
8	17												
9	13		12		12	12			16	15	28	13	15
10	14	28	14	21		12	12		14	23	18	16	33
11	17												
12	17	24	15			12			16	21	24	19	
13	16								16				
14	14					13			14				
15	13	16	14							18			
16	12												
17	9	14	11			11					12	14	
18	9		0	0					0			0	
19	9	0		0	0	9						0	
20	0												
21	0												
22	0					0							
23	0												
24	8												
25	10												
26	13												
27	12												
28	0												
29	0	0		0		0			0		0		
30	10												
31	17	25				0			22			25	
observ		10	10	4	2	13	1	1	9	5	5	10	2
k		0,69	0,98	0,67	1,08	1,14	1,17	0,67	0,91	0,74	0,68	0,75	0,85
st.dev.		0,17	0,14	–	–	0,19	–	–	0,10	0,10	0,14	0,15	0,31
st.d./ k		0,24	0,14	–	–	0,17	–	–	0,11	0,14	0,21	0,20	0,46

Observers	[...] = Refractor, d = ... mm	[Rf...] = Reflector, d = ... mm
Bals = H.A.M. Balster [70]	Jn 9 = D. Jannink [9]	Son = A.T. Son [Rf 150 Kutter]
Gort = E.Gorter [80]	Jn40 = D. Jannink [40]	Spa = T. Spaninks [75]
Gr60 = Mw G. Gravers [60]	K105 = K. Kroesen [105]	Stam = R.Stammes [100]
Groe = A.Groenewegen [102]	vSlo = B. van Slooten [90]	Zans = W. Zanstra [Rf 155]
		Zijle = W.A. Zijlema [90]



december 2006


A.K.
Geomagnetic A.K. Index
DECEMBER 2006
A.K. (Wingst RWC Brussel)
S.10
10 Cm. Solar Radio Flux
10 Cm. (Ottawa RWC Brussel)
R.
Relative Sunspot Numbers
R (Calmia RWC Brussel)
Ri (S.I.D.C.)
Rn (S.I.D.C.)
Rz (S.I.D.C.)
Rimx. 34
Dec. 1
Rimn. 0
Dec.18
t/m 23,
28 en 29
Rigem.
13,6

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

december 2006

	S.I.D.C.		Balster		Jenninк4		v.Slooten		Son		Spaninks		Zanstra	
Day	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	12	22	15	17					31	18				
2	9	23	14	38										
3	8	20	14	33									12	27
4	9	15					11	18					12	26
5	8	20												
6	8	25											12	45
7	8	23												
8	6	11												
9	0	13					0	18	0	15	11	17	0	13
10	0	14	0	28	0	12	0	14	0	23	0	18	0	18
11	0	17												
12	0	17	0	24			0	18	0	21	0	24	0	19
13	0	18					0	16						
14	0	14					0	14						
15	0	13	0	18					0	18				
16	0	12												
17	0	9	0	14							0	12	0	14
18	0	0					0	0					0	0
19	0	0	0	0									0	0
20	0	0												
21	0	0												
22	0	0												
23	0	0												
24	4	4												
25	5	5												
26	0	13												
27	6	6												
28	0	0												
29	0	0	0	0			0	0			0	0		
30	0	10												
31	8	9	12	13			11	11					12	13

Meer informatie over de zon, met o.a. waarnemingen van leden van de Werkgroep Zon, vindt U op de website van de European Radio Astronomy Club:

www.eracnet.org onder observations

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_1	PPSI	600	2800	COS	SFI	XI	Ak	SEA
30	35	68	-	84	////	0	0/2	20	
1	35	54	-	84	////	1	0/0	7	
2	32	45	-	87	////	5	0/0	3	
3	28	30		87	////	2	0/0	5	
4	24	16	-	92	////	1	0/0	2	
5	28	14		102	////	17	1/1	5	
6	33	21	-	100	////	120	3/1	36	
7	31	60	-	96	////	23	1/0	28	
8	17	///	-	96	////	0	0/0	24	
9	10	92	-	94	////	2	0/0	13	
10	14	55		90	////	2	0/0	24	
11	17	61		92	////	14	0/0	12	
12	17	111	-	132	////	104	2/0	32	
13	16	109	-	94	////	///	0/1	8	
14	14	41	-	90	////	6	0/1	45	
15	13	38	-	87	////	3	2/0	52	
16	12	18	-	82	////	3	0/0	14	
17	9	1	-	81	////	0	0/0	5	
18	3	0	-	75	///	0	/0	4	
19	2	0	-	73	///	0	/0	2	
20	3	0	-	72	///	0	/0	2	
21	5	0	-	72	////	0	0/0	21	
22	0	0	-	73	///	0	/0	7	
23	3	0	-	75	///	0	/0	3	
24	8	1	-	74	////	0	0/0	14	
25	10	0	-	76	////	0	0/1	10	
26	13	3	-	75	////	0	0/0	6	
27	12	3	-	72	////	0	0/0	3	
28	8	0		72	///	0	/0	4	
29	8	0	-	78	///	0	/0	3	
30	10	0	-	80	////	0	0/0	4	
31	17	5	-	82	////	1	0/0	2	

