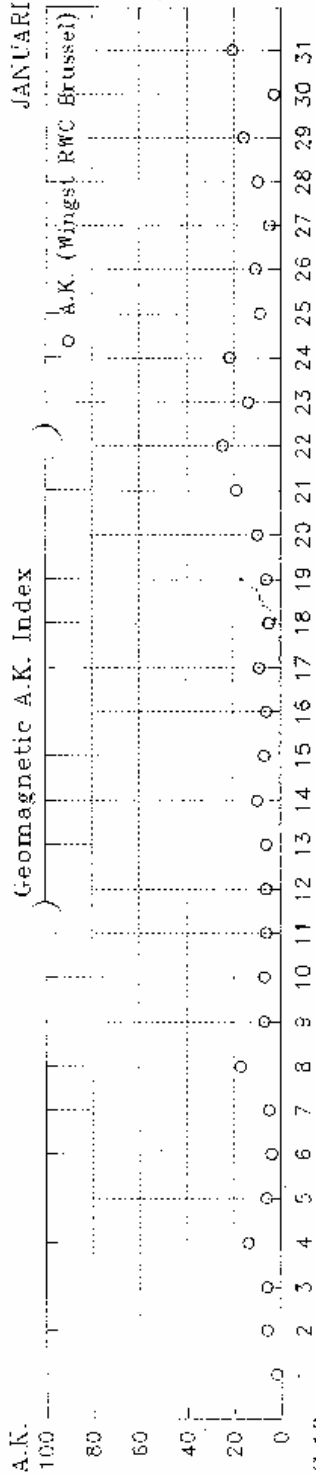
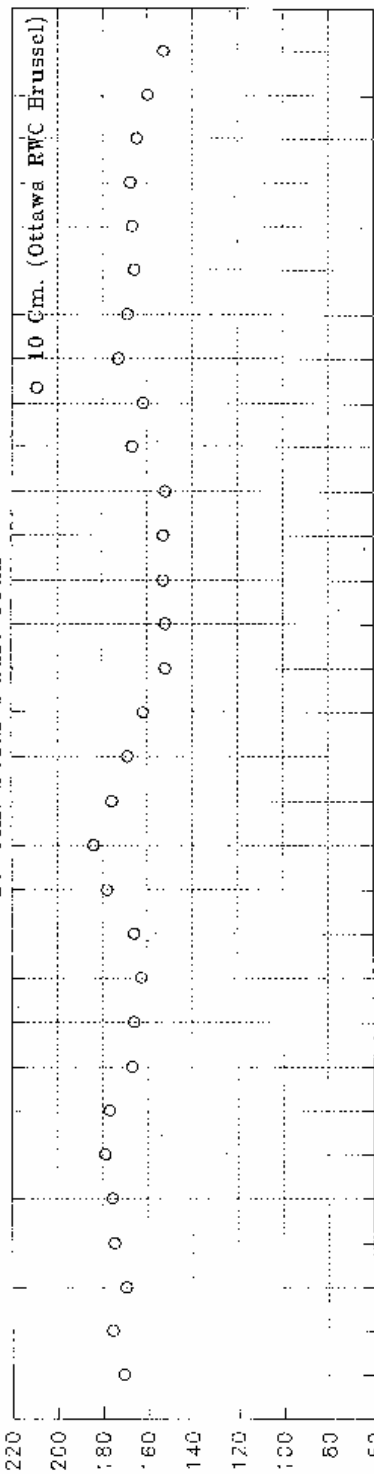


januari 2001

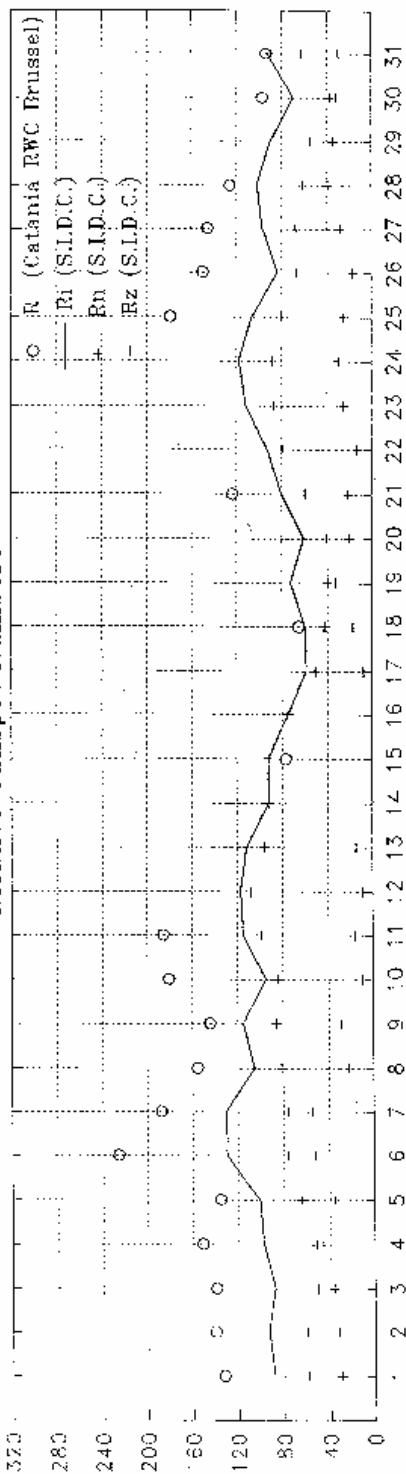
Geomagnetic A.K. Index



10 Cm. Solar Radio Flux



Relative Sunspot Numbers



Rimx 131
Jan. 7

Rimn 59
Jan. 17

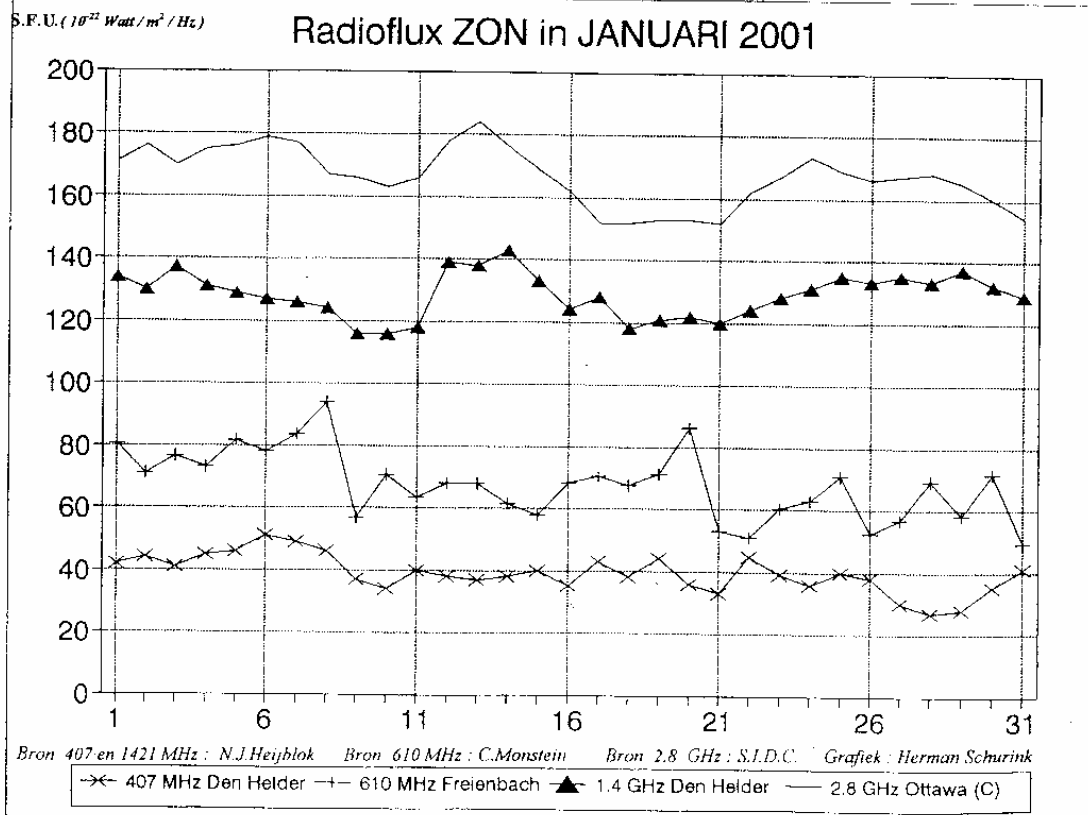
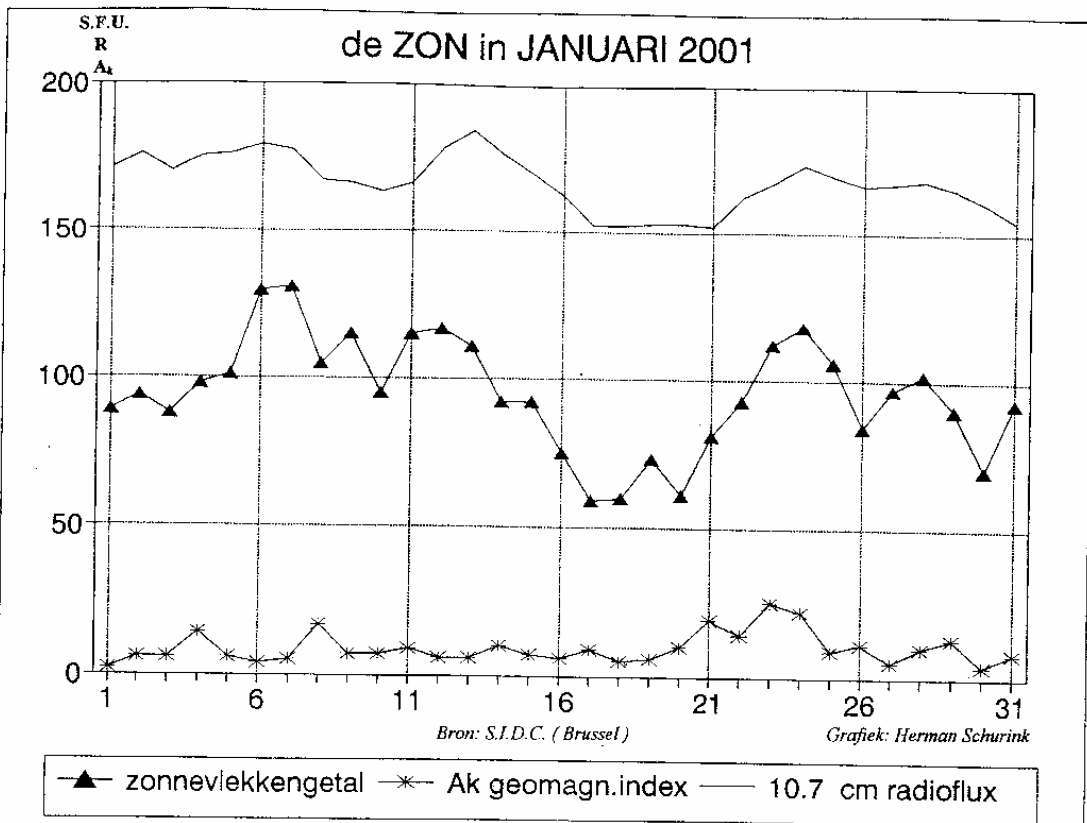
Rigom.
95.1

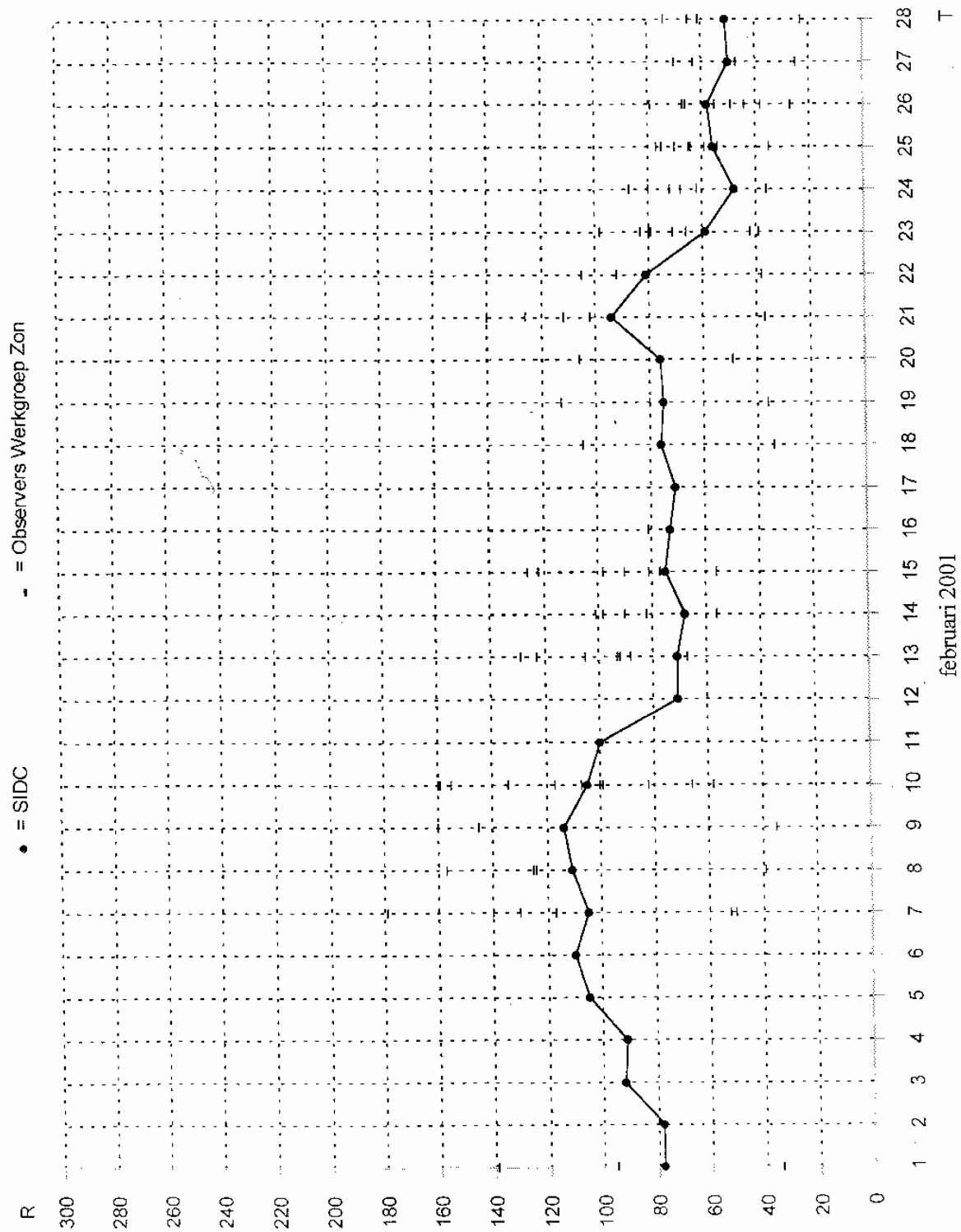
Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

januari 2001

Day	S.I.D.C.		Balster		Groenew		Jannink 4		v. Slooten		Spaninks		Wigman		Zanstra	
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	30	59														
2	33	61							36	66			47	75	50	58
3	37	51	47	70	36	46	33	26	48	61	50	79	49	59	38	51
4	52	46														
5	65	36														
6	77	53							88	74					94	61
7	76	55														
8	82	23	112	31									95	27		
9	86	29					49	11	120	34			94	34		
10	85	10														
11	99	16	132	11					123	22			111	22	104	11
12	108	9			96	11			120	11			117	11	113	11
13	96	15	142	22	79	0			111	11	118	22	106	11		
14	92	0														
15	92	0	103	0	52	0			125	0			92	0		
16	75	0	90	0	45	0			101	0	89	0	86	0	53	0
17	51	8	62	0	51	0	34	0	66	12			64	0	61	0
18	43	17														
19	40	33			22	26			57	47			37	44		
20	20	41			11	31										
21	21	60	16	77					27	74	40	79	26	77		
22	13	80														
23	25	87	34	117	15	40	36	12	17	100	39	134	21	110		
24	30	88													27	81
25	25	81														
26	17	67														
27	29	68														
28	40	62	52	83	68	11			61	86			59	82		
29	35	55	42	71					40	66			39	76		
30	38	32	53	49					56	37						
31	63	30							69	40			79	26	66	26

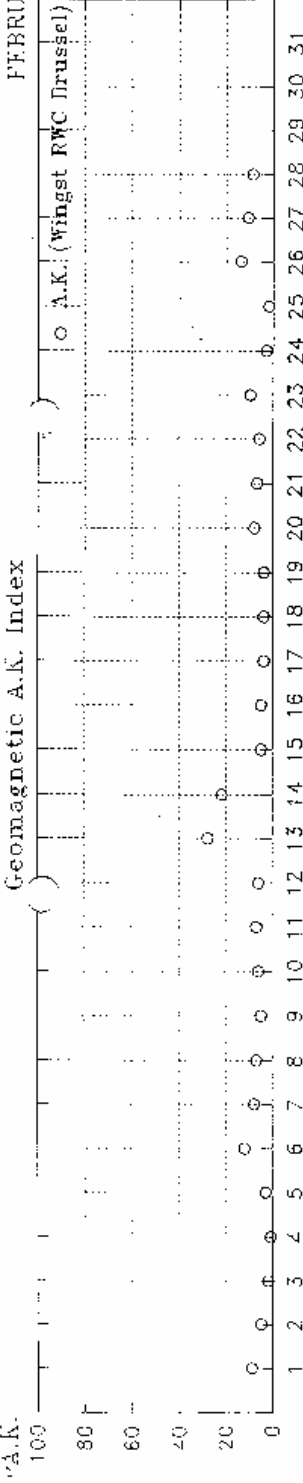




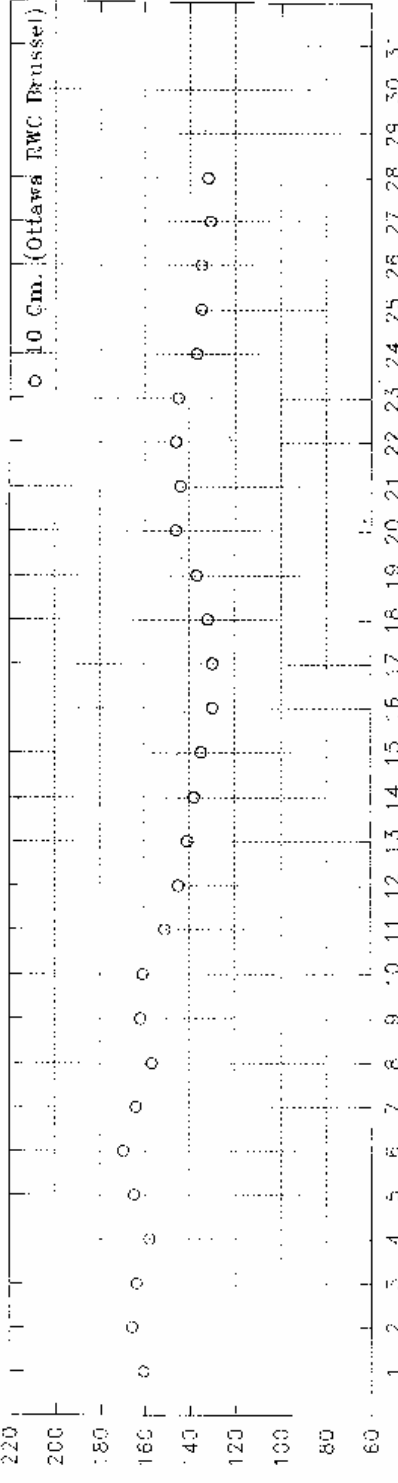
februari 2001

T

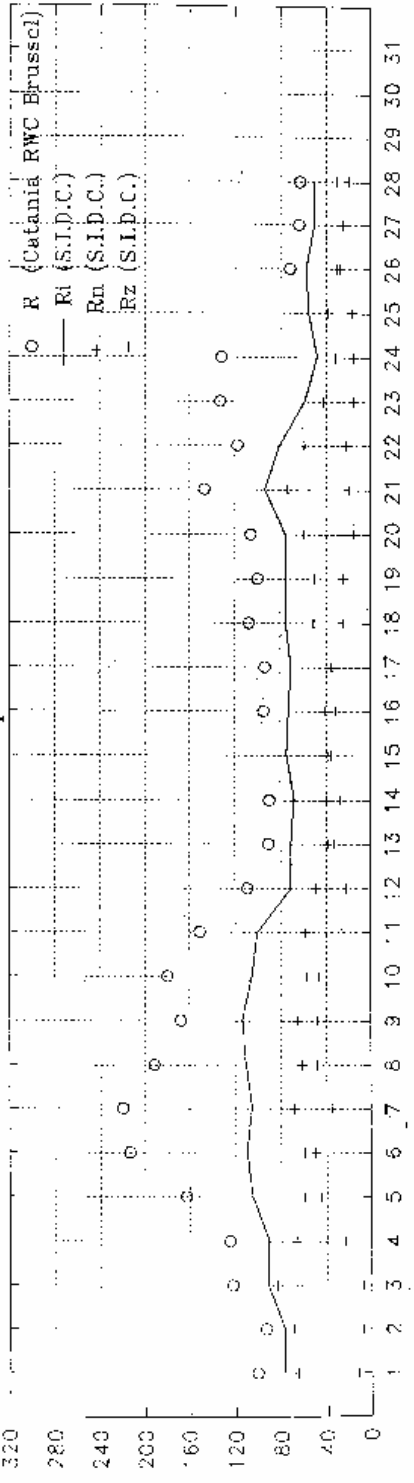
Geomagnetic A.K. Index



10 Cm. Solar Radio Flux



Relative Sunspot Numbers



Rimx 114
Feb. 9

Rimun 48
Feb. 24

Rigom.
80,1

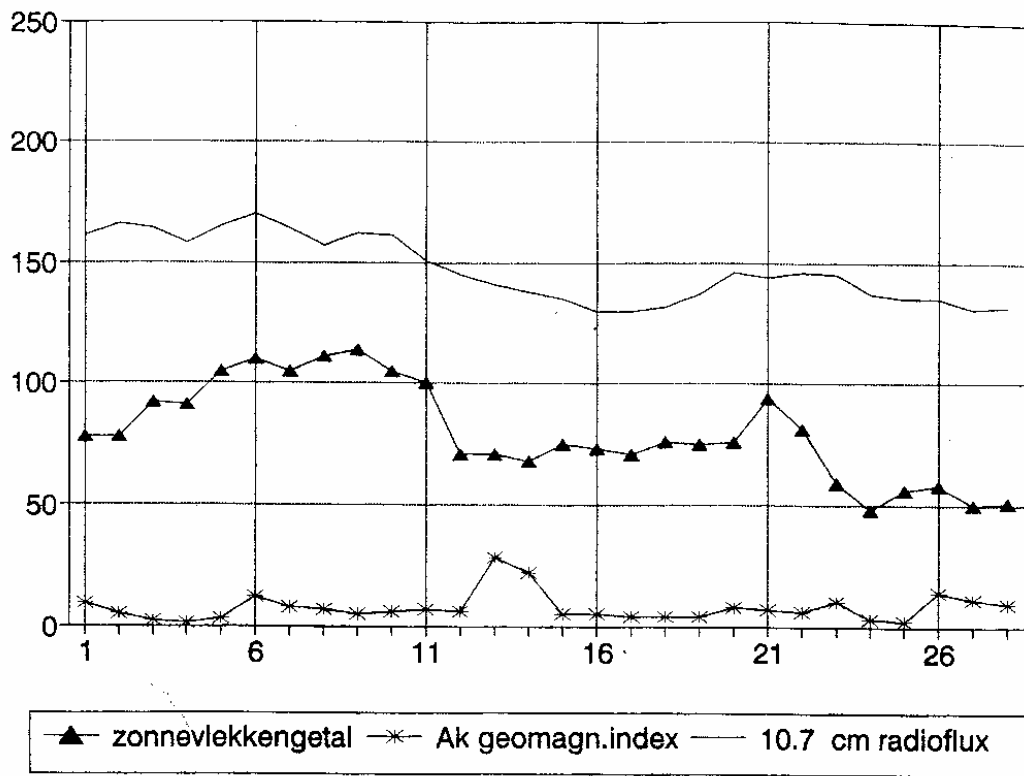
Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

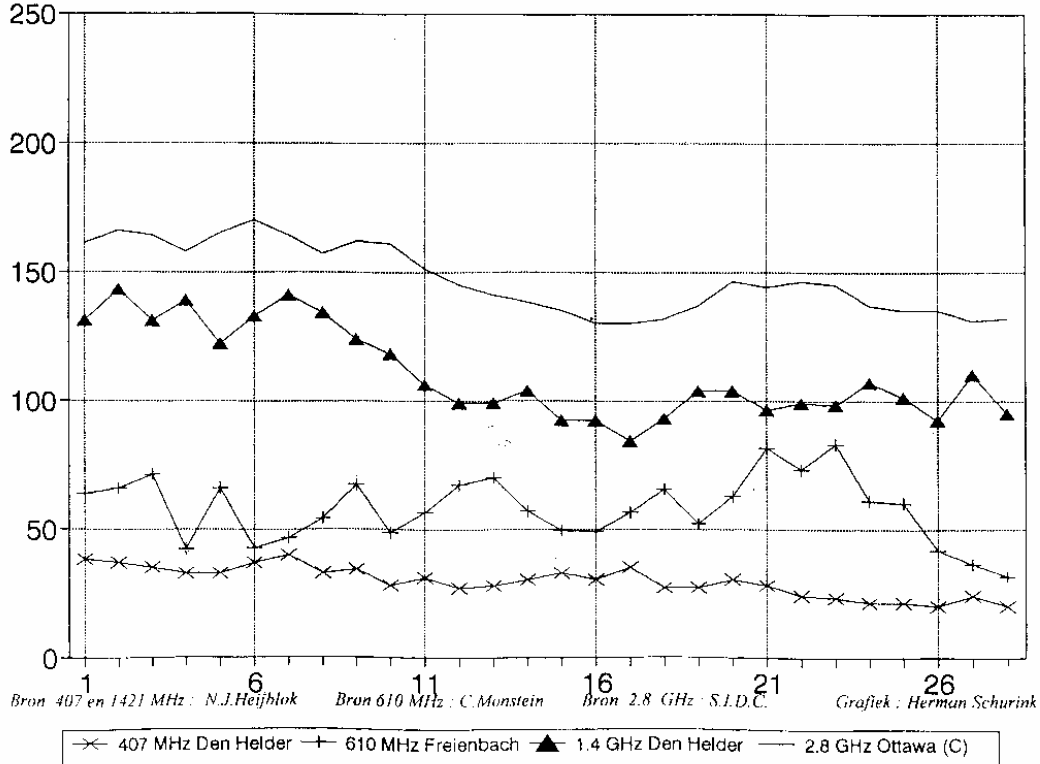
februari 2001

Day	S.I.D.C.		Balster		Groenew		Jannink4		v.Slooten		Son		Spaninks		Wigman		Zanstra	
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	66	12															77	18
2	70	8																
3	84	8																
4	67	24																
5	60	45																
6	50	60																
7	69	36	90	50			28	24	80	50					68	49		
8	62	49	85	72					63	61					63	62		
9	66	48							77	68			91	69				
10	58	47	99	61	36	30			99	56	51	31	99	60	56	51	63	37
11	59	41																
12	49	22																
13	38	33	61	68	48	40	45	22	53	52					53	40	53	39
14	40	28	59	39	48	34			55	46			55	35				
15	39	36	65	57	48	33			57	69					51	47	53	24
16	41	32	46	35														
17	36	35																
18	25	51							36	69								
19	25	50							34	79					33	47		
20	16	60	23	83			11	38										
21	20	74							27	113					28	98	26	86
22	22	59							29	76								
23	16	43	25	58	15	27			40	58			26	54	24	47	17	49
24	16	32							29	43	32	30	24	56				
25	17	39	24	51	18	36			23	54	54	16	23	42	25	39	21	38
26	28	30	36	42	11	24			30	36			37	42	41	26	28	27
27	25	25	32	38					28	35			35	35			21	26
28	20	31	24	37					23	42			29	45				

de ZON in FEBRUARI 2001



Radioflux ZON in FEBRUARI 2001



Bulletin Werkgroep Zon
N.J. Heijblok
Wezenstraat 70
1781 GM Den Helder



**Volkssterrenwacht
De Schothorst**
Schothorsterlaan 27
Amersfoort
033-4559616
lezing 27 april
Michiel Brentjens

Mill-Hillcollege
Venneweg 42
Goirle
013-5420538
lezing 27 april
dr. Rob Rutten

Planetron
Drift 11b
Dwingeloo
0521-593535
lezing 28 april
drs Thijs Krijger

Sterrenwacht Leiden
info Martijn Nuyten
071-5223770
lezing 25 april

**SOHO 5 jaar
modern zonneonderzoek**

meewerkende organisaties

**Volkssterrenwacht
Philippus
Lansbergen**
Herengracht 52
Middelburg
0118-638018
lezing 27 april
Jelle de Pfla

**Volkssterrenwacht
Copernicus**
Vergierdeweg 269
Haarlem
023-5383339
lezing 27 april
drs Thijs Krijger

**amateurbijeenkomst
Roden**
Het Wapen van Drenthe
lezing 28 april
drs Maarten K.v.Aalst



Bulletin Werkgroep Zon

Maart 2001

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

Zonnevlekkengetallen (Sunspot numbers)

Day	Bats	Gr 6	Jn 9	Jn 4	Kroe	vSio	Sp 7	Wig	Zans	Uccle group spots
1										
2			64	0		69		56	79	
3		99		35	141	90				5 20
4										
5			26	38	137	141		98	122	7 72
6	125		84	41		118	127	113	123	6 84
7	119		38			102				6 37
8										
9										
10										
11			37							
12	126		56	29	93	127	138	68	70	7 32
13				18						6 42
14			89	16		119	159	97	58	5 40
15	87		70	15	41	78				4 40
16	106			23						4 45
17										2 37
18										
19	93		37			94		85		5 28
20	123		36	36	90	115				
21										5 18
22										
23										
24	228					240		241		
25										
26						280				
27			174		91					18 17
28	282		108			297				
29			110							13 75
30	308					260	368	251		15 136
31	278					185	243			14 108
observ	11	1	5	16	3	4	14	6	8	11
x	0.74	0.76	1.19	3.00	2.28	0.80	0.80	0.69	0.92	1.12
st.dev	0.06		0.28	1.11	0.46	0.21	0.15	0.11	0.23	0.29
si.d./k	0.11		0.24	0.37	0.20	0.28	0.19	0.18	0.25	0.26

Observers	[...] = Refractor, d = ... mm	[R...] = Reflector, d = ... mm
Bats = H.A.M. Baister [70]	Jn 4 = D. Jannink [40]	[Wig] = G. Wigmant [80]
Gr 6 = M.v.G. Gravers [80]	Kroe = K. Kroessen [102]	Zans = W. Zansstra [R1 155]
Groe = A. Groenewegen [102]	vSio = B. van Slooten [90]	
Jn 9 = D. Jannink [9]	Sp 7 = T. Spaninks [75]	

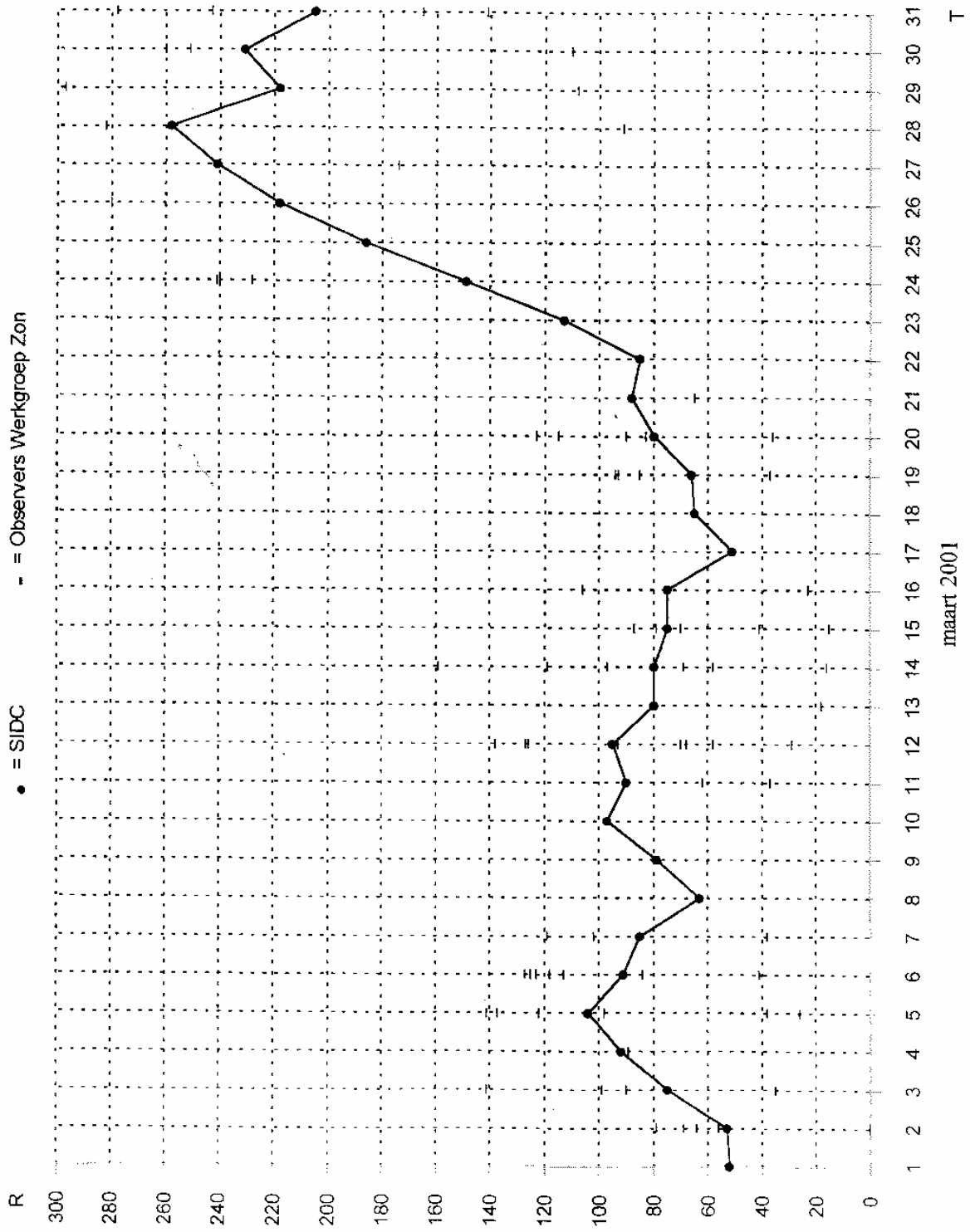
SIDC SUMMARY OF THE URSIGRAMS

2001 MARCH R_M = 114.2

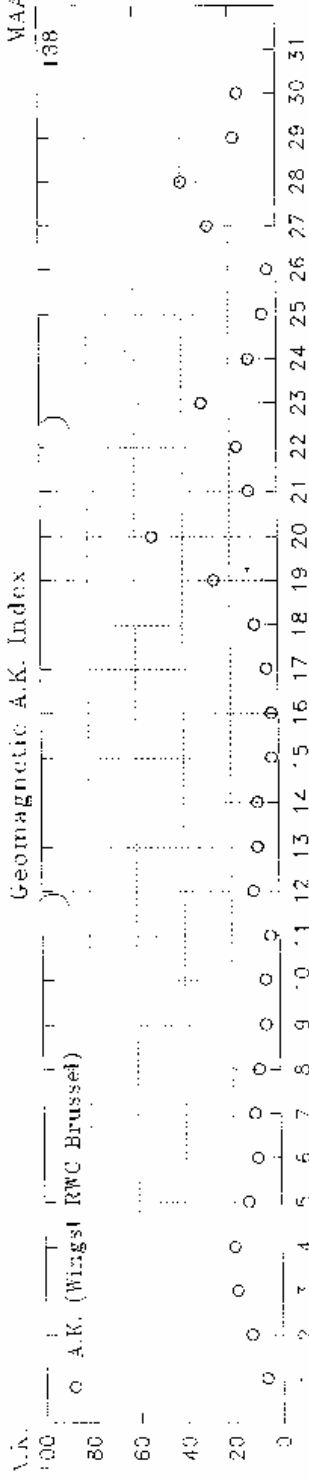
Date	R'	PFSI	600	COS	SFI	XI	Ak	SEA
28	51	33	51	132	-	0	0/0	9
1	52	16	51	131	-	3	0/0	7
2	53	21	50	130	-	0	0/0	13
3	75	45	51	140	-	8	0/0	19
4	92	64	51	141	-	1	0/0	20
5	104	76	51	156	-	3	0/0	14
6	91	112	55	158	-	7	0/0	10
7	85	124	58	177	-	19	0/0	11
8	63	121	57	167	-	11	1/0	9
9	79	89	54	161	-	18	2/0	6
10	97	81	52	160	-	25	1/0	6
11	90	70	51	158	-	4	0/0	4
12	95	61	51	158	-	7	0/0	11
13	80	59	49	147	-	1	0/0	9
14	80	66	48	142	-	1	0/0	9
15	75	83	48	136	-	9	0/0	3
16	75	92	50	140	-	5	0/0	3
17	51	67	51	134	-	2	0/0	5
18	65	44	51	140	-	10	0/0	10
19	66	48	53	147	-	4	0/0	27
20	80	42	55	153	-	16	5/0	53
21	88	56	53	159	-	4	1/0	12
22	85	93	54	183	-	3	3/0	17
23	113	109	52	180	-	7	0/0	32
24	149	185	58	219	-	133	3/0	12
25	186	246	65	217	-	133	2/0	6
26	218	361	68	264	-	42	2/0	4
27	241	467	74	273	-	44	1/0	29
28	258	658	70	274	-	56	6/0	40
29	218	403	72	262	-	42	7/1	18
30	231	437	86	257	-	43	2/0	16
31	205	448	66	246	-	17	1/0	138

Because of harmful interferences saturating our receivers, no SEA could be detected this month.
 R', R_M: provisional international sunspot numbers from the S.I.D.C.
 PFSI: prompt photometric sunspot index from the S.I.D.C. in 10⁻⁵ w m⁻²; the quantity to subtract from the mean solar constant.
 600: 600 MHz solar flux from Ottawa (origin: Usgisgrams - UGEOB). The 10.7cm Flux data are a service of the National Research Council of Canada.
 COS: thousands of the cosmic ray counts (origin: Usgisgrams - UCOSE Kerguelen).
 SFI: From October 1992, Solar Flare index from the S.I.D.C. (origin: Usgisgrams - UGEOB, evaluation: 1 x Sum 10^x "1+100 x >=").
 XI: X-flares index from the Usgisgrams (M-flares/X-flares) (origin: Usgisgrams - UGEOB, UGEOI).
 Ak: geomagnetic index from Wang, Germany (origin: Usgisgrams).
 SEA: sudden enhancements of atmospheres from Uccle & Hainin (Royal Observatory, Belgium).

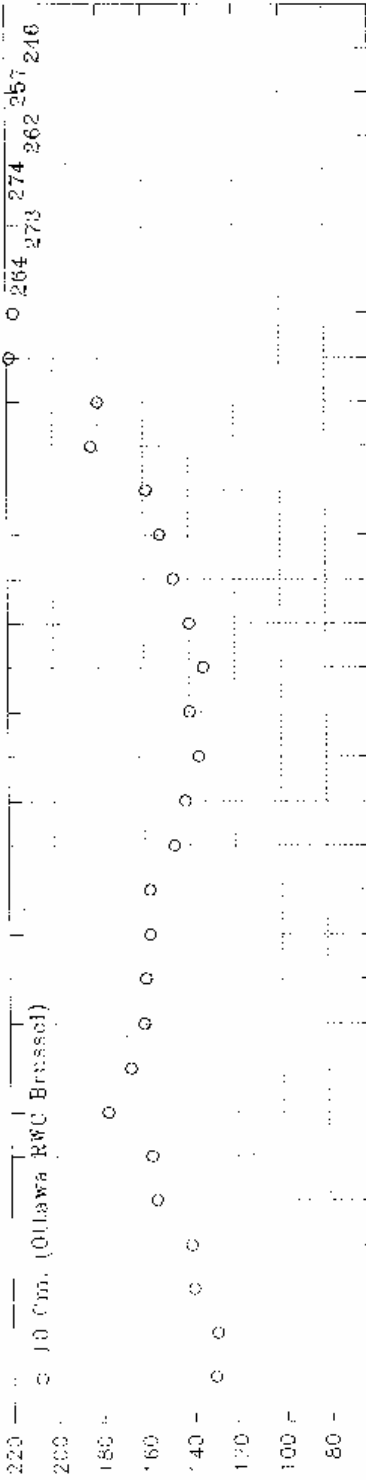
Samenvatting van de belangrijkste gebeurtenissen op de Zon elders in dit Bulletin.



