Notes and News

From the President

It is late August as I write and, as always, I am keenly looking forward to forthcoming events of an astronomical kind. Of course, by the time you read this, much of what is anticipated will have already taken place and be part of history. So what will we have had to look forward to in the coming weeks?

SMART-1, the European Space Agency's lunar probe, is scheduled to have crashed into the Moon's surface on the morning of September 3 releasing debris and material, which may have been detectable using amateur-sized telescopes.

Also as I write, astronomers are meeting *en masse* in Prague on the occasion of the General Assembly of the International Astronomical Union. Having been involved in the subject of minor planets for many years now, I have a particular interest in the deliberations that are ensuing at Prague as to the status of Pluto as a planet, and indeed the definition of 'What is a Planet?' Whatever happens, I do not envisage that we shall have to rename our Asteroids and Remote Planets Section in the light of any decision by the IAU!

On September 15/16, the 6th European Dark-Skies Symposium will have taken place: this year it is being held in Portsmouth and is organised by the BAA Campaign for Dark Skies (CfDS). Naturally I shall be attending, as like many of you I am acutely aware of the way in which access to the night sky is made more and more difficult by the seemingly inexorable increase in light pollution. Many of the delegates and speakers will be from mainland Europe and we shall also have representatives present from the International Dark-Sky Association (IDA), based in America. The symposium is very much a 21st Century initiative and in the case of the UK is a timely event since it builds on the outcome of the recent report from the House of Commons Science and Technology Committee on 'Light Pollution and Astronomy'. One of the issues in my mind is that of public awareness of the growing problem – I for one am disappointed in the minimal coverage the subject seems to achieve in the media, so I do hope the CfDS Symposium will have attracted accurate and sensible reporting in the press and on TV.

One proposal for the future is to utilise the BAA website to carry out an ongoing online survey of night sky visibility both in the UK and elsewhere. The survey would be based on observations of the limiting visual magnitude using the unaided eye, counting stars within asterisms such as the Square of Pegasus and the Dipper on moonless nights. If you have any particular views on the matter then why not raise the topic as a discussion item on our Members Only section of the BAA website at **www.britastro.org**: you do need to register first to gain access.

Previous notes have mentioned our impending temporary move from Burlington House. Our new 'home' will be at Hallam Court, 77 Hallam Street, London W1W 5HB. By October the move will be well underway. Indeed, the present schedule calls for us to vacate Burlington House by the end of the month so as you can imagine October will be a very hectic time for the BAA Office and Library. If you do have any difficulty communicating or otherwise then do consult the website or feel free to get in touch with me directly (my contact details are included with those listed on the last page of each *Journal*). The premises at Hallam Court are quite spacious and so we have agreed to share them with the Royal Astronomical Society. We anticipate being in residence there until the end of 2007.

One final mention is that of the free e-Circulars that are sent out by e-mail from time to time. These are proving to be a most effective vehicle for notifying members of important astronomical events, news of forthcoming meetings, etc. Since their inception in late 2001, we have sent out on average 50 such circulars per annum. That corresponds to about 1 e-Circular per week.

If you do not yet receive these by e-mail and you wish to do so then you will have to register so that your address can be added to the BAA mailing list. You can do this by sending an e-mail request to **circadmin@britastro.org**. E-circulars are a very immediate means by which we can inform members of important news, so I do encourage you to take full advantage of this facility.

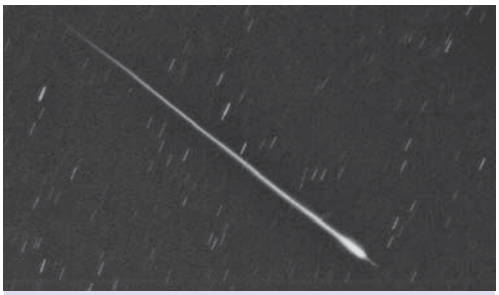
Clear skies,

Richard Miles, *President*

Meteor Section

One last blast from the Leonids?

With a bright Moon drowning out the Perseids back in August, meteor observers have had a thin year so far. More favourable lunar phasing through the autumn will bring a change for the better. The Orionids, active in the second half of October, are excellently placed in 2006, with the Moon not reaching first quarter until Oct 29, and therefore setting well before midnight during the shower's most active period.



