

Deep Sky Section

Supernova in galaxy M51

A magnitude 14 supernova was discovered in the galaxy M51 on 2005 June 28 by Wolfgang Kloehr of Schweinfurt, Germany using a 20cm reflector. M51 is one of the most observed galaxies in the northern hemisphere and although late June, with its lighter night time skies, is not an ideal time for galaxy observing from the UK, it is possible that some observers recorded the supernova without being aware of it. Could you please check all images recorded around that date and forward any containing positive sightings to the Director.

Two images of the supernova, one recorded by Ron Arbour using his recently installed 40cm f/5 Newtonian on 2005 July 10.991 UT under a slightly hazy sky, and the other by Martin Mobberley using his Paramount ME/C14 combination on 2005 July 9.913UT, also under a hazy sky, are reproduced here. The Type II supernova, designated SN 2005cs, is marked on the images. It lies 78 arcseconds south of the nucleus of M51 at RA 13h 29m 53s.37 and Dec +47° 10' 28".2 (2000.0). Type II supernovae result from the core collapse of massive stars and are important cosmologically as they can be used as standard candles for determining galactic distances.

The galaxy M51 was discovered by Charles Messier on 1773 October 13, although its exact nature was unknown at the time of discovery. He reported it as '... a difficult object in a 3½ foot telescope; double with each component having a brilliant centre 4' 33" apart. The two atmospheres touching; one fainter than the other.' M51 has two NGC numbers: NGC 5194 refers to

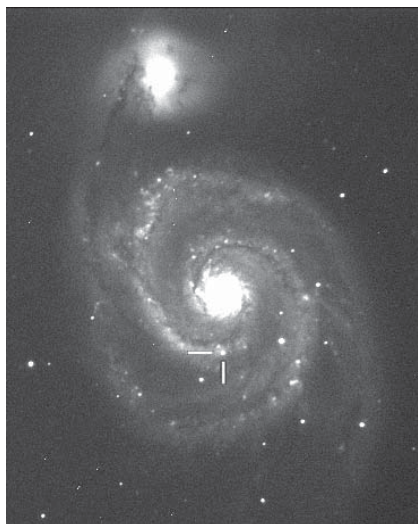


Figure 1. SN 2005cs in M51 recorded by Ron Arbour. July 10.991UT, 40cm f5.0 reflector, SXV H9 CCD camera. 1x30s + 1x60s.

the larger southern component and NGC 5195 to the smaller northern one – sometimes referred to as the companion galaxy to M51. In fact it is surprising that Messier did not give M51 two numbers as he clearly saw it as a double object. M51 rose to fame in 1845 as a result of drawings made by the 3rd Earl of Rosse with his 72-inch (183cm) speculum reflector at Birr Castle, Ireland, which showed for the first time the spiral structure of M51. It was this drawing that led to the galaxy being dubbed The Whirlpool.

M51 is visible in almost any instrument, although large apertures are needed to show the spiral structure. In 10x50 binoculars it appears as a small double hazy patch and in firmly mounted large binoculars (say 20x80s) the apparent bridge between the two components can be discerned. In fact I find the bridge easier to see in large binoculars than in a 30cm telescope. Although this 'bridge' appears to connect the two galaxies, it is in fact an illusion. It is an outer spiral arm of NGC 5194 covering the smaller NGC 5195 which lies beyond. While the spiral structure can

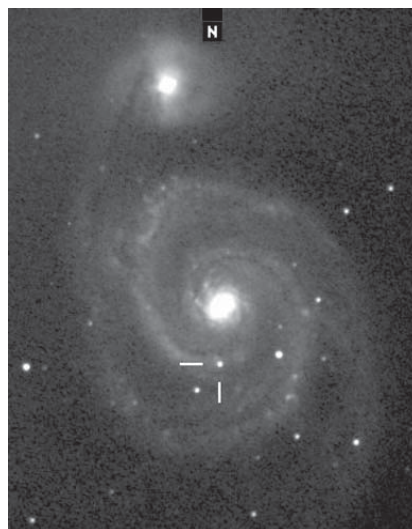


Figure 2. SN 2005cs in M51 by Martin Mobberley. July 9.913UT, Paramount ME/Celestron 14 at f7.7, SBIG ST9XE camera, 2x180s. Very hazy twilight sky (Sun -10°).

be hinted at in a 30cm telescope – particularly when you know it to be spiral – a 50cm telescope is really needed to show it clearly. M51 lies at a distance of about 35 million light years.