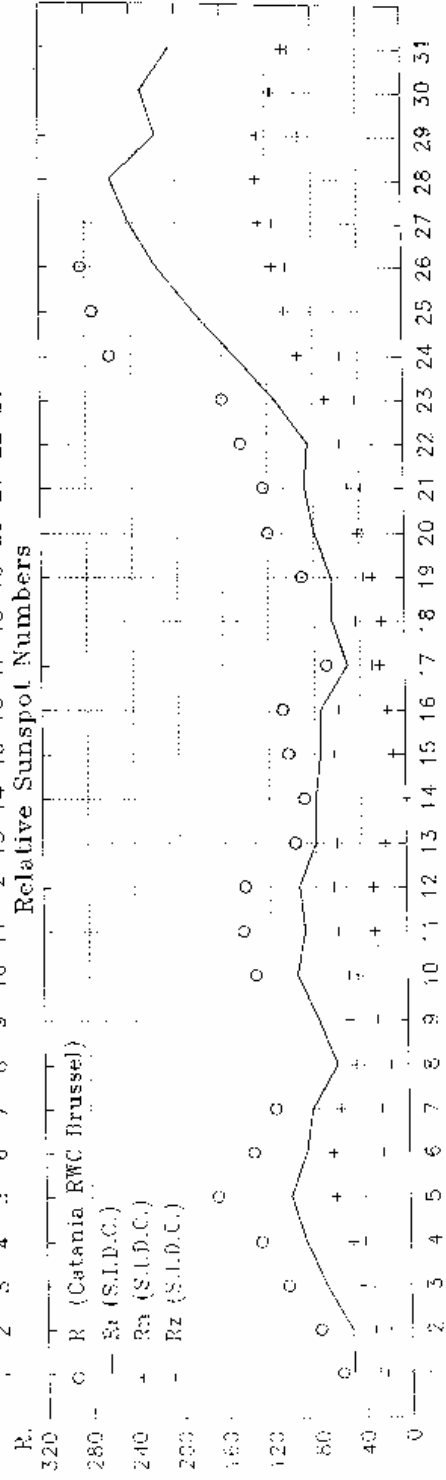
Geomagnetic A.K. Index



10 Cm. Solar Radio Flux



Relative Sunspot Numbers



Zonnevlekkengetalen noordelijk- en zuidelijk halfrond

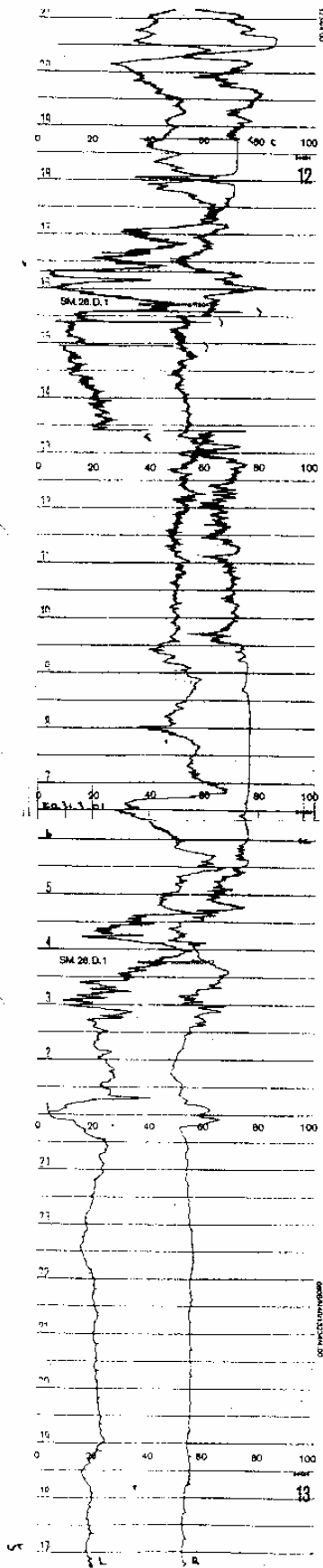
(Hemispheric sunspot numbers)

Maart 2001

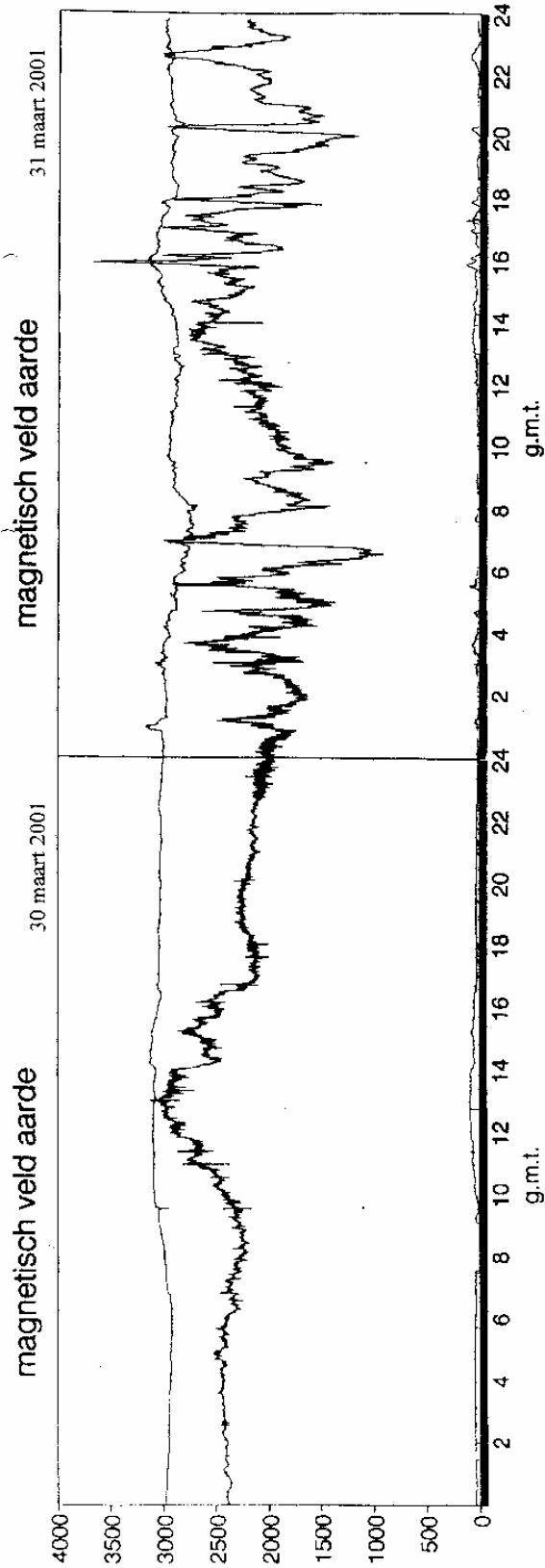
Day	S.I.D.C.		Balster		Groenew		Jann.40		v.Slooten		Spaninks		Wigman		Zanstra	
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	23	29														
2	20	33			34	30			26	43			25	31	36	43
3	42	33							54	36						
4	51	41													43	46
5	66	38					26	12	89	52			64	34	74	48
6	68	23	97	28	61	23			87	31	96	31	86	27	86	37
7	61	24	93	26					62	40						
8	47	16														
9	52	27														
10	45	52														
11	29	61													37	25
12	30	65	42	84	14	44			57	70	43	95	21	47	28	42
13	18	62														
14	0	80			11	58			15	104	14	145	13	84	14	44
15	11	64	15	72	14	56	12	27	17	62					13	57
16	16	59	33	73												
17	22	29														
18	21	44														
19	29	37	52	41					55	39			44	41		
20	42	38	61	62			11	25	53	62					49	34
21	50	38													39	28
22	57	28														
23	70	43														
24	93	56	130	98					135	105			152	89		
25	104	82														
26	115	103							132	148						
27	127	114			82	92										
28	129	129	142	140												
29	127	91									172	125				
30	116	115	178	158					137	123	201	157	137	114		
31	105	100	138	140					82	83	129	114			85	56

III. Noticeable Solar Events

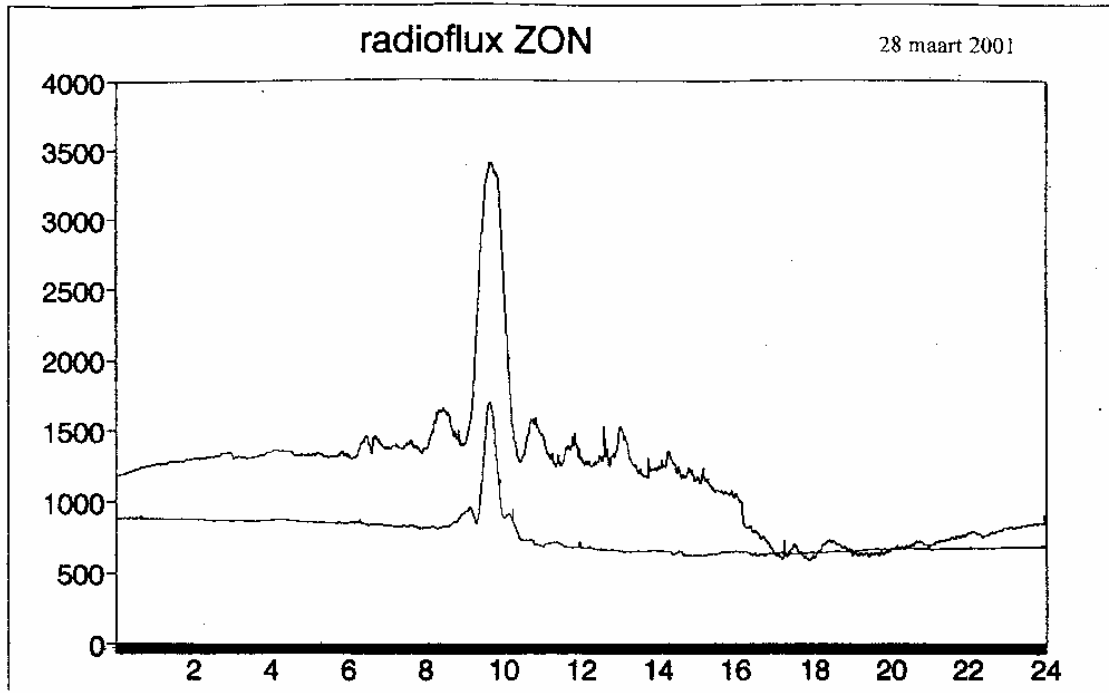
day	begin	max	end	loc	Xray	op	10cm	type	Cat	NOAA	comment
8	1113	1118	1121	N30W18	M5.7	1B	82	II/2	84	9368	
9	0151	0156	0157	N24W38	M1.5	1N	92	III/1	84	9368	
10	0400	0405	0407	N27W42	M6.7	1B	76	III/3	84	9368	
16	0350										HALO CME
20	0206	0218	0225	S05W54	M1.1	SF		II/3	93	9373	
20	0320	0333	0337	N07W70	M1.2	SF	27	III/1	03	9384	
20	1457	1507	1514	S05W61	M1.6	1F	30				
20	2056	2104	2112		M1.5			II			
21	0228	0237	0242	S05W65	M1.8	SN	87				
21	1122	1127	1132	S05W70	C9.8	SF	660				
24	0133	0138	0142	S14W82	M1.2	SF	510	II			
24	1935	1955	2047	N15E22	M1.7	2N	2300				
24	2304	2318	2330	N19E60	M1.1	1F	270				
25	0412	0424	0431	N17E51	M2.5	2N					
25	1033	1116	1120	N21E59	M2.6	1N	470				
26	0228	0239	0246	N20E51	M2.7	1N			25	9401	
26	1303	1326	1344	N15E27	M2.2	1F			16	9393	
27	1625	1630	1632	N21E33	M2.2	1N	230	II/2	25	9401	
28	0942	0947	0953	N17E05	M1.3	SN			16	9393	
28	1121	1240	1306	N19E02	M4.3	SF	78		16	9393	HALO CME
28	1858	1909	1924	N14W05	M1.5	1F			16	9393	
29	0244	0256	0300	N17W04	M2.1	1N	70		16	9393	
29	0957	1015	1032	N20W19	X1.7	SF		III/3	16	9392	p/HALO CME
30	0511	0515	0520		M2.2		91		16	9393	
31	1100	1112	1131	N16W34	M2.1	SF	100		16	9393	



Magnetogram van 30 en 31 maart 2001, opgenomen door Rob Stammes te Dirksborn
 De bovenste kromme is de H-component, de onderste kromme is de richtingsvariatie van het magnetisch veld. Opvallend zijn de grote uitlagen tijdens de magnetische storm

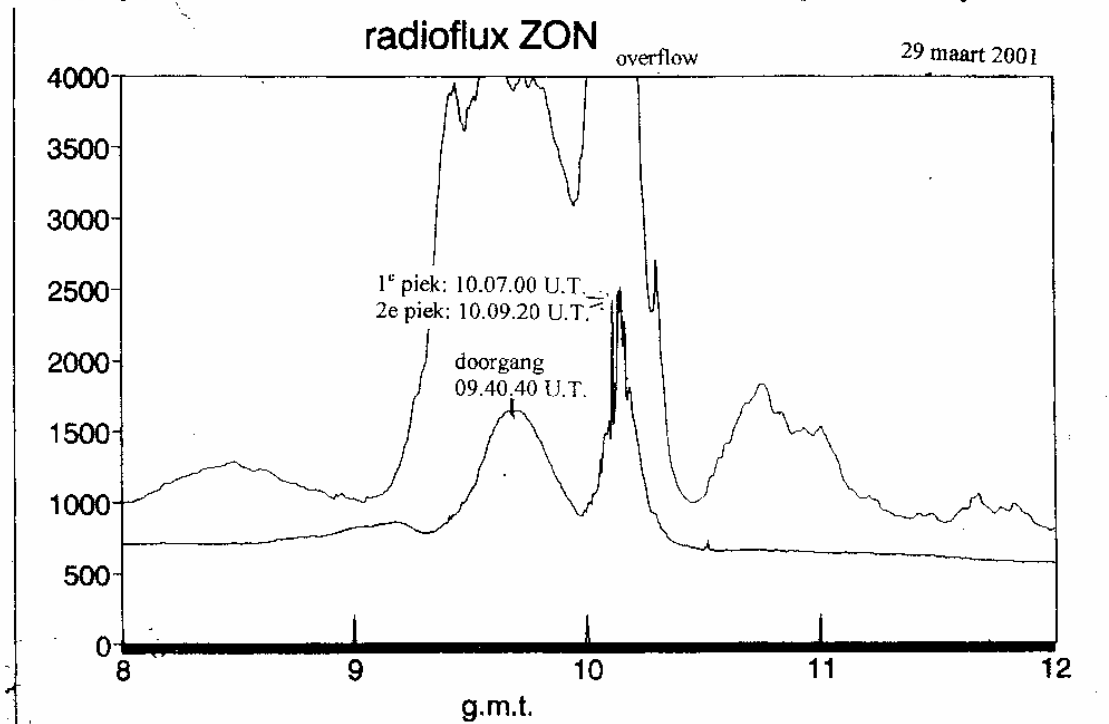


Magnetogram, opgenomen te Den Helder door Nico Heijblok. De bovenste kromme is de veldsterkte, de onderste kromme de variatie in richting van het magnetisch veld.

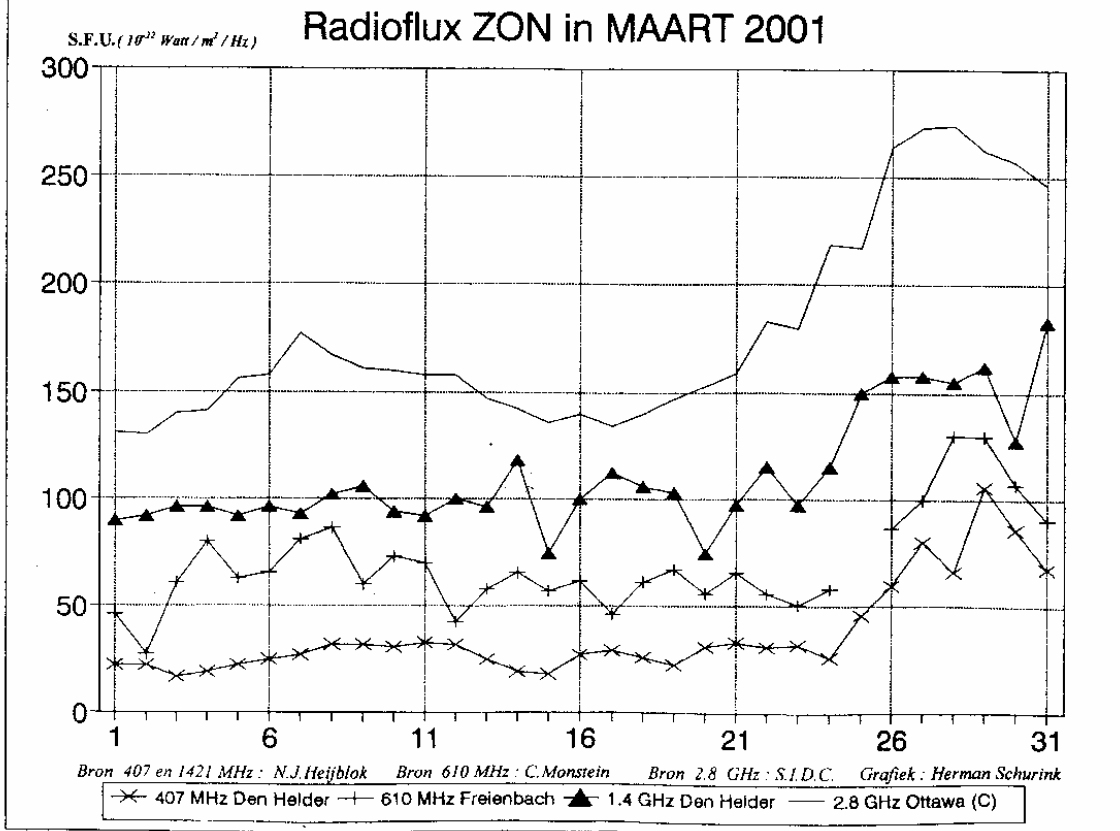
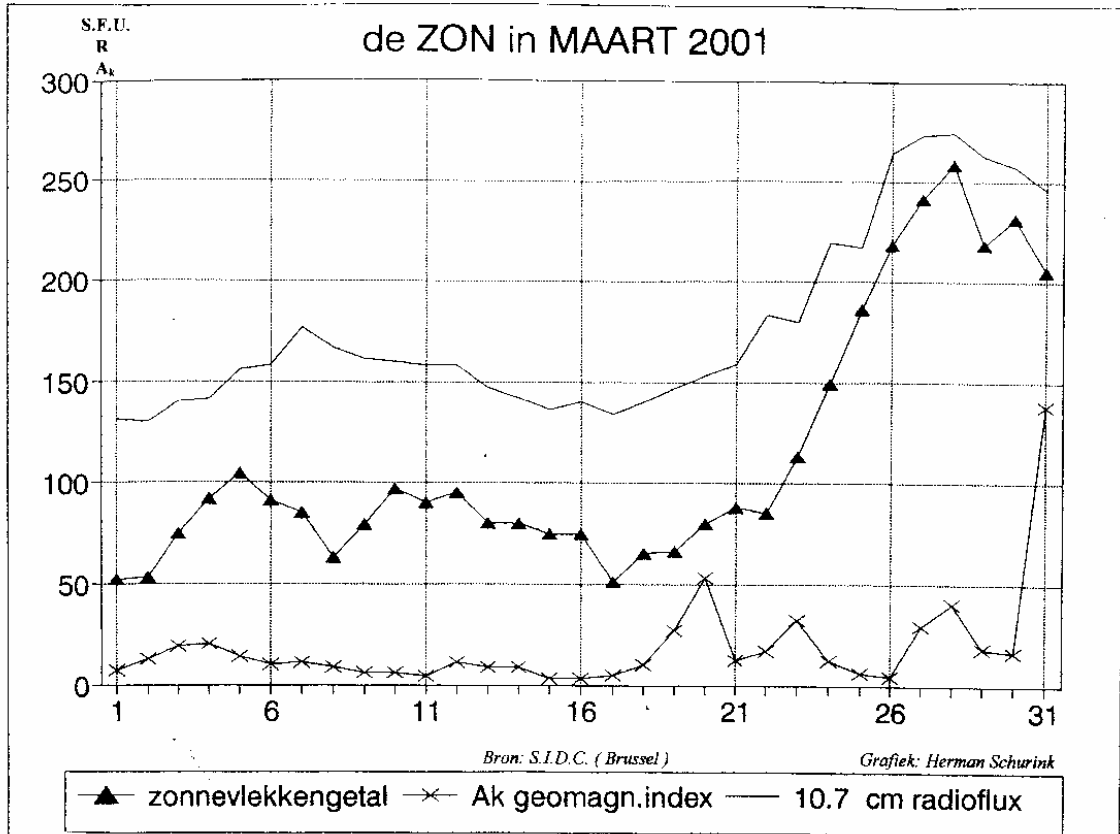


Radioflux van de Zon op een normale dag (als voorbeeld de flux op 28 maart 2001). De bovenste kromme is de relatieve flux, gemeten op 406 MHz (74 cm golflengte), de onderste kromme is de radioflux op 1421 MHz (21 cm golflengte)

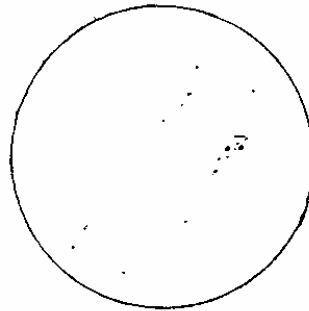
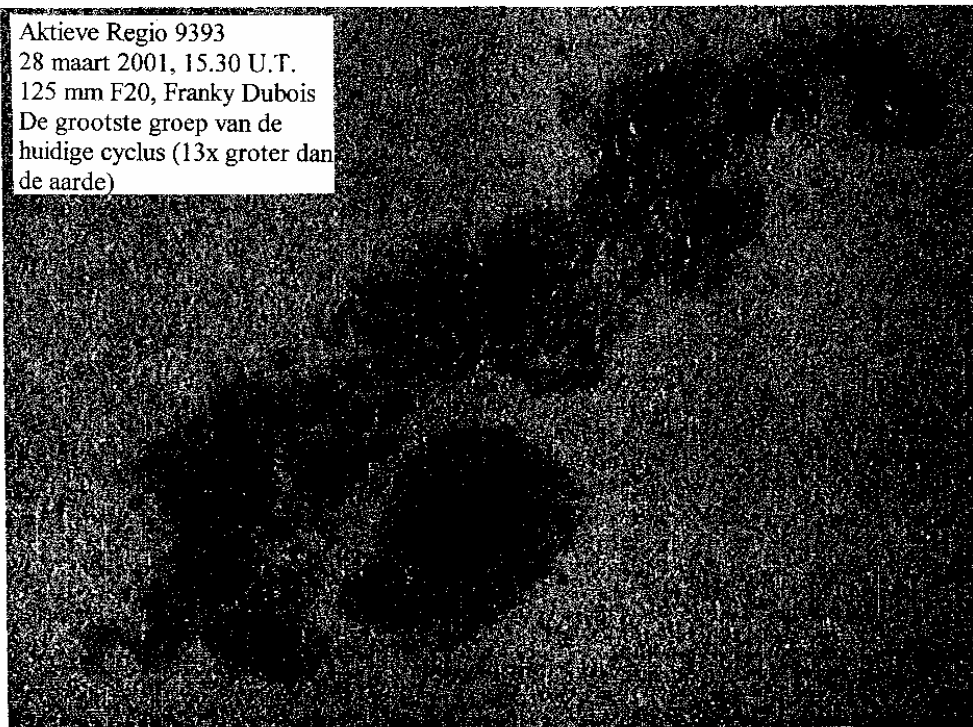
opname: Nico Heijblok



Een detail van de radioflux op 74 cm (boven) en 21 cm (onder), op het moment van een hevige eruptie op de Zon. De uitgestoten massa van deze eruptie veroorzaakte de geomagnetische storm op 31 maart.



Bulletin Werkgroep Zon
N.J.Heijblok
Wezenstraat 70
1781 GM Den Helder



Zonnevlekken 28 maart 2001
10.15 UT

Dobj. =9 mm vergr. 28 x

tekening: Dennis Jannink, De Biit



Werkgroep Zon

Bestuur: T. Spaninks, voorzitter.

C. Pauw, secretaris, Bastion 60,

3823 BR Amersfoort, tel: 033 - 4554638.

e-mail: keespauw@planet.nl

N. Heijblok, penningmeester en
waarnemingsleider

Uitnodiging voor onze bijeenkomst op:

Zaterdag 19 mei 2000, aanvang 11 uur;

plaats: Volkssterrenwacht 'Schothorst', Schothorsterlaan 27 te Amersfoort.

Programma:

1. Ontvangst met een kop koffie of thee en even bijpraten.
2. Mededelingen en ingekomen stukken.
3. Jubileumnummer Werkgroep Zon.
4. Lunchpauze van ca. 13 – 14 uur. Voor koffie en thee zal worden gezorgd.
5. Presentatie Zon en SOHO door drs. Maarten van Aalst
6. Overige voordrachten, gaarne z.s.m. via mij aanmelden.
7. Vragenuurtje. Gelegenheid om allerlei vragen te stellen over de zon.
8. Sluiting om uiterlijk 16.00 uur.

Graag tot 19 mei in Amersfoort,

Kees Pauw (secretaris)

Vereniging 'Werkgroep Zon'

Bestuur: Ton Spaninks, voorzitter.
Kees Pauw, secretaris, Bastion 60,
3823 BR Amersfoort, tel: 033 - 4554638
e-mail: keespauw@planet.nl.
Nico Heijblok, penningmeester, waarnemingsleider

Geachte leden,

Het jaar 2001 is voor de NVWS een belangrijk jaar. Zij viert namelijk haar 100 jarig bestaan. Een jubileumjaar wat nu al niet ongemerkt voorbij zal gaan. In de eerste 4 maanden van dit jaar hebben reeds enige activiteiten in dit jubileum jaar plaatsgevonden. Zo heeft er reeds een meteosymposium plaatsgevonden, maar ook en astrofotografiedag. Onlangs werd in samenwerking met de professionele astronomen het 5 jarig jubileum van de SOHO op 7 verschillende plaatsen gevierd. Bij deze laatste viering was de Werkgroep Zon en met name Ton Spaninks nauw betrokken.

Op 22 september a.s. wordt een jubileum bijeenkomst in de Reehorst te Ede georganiseerd (voor opgave zie Zenit no. 5, 2001) en op 13 oktober a.s. wordt een publieksmanifestatie georganiseerd. Op beide bijeenkomsten zal de Werkgroep Zon met een stand aanwezig zijn. Ook zal de NVWS een jubileumboek laten verschijnen.

In dit licht is het bestuur onlangs bijeen geweest en heeft besloten dat het leuk is om in lijn met de 100 jarige viering ook een jubileumnummer van de Werkgroep Zon te laten verschijnen. Het boekwerk zal bijdragen van o.a. de leden van de Werkgroep Zon bevatten. Het bestuur heeft reeds enig leden benaderd om artikelen te schrijven. Velen waren enthousiast en hebben hun medewerking toegezegd.

Bent u niet benaderd en wenst u toch een bijdrage aan het jubileumnummer te leveren, verzoek ik u zicht tot mij te wenden. De tijd dringt dus reageer snel.

Namens het bestuur
Kees Pauw



Bulletin Werkgroep Zon

April 2001

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

Zonnevlekkengetallen (Sunspot numbers)

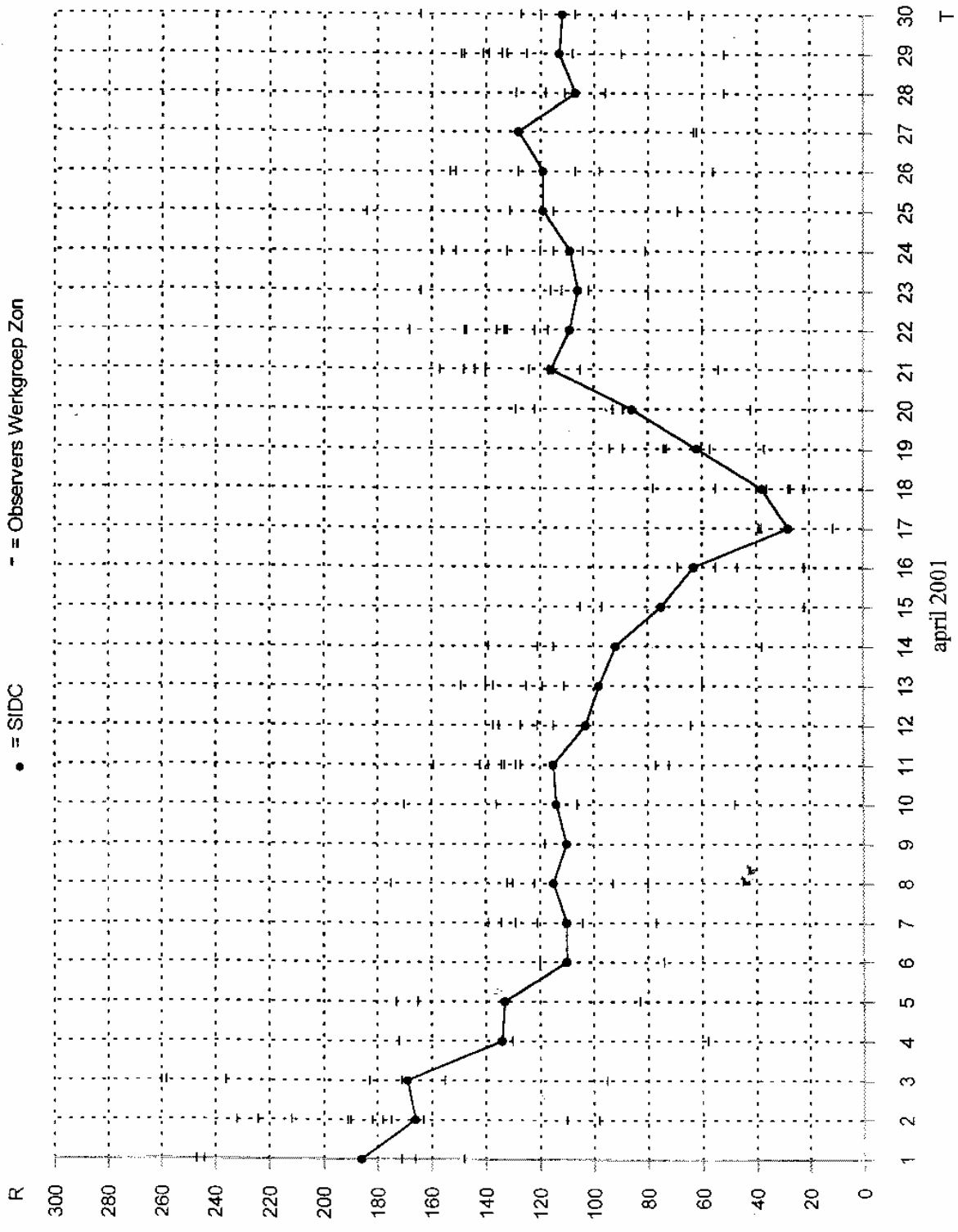
Day	Bais	Gr 6	Gr 9	Gr 10	Kros	vSlo	Son	Sp 7	Wig	Zans	Zijle	Lichte groepen	spots
1	247				171	148	244				166		
2	232	212	98	110	175	180	178	224	191	163	182	11	71
3	258		95		238	155	260	171			183		
4			58		172						130	11	42
5	173		83		165						52	12	52
6			74		120							9	69
7	128		77		134	104	139	111			122	10	81
8	132		80		130	93	175				118	7	84
9													
10	170		48		138					106			
11			127	72	129	142		159	133	134	139		
12	135		64		137			127	115	121		9	86
13	140	119	60		137	125		149	111	111		9	81
14	121		38		139		115					9	32
15			22		105		97					8	9
16			22		69	56	47					2	8
17			11		39		38					4	9
18			36	22	22	78	27	55	40	28	56	5	29
19	94		73	37		99		57	74	60		6	48
20	129		42		63			122	89			8	81
21		140	117	54	105	144	115	157		124	148		
22	147	148	60		132	147	117	168	136	122	133		
23	184		80		116					112	102		
24	151		81		115	132	104	158	110	120		7	30
25			69		131			184	115			8	61
26			107	58	119	128		151	153	98		7	58
27			62	63								8	68
28	111		52		118	129				96		6	43
29	141	132	52		125	134	90	148	148	108	139		
30			65		127	92	164	120	107				
observ	15	5	7	28	4	10	28	12	21	16	20	7	
k	0.73	0.83	0.94	1.89	0.92	0.82	1.13	0.77	0.90	1.00	0.84		
st dev	0.07	0.06	0.12	0.48	0.25	0.10	0.11	0.15	0.16	0.10	0.13	0.11	
st.d/k	0.09	0.10	0.13	0.25	0.15	0.11	0.14	0.13	0.21	0.12	0.13	0.13	

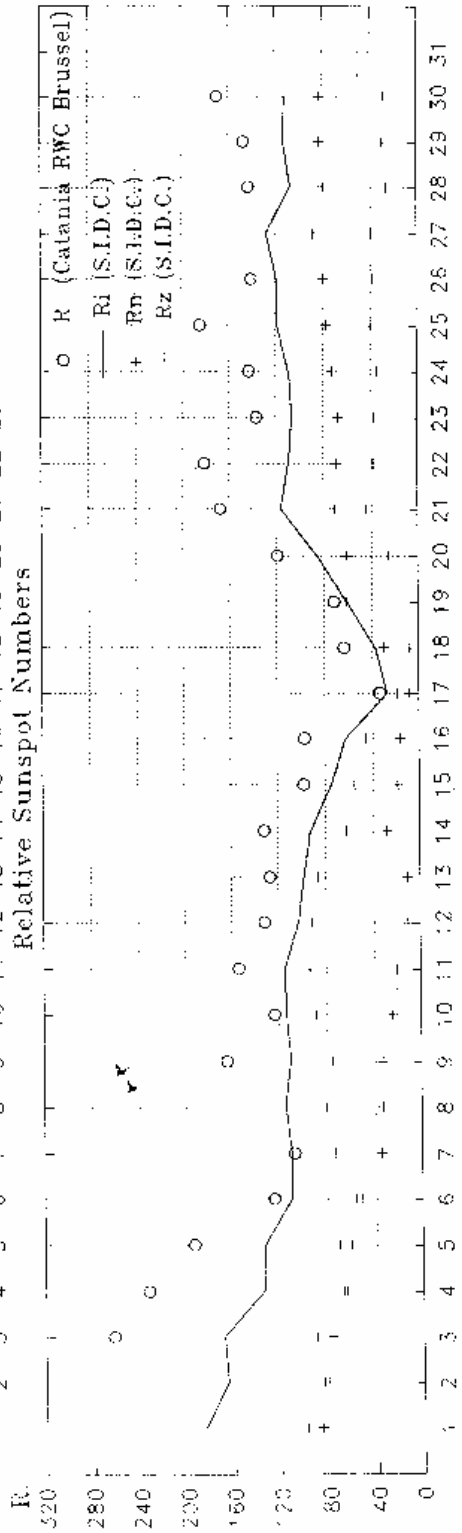
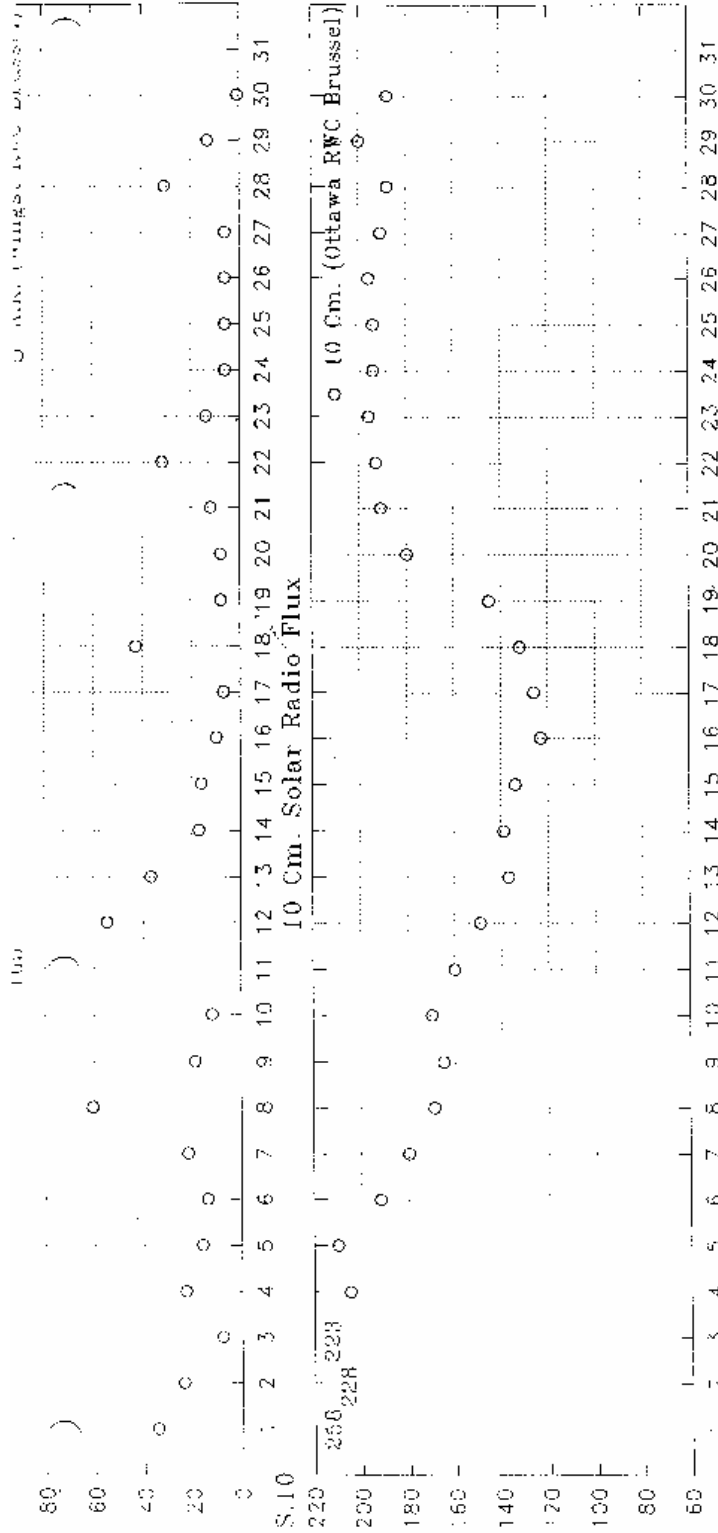
Observ	[...] = Refractor, d = ... mm	[RF ...] = Reflector, d = ... mm
Bais = H.A.M. Balster [70]	Jn 4 = D. Jannink [40]	Sp 7 = T. Spanink [75]
Gr 6 = Mw G. Gravers [60]	Kros = K. Kroesen [102]	Wig = G. Wigman [80]
Gr 9 = A. Groenewegen [102]	vSlo = B. van Slooten [90]	Zans = W. Zansstra [Rf 156]
	Son = A.T. Son [Rf 150 Kunter]	Zijle = W.A. Zijlerna [90]

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

Date	R'	PFSI	600	2800	COS	SFI	XI	Ak	SEA
31	205	448	66	246	-	17	1/0	138	
1	186	343	63	258	-	27	3/0	35	
2	166	195	64	228	-	42	4/3	24	
3	169	179	64	223	-	117	2/1	8	
4	134	118	61	205	-	37	3/0	23	
5	133	115	61	210	-	107	5/0	16	
6	110	187	59	192	-	-	0/1	14	
7	110	190	57	180	-	2	0/0	22	
8	115	193	59	169	-	1	0/0	61	
9	110	218	60	165	-	106	1/0	19	
10	114	168	62	170	-	104	0/1	12	
11	115	163	57	160	-	116	2/0	105	
12	103	141	51	149	-	12	1/1	55	
13	98	90	49	137	-	0	0/0	37	
14	92	55	49	139	-	7	1/0	17	
15	75	32	50	134	-	103	0/1	16	
16	63	26	47	123	-	0	1/0	10	
17	28	20	47	126	-	0	1/0	7	
18	38	24	49	132	-	0	0/0	43	
19	62	54	52	145	-	3	1/0	8	
20	86	76	54	180	-	32	2/0	8	
21	116	159	56	191	-	6	0/0	12	
22	109	198	60	193	-	19	1/0	32	
23	106	216	60	196	-	115	2/0	14	
24	109	231	60	194	-	60	5/0	6	
25	119	178	61	194	-	126	1/0	6	
26	119	192	65	196	-	117	1/0	6	
27	128	196	57	191	-	26	1/0	6	
28	107	148	57	188	-	16	0/0	31	
29	113	127	55	192	-	10	0/0	13	
30	112	120	58	188	-	14	0/0	1	

R', R'w : provisional international sunspot numbers from the S.I.D.C.
 PFSI : protonet photoelectric sunspot index from the S.I.D.C. in 10⁵ w/m²; the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.
 600 : 600 MHz solar flux from Humint station (Belgium).
 2800 : 2800 MHz solar flux from Orlawa (origin : Ursigrans - UGEO). The 10.7cm Flux data are a service of the National Research Council of Canada.
 COS : thousands of the cosmic ray counts (origin : Ursigrans - UCOSE Kerguelen, when available).
 SFI : From October 1992, Solar Flare index from the S.I.D.C. (origin : Ursigrans - UGEO).
 XI : X-flares index from the Ursigrans (M-flares/X-flares) (origin : Ursigrans - UGEO).
 Ak : geomagnetic index from Wingst, Germany (origin : Ursigrans).
 SEA : sudden enhancements of atmospheres from Uccle & Humint (Royal Observatory, Belgium).
 Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.





Rimx 186
Apr. 1

Rimn 28
Apr. 17

Rigema.
108.2

Berekening van de k-factor over 2000 m.b.v. de definitieve zonnevlekkengetallen van het SIDC.