A Leonid fireball photographed from Palau, Micronesia on 2001 November 18. *Martin Mobberley.*

Produced by debris shed from Comet 1P/Halley, the Orionids have a broad activity peak between October 20 and 22. Zenithal Hourly Rates (ZHRs), corrected for sky transparency and radiant altitude, are typically of the order of 20–25 at best, corresponding to observed rates in reasonable conditions of 10–15 meteors/hr. Even away from the nominal maximum period, the Orionids can produce intervals of quite respectable activity – October 27–28 seems to bring a subpeak in many years, for example.

Orionids are swift meteors (the stream meteoroids have an atmospheric entry velocity of 60 km/s), and often leave behind persistent ionisation trains. The majority of Orionids are in the magnitude +1 to +3 range visually, but occasional brighter examples are seen.

The Orionid radiant, northeast from Betelgeuse, doesn't rise until 22h local time, and best observed rates will be found in the early hours. Similar constraints apply for the Leonids, active between November 15–20 – again in dark skies this year, untroubled by moonlight. The shower radiant, in Leo's 'Sickle', rises around 23h local time, and climbs high in the southeastern sky during the post-midnight hours.

The strong display of 1998[1] has gone down in observing lore as 'The Night of the Fireballs', fondly remembered by the many around the globe who saw it, while storms – intervals during which the ZHR briefly exceeded 1000 – were seen in 1999,[2] 2001 and 2002. Section reports on the last two of these are in preparation: out of all the activity in the recent cycle of Leonid enhancement, 2001 was the most active and sustained, with Equivalent ZHR over Pacific longitudes reaching about 6000 around Nov 18d 18h UT. When last seen in dark skies, in 2004, the Leonids appear to have returned to their more normal, quiet-time pattern with ZHR no higher than the 20s.

Based on distinct 'filaments' of debris shed by Comet 55P/Tempel–Tuttle at each perihelion return, the model of the Leonid meteor stream developed by David Asher and Robert McNaught proved successful in forecasting interludes of strong activity between 2000 and 2002.[3] The big peak in 2001, for

example, resulted from near-overlapping encounters between Earth and filaments laid down at the 1767 and 1866 returns. The model suggests that we may enjoy one last encounter, leading to enhanced – though far from storm-level – rates on 2006 November 18–19, a Saturday night to Sunday morning. Close to Nov 19d 04h 45m UT, we should run through the debris trail from Tempel–Tuttle's 1932 return.

Being now eight years 'downstream' from the comet, it is reasonable to assume that the debris, even in such a filament, will be fairly thinly-spread compared with that encountered in 2001/2. Based on a similar encounter in 1969, McNaught and Asher suggest we may enjoy a ZHR of 100; some of the more optimistic forecasts say 150. Such a display would compare favourably in terms of rates, at least, with the Perseids in a typical year. It is felt likely, however, that most of the meteors will be relatively faint; absence of moonlight will certainly be advantageous on this occasion. Leonid meteors are even faster than Orionids (entry velocity 70 km/s), and the brighter shower members, particularly, often leave long-duration persistent trains.

Observers are encouraged to carry out watches on November 18–19 from midnight until dawn, using the Meteor Section's standard methods[4] (**http://www.britastro.org/meteor**). Even negative reports will be of use in assessing the spread of material within the Leonid stream. Seasoned observers will need no reminder that we need data for all possible nights during this favourable Leonids return. The regular, annual maximum is expected around Nov 17d 23h UT, and Leonid activity on the night of November 17–18 should be rewarding.

The possible outburst on 2006 Nov 18–19 represents the last opportunity for very high Leonid rates until the late 2020s, when the next round of enhanced activity begins. Gravitational perturbations by the major planets will pull the densest parts of the Leonid stream away from Earth again, and it is likely that activity around 55P/Tempel–Tuttle's 2032 return will be less strong than that seen between 1999 and 2002.

Neil Bone, *Director*

1 Bone N. M. & Evans S. J., *J. Brit. Astron. Assoc.*, **111**(6), 333–339 (2001)
2 Bone N. M., *J. Brit. Astron. Assoc.*, **113**(3), 157–163 (2003)
3 Asher D. J. & McNaught R. H., *WGN*, **28**(5), 136–143 (2000)
4 Bone N., *J. Brit. Astron. Assoc.*, 114(4), 219–222 (2004)

Solar Section

2006 May

Sunspot activity during May was on a similar level to that of April with only five spotless days recorded, between May 14 and 18. The southern hemisphere saw the bulk of activity with the northern hemisphere being recorded as spotless on May 7, 9–13, and 20–21.