R'_1 : provisional international sunspot numbers from the S.I.D.C.

PPSI : prompt photometric sunspot index from the S.I.D.C. in 10^{-5} w/m^2 : the quantity to be substracted from the mean solar constant to account for the sunspot contribution.

600 : 600 Mhz solar flux from the station at Humain (Belgium).

2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10,7cm Flux data are a service of the National Research Council of Canada.

COS : thousands of the cosmic ray counts (origin : Ursigrams - UCOSB Terre Adélie).

SFI : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams - UGEOR, evaluation : 1 x Sn+10 x "1"+ 100 x "2+").

XI : X-Flares Index from the Ursigrams (M-flares/X flares) (origin : Ursigrams - UGEOR, UGEOI).

Ak : geomagnetic index from Wingst, Germany (origin : Ursigrams).

SEA : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium)

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Solar activity was highly atypical this month. Catania sunspot group 06 (NOAA AR 0930) was the source of some extreme flares and storm events. This group was rather persistent. When the group rotated over the east limb on Dec 04, it started already its second journey over the visible side of the solar disk. The group came into view for a third rotation at the solar east limb on Dec 31. Its second transit was the most violent one.

Almost immediately when Catania group 06 (NOAA AR 0930) was visible in SOHO/MDI on Dec 04, the background soft X-ray and 10.7cm radio fluxes increased, and C-class flares were detected by GOES satellites. Unlike its previous rotation as NOAA AR 0923, the region did not decay; rather it unleashed a very un-minimum-like impulsive X9.0 flare on Dec 05. SOHO/EIT and SOHO/LASCO were not operating because of spacecraft manoeuvres but the flare was observed by GOES SXI. The flare was accompanied by a Type II radio burst. A few hours later, the proton fluxes increased. An explanation for the late arrival of the protons at earth may be the fact that those protons are accelerated by the CME driven shock. The plasma cloud or CME associated with the flare moves with a large speed through the interplanetary space creating a shock in front of it. The CME driven shock is capable of accelerating particles. This CME was east-directed. At first sight one would think that the protons are predominantly ejected in the east direction and would never arrive at earth. But, the shock intersects with the magnetic field lines emanating from the sun forming the Parker spiral. The charged particles are accelerated at the shock front and move further along these field lines, away from the sun. When those magnetic field lines are connected with the near-earth environment, they can reach our neighbourhood. Only after a few hours when the shock was extended in space and intersects with magnetic field lines connected to earth, the protons were detected by GOES.

On Dec 06, after an M1.1 and an M6.0 flare, the group yielded an X6.5 flare, along with a new enhancement of the proton fluxes. On Dec 07, an M2.0 flare was released. The flaring activity of Dec 05-06 made the proton levels steadily increase with finally all three energy bands surpassing the 10pfu threshold on Dec 07. From Dec 08 onwards, the group seemed to calm down with only a few C-class flares. This was only a short flaring silence before a new storm. The small bipolar sunspot in front of the big bipolar sunspot of the group could be identified as the trigger for the exceptional strong solar flares on Dec 13 and 14. The mixing of magnetic fields cleared the way for the energy stored in the big sunspot group to be released. The group exploded into an X3.4 flare on Dec 13 peaking at 02:39UT. CACTus detected a full halo CME coming into the field of view at 02:54UT with a median velocity of 1140 km/s. A big, nicely radially propagating EIT wave was detected. Since there were no other active regions present on the Sun, the EIT wave could propagate radially without any obstacles on its path. The event caused a proton storm with all three energy levels passing the 10 pfu threshold.