Naam:	Balster 70 mm	Gravers 50 mm	Gravers 60mm	Groenew. 102 mm	Jannink 9 mm	Jannink 40 mm	Kroesen 102 mm	Scholten 60 mm	v.Slooten 90 mm	Son 150 mm
Instrument	183	41	26	147	273	44	81	31	247	134
Aantal waarn. (N) =										
waarvan R=0 (No) =	0	0	0	0	6	0	0	0	0	1
waarvan R>0 (Nj) =	183	41	26	147	267	44	81	31	247	133
k-factor (k) =	0,799	0,966	0,817	1,030	2,179	1,904	0,867	1,157	0,849	1,104
Spreading (σ) =	0,16	0,13	0,18	0,16	0,74	0,48	0,20	0,45	0,15	0,33
Spreading / k σ1) =	0,20	0,13	0,22	0,16	0,34	0,25	0,23	0,39	0,18	0,30

Berekening van de k-factor over 2000 m.b.v. de definitieve zonnevlekkengetallen van het SIDC.

Naam:	Spaninks 75 mm	Verschur 80 mm	Wigman 80 mm	Zanstra 155 mm	Zijlema 90 mm
Instrument	182	45	188	189	50
Aantal waarn. (N) =					
waarvan R=0 (No) =	0	0	0	0	0
waarvan R>0 (Nj) =	182	45	188	189	50
k-factor (k) =	0,757	1,501	1,001	1,115	0,949
Spreading (σ) =	0,16	0,32	0,18	0,49	0,24
Spreading / k σ1) =	0,21	0,22	0,18	0,44	0,25

SIDC - News

2001 n° 1

SIDC DEFINITIVE INTERNATIONAL AND HEMISPHERIC SUNSPOT NUMBERS FOR 2000

Date	OCTOBER			NOVEMBER			DECEMBER		
	Ri	Rn	Rs	Ri	Rn	Rs	Ri	Rn	Rs
1	115	23	92	140	73	67	116	63	53
2	153	44	109	147	80	67	109	48	61
3	159	43	116	141	82	59	118	55	63
4	150	47	103	130	77	53	72	45	27
5	128	39	89	133	82	51	65	45	20
6	97	33	64	108	57	51	57	35	22
7	66	20	46	122	65	57	68	39	29
8	72	27	45	127	67	60	57	33	24
9	71	30	41	95	44	51	58	47	11
10	57	34	23	101	55	46	62	48	14
11	82	38	44	90	42	48	72	57	15
12	122	51	71	72	27	45	89	65	24
13	121	56	65	70	22	48	114	85	29
14	104	34	70	84	30	54	135	89	46
15	83	23	60	98	44	54	153	107	46
16	92	24	68	95	47	48	145	99	46
17	97	34	63	94	57	37	151	94	57
18	95	36	59	116	74	42	138	81	57
19	90	48	42	125	90	35	118	68	50
20	94	67	27	110	76	34	127	85	42
21	97	71	26	120	76	44	116	76	40
22	89	64	25	113	73	40	107	72	35
23	85	59	26	91	64	27	102	64	38
24	82	51	31	98	66	32	115	72	43
25	88	49	39	74	54	20	108	59	49
26	73	33	40	59	50	9	121	66	55
27	80	29	51	84	66	18	118	56	62
28	106	44	62	106	81	25	118	55	63
29	113	47	66	123	83	40	110	52	58
30	108	42	66	138	82	56	111	50	61
31	111	44	67				87	24	63

MEAN : 99.4 41.4 58.0 106.8 62.9 43.9 104.4 62.4 42.0

The mean definitive Sunspot number for the year 2000 is 119.6

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity:

Solar activity was mostly high during the first half of the month, with quieter periods on April 7 and 8 and on April 13 and 14. The second half was characterized by a moderate activity level, except for short periods of low activity on 17 and 21.

The dominant region was first Catania Sunspot group 16 (NOAA AR 9393), until it crossed the West limb on April 3. It produced several M and X flares, among which a X17 flare on April 2 at 21:32 UT. This event, which is the largest one of this cycle, triggered a major CME as well as a strong proton event. Without transition, a new major active region, Catania Sunspot group 41 (NOAA AR 9415), dominated the solar activity once it appeared at the East limb on April 3. This active region produced several M and X flares, including a M5 on April 5 (17:25 UT) and a X5 on April 6 (19:21 UT) which both produced halo CMEs. This region continued to flare almost every day, with each time an associated halo CME. The biggest flare was an X14 event on April 15 at 13:50UT. No significant activity was produced by the other active regions. The region disappeared at the West limb on April 16, but produced still a C2.2 flare on 18, from **behind the limb** that was accompanied by a proton event and a CME. After that, virtually **all** activity (in particular several M-class flares) came from Catania sunspot group 64 (NOAA active region 9433). This sunspot group was the return of the extremely large group that on April 2 spawned the largest solar flare observed in the current solar cycle. During the current rotation this region was clearly declining and produced only M-class flares. The largest of these, an M7.8 flare on April 26, also caused a full halo CME.

II. Geomagnetic Activity:

Geomagnetic activity was mostly unsettled to active during the first week. Two shocks, recorded by ACE on 04/04 14:22UT and 04/07 17:00UT, induced minor storm levels. A shock, recorded by ACE on 04/08 (10:34 UT) and associated with the X5 flare of April 6, triggered major storm levels.

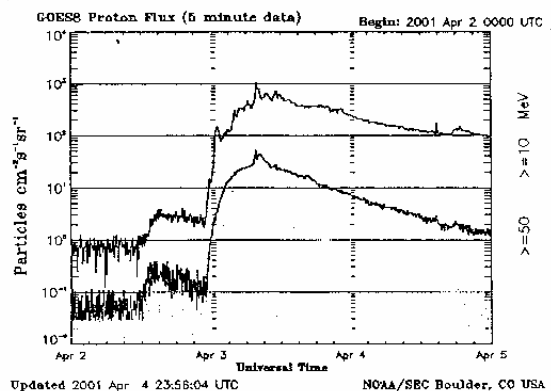
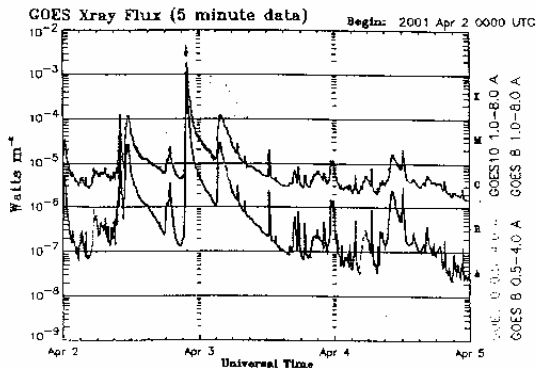
The major Y1.7 flare of April 2 initiated a strong proton event (1110 PFU at 10 MeV) which slowly decayed, with a slight enhancement on April 7 following the X5 flare in active region Catania 41. Geomagnetic activity varied from quiet to major storm levels during the second week, in response to the arrival of successive Earth-directed CMEs. Severe storm conditions occurred on April 11 (11:00 - 18:00 UT) and on April 13 (12:00 - 21:00 UT). Proton levels were mostly high throughout the period. Successive enhancements over an overall decaying level were produced by the M and X flares of April 9 to 12, with a peak of 322 PFU for 10 MeV protons on April 11. The X14 flare of April 15 triggered a large 100MeV proton event (peaks: 146PFU @100MeV at 15:25UT, 951 PFU @10MeV at 19:20 UT) which was slowly decaying at the end of the period. After the disappearance of active region Catania 41 (NOAA9415), geomagnetic activity drop to quiet to unsettled levels, to reach active to minor storm levels on April 18, probably as a consequence of the X14 flare on 15 April. the field dropped then to quiet to unsettled values on 20. It reached again minor storm levels on 21 and 22, due to the arrival of CME material. Geomagnetic activity becomes then quiet until 28 April, when a geomagnetic storm occurred following the arrival of the CME material ejected by the M7.8 flare on April 26.

III. noticeable solar events

Day	begin	max	end	loc	Xray	op	10cm	type	Cat	NOAA	comment
02	0014	0028	0040	N17W57	M3.2	SF	190		16	9393	
02	0525	0528	0532	N13W63	M1.0	SF			16	9393	
02	0919	0931	0937	N17W62	C8.5	1F			16	9393	
02	0945	0952	0959	N15W64	M1.9	SF			16	9393	
02	1004	1014	1020	N17W60	X1.4	1B	140		16	9393	
02	1058	1136	1205		X1.1		670	1I/IV	16	9393	halo CME
02	2132	2151	2203		X17		1000	II	16	9393	cycle 23 highest, halo CME
03	0325	0357	0455	S21E83	X1.2	1N	3300	IV	41	9415	
03	1229	1234	1238	N15W88	M2.4	2F	31		16	9393	
04	0941	1027	1111	S21E68	M1.6	SF	360		41	9415	
05	0200	0220	0311	N26E70	M3.1				45	9418	
05	0837	0922	0954	S08E35	M8.4	SN	980	1II	47	9417	
05	1657	1725	1814	S24E50	M5.1	2N	2800	IV	41	9415	halo CME
06	1910	1921	1931	S21E31	X5.6	SF	3300	V/3	41	9415	halo CME

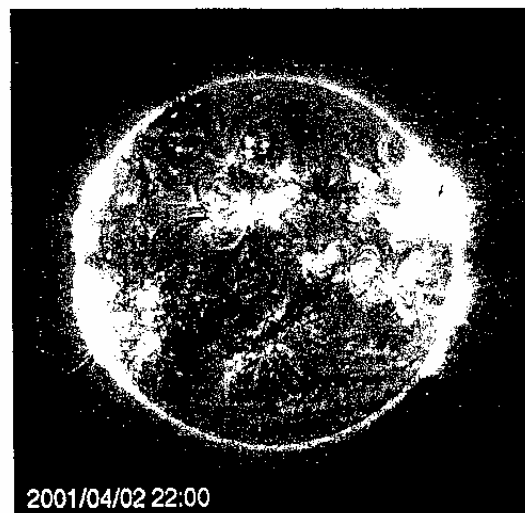
09	1520	1534	1600	S21W04	M7.9	2B	1600	III/1	41	9415	halo CME
10	0506	0526	0542	S23W09	X2.3		4000	II/3	41	9415	halo CME
11	1256	1326	1349	S22W27	M2.3				41	9415	halo CME
12	0256	0304	0329	S22W38	M1.3	1N			41	9415	
12	0939	1028	1049	S22W38	X2.0		1200	II/2	41	9415	halo CME, proton ev.
15	1319	1350	1355	S20W85	X14	2B	48000	II/IV	41	9415	CME, proton ev.
17	2118	2157	2216		M1.3			III			
18	0211	0215	0216		C2.2		570	III/II	41	9415	behind limb, CME, proton ev.
19	1122	1135	1155		M2.0		270		64	9433	
20	0501	0523	0543	N16E63	M1.0	1F			64	9433	
20	1951	2004	2140	N15E55	M4.1	1F	70		64	9433	
22	2037	2044	2047	N14E18	M3.2	1N	270	II	64	9433	CME
23	0119	0128	0137	N18E18	M1.0	1f	53		64	9433	
23	2015	2030	2033	N14E23	M4.0	2n	79		64	9433	
24	0533	0542	0547	N18E01	M2.1	1n	100	III	64		
24	0653	0700	0708	N18E11	M3.1	1f	140	III	64		
24	1238	1253	1309	N19E15	M1.6	1n	34		64	9433	
24	1804	1812	1309	N17E13	M2.3	1n			64	9433	
24	2214	2224	2230	N17E01	M1.8	1n	130		64	9433	
25	1339	1348	1359	N18W09	M2.7	2n	200	II/III	64	9433	CME
26	1126	1312	1319	N17W31	M7.8	2b	360	II/IV	64	9433	full halo CME
27	1906	1915	1935	N18W37	M1.2	1F			64	9433	

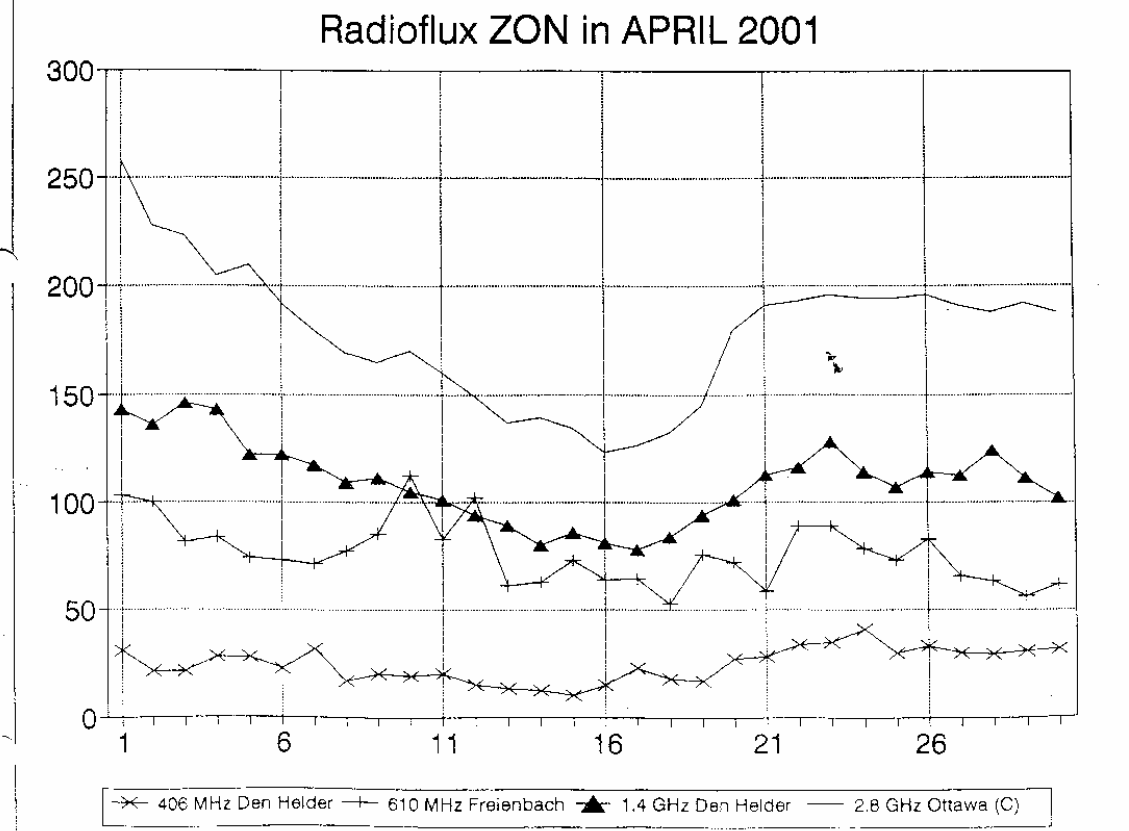
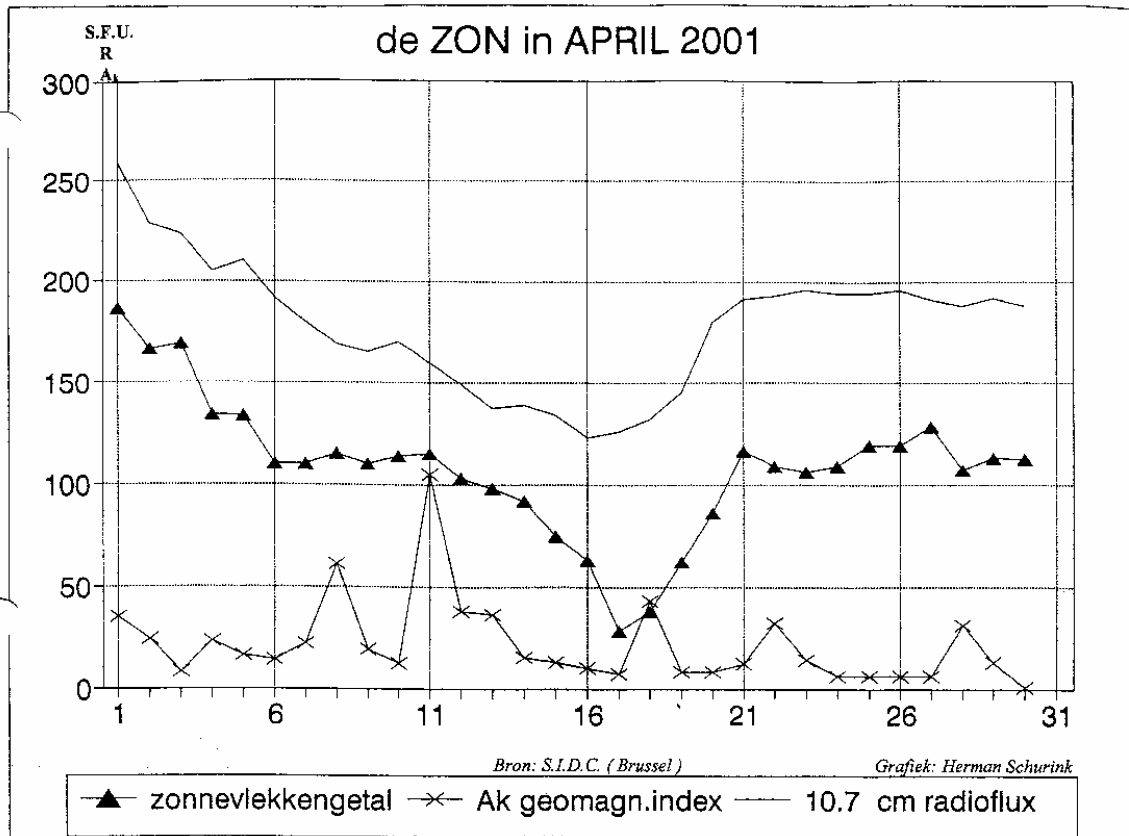
IV. The event of the month : the X17 proton flare of April 2, 2001



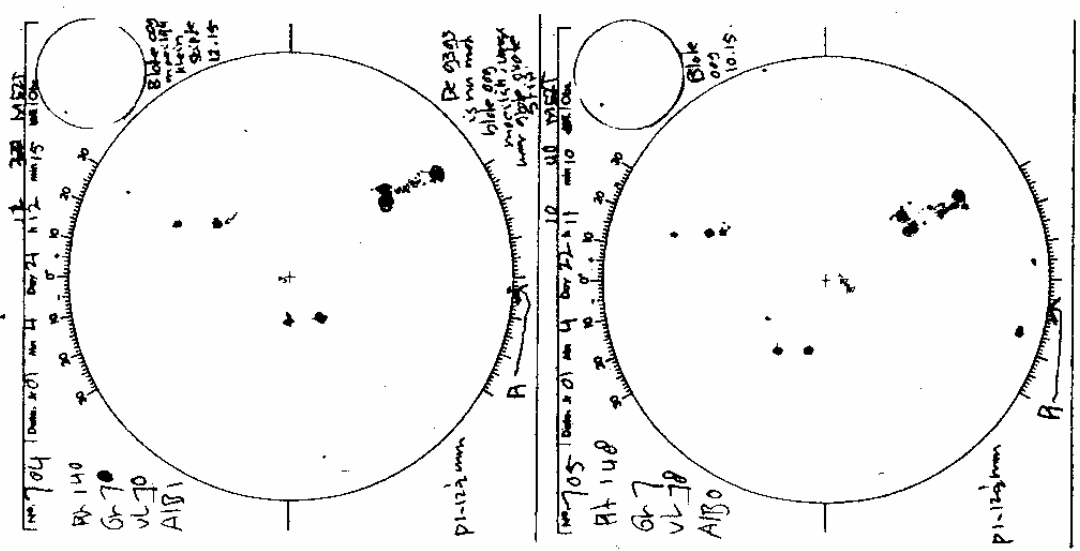
The highest X-ray and proton flare of cycle 23, observed on April 2 in Catania sunspot group 16 (NOAA AR 9393). Data of the graph are from GOES satellites (NOAA, Space Environment Center, Boulder CO, USA); left : X-ray fluxes; right : proton fluxes, with all levels of energy concerned. EIT also observed the flare, as shown by the image bottom right. As usual for big flares on EIT images, the region concerned is saturated.

EIT is an EUV telescope, on board of SOHO, an ESA-NASA mission. The present image is extracted from a NRL movie.





Bulletin Werkgroep Zon
 N.J.Heijblok
 Wezenstraat 70
 1781 GM Den Helder



De grote groep van vorige maand, AR/NOAA 9393 komt voor de tweede keer langs.
 (tekeningen: Gerda Gravers, Zaandam; refractor $f=700$ mm, $d=60$ mm)



Bulletin Werkgroep Zon

Mei 2001

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

Zonvlekkengetallen (Sunspot numbers)

Day	Bals	Gr 5	Gr 6	Jn 9	Jn 4	Kroe	vSlo	Sp 7	Wig	Zans	Zijle	
1				65				160	165	148	124	161
2		123		85	84			133	143	123	120	
3	153			76							125	
4												
5			122	73				146	148	135	129	
6		106	55					127	130	120	116	112
7	122	71	94	44				106	89	97	83	106
8				34		68	82	89				
9	82	82		33		57	100	72	78	71		
10	87	94	60	44		48	94	65	62	60		
11	124	100	90	49	61	60	103	97	114	95		
12	121	104	77	65		81	116	135		85	92	
13	120	114	83	53			106	125	101	90	83	
14	120						77	89	81	113		
15	126	113		55			95	106		88		
16	127		50				114	123		95	105	
17	112		28				136	129	103	95	120	
18			36				114		90	73	93	
19		85		35			118	106	77	84	94	
20	103	119	36				112	123	85	79	72	
21	138	131	60				126	95	107	92	118	
22	182	167	61	74			126	165	136	124	122	137
23	184	135	70				109	184	183	141	139	145
24	180	126	117	86			121	165	155	119	147	
25	132	111	124	61			106	128	120	117	111	127
26	152			48			114	157	126	84	114	
27												
28		96	111	56				101	125			
29	89	78	57	68			80	105	118	79	86	100
30	80	87	35	35			68	103	95	55	87	
31	96	73	23	23			85	94	66	38		
Observ	20	19	11	28	4	13	28	26	20	27	18	
k	0.78	0.86	0.97	1.90	1.43	1.03	0.82	0.80	0.94	1.08	0.90	
st dev	0.10	0.14	0.10	0.51	0.14	0.19	0.15	0.09	0.13	0.20	0.11	
st.d./k	0.14	0.16	0.10	0.27	0.10	0.18	0.18	0.12	0.14	0.19	0.12	

Uccle	groups	spots
	7	59
	8	82
	8	43
	8	25
	5	13
	6	14
	6	12
	7	27
	5	40
	6	48
	6	56
	6	49
	7	41
	6	38
	6	32
	7	30
	9	37
	11	47
	13	63
	13	61
	8	49
	10	50
	7	20
	9	20
	9	23
	8	23
	7	17

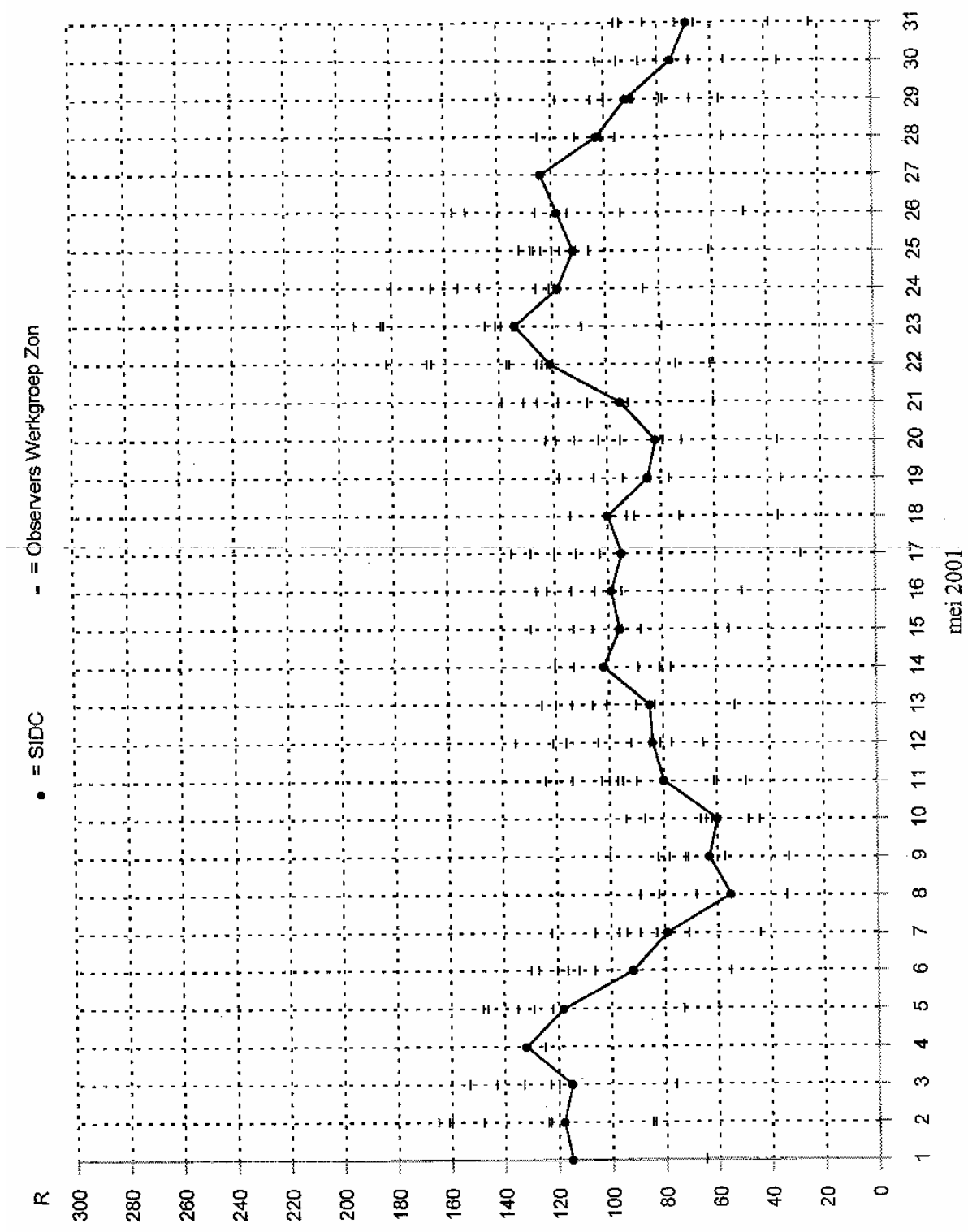
Observers: [..] = Refractor, d = ... mm
 Bals = H.A.M. Balster [70] Jn 4 = D. Jannink [40]
 Gr 5 = M.W.G. Gravers [50] Kroe = K. Kroesen [102]
 Groe = A. Groenewegen [102] vSlo = B. van Slooten [90]
 Jn 9 = D. Jannink [9] Sp 7 = T. Spaninks [75]

[R..] = Reflector, d = ... mm
 Wig = G. Wigmant [80]
 Zans = W. Zaanstra [Rf 155]
 Zijle = W.A. Zijlerna [90]

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

Date	R ¹	PPSI	600	2800	COS	SFI	XI	AK	SEA
30	112	120	58	198	-	14	0/0	0	
1	115	131	57	210	-	16	1/0	4	
2	118	153	59	176	-	19	1/0	6	
3	115	116	59	172	-	11	0/0	7	
4	132	148	59	176	-	6	0/0	8	
5	118	127	57	161	-	13	1/0	3	
6	92	85	56	155	-	2	0/0	6	
7	79	76	55	138	-	3	0/0	13	
8	55	64	52	129	-	10	0/0	20	
9	63	68	50	129	-	3	0/0	37	
10	60	61	49	130	-	1	0/0	21	
11	80	75	49	137	-	1	0/0	10	
12	84	109	53	138	-	28	1/0	33	
13	85	124	51	139	-	17	1/0	32	
14	102	127	50	138	-	5	0/0	12	
15	96	107	48	142	-	14	1/0	17	
16	99	77	49	138	-	7	1/0	8	
17	95	61	48	147	-	39	1/0	8	
18	100	39	52	138	-	0	0/0	10	
19	85	55	50	141	-	0	0/0	12	
20	82	67	52	142	-	0	2/0	8	
21	95	89	-	150	-	12	0/0	5	
22	121	188	54	152	-	2	0/0	12	
23	134	174	55	159	-	3	0/0	14	
24	118	195	55	170	-	12	1/0	7	
25	112	137	57	162	-	20	0/0	9	
26	118	144	55	147	-	2	0/0	6	
27	124	104	56	147	-	0	0/0	12	
28	103	84	55	143	-	0	0/0	23	
29	92	51	54	139	-	2	0/0	12	
30	75	39	52	132	-	0	0/0	5	
31	69	30	52	133	-	1	0/0	4	

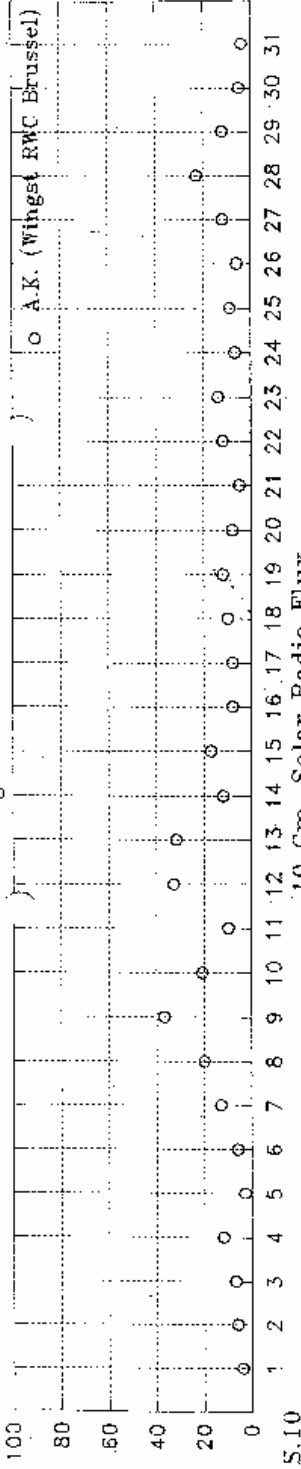
R¹, R²: provisional international sunspot numbers from the S.I.D.C.
 PPSI: prompt photometric sunspot index from the S.I.D.C. in 10⁻⁵ win²; the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.
 600: 600 Mhz solar flux from the station at Humain (Belgium).
 2800: 2800 Mhz solar flux from Ottawa (origin: Ursigrams - UGBO). 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 Kerpelien, when available).
 SFI: From October 1992, Solar Flux Index from the S.I.D.C. (origin: Ursigrams - UGEO).
 XI: X-flares index from the Ursigrams (M-flares/X-flares) (origin: Ursigrams - UGEO, UGEO).
 AK: geomagnetic index from Wang, Germany (origin: Ursigrams).
 SEA: sudden enhancements of atmospheres from Uccle & Humain (Royal Observatory, Belgium).
 Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.



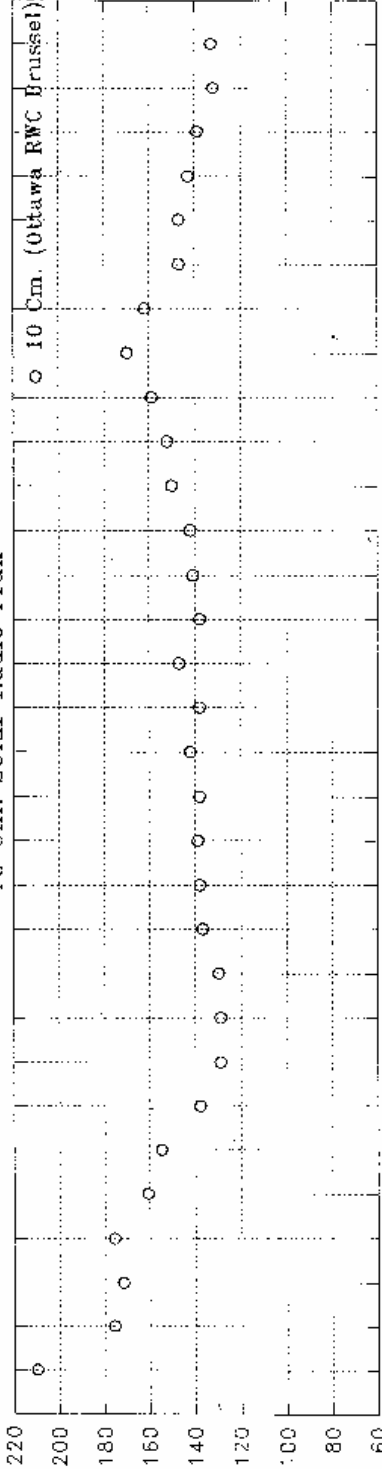
A.K.

Geomagnetic A.K. Index

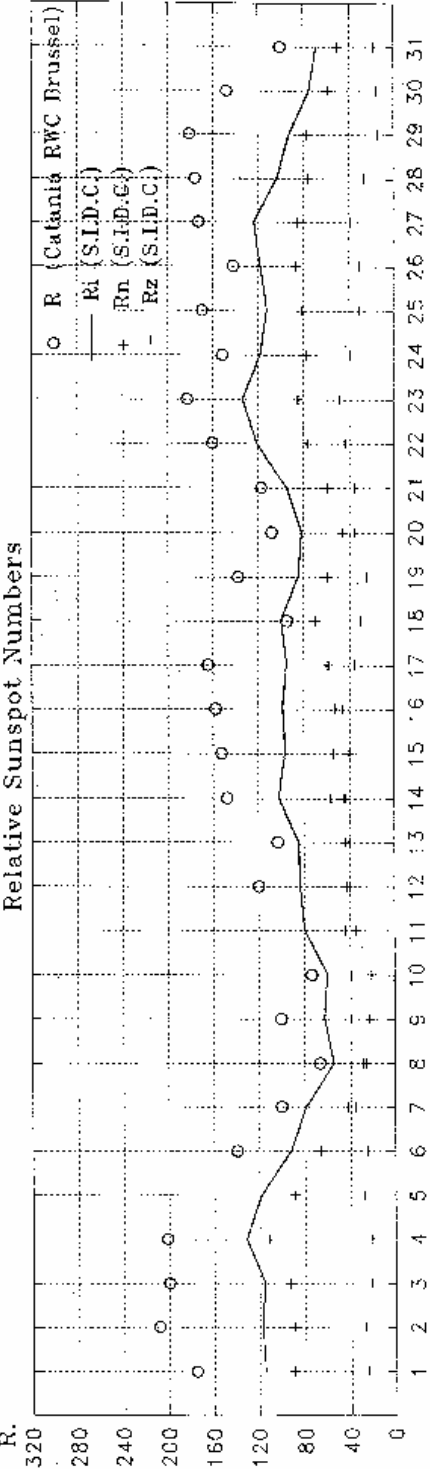
Mei 2001



10 Cm. Solar Radio Flux



Relative Sunspot Numbers



Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

mei 2001

Day	S.I.D.C.		Balster		Groenew		Jannink 4v.		Slooten		Spaninks		Wigman		Zanstra	
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	90	25														
2	90	28					62	22	126	34	131	34	115	33	90	34
3	93	22	131	22					111	22	109	34	112	11	98	22
4	111	21													100	25
5	89	29			99	23			108	38	111	37	113	22	92	37
6	67	25			83	23			94	36	84	36	69	47	76	36
7	43	36	70	52	60	34			57	49	49	40	48	49	46	37
8	26	29							39	46	41	48				
9	23	40	28	54					38	62	31	41	23	55	23	48
10	21	39	30	57	24	36			26	38	25	41	25	37	23	37
11	35	45	51	73	43	47	25	36	44	59	46	51	50	64	52	43
12	43	41	62	59	43	34			54	62	61	74			46	39
13	44	41	56	64	48	35			51	55	53	72	54	47	49	41
14	45	57	55	65					35	42			43	46	40	41
15	41	55	49	80					34	61	40	66			36	52
16	53	46							54	61	59	64			54	41
17	59	36	71	41					87	49	65	64	66	37	50	45
18	70	30							89	25			54	36	57	16
19	60	25							82	36	78	27	66	11	61	23
20	46	36	63	40					61	62	56	39			52	27
21	59	36	97	42					78	48	67	28	68	39	64	28
22	77	44	131	51			55	23	101	64	92	44	78	46	74	48
23	85	49	122	72					104	80	132	51	94	47	91	48
24	78	40	106	74	93	24			93	72	111	44			90	29
25	81	31	91	41	86	38			89	39	90	30	87	30	87	24
26	87	31	107	45					87	29	120	37	94	32	69	25
27	85	39														
28	76	27			61	50			77	24	97	28				
29	77	15	77	12	67	11	46	22	83	22	107	11	55	24	77	12
30	59	16	56	24					78	25	72	23			44	11
31	51	18		28					60	25	70	24	41	25	38	0

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

During May the solar activity was low to moderate. A single larger than 10MeV proton event started on May 7 and was probably triggered by a large CME event which took place behind the West limb the same day.

At the beginning of the month, nearly all of the activity came from two regions, Catania groups 75 (NOAA AR 9441) and 80 (NOAA AR 9445). These sunspot groups were fairly extended and magnetically complex (they reached respectively 330 millionths and 500 millionths of the solar disk), but displayed no strong activity. Both produced a single M-class flare besides a number of C-class flares. On May 11, a new active region (Catania 97, NOAA9455) emerged and started to grow in complexity. So far, it produced many C flares, as well as two M flares on May 12 and 13. Solar activity remained then at moderate level with several flares exceeding the M1 level. The dominant region was Catania Sunspot group 97 (NOAA AR 9455). The biggest flare was an M6.4 class that erupted on Sunday 20 close to the west limb. Soon after the flare, the flux of 10 MeV solar protons increased, but stayed just below thresholds.

The giant NOAA active region 9393 that produced the most powerful solar flare of the cycle, returned as NOAA AR 9461 (Catania Sunspot group 04). In this third transit over the solar disc, the group has declined to a more regular size with a magnetic beta configuration. Solar activity came then again to low levels, except on May 24, when it reached moderate levels. At that time, the most active region was Catania sunspot group 14 (NOAA9468) which produced isolated C-class flares, and a M1/1n flare accompanied by a radio type II burst and a CME on May 24.

II. Geomagnetic Activity

From low at the beginning of the month, the geomagnetic activity reached unsettled to active periods separated by several minor storm intervals (on 6, 7, 9, 10, 12, 13) These disturbances were probably associated with high-speed streams from low-latitude coronal holes and/or weak transients. The geomagnetic remained then quiet to unsettled during with two peaks at active levels, on May 23 (coronal hole effect) and on May 27 apparently as a consequence of the M1/1n/type II/CME event of May 24.