AR875 was recorded at 9º/113º with an area of 100 millionths and was observed as a group type Hax on May 2, being the return of AR865 from early April.

AR879 was a short lived Cao group at N15º/62º, observed on May 3 but not visible by May 6.

AR882 was the largest group during May, appearing between May 5 and 7 as a Dso group at S13º/34º with an area of 60 millionths. The leading penumbral spot developed until May 9 but by May 10 the group had decayed to type Cso as it approached the western limb on May 11.

AR885 was observed on May 23 as trio of penumbral spots at S12º/148º, but had decayed by 25th and had disappeared by the following day.

AR889 was close to the solar equator at 0º/91º on May 28 as type Cao and as type Hsx by May 29, with an area of 30 millionths on both days.

Hydrogen alpha

Prominences

MDF 3.96 (5 observers). The prominence count was similar to recent months with a preponderance in the southern hemisphere. A striking prominence was seen on May 9 as a 'flame' on the NE limb about 35ºN. Although similar in appearance on May 10, by the 11th it looked like a 'tree' with many 'branches' and was twice the height of the previous day. There was no trace of it on May 12.

A similar but less massive prominence was observed on the E limb on May 25 at S47º to S52º, leaving two single jets in the same position on the following day. A complex low arc prominence was seen on May 31 on the E limb at S15º to S24º, with thin streamers extending northwards.

Filaments

On May 11 a very dark filament was seen near the centre of the disk which had weakened in intensity by the following day.

On May 26 Eric Strach observed the first sign of a circumpolar filament which appeared as a small prominence on the E limb at N51º, associated with a short filament. On 28 the filament was approaching the CM and by May 30 the elongated filament was seen W of CM on the N50º parallel. By May 31 it had extended almost to the W limb.

Plages and flares

Eric Strach observed 'extensive bright plages' surrounding AR875 and to a lesser extent

'Hello' from your new Director

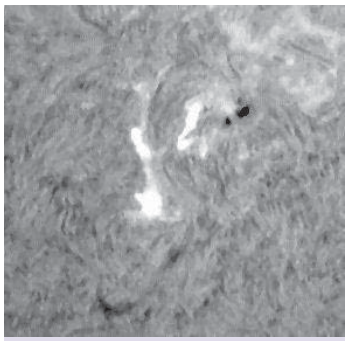
Hello everyone. I'd just like to say how delighted I am to be taking over the Section from Mike Beales and to thank him for his contribution to the Section. I am just starting to realise how much work he actually did!

A few words about myself by way of introduction. I first started solar observing in the late 1960s but had to give up active observing in the mid '70s due to work commitments. I took up active observing again twenty years later and found that my enthusiasm for solar related matters had not diminished. In fact, due to the progress in technology, the observing side of astronomy had markedly improved with the introduction of digital cameras, CCDs, H-alpha 'scopes etc. I hope that all Solar Section members will find some time to get out into public venues with their 'scopes and take solar observing to the general public. You'll soon attract the curious and who knows, you may even recruit a member or two.

Good observing, and I hope to meet you at a future BAA meeting. Please come up and introduce yourself.

Lyn Smith

AR876. Two southern extensions of the AR875 plage brightened significantly at 15:05 UT and became a 2N flare. Although the spots of AR876 had faded on May 3, the extensive plages persisted up to May 5. Extensive plages as well as filaments surrounded the 'trio' of spots of AR885 on May 23.



Solar flare on 2006 May 01 at 15:59 UT. *Eric Strach*.

Monty Leventhal reported a type 1B flare starting at 23:15 UT on May 25, peaking at 23:25 and ending at 23:45. 2 surges on that date commenced at 23:15 and ended at 23:30 UT, 30ºW, 20ºS.

2006 June

The month began with a spotless disk for the first three days. Three further spotless days were recorded on June 22, 23 and 24. Again the bulk of activity was in the south with little northern activity until the appearance of AR897 on June 26.

AR892 rotated onto the disk at S8º/283º as a bipolar Cso group on June 4. The following day it had expanded to type Eao with an area of 170 millionths and by June 6 was 14º in longitude, type Eki. It obtained its maximum area on June 7 and crossed the CM on 10th, losing all its following penumbral spots to become type Cai. The group started to decay on June 11 and was last seen approaching the western limb on June 15, exhibiting a dark area to the east and south of the group which coincided with a short lived prominence at 08:25 UT at S7º.

