



TRANSIT

The December 2012 Newsletter of



NEXT TWO MEETINGS at Wynyard Planetarium

Friday 14 December 2012, 7.15 for 7.30 pm
Searching for the most distant objects in the Universe

Prof. Andrew Levan, Warwick University

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Friday 11 January 2012, 7.15 for 7.30 pm

A Yorkie Down Under

Martin Whipp, York A.S.



(No photo of Martin, alas!)

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Editorial

Rod Cuff



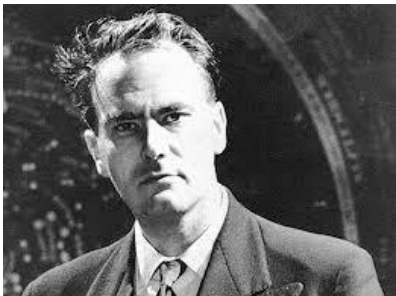
I've had word of only one new 'member' this month: please join with me to welcome to CaDAS, the Brown family – Adrian, Alex, Jess & Alison!

Rob Peeling isn't able to provide us with a new Skylights article for this month, so as usual I've taken the 'Deep space' part of a previous December's article (this one from two years ago) and written a new section on solar system bodies.

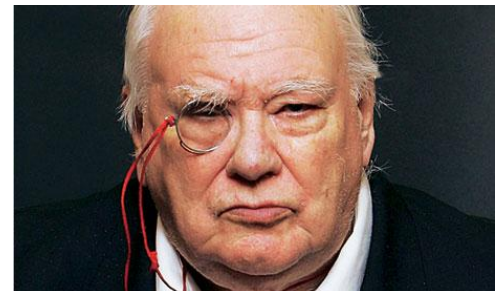
There are three focuses to *Transit* this month. One is Neil Haggath's exuberant article on his successful visit to Australia in November to catch the latest solar eclipse. Congrats to him and to Don Martin and Julia & Stephen Goudge, who all made the trip as well. Wish I could have been there too.

The second is some amazing images of Jupiter from the prolific and ever-impressive Keith Johnson.

Thirdly, while I was putting the finishing touches to this issue, the news came through that Sir Patrick Moore has died. What an amazing legacy he left. These days there are other TV presenters and authors who may be greater influences on people coming new to the subject, but I imagine that for the overwhelming majority of us in CaDAS, and amateur and professional astronomers throughout the UK, Patrick was a truly seminal influence on our interest in astronomy, and on our viewing and reading around the subject. I'm old enough to be able to say I watched the very first *The Sky at Night* programme in April 1957, on Comet Arend-Roland (which I could see out of my living-room window), and very many editions after that.



Patrick across the years



Neil and John McCue give their personal recollections below on the Letters page, and I'd very much like to publish other reminiscences that CaDAS members may have – many of us must have met him. My own involvement was more of a missed opportunity. In August 1969 my then sister-in-law married Dr Peter Cattermole, then and now a familiar face to many from his appearances on *The Sky at Night*. Pete had been a friend and co-author with Patrick for years by then, and Patrick was invited to the reception. On a beautifully sunny day, the six-foot and heavily overweight Patrick strolled around the grounds of the hotel, wearing his usual rather scruffy suit and tie, looking affable and approachable – but I was too much in awe of this person who had been such an influence on my childhood and teenage years, and I let the opportunity pass. I've kicked myself regularly ever since.

I wish everyone a happy Christmas and a fulfilling and clear-skied 2013. Please keep your contributions to *Transit* coming in!

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I put out a plea a while back for someone to take over from me at the AGM next February as Communications & Information Secretary for CaDAS, or at least as editor of *Transit*. No volunteer yet – I'm repeating the request now and will do so again, if need be, in January's issue. That will be my last as editor of a standard monthly *Transit*; Andy Fleming (who is unable to take over as editor in the near future for personal reasons) will be guest-editing February's edition, as I'll be abroad on holiday during the time it will need to be put together.

If push comes to shove, I'll carry on editing *Transit* on a best-can-do basis – that won't be on a monthly schedule, but only when I can spare the time to put an issue together. I would much rather someone stepped forward to take the job on as the regular editor. **Perhaps that could be you?** If it helps, I'd be happy to keep supplying quizzes.



