Notes and News

From the President

Ever since the formation of the BAA, the traditional view of the keen amateur observer has been of someone having ready access to a telescope in his or her backyard or some other place within easy reach. Convenient access is crucial since observers have to take advantage of those all too few occasions when the sky is clear. However, over the last few months, I have become acutely aware of a new vista on the observing horizon: namely that of the remote robotic telescope.

This first struck home in a very dramatic fashion at our Out-of-London meeting in April at Liverpool University, when we achieved our first successful remote observing session using the 2-metre Faulkes Telescope North in Hawaii. The very first object to be imaged was the fragmenting comet 73P/Schwassmann-Wachmann 3 as depicted in the June issue of the *Journal* (p.146). When this image flashed up on the big screen in the lecture hall at the University, spontaneous applause and cheering erupted from the 120-strong audience. They, like me, were clearly impressed by the dramatic image taken only seconds earlier from a remote mountain top on the other side of the globe.

The following month, I participated in the Meeting on Comets and Asteroids in Europe (MACE 2006) held at the historic Kuffner Observatory in Vienna, where again the topic of remote observing was on the agenda. On this occasion, the telescopes involved were more modest amateur-sized instruments, but seeing telescopes in both North America and South America being controlled in real time over the internet was most impressive. Then in June, I was surprised to hear that even our master visual variable star observer, Gary Poyner, was making use of the Bradford Robotic Telescope on La Palma in the Canary Islands to follow the blazar, OJ+287, a suspected binary black hole candidate, as it approaches solar conjunction this summer (see below).

All these recent happenings have led me to think more seriously about remote observing especially from the point of view of amateurs based in the UK, where the weather conditions are far from ideal. I do believe that one effect of global warming will be to disadvantage observers living at relatively northern latitudes, where we can expect to experience more extremes and more cloud cover on average in the future. Indeed, my observing records show that following a record month for clear nights in August of last year, the weather then deteriorated and we have had few truly 'photometric' nights since that time. This is where remote access to telescopes sited in parts of the world with favourable skies would permit a UK-based observer to follow observing targets from night to night immune from the British weather. Furthermore, many of our members not only have poor weather to contend with but also live in towns or cities, where light pollution is a serious problem. Again, a remote robotic telescope would be one way around this impasse and might encourage more active participation in the work of the Observing Sections.

How the BAA may help is a good question. I would be happy to receive any comments and suggestions on this topic. We shall of course continue to incorporate a live linkup to the Faulkes Telescope in Hawaii during some of our forthcoming all-day meetings and workshops. Do watch this space.

I mentioned in my very first '*From the President*' spot last December that our membership target should be 3000+ since we need this level of support to keep costs per member at an acceptable level. Well the good news is that, thanks to all the hard work of John Mason, along with Jean Felles and Val Stoneham in the BAA Office as well as others, we have now surpassed this figure! Of course, we shall be further encouraging all those with an interest in astronomy to join the Association. More members will mean we will have more scope to keep costs down, which is good news all round.

Also of note are two new products in our sales catalogue, namely a newly-compiled *Observers' Guide* and the *2006 Total Solar Eclipse DVD* containing pictures and videos from across Libya, Egypt and Turkey and including a post eclipse roundup by John Mason from on board the cruise vessel, the *M/V Perla*. The *Observing Guide* is ideal for those wanting to know more about the work of the Observing Sections. Both publications are well worth a look and can be ordered online via the Web page at **www.britastro.org**.

Finally, regarding news of our Office and Library at Burlington House, I can report that we have now identified temporary accommodation to use during our absence from the building whilst it is being refurbished, and that we are expecting to move during October. The new location for our office activities will be quite central, being fairly close to Oxford Circus. I should remind you again that we have suspended our normal library operations until further notice. I shall of course keep you posted on progress.