AR893 appeared at S3º/261º on June 6 as type Axx. By June 7 the group had developed a penumbral leading spot and became type Dso with an area of 120 millionths on June 8. The spot then started to decay to type Cai on June 10, crossed the CM on the 12th and was not seen after the 14th.

Prominence at 16:00 UT on 2006 May 26. *Peter Paice*.

AR896 was first seen as type Bxo at 10ºS/151º on June 16. By June 18 a small Hsx spot had formed. The group was short lived and quickly faded, disappearing altogether by June 22.

AR897 was first seen on June 26 at N6º/003º type Cao. On the 27th the group displayed an 'arc' of tiny spots to the north of the penumbral spot, type Csi. These spots developed considerably by the next day to encompass an area of 110 millionths. The group started to decay and was last seen on June 30 approaching the CM.

AR898, the most outstanding spot of the month, rotated onto the eastern limb on June 27. By June 28 the spot was fully on the disk as a single penumbral spot type Hsx. The group developed a nearby penumbral spot on June 29 which persisted the following day when the group was measured at 300 millionths in area.

Hydrogen alpha

Prominences

The prominence MDF for June was 3.8 (10 observers).

The northern hemisphere saw the most activity in H-alpha but the general activity level was on par with last month. Numerous prominences were evident in the first week reaching a total of 7 on June 5, but the most striking was a pyramidal shape on the western limb between 47ºN and 50ºN. This 'flame' prominence persisted until June 8.

Eric Strach reports a short-lived prominence eruption on June 15 on the W limb which seemed to have been associated with the passage of AR892 reported above. The pillar-shaped prominence was estimated at a height of 120,000km at 08:25 but had fallen to around 40,000km by 08:33. Lee Macdonald reported an eruptive prominence visible at 17:47 UT on June 24 on the eastern limb. The prominence had almost doubled in size during seven minutes of observation and was extremely bright appearing almost white in the central strand.

Filaments

Part of a circumpolar filament was seen on the western part of the N50º parallel during the first four days of June. By June 4 it was shorter, part of it being seen as a prominence. A long oblique filament was observed in the SE quadrant on June 6 which became more prominent on the 7th when it coursed from a point 10ºS from the CM in a SE direction. Its lowermost part crossed the CM on June 8; subsequently it seemed to fragment but revived to its original shape on June 11. There was no trace of it or a related prominence the next day leading to speculation that it was ejected.

A filamentous surge was seen to the N of the penumbral spot of AR892 at 11:00UT on June 7. Another filamentous surge was observed on June 30 at 09:00 to the NW of the large penumbral spot AR898.

Peter Meadows reported a particularly dark filament initially seen on June 21 close to the SE limb. It remained dark on June 23 and 24 but was a little broader than on the 21st, its length estimated around 20º.

Flares

Only two reported this month, both by Eric Strach:

June 7, 11:30 UT, S3º/E259, SF
June 9, 11:00 UT, S3º/E259, SF

both associated with AR893.

Lyn Smith, *Director*

BAA sunspot data, 2006 May–June

	May		*June*	
Day	*g*	*R*	*g*	*R*
1	3	45	0	3
2	4	42	0	0
3	3	44	0	1
4	4	52	1	13
5	4	40	1	20
6	3	33	2	25
7	4	41	2	44
8	3	40	2	39
9	3	33	2	35
10	2	27	2	32
11	2	19	2	28
12	1	12	2	24
13	1	8	2	22
14	0	0	1	13
15	0	0	1	12
16	0	0	0	5
17	0	0	1	8
18	0	0	1	11
19	1	7	1	15
20	1	15	1	16
21	2	27	0	6
22	2	32	0	0
23	2	27	0	1
24	2	34	0	0
25	2	29	1	8
26	3	34	1	13
27	3	33	1	21
28	4	31	2	34
29	4	47	2	34
30	4	39	2	34
31	3	29		
MDFg	2.11 (50)		1.10 (48)	
Mean R	27.66 (42)		16.68 (42)	

North & south MDF of active areas g

	MDFNg	*MDFSg*
May	0.76	1.6 (31)
June	0.35	0.98 (31)

g = active areas (AAs)
MDF = mean daily frequency
R = relative sunspot number
The no. of observers is given in brackets.