Stewart L. Moore, Director

From the President

This is the last 'From the President' column that I will be writing. The past two years have flown by so very quickly. This is either due to the fact that I am getting old, or that I enjoyed myself immensely. I would like to think that it was entirely down to the latter reason but no doubt age has also played a part. It has been a very enjoyable experience. An organisation the size of the BAA takes a lot of running and before getting involved, first on Council and then as Vice President, I had only the slimmest of ideas as to what was involved.

I would like to think that, during these two years, I have achieved some beneficial changes in how our organisation is run. Time will be the judge. Most Presidents come to the rôle with an idea or ideas of what they would like to achieve. My vision was to improve the way that we interfaced with our members, both on a personal level and with our IT systems. As an ex-Customer Services Director I knew that the way that we treat our customers (members and external contacts) was in great need of improvement and I felt that this was an area requiring updating. The office has been transformed and new computer systems have been successfully installed and are running. We have a strong front office team that is very customer focused and I hope that members will benefit from the changes.

One of the things that helped to make my Presidency so enjoyable was the excellent support given by the Officers, Council and Directors. We had issues to address during the year, some pleasant and some not so pleasant, but they kept focused and helped to confront the issues head on. I would particularly like to thank Guy Hurst who passed on much advice based on his experience as my predecessor. Ron Johnson has kept the business running to programme and made sure that our agenda has always been up to date and addressing his scheduled monthly tasks. Hazel McGee has continued to do an excellent job on the *Journal* and to continually improve it. She has received excellent help on controlling its quality from Nick James as Papers Secretary and David Boyd with advertising revenue, which has allowed the increasing use of colour and the financing of our special editions. Hazel has also done a fine job specifying and project managing the new office computer system for which I am extremely grateful.

Jean Felles and Val Stoneham have helped immensely with the installation and testing of the new systems as well as changing many of the office processes to streamline them.

There have also been changes to our Treasury team during this year. Some of



you may know that David Tucker's day job is as a consultant architect specialising in historic listed buildings. He has recently taken over a new rôle as troubleshooter for his local County Council. This is taking up so much of David's time that he has been forced to step down as our Treasurer. Our thanks go to David for all the help he has given in the last few years. Our web pages have been developed a lot more and members can more easily access data and buy items or pay subscriptions. Thanks to Callum Potter for his hard work in developing these.

As always we are working on encouraging members to not only observe but report their observations to the Association. To progress this, the 'Back to Basics' workshops have continued. These encourage new members or members moving on to a new area of astronomy to gain basic experience fast. Many thanks to Nick Hewitt and Hazel Collett for their hard work in making these happen. Nick will be standing down as Meetings Secretary in October. My personal thanks go to Nick for persevering as Meetings Secretary during my Presidency. This is probably the most onerous unpaid job in the Association. I know that his workload outside of the BAA has been increasing and he stayed on to help to the end of my Presidency as a personal favour to me. He has done an excellent job training Hazel Collett who will be standing for election as his successor.

As well as the regular stalwarts, your Council now has several new faces and they are not all from London and the Home Counties. The number of lady members has increased and members are attending from all over England.

There are always many more ideas and plans in the wings than we have resources to implement. It is for this reason that we need to encourage many more people to become involved in helping to run the Association. Hopefully, I will have a bit more free time after this month so if anyone would like to chat about getting involved on Council or other projects please feel free to contact me. In the meanwhile we will prioritise the ideas that we have and work to implement them. I will leave this in the capable hands of my nominated successor, Dr Richard Miles, who is a very enthusiastic observer and very able and keen to take the Association forward.

In closing I would like to thank all the members for supporting me during my Presidency. Special thanks go to those of you who wrote to me with your ideas and thoughts. I hope I have answered everyone. It has been a privilege and honour to lead this prestigious organisation for the past two years.