III. noticeable solar events

day	begin	max	end	loc	Xray	op	10cm	type	Cat	NOAA	comment
01	1858	1917	1945	N22W77	M2.4	SF	110		64	9433	
02	0032	0040	0047		M1.8		82		75	9441	
05	0842	0856	0915	N25W06	M1.0	1F			80	9445	
08	0036	0055	0117	N23W43	C9.9	1F			80	9445	
12	2242	2335	2345	S17E00	M3.0	1B	230	III/2	97	9455	
13	0258	0304	0308	S18W01	M3.6	SN	220	II/2, III/1, IV/1	97	9455	
15	0253	0300	0308	S17W29	M1.0	1N		II/2, III/1, IV/1	97	9455	
16	1035	1042	1045	S17W47	M1.3	SF			97	9455	
17	1646	1652	1657	S16W64	M1.2	1F			97	9455	
20	0600	0603	0606		M6.4		360	II/3, III/3			CME, p
20	0912	0920	0923		M1.5			III/1, II			CME
21	0311	0320	0325	N22E08	C9.0	1N	120	III/3	04	9461	CME
24	1930	1944	2004	N07E29	M1.2	1N	110	II/3	14	9468	CME

Xray: Xray flare class

op: optical flare class

10 cm: radio flux on 10 cm

type: type of radio-burst

Cat: Catania sunspot group identification

NOAA: NOAA active region identification

p: proton event

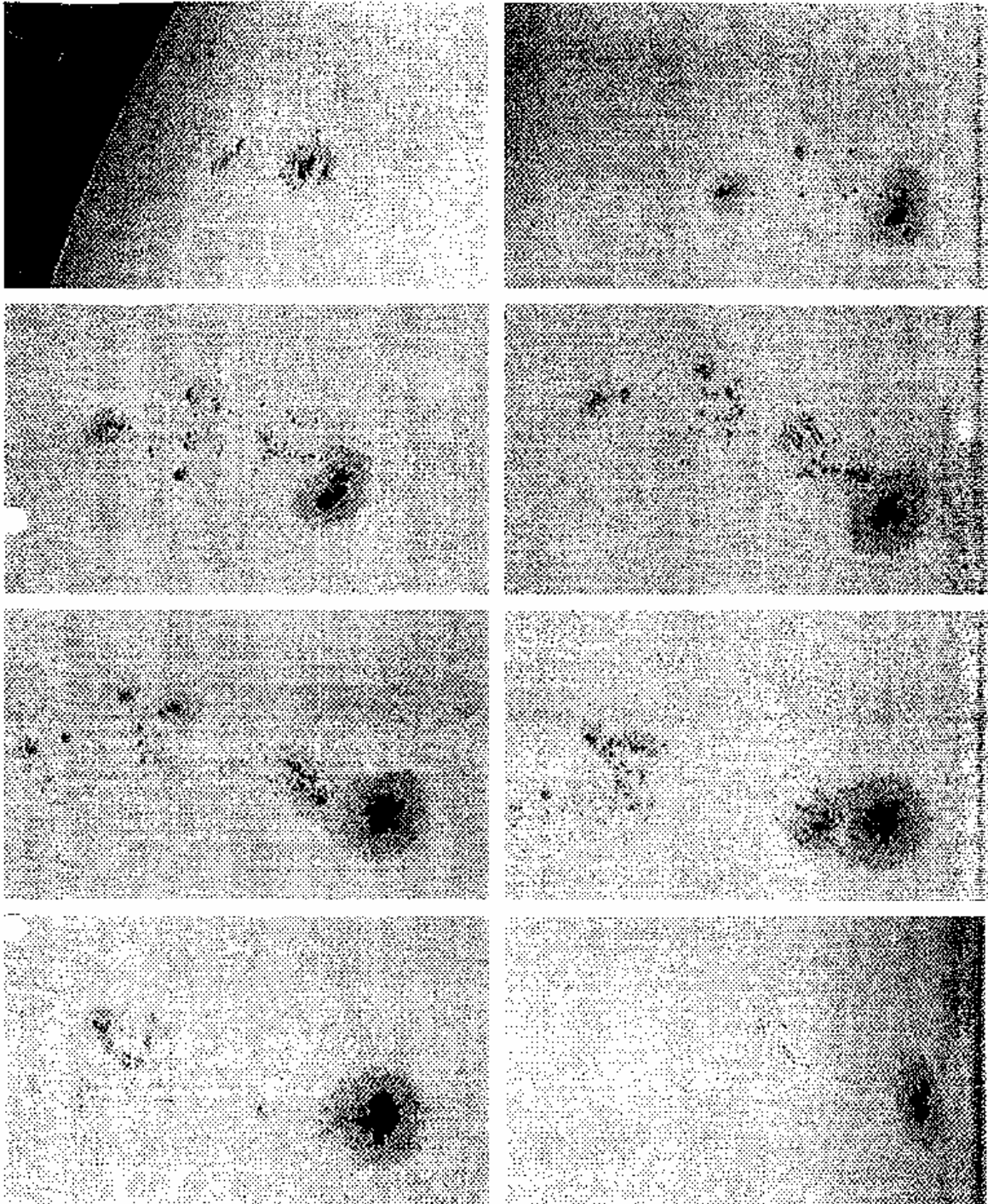
CME: Coronal Mass Ejection

SIDC - News

2001 n° 2

SIDC DEFINITIVE INTERNATIONAL AND HEMISPHERIC SUNSPOT NUMBERS FOR 2001

Date	JANUARY			FEBRUARY			MARCH		
	Ri	Rn	Rs	Ri	Rn	Rs	Ri	Rn	Rs
1	89	30	59	78	66	12	52	23	29
2	94	33	61	78	70	8	53	19	34
3	88	37	51	92	79	13	75	42	33
4	98	52	46	91	67	24	92	52	40
5	110	69	41	105	60	45	104	65	39
6	130	77	53	110	50	60	91	68	23
7	131	72	59	111	70	41	85	61	24
8	105	82	23	111	62	49	63	47	16
9	115	86	29	114	66	48	79	52	27
10	101	89	12	105	58	47	97	45	52
11	115	99	16	100	59	41	90	28	62
12	117	108	9	71	46	25	95	30	65
13	111	96	15	71	38	33	74	16	58
14	100	100	0	68	40	28	80	0	80
15	92	92	0	75	39	36	75	11	64
16	75	75	0	73	41	32	70	15	55
17	59	51	8	71	33	38	51	22	29
18	60	47	13	76	25	51	61	21	40
19	73	40	33	75	25	50	66	29	37
20	61	20	41	76	16	60	80	42	38
21	81	27	54	94	20	74	88	47	41
22	93	13	80	81	22	59	85	58	27
23	112	25	87	59	16	43	113	71	42
24	118	30	88	56	17	39	149	91	58
25	106	25	81	56	17	39	186	106	80
26	84	17	67	58	28	30	218	118	100
27	97	29	68	50	25	25	241	125	116
28	102	40	62	51	20	31	235	121	114
29	90	35	55				233	120	113
30	70	38	32				231	118	113
31	86	60	26				205	105	100
MEAN :	95.6	54.6	41.0	80.6	42.0	38.6	113.5	57.0	56.5

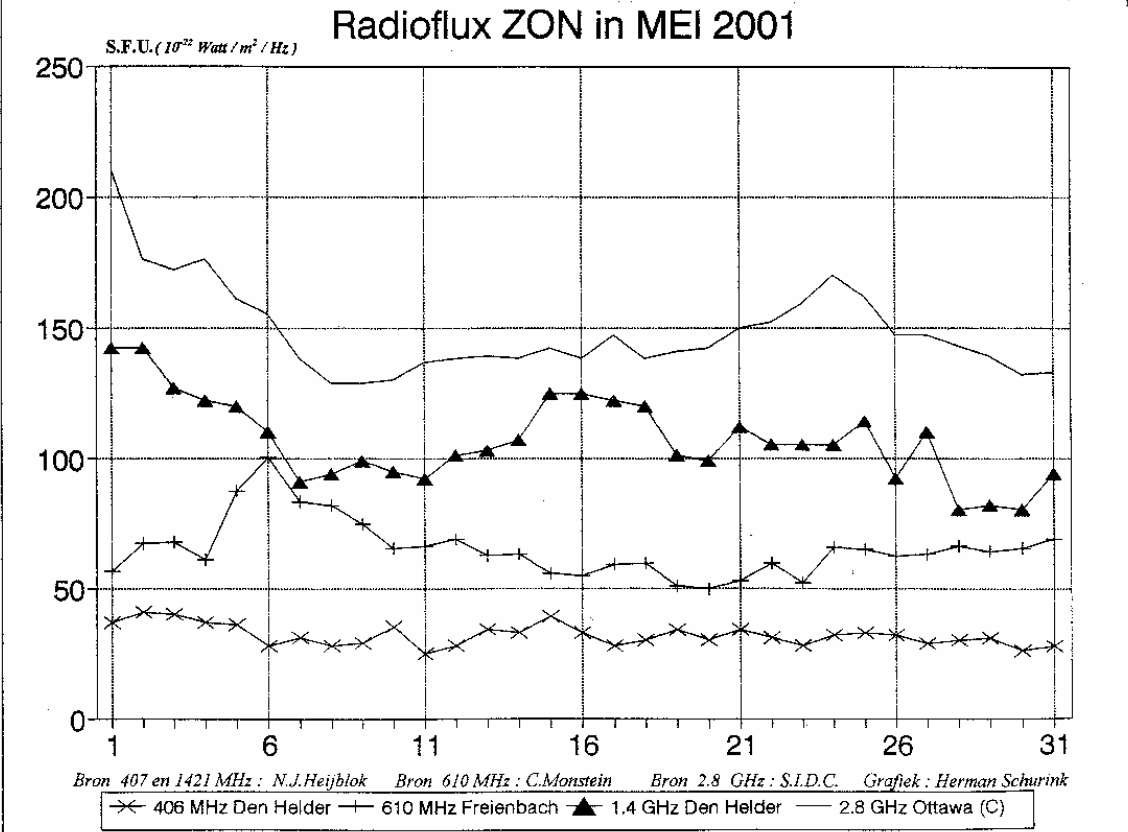
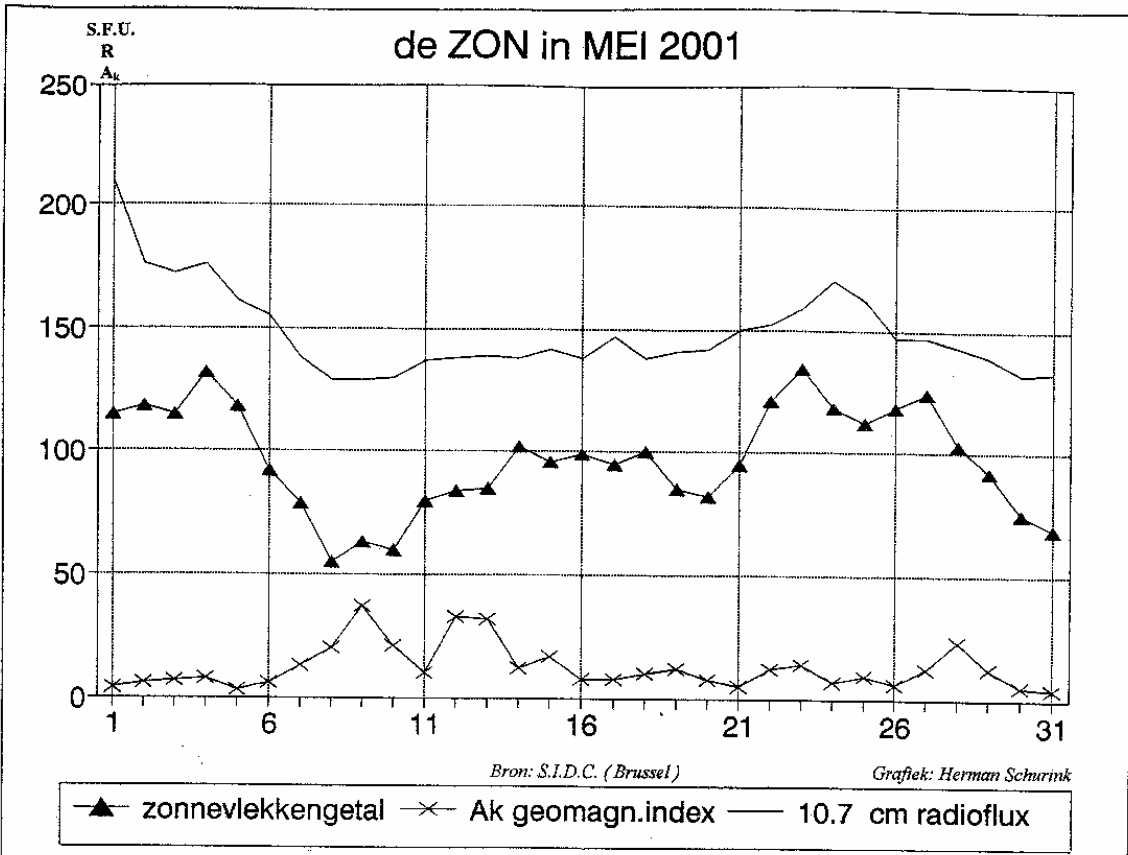


Opmnames Gunther Groenez - 140mm F800 refractor en Phillips Webcam Vesta pro

Van links boven tot rechts onder : 19 ,20 ,21 ,22 ,23 ,24 ,25 ,28 en 29 mei 2001

De zonnige maand mei gaf me ruimschoots de tijd om bijna iedere dag de zon te observeren en te fotograferen.

Op 19 mei verscheen aan de oostrand een D-groep NOAA 9463. En op 29 mei was ze aan de westrand van de zon waarneembaar terug als een alleenstaande grote vlek.





Bulletin Werkgroep Zon

Juni 2001

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

Zonnevlekgetallen (Sunspot numbers)

Day	Bais	G150	G125	G80	G102	Jn 9	Jn 40	Kroe	vSio	Spa	Wigm	Zans
1	100				38	77	68	50	52			
2	129				33	110	137		85			
3					55	129	152					
4					70	119	152					
5	185				138	98	87	70	124	158	119	119
6	172				142	51	157		157	138	118	
7	187	149			72	156	97	131				
8	186				97	168	182	153	149			
9	219	182			93	219	242	165				
10	202	193			85	188	211	153				
11	241				83	258	235	251	191	172		
12					94	208	214		144			
13	250				90	187	162	157				
14					108	222	236	217	188	181		
15	256					218	255	151	198			
16	242				130	219	242	198	195			
17					108							
18	220				146	67			144			
19	223				52	55	158	169	161	127		
20	179				55	155	184	129				
21	213				77	154	144	139	159	142		
22					69		169		191			
23	183				149	73	202	209	166	177		
24	183				159	156	110	169	172	206	186	167
25	173				154	98	111	142	150	170	122	133
26					129	71		134	164	108	121	
27								120		90		
28	124				88	44		131	117	102	89	
29					83	33	44	44	97	85	82	57
30	76				73	45		59	75	77	86	
observ	19	5	2	10	6	28	4	9	27	24	18	26
k	0.72	0.82	0.93	1.00	2.01	1.73	1.02	0.83	0.78	0.97	1.02	
sl.dev	0.07	0.07	0.13	0.07	0.76	0.59	0.36	0.07	0.10	0.15	0.11	
std.d	0.10	0.08	0.08	0.14	0.07	0.38	0.34	0.35	0.08	0.12	0.16	0.11

Observers	[...]	= Refractor, d = ... mm	[Rf...]	= Reflector, d = ... mm
Bais	= H.A.M. Baister [70]	G102 = A. Groenewegen [102]	vSio	= B. van Sirooten [90]
G150	= Mw G. Gravers [50]	Jn 9 = D. Jannink [9]	Spa	= T. Spaninks [75]
G125	= Mw G. Gravers [Rf 125]	Jn 40 = D. Jannink [40]	Wgm	= G. Wigmant [60]
G80	= A. Groenewegen [80]	Kroe = K. Kroessen [102]	Zans	= W. Zanstra [Rf 155]

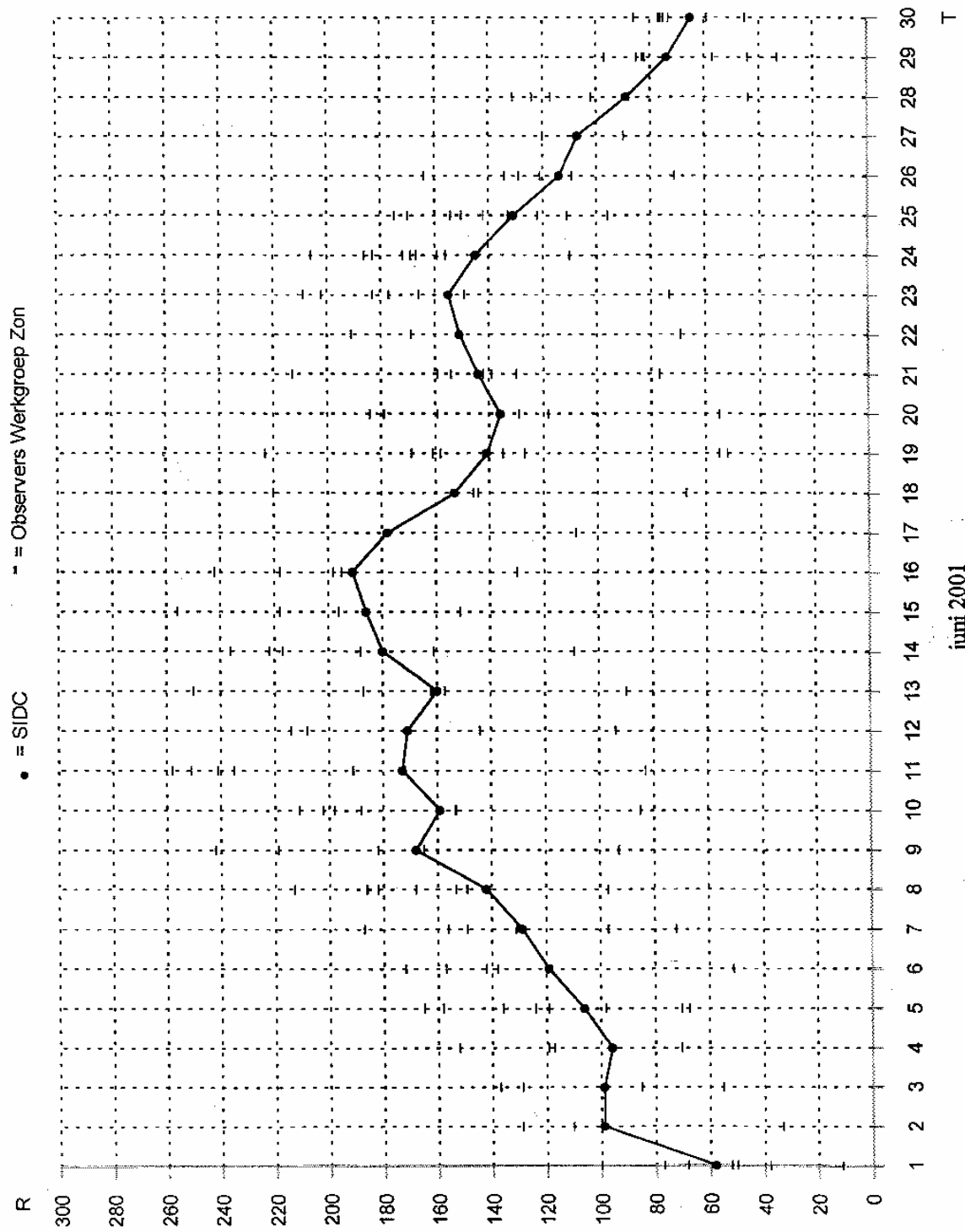
1000^{ste} waarneming van Gerda Gravers. Van harte gefeliciteerd.

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

Date	R _s	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	69	30	52	133	-	1	0/0	4	
1	58	22	52	133	-	5	0/0	14	
2	42	52	52	134	-	5	0/0	25	
3	99	66	52	145	-	17	0/0	9	
4	96	124	54	154	-	26	2/0	11	
5	106	129	50	153	-	102	1/0	6	
6	119	122	53	158	-	121	0/0	10	
7	129	137	53	165	-	4	0/0	4	
8	142	161	56	180	-	25	1/0	12	
9	168	209	60	177	-	32	0/0	31	
10	159	193	59	163	-	16	0/0	19	
11	173	196	58	162	-	4	0/0	13	
12	171	139	56	166	-	16	0/0	4	
13	160	142	57	181	-	31	2/0	12	
14	180	162	59	195	-	6	0/0	9	
15	186	159	55	197	-	29	1/0	12	
16	191	218	55	208	-	8	0/0	1	
17	178	253	55	205	-	2	0/0	12	
18	153	230	56	221	-	219	1/0	31	
19	141	231	56	195	-	1	0/0	16	
20	136	218	-	199	-	11	0/0	14	
21	144	184	-	200	-	5	0/0	15	
22	151	160	-	204	-	39	3/0	7	
23	155	158	-	206	-	63	2/1	8	
24	145	187	-	195	-	4	0/0	10	
25	131	144	-	182	-	16	0/0	7	
26	114	119	-	169	-	4	0/0	18	
27	107	91	-	148	-	9	0/0	8	
28	89	71	-	140	-	5	0/0	3	
29	74	48	-	140	-	1	0/0	5	
30	65	42	-	137	-	0	0/0	10	

R_s, R_w: provisional international sunspot numbers from the S.L.D.C.
 PPSI: prompt photometric sunspot index from the S.L.D.C. in 10⁻⁵ w/m²; 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 Humant (Belgium).
 2800: 2800 MHz solar flux from Ottawa (origin: Ursigrans - UGEO). The 10.7cm Flux data are a service of the National Research Council of Canada.
 COS: thousands of the cosmic ray counts (origin: Ursigrans - UCOSE Kerguelen, when available).
 SFI: From October 1992, Solar Flare Index from the S.L.D.C. (origin: Ursigrans - UGEO), evaluation: 1 x 10⁻⁵ x 10⁻¹⁰⁰ x > 1.
 XI: X-flares index from the Ursigrans (M-flares/X-flares) (origin: Ursigrans - UGEO, UGEO).
 Ak: geomagnetic index from Wings, Germany (origin: Ursigrans).
 SEA: sudden enhancements of atmospherics from Uccle & Humant (Royal Observatory, Belgium).

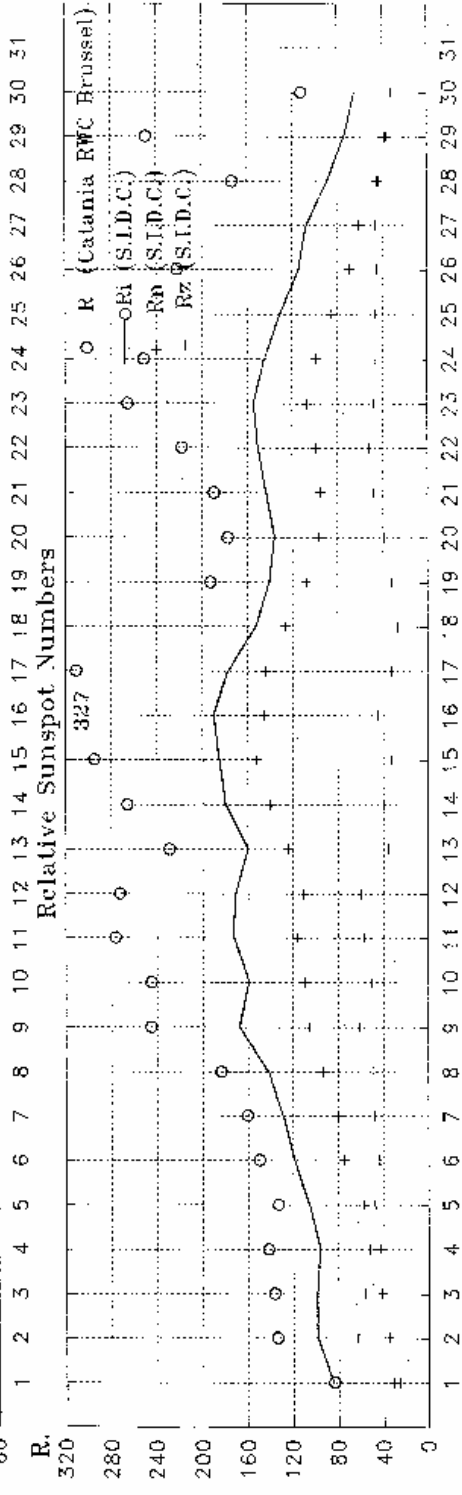
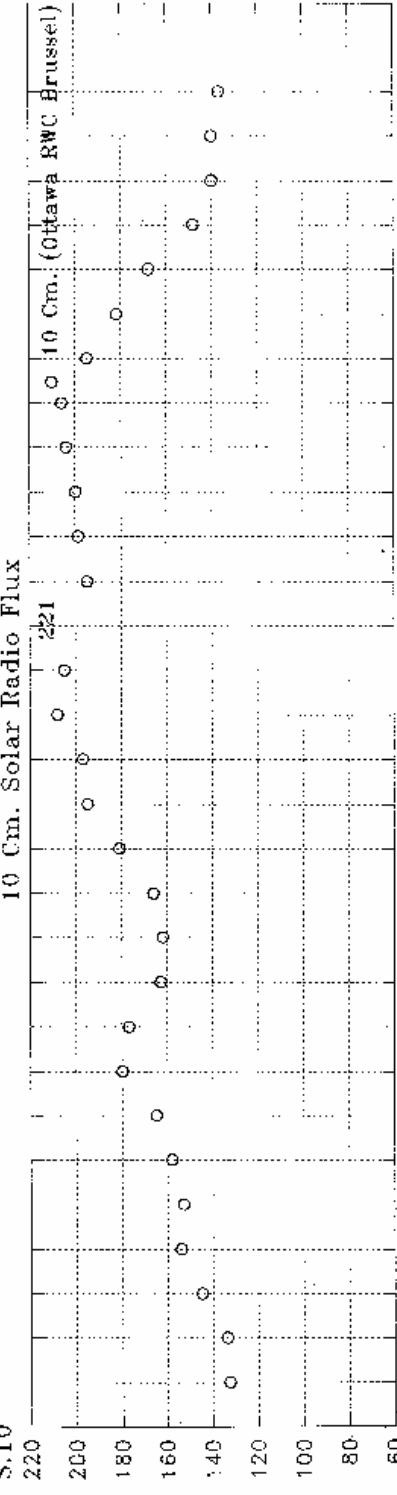
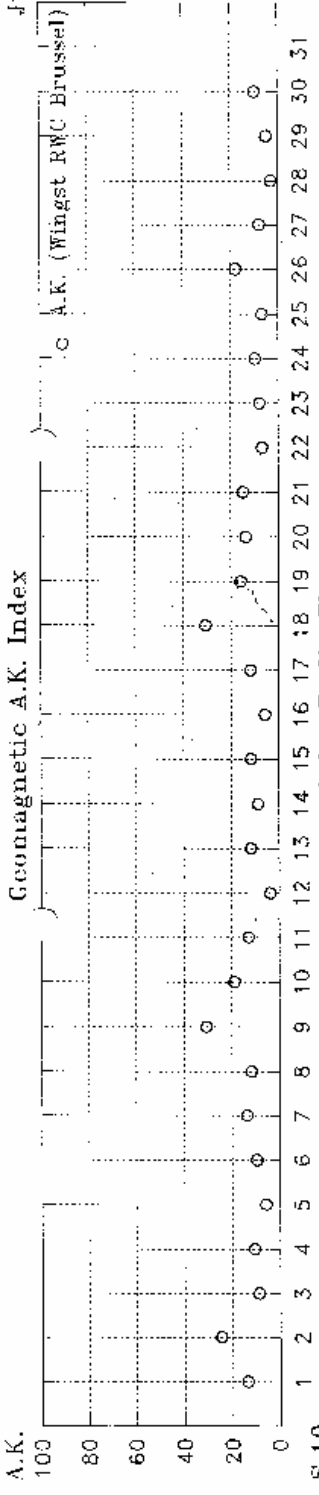
Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.



juni 2001

T

June 2002



Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

juni 2001

Day	S.I.D.C.		Balster		Groenew		Jannink4		v.Slooten		Spaninks		Wigman		Zanstra	
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	32	26	50	50					38	39	39	29	22	28	37	15
2	36	63							43	67						
3	42	57							51	79	63	74			41	44
4	43	53							54	65	71	81				
5	58	48	105	60	67	31	39	31	77	47	88	70	66	53	67	52
6	75	44	104	68					103	54			89	49	66	52
7	81	48	112	75					96	60			57	40	71	60
8	93	49							115	53	81	101	104	49	70	79
9	106	62	130	89					146	73	146	96			114	51
10	109	50	149	53					127	61	135	76			107	46
11	116	57	168	73					160	75	165	86	132	59	114	58
12	111	60							132	76	131	83			79	65
13	124	36	200	50					140	47	123	39			119	38
14	140	40							182	54	160	57	143	45	118	43
15	153	33	219	37					184	34	196	60	118	33	147	49
16	146	45	186	56					169	49	178	64	166	32	156	39
17	145	33														
18	126	27	174	46	113	33									114	30
19	108	33	166	57			44	11	117	41	122	47	115	46	95	32
20	97	39	142	37					110	49	128	56			93	36
21	95	49	150	63					100	44	89	50	98	61	104	38
22	99	52									104	65			126	65
23	107	48	132	51	95	54			141	61	140	69	116	50	133	44
24	99	46	131	52	108	48			116	56	134	72	121	65	112	55
25	85	46	117	58			73	38	105	45	102	68	76	46	93	40
26	69	45							78	56	106	58	69	40	85	36
27	61	46							80	40					53	37
28	45	44	61	63	52	36			66	65	50	67	53	49	51	38
29	38	36					22	22	47	50	37	48	34	48	22	35
30	33	32	38	38	35	38			35	40	37	40	38	48		

Van Gerda Gravers ontvingen wij de volgende korte E-mail- berichten over de Eclips 2001:

Beste mensen,

ECLIPS ZAMBIA AFRICA 2001 , MIJN DERDE ECLIPS.

* Ik heb waargenomen 6 a 7 km ten zuiden van Lusaka, op een maisveld naast

Camp Eureka waar we 4 nachten verbleven.

- Ik keek met het blote oog en een 10 keer 50 verrekijker en een klein zonnespiegeltje.

* De corona was verdacht gelijk aan die van 11 augustus 1999, mooi rondom de maan wederom net een zonnebloem aan de hemel, met uitlopers (streamers) zo lang als 3 a 4 keer

de diameter groot als de schijf.

- Hemelkleur donkergrijs, niet dat mooie blauwe.

* Zandweg voor en na totaliteit golfde door de vliegende schaduwen, deze zeer duidelijk,

leek als laagje water over het weggetje.

- Zag verre bewolking donker worden.
- Zag 2 zeer heldere protuberansen(blote oog), links en rechts op de maanrand als

WITTE stippen alsof er hapjes uit de maanrand zaten. De rechter was zeer fel helder en de linker zwakker. Evenals in 1999 zag ik ze WIT en niet purperrood, de kleur van protuberansen. Aan de onderkant veel protuberansen (mensen met telescopen), met blote oog niet te zien.

- 2 keer diamantring eens gezien, deze duurde langer ivm diepe dalen, men moet dan net bril op en af op dat moment, nu eens echt gezien ipv alleen op foto's. Zeer zuivere mooie ring alle 2 keer.
- Enkele vogels (spreeuwensoort en duiven) zongen als s 'avonds vertrekvlucht naar de slaapplekken.

* Zoals de 2 eclipsen ervoor vond ik het weer niet echt opvallend kouder tijdens de totaliteit,

ietsje frisser maar qua gevoel. Mensen hadden het wel over 6 a 8 graden verschil maar ik voel het niet.

- Jupiter linksonder en Sirius verderweg te zien geweest.
- Duur totaliteit hier helaas vrij ver van de centrale lijn, ruim 3 minuten.

Onderwerp: kort e-mailverslag eclips 2001 deel 2

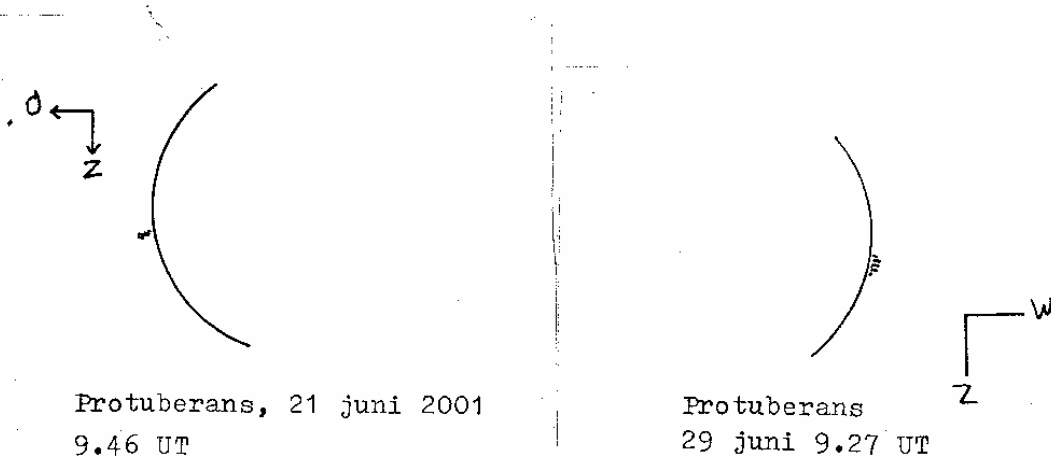
Beste mensen,

- Camera obscura in bomen duidelijk 50 meter van maisveld en zelfs sikkeltjes in kleine planten ter plekke.
- Deze 3 e eclips geheel onbewolkt van 1 e contact tot en met laatste contact.
- De wind ging voor, tijdens, en erna helemaal weg ongeveer 10 minuten na totaliteit weer terug.
- Het "rare licht" weer te zien op 80 % bedekking, sommige mensen al eerder b.v. door zonnebril te donker, ik zie het zelf pas na 80 %. Na totaliteit dit keer langer als normaal te zien, meestal is het dan weer sneller normaal.
- Buiten de eclips verder een pracht reis met veel wild van 2 weken. I.v.m. de e-mail alleen over de eclips houden hier verder buiten gelaten.
- Op internet op later tijdstip een uitgebreider verslag over de eclips, op welke site maak ik tegen die tijd aan jullie bekend.

Gerda Gravers

Overige onderwerpen:

- Van de hand van Dennis Jannink zijn de volgende twee protuberanstekeningen:



- Bob van Slooten meldde op 28 juni dat hij op 44 Zuiderbreedte op de Zon een B-groep waar nam. Zoals bekend een zeldzaam fenomeen!

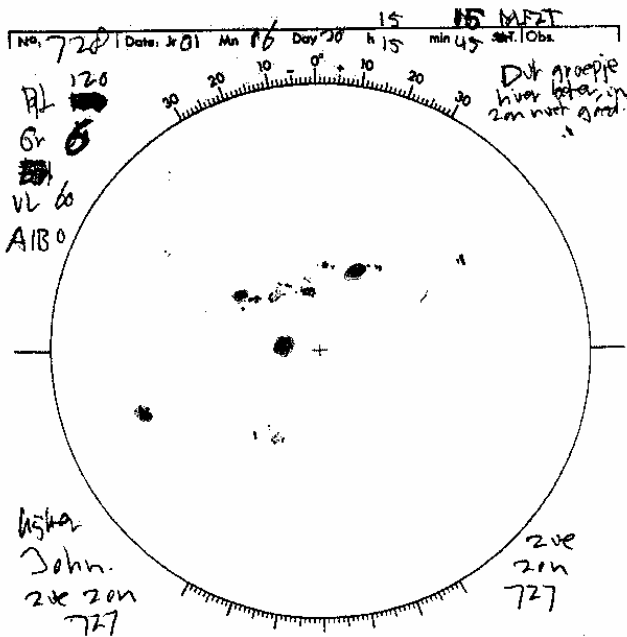
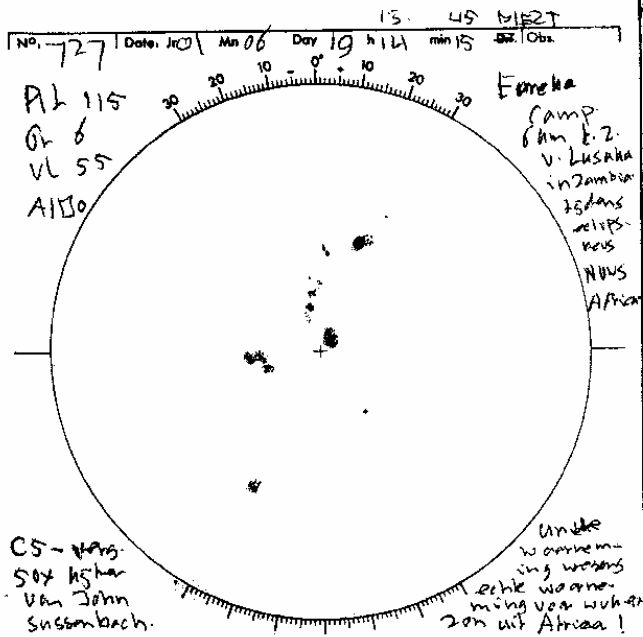
Ook Wim Zanstra meldde dit op 1 t/m 5 juli.

- Aad Groenewegen neemt in de zomermaanden, naast zijn normale tellingen met de 102/1000 kijker, tevens waar met een 80/900.
- Gerda Gravers verrichtte op 10 juni 2001 **haar 1000-ste waarneming**. Gelukkigwens met deze mooie prestatie.
- Gerda nam op 19 en 20 juni op het zuidelijk halfrond waar tijdens de Elips in Zambia. Ze maakte gebruik van een kijker van John Sussenbach (F=1250, d=125mm).

Onderwerp: tekeningen zon in africa .

Van: "g.gravers"

19 en 20 juni 2001



Verder nieuws:

Van Jean Meus het volgende bericht:
 Het Sunspot Influences Data Center (S.I.D.C.-
 Ukkel) deelde de definitieve Wolfgetallen voor
 het jaar 2000 mee.
 De definitieve jaargemiddelden van de laatste
 jaren zijn:

1996:	8.6 (minimum)	1997:	21.5
1998:	64.3	1999:	93.3
2000:	119.6 (maximum?)		

Wanneer men de afgegladde maandgemiddelden
 berekent aan de hand van de formule die Jean
 Meus in 1958 heeft voorgesteld (in het tijdschrift
Ciel et Terre), en dat ook vermeld staat op blz.
 316 van zijn *Mathematical Astronomy Morsels*,
 dan vinden we dat het maximum van de huidige
 zonnevlekkencyclus in juni 2000 heeft
 plaatsgevonden, met een (afgeglad)
 maandgemiddelde van 125.6.

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

solar activity varied from low to moderate levels. The most active region at the beginning of the period was Catania sunspot group 43 (NOAA 9488), which produced two M-Class flares with optical counterparts on 4 and 5 June. The activity dropped then to low levels, except for an M1 flare on 8 June. The Sun became more active when Catania sunspot group 66 (NOAA 9502) rotated into view. This region produced two M-flares on Wednesday, June 13 and another one on Friday, June 15. A proton event was also observed from the afternoon of Friday 15 onwards. In the week after that, despite the presence of several magnetically complex large sunspot groups, including groups 67 (NOAA 9503) and 74 (NOAA 9506) with a beta-gamma configuration, most of the flare activity was small-scale, with the exception of a single M-flare from group 74 on Jun 18. On June 22, however, the rather small but very active sunspot group 81 (NOAA 9511) appeared and produced 4 M-class flares and 1 X-flare, before settling down to much lower activity on June 24. Also sunspot group 67 (NOAA 9503) produced an M-flare on Jun 22 before rotating off the disk. Solar activity remained low from 24 June onwards.

II. Geomagnetic Activity

On 1 June, the field increased to minor storm levels due to the effect of a coronal hole with negative polarity. Quiet levels were then observed until 9 and 10 June, when the field reached active to minor storm levels, due to a coronal hole associated with a high velocity streamer. The field became then mostly quiet to unsettled but reached again minor storm levels in the aftermath of the arrival of a CME front on 18 June, at approximately 02:00 UT, followed by a 36-hour increase of the solar wind speed to 700-800 km/s. The following 3 days geomagnetic conditions remained elevated, but then returned to quiet levels until 26-27 June when shorts periods of active levels were observed due to coronal hole effects. The following days, the geomagnetic environment remained quiet.