On Dec 14, the same group fired an X1.5 flare peaking at 22:14UT. This event again pushed up the proton levels. The >100MeV curve did not pass the threshold, the >50MeV curve was only for a short time above the threshold, while the >10MeV stayed well above it until mid Dec 15. An EIT wave was visible in EIT195. The associated halo CME was also seen in LASCO pictures. CACTus split the event in three parts and was as such not recognized as a halo.

On Dec 17, GOES detected a C-flare originating from this group. In view of the past turbulent circumstances, a C-flare is not worth mentioning but this one was. The X-ray radiation curve shows a flat bulb rather than a peak. This is due to the fact that the event happened when the group was already behind the limb. Large post-flare loops were clearly visible in EIT. Only the radiation associated with these loops was measured by GOES. This indicates that the actual event was much stronger then only a C-flare. It was possibly another extreme flare, missed because of the position of Catania 06 (NOAA AR 0930) behind the limb. A CME was associated with this event, but it was no threat since it was not earth directed.

After the large active sunspot group Catania 06 had just disappeared at the west limb on Dec 17, not a single sunspot was observed during the next 6 days. The GOES X-ray flux was extremely low and remained at or often below the A level. On Dec 31, NOAA AR 0930 reappeared at the east, now with NOAA number 0933. The numbers 0931 and 0932 were assigned to two smaller active regions evolving into inactive plages. NOAA AR 0933 pushed the X-ray background radiation to a slightly higher level, but the overall activity stayed low. The group had decayed considerable when it crossed the backside of the solar disk.

The remaining solar features to be discussed are coronal holes. From Dec 11 onwards, when EIT was again operational, a few holes could be identified. A first small one was located in front of the big sunspot group Catania 06. On Dec 12, it was already situated at 45° to the west. A second hole was recurrent and southern. A first part crossed the central meridian on Dec 16. The hole was fairly extended in longitude (>60°). The third coronal hole was small and located in the southern hemisphere. It passed the central meridian on Dec 25. The last hole was clearly visible in EIT195 in the south. A first part reached the central meridian on Dec 30.

II. Geomagnetic Activity

The extreme geomagnetic conditions this month were caused by the arrival of the full halo CMEs associated with the energetic X-flares. Other geomagnetic disturbances were less extreme and caused by the passage of coronal holes.

Geomagnetic conditions were at minor storm level on Dec 06-09 following the arrival of a fast stream from a recurrent coronal hole. The solar wind speed eventually reached a level in excess of 600 km/s, though energetic particles contaminated ACE plasma data. It was very difficult to identify any signatures in the solar wind data that could be related to the CMEs associated with the flares between Dec 05 and 07. On Dec 11-12, active to minor storm conditions were reached. They were possibly caused by the first coronal hole mentioned in the previous section. From Dec 14, geomagnetic conditions were completely ruled by the arrival of the halo CMEs associated with the X-flares. On Dec 14 around 14:00UT, a shock arrived at earth. The shock was clearly visible in both SOHO/CELIAS and ACE data. The arrival triggered a major geomagnetic storm. The passage of the shock was also visible in the proton flux curve measured by GOES. The curve of the low energy elements (>10MeV) shows a small discontinuity followed with a relatively faster decrease of the flux.

The halo CME associated with the X1.5 flare of Dec 14 arrived at earth on Dec 16 around 17:30UT. Because of the northwards orientation of Bz, geomagnetic consequences were limited. NOAA estimated one period with a Kp-index of 4.

On Dec 18, the solar wind speed increased due to the arrival of a recurrent fast stream associated with the southern hemisphere coronal hole mentioned above. This fast stream arrived at least one day earlier than in previous solar rotations, possibly because of a change of the background interplanetary medium in the wake of the major CME that just preceded the fast stream. As a consequence, the fast stream lasted for an entire week and maintained unsettled to active geomagnetic conditions at the earth until Dec 23. Two periods were particularly active, with minor geomagnetic storms recorded at many stations. The first one came late on Dec 18, due to the co-rotating interaction region. The second one took place late on Dec 20, when the fast stream reached an exceptional top speed of 700km/s, leading to a large dynamic pressure. It was only from Dec 24 onwards that the geomagnetic field finally returned to quiet to unsettled conditions. The signature of the third, small southern coronal hole was visible in ACE data, although not pronounced. The influence was limited. The interaction region associated with the fast coronal hole wind stream emanating from the last mentioned coronal hole arrived the first day of 2007.