Jupiter Section

Jupiter in 2006

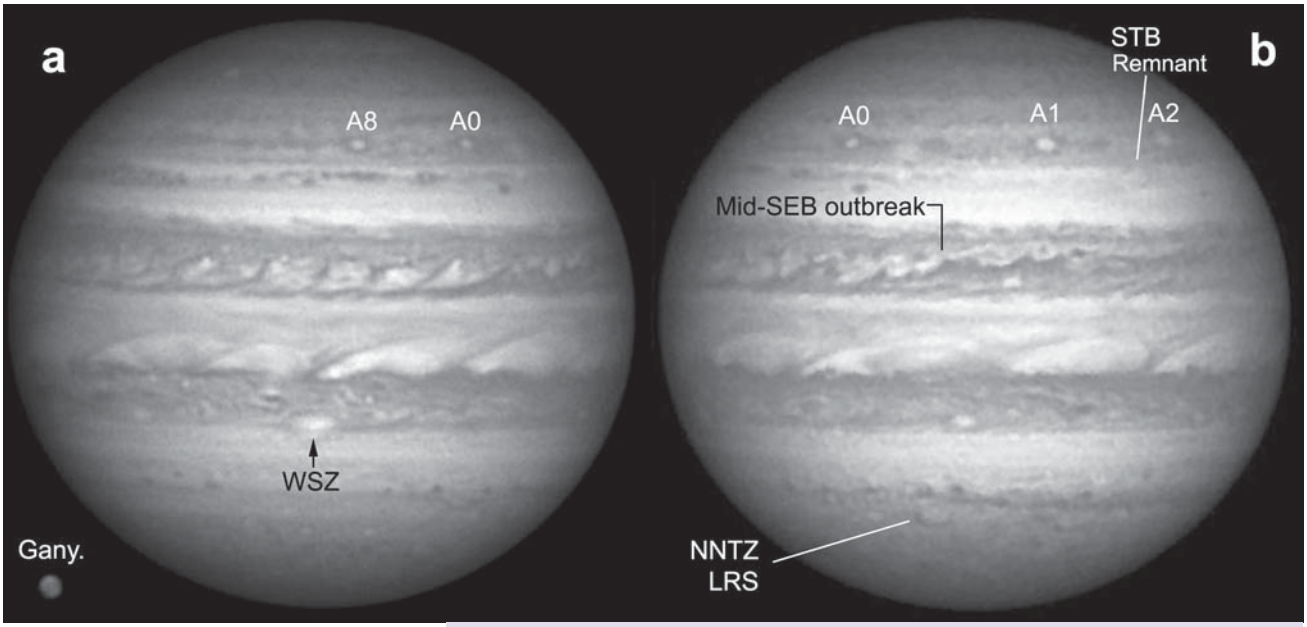


Figure 1 (above and facing page). Four images covering the whole planet on 2006 April 12–15. **(a,b: above)** Taken by Christopher Go (Cebu, Philippines) using a Celestron-11. **(c,d: facing)** Taken by Damian Peach and Dave Tyler in Barbados, using Celestron-14s: **(c)** is a synthesis of simultaneous recordings from both telescopes; **(d)** by Peach.

Features marked include long-lived anticyclonic white ovals (AWOs) in each of the South Temperate domains, viz.: 60°S, 50°S, 41°S (the S.S. Temperate AWOs labelled A8, A0, A1 to A5), and oval BA. Numerous AWOs can also be seen in the NEBn including the longest-lived, white spot Z (WSZ). In the N.N. Temperate domain, labels indicate an AWO, a Little Red Spot (LRS), a dark spot (DS), and NNTBs jetstream spots prograding along a faint, reddish sector of NNTB.

(a) April 12, 18:20 UT, CM1=133, CM2=252. Ganymede (slightly displaced to include it in the figure) shows a genuine oblique dark band (although image processing also produces a central dark spot in such hi-res images).
(b) April 15, 17:33 UT, CM1=219, CM2=315.
(c) April 14, 04:29 UT, CM1=302.5, CM2=50.5. Io appears flattened because its polar caps are dark.
(d) April 12, 05:59 UT, CM1=41, CM2=164. South is up in all images.

Jupiter has been in the news in 2006 because one of its long-lived white ovals has become reddish, like the Great Red Spot (GRS). But that is not the only event on the planet this year. Figure 1 shows the whole planet at the high resolution now achieved in webcam images.