Letters

Eclipse hunting with Sir Patrick

from Neil Haggath

Following the sad news of the death of dear old Sir Patrick, I would like to share a personal memory of him. I met him a few times over the years, at various events.

He was always known for his sense of humour – though in the days when he used to give public talks, he often told the same jokes and anecdotes not only year after year, but decade after decade! One of his favourites was the analogy of how long it would take to drive to the Sun at 70 mph (about 150 years); this was *always* followed by: 'But it would take a little longer in my old Ford Prefect. The other day, I was driving up a hill, and I was overtaken by a dog!'



In 1991, in the days when he was still able to travel, I went on my first total eclipse expedition – the infamous Hawaii debacle – together with Don Martin, Dave Graham and Jack and Pat Youdale. Patrick and John Mason were with the tour group as resident astronomy experts.

Before going to Hawaii, we all spent a few days in Los Angeles. One day, we visited Mount Wilson Observatory, and while on the mountain top, we felt a minor earth tremor.



That evening, Patrick and John gave their eclipse briefing talk to the group, which included a fine example of Patrick's self-mocking humour. He mentioned that we had had our very own earth tremor on Mount Wilson, and said, 'And contrary to the rumours, it *wasn't* caused by me jumping up and down!'

Best wishes – Neil

Tea, biscuits and more with Sir Patrick

from John McCue

It is the end of an era. He was an inspiration to me, certainly. I became interested in astronomy in 1963 when I was 12, and followed his *Sky at Night* programmes, of course. He gave a public lecture at a small venue in Middlesbrough the following year – a schoolpal and I went.



Afterwards, at tea and biscuits, he was surrounded by people who didn't seem to be talking about space exploration, and we wanted to ask him about Ranger 7, which had just crash-landed on the moon and sent back the first close-up pictures. We edged forward and asked him his opinion. He looked delighted. 'Ah, boys,' he said 'I've got the pictures here', and to our astonishment he pulled them out of his briefcase. 'Look,' he said, 'the craters just get smaller and smaller.' We missed the last bus home and had to walk from Middlesbrough to Thornaby, but we didn't care.

Years later, in the 1980s, I was Venus coordinator for the British Astronomical Association. Along with other BAA Venus observers, Patrick sent his Venus drawings for the regular reports. Despite his fame, he was one of us, keeping a regular eye on the planets. There was a BAA meeting at Durham at which I had to present a display of drawings, including his. After the tea-break he came up to me and said, 'Are you John McCue?' Feeling very proud I said, 'Yes'. 'Well, you've cut my drawings very wobbly, very wobbly', he said. 'Be careful in future.' 'Yes,' I said, 'sorry.' I had been told off by Patrick Moore. I still felt proud.

He was so dedicated to astronomy that I felt he was supporting me personally. Every other young amateur astronomer in the country must have felt that direct connection. If ever I was

thought a bit strange at school for following this weird interest, I used to feel that Patrick was helping me, making the study of the universe accessible, serious and very worthwhile.

Thanks, Patrick.

John McCue

P.S. I've got every one of his Yearbooks from 1962.

OBSERVATION REPORTS AND PLANNING

Skylights – December 2012

Rob Peeling & Rod Cuff

The Moon



	Last Quarter	New Moon	First Quarter	Full Moon
	6 December	13 December	20 December	28 December
<i>Rise</i>	23:03 (5 th)	08:10	11:42	16:19
<i>Set</i>	12:02	16:09	midnight	08:38 (29 th)

The planets

Jupiter reached opposition (was due south at midnight) on 3 December, and shines brilliantly high in the sky all month and beyond. In fact, Jupiter can be observed all night, reaching an altitude of nearly 60°. There's a lot of activity in the various cloud belts at the moment, and it would be a satisfying project to take as many images as possible across different nights in order to be able to make comparisons. Of course, a decent scattering of clear nights to do so would be a good thing ...

The **Great Red Spot** (pale pink at the moment) is readily visible and easy to pick out against the South Equatorial Belt at lots of convenient times this month. Here is a list of times when it's on the planet's central meridian either in our evening or in the first hour or so after midnight (and remember that it will be visible off-centre for a couple of hours before and after the times shown below).