III. noticeable solar events

day	begin	max	end	loc	Xray	op	10cm	type	Cat	NOAA	comment
04	0803	0812	0820	S18E57	M2.4	1F	210		43	9488	
04	2234	2259	2309		M1.7				41	9484	
05	0441	0451	0501	S18E44	M2.5	2N	1000	III/3	43	9488	
08	1918	1927	1934	S09W30	M1.0	SF		III/3	53	9494	
13	0422	0433	0444	S25E74	M2.0	1F	85	III/2	66	9502	
13	1122	1142	1151	S29E66	M7.8	1N	110	III/3	66	9502	
15	1001	1013	1020	S26E41	M6.3	1N	130	III/3	66	9502	
18	1959	2021	2050	N18E34	M2.0	2N	72		74	9506	
22	2117	2122	2129	N10E27	M1.7	1N		III/1	81	9511	
22	2214	2222	2231	N14W47	M6.2	1N	110	III/1	67	9503	
22	2357	0001	0006	N09E25	M1.1	SF		III/2	81	9511	
23	0010	0015	0020	N09E24	M5.6	1N			81	9511	
23	0402	0408	0411	N09E23	X1.2	1B	100		81	9511	
23	0620	0626	0634	N10E21	M1.3	1N	100		81	9511	
26	1150	1312	1402	behind	C7.1						CME

Xray: Xray flare class

op: optical flare class

10 cm: radio flux on 10 cm

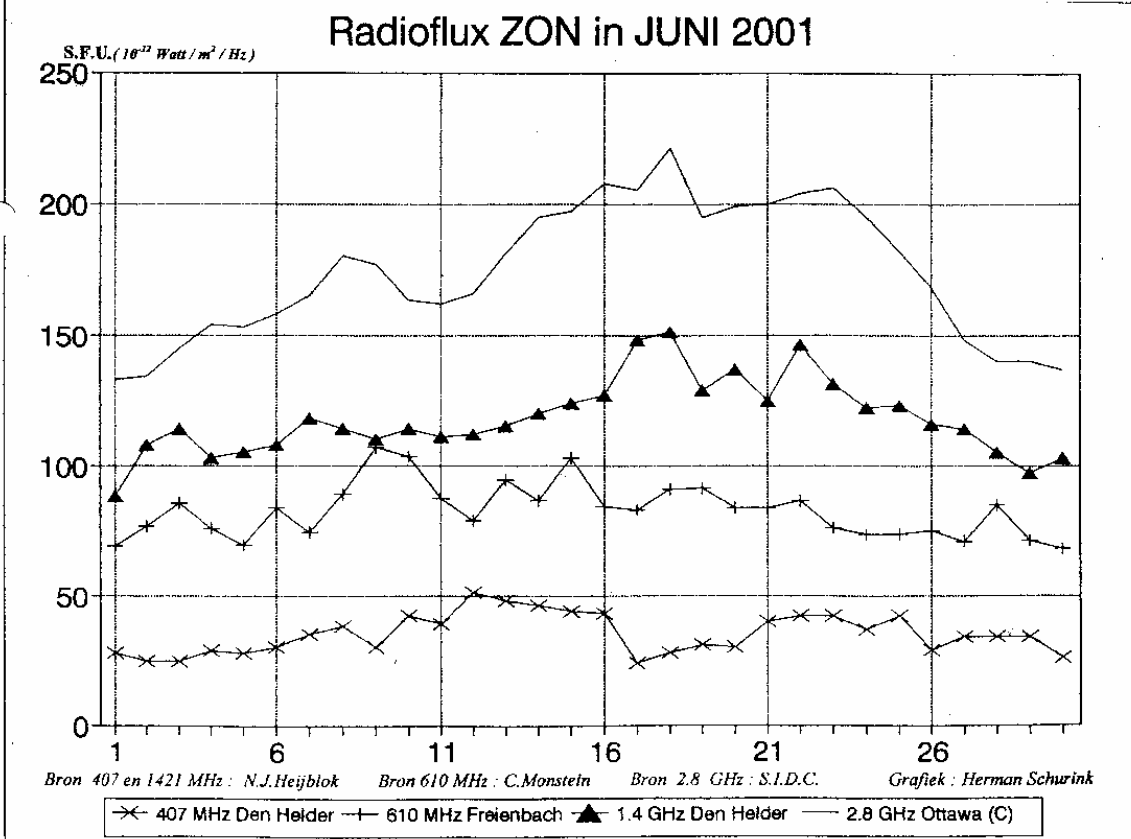
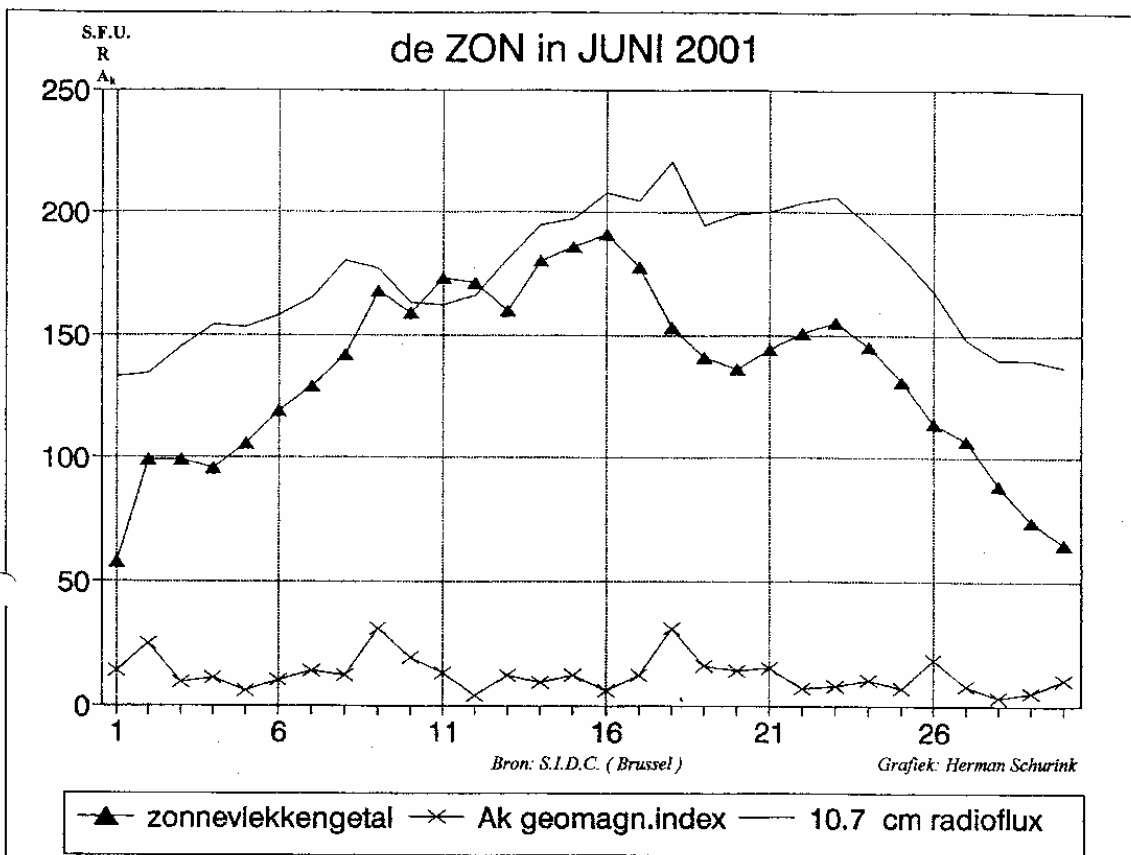
type: type of radio-burst

Cat: Catania sunspot group identification

NOAA: NOAA active region identification

p: proton event

CME: Coronal Mass Ejection





Bulletin Werkgroep Zon

July 2001

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

Zonnevlekgetallen (Sunspot numbers)

Day	Bals [Gr 6]	Groß [Gr 9]	Jn 4	Kroo [Scho]	vSlo	Sp 7	Wig	Zans	Zijle
1	118	81	91	44	88	81	95	105	90
2			33	33	33	33	79	66	108
3	118	86	114	33	33	33	79	66	108
4	110	81	88	23	79	77	69	94	76
5	89	54	91	22	57	72	90	51	66
6		65		22	38	60	62	52	63
7	45			23		56	63	57	41
8									
9		97		39		81		80	85
10			23	23		68		57	82
11			34	12		82		69	98
12		121		45	118			81	106
13			45			152		119	120
14						190			98
15	114	91		37	123	94	127		98
16	128	150		60	74		129	132	120
17	168	140	161			157	140	98	154
18				46		124	152	123	
19				46			108		
20	165								
21									
22	128	98	118		59	64		138	115
23					51		107	125	118
24	135	82	86	25	103	81	112	104	82
25	108	79		38			112	99	82
26	95	76	76	34	36		67	88	47
27	80			46			57	80	73
28	98	67	71	32		60	55	84	64
29	82	67	42	21	71	34	53	33	54
30	81	68	67	68	34		64	58	58
31	80		75	41	38		71	69	50
observ	17	12	16	4	28	4	10	28	15
k	0.73	0.98	0.83	1.02	2.22	1.87	0.92	1.06	0.82
at obsv	0.10	0.15	0.12	0.21	0.55	0.39	0.16	0.19	0.11
at d.7	0.14	0.16	0.14	0.21	0.25	0.21	0.18	0.15	0.13
	0.18	0.14	0.18	0.21	0.18	0.15	0.13	0.22	0.18

Observers	[...] = Reflector, d = ... mm
Bals	H.A.M. Baister [70]
Gr 5	Mw G. Gravers [50]
Groß	A. Groenewegen [90]
Groe	A. Groenewegen [102]
Jn 4	D. Jaminik [40]
Kroo	K. Kroesen [102]
Scho	A. Scholten [80]
vSlo	B. van Slooten [90]
Sp 7	T. Spaninks [70]
Wig	G. Wijnman [80]
Zans	W. Zanstra [R 155]
Zijle	W.A. Zijlstra [90]

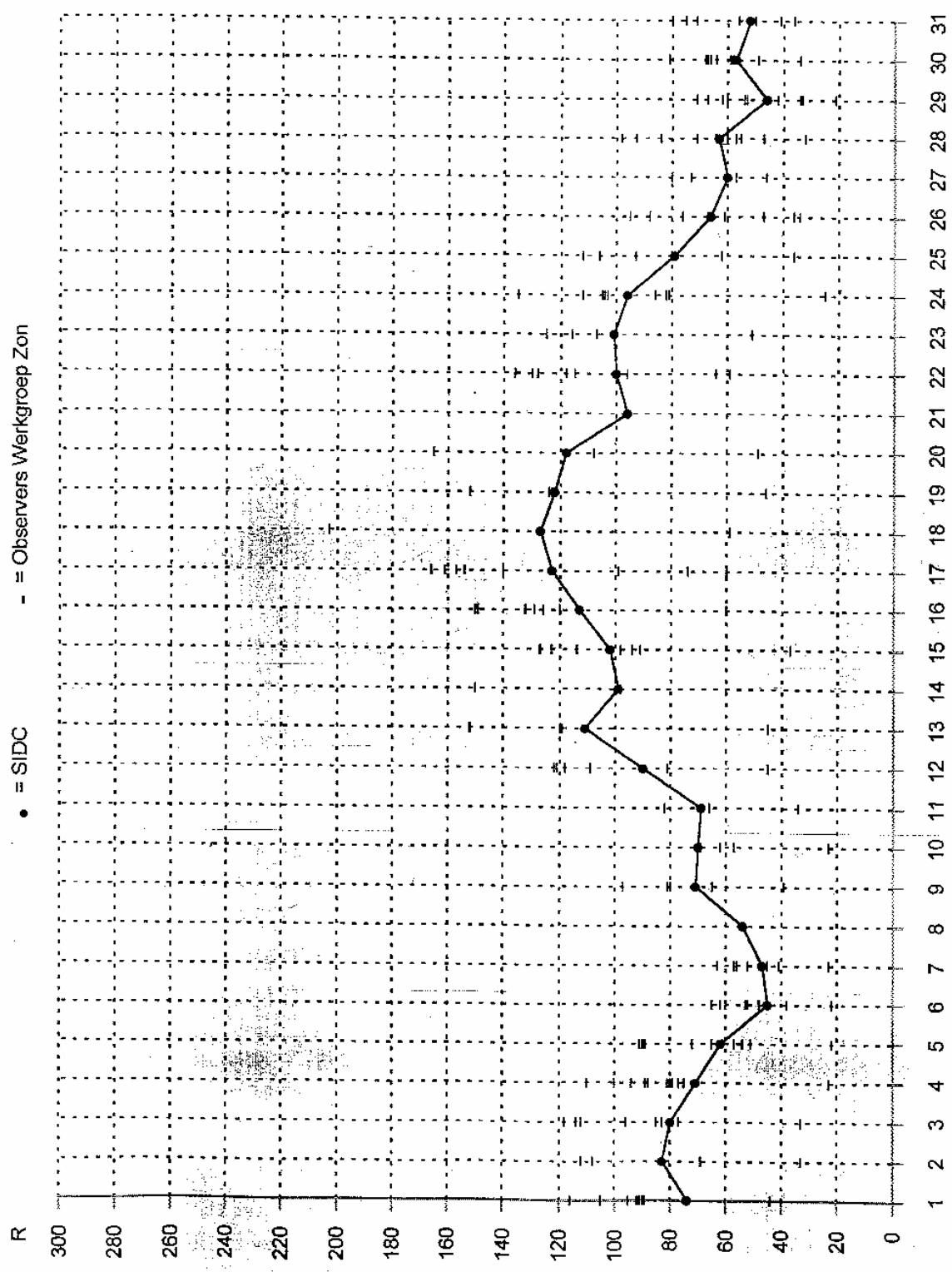
Uctie	Dev	groups	spots
1	1	9	12
2	2		
3	3	6	17
4	4	7	18
5	5	5	12
6	6	4	9
7	7		
8	8		
9	9	6	32
10	10	5	32
11	11	8	17
12	12	9	33
13	13	10	43
14	14		
15	15	9	84
16	16		
17	17	11	89
18	18	10	38
19	19	11	61
20	20		
21	21		
22	22	8	63
23	23		
24	24	7	59
25	25	5	36
26	26	4	41
27	27	4	23
28	28	5	25
29	29	5	21
30	30	6	17
31	31	6	26

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

Date	R ₁	PFSI	600	2800	COS	SFT	XI	Ak	SEA
30	65	42	-	13	859	0	0/0	10	
1	74	39	51	135	861	0	0/0	10	
2	83	34	48	134	861	0	0/0	7	
3	80	44	52	132	850	1	0/0	8	
4	71	43	56	127	849	0	0/0	20	
5	62	38	54	120	848	1	0/0	10	
6	45	33	53	116	855	0	0/0	10	
7	47	43	52	118	860	1	0/0	8	
8	54	47	52	126	860	4	0/0	19	
9	71	66	53	130	862	5	0/0	13	
10	70	62	53	130	864	1	0/0	12	
11	69	52	51	132	863	1	0/0	9	
12	90	58	51	134	868	1	0/0	11	
13	111	68	49	133	874	3	0/0	8	
14	99	90	49	141	877	7	1/0	14	
15	102	119	50	142	880	16	0/0	13	
16	113	140	56	150	880	21	1/0	18	
17	123	145	54	146	875	5	0/0	18	
18	127	136	54	143	877	5	0/0	10	
19	122	127	53	142	877	14	1/0	12	
20	118	128	52	143	874	2	0/0	6	
21	96	101	54	139	870	4	0/0	6	
22	100	123	51	140	878	1	0/0	16	
23	101	72	52	143	876	4	0/0	12	
24	96	69	52	133	868	4	0/0	15	
25	79	53	53	133	865	2	0/0	16	
26	66	68	50	123	864	0	0/0	10	
27	60	44	50	121	868	1	0/0	8	
28	63	19	48	116	870	0	0/0	4	
29	46	28	53	117	867	1	0/0	8	
30	57	28	51	115	862	0	0/0	10	
31	52	35	52	117	864	5	0/0	28	

R₁, R₂: provisional international sunspot numbers from the S.I.D.C.
 PFSI: prompt photometric sunspot index from the S.I.D.C. in 10⁻⁵ wim²: 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 (Humain - UGEO). The 10.7cm Flux data are a service of the National Research Council of Canada.
 COS: thousands of the cosmic ray counts (origin: Ursigraems - UGEOSE Terre Addie).
 SFT: From October 1992, Solar Flare Index from the S.I.D.C. (origin: Ursigraems - UGEO).
 XI: evaluation: 1 x SFT x 10⁻⁵ x 10⁻⁵ x 10⁻⁵.
 Ak: X-flares index from the Ursigraems (M-flares/X-flares) (origin: Ursigraems - UGEO, UGEO).
 SEA: geomagnetic index from Wings, Germany (origin: Ursigraems).
 SEA: sudden enhancements of atmospheres from Uccle & Humain (Royal Observatory, Belgium).

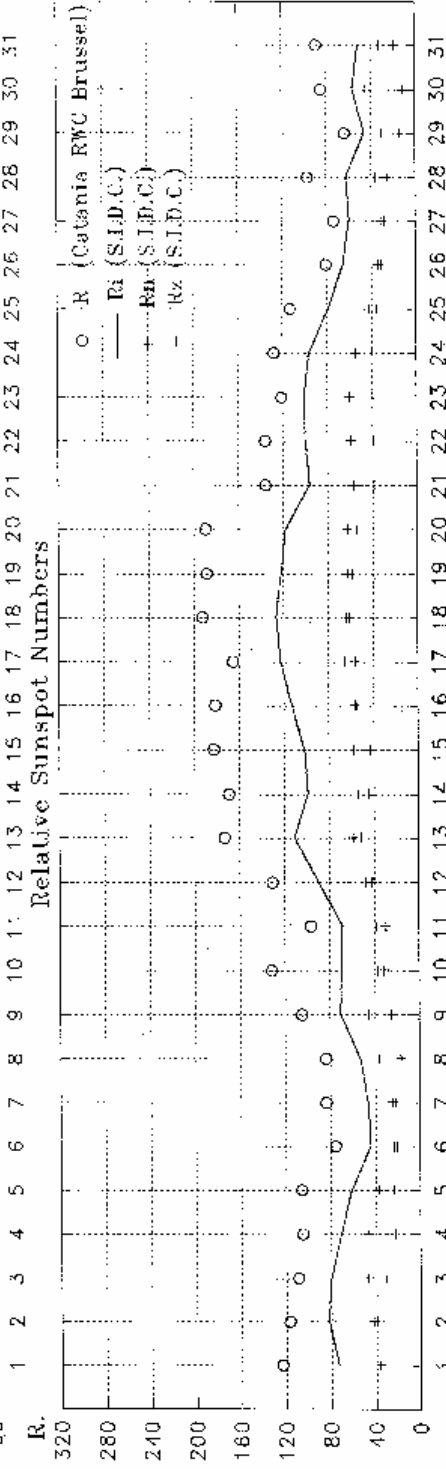
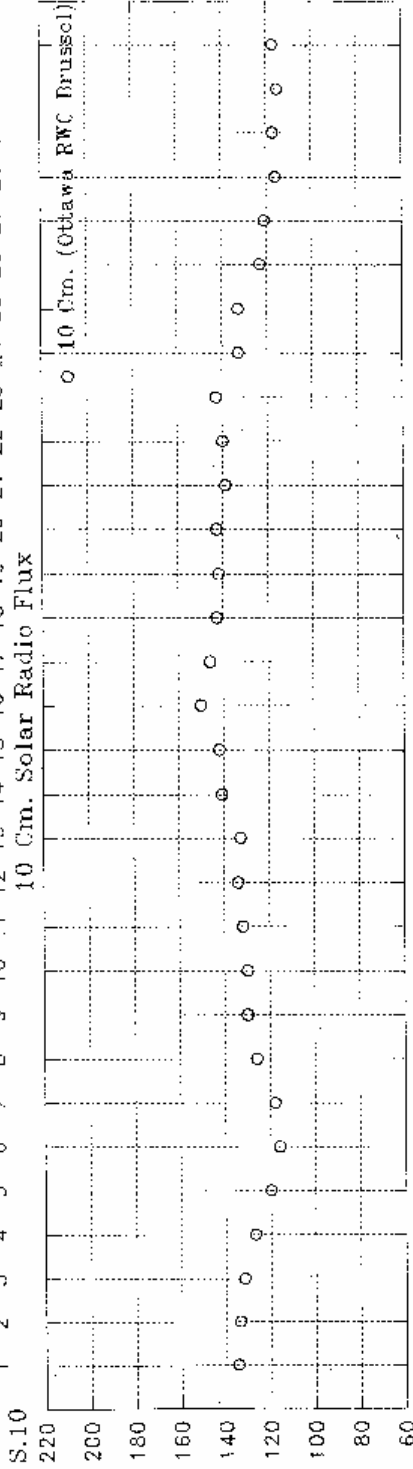
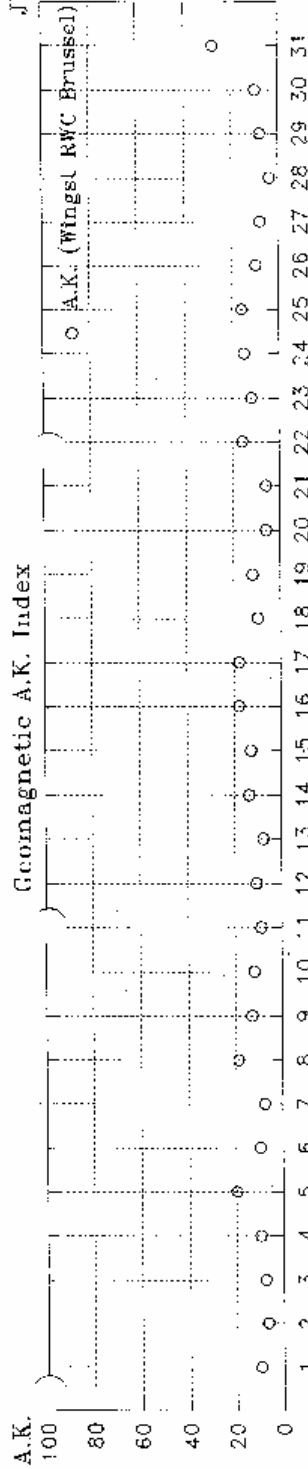
Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.



juil 2001

JULI 2001

Geomagnetic A.K. Index



A.K.

S.10

R.

100
80
60
40
20
0

220
200
180
160
140
120
100
80
60

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

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

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

A.K. (Wingsl RWC Brussel)

10 Cm. (Ottawa RWC Brussel)

R (Catania RWC Brussel)
Ri (S.I.D.C.)
Rm (S.I.D.C.)
Rz (S.I.D.C.)

Rimx 127
Jul. 18

Rimn 45
Jul. 6

Rigem.
82.2

Zonnevlekkengetallen noordelijk- en zuidelijk halfmond

(Hemispheric sunspot numbers)

juli 2001

Day	S.I.D.C.		Balster		Groe102		Jannink 4		Scholten v. Slooter		Spaninks		Wigman		Zanstra			
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs		
1	37	37	58	58	45	46			45	46	46	49	45	60	45	45	44	48
2	43	40							58	50	62	50					57	51
3	48	32	58	60			22	11	50	29	58	38	70	42	48	29	49	34
4	48	23	68	42					49	28	60	29	62	32	49	26	51	29
5	38	24	50	39					48	24	41	49	38	13	40	25		
6	24	21							12	26	36	24	25	37	26	26	28	25
7	25	22	16	29					29	27	31	32	32	25	16	25		
8	17	37																
9	25	46							29	54			27	53	28	37		
10	32	38							24	45			24	57	15	47		
11	30	39							39	43			24	45	38	28		
12	42	48							56	66			35	46	45	64		
13	59	52							68	84			45	74	56	64		
14	45	54							83	67					48	50		
15	44	58	49	65					35	59	59	68			35	63		
16	57	56							61	68			48	84	53	67		
17	57	66	66	100			36	38	79	78			60	80	49	50		
18	62	65							108	95								
19	63	59							61	63	70	82	58	65				
20	63	55	81	84					62	46								
21	57	39																
22	60	40	82	46			34	30	83	53			69	46				
23	61	40							56	51	77	48	63	53				
24	55	41	77	58	41	45			40	41	66	46	58	46	41	41		
25	43	36	53	53					59	53	57	36	29	33				
26	34	32	49	46			24	12	38	30	45	43	33	14				
27	32	28	37	43					32	25	42	38	37	36				
28	26	37	33	65					27	28	32	52	36	57	31	33		
29	15	31	11	51					0	34	11	42	0	33	11	43		
30	12	45	14	67	13	53			12	52	12	47	13	45				
31	19	33	26	54	12	29			24	47	16	40	14	36				

SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

1. solar activity:

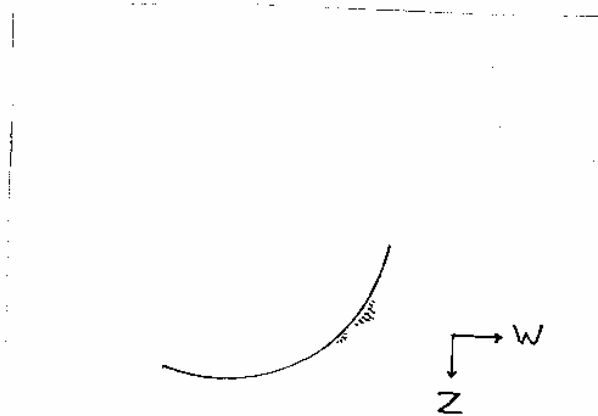
Solar activity was very low to low during the month, except for short periods of moderate activity, on 14, 16 and 19 July. The most active regions were Catania groups 09 (NOAA 9531), 16 (NOAA 9537), 17 (NOAA 9539), 27 (NOAA 9545) and 36 (NOAA 9543).

2. geomagnetic activity:

The solar wind velocity varied from about 350 km/sec to 500 km/sec during different brief periods, due to coronal hole activity. Correspondingly, the magnetic field varied from low to unsettled and active levels.

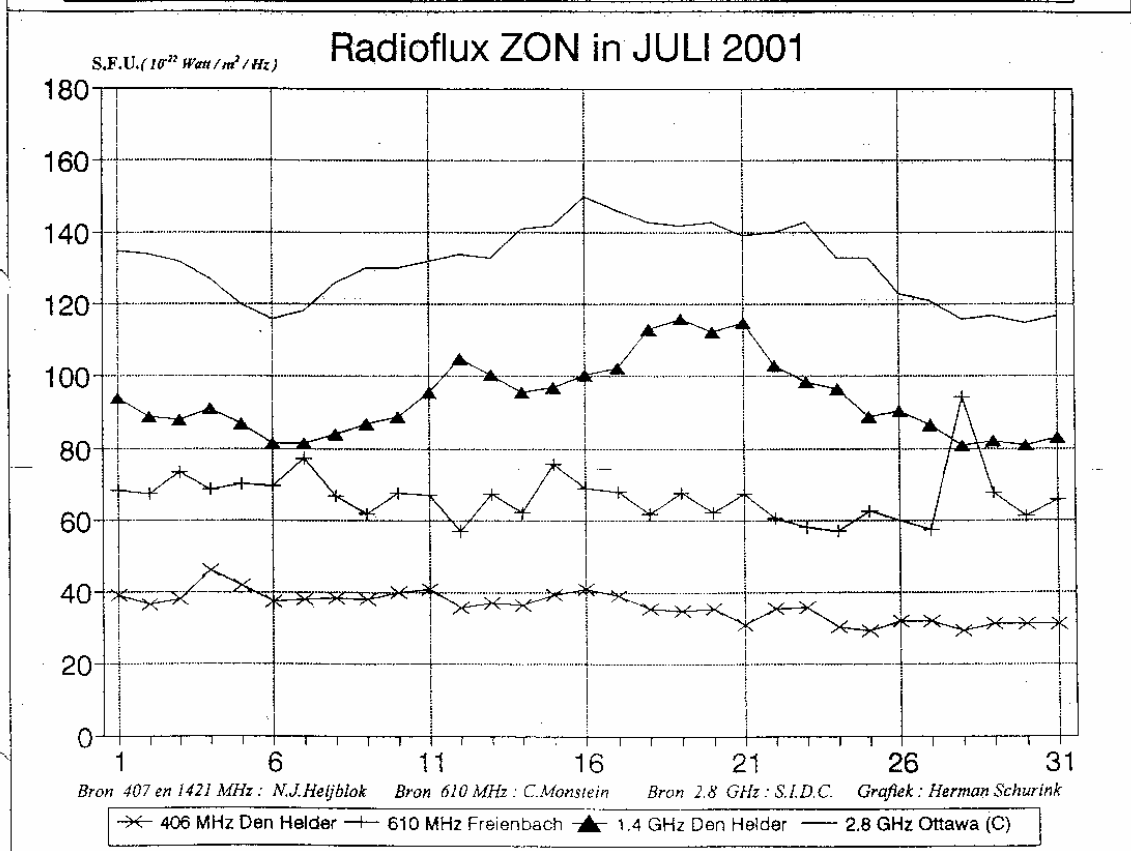
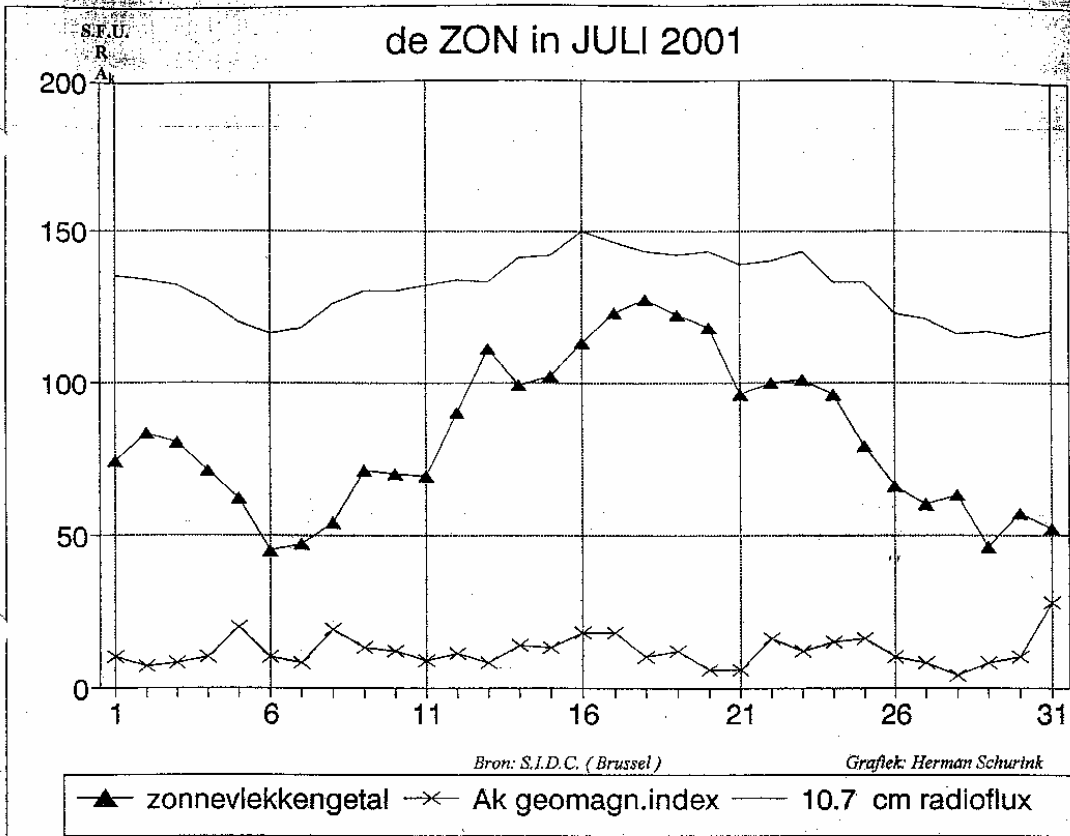
3. Noticeable events summary

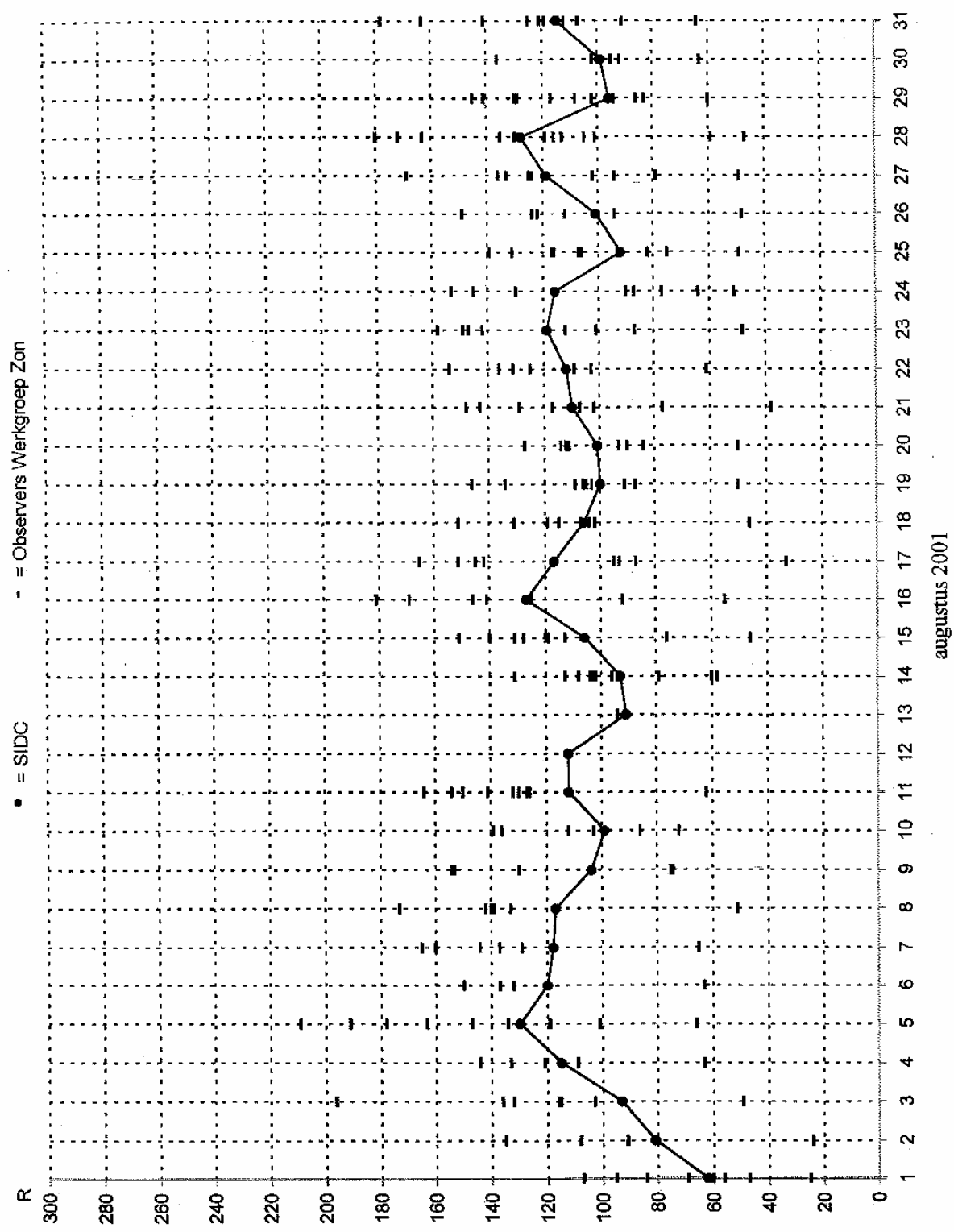
Date	begin	max	end	loc.	Xray	Opt	10cm	Type	Cat	NOAA
14	2126	2133	2140	S19W02	M1.0	SF				17 9539
15	0642	0656	0707	S19W08	C6.9	SF	62	III/1		17 9539
16	0313	0320	0329	S19W20	M1.2	IN	47			17 9539
17	1536			N32E15						partial halo CME
19	0952	1004	1017	S08W62	M1.8	IB	380	III/2		16 9537
23	1027			NWlimb						CME, LASCO C2 time
30	2036	2043	2049		C6.0		35	III/II		



protuberans 3 juli 2001
10.28 UT

tekening: Dennis Jannink

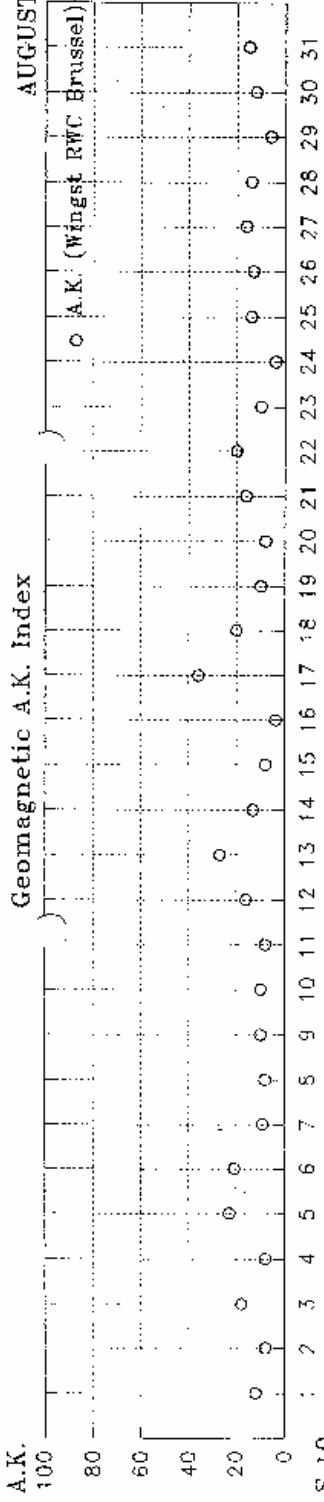




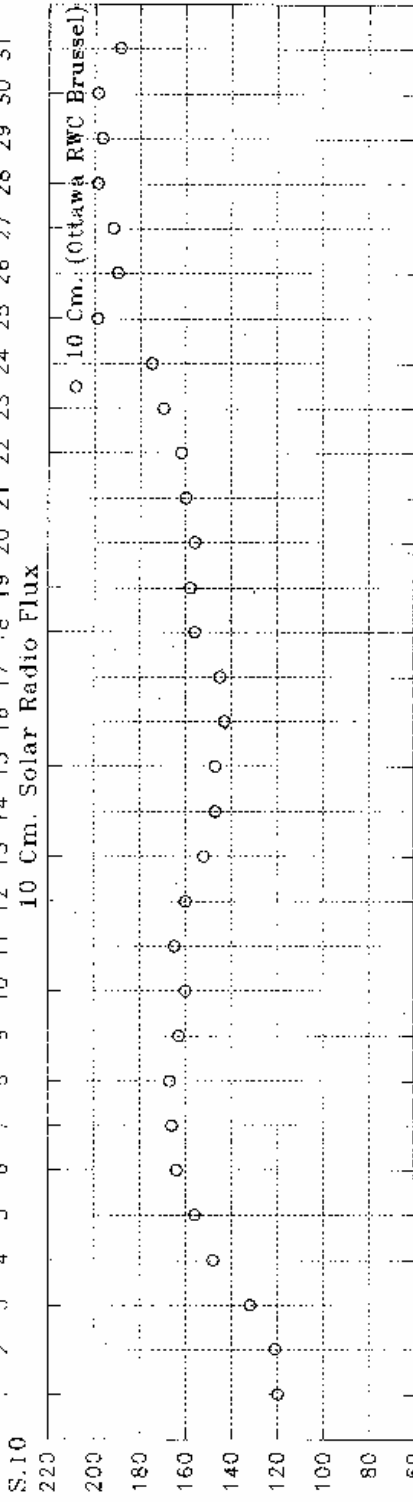
augustus 2001

AUGUSTUS 2001

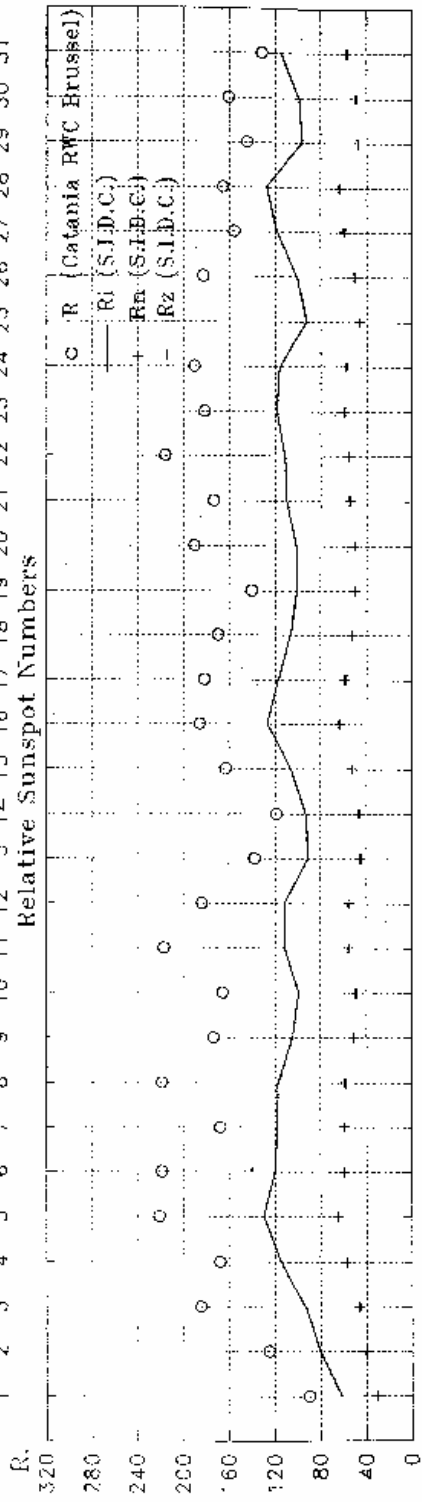
Geomagnetic A.K. Index



10 Cm. Solar Radio Flux



Relative Sunspot Numbers



Rimx 130
Aug. 5
Rimn 62
Aug. 1
Rigem.
106,8

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

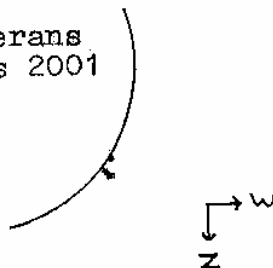
(Hemispheric sunspot numbers)

augustus 2001

Day	S.I.D.C.		Balster		Groenew		Jannink 4		Scholten		v. Slooten		Spaninks		Wigman		Zanstra	
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	31	31	41	66					14	55	41	54	46	38	16	31		
2	41	40	71	64							59	49			46	45		
3	47	46	52	84	47	56					52	64	106	90	70	62		
4	58	57			65	56					75	58			79	65		
5	65	65	84	107	50	80			63	56	80	98	99	110	72	75		
6	60	60									57	75			70	80		
7	59	59	84	81							58	71	86	74	64	73		
8	59	58			74	66					68	77	87	86	76	57		
9	52	52	97	56			41	34					92	62	74	56		
10	50	49	68	68							48	64	65	74	45	58		
11	56	56	78	86					61	65	71	70	73	81	64	86		
12	56	56																
13	46	45			23	71												
14	47	46	36	95	33	61	38	22	35	69	33	69	34	74	67	46	35	44
15	53	53	66	85					49	71	48	72	60	80	79	49	61	15
16	64	63			68	73					60	109	88	93	84	62	48	44
17	59	58	77	88	70	47			60	27	60	91	69	76	47	48	50	37
18	53	53	90	61					66	65	63	65	63	56	67	40	61	41
19	50	50	78	68			39	11	70	64	56	53	64	39	64	39	67	38
20	51	50	77	34					81	46	79	35	65	25	67	26		
21	55	55	101	47	67	35			85	22	84	45	96	47			82	35
22	56	56	99	55	63	40					86	39	89	47			93	32
23	60	59	78	80							90	52	85	62	47	40	62	50
24	58	58									80	65	60	70	42	35	28	36
25	46	46	56	83					35	47	31	62	64	67	46	70	30	45
26	51	50	38	111							37	85	40	84			35	59
27	60	59	63	106							40	84	52	81	49	45	24	55
28	64	64	70	110	54	47	23	36			67	63	68	95	59	60	48	65
29	48	48	61	84	53	49			31	55	45	49	48	69	62	68	33	50
30	50	49	63	73							48	54					42	53
31	58	57	95	82					50	57	54	60	90	73	70	51	61	51

tekening: Dennis Jannink

Protuberans
10 augustus 2001
9.35 UT



SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

1. solar activity:

The activity was low for most of the first 20 days of the month, with isolated periods of moderate activity. Catania groups 55 (NOAA 9563) and Catania 47 (NOAA 9557) were the dominant active regions and produced some M-flares. A filament erupted on August 9 and produced a semi-halo CME without associated flare. A proton event was also observed on the same day, probably associated with the filament eruption. From August 13 to August 19, 3 active regions reached beta-gamma magnetic configuration and produced several C-class flares, but no major flare. On August 14, an erupting prominence produced a geo-effective full halo CME and on August 16, an unusual proton event occurred, which is believed to have been caused in a region near the central meridian on the backside of the sun. The solar activity reached then moderate to high levels during the last part of the month. Successively, Catania Sunspot group 93 (NOAA 9591) a complex beta-gamma-delta structure produced on August 25 a major X-ray flare associated with type III, II and IV radio bursts and a partial halo CME, and two close groups (Cat 08 and 09, NOAA 9600 and 9601, which merged as a unique complex region) produced several C-flares and some isolated M-flares.