Large-scale changes in the Equatorial Belts and Zone

The South Equatorial Belt (SEB) has displayed more widespread disturbance than for many years. There is always a turbulent 'rifted' region following the GRS, in which bright white spots (thunderstorms) erupt and prograde towards the Red Spot Hollow. Sometimes, the site of these eruptions suddenly shifts tens of degrees west, extending this post-GRS disturbance; more rarely, every few years, such an eruption begins at a more remote longitude, comprising a separate mid-SEB outbreak. In 2005 December, not one but two such new eruptions were noticed. One, at L2~ 180-195, had probably begun in or about November. The other, at L2= 350, was first observed by Tiziano Olivetti (Thailand) on Dec 10, and noticed by Hideo Einaga (Japan) on Dec 18. From both these sources, bright spots repeatedly burst forth and prograded as usual, producing long turbulent sectors of SEB, which ultimately overlapped and merged. Moreover, sometimes turbulent bright spots came through *p.* the Red Spot Hollow, so that the SEB was intricately disturbed at all longitudes.

Meanwhile the North Equatorial Belt (SEB) is in the post-expansion phase of one of its quadrennial cycles. It underwent a classical expansion event in 2004, followed as usual by appearance of more dark 'barges' and bright white ovals. The other sequel, reddening of the belt, was suggested by images at the start of 2006, although this was not very strong nor persistent. The brilliant, long-lived white spot Z was prograding even faster than before, and induced another merger of two 'barges' preceding it in Feb, and itself collided with another white oval in June.

The most dramatic large-scale changes have been in the Equatorial Zone (EZ): dark features are accumulating all across the EZ and EB. The narrow EZ(S) has gradually changed from brilliant white to a dull yellowish colour, with some grey-brown veils. Even more obviously, the bluish-grey festoons in EZ(N) have become much bigger and darker (and speeded up their drift rate), reverting to the state last seen in 1999. This change may be a seasonal one on Jupiter, as the fading and slowing of the dark projections in 2000 resembled a similar change in 1989, and indeed such decelerations have tended to occur a year or two after Jupiter's perihelion.[1]

The evolution of the Great Red Spot

It is often said that the GRS has existed for more than 340 years, since Cassini and others first observed a similar spot in 1665-1713. However I suspect the present GRS is actually a new one that arose in the 1700s.[2] It was first observed as a long pale 'hollow' in 1831. It became a dusky elliptical ring in 1857-'59 and again in 1870. It first developed reddish colour in the 1870s, and only then became a striking Great Red Spot. It has been shrinking in length and decelerating in drift rate (though with large fluctuations) ever since the 19th century. There is also probably a trend for its internal wind speeds to accelerate (*Galileo Orbiter* data[3]).

In 2006, amateur images have recorded the internal circulation clearly. Dark streaks were imaged rotating inside the GRS in April, ▸ *p.228*