Clear skies,

Richard Miles, *President*

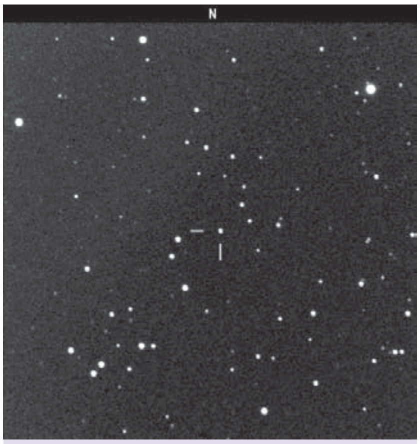
Variable Star Section

The 2005–2007 OJ287 observing campaign

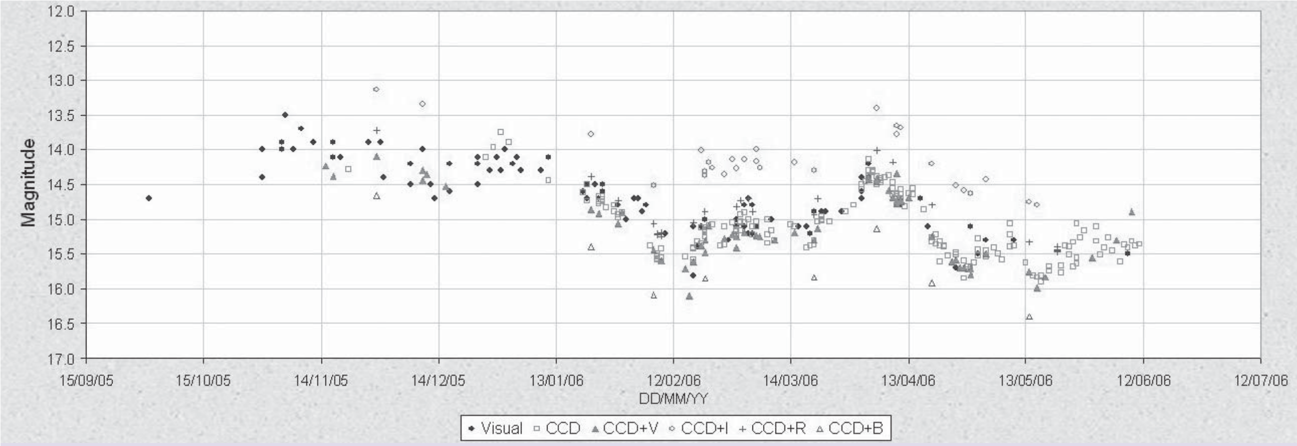
Residing in the constellation of Cancer, and just 3.5° east of the open cluster M44, lies one of the most enigmatic objects visible with amateur telescopes. The blazar OJ287 has been studied professionally since its discovery as a quasar in 1968, and pre-discovery images taken 'by accident' since 1891 have led astronomers to compile a 100+ year lightcurve revealing a most extraordinary find – OJ287 appears to have periodic outbursts of magnitude 12.0 to 14.0. Other AGN have outbursts too of course, but not at regular intervals. OJ appears to be unique.

Astronomers in Finland began a detailed look at the long term lightcurve in 1987, and came up with a double period of 11.6 and 1.1 years. Also not only did the outbursts seem periodic, but a sixty-year cycle seemed to be present in the light curve, suggesting that the amplitude may be cyclic too. Dr Mauri Valtonen and his team suggested a binary black hole model in a highly elliptical orbit could be a likely cause of the periodicity seen in the data. Following outbursts in 1972 and 1983, it became obvious that an international campaign was needed to cover the expected 1994 outburst, to help support the binary black hole model.

It came as a surprise therefore to find that the predicted 2006 outburst was hardly being publicised, and that professional interest seemed a bit thin on the ground. A chance meeting with Dr Mark Kidger (who had been involved with OJ287 and the Finnish group since the early 1990s) at the 2005 TA AGM, provided a good opportunity to talk about



OJ287 at about mag 15.8, imaged by Martin Mobberley on 2006 May 15.930. 120 sec., Celestron 14 (355mm SCT) with ST9XE CCD. The image size is 13'×13'.



Light curve for OJ287 from 2005 October to 2006 June. The 'outburst' type rise in 2006 March/April was in fact a flare, often seen in this remarkable object.

setting up an observing campaign of our own to cover the forthcoming outburst. This resulted in the current BAAVSS 2005–2007 campaign. At present 26 observers (both visual & CCD) from five countries (UK, USA, New Zealand, Finland & Germany) have reported over 350 observations to the writer, who has in turn sent the data to Mark for a more detailed analysis.

As the campaign progressed, it became obvious from the data received that all was not going to plan. For the 2006 outburst to happen 'on time', a slow brightening trend should have been visible in the lightcurve for several months prior to mid 2006. This has not happened. Instead we have a major brightening in 2005 October/November, where OJ287 reached its brightest level for twenty years, and data to suggest it had been steadily rising over a period of about two years (we also had a flare in 2006 March, but this phenomenon is not unusual in this object). Was this the outburst we were all looking for? Analysis by Mark has revealed that it's quite impossible to fit this outburst with the period as determined from sixty years of data, and the idea that OJ287 has a strong 11.6 year period is now looking increasingly unlikely. Further work by Mark on BAAVSS/TA data from 1990 onwards, and his subsequent discussions with astronomers in Finland who worked on the OJ287 campaign in the 1990s, reveal that the 2005 autumn maximum did appear to be the outburst we were waiting for. To make matters even more complicated, Dr Harry Pietila (Tuorla, Finland), who has studied the available data and made many minor changes to the orbital parameters of the binary black hole model, has predicted a date for the first outburst to be early to mid 2006 and that the outburst will be short, and the second one to be larger and occurring between late July and early September 2007.[2]

