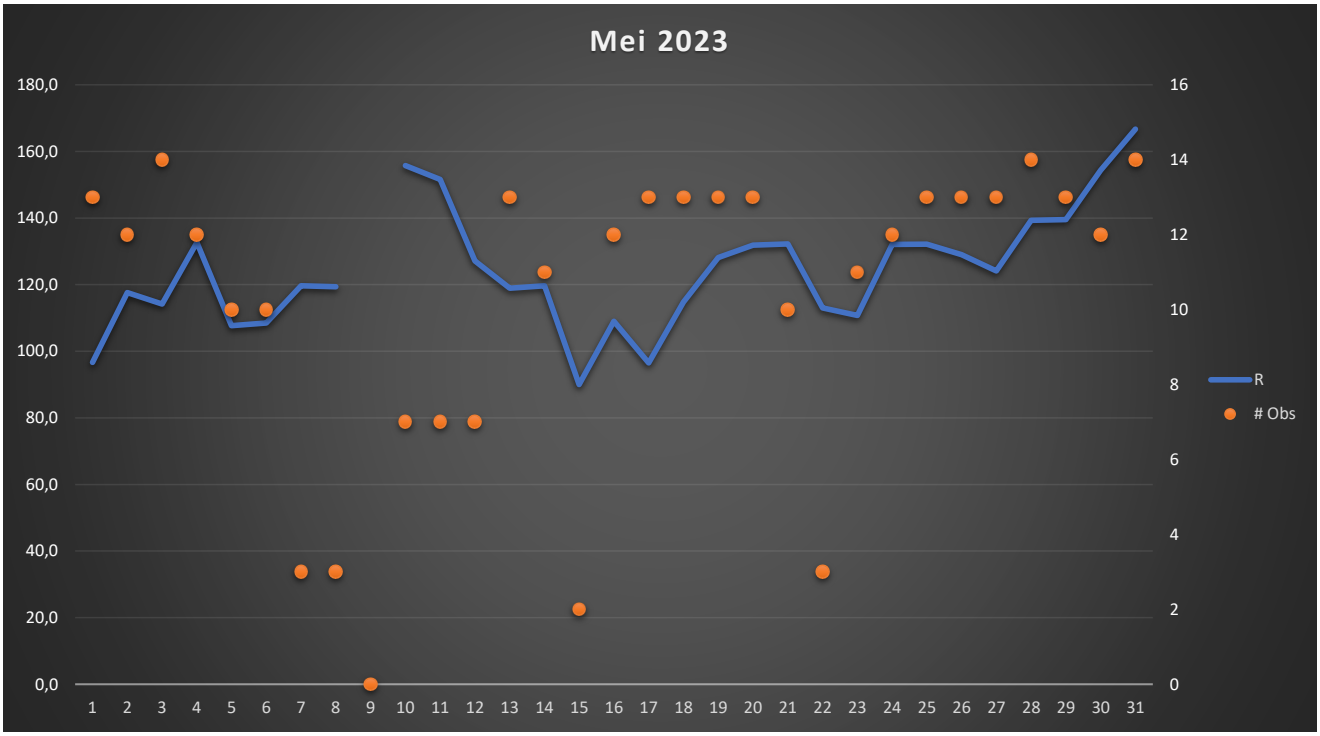
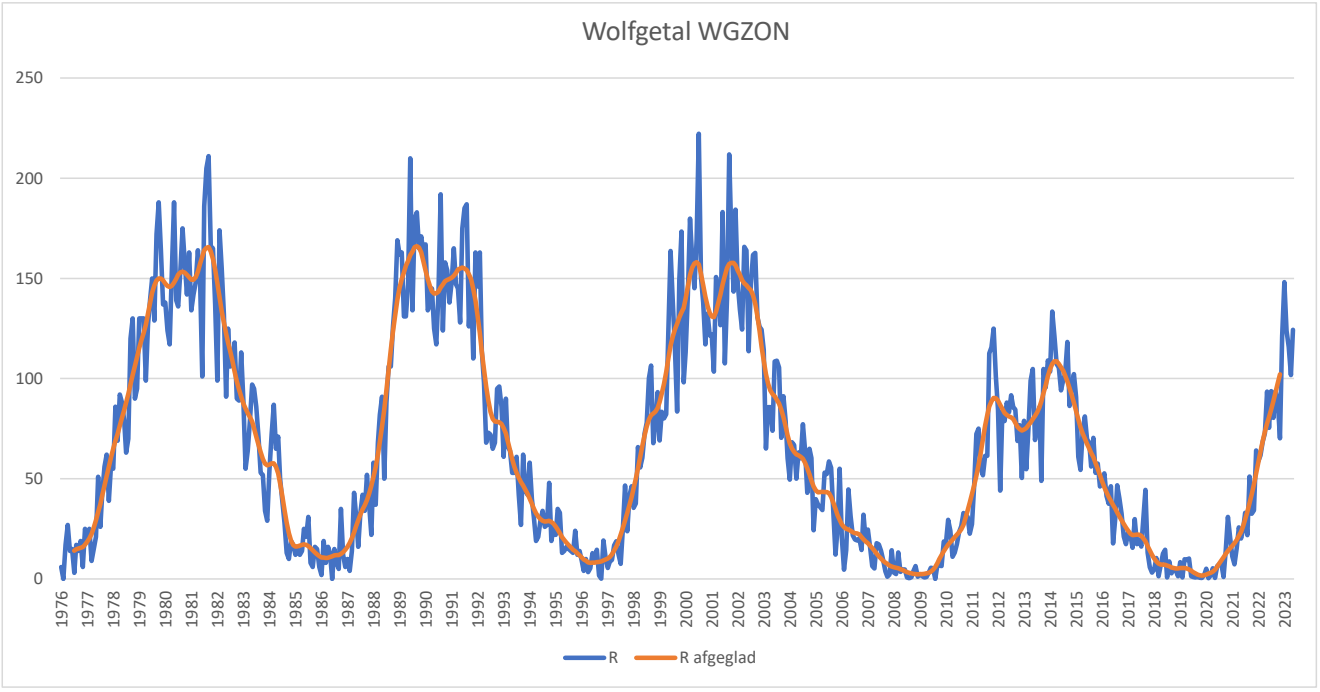
Zonnerapport Werkgroep Zon VVS

Waarnemingsresultaten en nieuws voor zonnewaarnemers	Jaargang :	28	Nummer:	324	Mei 2023