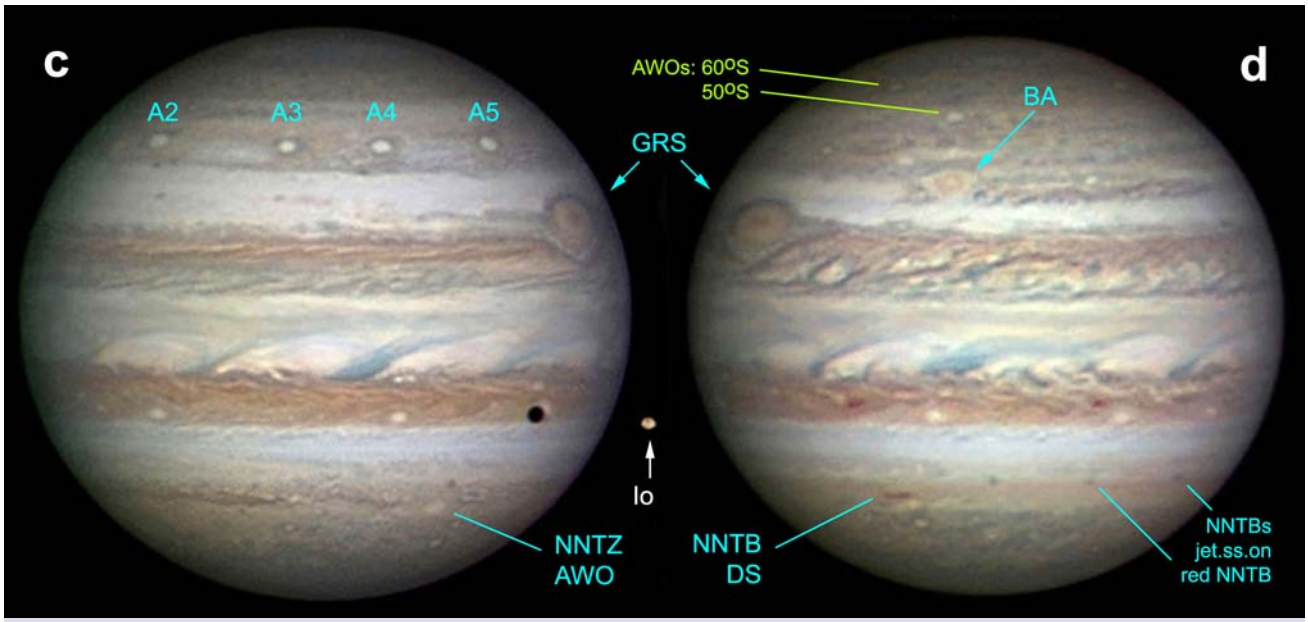


Figure 1 *(continued)*. See caption opposite.

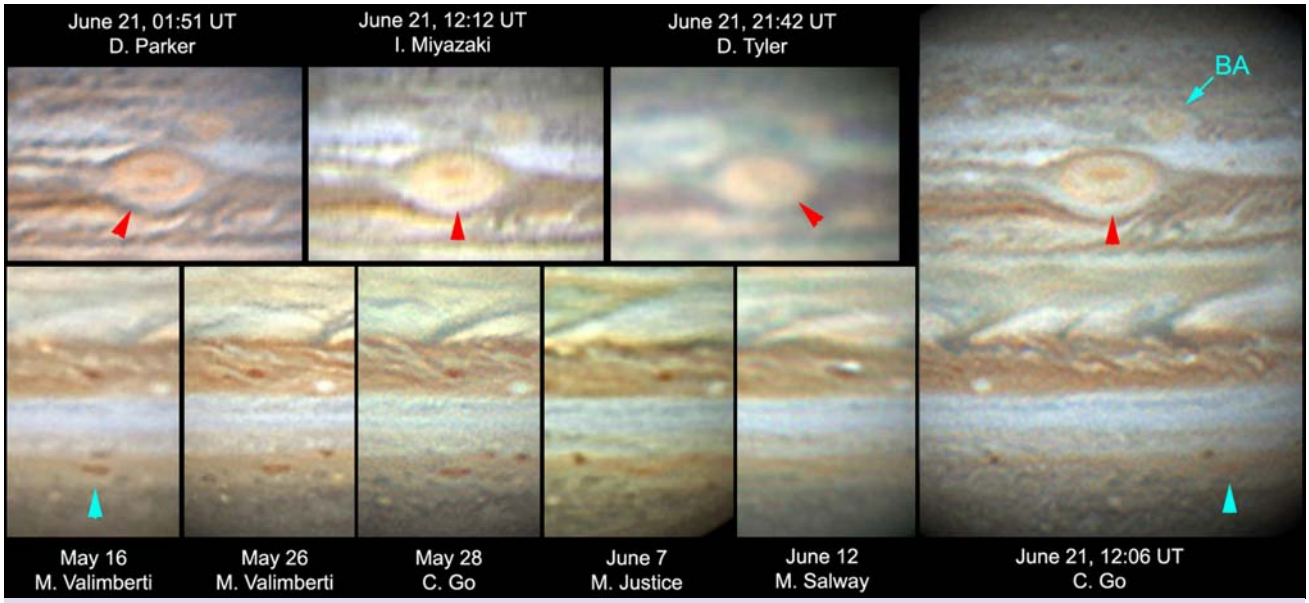


Figure 2. *Top:* Internal circulation of the GRS on 2006 June 21, as shown by the movement of a dark streak (red arrow) on successive rotations of the planet. This motion supports the rotation period of 4–5 days obtained in other sequences of images. Oval BA is adjacent.
Bottom: A very dark cyclonic spot ('barge'; blue arrowhead), belonging to the NNTB, turns red just before it fades away, leaving only a faint red smudge in its place. Due south is a dark barge in NEB, which is destroyed after June 12 when a bright white spot erupts adjacent to it. *Observers:* Christopher Go (Cebu, Philippines), Mark Justice (Australia), Isao Miyazaki (Okinawa, Japan), Donald C. Parker (Florida, USA), Damian Peach (Barbados), Mike Salway (Australia), Dave Tyler (Barbados or UK), Maurice Valimberti (Australia).