With this degree of uncertainty on whether the predicted 2006 outburst occured in late 2005, or when the next outburst will even take place, it is even more important that the current campaign continues to monitor OJ287 for as long as possible – even into 2008. Observers are asked to attempt to observe OJ287 as early as possible following solar conjunction (mid-September), and to report their observations to the writer as soon as possible. OJ287 should then be monitored at every possible occasion until the campaign closes. A web page with daily updates to the lightcurves has been set up, which includes links to the official charts used in the observing campaign.

All this goes to show that when it comes to a mysterious object like OJ287, we still have it all to discover.

The writer is indebted to Dr Mark Kidger for his unwavering support for this campaign, and his frequent e-mails supplying up-to-date information on OJ287 itself.

Gary Poyner

http://www.garypoyner.pwp.blueyonder.co.uk/oj_camp.html

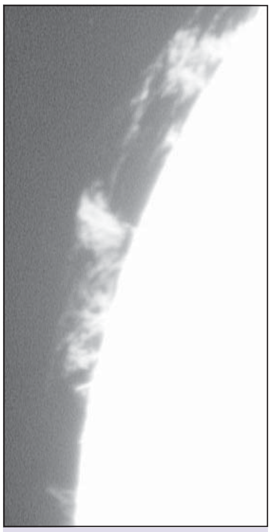
1 Pursimo T. *et al.*, 'Intensive monitoring of OJ 287', *A&AS*, **146**, 141 (2000)
2 Pietila H., 'Possibilities and predictions of the OJ 287 binary black hole model', *ApJ*, **508**, 669 (1998)

Solar Section

2006 March

The MDF for March was higher than last month with slightly fewer blank disks recorded.

On March 15 a small Axx type spot was seen at –04/305° (AR 860). By March 18 it had developed into a Cso group at –06/302° with an area of 30 millionths. It reached the CM on the 19th by which time it had developed three further spots at –07/304° which was designated AR 862. Being so close to AR 860 it is doubtful whether it should be considered as a separate spot group. On March 18 it consisted of 13 spots as a Dai group. It rotated around the W limb on March 25, leaving only the follower visible on the disk.



Prominences imaged by Eric Strach on 2006 March 01.

The two most important groups of the month were first seen on March 29. A bipolar group Dso was seen at –12/108° (AR 865) and a single penumbral spot Hax at –06/88° (AR 866). The latter remained as such up to the end of the month, but AR 865 developed 15 intermediary spots and the longitude spread increased to 10° making it an Eai group, and becoming a naked-eye object.

Hydrogen-alpha

The prominence count was slightly higher than the previous month but throughout March it varied from high to low. A surprisingly high number was recorded on March 1 due to the many interactive prominences on the E limb (see image). On March 3 most of the prominences were seen in the N hemisphere, both E and W.

On March 15, three beautiful, large prominences were seen on the E limb. Lee Macdonald also noted a small, very bright object at the W limb, not counted as a prominence, probably a limb flare.

Fewer prominences were seen on subsequent days, reaching the lowest point on March 22 and 23.

Filaments

The northern portion of the very long filament of Feb 28 came to lie close to the W limb on the March 1 extending from N10º to N26º, whilst the southerly part was seen as an arc prominence.

A long winding filament was observed on March 3 extending roughly N to S some 15º E of the CM. It was still present the next day in a J-shaped form; its total length was one third of the solar radius. Only a very small remnant was seen on March 5.

A dark and short filament was observed on March 18 at around 7º above the equator and 25º from the E limb. On March 22 it lay across the CM and it seems to have crossed the W limb on 26th, appearing as a low arch prominence.