III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO TYPE	Cat	NOAA	NOTE
05	0715	0800	0806	S05E71	M1.8	SF			05	0930	No LASCO/EIT
05	1018	1035	1045	S06E55	X9.0	2B	12000	III/2,II/3,IV/2	05	0930	No LASCO/EIT
06	0130	0220	0256	S05E[illegible]	M1.1	SF		III/2	05	0930	No LASCO/EIT
06	0802	0822	0901	S07E65	M6.0	SF	546	II/1,IV/1	06	0930	No LASCO/EIT
06	1839	1847	1905	S06E63	X6.5	3B	5000	III/2,II/3,IV/3	05	0930	No LASCO/EIT, p
06	2314	2315	2322	[illegible]	M3.5				06	0930	No LASCO/EIT
07	1826	1915	1935	S07E47	M2.0	1N	2600	CTM/2	06	0930	No EIT, CME
13	0214	0240	0257	S06W24	X3.4	4B	44000	II/3,III/3,IV/2	06	0930	Halo CME, p
14	2107	2215	2256	S06W[illegible]	X1.5	3B	829	II/2	06	0930	Halo CME, p

LOC: approximate heliographic location
XRAY: X-ray flare class
OP: optical flare class
10CM: peak 10 cm radio flux

RADIO TYPE: radio burst type
Cat: Catania sunspot group number
NOAA: NOAA active region number
NOTES: p = proton event,
CME = coronal mass ejection

IV. Halo CME list

[illegible]	Onset time CACTus		e-mail time LASCO	dw (Cact.)	Ass. Events	consequences
[illegible]	[illegible]				False alert	
[illegible]	[illegible]				False alert	
[illegible]	[illegible]		[illegible]		X9.0, dimming, EIT wave	major geostorm on 12/14, SEP rise instead of Kp=4 on 12/16
[illegible]	[illegible]		[illegible]		X1.5, dimming, EIT wave	
[illegible]	[illegible]				backsided	note

Onset time: Ut time first visible in C2 field of view
CACTus: Computer Aided CME Tracking (software developed by the SIDC)
LASCO: SOHO-LASCO Operations, G. Stenborg

FF: Fearless Forecast (a NOAA trial service)
e-mail time CACTus/LASCO/FF: Ut time alert e-mail sent by group
dw: angular width of CME, measured by CACTus
Ass. Events: Associated Events, Long Duration Event (LDE), flare class