Best wishes and good observing to you all.

Tom Boles, President

Meteor Section

A Giacobinid meteor shower in 2005 October?

The Giacobinid (or October Draconid) meteor showers were among the most spectacular of the last century. As early as 1915, the Rev M. Davidson wrote that there was the possibility of a meteor shower on or about October 9/10 caused by debris from the short-period comet discovered in 1900 December by Michel Giacobini at Nice Observatory. The comet was independently discovered in 1913 October by Ernst Zinner at Bamberg, and is now known as comet 21P/Giacobini-Zinner. The comet makes frequent close approaches to Jupiter, which may considerably alter its perihelion distance. These Jovian perturbations have a great effect on the potential visibility, or otherwise, of the associated meteor shower. Close approaches to Jupiter in 1898 and 1910 brought the descending node of the comet's orbit close enough to that of the Earth for meteor showers to be observed at four out of the next eight returns of the comet, in 1926, 1933, 1946 and 1952.

The first recorded Giacobinid shower, with only low rates, was on 1926 October 9. Then on 1933 October 9 and 1946 October 10, brief but intense Giacobinid meteor storms took place, with peak rates of several thousand meteors per hour. The 1946 storm was the first to be extensively observed using radio techniques. On 1952 Oc-

tober 9, radio observations from Jodrell Bank showed that a moderate shower took place during daylight hours from the UK. One or two meteors at the end of the shower were observed visually in the early evening.

As a consequence of further perturbations, no Giacobinid showers were observed between 1952 and 1972, but approaches to Jupiter in 1969 and 1981 brought the node close to Earth's orbit once again, increasing the chances of a shower. The orbital period of the comet was now 6.52 years, so major showers were most likely every 13 years. On 1972 October 8, weak Giacobinid activity was observed using radio techniques, but on 1985 October 8 and again on 1998 October 9, strong Giacobinid showers were seen, in both cases during daylight hours from the UK.

The table below (reproduced courtesy of Nick James) summarises the seven Giacobinid showers observed to date. *C-E (AU)* gives the minimum distance between the comet's orbit and the Earth's orbit at the node (- denoting the Earth outside, and + inside the comet's orbit), and *Earth at node* is the number of days before or after the comet that the Earth passed the descending node.

Consideration of previous displays suggests that major Giacobinid meteor showers occur if 1) the Earth closely follows the comet to the comet's descending node, i.e. 80 days in 1933, 15 days in 1946, and 27 days in 1985; 2) the Earth passes very close to the comet's orbit, i.e. 0.0054 AU in 1933 and 0.0015 AU in 1946; and 3) the Earth passes inside the comet's orbit at the node, i.e. as in 1933, 1946, 1985 and 1998. Only one of these three criteria (no. 3) is fully satisfied in 2005 October. Although the Earth does follow the comet to the node, it is 91.8 days afterwards, and

Major Giacobinid showers or storms

Year	<i>C-E (AU)</i>	<i>Earth at node</i>	<i>ZHR (m/h)</i>
1926	-0.0005	69.1 days before	~17
1933	+0.0054	80.2 days after	~5,000
1946	+0.0015	15.4 days after	~4,000
1952	-0.0057	195.5 days before	~180
1972	+0.00074	58.5 days after	very low
1985	+0.0329	27.2 days after	~700
1998	+0.038	49.5 days before	~500
[2005	+0.043	91.8 days after	???

New Honorary Members

Congratulations to the following, who have been members of the Association for a continuous period of fifty years at the start of the new session, and therefore now become Honorary Members:

	<i>Date elected</i>		<i>Date elected</i>
Mr T. Lithgow	1954 Oct 27	Mr B. S. Rothwell	1955 Feb 23
Mr R. S. Cretnay	1954 Nov 24	Professor B. Warner	1955 Feb 23
Mr R. Davies	1954 Nov 24	Mr R. B. Hill	1955 April 27
Mr S. Dresner	1954 Nov 24	Mr V. A. Holt	1955 May 25
Dr D. A. A. Fagandini	1954 Nov 24	Mr M. F. Farrant	1955 June 29
Mr M. Forman	1954 Nov 24	Mr J. N. Shearme	1955 June 29
Mr K. M. Mayall	1954 Dec 29		

the ‘miss’ distance is not particularly close, being 0.043 AU. So, although a strong Giacobinid shower seems unlikely this October, there have been surprises before, and it is, therefore, important to monitor the shower’s activity this year.