BAA sunspot data, 2006 March–April

	March		April	
Day	g	R	g	R
1	0	0	2	45
2	0	0	3	55
3	0	0	3	64
4	0	0	4	66
5	1	14	4	70
6	0	0	5	73
7	0	0	4	67
8	0	0	4	53
9	0	0	4	50
10	0	0	4	50
11	0	0	4	55
12	1	11	5	59
13	1	13	5	54
14	1	11	4	43
15	1	16	2	27
16	1	10	1	17
17	1	17	1	11
18	1	16	0	0
19	1	19	0	0
20	1	24	1	15
21	1	24	1	12
22	1	20	0	0
23	1	20	1	11
24	1	17	1	18
25	0	0	3	39
26	0	0	3	49
27	0	0	3	56
28	1	13	3	54
29	2	27	3	46
30	2	29	3	54
31	2	31		
MDFg	0.75 (49)		2.68 (48)	
Mean R	11.5 (42)		40.69 (43)	

2006 April

Activity during the month was much higher than recent months but only in the southern hemisphere, with activity in the northern hemisphere remaining very low.

On April 2, AR 865 was an Ekc group on the central meridian at −11/111° with an area of 230 millionths (just visible with the protected naked eye). The main spot of the group was the leader penumbral spot; a smaller irregular penumbral spot was seen following. By April 4, the main spot had increased in size as had the follower to give a total area of 590 millionths. The appearance of the leader spot had changed again the next day into a much more irregularly shaped sunspot with several umbrae within it. By now it was clearly seen as a naked eye object. By April 6 the group began to decay such that it was of type Hkx with an area of 360 millionths as the following penumbral spots had disappeared, to be replaced by a few small spots. When last seen on April 8 just the penumbral spot was seen close to the western limb.

To the east of AR 865 were three much smaller groups, AR 866, 867 and 868. After these had rotated off the disk, the other five groups seen up to April 22 were all small in size. The largest of the three groups on April 26 was the return of AR 865, as AR 875 at −10°/115°. It was much smaller at 260 millionths and of type Dac with the main spot being irregular in shape. On April 29 it just consisted of an irregular spot with an area of 110 millionths.

The Sun was spotless on April 18, 19 & 22.

Hydrogen-alpha

The prominence MDF was 4.23 (9 observers). A quite striking prominence was seen on the western limb on April 7 and 8 which had the form of a spire but with hydrogen not being present in its middle portion. On April 8 the spire shape had filled in except for near its base.

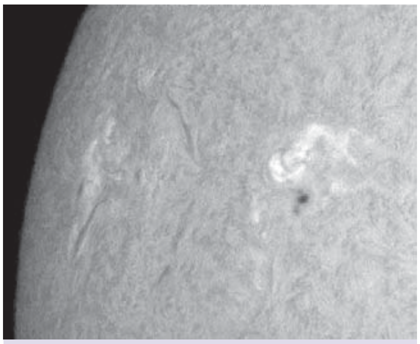
Multiple massive arc prominences were seen on the NE limb at latitudes +23º to +33º on April 9 and 10. Only one important remnant was seen on April 11 as a complex jet some 10,000km high. The main structure of the prominences was at longitudes 289º to 278º. A lofty Y-shaped remnant was seen on April 13 at +26º.

The prominences survived the rotation and reappeared on the NW limb on April 21 to 23 at similar latitudes, +18 to +34, around longitudes 311º and 286º.

North & south MDF of active areas g

	MDFNg	MDFSg
March	0.21	0.53 (30)
April	0.22	2.64 (32)

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



Type Sf flare imaged on 26 April at 11:21 UT by Eric Strach.

Filaments

The prominences described above were seen as filaments on the disk. They were of various shapes and sizes; on April 13 a long S-shaped filament was seen. It persisted in this shape until reaching the CM on April 16 and 17 when it fragmented. It was last seen as a whole filament on April 19, and on April 21 it revealed itself as a prominence with the most northerly portion still seen as a fragmented filament.

There was also a very long filament in the southern hemisphere. It started on April 12, seemingly emanating from a small prominence on the E limb at −22º. On April 13 it was coursing at a slant towards the sunspot AR 872, curving around it on April 14. The next day it was a long band-like structure extending from the E limb obliquely northwards towards AR 872, its length estimated to be 4/5 of the solar radius. On April 17 it became fragmented with a detached fragment still adjacent to AR 872. It was not seen after that.

Mike Beales, *Director*

From methane seas to sand seas: Titan's topography emerging from *Cassini*'s radar imaging

Just as the local landscape of Titan gradually emerged from the mist as the *Huygens* probe descended towards it 1½ years ago (see *JBAA*, **115**(2), 2005 April), so the landscape on a global scale is coming into focus as the *Cassini* orbiter scans strips of Titan with its imaging radar. Five strips have now been imaged at different flybys (Figure 1), and the *Cassini* team are beginning to recognise the nature of the landscape in different regions of this mysterious world. Titan is coming to look more like Mars than Earth, with dry seabeds, sand dunes, craters, ancient mountains, river channels, and pervasive erosion by wind and rain. But much remains enigmatic.