Solar Influences Data analysis Center

Data Analysis Service supported by the FAGS

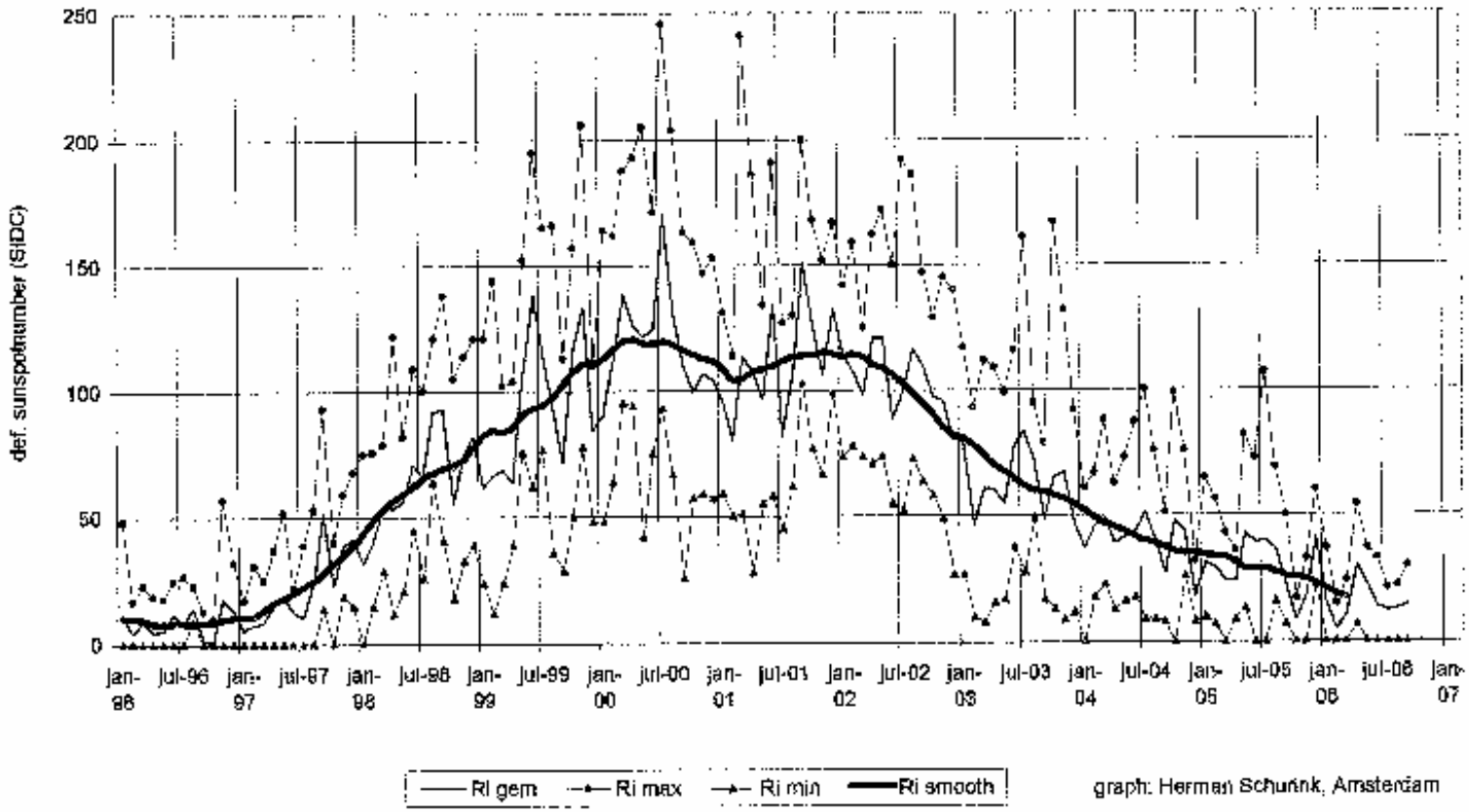
:Issued: 2007 Jan 27 0036 UTC
:Product: documentation at http://www.sidc.be/products/qua

SIDC-NEWS: DEFINITIVE INTERNATIONAL AND HEMISPHERIC SUNSPOT NUMBERS from the SIDC (RWC-Belgium)