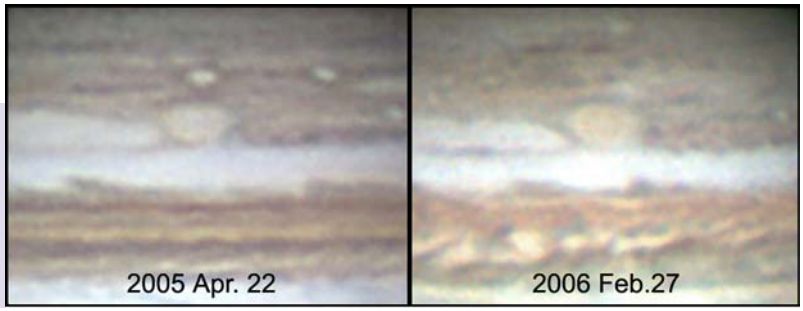


Figure 3. The appearance of orange colour in oval BA. *Left,* 2005 April 22, 01:19 UT, CM1=11.0, CM2=323.8, CM3=0.9, Peach: oval BA (in centre) is almost white. *Right,* 2006 Feb 27, 19:37 UT, CM1=68, CM2=162, CM3=284, Go: oval BA contains a distinct pale orange ring. This became more distinct over subsequent months (Figure 2 and cover pictures).

June, and July. A set of images from June 21 is in Figure 2. Taking all the data together, the circulation period is only 4.5 days. It confirms that the period has shortened since 1979 when the *Voyager* images gave a period of 6–8 days.

The evolution of oval BA

The most novel change this year is that white oval BA, an enormous anticyclone like the GRS, has likewise turned reddish. Oval BA is the last survivor of the three great South Temperate white ovals which merged in 1998–2000. Up to mid-2005, it had little or no colour. But from the start of this apparition it has appeared orange (Figure 3 & cover). This was first evident in an image by Tiziano Olivetti on 2005 Dec 9, and first reported by Christopher Go on 2006 Feb 24. The colour is confined to an oval ring within BA, and if anything it has intensified during the apparition. Two teams of scientists obtained time on the Hubble Space Telescope to image it (see cover picture). Then in 2006 July, its drift carried oval BA past the GRS, producing the striking sight of these two orange ovals in contact.

The development of colour in oval BA was not expected, but it may resemble the way in which the GRS first developed an oval ring, in the 19th century, as a precursor to becoming generally red. It may also indicate that the wind speeds in oval BA are accelerating, as they are in the GRS.

'Red' material on Jupiter (which is usually more dull orange or brownish in colour) forms a haze overlying the main cloud-tops, and generally appears in areas of rapid winds or intense eddying. The nature of the red material is not known, but scientists suspect that strong vorticity draws gas up from deep in the planet, carrying compounds which are either red themselves, or acted on by sunlight to create the red colour.

Several other, more common examples of reddish tints have been seen this year as well. Indeed there was already another anticyclonic Little Red Spot, in the NNTZ (Figure 1). Although its colour is presently weak, such ovals in the NNTZ are quite common. Conversely, a very dark cyclonic oval in the NNTB also turned red just before fading away in 2006 May–June (Figure 2). As it started to turn reddish, the author predicted that this oval would 'vanish in a puff of red smoke', having recently discovered that this is a general phenomenon for dark ovals or belt segments in this and other latitudes (to be described in our report on Jupiter in 2001/'02, in preparation). Finally, whole belts often develop reddish colour after a sudden outbreak of disturbance: e.g. in early 2006 the NEB, after the broadening event, and part of the NNTB, after jet-stream spot activity. All these phenomena must be telling us something interesting about the chemistry and dynamics of Jupiter's atmosphere.

John H. Rogers, *Director*

1 Rogers J. H., *The Giant Planet Jupiter,* Cambridge University Press, 1995, p.144
2 *ibid*., pp.188-196, 262-264
3 Simon-Miller A. A. *et al., Icarus* **158**, 249-266 (2002)