Many of the largest features are congruent between infrared and radar images, notably the dark 'maria' (named on the map) and the brightest 'continent' Xanadu. But many other areas look very different with the two instruments. Brightness in IR indicates that the surface reflects IR light, although the substance responsible is unidentified. (It is not exposed water ice, according to spectra from VIMS and *Huygens*, although the dark areas probably are a mixture of water ice and organics and unknown substances). Brightness in radar may indicate that the surface is rough (rocky), or rugged (mountainous), or tilted (facing the instrument). Or the radar may fail to show even major topographic features if the angle of incidence is wrong.

Flat dark plains (IR-dark and radar-dark), which dominate the low latitudes of Titan, might be described as 'maria' in the old lunar sense. Radar shows that these are indeed smooth plains, with bright, low-lying islands matching the IR-bright patches. Many of the shorelines and islands trend roughly E–W, and sometimes have diffuse fringes on the east side, as if sculpted by the planet's constant winds that blow roughly eastward.

In most places the maria are streaked with very long parallel sand dunes, again running roughly E–W and deflecting around islands. These have been seen in all the maria imaged, and are attributable to the same roughly eastward winds, modulated by tidal winds (Lorenz *et al.*, *Science* **312**, 2006). They confirm that the maria are now essentially dry.

Dunes may look bright or dark depending on the background; they were initially nicknamed 'cat scratches'. They are also seen in some areas of transitional terrain around the maria, both on flat dark straits between rugged ridges, and on flat but radar-bright terrain which may be a continental plain.

Transitional regions, which are mostly IR-bright but have varied radar patterns with little interpretable topography, cover a large fraction of the planet. They may be very broad margins between maria and continents, perhaps with little relief. Around the margins of the 'continent' Xanadu (Figure 2), they include a 'swiss cheese pattern' which is probably due to surface texture (distribution of rocks?), though elsewhere there are dark features which may be 'sinks' (former lakes fed by short stubby broad channels).

The *Huygens* landing area at the edge of mare Shangri-La appears virtually blank in the radar scan, and could be regarded as another puzzling transitional area, though there