The Earth passes closest to the comet’s descending node shortly after 15:00 UT

on 2005 October 8, which is during daylight hours in the UK, but any meteor activity could well peak somewhat later, and observations as it is getting dark that evening (a Saturday) will be particularly useful. Obviously, radio observations during daylight hours will also be of considerable value. The radiant of the shower is

located at RA 17h 22m, Dec +57.5°, not far from the quadrilateral of stars marking the ‘head’ of Draco.

The BAA Meteor Section will welcome any observations of the Giacobinid shower this year.

John Mason, *Assistant Director*

Aurora Section

2005 May

Geophysically, sunspot cycle 23 is by no means dead. Geomagnetic storm sudden commencements (SSC) were reported on May 7, 15, 28 and 29. Major magnetic storms took place on 8, 15, 16 and 30 May when the planetary magnetic index Ap was respectively 22, 21, 23 and 20. Disturbances in the ionosphere were noted on 8, 15, 29 and 30 when VHF and HF radio transmissions were affected.

On May 26 and 27 however there was a period of virtually no activity at all, and the Ap index was only 2 on both days.

Late on May 7 a solar coronal mass ejection and a coronal hole stream interacted, reaching a peak of disturbance at midday on May 8 when the planetary magnetic index Kp reached 8+. It is reported that the GOES-12 satellite experienced two crossings of the magnetopause as the Earth’s magnetic field was squeezed by the solar wind at about 13.30 and 16.10 UT. The ACE spacecraft measured an increase of the solar wind from 330 to 880 km/sec with particle densities rising from 1 to 35 parti-

cles/cc on May 7. The north-south component of the interplanetary magnetic field Bz fluctuated between -16 to +14 nanoteslas on May 8.

On May 15, the arrival of a CME increased the solar wind speed from about 300 to 1000 km/sec and the particle density rose to 20 particles/cc. Bz, initially varying between -8 and +6 nanoteslas at the start of the magnetic storm, swung to -45 for a period, then returned to positive values. The Kp value rose to 8+ in the morning.

On the night of May 7/8 an active aurora was reported from Vildbjerg in Denmark, by five observers from Wick to Glengarnock in Scotland, and from Morpeth, Northumberland, between 22.00 and 04.15 UT. An auroral glow was seen from Kølvrå in Denmark on May 11/12. There was an unconfirmed report of rays at 02.00 UT in the area of Aboyne on May 15/16.

At Glen Ullin in North Dakota an all-sky, active coronal aurora was recorded on May

NLC observations from the British Isles, 2005 June

Date	No. of observers	Lowest latitude observed	I	II	III	IV	V
06/07	2	Wallsend	✓	✓	-	-	-
08/09	4	Morpeth	✓	✓	✓	-	-
09/10	3	Gengarnock	✓	✓	✓	-	-
13/14	3	London	✓	✓	✓	✓	-
14/15	12	Chichester	✓	✓	✓	✓	✓
15/16	1	Wallsend	✓	✓	-	-	-
16/17	1	Dundee			?		
19/20	13	London	✓	✓	✓	-	-
20/21	1	Wallsend			?		
22/23	14	Chichester	✓	✓	✓	✓	-
26/27	2	Wallsend	-	✓	✓	✓	-
28/29	1	Morpeth	-	✓	-	-	-

14/15. Active lesser aurorae appeared on 15/16 and 19/20 with rays up to an elevation of about 50°. Quiet glows and arcs were noted on 21/22 while glows, arcs and rays were recorded on 28/29 and 29/30.

When comparing geomagnetic with auroral activities note that the magnetic day runs from midnight to midnight and the auroral day from midday to midday. Thus the aurora of 7/8 was best observed by Alastair McBeath in the morning hours of May 8 at Morpeth, as the magnetic storm was coming to a maximum. Similarly the major North Dakotan aurora of May 14/15 was most active in the Dakotan morning when the magnetic storm of the 15th maximised, too late for UK observers. The strength of the aurora was related to the strong negative Bz value of the interplanetary magnetic field orientation.