Website: http://www.bso.vvs.be/ e-mail: **waarnemingen-wgzon@carels.be**





Gemiddelden werkgroep zon Mei 2023

Groepen :	N	**5,6**	Wolfgetal :	N	**81,0**	RE'	**998,0**
	S	**3,5**		S	**43,3**	CV	**123,2**
	N+S	**9,1**		N+S	**124,4**	SN	**133,2**
316 waarnemingen - 14 waarnemers						IS	**57,6**

Sunspotnumbers VVS Belgium

Month: Mei 2023

	Groups			Wolfnumber			Other Solar Indices				
Day	**N**	**S**	**N+S**	**N**	**S**	**N+S**	**RE'**	**CV**	**SN**	**IS**	**# OBS**
1	4	3	7	58,4	38,2	**96,6**	797,8	103,1	125,4	46,5	13
2	6	3	9	78,1	39,5	**117,6**	932,4	136,5	140,4	49,5	12
3	6	3	9	81,2	32,9	**114,2**	727,9	157,4	153,6	48,0	14
4	6	4	10	90,1	42,5	**132,7**	849,3	135,0	134,5	62,5	12
5	4	4	8	73,7	34,0	**107,7**	1108,1	133,2	173,0	54,0	10
6	3	4	7	71,6	36,9	**108,4**	1095,4	120,3	122,5	54,0	10
7	3	4	7	77,1	42,5	**119,7**	1199,0	137,5	144,0		3
8	4	3	7	84,5	34,8	**119,3**	1367,0	135,5	125,0	65,0	3
9											0
10	8	3	11	122,7	33,0	**155,7**	1380,2	149,0	168,0	86,0	7
11	8	2	10	123,7	27,9	**151,6**	950,3	132,3	148,0	72,0	7
12	8	1	9	112,9	14,3	**127,1**	582,0	128,5			7
13	7	3	10	92,3	26,7	**118,9**	559,1	77,0	103,0	42,5	13
14	8	4	12	89,7	30,0	**119,6**	584,6	86,1	104,4	42,5	11
15	3	2	5	62,5	27,5	**90,0**	532,0				2
16	5	5	10	70,0	39,0	**109,0**	615,5	60,8	73,0	41,5	12
17	4	3	7	61,8	34,6	**96,5**	424,3	71,3	84,6	34,0	13
18	5	4	9	69,7	45,0	**114,8**	485,0	104,6	99,6	52,0	13
19	5	4	9	83,9	44,2	**128,2**	982,4	127,4	155,8	60,5	13
20	6	3	9	98,2	33,7	**131,8**	1217,6	130,3	148,8	71,0	13
21	6	5	11	82,8	49,4	**132,2**	1318,5	116,0	172,5	60,0	10
22	3	2	5	75,0	38,0	**113,0**	1692,0	111,0	110,0		3
23	4	3	7	64,3	46,4	**110,7**	1419,5	102,3	136,8	59,0	11
24	4	3	7	70,1	62,0	**132,1**	1653,6	119,5	157,8	73,0	12
25	4	5	9	61,0	71,2	**132,2**	1504,5	128,7	140,8	83,0	13
26	5	4	9	68,0	61,0	**129,0**	1197,2	133,3	143,6	66,0	13
27	5	3	8	64,4	59,6	**124,1**	1124,2	142,0	115,8	60,0	13
28	7	5	12	74,4	64,9	**139,3**	1128,2	135,9	115,8	62,0	14
29	8	4	12	87,9	51,6	**139,5**	764,8	150,9	129,4	48,5	13
30	9	4	13	95,7	58,7	**154,3**	768,6	146,7	141,4	50,5	12
31	9	5	14	83,4	83,3	**166,7**	977,7	161,5	162,0	54,0	14
	5,57	**3,50**	**9,07**	**81,0**	**43,4**	**124,4**	**998,0**	**123,2**	**133,2**	**57,6**	**316**

Monthly mean:	**124,4**	Spotless days:	**0**	Covering:	**30/31**
Observations:	**316**	Number of observers:	**14**		

V.V.S. BELGIUM SOLAR SECTION
Processing: Jeffrey Carels
e-mail : jeffrey@carels.be

Observers:
E.De Ceuninck; J.Janssens; J.Bourgeois; O. Steen
H. De Backer; F.Dubois; B.Taillieu; J.Carels; G.Verbanck
KSB; L.Claeys; J.De Wit; J. Neys; D. Laurent

Individuele waarnemingen - Wolfgetal

	SIDC	J. Bourgeois			J. Carels			L. Claeys			H. De Backer			E. De Ceuninck			J. De Wit			F. Dubois			
Dag	R	g	f	R	g	f	R	g	f	R	g	f	R	g	f	R	g	f	R	g	f	R	Dag
1	105	3	40	70	5	42	92	5	39	89	7	47	117	6	37	97	6	40	100	5	41	91	1
2	123	4	55	95	8	43	123	5	42	92	8	35	115	8	35	115	9	47	137	9	43	133	2
3	122	5	50	100	8	41	121	7	43	113	8	36	116	8	35	115	8	43	123	8	43	123	3
4	138	5	48	98	9	53	143	7	67	137	9	37	127	9	49	139	9	56	146	9	57	147	4
5	114	4	58	98							6	59	119	6	58	118	6	52	112	6	50	110	5
6	116	4	50	90				5	65	115	6	55	115				6	54	114	6	49	109	6
7	133										7	65	135										7
8	130										7	66	136				5	51	101	6	61	121	8
9	177																						9
10	165	6	84	144							9	65	155	8	61	141	8	69	149	10	78	178	10
11	158				9	64	154	8	53	133	9	66	156				8	61	141				11
12	142	4	29	69				8	39	119	8	52	132				9	51	141				12
13	133	7	37	107	9	42	132	8	46	126	9	48	138	8	25	105	10	40	140	7	32	102	13
14	134				7	37	107	7	48	118	7	45	115	8	42	122	9	46	136	8	38	118	14
15	111	5	35	85				5	45	95													15
16	106	4	37	77	9	40	130	5	37	87	7	42	112	8	39	119	8	40	120	7	34	104	16
17	106	5	39	89	7	31	101	7	37	107	7	33	103	7	25	95	7	26	96	6	27	87	17
18	134	5	24	74	8	48	128				8	41	121	7	31	101	7	44	114	8	43	123	18
19	143	7	55	125	7	56	126	6	54	114	8	61	141	8	48	128	9	50	140	8	52	132	19
20	144	6	70	130	7	68	138	8	62	142	7	63	133	7	50	120	8	60	140	7	65	135	20
21	144	7	55	125	7	55	125	8	68	148	7	56	126	8	68	148	8	60	140				21
22	138										5	66	116				6	62	122				22
23	128	4	53	93	6	58	118				7	59	129	7	58	128	6	53	113	6	50	110	23
24	150	5	87	137	7	78	148	6	66	126	6	71	131	5	62	112	6	78	138	6	57	117	24
25	151	5	72	122				6	61	121	7	76	146	6	59	119	7	56	126	6	78	138	25
26	145	6	55	115	7	59	129	8	60	140	7	61	131	9	62	152	7	64	134	7	61	131	26
27	139	7	49	119	8	53	133	8	58	138	7	62	132	7	44	114	7	50	120	7	54	124	27
28	146	7	59	129	7	51	121	8	62	142	8	57	137	9	57	147	9	60	150	10	59	159	28
29	157	6	49	109	9	43	133	8	59	139	10	49	149	9	44	134	11	50	160	9	42	132	29
30	165	11	45	155	12	50	170	10	61	161	10	47	147	11	34	144	11	43	153	10	36	136	30
31	179	9	60	150	12	41	161	11	58	168	14	45	185	14	56	196	11	59	169	10	49	149	31
	137,9	**5,6**	**51,8**	**108,2**	**8,0**	**50,1**	**130,1**	**7,1**	**53,5**	**124,8**	**7,8**	**54,0**	**131,6**	**8,0**	**46,9**	**126,5**	**7,9**	**52,3**	**131,3**	**7,5**	**50,0**	**125,4**	