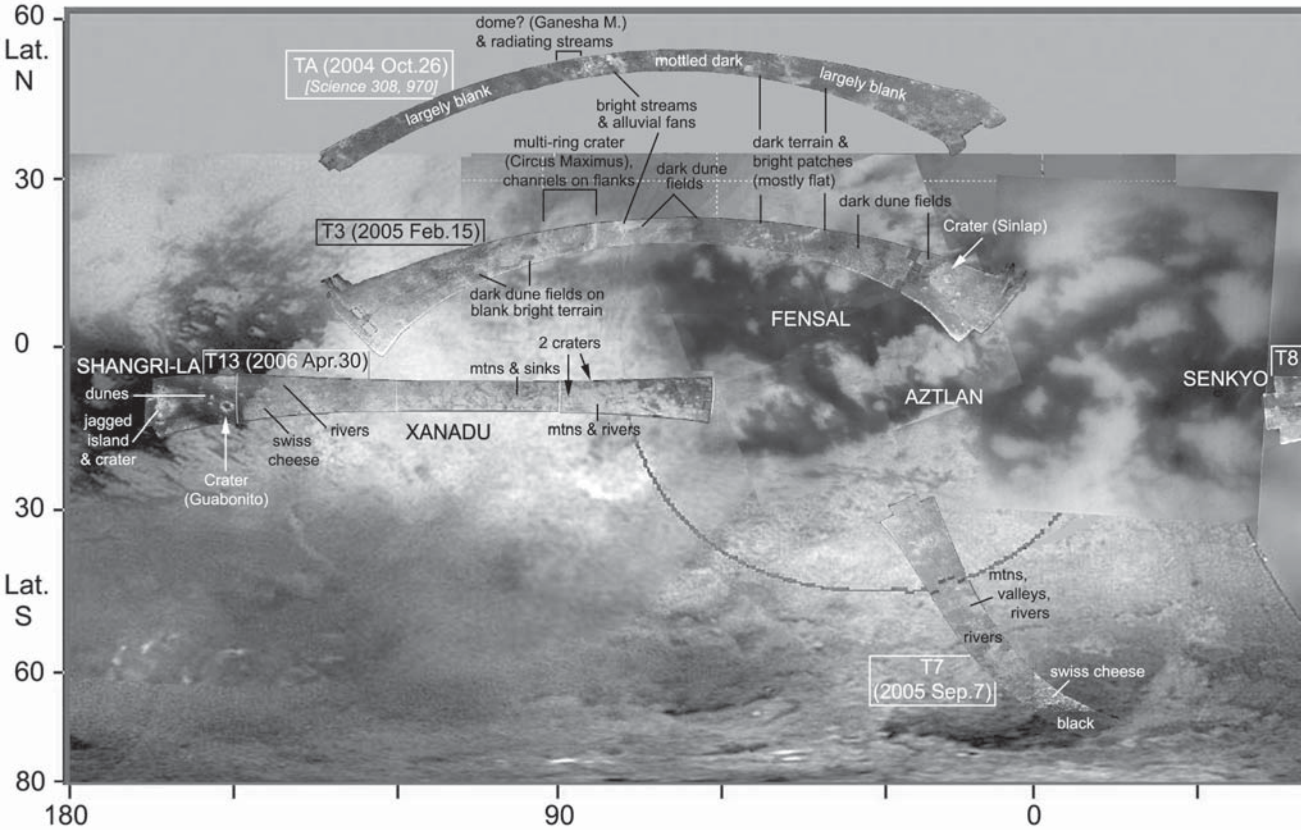


Figure 1 *(above and opposite page).* The best available map from *Cassini*'s near-infrared images, with the five radar strips laid onto them. These are adapted from maps and images released on the *Cassini* website. The IR images have best resolutions of ~0.5km, limited by the thick haze: they do not show recognisable landforms. The radar strips have a best resolution of ~0.3km, but actually show far more detail than the IR images. (Large semicircular lines outline areas mapped in IR at specific flybys.) *NASA, JPL, and the Cassini radar and ISS teams.*

are dune fields in the mare to N and S of it. (Its unfavourable position near the end of the radar strip may have suppressed the detection of the topography.) The *Huygens* landing area as seen in the descent images was a microcosm of the larger-scale Titanian landscapes: channel-covered hills to the N, enigmatic transitional terrain to the S, and dark mare plain at the landing site. But of course, this plain was not dune-covered nor dry, but covered in rounded river pebbles and damp with methane. Perhaps the margins of the maria stay damp from more frequent river runoff, in contrast to the vast windswept plains further out.

Quite large impact craters, 50–90km across, seem to be fairly common. At least two were imaged in the scan across the continent Xanadu. In the maria, the bright rings seen in IR images are probably old craters with various amounts of bright flanks exposed above the dark mare surface. At least two examples have been radar-imaged: Guabonito (in mare Shangri-La: a ‘ghost crater’, only the degraded rim is exposed), and Sinlap (in mare Fensal: with extensive bright flanks). The largest crater known is the multi-ringed basin called Circus Maximus, 440km across, which has many stream channels running down its flanks.