There was an unconfirmed possible sighting of noctilucent clouds (NLC) from Kilwinning between 21.45 and 22.30 UT on May 10/11. Indications are that sightings in June began on June 6/7, with a big display seen down to the Channel coast on 14/15.

2005 June

Geomagnetic storm sudden commencements were reported on June 12, 14 and 16. Geomagnetic storms were recorded on the nights of 12/13 and 23 when the planetary magnetic index rose respectively to 53 and 50. Lesser disturbances were noted on June 4 ▶

Campaign for Dark Skies Award for M6 Toll lighting

On 2005 May 12 Bob Mizon (CfDS coordinator) and Dr Matthew Dugas (CfDS local officer, West Midlands) visited the headquarters of the M6 Toll motorway, to present BAA Good Lighting awards to Midland Expressway Ltd and WRTL Exterior Lighting Ltd.

The recently built relief motorway is not lit along the whole of its course north of Birmingham, but only around junctions and at the toll collection areas. All its road lamps and floodlights are strictly full-cut-off, with no emissions above the horizontal.

The photo shows Dr Dugas (*left*) and Bob Mizon (*centre*) with Steve Werrett, Midland Expressway’s Assistant Systems Engineer.





Solar Section

2005 May

The month started with active region 756 at $-07^{\circ}/230^{\circ}$, a type Dkc spot near the centre of the disk. It comprised one irregularly shaped penumbral spot with the main umbra to its west and an area of photosphere to its east. Several small spots were seen around the main spot. As this spot neared the western limb, it began to reduce in size and lose its surrounding spots. On May 6, the group

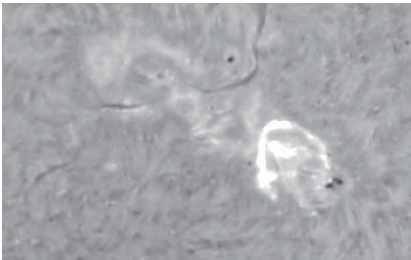


Image taken on 2005 May 09 at 11:04 UT by Eric Strach. An almost circular flare emanating from the penumbral leader spot of AR758 at $-09^{\circ}/19^{\circ}$ W.

and 16, while there were quiet periods from 8 to 11, 19 to 22 and 27 to 30. Our self-recording stations at Kincardine O'Neil, Carlisle and Saltash, together with jamjar magnetometers read in the evenings at Edinburgh and Trelogan, observed the magnetic activity. With allowance for latitude and local circumstances they agreed generally with the magnetograms obtained by the British Geological Survey at their Eskdalemuir observatory in Dumfriesshire.

There were no British observations of the aurora in June. Stephen Martin flying at 51° N 40° W recorded an active striated band between 01.05 and 01.15 UT on June 12/13. From the altitude of the aircraft the base of the arc had an elevation of 3° and the top at 10° .

Jay Brausch in darker skies at Glen Ullin, North Dakota, observed quiet glows on June 5/6 and glows, arcs and active bands on 11/12 that reached an elevation of 50° . On 14/15 and 22/23 glows, arcs, bands and pulsating rays appeared in the morning hours, the latter being classified as a major event coinciding with a magnetic storm.

The principal activity of members this month lay in observing noctilucent clouds. Over 180 observations have been collected to date by Section members and others in the UK, Europe and North America. A preliminary listing of UK apparitions is given in the table.

R. J. Livesey, Director

consisted of a much smaller irregular penumbral spot and two smaller penumbral spots to its south. On May 7 just one penumbral spot was seen on the solar limb.

On May 2 an Hsx spot was seen close to the eastern limb. On the following day a follower spot was seen, making it a type Dao group. By May 5 a loose collection of several penumbral and other spots was seen at $-07^{\circ}/130^{\circ}$ with a total area of 180 millionths. Over the next two days, more small spots appeared which had spread out in longitude to make the group of type Fac. On May 8 the group extended some 20° in longitude which included the central meridian. By May 9 the leading penumbral spot had grown slightly; on May 10 there were three leading penumbral spots which gave the group a total area of 240 millionths. When seen on the following day, these had merged to give an elongated irregular penumbral spot of almost 10° in length; the size and number of following spots had reduced. With the group nearing the western limb on May 12, the penumbral spot had split into three. When last seen on May 13 just a single small irregular spot remained.