	SIDC	KSB			D. Laurent			J. Neys			O. Steen			B. Taillieu			G. Verbanck			R. Verboven			
Dag	R	g	f	R	g	f	R	g	f	R	g	f	R	g	f	R	g	f	R	g	f	R	Dag
1	105	6	44	104	6	34	94	6	29	89	6	45	105	5	48	98	6	50	110				1
2	123	8	37	117				9	30	120	9	48	138	7	34	104	8	42	122				2
3	122	8	33	113	7	31	101	8	31	111	7	45	115	8	31	111	8	42	122				3
4	138	9	53	143	8	37	117				9	45	135	8	34	114	9	56	146				4
5	114	6	51	111	5	41	91				7	50	120	6	34	94	6	44	104				5
6	116	7	63	133				5	38	88				5	41	91	7	51	121				6
7	133										6	47	107	6	57	117							7
8	130																						8
9	177																						9
10	165										11	92	202	7	51	121							10
11	158	10	70	170	10	45	145							10	62	162							11
12	142	9	85	175	8	34	114							8	60	140							12
13	133	8	31	111	7	25	95	8	26	106	9	34	124	9	53	143	8	37	117				13
14	134	10	55	155	6	35	95	11	34	144	8	38	118	6	28	88							14
15	111																				no data		15
16	106	8	41	121	7	21	91				7	30	100	8	39	119	8	48	128				16
17	106	7	31	101	7	19	89	7	21	91	7	26	96	7	31	101	7	28	98				17
18	134	7	39	109	7	29	99	8	27	107	9	48	138	8	49	129	9	44	134				18
19	143	7	54	124	7	40	110	8	47	127	8	67	147	7	50	120	8	52	132				19
20	144	8	71	151	7	48	118	7	37	107	7	57	127	7	66	136	7	67	137				20
21	144	8	59	139	7	42	112										7	57	127				21
22	138										5	51	101										22
23	128	6	63	123	6	32	92				5	49	99	5	46	96	6	57	117				23
24	150	6	90	150	6	46	106				7	75	145	6	66	126	6	89	149				24
25	151	8	81	161	7	47	117	7	42	112	7	63	133	7	75	145	7	76	146				25
26	145	7	75	145	7	40	110	7	32	102	7	53	123	7	41	111	9	64	154				26
27	139	7	80	150	7	46	116	7	36	106	6	51	111	7	41	111	7	69	139				27
28	146	11	75	185	8	43	123	9	38	128	8	40	120	8	28	108	10	62	162				28
29	157	11	58	168	10	40	140	11	31	141	11	40	150	10	31	131	8	48	128				29
30	165	11	60	170				11	43	153	11	45	155	11	44	154	10	54	154				30
31	179	11	60	170	12	45	165	12	37	157	12	49	169	11	35	145	12	63	183				31
	137,9	**8,2**	**58,4**	**140,0**	**7,4**	**37,3**	**110,9**	**8,3**	**34,1**	**117,0**	**7,9**	**49,5**	**128,3**	**7,5**	**45,2**	**119,8**	**7,9**	**54,5**	**133,2**				

Het Wolfgetal wordt berekend als tien maal het aantal groepen plus het totaal aantal zonnevlekken. De formule is als volgt: R = 10 x g + f waarbij R het Wolf-getal is, g het aantal groepen van zonnevlekken en f het aantal individuele zonnevlekken.

Individuele waarnemingen - andere maatgetallen

R' - Beckgetal

Dag	J. Bourgeois	J. Carels	H. De Backer	E. De Ceuninck	F. Dubois	D. Laurent	J. Neys	O. Steen	G. Verbanck	R. Verboven
1	1408	668	744	626	730	698	511	809	986	
2	1878	831	631	939	750		637	860	933	
3	1134	455	669	734	826	506	577	774	876	
4	1214	894	634	691	1003	545		778	1035	
5	1711		1304	1160	1247	837		535	963	
6	1423		1137		1097		780		1040	
7			1394					1004		
8			1452		1282					
9										
10	1502		1398	1194	1195			1612		
11		638	1290			923				
12	518		619			609				
13	423	421	912	218	546	525	426	627	934	
14		559	671	456	622	601	586	597		
15	532									no data
16	624	557	796	647	661	422		338	879	
17	666	391	497	342	424	271	373	391	464	
18	298	524	696	251	540	435	428	602	591	
19	1029	839	1038	1044	1108	745	787	1400	852	
20	1690	114	1218	1402	1762	1049	712	1215	1796	
21	1613	1257	1105	1449		885			1602	
22			1811					1573		
23	2018	1307	1614	1039	1277	816		1488	1797	
24	2631	1888	1660	1365	1403	981		1306	1995	
25	2229		1892	1490	1841	945	708	914	2017	
26	1482	1290	1364	1424	1251	776	587	1034	1567	
27	901	1182	1347	1177	1247	749	780	1032	1703	
28	1430	1347	1304	945	1261	947	827	766	1327	
29	880	780	980	879	658	639	570	644	853	
30	712	788	962	542	865		371	828	1081	
31	1180	914	718	952	1208	908	588	888	1443	
	1245,0	**840,2**	**1098,5**	**911,6**	**1033,5**	**718,7**	**602,8**	**917,3**	**1215,2**	