2. geomagnetic activity:

Several disturbances mainly due to CME activity occurred this month. The field started at active levels, due to coronal hole effects and a weak disturbance which followed the arrival of a shock, recorded by ACE on August 3. Minor storm levels were reported on August 5 and 6, probably associated to combined coronal hole and CME activity on August 4. Storm levels were reached again on August 12 on August 13 (major storm) in response to the arrival of the August 9 halo CME. Minor storm levels were also observed on August 17, due to CME activity. On August 21 and 22, the field was at active levels, likely produced by an active coronal hole in geo-effective position. The field was again disturbed to active levels after the arrival of a shock on 27 August, probably related to the CME associated with the X flare on Aug 25. Other active periods were observed on 30-31 probably also associated with a CME arrival. Outside of the periods of activity quoted above, the field remained quiet to unsettled.

3. Noticeable events summary

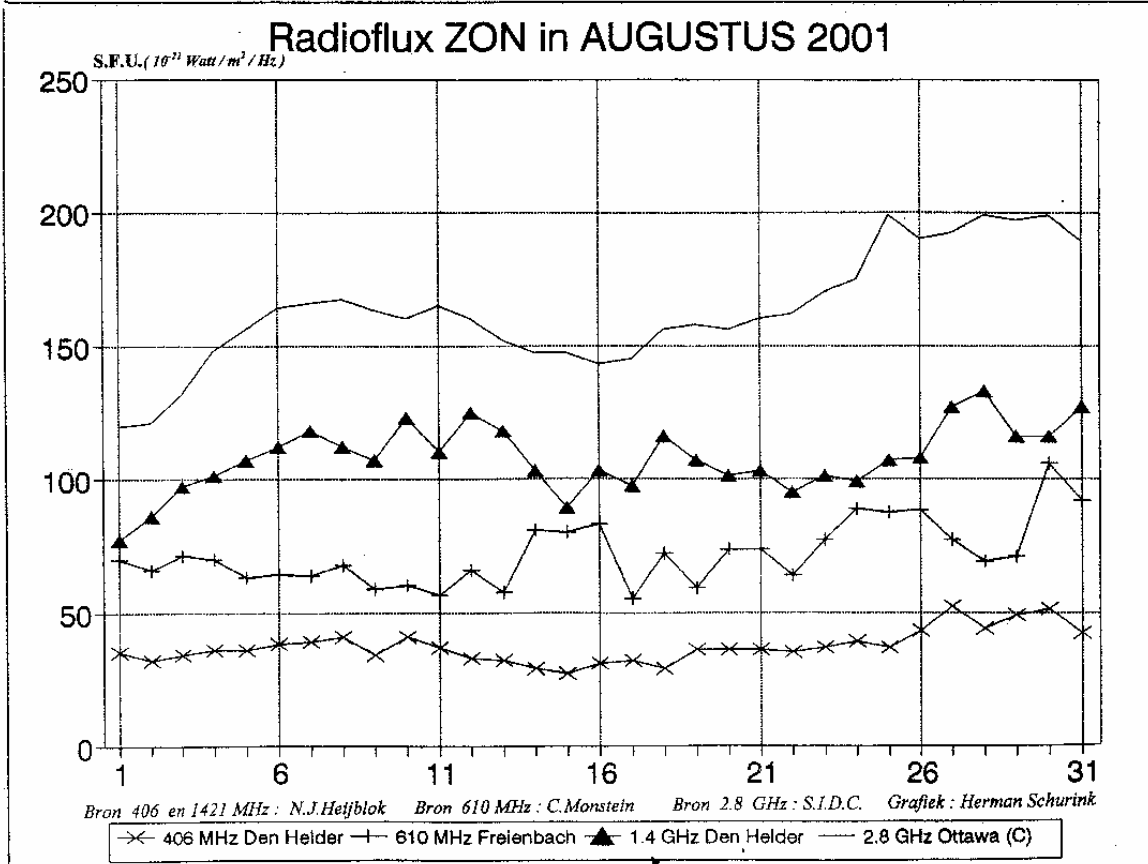
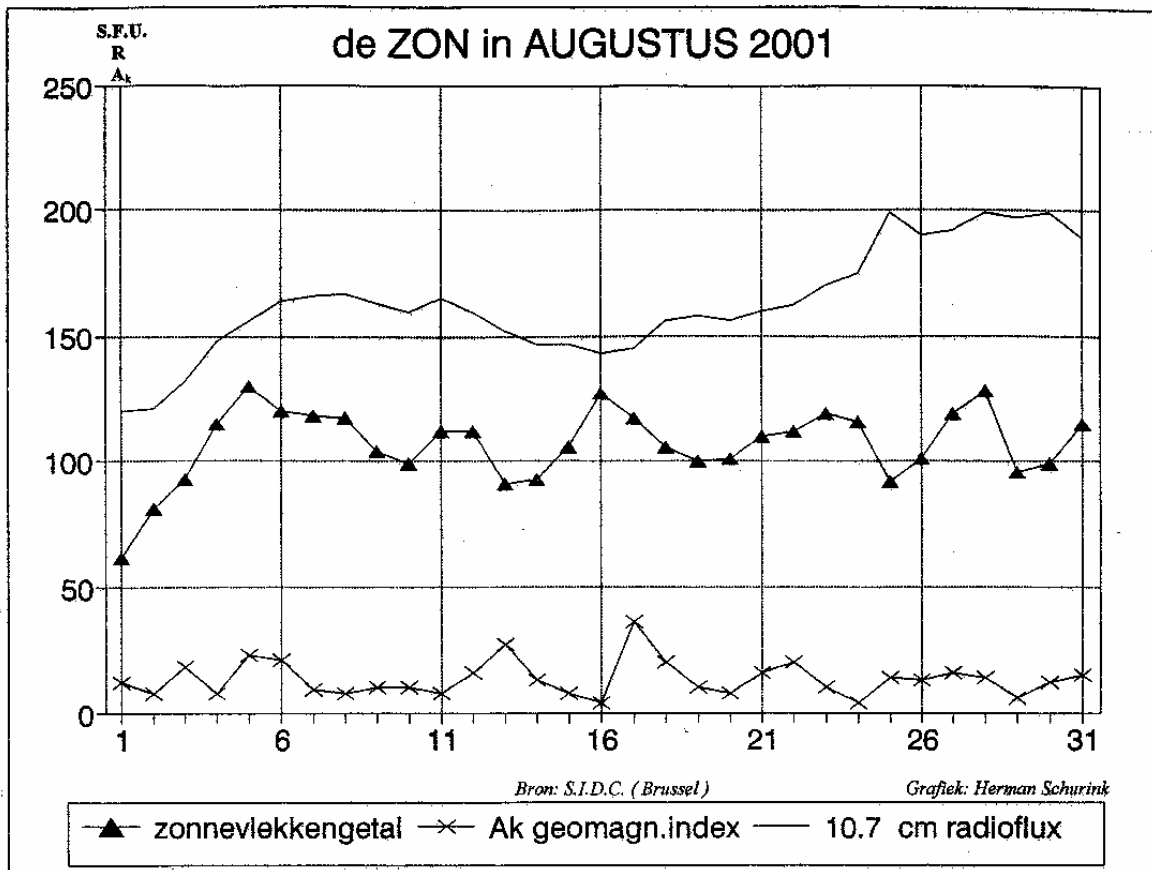
DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO	TYPE	Cat.	NOAA	NOTE
03	0302	0307	0309	N22E27	M1.5	SN				55	9563	
04	1221	1235	1250		C9.6							SE limb, CME
05	1522	1531	1536	S21W46	M1.7	SF				47	9557	
05	2216	2224	2229	S20W49	M4.9	1N		III/1		47	9557	
07	0726	0737	0747	S20W71	M1.1	SF				47	9557	
10	0128	0136	0143	N05W72	C8.0	SF	64	II/3		51	9562	
21	2151	2157	2200		M1.5		150	II/2, III/1				CME
24	0848	0913	0941	S15E57	M1.1					93	9591	
24	2231	2254	2313		M1.2							
24	2347	0017	0044	S18E44	M3.5	SF	280			93	9591	
25	0909	0928	0932	S18E31	M1.2	SF				93	9591	
25	1623	1645	1704	S17E34	X5.3	3B	8100	III/II/IV		93	9591	Partial halo CME
25	1952	1956	1959	S19E37	M1.2	SF				93	9591	
26	1206	1306	1323		M1.3							
27	0631	0638	0656		M1.9							
28	0002	0012	0023	S13E06	M1.0	1N	99			93	9591	
28	0743	0840	0853	N12E80	M1.2					09	9601	
28	1556	1611	1626	N12E69	M1.1	1F	41	II/3	IV/1	09	9601	
29	0503	0523	0534	N16E64	M1.6	1F	21			08	9600	
29	1242	1253	1307	N18E65	M1.2	1F	26			08	9600	
29	2013	2019	2028	N15E59	C9.6	1N	32			08	9600	
30	0130	0139	0143	N12E52	C5.4	SF	34	II/1	III/1	09	9601	
30	1745	1757	1811	S21W28	M1.5	2N	37			93	9591	
30	2034	2038	2041	N15E44	M3.0	1N	1000	III/V/II		09	9601	
31	1035	1042	1045	N15E37	M1.6	SN	270	II/2	III/2	09	9601	CME
31	2227	2242	2245	N14E25	M2.9	2N	540	II/2	III/2	09	9601	CME

SIDC - News

2001 n° 3

SIDC DEFINITIVE INTERNATIONAL AND HEMISPHERIC SUNSPOT NUMBERS FOR 2001

Date	APRIL			MAY			JUNE		
	Ri	Rn	Rs	Ri	Rn	Rs	Ri	Rn	Rs
1	186	87	99	107	83	24	58	32	26
2	166	81	85	118	90	28	99	36	63
3	169	78	91	115	93	22	99	42	57
4	134	68	66	132	111	21	96	43	53
5	133	62	71	118	89	29	106	58	48
6	110	52	58	92	67	25	119	75	44
7	100	33	67	79	43	36	129	81	48
8	115	34	81	55	26	29	142	93	49
9	110	34	76	63	23	40	168	106	62
10	114	25	89	60	21	39	159	109	50
11	115	21	94	80	35	45	173	116	57
12	103	11	92	84	43	41	171	111	60
13	98	11	87	85	44	41	160	124	36
14	92	29	63	102	45	57	180	140	40
15	75	19	56	96	41	55	186	153	33
16	58	18	40	99	53	46	191	146	45
17	28	9	19	95	59	36	178	145	33
18	38	30	8	93	66	27	153	126	27
19	62	62	0	85	60	25	141	108	33
20	86	61	25	82	46	36	136	102	34
21	116	71	45	95	59	36	144	95	49
22	109	70	39	121	77	44	151	99	52
23	106	68	38	134	85	49	155	107	48
24	109	73	36	118	78	40	145	99	46
25	119	78	41	112	81	31	131	85	46
26	119	80	39	118	87	31	114	69	45
27	128	88	40	124	85	39	107	61	46
28	107	80	27	103	76	27	89	45	44
29	113	83	30	85	71	14	74	38	36
30	112	87	25	75	59	16	65	33	32
31				69	51	18			
MEAN :	107.7	53.4	54.3	96.6	62.8	33.8	134.0	89.2	44.8





Bulletin Werkgroep Zon September 2001

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

Zonverkliekgestellen (Sunspot numbers)

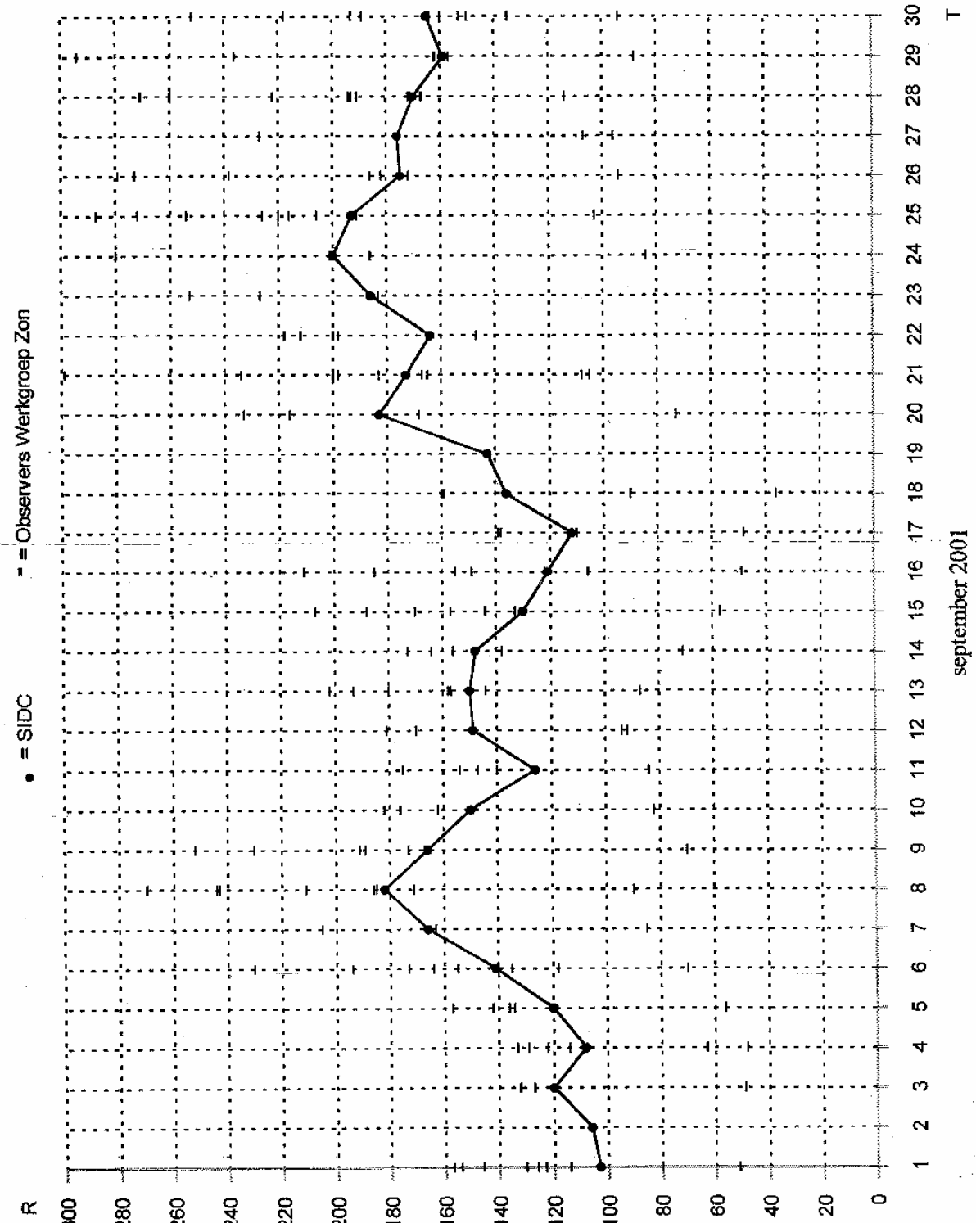
SIDC	Day	Basis	Gort	Groß	Groß	Groß	In 9	In 40	Kroe	Scho	vSto	Spa	Mig	Zans	Zijle	Uctale					
103	1	154	123	130			51			128	148	114	80	157							
108	2																				
120	3						48				132	127									
109	4	122					48	83		114	129	133	122	114	7	63					
120	5						56			136	157		142	134	7	52					
141	6	164					70			118	173	184	230	155	9	96					
168	7						85				205			183							
182	8	211	244				90			186	244	243	185	171	12	184					
160	9	167					70			189	191	252		173	230						
150	10	162					82			182		176		154	8	136					
126	11	140					84			147	175			170	6	91					
149	12						181	94	92					8	108						
150	13	202	158				144	87		180				8	80						
146	14	138					71			173	164	166		8	122						
130	15	188	133				57			170	207	144	157								
121	16	155	108	149			48			149	185		122	211							
112	17	139	110				48			138				10	40						
136	18	160					36			159			90	15	44						
143	19													11	88						
183	20						73			233	216	168									
173	21	234	188	209			108	105		163	185	200	167								
164	22	218								200				227							
186	23						183			147				186	212						
200	24						186	84						10	73						
183	25	272					181	103						12	131						
175	26	278	182	273			94			228	254	220	218	208							
178	27						86	107		186				13	85						
170	28	271	187	280			171	114						13	122						
159	29	236					88			172	181	194	222								
168	30	135	252				84			162	158			11	52						
							150	94		153	160	189	218	164							
							12	15	10	1	7	26	4	5	7	25	18	19	6		
							0,72	0,98	0,69	0,79	1,01	2,07	1,66	1,08	0,92	0,83	0,78	0,94	0,98	0,74	
							0,07	0,11	0,10	-	0,09	0,46	0,04	0,10	0,07	0,07	0,13	0,16	0,12	0,14	
							st.d./h	0,10	0,11	0,14	-	0,09	0,22	0,02	0,10	0,08	0,08	0,17	0,17	0,12	0,18

Observer	Basis	Gort	Groß	Groß	In 9	In 40	Kroe	Scho	vSto	Spa	Mig	Zans	Zijle	Uctale
H.A.M. Bakster [70]														
E.Gort [80]														
M.W.G. Graves [60]														
A. Groenewegen [80]														
A. Groenewegen [102]														
D. Jannink [9]														
D. Jannink [40]														
K. Kroesen [102]														
A. Scholten [80]														
B. van Stobben [80]														
T. Spaarinks [79]														
G. Wignand [80]														
W. Zanstra [165]														
W.A. Zijlstra [90]														

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

Date	R ₁	PPSI	600	2800	COS	SFI	XI	AK	SEA
31	115	227	65	189	817	26	2/0	15	
1	103	183	65	184	815	4	0/0	5	
2	106	172	65	183	824	123	3/0	6	
3	120	135	59	159	834	7	2/0	21	
4	108	155	62	218	847	38	3/0	17	
5	120	176	66	218	853	123	3/0	9	
6	141	186	63	222	859	17	0/0	8	
7	166	219	66	226	855	18	1/0	3	
8	182	244	63	250	854	27	2/0	8	
9	166	294	68	236	852	319	6/0	4	
10	150	313	64	245	862	32	0/0	4	
11	126	288	65	250	866	15	3/0	10	
12	149	215	52	235	872	8	1/0	14	
13	150	212	61	240	877	14	0/0	16	
14	148	155	26	237	851	11	1/0	10	
15	130	156	63	219	844	22	2/0	24	
16	121	121	51	207	855	147	1/0	10	
17	112	90	64	199	863	239	4/0	8	
18	136	96	64	204	866	15	4/0	10	
19	143	136	64	199	861	11	0/0	10	
20	163	186	67	227	865	6	1/0	6	
21	173	251	68	239	865	17	0/0	6	
22	164	273	66	255	864	35	0/0	8	
23	186	343	67	259	852	15	1/0	43	
24	200	381	71	279	855	123	0/1	10	
25	193	235	73	275	844	42	3/0	32	
26	175	360	69	283	787	16	1/0	18	
27	176	365	78	270	803	20	1/0	12	
28	170	261	68	266	808	174	4/0	12	
29	159	245	70	240	818	21	1/0	26	
30	165	231	71	236	796	21	2/0	35	

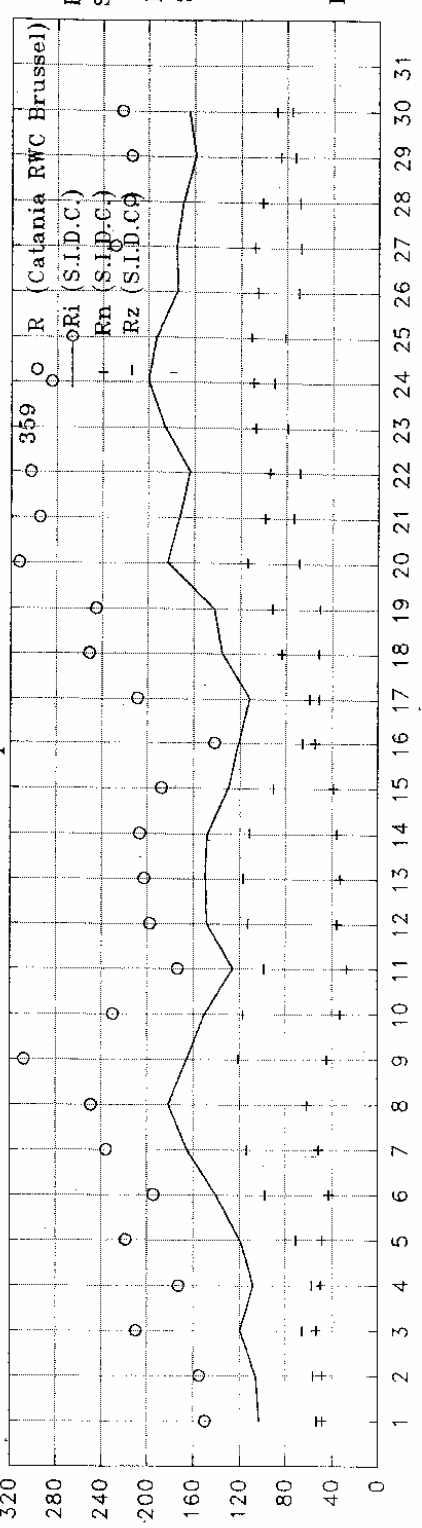
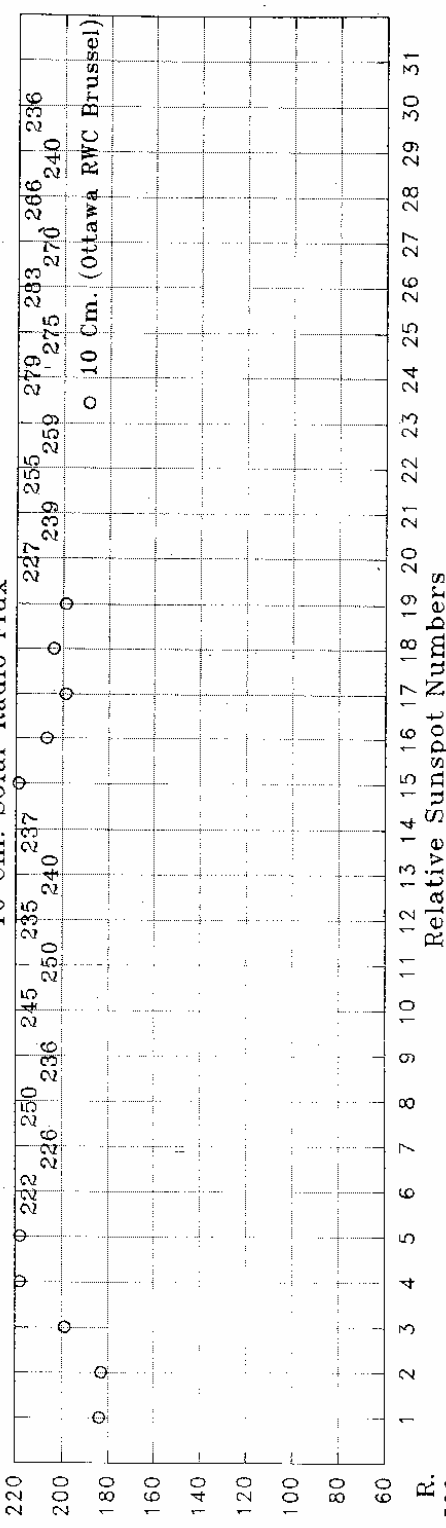
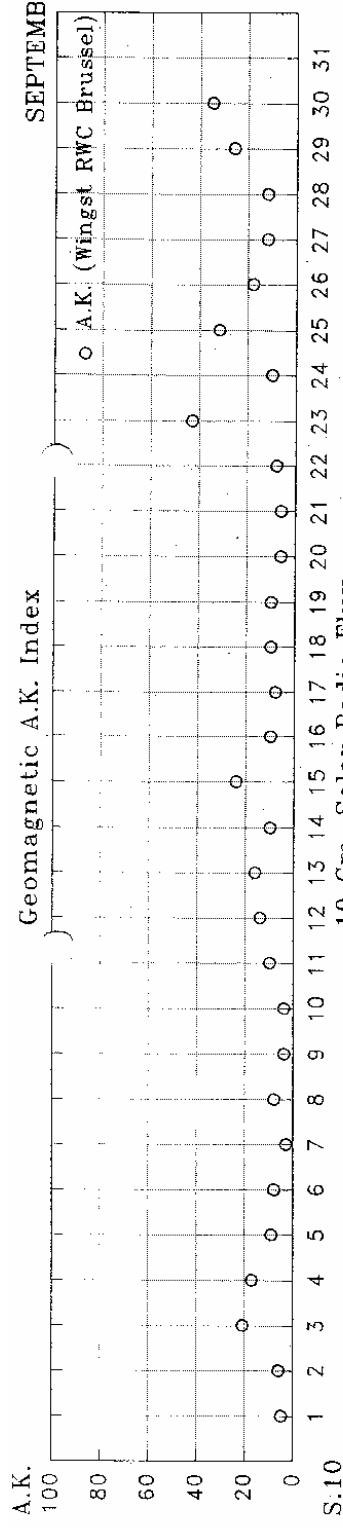
R₁: provisional international sunspot numbers from the S.I.D.C.
 PPSI: prompt photometric sunspot index from the S.I.D.C. in 10-5 w/m²; the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.
 600: 600 MHz solar flux from the station at Hamain (Belgium).
 2800: 2800 MHz solar flux from Ottawa (origin: Ursigrans - UGEOR). The 10.7cm Flux data are a service of the National Research Council of Canada.
 COS: thousands of the cosmic ray counts (origin: Ursigrans - UCOSE Terre Adèle).
 SFI: From October 1992, Solar Flare Index from the S.I.D.C. (origin: Ursigrans - UGEOR).
 XI: X-flares index from the Ursigrans (M-flares/X-flares) (origin: Ursigrans - UGEOR, UGEOD).
 AK: geomagnetic index from Wings, Germany (origin: Ursigrans).
 SEA: sudden enhancements of aurorae from Loche & Hamain (Royal Observatory, Belgium).
 Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.



september 2001

T

SEPTEMBER 2001



Rimx 200
Sept. 24
Rimn 103
Sept. 1
Rigem.
150,7

Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

September 2001

Day	S.I.D.C.		Balster		Groenew		Jannink4		Scholten		v.Slooten		Spaninks		Wigmann		Zanstra	
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	49	54	69	85							56	70	63	83	66	48	46	34
2	49	57																
3	54	66											59	73	56	71		
4	50	58					28	35	49	65	57	72	57	76	52	70	44	70
5	49	71							47	89	61	96			56	86	42	92
6	43	98							51	122	56	138	72	158	55	100	47	88
7	52	114									67	138					66	97
8	62	120							36	150	92	152	68	175	54	131	59	112
9	45	121							48	141	52	139	57	195			43	130
10	33	117									47	135			33	143		
11	27	99									33	114	38	137			36	118
12	36	113			46	135	12	80									44	126
13	33	117	46	156	29	115					44	136			35	158	31	126
14	36	112									48	125			29	135	43	113
15	39	91	59	129							61	109	63	144	32	112	47	110
16	55	66	66	89							72	77	56	129			55	67
17	60	52	74	65							86	52						
18	84	52	101	59							104	55			51	39		
19	92	51																
20	114	69									156	77	140	76	82	86		
21	99	74	127	107			65	40			118	65	84	81	107	93	96	71
22	95	69	123	95							127	73			105	93	120	92
23	107	79			118	65											143	84
24	109	91			85	101					129	72	128	152	114	72	134	66
25	111	82	184	88	96	95					160	66	129	125	129	91	138	78
26	105	70	162	117							167	71			108	64		
27	108	68					74	33			143	84						
28	101	69	165	106	73	98			118	73	122	71	118	76	126	96		
29	86	73	129	107							99	63	82	76			84	73
30	89	76			75	75			95	65	110	79	134	84	85	79		

SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

1. solar activity:

Solar activity started at moderate levels; most of the activity at the beginning of the period came from group 93 (NOAA 9591), a complex structure beta-gamma-delta, which rotated off the disk on Sept. 3. Its role as main activity centre was then taken over by sunspot group 09 (NOAA 9601), which developed a beta-gamma-delta magnetic configuration with about 60 spots and produced several M-class flares. When group 09 reached the edge of the visible disk, a new complex of two active neighbouring regions appeared, Catania groups 23 and 25 (NOAA 9607 and 9608), both with a beta-gamma magnetic configuration which produced a large number of flares, among which a M9.5 flare on Sept. 9. The activity became then predominantly moderate, with short periods of low and high activity essentially with isolated M-class flares. A filament eruption occurred on 11 September, accompanied by a halo CME. Catania Sunspot groups 25 (NOAA 9608) and 36 (NOAA9616) were the most active, the first one producing a M1.5/1N flare on Sept. 15 associated with a type II burst and a proton event and a M5.6/2N flare on Sept 16. The same groups produced also 4 M-flares on both September 17 and 18. The activity level then dropped somewhat, but there were still plenty of C-flares and a few isolated M-flares. New sunspot groups continued to appear, resulting in a strong increase in the sunspot numbers. The dominant sources of activity became then sunspot groups 48 (NOAA9628) and 53 (NOAA 9632) (linked by a complex of coronal loops). Several coronal mass ejections were recorded, of which partial or full halo events. Most of these events produced no notable activity on the Earth. Solar activity reached then high levels, with a X2.6/2b flare on Sept. 24, associated with a big tenflare (7500 sfu) a type IV radio burst, a fast full halo CME, and a major proton event at >10 Mev and >100 Mev produced by a magnetically complex region (Catania 53 - NOAA 9632), which started then to decay and reached the West limb at the end of the period. Catania region 48 (NOAA9628) also produced high activity, with a M7.6/1n/type II sweep - flare on Sept.25. A M3/2n flare occurred on Sept. 28 in Catania sunspot group 59 (NOAA9636) and was accompanied by type II/IV bursts and a partial-halo CME. During this month, both the Sunspot Number and the 10cm flux reached levels comparable to those of the past maximum period.

2. geomagnetic activity:

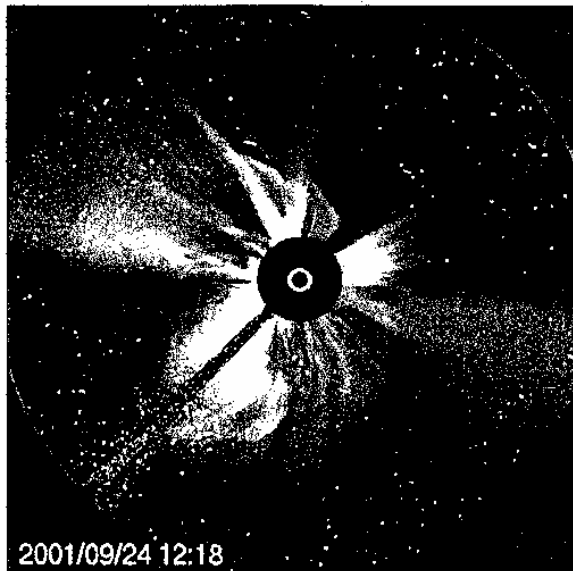
Geomagnetic conditions were unsettled in the beginning of the period due to coronal hole effects. Thereafter, conditions became quiet. Although several CMEs were observed, none of these had any significant effect on the geomagnetic environment. The geomagnetic field increased then to unsettled and active conditions on Sept. 11 and 12, due to coronal hole effects. On Sept. 13, the arrival of CME material induced minor storm conditions. The field remained active on Sept. 14 and 15, to decline to quiet to unsettled levels. On Sept. 23 the arrival of a CME front induced a minor geomagnetic storm. Active to major storm levels were observed on Sept. 25 after a CME arrival. The field decayed then to quiet to unsettled levels. Active to major storm levels were again attained on Sept.29 and 30 after the passage of two CMEs.

3. Noticeable events summary

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO	TYPE	Cat.	NOAA	NOTE
02	0554	0601	0614	S17W66	M1.3	1F					93	9591
02	0616	0624	0635	N16E18	M1.1	SF					09	9601
02	1341	1348	1354	S21W65	M3.0	2N	140				93	9591
03	0149	0158	0203		C9.0			II/2	III/3			CME
03	1545	1716	1737		M1.1						09	9601
03	1821	1841	1910		M2.5		300	II/1	V/3			
04	1853	1925	1937		M1.0			III/1				
04	2012	2017	2022	S19E45	M1.8	1N					21	9606
04	2153	2159	2205	N15W23	M3.7	1N	320	III/1			09	9601
05	1425	1432	1434	N15W31	M6.0	2B	800	III/3			09	9601
05	1903	1913	1922	S16E35	M1.3	1N	68				21	9606
05	2223	2233	2246	S25E67	M2.2	SF	24				26	9608
07	1526	1538	1542	N19W65	M1.2	1F	41	IV/1			09	9601
08	0438	0457	0507	S28E50	M1.2	SF		III/1			25	9608
08	1900	1923	1946	N08W74	M1.1	SF					09	9601
09	0232	0240	0247	S24E26	M1.9	2B	65				25	9608
09	0955	1001	1006	S31E30	M1.0	SF					25	9608
09	1510	1516	1521	S17E03	M3.4	1N	340	III/1-II/2			27	9607
09	1523	1526	1528	S32E22	M2.2	SN					25	9608

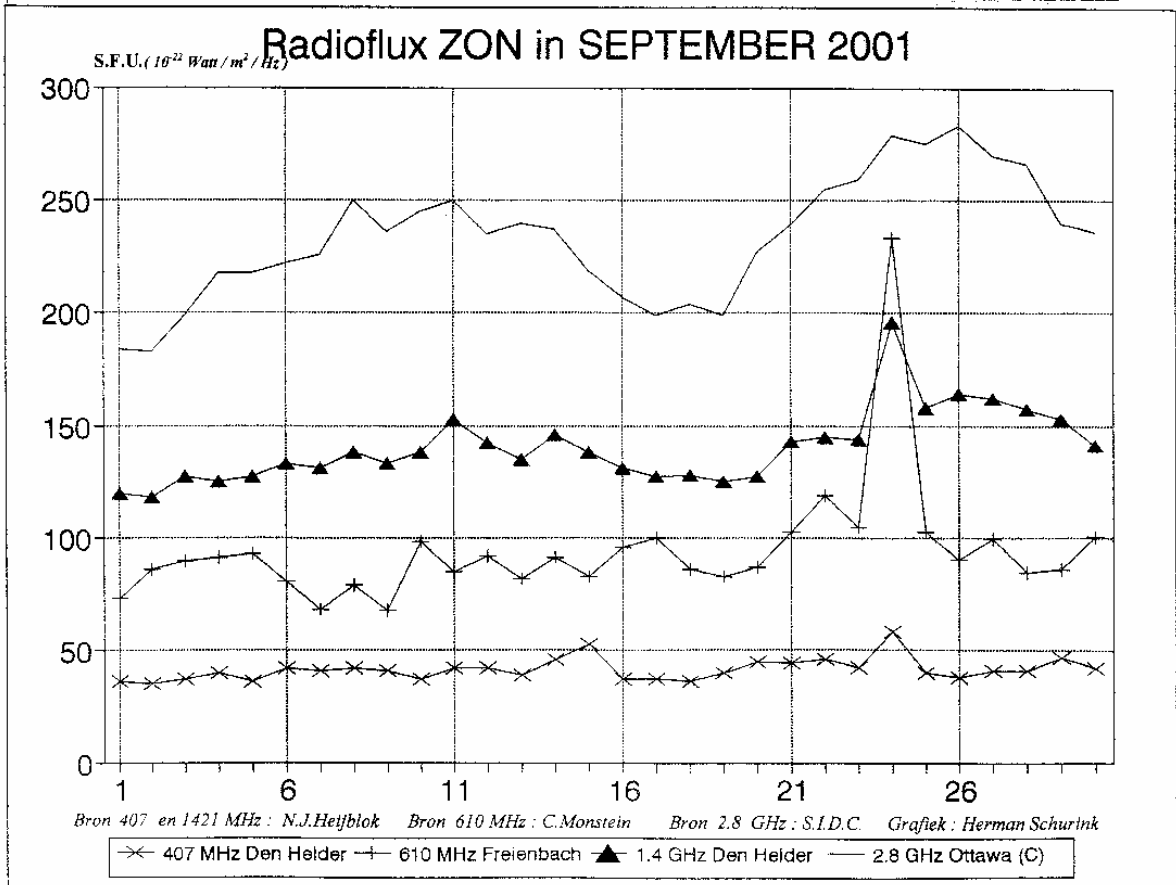
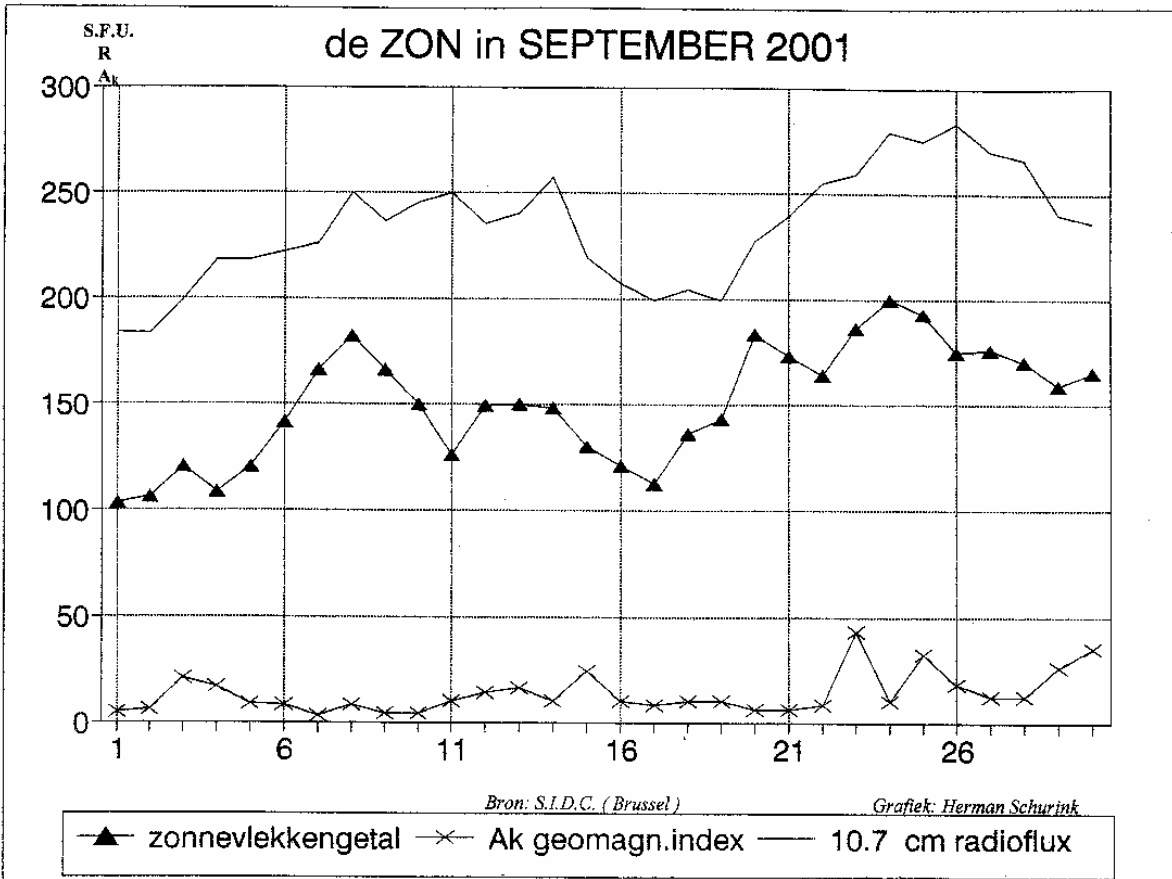
09	1824	1841	1921	S26E24	M2.0	2B	36		25	9608
09	2040	2045	2048	S31E26	M9.5	2N	510		25	9608
10	0512	0516	0518	S24E13	C8.7	1N	120		25	9608
11	0028	0033	0037	S28E09	C9.5	SF			25	9608
11	0049	0111	0123		M2.6		86	V/3-III/3	25	9608
11	0653	0704	0722		M1.2			III/1		
11	2025	2036	2043	S12E88	M4.5	SF	26	III/2	36	9616
12	0435	0444	0452		M1.0			III/1		
12	2105	2149	2211		C9.6			II/1		
13	1557	1602	1604	S15W11	C7.0	sn	56	III/1-II/1	29	9610
13	1948	1951	1954	S15W11	C5.8		53	III/1-II/1	23	9607
14	2141	2150	2200		M3.7		920	III/2	36	9616
15	1104	1128	1154	S21W49	M1.5	1N	99	II/1	25	9608
15	1544	1559	1610	S13E27	M1.3	1F	140	III/1,V/1	36	9616
16	0339	0353	0418	S29W54	M5.6	2N	41	III/1	25	9608
17	0818	0825	0834	S14E04	M1.5	2N	460	II/3 III/3	36	9616
17	1544	1550	1554	S32W73	M8.1	1N	380	III/1	25	9608
17	2101	2108	2111	S11W06	M1.0	1N	110	II/2 III/2	36	9616
17	2132	2146	2155	S31W73	M1.0	2N			25	9608
18	0002	0008	0015	S32W78	M1.4	SF	230	III/3	25	9608
18	1531	1538	1543	N15E49	M1.3	1F	99	III/2	40	9620
18	1549	1552	1554		M1.0		32			
18	1702	1707	1709	S18E85	M1.4	SF	95		48	9628
20	1812	1817	1821	N09W11	M1.5	SN	98	III/1	51	9631
23	1131	1137	1143	S18E40	M1.1	SN			53	9632
24	0932	1038	1109	S16E23	X2.6	2B	500	III/2,IV/1	53	9632 full halo CME,proton ev.
25	0143	0148	0154	S14E03	M1.1	SF	53	III/2	48	9628
25	0424	0440	0452	S18E01	M7.6	1N	190	II/2	48	9628
25	1018	1027	1031	S16E03	M2.0	1N	38		48	9628
26	0252	0258	0303		M1.8		40	V/3-III/3		
27	0855	1213	1406		M1.0					maybe from Cat.48 (AR9628)
27	0854			SWlimb						partial halo CME
28	0810	0830	0910	N10E18	M3.3	2N	150	II/3-IV/2	59	9636
28	0934	1014	1050	S17W24	M2.4	SF	240		53	9632
28	1918	1926	2005	S18E22	M1.0	1F			60	9637
28	2115	2125	2134	N13E11	M1.2	1F	50		58	9637
29	1019	1106	1148	N13E03	M1.8	1F			58	9637
30	1131	1141	1219	S20W75	M1.0	SF			48	9628
30	2129	2136	2145		M1.2					

4. Image of the month: the X2.6 flare of Sept. 24, 10:38 UT.



Left: EIT- 195 images of the active region: *top:* before the flare; *middle:* around the maximum of the flare; *Bottom:* post-flare loop activity.