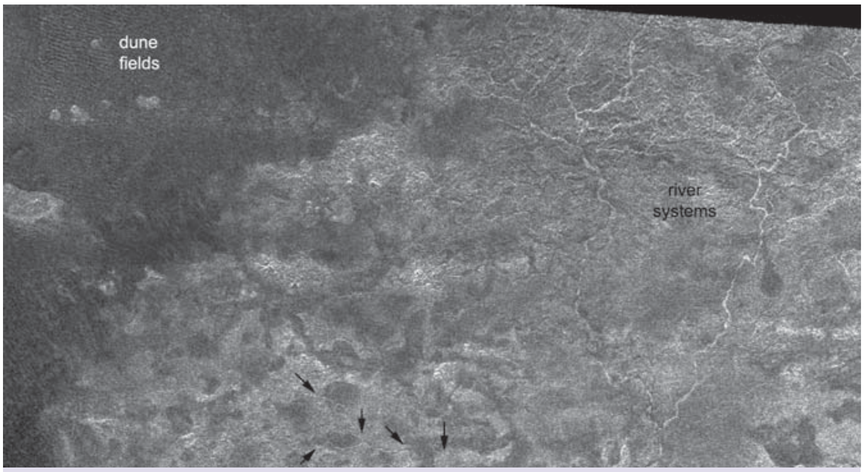


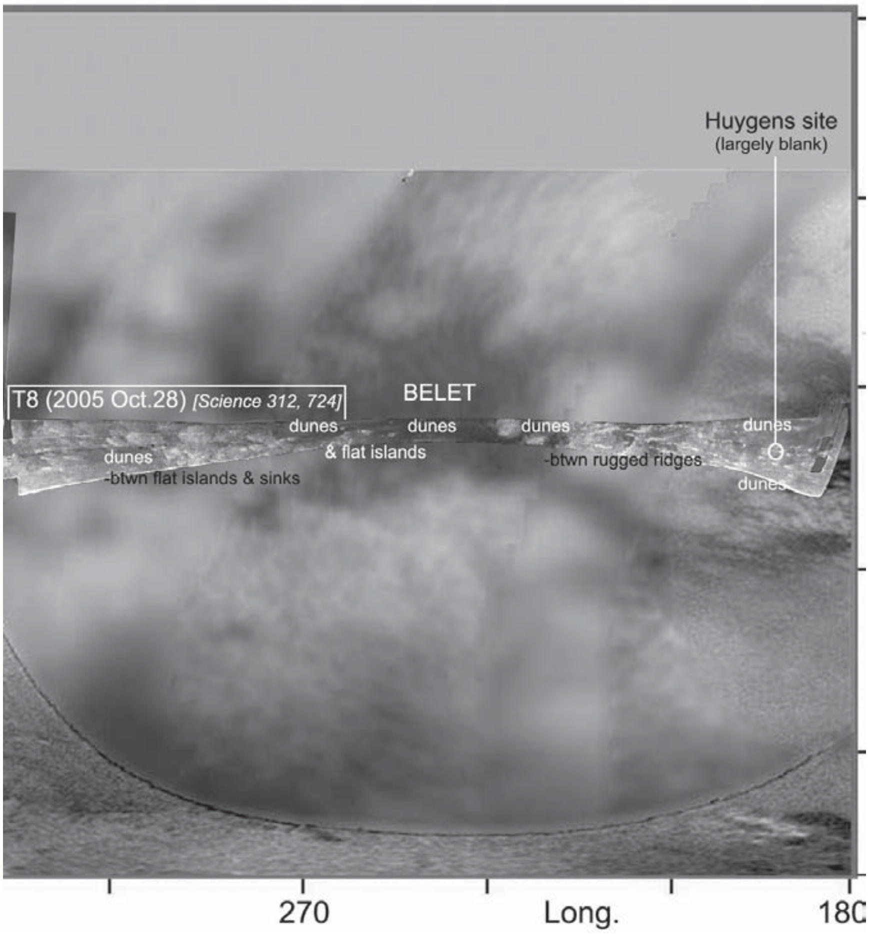
Figure 2. The western margin of the brightest continent, Xanadu, imaged on 2006 April 30. This radar image shows three types of terrain. At upper left is part of the mare Shangri-La, a dark plain with extensive fields of sand dunes (parallel lines). At upper right, more rugged and elevated continental terrain is covered in sinuous, radar-bright river networks. At lower left is ‘swiss cheese’ terrain; some of the dark patches may be sinks, but others probably have little relief as a small forked river (arrowed) appears to meander across them. The *Cassini* team, aptly paraphrasing Coleridge, labelled this image: ‘Rivers flowed onto a sunless sea’.

Rugged terrain is seen on Xanadu (including some mountain ranges, though there is no obvious sign of how they originated), and on an IR-bright region in the southern hemisphere, and also in the Circus Maximus.

All of these rugged areas also show numerous sinuous, branched river channels. In Xanadu they may be especially near the margins (Figure 2). In the southern hemisphere, there are valleys radiating around one massif, and impressive sinuous canyons cutting through another, and nearby there are many rivers meandering across a largely radar-dark (flat?) area. These channels are usually sinuous, and their tributaries often join at large angles, implying that they have not managed to incise convergent valleys – indeed it is often difficult to be sure which way they flow. They appear very similar to the smaller river networks imaged by the *Huygens* descent capsule.

On the flanks of Circus Maximus, there are many channels, and some extend as radar-bright streams (up to 200km long) that broaden into bright areas – possibly alluvial debris fans. The *Cassini* team likens this area to debris fans from flash floods in terrestrial deserts, radar-bright because covered with stones. Similar streams opening onto debris fans are identfied in the scan of a northerly region (Elachi *et al.*, *Science* **308**, 2005).

Scans of the north and south polar regions have not revealed any craters, suggesting the polar regions may be thickly covered with younger deposits. Indeed many of the radar patterns there are still enigmatic, though some indicate fluid flow. The south polar region includes a prominent IR-dark ‘lake’ which is also very dark in radar, flanked by a ‘swiss cheese’ pattern – but the IR and radar shorelines do not match at all, so one or other map is probably not topographic. The far northerly area imaged in the first radar scan is largely dark and blank, with some darker mottling and some brighter bands but no evident topography (Elachi *et al.*, *op. cit.*). There is a broad quasi-circular feature



~180km across (‘Ganesa Macula’), which is revered by ‘cryovolcanologists’, but there is no evidence as to its nature. It contains roughly radial stream channels, and bright patches outside it may be more alluvial debris fans. High-latitude northern regions have not yet been IR-imaged as they have been in winter darkness up to now.