CV - Classification Value

Dag	J. Carels	H. De Backer	E. De Ceuninck	F. Dubois	J. Janssens	D. Laurent	J. Neys	O. Steen
1	72	108	101	95		104	103	139
2	133	99	115	115			168	189
3	90	126	129	183	153	183	214	181
4	132	100	137	170		113		158
5		144	102	181		103		136
6		130		120	89		142	
7		143						132
8		173		98				
9								
10		198	100	119				179
11	99	174				124		
12		140				117		
13	54	92	35	74		57	103	124
14	62	91	61	85		71	140	93
15								
16	47	101	50	55		40		72
17	83	62	53	56		77	69	99
18	87	145	52	85	123	102	112	131
19	129	133	84	128		126	135	157
20	115	124	90	124		109	185	165
21	104	158	96		111	111		
22		130						92
23	109	140	82	100		86		97
24	110	140	113	114		108		132
25		134	142	131	104	107	149	134
26	115	134	105	132		127	173	147
27	148	156	108	142		143	152	145
28	140	156	66	146	139	136	169	135
29	141	167	111	150		140	179	168
30	151	160	98	157			158	156
31	157	147	111	165	166	215	159	172
	108,5	**134,7**	**93,1**	**121,9**	**126,4**	**113,6**	**147,6**	**138,9**

SN- Pettis Index

Dag	J. Carels	E. De Ceuninck	F. Dubois	J. Neys	O. Steen
1	118	131	133	111	134
2	140	137	135	147	143
3	143	150	172	158	145
4	165	103	158		112
5		189	168		162
6			134	111	
7					144
8			125		
9					
10		160	173		171
11	148				
12					
13	93	70	120	94	138
14	77	102	123	116	104
15					
16	80	80	64		68
17	95	78	90	81	79
18	107	66	94	113	118
19	182	144	162	128	163
20	151	152	149	128	164
21	176	169			
22					110
23	114	183	131		119
24	209	105	147		170
25		162	162	109	130
26	185	155	138	100	140
27	118	135	117	99	110
28	123	131	111	122	92
29	128	113	126	144	136
30	142	128	147	148	142
31	168	181	165	155	141
	136,3	**131,5**	**135,2**	**121,4**	**130,6**

IS - Inter-sol Index

Dag	J. Carels	F. Dubois
1	47	46
2	49	50
3	47	49
4	62	63
5		54
6		54
7		
8		65
9		
10		86
11	72	
12		
13	50	35
14	42	43
15		
16	44	39
17	36	32
18	54	50
19	62	59
20	73	69
21	60	
22		
23	64	54
24	84	62
25		83
26	65	67
27	60	60
28	57	67
29	49	48
30	59	42
31	50	58
	56,5	**55,6**

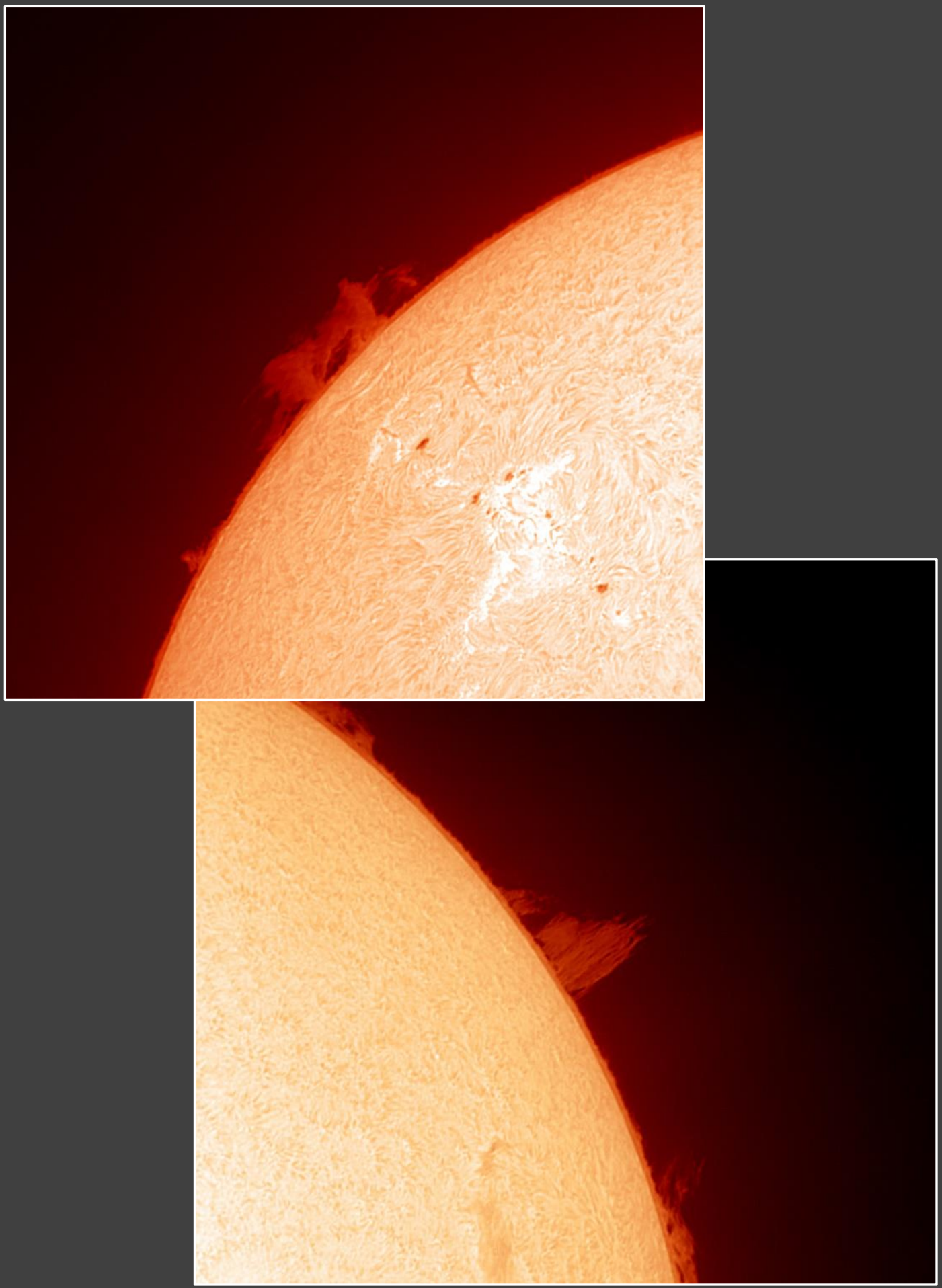
A - Blote Oog *

Dag	J. Carels	J. Janssens
1	0	
2	0	
3	0	0
4	0	
5		
6		0
7		
8		
9		
10		
11	0	
12		
13	0	
14	0	
15		
16	0	
17	0	
18	0	0
19	0	
20	1	
21	*	1
22		
23	1	
24	1	
25	1	1
26	1	
27	1	
28	1	1
29	1	
30	0	
31	0	0
	8,0	**3,0**