Right: LASCO - C3 image of the full-halo CME associated with the flare; several proton impacts on the CCD from the high energy proton event that followed the flare can be seen on this image.





Bulletin Werkgroep Zon

Oktober 2001

Waarnemingsleider: Nico Heijblok, Wezenstraat 70, 1781 GM Den Helder
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Zonnevlekgetallen (Sunspot numbers)

Day	Bals	Gort	Gr80	Gr60	Gr00	Jn 9	Jn40	Kroe	Slo	Son	Spa	Wig	Zans					
1																		
2																		
3	183	110				80				180		128	138					
4	175	101	185			68				133	147	141	128	155				
5	175	108	151	132		79				151		155	128	139				
6	128					67				123	113	119	103	118				
7						100	48			97	101	136	106					
8						73	36			105	81	75	78	88				
9						47				72			76					
10	134	88				77	37	49	76	109			92					
11											84							
12	111	175				69				128			172	132				
13	142	136				61				133	150		137	136				
14	180	134				36				107	131	89	171	103				
15	207	97				114	39			118	179	130	157	129	128			
16	168	129				116	75	73	128	152			144	135	145			
17	180					148	87			156			142	161	153			
18	198					66				136	153	173						
19	230					102				187			190	160				
20	213					87				182	183		172	182				
21																		
22						145	83			140			156					
23																		
24										147								
25						101				208			215	200				
26	203					165	100	101		189			188					
27						147	90						208	164	184			
28						135	182	136	78				107	161	106	176	153	164
29						129												
30	142	88				75	45			60	71		112	84	90			
31						111				88	48	49		115				
observ	15	13	6	13	25	6	7	23	9	16	22	17						
k	0.71	1.14	0.78	1.03	1.91	1.75	1.15	0.89	1.04	0.82	0.83	0.90						
sdw	0.06	0.17	0.06	0.15	0.45	0.19	0.33	0.16	0.22	0.10	0.12	0.11						
sd/r	0.06	0.15	0.07	0.14	0.24	0.11	0.28	0.18	0.22	0.12	0.13	0.12						

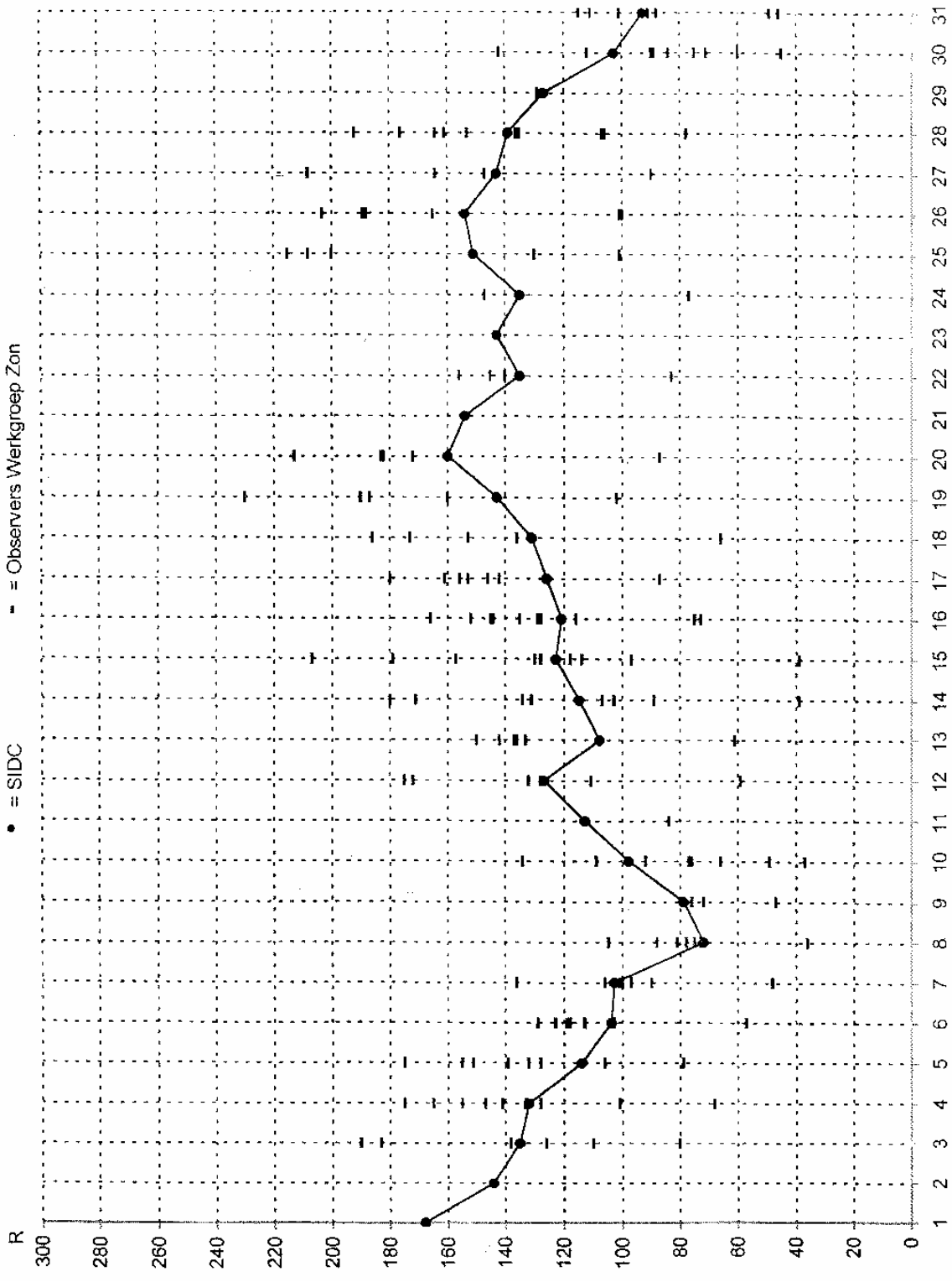
Urcde	Grouped spots
12	43
19	82
12	38
13	48
11	48
8	20
6	19
9	32
12	33
12	57
11	68
11	74
10	91
9	40
12	50
13	68
13	109
12	111
12	96
13	75
12	86
6	61
5	44
5	52

Observers
 Bals = H.A.M. Balster [70]
 Gort = E. Gort [90]
 Gr 80 = M.W.G. Gravers [80]
 Groe = A. Groenewegen [102]
 Jn 9 = D. Jannink [9]
 Jn40 = D. Jannink [40]
 Kroe = K. Kroesen [102]
 vSlo = B. van Slooten [80]
 [Rf...] = Reflector, d = ... mm
 Son = A.T. Son [Rf 150 Kutler]
 Spa = T. Spaninks [75]
 Wig = G. Wigmant [80]
 Zans = W. Zansstra [Rf 155]

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

Date	R ₁	PPSI	600	2800	COS	SFI	XI	AK	SEA
30	1.65	231	71	236	79E	21	2/0	3>	
1	1.68	305	69	217	807	5	2/0	3>	
2	1.44	269	59	201	791	5	2/0	4/	
3	1.35	204	70	192	803	18	0/0	47	
4	1.32	97	66	187	808	6	0/0	17	
5	1.14	81	63	177	824	15	0/0	8	
6	1.04	80	65	180	827	11	1/0	7	
7	1.03	87	64	173	826	4	0/0	4	
8	0.72	59	58	171	829	0	0/0	10	
9	0.79	54	61	176	815	10.6	1/0	1.6	
10	0.98	55	62	179	847	7	0/0	0	
11	1.13	80	62	175	855	4	0/0	19	
12	1.27	106	64	179	806	10	0/0	25	
13	1.08	127	66	180	814	4	0/0	12	
14	1.15	164	68	192	826	4	0/0	17	
15	1.23	181	68	193	834	6	0/0	11	
16	1.21	200	66	207	838	2	0/0	9	
17	1.26	219	68	217	843	6	1/0	5	
18	1.31	202	69	229	850	25	0/0	5	
19	1.43	249	76	298	856	26.3	6/2	11	
20	1.60	339	73	245	857	5	0/0	14	
21	1.54	224	100	224	855	107	2/0	51	
22	1.35	223	81	233	821	221	2/1	75	
23	1.45	211	68	226	934	39	2/0	16	
24	1.35	211	71	239	844	17	0/0	2	
25	1.51	211	70	239	844	13	0/1	9	
26	1.54	249	100	237	843	10	2/0	6	
27	1.43	301	12	247	847	18	0/0	6	
28	1.39	267	14	227	831	38	1/0	33	
29	1.27	290	11	216	834	60	5/0	16	
30	1.03	304	11	226	840	41	1/0	8	
31	0.93	309	12	221	846	16	3/0	13	

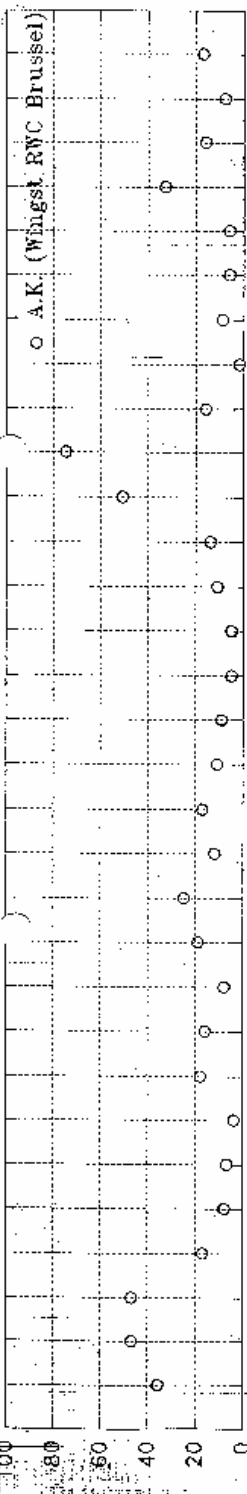
R₁: provisional international sunspot numbers from the S.I.D.C.
 PPSI: prompt photoelectric sunspot index from the S.I.D.C. in 10⁻⁵ w/m²; the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.
 600: 600 MHz solar flux from the station at Himaan (Belgium).
 2800: 2800 MHz solar flux from Ottawa (origin: Ursigrama - UGEOI). The 10.7cm Flux data are a service of the National Research Council of Canada.
 COS: thousands of the cosmic ray counts (origin: Ursigrama - UCOSE Terre Adélie).
 SFI: From October 1992, Solar Flare Index from the S.I.D.C. (origin: Ursigrama - UGEOR).
 XI: X-flares index from the Ursigrama (M-flares/X-flares) (origin: Ursigrama - UGEOR, UGEOI).
 AK: geomagnetic index from Wings, Germany (origin: Ursigrama).
 SEA: sudden enhancements of atmospheres from Uccle & Humaan (Royal Observatory, Belgium).
 Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.



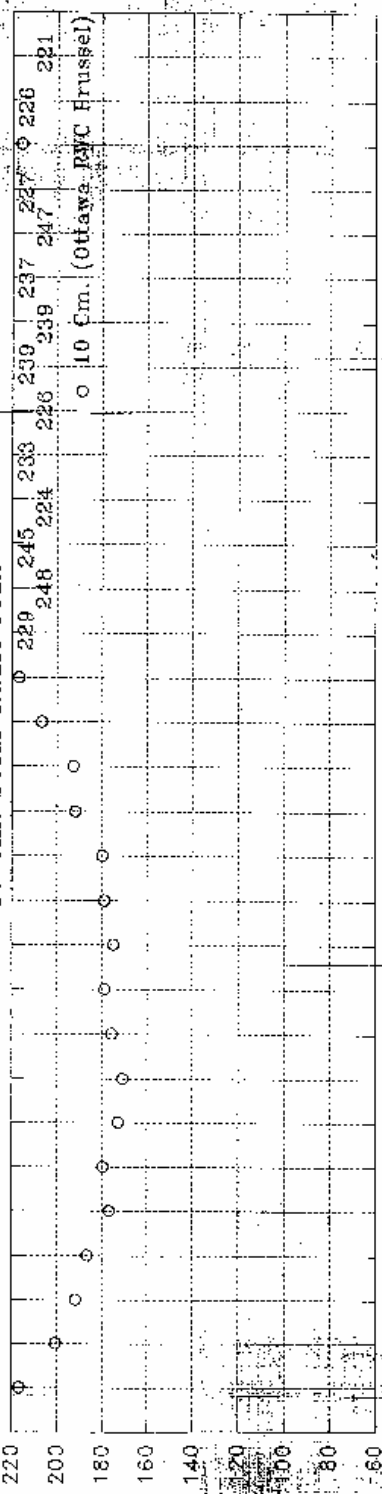
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OKTOBER 2001

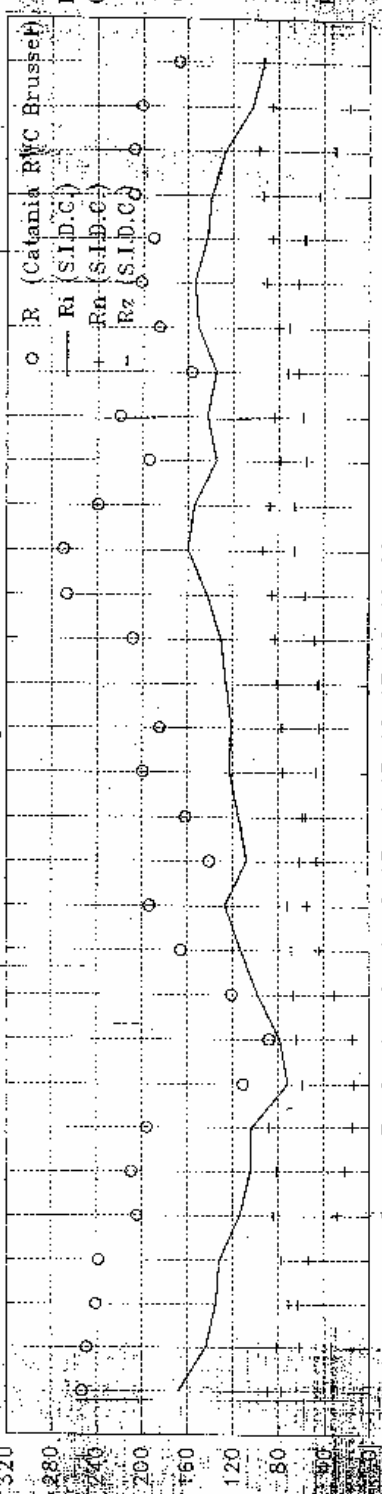
Geomagnetic A.K. Index



10 Cm. Solar Radio Flux



Relative Sunspot Numbers



Rimx 168
Okt. 1
Rimn 72
Okt. 6

Rimx 168
Rimn 72

Zonnevlekgetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

Oktober 2001

Day	S.I.D.C.		Balster		Groenew		Jannink 4		v. Slooten		Son		Spaninks		Wigman		Zanstra	
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	90	78																
2	82	62																
3	72	63	80	103			34	46	96	94					58	68	78	60
4	54	78	65	110					50	83	44	103	52	89	41	87	65	90
5	29	85	42	133	50	82			36	115			39	116	38	100	36	103
6	22	82	13	116					24	99	22	91	26	93	11	92	11	107
7	15	88			23	77			11	86	0	101	22	114	11	95		
8	13	59			11	62			22	59			12	63	11	67	11	77
9	15	64							12	60					11	65		
10	31	67	37	97	11	66	11	38	36	73					23	69		
11	44	69									26	58						
12	55	72							58	70					86	86	63	69
13	46	62	66	76					54	79	47	103			65	72	58	78
14	59	56	96	84					67	64	89	0	113	58			50	53
15	76	47	129	78	86	28			111	68	76	54	106	51	77	51	78	50
16	77	44	111	55	81	35	49	24	90	62			102	42	89	46	96	49
17	81	45	120	60	102	44			102	54			93	49	107	54	89	64
18	83	48	119	67									94	42	98	55	101	72
19	86	57	126	104					98	89			99	91	105	55		
20	94	66	122	91					112	70	23	160			98	74	112	70
21	88	66																
22	79	56			93	52			83	57					93	63		
23	84	59																
24	63	72							74	73								
25	80	71							102	106			107	108	105	95		
26	91	63	122	81	105	60	54	47	105	84			106	82				
27	86	57			84	63							144	64	110	54	89	75
28	94	45			95	41			114	47	51	55	130	46	104	49	108	56
29	97	30																
30	86	17	131	11	75	0			71	0			90	22	84	0	90	0
31	93	0			88	0	49	0	115	0					101	0	91	0

SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

1. solar activity:

Solar activity varied this month from very low to high levels. It started at high levels, with a long-duration M9 flare on Oct. 1 0515 near Cat region 48 (NOAA 9628), associated with a full-halo CME and a long duration proton event at >10 MeV which dropped below the threshold only by Oct. 5. Solar activity decreased then to moderate levels on Oct. 1 and 2 with 3 M -flares, dropped and remained at low to very low level until roughly the middle of the month, except for a M2 flare on Oct. 6 which produced a CME and a M1.4 flare from Catania sunspot group 82 (NOAA 9653) on Oct 9, with full halo CME.

The activity became then moderate, and very high on Oct. 19 when two successive X flares took place in active region Catania 01 (NOAA9661), associated both to halo CMEs, as well as several M flares in AR Catania 93 (NOAA9658). When these regions disappeared at the West limb, a new region, Catania 15 (NOAA9672), showed growth in complexity. Solar activity became then strongly variable, with relatively quiet days interspersed in periods of high activity. Highly complex magnetic fields were present all the time. High activity was observed on Oct 22 and the early hours of Oct 23 with 4 M-flares and an X-flare, nearly all from the large, complex sunspot group Catania 15 (NOAA 9672) and a minor proton event. After a day-and-a-half of quiet, this group produced another X-flare on Oct 25. The latter, as well as some of the previous events, produced a clear full halo CME. Towards the end of the period, sunspot group 15 quietened down, and Catania group 26 (NOAA9682) became the dominant centre of activity event. This region produced several M-class flares, among which a M3/1F associated with a type II burst on Oct 29.

2. geomagnetic activity:

Geomagnetic activity was highly variable during this month. It started at major storm levels due to a CME arrival on the first day. The field remained at active to minor storm levels increasing again to major storm levels on Oct. 3, likely due to the passage of CME material associated with activity at the S-W limb of the sun. The activity dropped then slowly to quiet to unsettled levels. On Oct 11, the shock front of the Oct 9 halo CME arrived near Earth, which caused minor storm conditions persisting until Oct 12. After that, the geomagnetic field became quiet to unsettled with a brief active period on Oct. 15.

On October 21, a shock recorded in the solar wind by ACE at 16:10UT initiated a major storm (Kp=6-8) at about 16:50UT. This storm, which resulted from the arrival of the first CME which left the Sun on October 19, lasted for more than one day, and produced auroras observed in Europe at middle latitude, in particular in Belgium and even in the south of France. Then followed a few days of quiet conditions, but the arrival of another shock on Oct 28 (caused by the halo CME associated with the X1.3 flare of Oct 23) started another geomagnetic storm. The geomagnetic dropped then at quiet to active levels until Oct 31 evening, when it reached minor storm levels due to the arrival of a new shock.

3. Noticeable events summary

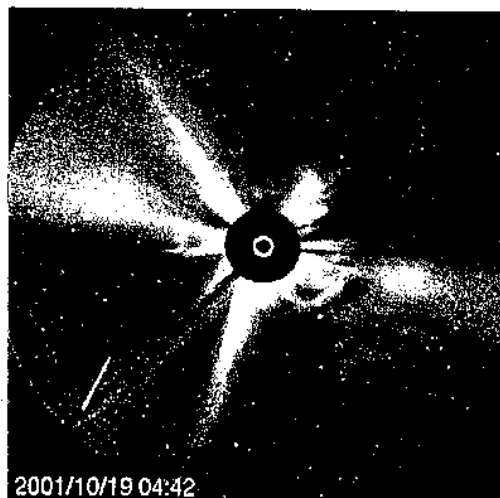
DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO	TYPE	Cat.	NOAA	NOTE
01	0441	0515	0523		M9.1		69			48	9628	CME
01	2340	2345	2351	S16W86	M1.2	SF				53	9632	
02	1012	1021	1057		M1.4			III/1				
02	1123	1127	1132	S15E17	M1.0	SF	28	III/2		64	9641	
03	0639	0643	0646	N19W46	C6.1	SF		III/3, II/1		59	9636	
06	0519	0525	0533		M2.8		35	V/3, III/1				
09	1046	1113	1149	S28E08	M1.4	2F		II/2 IV/2		82	9653	halo CME
17	1116	1123	1128	S17W22	M1.1	SF	43			93	9658	
19	0047	0105	0113	N16W18	X1.6	2B	1400	II/3		01	9661	full-halo CME
19	0220	0232	0246		M1.2							
19	0252	0258	0303	N16E17	M1.4	SF	21	III/2		14	9671	
19	0314	0316	0318		M1.0							
19	0635	0645	0653		M1.3					93	9658	
19	0656	0700	0704	N13W30	C8.9	1F	25			01	9661	
19	0935	0943	0955	S14W47	M5.7	1B	370			93	9658	partial-halo CME
19	1613	1630	1643	N15W29	X1.6	2B	720	IV/2		01	9661	halo CME
19	2314	2325	2333	S17W57	M3.3	1F	170			93	9658	
21	0509	0518	0527		M1.3		43					

21	1112	1136	1148	N13W56	M2.5	2N	100		01	9661	
22	0022	0040	0048		M1.0	SF		III/1	93	9658	CME
22	1427	1508	1531	S21E18	M6.7	2N	380	II/2 III/2	15	9672	full-halo CME
22	1744	1759	1814	S18E16	X1.2	2B	790	II/1 III/1	15	9672	
23	0014	0023	0042	S18E11	M1.3	SN	94	III/1	15	9672	
23	0211	0223	0234	S18E11	M6.5	1B	66		15	9672	
25	1442	1502	1528	S16W21	X1.3	2B	540	II/1	15	9672	full-halo CME
26	0952	1004	1013		M1.6						
26	1428	1435	1437	N07E16	M2.0	SN	130	III/3 V/3	22	9678	
28	0436	0450	0458	N12E40	M1.3	1F			26	9682	
28	0949	1000	1005		M1.5						
28	1645	1651	1653	N13E31	M1.4	1N			26	9682	
29	0152	0159	0207		M1.3						
29	0807	0811	0817	S18W82	M1.0	1F		III/2	15	9672	
29	1056	1113	1119	N12E25	M3.6	1F	58	III/1, II/1	26	9682	CME
29	1130	1133	1137	N12E23	M1.6	1N	26		26	9682	
29	1627	1634	1637	N16E23	C8.7	1N	110		26	9682	
29	2349	2358	0008		M1.5				26	9682	
30	0830	0836	0920	N12E11	M3.3	1N			26	9682	

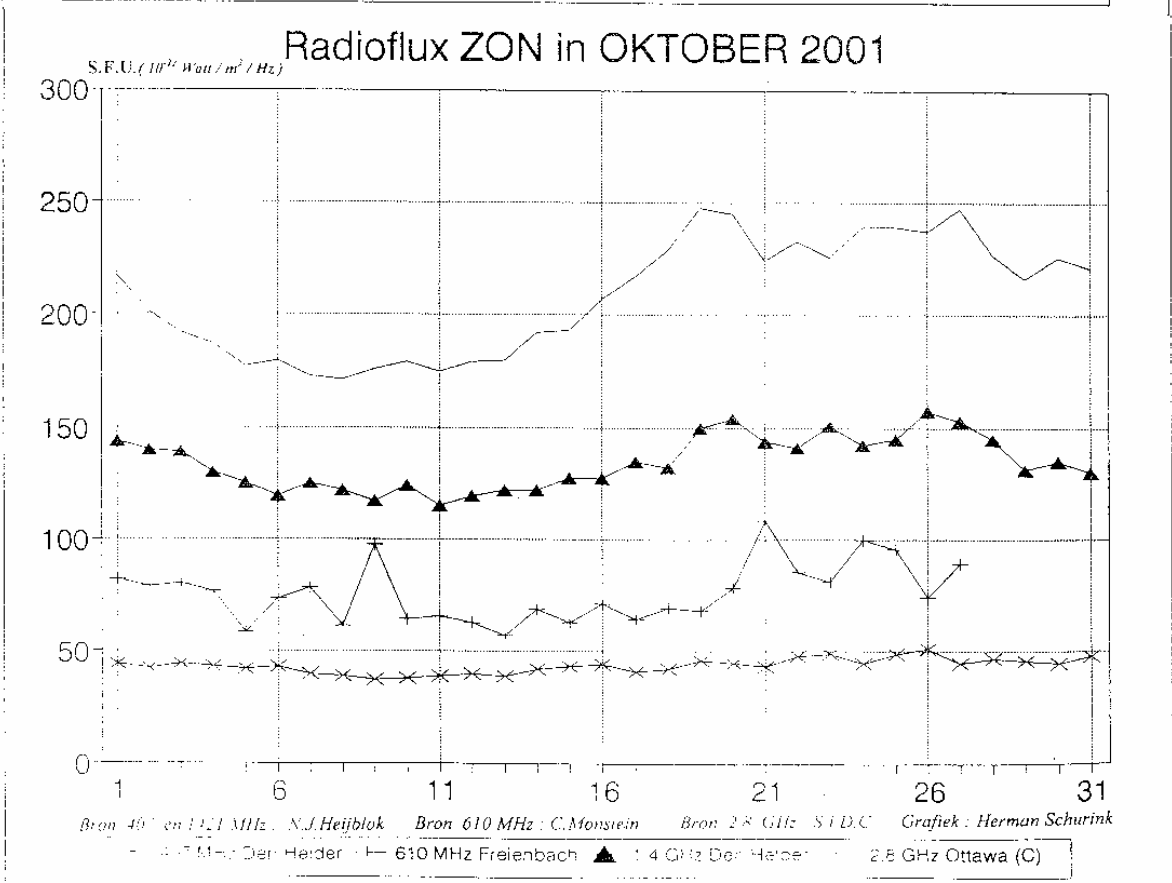
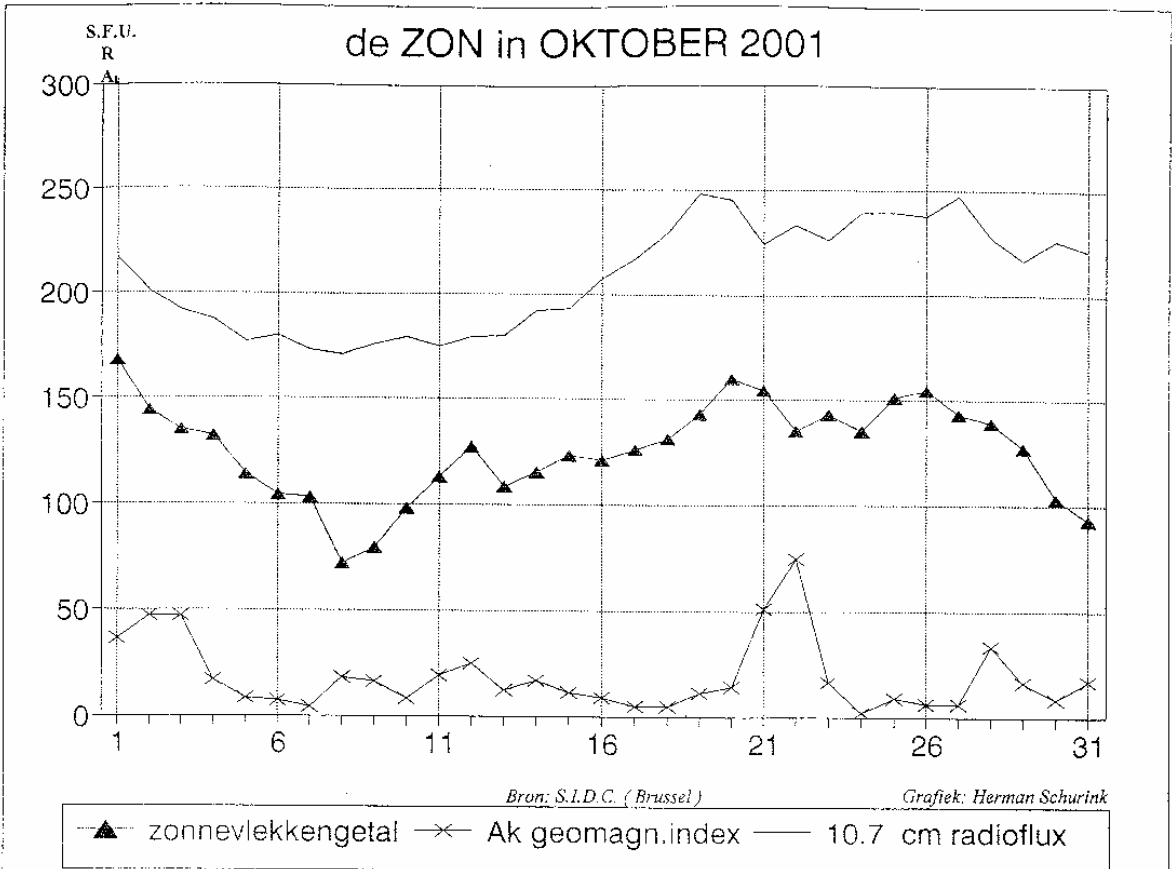
4. Event of the month : the CME of October 19 and the aurora seen in Belgium on October 21



Photo: Demoulin (Melreux-Hotton)



Source: LASCO SOHO





Bulletin Werkgroep Zon November 2001

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tel: 0223-624130

Zonnevlekkengetallen (Sunspot numbers)

SIDC	Day	Bals	Gort	Gr60	Groel	Jun 9	Jm40	Kroetv	Sloc	Sen	Spa	Wig	Zans
96	1	144		105	56		116					119	106
100	2	182	78	134	104	55	122	131	139	139	125		
100	3				62							58	
111	4		82					116	135			45	
130	5	226	118	141	79	83	178					84	
140	6				80								
123	7												
152	8	208		165	91							88	
149	9	231	216	144	92		179					116	178
149	10	219	105	151	86		189	210	185	176	147		
145	11												
121	12												
118	13				87	89	154					145	125
118	14	169	94	119	85		86	178	139	119	122	14	68
117	15	143		117	86		134					12	71
90	16												104
86	17				89								
92	18											7	28
81	19				96							7	39
87	20												
80	21				49	49	86					6	37
87	22												
80	23	100	67		59		102				131	105	
67	24												
73	25												
84	26												
76	27	110		74	41	38	90					86	75
107	28	123	91	123	73		123					107	133
115	29												
121	30												
observ	11	7	2	11	18	4	1	13	3	5	11		
k	0.70	1.32	0.72	0.95	1.61	1.63	1.20	0.82	0.81	0.76	0.85	0.93	
st dev	0.10	0.23	0.04	0.06	0.25	0.28		0.07	0.13	0.10	0.09	0.10	
st d./k	0.14	0.18	0.06	0.07	0.16	0.17		0.09	0.16	0.13	0.10	0.11	

Uccle	groups	spots
6	88	
6	58	
7	45	
11	84	
12	88	
11	116	
13	99	
10	61	
14	68	
12	71	
7	28	
7	39	
6	37	
7	36	
5	41	
10	81	

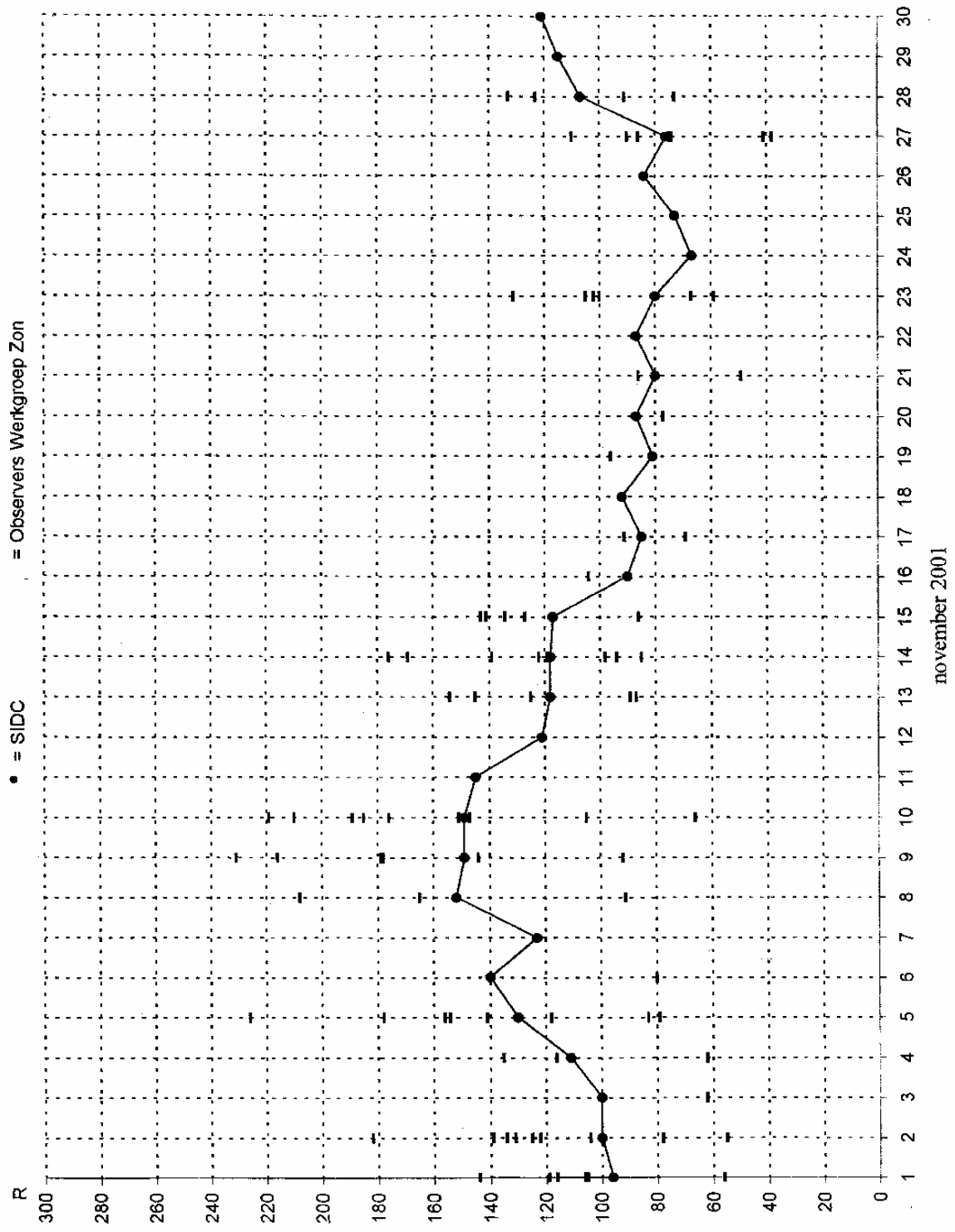
Observers	[...]	= Refractor, d = ... mm	[R...]	= Reflector, d = ... mm	
Bals	= H.A.M. Balster [70]	Jun 9	= D. Jannink [9]	Son	= A.T. Son [R1 150 Kutter]
Gort	= E. Gorter [80]	Jm40	= D. Jannink [40]	Spa	= T. Spantinks [75]
Gr60	= M.w.G. Gravens [80]	Kroe	= K. Krossen [102]	Wig	= G. Wigman [80]
Zans	= W. Zanstra [R1 155]	Zans	= W. Zanstra [R1 155]	Zans	= W. Zanstra [R1 155]

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

Date	R ₁	PPSI	600	COG	SFTI	XI	AK	SEA
31	93	309	72	221	846	16	3/0	17
1	96	262	78	236	853	27	5/0	20
2	100	248	77	214	856	10	1/0	5
3	100	228	70	216	861	15	0/0	2
4	111	189	74	227	871	122	0/1	4
5	130	187	70	235	872	17	4/0	24
6	140	163	71	237	814	19	4/0	32
7	123	159	73	269	816	35	5/0	19
8	152	199	80	248	835	132	4/0	5
9	149	164	77	271	842	137	5/0	6
10	149	237	71	246	849	14	2/0	9
11	145	305	77	234	861	20	1/0	7
12	121	258	70	227	862	18	1/0	4
13	118	224	69	232	860	10	1/0	4
14	118	165	72	217	859	29	1/0	4
15	117	168	77	207	865	6	0/0	12
16	90	164	73	202	862	10	0/0	8
17	85	178	73	199	866	16	1/0	16
18	92	168	69	188	874	6	0/0	12
19	81	183	66	191	877	6	0/0	23
20	87	182	66	185	864	4	0/0	7
21	80	160	72	184	863	13	0/0	4
22	87	132	64	190	859	117	3/0	9
23	80	90	61	177	853	2	0/0	12
24	67	67	61	173	825	49	0/0	88
25	73	51	61	170	800	15	0/1	8
26	84	69	63	175	826	5	0/0	4
27	76	85	38	190	843	29	1/0	2
28	107	212	63	199	858	44	1/0	2
29	115	245	66	216	865	35	2/0	3
30	121	316	63	226	867	19	3/0	2

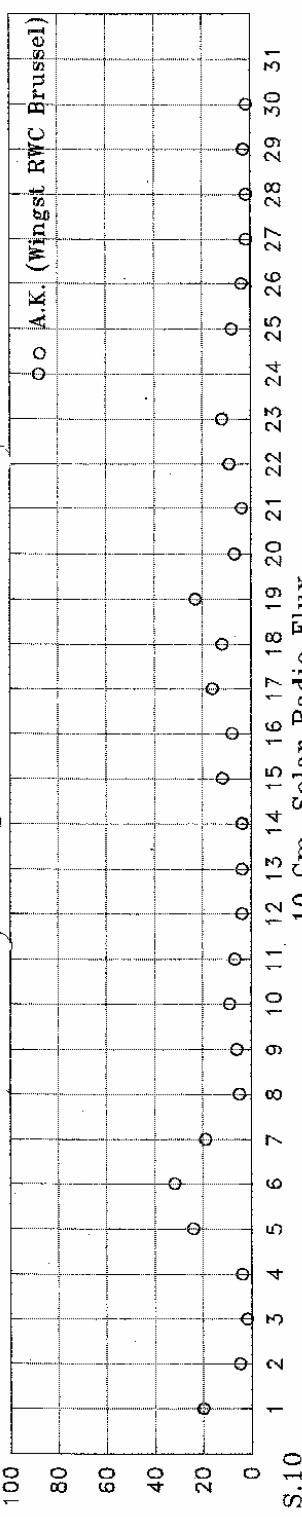
R₁: provisional international sunspot numbers from the S.I.D.C.
PPSI: prompt photometric sunspot index from the S.I.D.C. in 10⁻⁵ w/m²; the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.
600: 600 Mhz solar flux from the station at Humain (Belgium).
2800: 2800 Mhz solar flux from Ottawa (origin: Ursigrams - UGBO). The 10.7cm Flux data are a service of the National Research Council of Canada.
COG: thousands of the cosmic ray counts (origin: Ursigrams - UCOSE Terre Adelle).
SFTI: From October 1992, Solar Flare Index from the S.I.D.C. (origin: Ursigrams - UGEOR, evaluation: 1 x Sp+10 x r₁+100 x r₂+1st).
XI: X-flares index from the Ursigrams (M-flares/X-flares) (origin: Ursigrams - UGEOR, UGBO).
AK: geomagnetic index from Wingat, Germany (origin: Ursigrams).
SEA: sudden enhancements of atmospheres from Uccle & Humain (Royal Observatory, Belgium).