Date	Transit time	Date	Transit time	Date	Transit time
10	22:13	17	22:59	24	23:45
11	18:04	18	18:50	25	19:36
12	23:51	20	00:36	27	01:23
13	19:42	20	20:28	27	21:15
15	01:29	21	16:19	28	17:05
15	21:20	22	22:06	29	22:52
16	17:12	23	17:58	30	18:44

Uranus is still well placed for evening viewing in a telescope, well below the Square of Pegasus . Check out a finder chart from Night Sky Info at www.nightskyinfo.com – in fact, in any month this website is a great place for full details on what planets are visible.

For pre-dawn viewing by early-birds (of which I am only very rarely one!), **Venus** is still brilliant but getting lower in the sky. From 10–12 December, Venus, **Mercury** and **Saturn** are all in the morning sky near the Moon (which is just a few days before New). Saturn is rising higher each morning and is, as ever, a great sight in any telescope – and will get better over the next few months, as the planet heads for opposition on 28 April 2013.

Meteors

This is an excellent year to view the peak of the Geminid meteor shower, best seen in the early morning of 14 or 15 December . As you'll see from the Moon table above, this year the shower is close to the time when the Moon is New. Try to get away somewhere relatively dark, and if you do you may be rewarded with a fine view of these relatively slow-moving meteors, which come from debris associated not with a comet, as we usually expect, but from an asteroid, 3200 Phaethon. The radiant is near Castor, one of the bright stars in the constellation of Gemini.

Thinking slightly ahead, the Quadrantids shower, which can be quite intense over a short period, is active in the first six days of January, but from our area the best times to look will be late in the evening/night of 2–3 January. The Moon is not very helpful, but you should still be able to see a fair number of meteors. There's a chart showing the radiant at <http://snipurl.com/25t884q> .

Deep space

Try to find **NGC 752**, an open cluster in Andromeda. Look for the two stars marking the shortest side of Triangulum (β and γ Tri). Using these as pointers, move about twice their separation distance up towards Andromeda. This cluster is one of Sir Patrick Moore's Caldwell objects (#28) and is an excellent low-power telescope target as well. It's unusual because the stars are old for a cluster – about one billion years. This is definitely a naked-eye object with averted vision, even in quite poor skies. It's not quite as bright as **M44**, though.



M78: APOD 2005 November 4, Stephan Messner

When you've finished enjoying the spectacle of **M42**, see if you can find the nebula **M78** for a change. It lies north of Orion's Belt.

While not as breathtaking as M42, it is still an interesting object. This is a reflection nebula rather than an emission nebula because the embedded stars are cooler than those of the Trapezium. (Rob reported that he usually sees a fuzzy area with two stars embedded in it.)

I have lots of other favourite targets in Orion.

- With M42 itself, try to see the bands like the gills in the 'fish's mouth', which is the darker bay reaching in towards the Trapezium within M42. They can be faintly visible in good conditions, and a filter may help.
- Try to follow the huge arm of nebulosity east and down from M42 towards **iota (ι) Orionis**, which is itself surrounded by nebulosity and is a good triple star.
- Just to the south-east of iota is the obscure but bright cluster of **Collinder 72** (not marked on maps).
- Further south again is the small but bright nebula **NGC 1999**.
- **M43**, just north of M42, is a glow around a star; it's quite elusive in poor sky conditions.
- Further north still is the obvious bright open cluster **NGC 1981**.
- Look carefully at the stars between M43 and NGC 1981. Can you spot any nebulosity here? For imagers, this is the **Running Man Nebula**.
- Finally, with dark skies, aim the telescope at Alnitak (zeta [ζ] Orionis) at the left (eastern) end of the Belt. Nudge eastwards to put bright Alnitak just out of the field and see if you can spot the **Flame Nebula, NGC 2024**. It may require a filter to pull it out. It's well worth a look if you can see it.



Jupiter is bustin' out all over ...

Keith Johnson



[I've edited together a couple of emails that Keith put out last month concerning his image-captures and post-processing fun & games on 11 November with new camera, new software and Jupiter as the target. I suspect this one will run and run ... Ed.]