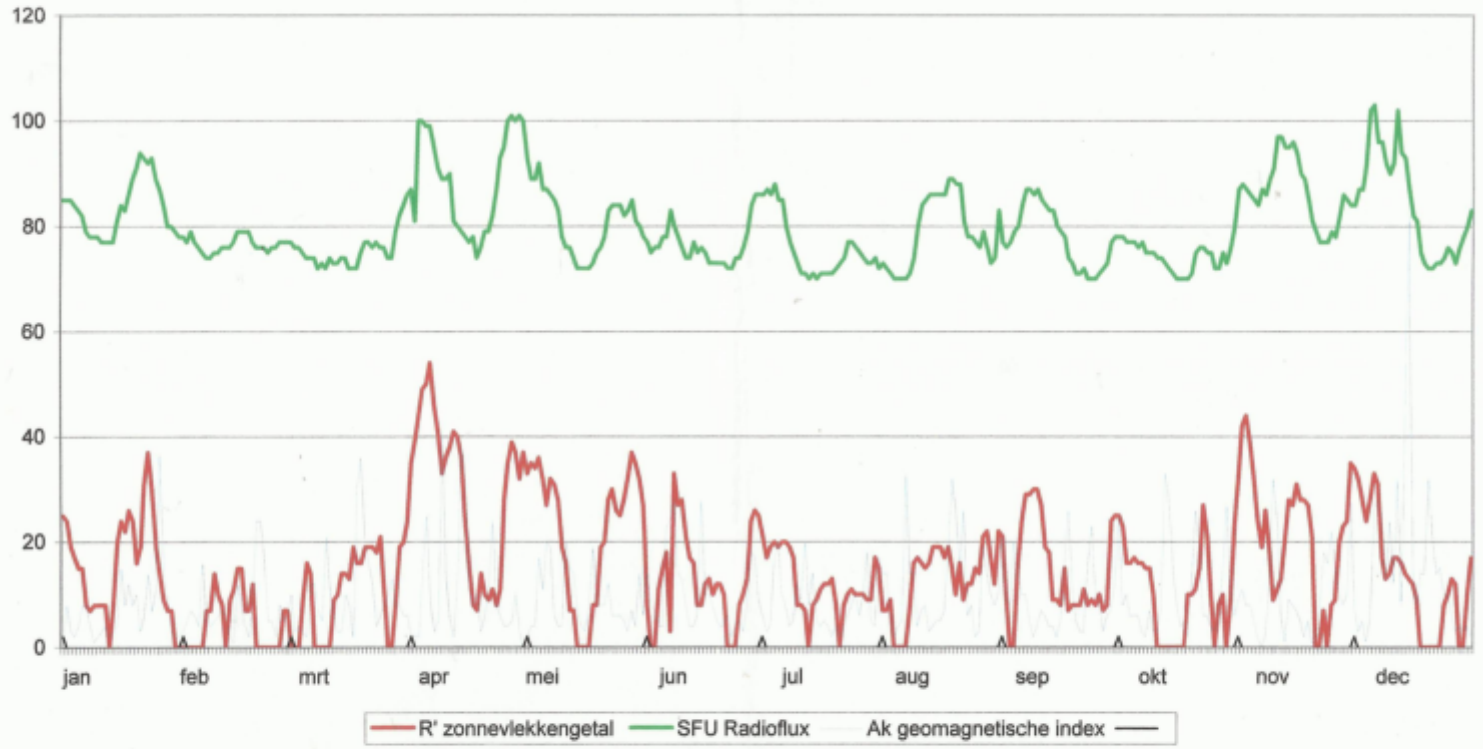
SIDC DEFINITIVE INTERNATIONAL AND HEMISPHERIC SUNSPOT NUMBERS FOR 2006

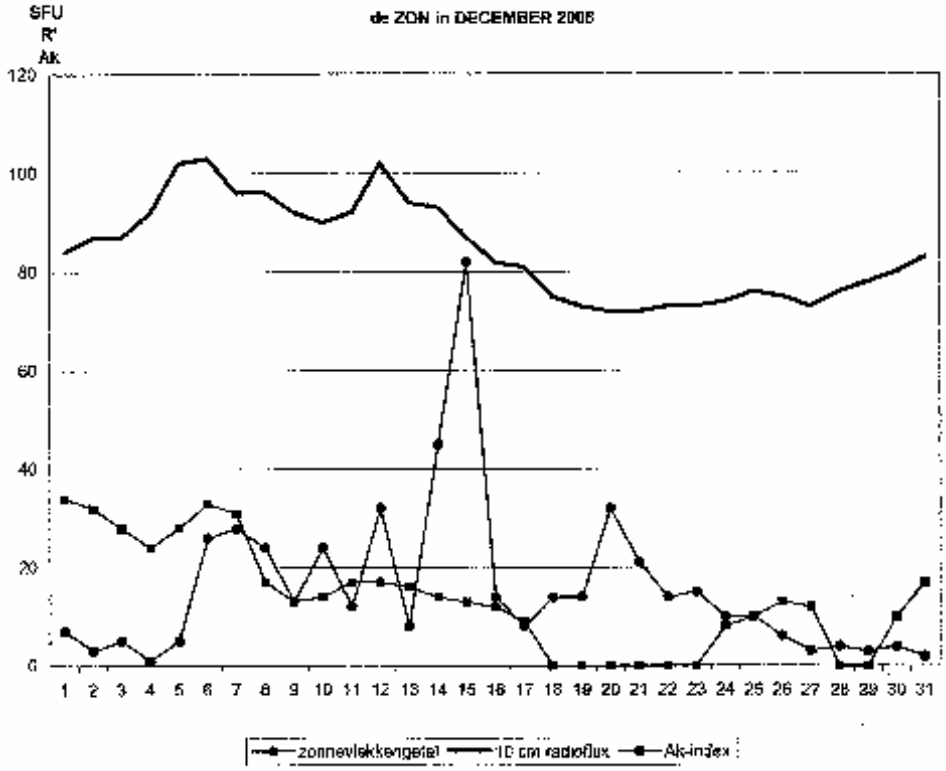
	JULY			AUGUST			SEPTEMBER		
Date	Ri	Rn	Rs	Ri	Rn	Rs	Ri	Rn	Rs
1	21	10	11	7	0	7	21	0	21
2	17	7	10	7	0	7	10	0	10
3	19	8	11	9	0	9	0	0	0
4	20	7	13	0	0	0	0	0	0
5	19	0	19	0	0	0	16	0	16
6	20	0	20	0	0	0	24	0	24
7	20	0	20	0	0	0	29	0	29
8	19	0	19	7	0	7	29	0	29
9	17	0	17	16	0	16	30	0	30
10	8	0	8	17	0	17	30	0	30
11	8	0	8	16	0	16	27	0	27
12	7	0	7	15	0	15	19	0	19
13	0	0	0	16	0	16	18	0	18
14	8	0	8	19	0	19	9	0	9
15	9	0	9	19	0	19	9	0	9
16	11	0	11	19	0	19	8	0	8
17	12	0	12	17	0	17	15	0	15
18	12	0	12	19	0	19	7	0	7
19	13	0	13	15	0	15	8	0	8
20	8	0	8	10	0	10	8	0	8
21	0	0	0	16	0	16	8	0	8
22	8	8	0	9	0	9	11	0	11
23	10	10	0	12	0	12	8	0	8
24	11	11	0	12	0	12	9	0	9
25	10	10	0	15	0	15	8	0	8
26	10	10	0	14	0	14	10	5	5
27	10	10	0	21	0	21	7	4	3
28	9	9	0	22	0	22	8	0	8
29	9	9	0	17	0	17	22	0	22
30	17	9	8	12	0	12	25	0	25
31	15	8	7	22	0	22			
MEAN :	12.2	4.1	8.1	12.9	0.0	12.9	14.4	0.3	14.1