R' - Beckgetal
CV - Classification Value (https://www.cv-helios.net)
SN - Pettisgetal
IS - Inter-Sol Index (https://www.inter-sol.org)
A - Blote oog zonnevlekken

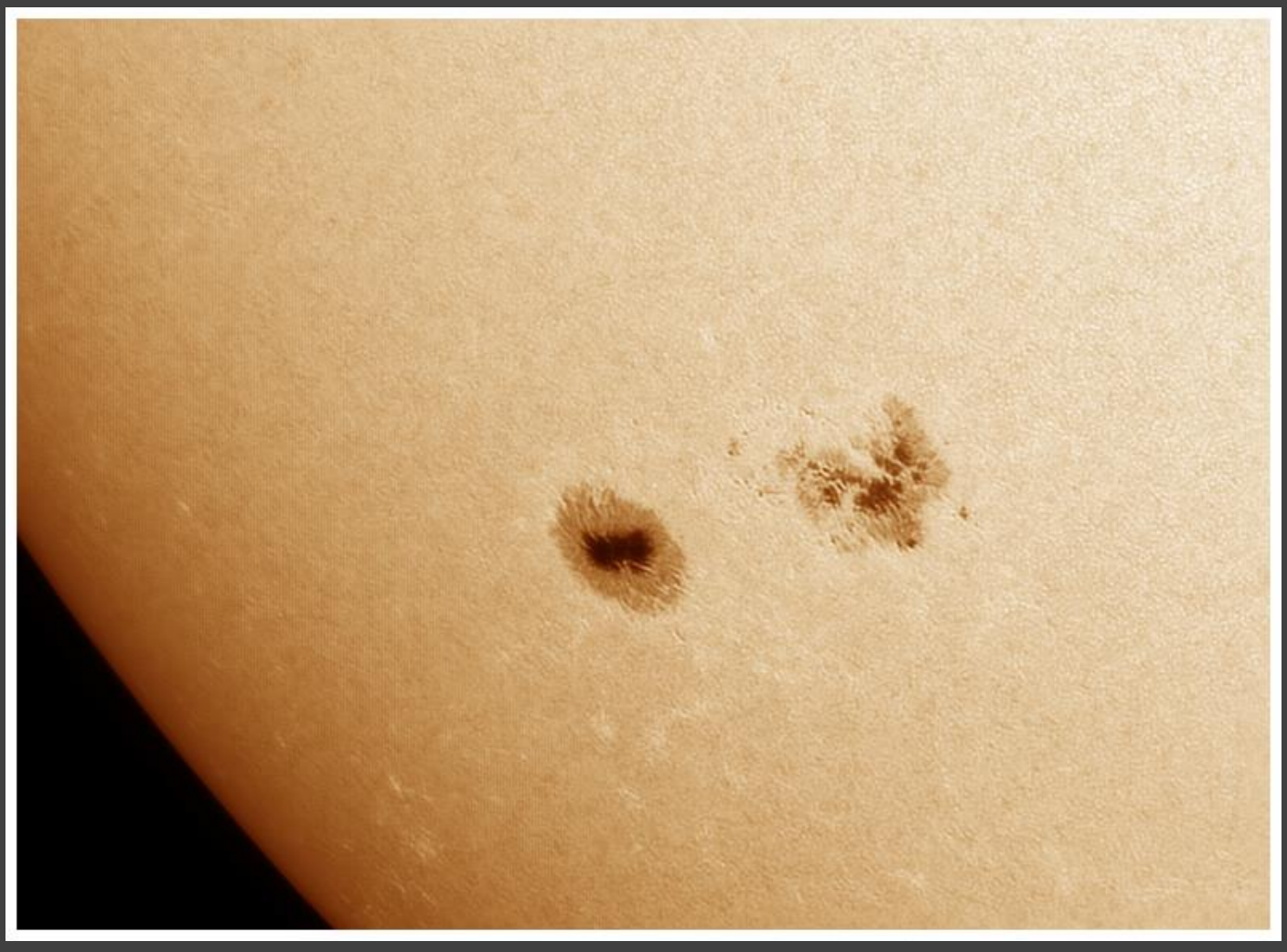
Maandelijkse selectie foto’s

Wilfried De Vriese - 21 mei 2023 – Protuberansen - Lunt 60THa-b600 + ASI290MM

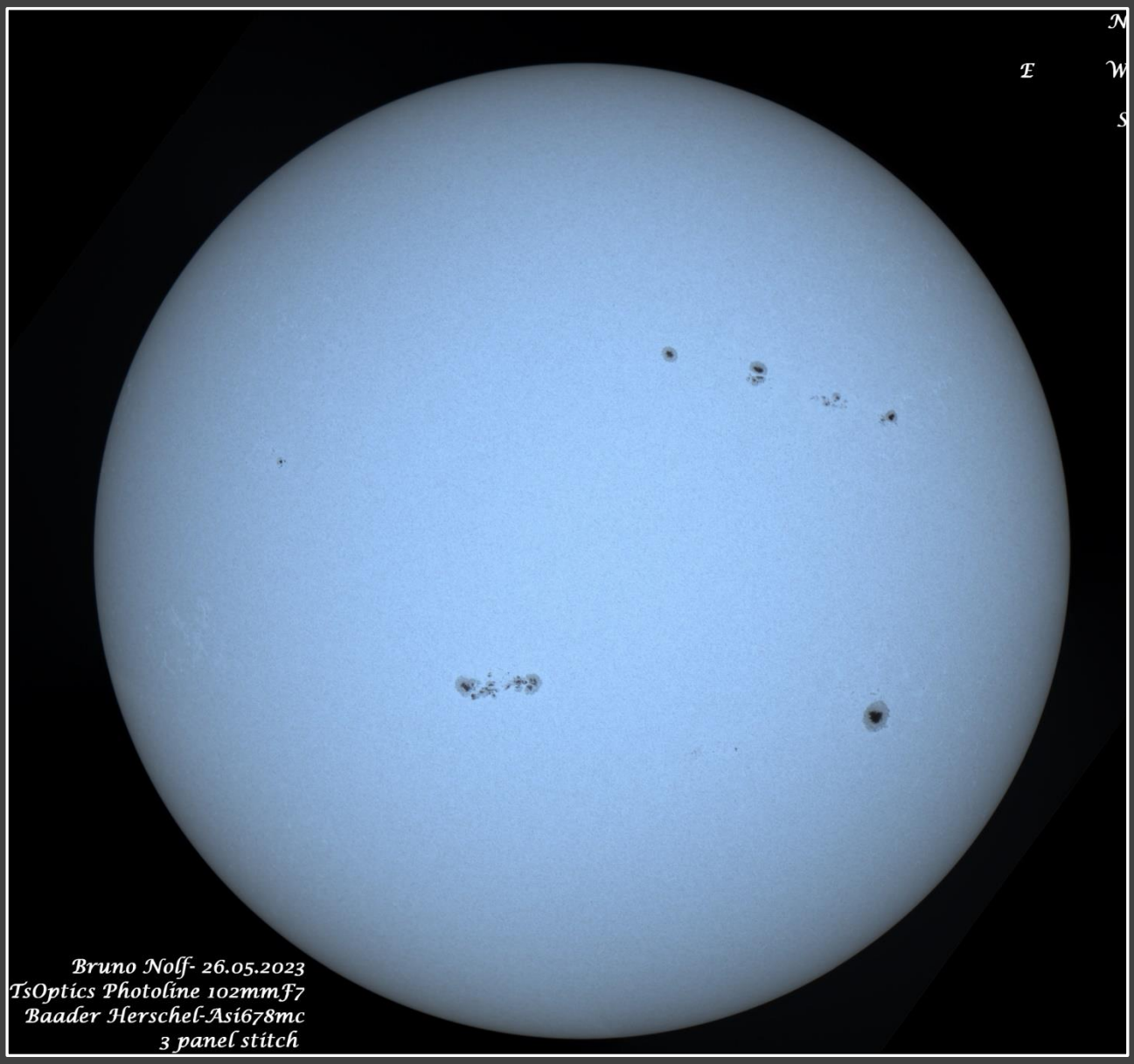


Paul De Backer – AR 13315 - 28 mei 2023

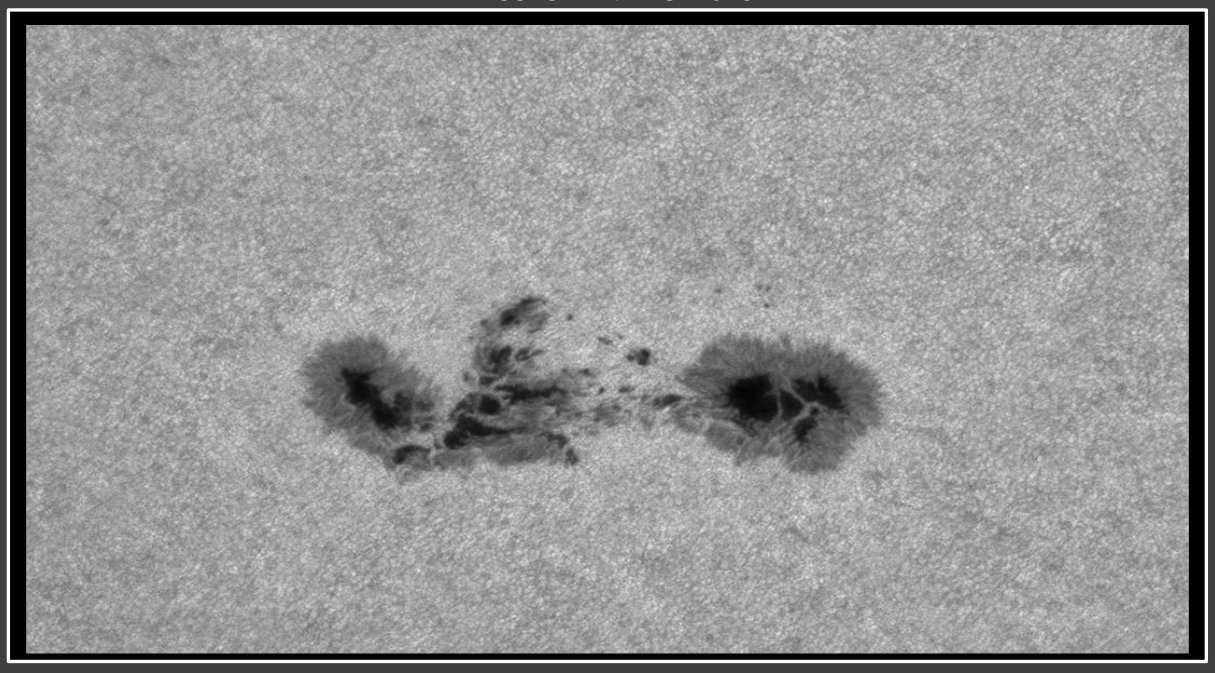