The N hemisphere became active on May 8 with a new spot appearing at $+12^{\circ}/56^{\circ}$ as a large penumbral spot with two small followers. It developed marked activity on May 12. It was lying on the CM on May 14 after which it started to fade and it rotated round the W limb on May 20. The disk was blank on May 21 but on the next day two groups appeared on the E limb: AR 767 at $-07^{\circ}/234^{\circ}$ (Dao type) was probably the return of AR 756 of the last rotation. The second group was in the N of a similar type at $+14^{\circ}/240^{\circ}$. It did not develop and faded quickly even before reaching the CM. The southern group did develop spreading into an array of small spots on May 26 and producing three penumbral spots on May 27 before crossing the CM on May 28. After that it faded and on May 30 the follower spot was the only penumbral one.

Hydrogen alpha

Prominence MDF for May was 5.4 (6 observers). A high pillar was seen on May 2 on the W limb at $+24^{\circ}$ and a similar prominence was seen on May 3 at $+53^{\circ}$.

A prominence eruption was seen on May 21 at 10:30 UT at $+50^{\circ}$ on the E limb. It was an extensive smoke-like

structure veering strongly in a NW direction for some 20° . When observing again at 12:30 UT it had completely disappeared.

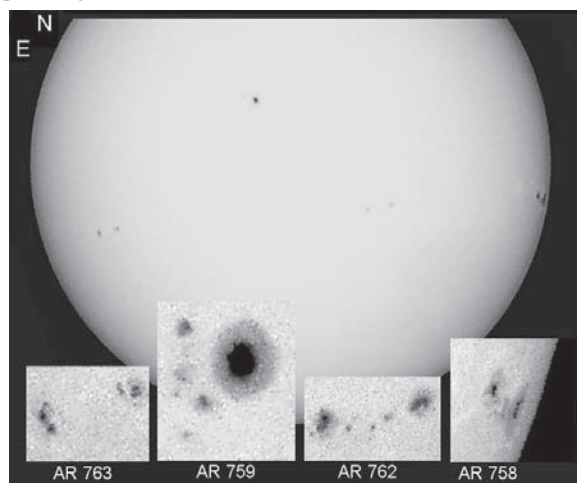
A small but intricate loop prominence was seen on the E limb at N 04° on May 29. It was probably associated with hydrogen activity on the limb. On the same day were six other prominences on the E limb, the most remarkable one at -32° to -39° as a hedge-row type. On May 31 two dense interactive prominences were seen on the E limb at $+13^{\circ}$ to $+19^{\circ}$.

As AR 759 rotated onto the disk on May 8, it was preceded by a long filament. Subsequently, various filaments accompanied the spot group and on May 10 a very dark filament was seen to the S of the group even before the H filter was on band, indicating line of sight motion. This area remained quite active culminating in a 1B flare on May 12. As the spot reached the CM on May 14, a long S-shaped filament was seen to the E of the group.

2005 June

There was a large variation in solar activity recorded during June. On June 7 the value for R was up to 83 but on June 24 to 27 the disk was blank.

On June 4 an Hsx spot was seen close to the eastern limb at $+10^{\circ}/55^{\circ}$. It was the return of AR 759 of rotation 2029 when the penumbral spot was on the CM on May 14 at $+11^{\circ}/54^{\circ}$ as a Cki group. By June 7, the penumbral spot appeared asymmetric with three umbrae within it, and two following spots were also seen. On June 9 following penumbral spots appeared and by June 10 the group was near the central meridian, of type Dkc and 320 millionths in size. During the passage to the western limb, the size and number of spots reduced such that on June 14 a single Hax spot was all that remained. It rotated around the W limb on June 16.



Composite image taken on 2005 May 13 by Peter Paice showing 4 active regions.



Prominence activity on 2005 June 21 imaged by Eric Strach.