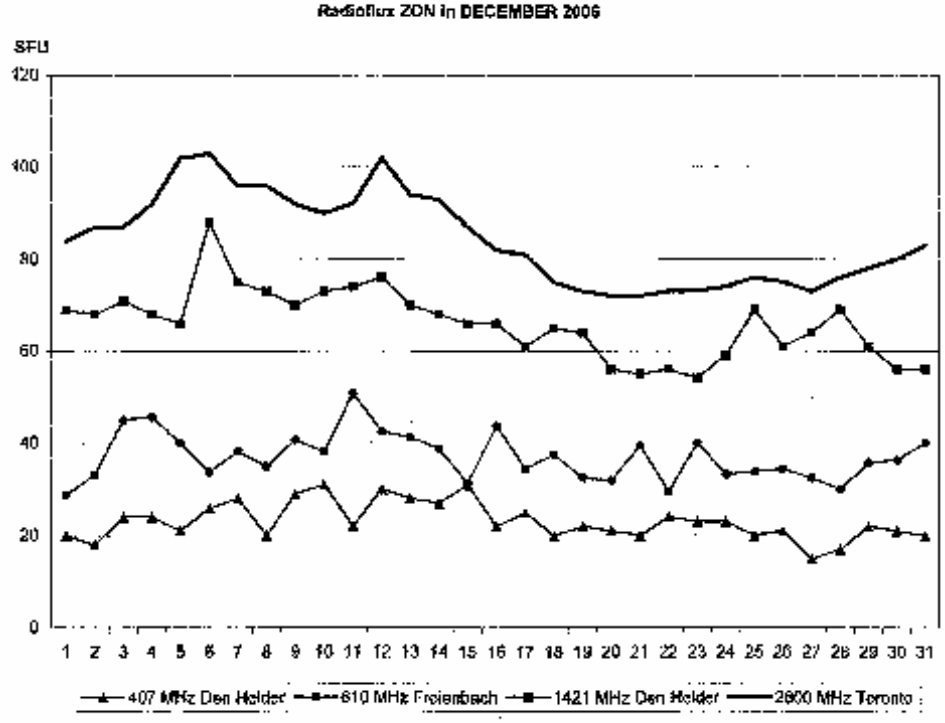
SOLAR CYCLE 23



de ZON in 2006




SFU
R'
Ak
de ZON in DECEMBER 2006
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
zonnevlekkengetal
10 cm radioflux
Ak-index


Radioflux ZON in DECEMBER 2006
SFU
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
407 MHz Den Helder
610 MHz Freienbach
1421 MHz Den Helder
2800 MHz Toronto