Thus the basic surface structure, at least at low latitudes, must be rather ancient as indicated by the high frequency of craters. Perhaps it has been frozen solid since the Saturnian moons settled into their present orbits. But it has been much modified by methane rainfall and sedimentation and wind, all of which are probably continuing in recent times.

John H. Rogers, *Director, Jupiter Section*

Mercury & Venus Section

Venus: Eastern elongation 2005

Venus was in eastern elongation throughout 2005, but the extremely low altitude of the planet at dichotomy guaranteed that fewer observations would be made from the latitude of the UK. The planet has nonetheless received attention, and in this note we mark especially recent work in ultraviolet and infrared imaging.

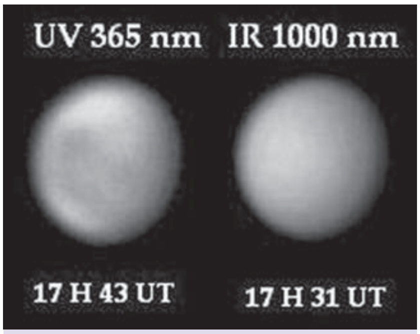


Figure 1. UV and IR images of Venus (south uppermost) by C. Pellier (210mm Dall–Kirkham Cass.) on 2005 June 18.

On 2005 June 18, Christophe Pellier (Paris, France) obtained a rare UV image of the planet at high phase (93%). For mapping purposes, images at high phase are essential, but no one else appears to have been imaging at this time. A bright S. polar hood and typical dark markings are seen (Figure 1). An infrared image is featureless in comparison. Much more recently, David Arditti (Edgware, Middlesex) had success with recording the UV markings, and some of his images are also given here (Figure 2). His IR images also reveal no obvious detail apart from limb brightening and terminator shading.

We also received some fine CCD images from T. Ikemura, observing from Japan. Ikemura had success in securing images of the infrared emission from the dark side of the planet from December 24 to January 2, by means of a 1-micron filter (Figure 3). We congratulate him in successfully repeating the 2004 work of Pellier (see the *Journal*, **114**(5), 241–242, 2004). Though more troubled by glare, Frank Melillo (New York State, USA) may also have recorded the dark side in the same waveband on December 23 and 30.

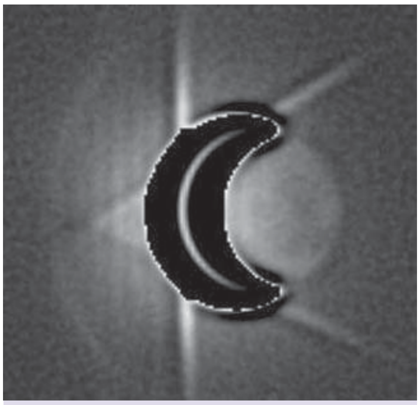


Figure 3. IR images of Venus (south uppermost) by T. Ikemura (310mm refl.) on 2006 January 2 with a 1-micron band filter. The bright crescent was deliberately overexposed, but a normally exposed image has been overlaid for reference. Some albedo variations are seen across the night side of the planet.

There has also been a fair amount of visual work. As the planet approached inferior conjunction on January 13, the Director recorded cusp extensions on December 31 and January 1, and Gianluigi Adamoli was able to see the planet as a complete ring of light on the day of conjunction.

Richard McKim, *Director*

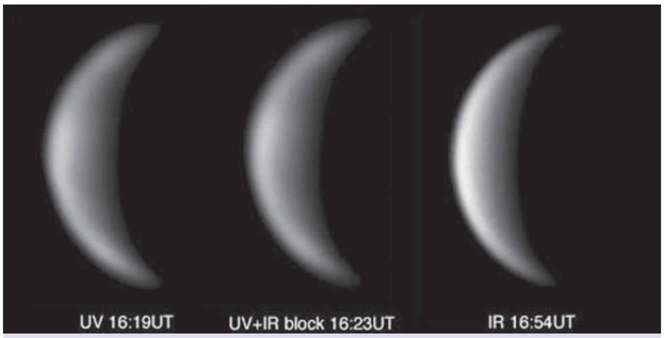


Figure 2. UV and IR images of Venus (south uppermost) by D. Arditti (254mm Dall–Kirkham Cass.) on 2005 December 4 with a Baader UV (320–390nm) filter and a Baader R-IR blocking (685 nm+) filter.