Hubert Hautecler
AR 13315 – 31 mei 2023



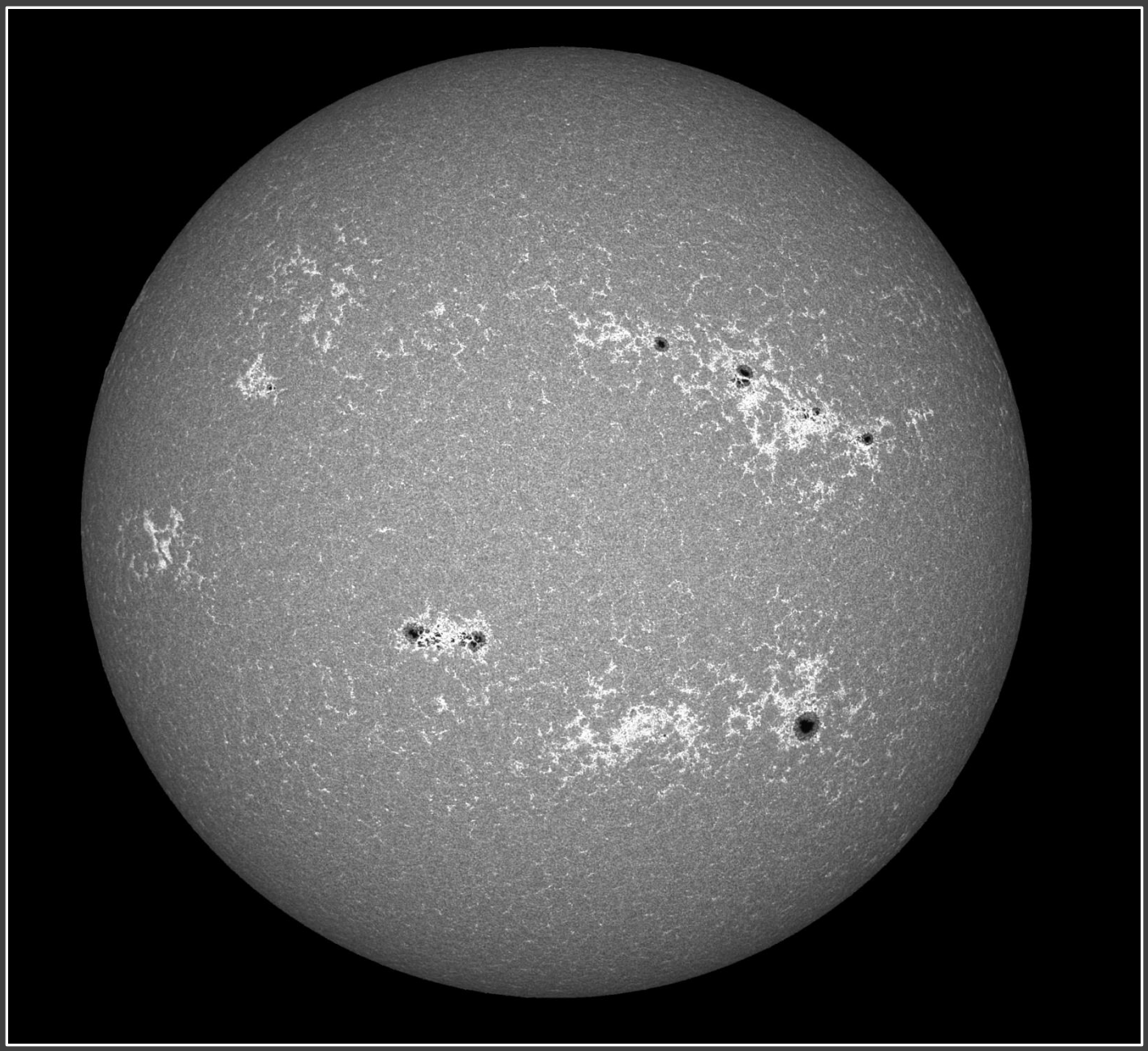
Bruno Nolf



Jeffrey Carels
AR 13315 – 27 mei 2023



Helen Peeters



26 Mei 2023 - 80mm/F7 afgediafragmeerd tot 60 mm F9 - Lunt Ca-k B1200

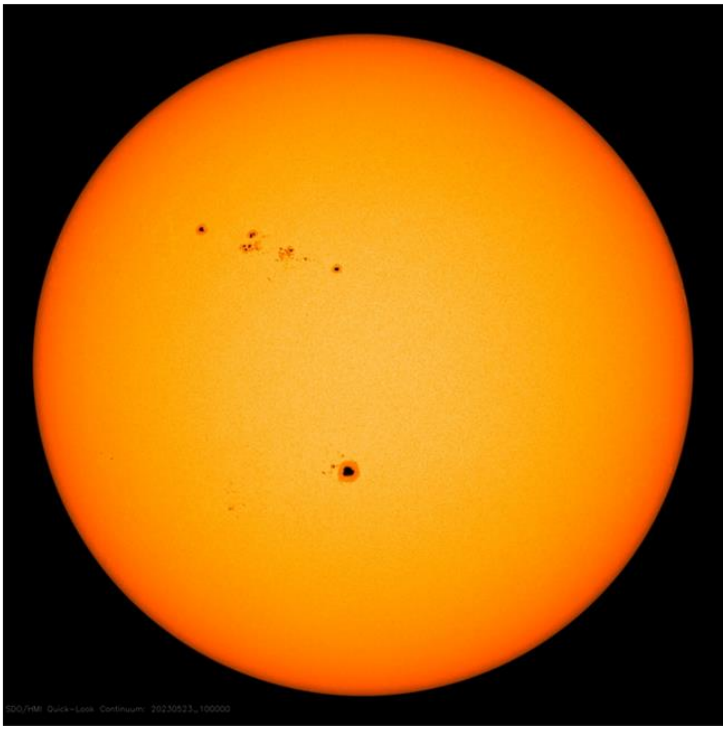
Maandelijks nieuwsartikel

Het laatste item in dit zonnerapport is een artikel uit de nieuwsbrief van het STCE over blote oog waarnemingen van zonnevlekken. Waarnemingen van blote oog vlekken zijn ook in het zonnerapport opgenomen, deze kan je terugvinden bij de waarnemingen (A). Momenteel zijn er maar 2 waarnemers die blote oog vlekken rapporteren. Met het aankomende zonnemaximum zullen er ongetwijfeld nog grote groepen de revue passeren. Wie weet kan je binnenkort ook eentje spotten! Doe dit uiteraard wel op een veilige manier, met een eclipsbrilletje bv.!