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

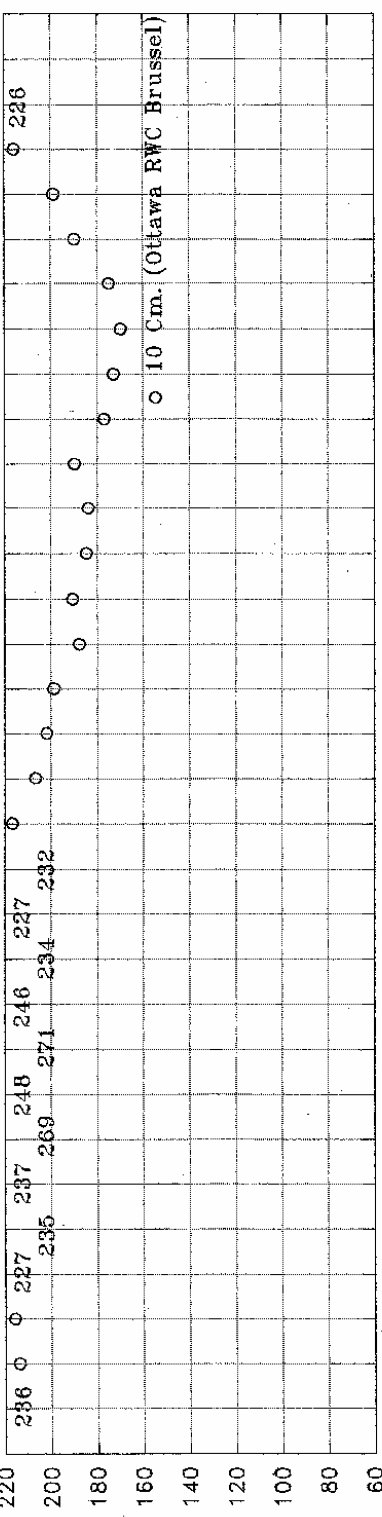


Geomagnetic A.K. Index

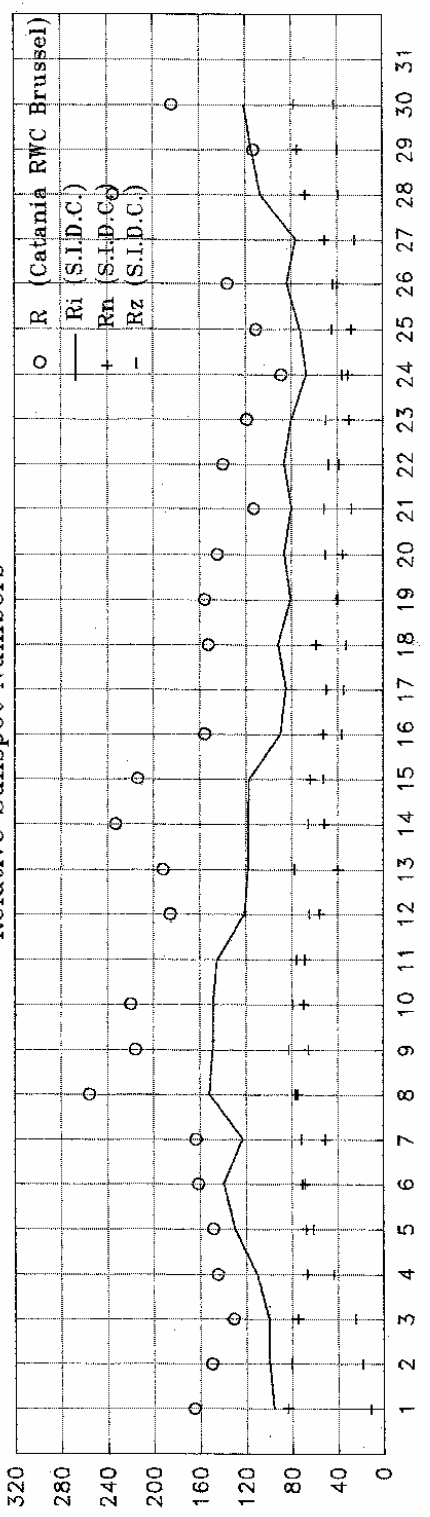
A.K.



10 Cm. Solar Radio Flux



Relative Sunspot Numbers



Rimx 152
Nov. 8
Rimn 67
Nov. 24

Rigem.
106,5

SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

1. Solar activity:

Solar activity reached high levels during significant parts of November. On the first days, the complex region Catania 26 (NOAA 9682) produced still some M-class flares, among which a M1 flare on Nov 1, associated with a partial halo CME. The dominant regions became then Catania regions 34 (NOAA9687) which produced several M-flares, and 31 (NOAA9684), responsible for a big X1/3B flare on Nov 4 associated with a full halo CME and a proton event in all energy bands which increased till Nov 6 and was sustained by two subsequent M-flares. This last sunspot group continued then to produce several M-flares, among which a M9.1/1N flare associated with type II and III bursts on Nov 8. However, the dominant group at that time was the complex Catania 38 region (NOAA9690), which produced 15 M-flares in 6 days (since Nov 6), with the largest (M5.7/1N) occurring on Nov 7. The solar activity stayed then at moderate levels for several days, with isolated M-flares, the largest being an M2.8/1N on Nov 17 from Catania sunspot group 72 (NOAA 9704), with an associated halo CME and a slowly increasing greater than 10 MeV proton event which reached the threshold on Nov 19 and ended on Nov. 20. This region remained the most active, but produced only several C-class flares of which the most significant was a long duration C4 which occurred on Nov 21, accompanied by a filament eruption with full halo CME. Solar activity became then moderate, with a M3/2B flare on Nov. 22, from the "old" region Cat 48 (NOAA 9698), which had shown no more activity during the 10 preceding days. This event was accompanied by a fast full halo CME and an energetic proton event in all energy bands. A second important flare (M9.9/2B) occurred the same day 3 hours later, that one issued from Catania region 72 (NOAA 9704), associated also with a fast full-halo CME. This region remained quite active with a X1 flare on Nov 25. The activity then decreased to low levels. At that time, Catania region 75 (NOAA 9715) became the most active and produced several minor flares, while increasing in complexity. Later, several M-class flares, of which 3 had associated halo CMEs (Nov. 28 and 29), were produced by this region. The activity remained high until the end of the period

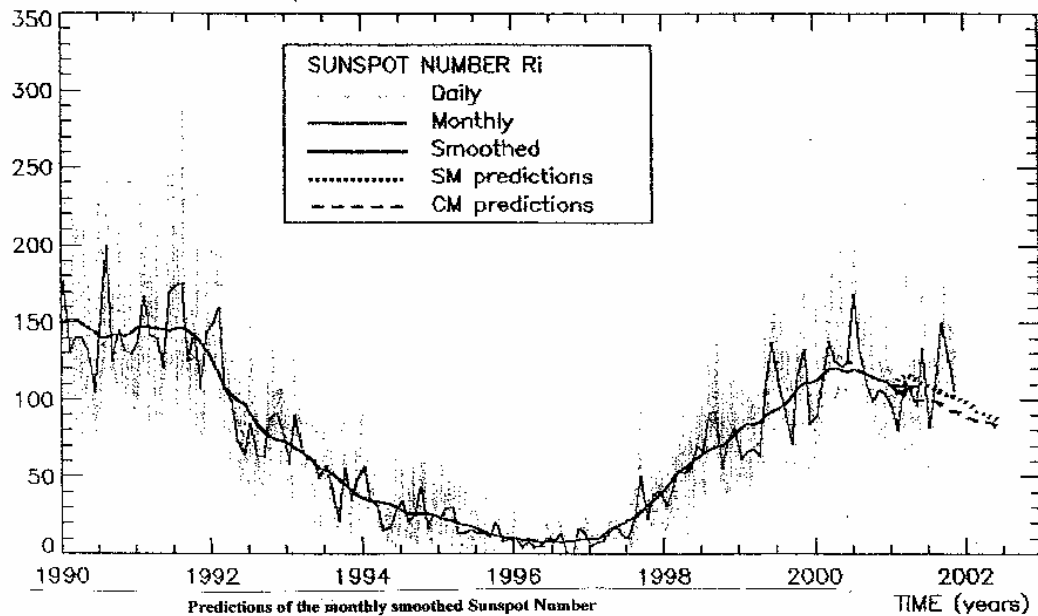
2. Geomagnetic activity:

The geomagnetic field started at quiet to unsettled levels to reach on Nov 5 minor storm levels. The shock wave from the full halo CME that left the Sun on Nov 4 caused a severe geomagnetic storm in the first 6 hours of Nov 6, with the Wingst Kp index reaching a maximum of 9. Auroral displays were seen in Northern America as far south as Florida. The geomagnetic field remained at quiet to unsettled levels from Nov 8 onwards. After the arrival of a small shock on Nov 15, unsettled to minor storm levels were observed. The geomagnetic field remained then quiet until Nov. 20, when a CME passage pushed it to active conditions. It dropped then again to quiet to unsettled levels before reaching severe storm activity on Nov. 24, due to the combined action of three CME (one on 21 and two on 22). The particularly short time of propagation of the last of these CME may be noted. The field remained then at quiet to unsettled levels.

3. Noticeable events summary

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO	TYPE	Cat.	NOAA	NOTE
01	0645	0653	0700	N07W62	M1.3	SF				22	9678	
01	1125	1210	1308	S20E77	M3.3	SF				34	9687	
01	1351	1503	1537	S19E77	M1.7	SF	480	III/1		34	9687	
01	1950	1958	2007	S18E69	M1.7	SF				34	9687	
01	2138	2352	2359	N12W23	M1.1	1F	34	III/3		26	9682	
02	0742	0809	0845	S20E71	M1.1	SF				34	9687	
04	1603	1620	1657	N06W18	X1.0	3B	1900	II/2, IV/1		31	9684	full-halo CME, proton event
05	0247	0250	0253	S20E34	M1.7	SF	29			34	9687	
05	0907	0915	0922	N02W37	M2.1	1N				31	9684	
06	0256	0300	0303	S19E10	M2.0	1B	160	III/1		34	9687	
06	1345	1351	1405	S17E05	M1.2	SF	91			34	9687	
06	1507	1549	1708	S18E64	M1.1	SF				38	9690	
07	0139	0146	0152	S18E54	M1.1	SF				38	9690	
07	0437	0444	0450	S19E50	M1.4	1N				38	9690	
07	0927	0933	0939	S18E58	M2.0	SF				38	9690	
07	1930	2001	2026	S17E44	M5.7	1N	62			38	9690	

07	2231	2237	2249	S18E41	M1.0	SF			38	9690
08	0659	0704	0706	S19W19	M9.1	1N	460	III/3,II/3	34	9687
08	1213	1229	1252	S17E36	M1.3	SF		III/1	38	9690
08	1356	1409	1420		M1.4					
08	1459	1535	1600	S17E36	M4.2	2F	39	III/1	38	9690
09	0119	0133	0149	S19E27	M1.6	1F		III/1	38	9690
09	0520	0539	0548	S18E25	M3.1	1F			38	9690
09	0623	0629	0632	S17E24	M1.0	SF			38	9690
09	0841	0856	0908	S18E26	M3.3	1N	22		38	9690
09	0916	0943	1001		M3.0		26			
09	1823	1841	1924	S21W42	M1.9	SF	88	II/1 IV/1	34	9687
10	0042	0050	0058	S17E22	M1.0	SF			38	9690
10	1947	2000	2009	S18E05	M2.3	1F			38	9690
11	1054	1103	1107	S17E05	M1.4	SF			38	9690
12	0752	0757	0801	N07W74	M1.6	1B			40	9692
13	0623	0626	0628	S17W24	M1.5	SN	180		38	9690
14	2143	2211	2234	S19W49	M1.9	1F	71		38	9690
17	0449	0525	0611	S13E42	M2.8	1N	150	II/1 IV/2	72	9704 halo CME
21	1207	1458	1650	S14W19	C4.7	SF			72	9704 full-halo CME
22	1700	1708	1803	S18W33	M1.2	1F			72	9704
22	2018	2036	2052	S25W67	M3.8	2B	630	II/3,III/1	48	9698 full-halo CME, proton event
22	2158	2215	2228		C5.9		9700	III/1	72	9704
22	2232	2330	0006		M9.9			II/1,IV/2	72	9704 full-halo CME
25	0945	0951	0954		X1.1					
27	2109	2121	2132	N03E26	M2.2	1F		III/1	75	9715
28	1626	1635	1641	N04E16	M6.9	1B	450	II/2	75	9715 halo CME
29	0142	0149	0151	N04E12	M1.1	SF	25	III/3	75	9715
29	1012	1036	1043	N04E10	M5.5	1N	58		75	9715
30	0100	0106	0111	S06E57	M3.5	1N	120	III/1	81	9718
30	1402	1418	1434		M1.5		37		82	9720 CME
30	1955	2001	2004		M2.9				77	9714



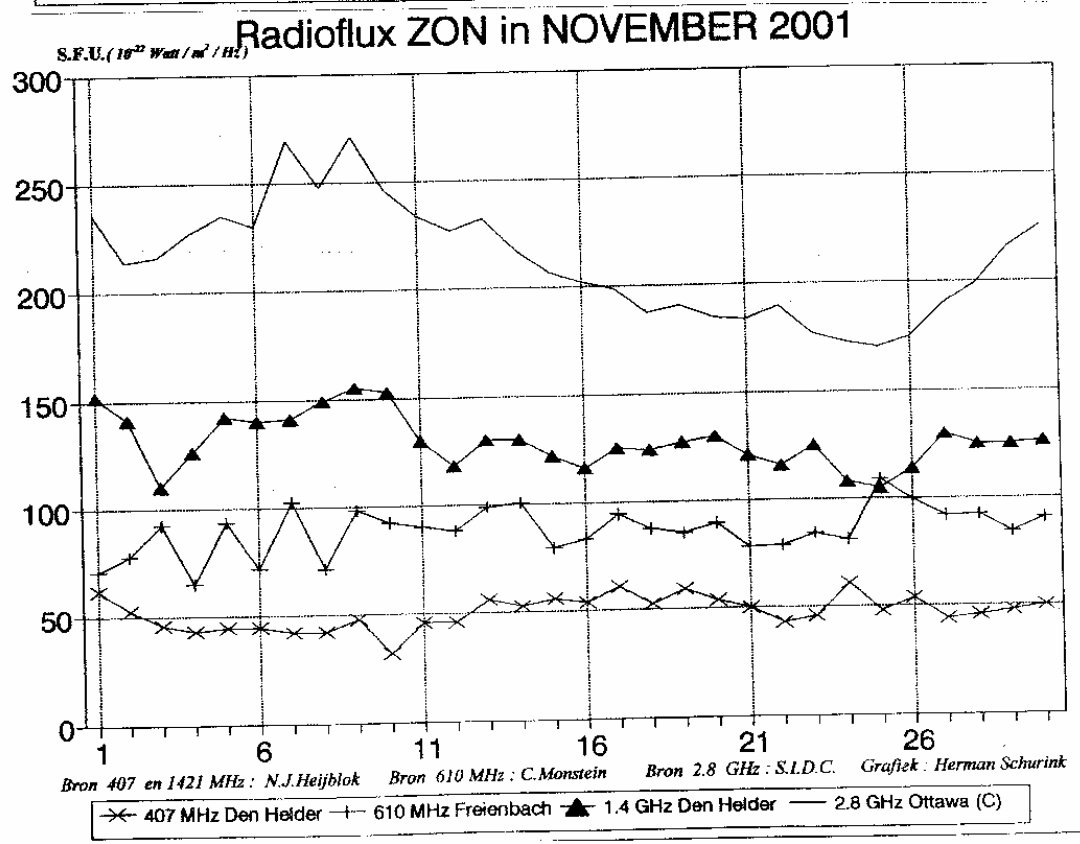
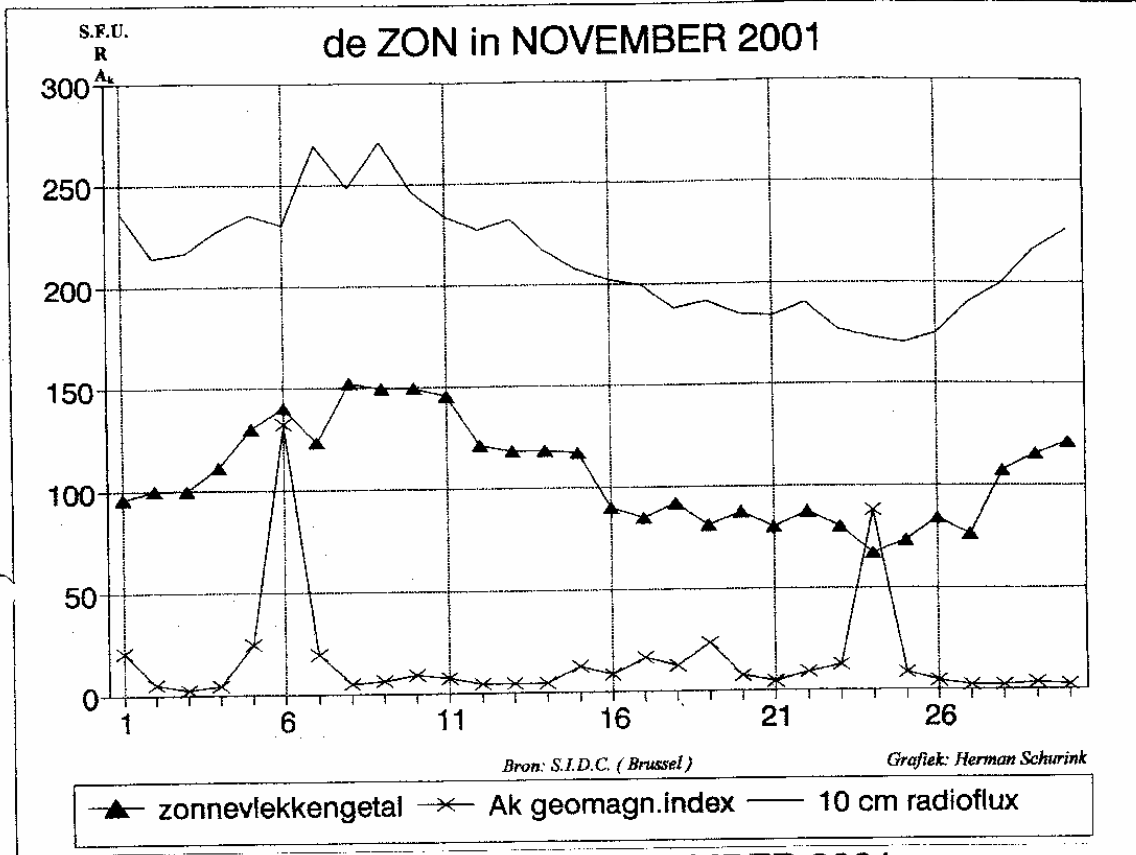
Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for May 2001 : 108.7 (± 5%)

	SM	CM		SM	CM		SM	CM
2001 Jun	110	108	2001 Dec	109	96	2002 Jun	98	82
Jul	114	108	2002 Jan	107	93	Jul	95	78
Aug	117	106	Feb	105	90	Aug	93	75
Sep	115	103	Mar	104	90	Sep	91	73
Oct	113	100	Apr	102	88	Oct	89	71
Nov	111	98	May	100	86	Nov	87	69

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. Cagnon, 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





Bulletin Werkgroep Zon December 2001

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

Zonnevlekgetallen (Sunspot numbers)

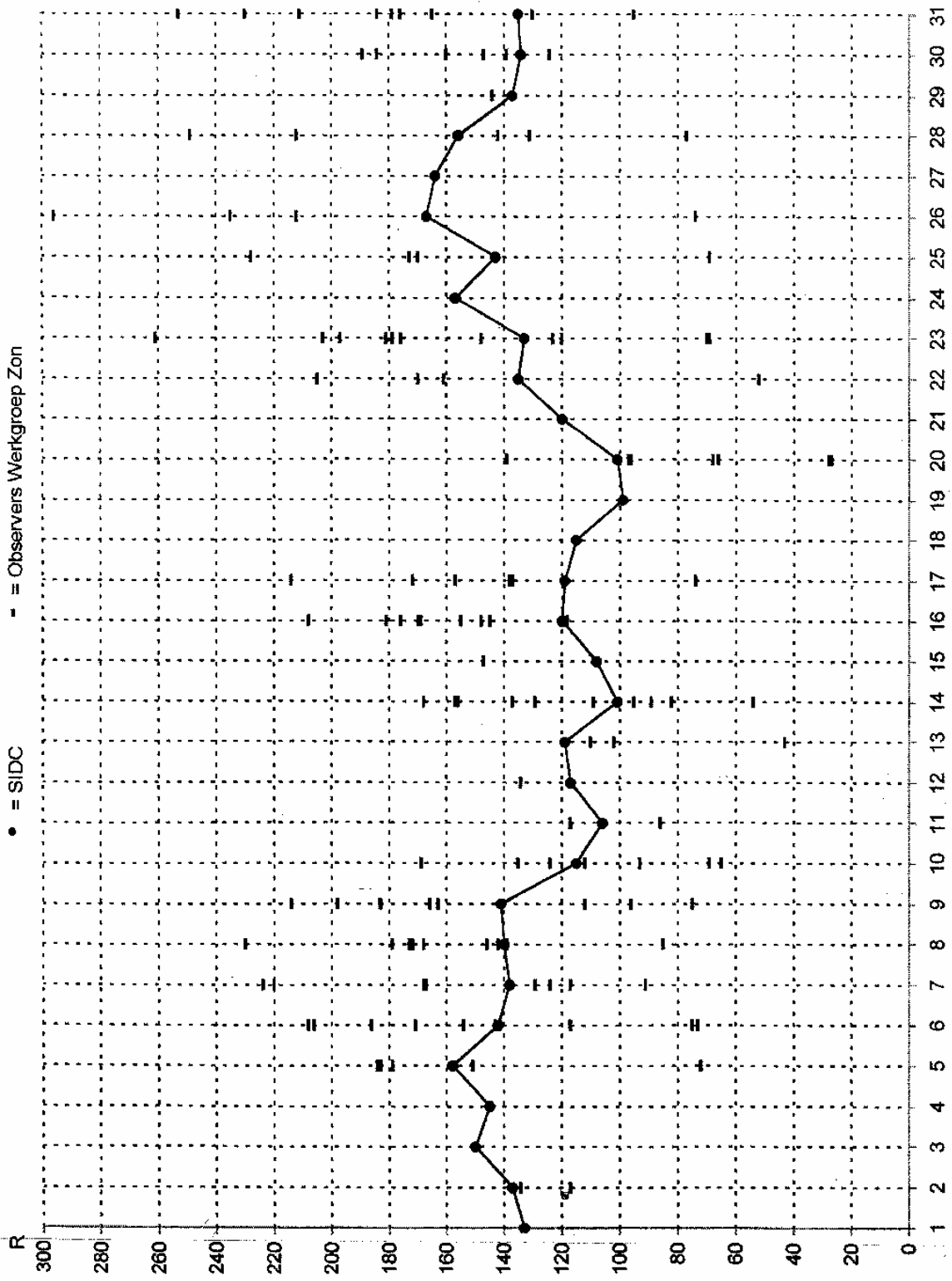
Day	Basis	Gort	G80	Groo	In 9	Jm40	Kroe	vSlo	Son	Spa	Wig	Zans	Zijle
1													
2								117					134
3													
4													
5	179			72		184							161
6	208	143		154	73	117	206						186
7	224	117		129	91	124	220						168
8	172	146	230		85	142	173	179	168	139			189
9	214	112		96	75	199	168	183	112	163			112
10	189	93			65	69	136						112
11						86							117
12													134
13						43							102
14	157	89	168		62	54		137	129	156	95	109	
15									147				
16	178	145	208	118				168	181	170	148	155	
17						74		138	172				157
18													137
19													
20													86
21													
22	205					52		170			181		
23	197	120	261	123	99	70		181	179	203	176	148	
24													
25						68		173					170
26	235					74		212					
27													
28	249					77		212					131
29													142
30	184	124						160	189				144
31	211	130	253					179		184	165	176	230
observ	14	11	8	8	16	4	8	18	8	8	16	17	2
st.lev.	0.07	0.17	0.04	0.23	0.57	0.96	0.28	0.13	0.06	0.07	0.17	0.09	0.17
st.d./k	0.11	0.16	0.07	0.20	0.28	0.44	0.23	0.16	0.07	0.10	0.18	0.10	0.24

Observers	[...]	Reflector, d = ... mm	[R...]	d = ... mm
Bals	= H.A.M. Bakster [70]	Jm40	= D. Jannink [40]	Wig = G. Wigmans [80]
Gort	= E. Gort [80]	Kroe	= K. Kroesen [102]	Zans = W. Zansma [R 155]
G80	= Mw G. Gravers [80]	vSlo	= B. van Slooten [90]	Zijle = W.A. Zijlenna [90]
Groe	= A. Groenewegen [102]	Son	= A.T. Son [R 150 Kutter]	
Jn 9	= D. Jannink [9]	Spa	= T. Spaninks [75]	

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

Date	R : 1	PSFI	600	2800	COS	SFI	XI	AK	SEA
30	121	316	63	226	867	19	3/0	2	
1	133	174	63	221	860	242	6/0	6	
2	137	171	57	245	862	24	2/0	6	
3	150	275	68	235	857	25	0/0	12	
4	145	286	72	233	839	12	2/0	14	
5	158	328	71	237	840	30	0/0	12	
6	142	253	68	247	781	115	1/0	12	
7	138	209	71	226	842	124	0/0	8	
8	140	170	73	221	849	14	1/0	8	
9	141	146	67	224	859	15	0/0	5	
10	115	159	100	219	869	28	0/0	4	
11	106	206	100	221	872	107	1/1	5	
12	117	212	100	237	874	42	3/0	9	
13	119	185	100	220	877	122	2/1	3	
14	101	143	100	245	872	119	2/0	5	
15	108	169	100	218	860	7	0/0	8	
16	120	173	100	209	843	116	2/0	12	
17	119	193	100	206	840	7	0/0	16	
18	115	145	100	212	840	21	0/0	11	
19	99	258	66	208	856	17	1/0	8	
20	101	141	73	221	859	12	0/0	5	
21	120	197	73	234	///	14	0/0	13	
22	135	229	72	243	862	5	0/0	9	
23	133	253	75	255	867	10	1/0	7	
24	157	388	76	275	865	27	3/0	24	
25	143	326	72	259	867	48	1/0	10	
26	167	266	82	268	870	63	5/0	6	
27	164	232	77	275	867	116	3/0	8	
28	156	195	79	263	868	33	3/1	///	
29	137	183	77	264	856	15	0/0	10	
30	134	189	75	247	857	15	0/0	21	
31	135	136	75	246	515	14	0/0	18	

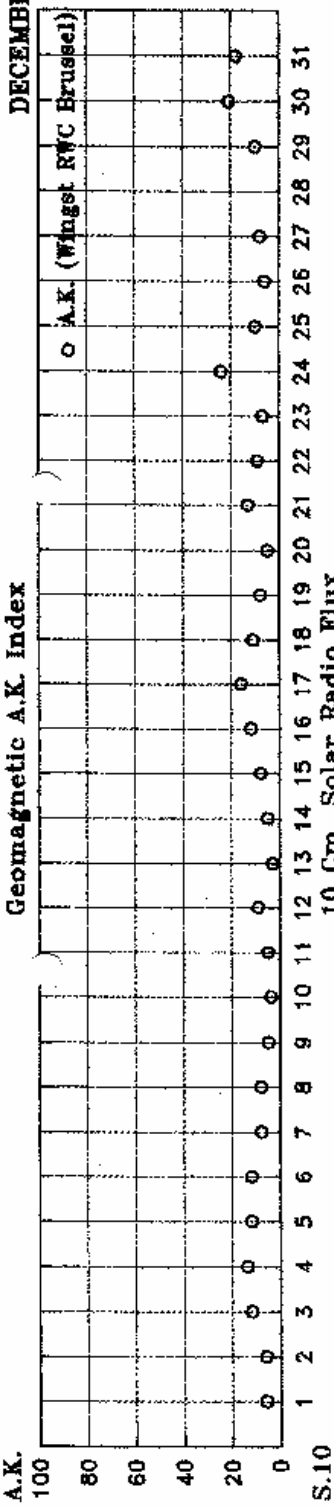
R : 1 : provisional international sunspot numbers from the S.I.D.C.
 PSFI : prompt photoelectric sunspot index from the S.I.D.C. in 10.5 min ; the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.
 600 : 600 Mhz solar flux from the station at Humant (Belgium).
 2800 : 2800 Mhz solar flux from Ottawa (origin : Ursigrans - UGEO). The 10.7cm Flux data are a service of the National Research Council of Canada.
 COS : thousands of the cosmic ray counts (origin : Ursigrans - UGEOSE Terre Aeldre).
 SFI : From October 1952 Solar Flux Index from the S.I.D.C. (origin : Ursigrans - UGEO).
 XI : evaluation : 1 x $10^{-4} \times 10^x > 1^+$.
 AK : X-flares index from the Ursigrans (M-flares/X-flares) (origin : Ursigrans - UGEO, UGEO).
 SEA : geomagnetic index from Wangs, Germany (origin : Ursigrans).
 SEA : sudden enhancements of atmospheres from Uccle & Humant (Royal Observatory, Belgium).
 Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.



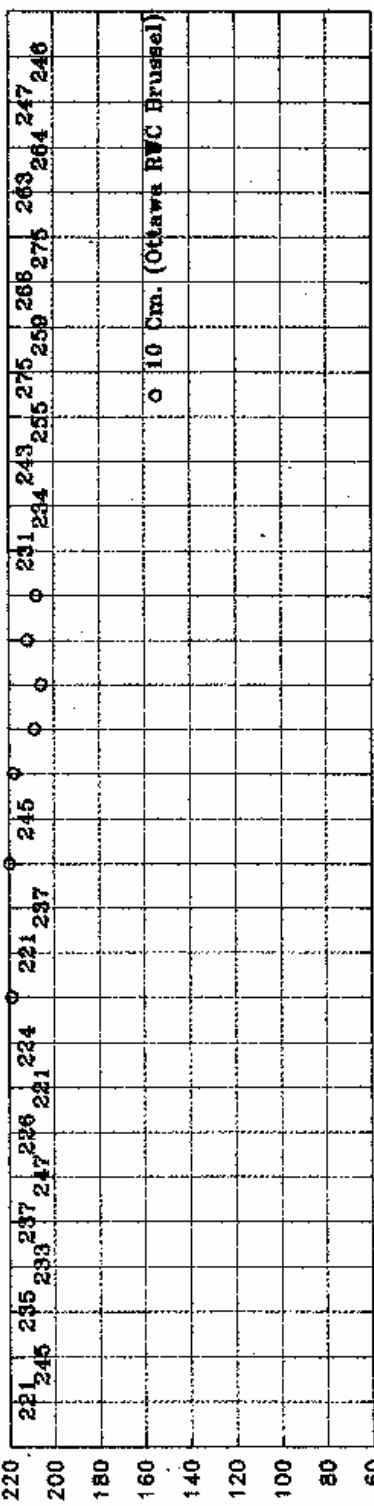
december 2001

DECEMBER 2001

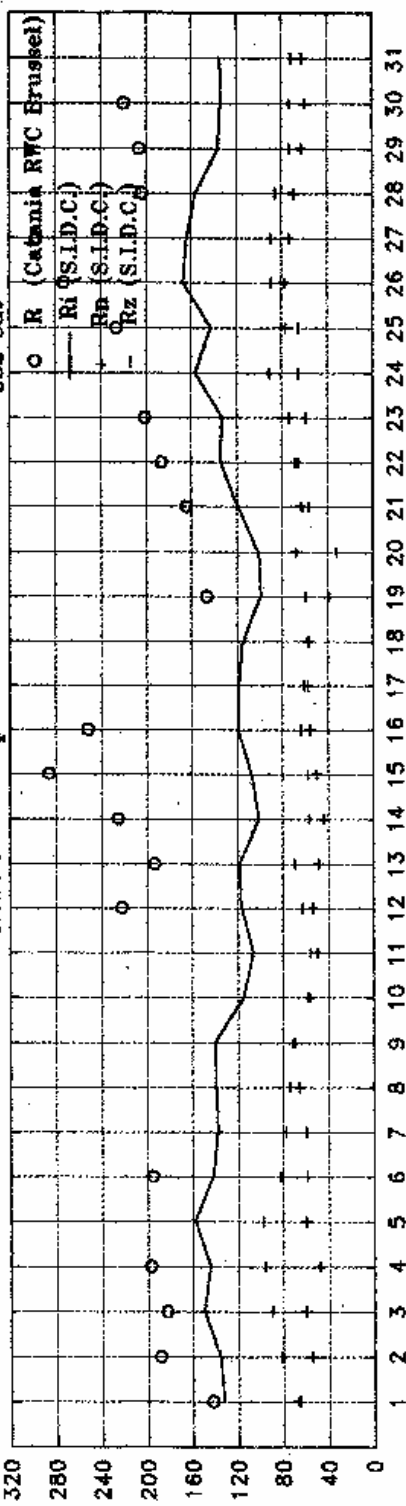
Geomagnetic A.K. Index



10 Cm. Solar Radio Flux



Relative Sunspot Numbers



Rinx 167
Dec. 28

Rimn 99
Dec. 19

Rigem.
131.8

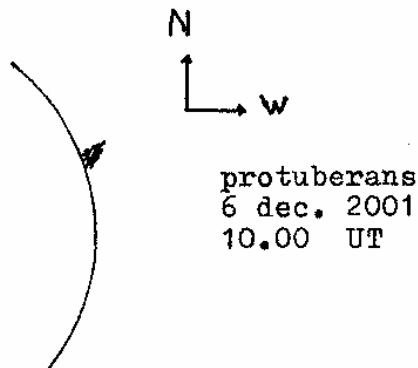
Zonnevlekkengetallen noordelijk- en zuidelijk halfrond

(Hemispheric sunspot numbers)

december 2001

Day	S.I.D.C.		Balster		Groenew		Jannink 40		v.Slooten		Son		Spaninks		Wigman		Zanstra	
	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs	Rn	Rs
1	87	66																
2	55	82							57	60							67	67
3	80	90																
4	49	96																
5	60	98	78	101					79	105					76	75	80	103
6	59	83	99	109	78	76	45	30	83	123				97	89	79	92	
7	60	78	104	420	76	53			105	115				75	93	86	81	
8	66	74	96	76					91	82	82	97	95	73	62	77		
9	71	70	134	80	51	45			103	95	122	44	112	71	54	58	98	65
10	57	58	90	79					88	47					62	59	69	55
11	50	56															54	63
12	54	63															56	78
13	49	70												30	72	41	69	
14	44	57	72	85	33	49			56	81	67	62	69	87	33	62	42	67
15	50	58									74	73						
16	56	64	81	95	57	61			77	92	100	81	87	83	71	77	73	82
17	58	61							88	84					76	81	77	60
18	58	57																
19	60	39																
20	68	33			53	13	17	11	62	36	112	27			59	37		
21	63	57																
22	66	69	99	106			44	28	75	95				60	101			
23	74	59	117	80	83	40			100	81	137	40	136	67	86	90	91	57
24	91	68																
25	77	66							82	101					86	84		
26	78	89	109	126					80	132								
27	74	90																
28	70	86	106	143					119	93				51	80	53	89	
29	63	74															63	81
30	60	74	82	102	66	73			71	89	89	100					59	88
31	63	72	101	110			59	36	93	86			87	97	74	91	90	86

tekening: Dennis Jannink



SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

1. Solar activity:

Solar activity started at high levels with active regions Catania 81 (NOAA9718) and Catania 77 (NOAA9714) which produced several M-flares, but dropped rapidly to low to moderate levels with an average of 5 C-flares per day and some M-flares due to Catania 81 (NOAA9718) and, from Dec 5 onwards, Catania group 92 (NOAA9727). On Dec 8 the new complex sunspot group Catania 03 (NOAA9733) was the source of a M3.4 flare associated to a CME erupting on the NE. These two beta-gamma-delta groups continued to dominate, producing M flares and bringing the activity to high levels, with two X-class flares from Catania 03 with associated semi-halo CMEs on Dec 11 and Dec 13. Catania 03 can still produce large flares in the next few days. A new active region, Catania 14 (NOAA9742) was the probable source of an impressive CME, behind the limb, on Dec 14. The solar activity became then low, except for two isolated M-flares on Dec 19 and 25. On Dec 19 also, a large prominence eruption occurred on the SE limb and was followed by a spectacular arcade activity and a CME. The dominant region were then Catania 14, a beta-gamma steadily growing region, and Catania 24 (NOAA9748). They produced several energetic M-flares, pushing the activity to high levels. On 28, this activity attained its maximum, with a X3.4 flare from behind the limb, probably associated with Catania group 49 (NOAA9767). After Dec 29, the activity decreased then to low levels.

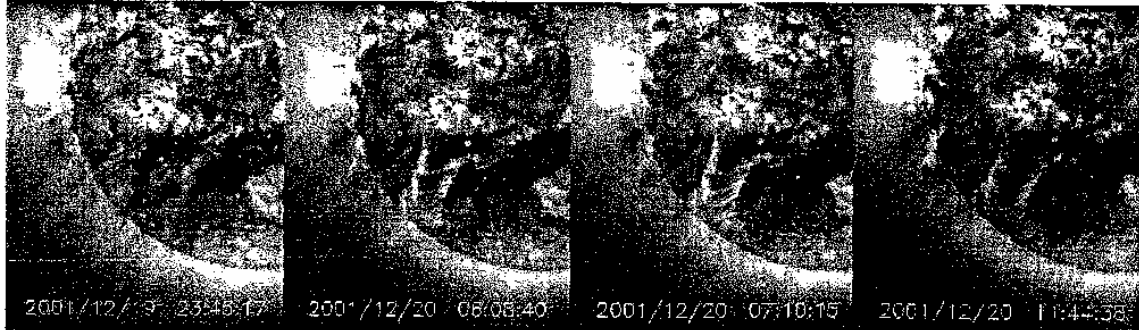
2. Geomagnetic activity:

In the first half of the period, the geomagnetic levels were often unsettled, because of a low-latitude coronal hole in the southern hemisphere, which started sending us solar wind gusts from Dec 3 onwards. As it turned away, the solar wind speed slowly decreased and the geomagnetic levels reached definitive quieter levels from Dec 7 onwards with a brief minor storm episode on Dec 12. On the two last days, the geomagnetic field was unsettled, under the temporary influence of a low-latitude coronal hole. The geomagnetic field remained then at quiet to unsettled levels except on 21 when the geomagnetic conditions became active. The geomagnetic conditions reached then active to minor storm levels on Dec 24, then became quiet again. On the last few days of the period, geomagnetic activity increased to active conditions due to the arrival of shocks on Dec 29 and Dec 30.

3. Noticeable events summary

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO	TYPE	Cat.	NOAA	NOTE
01	0647	0651	0654	S06E42	M2.2	2N	180			81	9718	
01	1430	1445	1456	S10W78	M1.2	SF				77	9714	
01	1500	1555	1628		M4.8							
01	1653	1656	1658	S08W80	M2.9	SF				77	9714	
01	1729	1731	1733		M1.5					77	9714	
01	1739	1749	1754	N10E80	M1.8	SF				90	9724	
02	1409	1500	1548		M1.3					77	9714	
02	2125	2206	2229		M2.0					77	9714	
04	0037	0045	0053	S05E03	M1.0	SF				81	9718	
04	0537	0546	0558		M1.3		16					
06	0813	0826	0839	S19E34	M1.0	2F				92	9727	
08	0602	0634	0655	N12E90	M3.4							on limb, CME
11	0758	0808	0814	N16E41	X2.8	SF	2600	II/2			9733	halo cme
11	1442	1451	1457	S26W35	M1.3	2N	50	III/1		92	9727	
12	1900	1911	1918		M3.0		420			03	9733	
12	2141	2200	2218		M5.6			CTM/1		92	9727	halo cme?
12	2313	2322	2328	S19W55	M4.8	1F		III/1		92	9727	
13	0632	0640	0700	S19W58	M1.8	SF				92	9727	
13	1420	1430	1435	N16E09	X6.2	3B	1800	III/1		03	9733	semi-halo cme
13	2244	2307	2317	S18W67	M1.4	1F				92	9727	
14	0840	0913	0953	N06E90	M3.5		220	III/3				CME behind NE limb
14	1941	1954	2002	N16W04	M4.4	2N	100			03	9433	

16	0114	0124	0129	N15W23	M1.5	2N			03	9733
16	0309	0328	0348	N13W26	M1.0	1F			03	9733
19	1701	1706	1709	S15W74	M1.3	SF			09	9739
23	2308	2336	2353	S14W12	M1.2	SF			24	9748
24	0026	0032	0037	S07E59	M1.7	1N	71		31	9754
24	1350	1400	1410		M3.5		100	III/1		
24	2234	2241	2247	S10E46	M1.4	1F	32		31	9754
25	0701	0708	0712	S11E50	M1.2	1F	30		31	9754
26	0432	0540	0647	N08W54	M7.1	1B	2600		14	9742
26	1222	1226	1229	N10W68	M1.8	1F	71		14	9742
26	1713	1718	1731	N10W72	M1.3	SF			14	9742
26	2111	2115	2119	S10W56	M1.2	SF			24	9748
26	2238	2242	2245		M1.0					
27	0526	0613	0619	S15W86	M1.4	2N				9752
27	1127	1133	1141	N08W80	M1.0	SF	44		14	9742
27	1643	1658	1720	S10W66	M2.3	2N	110		24	9748 CME
28	0344	0351	0357	N04W90	M4.7	SF	270		14	9742
28	0648	0655	0703	S07E10	M1.0	1F			31	9754
28	1210	1230	1259	S12W77	M1.3	SF			24	9748
28	2002	2045	2132		X3.4		1600			
29	0402	0411	0426		M2.1			III/1		
29	0539	0545	0551	N02W32	M1.4				26	9751
29	0859	0915	0928		M1.8					
29	0938	0945	1006	S07W85	M9.3	SF	100	II/2 III/3	24	9748
29	1152	1157	1204	S26E87	M1.4			III/1		
29	1633	1647	1702		M3.3					
29	1950	2127	2355		M1.8					
29	2251	2256	2308	S24E88	M2.8	1F			49	9767



Near midnight (UT) on 19 - 20 December 2001, a prominence eruption was associated Coronal Mass Ejection occurred on the southeast quadrant of the solar disk. Following this event, an arcade of bright post-flare loops was visible. The evolution of this arcade is depicted here on images made with the EIT instrument on board SOHO.