BAA sunspot data, 2005 May–June

Day	May		June	
	g	R	g	R
1	2	43	4	65
2	3	45	3	44
3	3	54	3	41
4	2	44	3	54
5	2	45	5	73
6	2	45	5	82
7	2	39	5	83
8	2	47	5	79
9	3	65	5	80
10	4	86	4	75
11	5	82	3	62
12	5	83	3	56
13	4	73	2	38
14	4	60	3	39
15	3	50	3	46
16	3	49	3	46
17	2	35	3	45
18	2	26	2	38
19	2	21	2	36
20	1	14	2	38
21	1	10	2	38
22	2	25	2	30
23	2	26	1	13
24	2	26	0	0
25	2	32	0	0
26	2	41	0	0
27	2	46	0	0
28	2	38	1	13
29	3	46	2	33
30	3	44	4	71
31	4	59		
MDFg	2.56 (50)		2.70 (48)	
Mean R	45.11 (42)		43.95 (40)	

North & south MDF of active areas g

	MDFNg	MDFSg
May	0.81	1.76 (33)
June	0.78	1.85 (29)

g = active areas (AAs)
 MDF = mean daily frequency
 R = relative sunspot number
 The number of observers is given in brackets.

To the south and slightly to the east was another group that was to become the largest seen during the month. It was first seen on June 7 as an Ekc group at $-05^{\circ}/43^{\circ}$ with an area of 370 millionths. It comprised two penumbral spots, the following being quite asymmetric with its largest length being in latitude. On June 10 the group's size increased to 560 millionths. As this group neared the western limb it also decayed as by June 12 it was of type Cao with a much smaller leader spot and a collection of follower spots. On the following day, the number of followers reduced and by June 15 an Hsx spot with an area of 280 millionths was all that remained.

On June 17 a spot had come round the E limb at $-08^{\circ}/250^{\circ}$. The next day the group consisted of 4 spots (AR 780) Cao. There was no spot around this position in the previous rotation but in rotation 2029 a group was seen on the CM on April 29 at $-05^{\circ}/259^{\circ}$ to $-06^{\circ}/254^{\circ}$ (AR 757). It is possible that AR 780 is a revival of AR 757 having failed to appear in rotation 2030.

AR 780 was followed up to its reaching the CM on June 22 but not seen after that. The Sun remained very quiet but on June 28 a spot had come round the E limb at $+13^{\circ}/107^{\circ}$.

On June 30 there were 4 spot groups on the disk, two in the N and two in the S. The largest was at $-16^{\circ}/149^{\circ}$, of bipolar type Dai. The other southern group was near equatorial at $-1.5^{\circ}/98^{\circ}$.

Hydrogen alpha

The prominence MDF for June was 5.4 (6 observers). On June 11 an unusual hedgerow type was on the W limb, extending from $+15^{\circ}$ to $+32^{\circ}$. It seemed to consist of a chain of arc prominences.

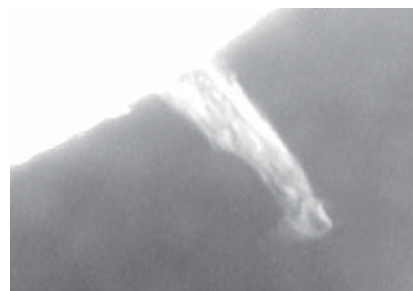
On June 18 an unusually high, chimney-like prominence was in the SW at -49° , its height estimated at 155,000 km (see image). There was no trace of it on the following day.

On June 20 a fairly massive arc prominence on the E limb spanned 10° from -08° to -18° . It had a complex structure and was still visible on June 21 (see image).

On June 22 only the southern portion was seen as a prominence, with the northern part showing as a filament. This was a dense structure on the disk near the E limb on June 23 but was no longer seen after that; it must have been ejected.

Another filament was seen on June 21 extending from the midpoint of the equator between the CM and the E limb in a northerly direction for 12° . It was not seen subsequently and also must be considered as a 'disappearing filament'. (H-alpha notes by Peter Meadows & Eric Strach).

Mike Beales, Director



Chimney-like prominence on 2005 June 18 (Eric Strach).

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