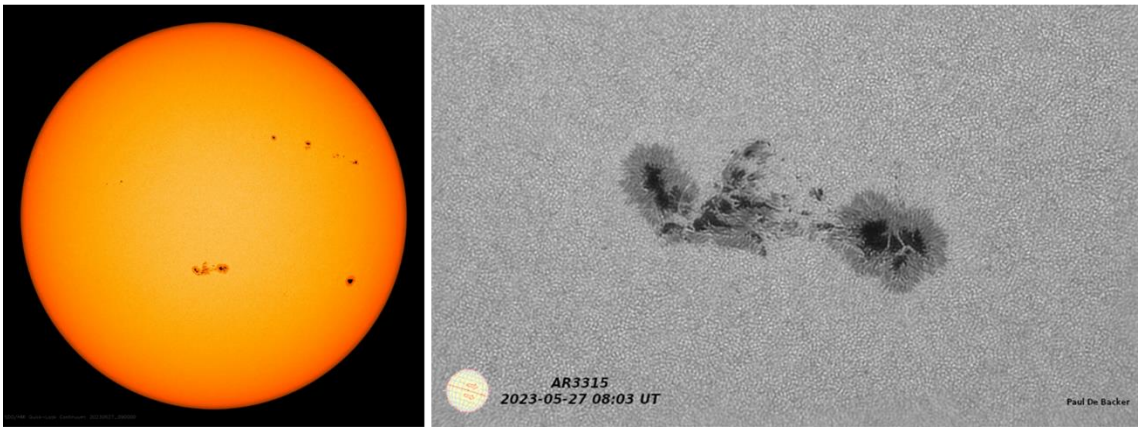
Naked eye sunspots

https://www.stce.be/

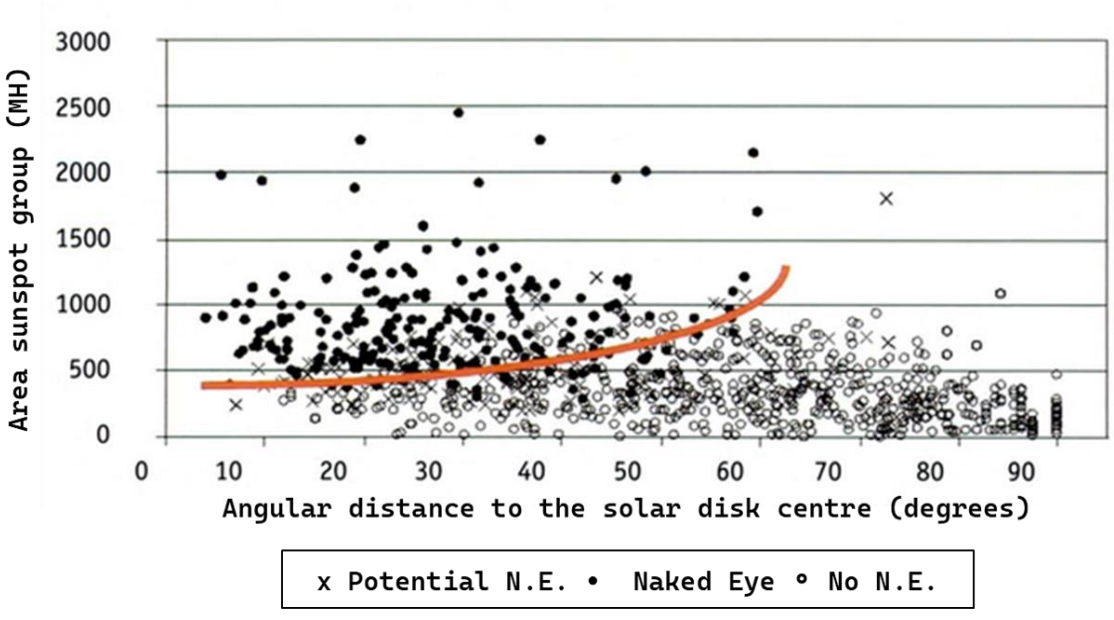
When observing the Sun and its active regions, we usually think of extreme ultraviolet imagers on board satellites such as PROBA2 (https://proba2.sidc.be/ssa) or SDO (https://sdo.gsfc.nasa.gov/data/ aiahmi/), as well as white light or H-alpha telescopes on the ground such as the USET solar telescopes (https://www.sidc.be/uset/) of the Royal Observatory in Brussels, Belgium. In short: telescopes are needed, the bigger, the better. So it is always a surprise when one learns that sunspots can also be seen without a visual aid, provided of course adequate protection of our delicate eyes such as by using solar eclipse glasses. The human eye has a resolution between about 0.7 and 1 arc minutes, which corresponds to the size of a sunspot between about 250 and 450 MH. MH means millionths of a solar hemisphere, with 167 MH corresponding to the total surface area of the Earth. This means that e.g. 300 MH concerns already quite a big sunspot, and there aren't that many during a solar cycle. According to McIntosh (1990 - https://ui.adsabs.harvard.edu/abs/1990SoPh..125..251M/abstract), only 8% of all unipolar and bipolar sunspot groups contain a large sunspot (north-south diameter larger than 2.5 degrees, i.e. an area larger than 250 MH) at some point during their transit.



Nonetheless, last week saw 2 relatively large sunspot groups transiting the solar disk, which were both located in the southern solar hemisphere. The first one was NOAA 3310, which was basically a nice circular sunspot with some smaller satellite spots nearby. Its area was stable and varied mostly between 300 and 360 MH during the 19-25 May period (NOAA reports - https://www.solarmonitor.org/). Note that the NOAA reported sunspot areas are usually about 40% lower than the true values (see the Solar Cycle Science webpage at http://solarcyclescience.com/activeregions.html). The author saw the sunspot with the naked eye from 21 to 25 May, and also USET solar observers as well as participants from the SWIC (STCE's Space Weather Introductory Course - https://www.stce.be/SWEC) were able to see the "tiny dot" using eclipse glasses on 23 and 24 May, as shown in the picture above. They did comment that it was on the limit, which is no surprise in view of its size and the fact that different observers have a different eye resolution.



Then, from 23 May onwards, a sunspot group started to develop in the southeastern solar quadrant. NOAA 3315 became a compact sunspot group consisting of 2 big main sunspots. This can be seen in the imagery above, with next to the white light image taken by SDO/HMI on 27 May, a captivating, detailed picture of the sunspot group taken by Paul De Backer around the same time. Paul regularly contributes his amazing pictures to the Belgian Solar Section (https://www.vvs.be/werkgroepen/werkgroep-zon). The group reached an area of 800 MH on 28 May, and was visible with the naked eye on 27 and 28 May (no reports yet from the 29th). In fact, with the naked eye, the group seemed somewhat "smeared" which is logical because of the 2 closely spaced main spots give it a more rectangular shape than NOAA 3310. Ancient Asian observations have described naked eye sunspot groups as plumes, peaches, eggs, coins, pears,... indicating that sunspot groups on occasion were so large that certain shapes could be distinguished with the naked eye (See e.g. Vaquero and Vazquez, 2009 - https://link.springer.com/book/10.1007/978-0-387-92790-9).



The diagram above was compiled by the author several years ago. It shows whether or not a sunspot group is visible with the naked eye (resp. the black and open dots) as a function of its area (vertical axis) and its angular distance to the solar disk's centre (horizontal axis). The data cover about 1000 naked eye observations done by solar observers from the Belgian Solar Section and the British Astronomical Association (https://britastro.org/sections/solar) between May 1996 and December 2001. The crosses ("x") indicate a potentially naked eye sunspot, i.e. an isolated report of naked eye visibility, which usually means an observer with exceptionally good eye view. The red curve provides an idea of the lower limit of sunspot's size and location for naked eye visibility: a minimum sunspot area of around 300-350 MH near disk centre and a maximum angular distance of about 60 degrees for the largest sunspots - that's very close to the solar limb! A transition zone from "naked eye" to "not naked eye" visibility is also apparent in the diagram. This is in large part because the area of the sunspot group as a whole is taken. NOAA 3310 was basically a single sunspot of about 350 MH, but there are plenty of sunspot groups that consist of e.g. 2 well-spaced main spots of 150 MH and a few other smaller spots,

also summing up to 350 MH. For a similar angular distance from the solar disk centre as NOAA 3310, the latter sunspot groups will not be visible with the naked eye. Another contributing factor is how much of the sunspot area consists of penumbra (the greyish zone around the dark core sunspot), as it contrasts less with the solar disk, and thus reduces the visibility with the naked eye.

The online version of this newsitem at https://www.stce.be/news/648/welcome.html also contains 2 clips composed from SDO/HMI (20-28 May) and USET (25-27 May) images.

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