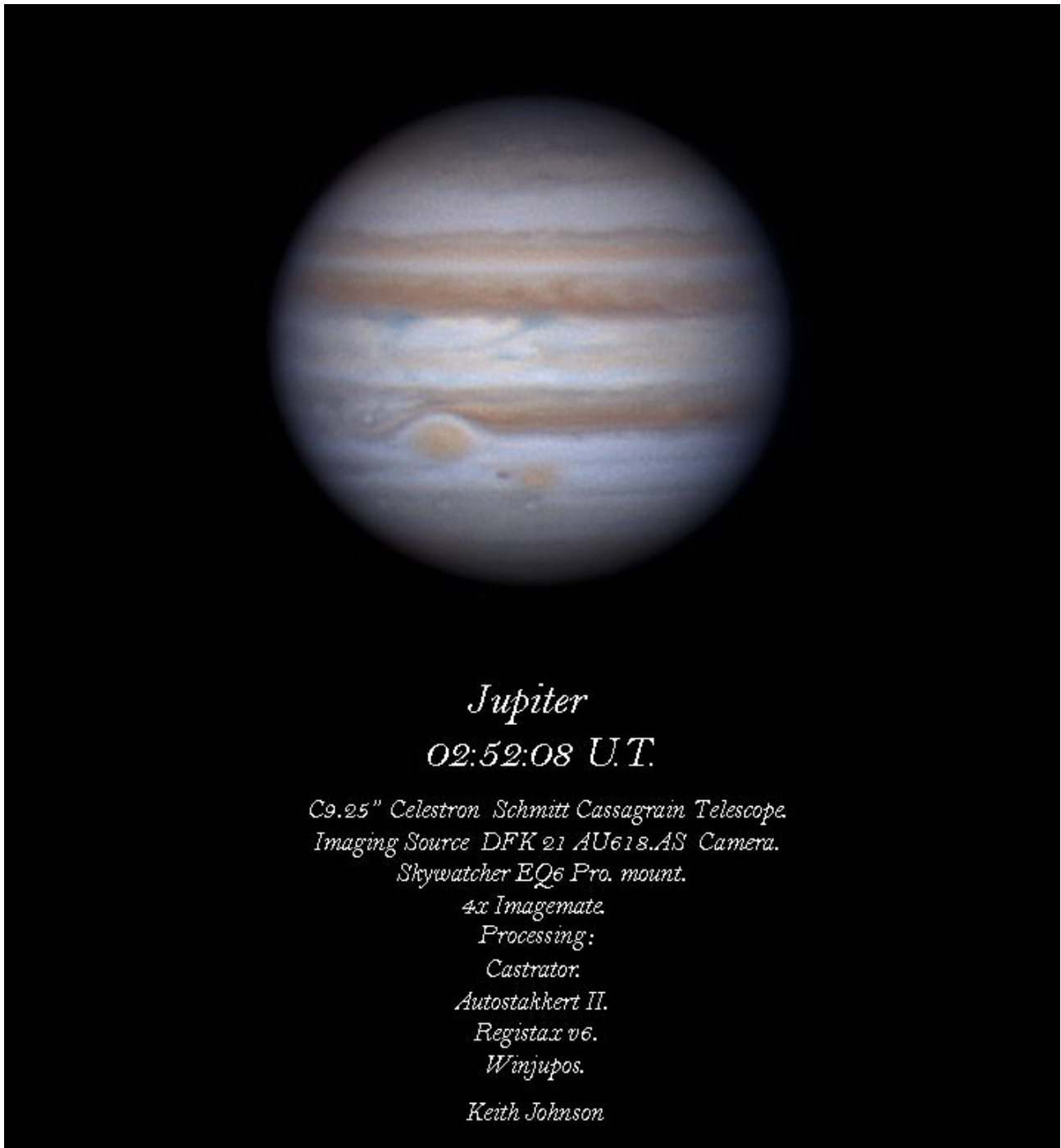
Seeing wasn't very good during this particular imaging session. But with this amazing camera from DFK, I can capture many more frames than with the ToUcam Pro II that I used in the past. As a result, there are many more frames to choose from.

Moreover, there are other interesting things to be done now with Jupiter images. Because Jupiter rotates rapidly (in about 10 hours), 90-second AVIs are about the maximum an imager can obtain, as any longer will result in image blurring.

However, using the software program WinJUPOS, I can capture several – typically three – AVIs in quick succession and then de-rotate the images to obtain a much more detailed image of the planet. Given the exact timings of each capture, WinJUPOS calculates how much each image must be de-rotated before the images are combined to give a high-quality result.

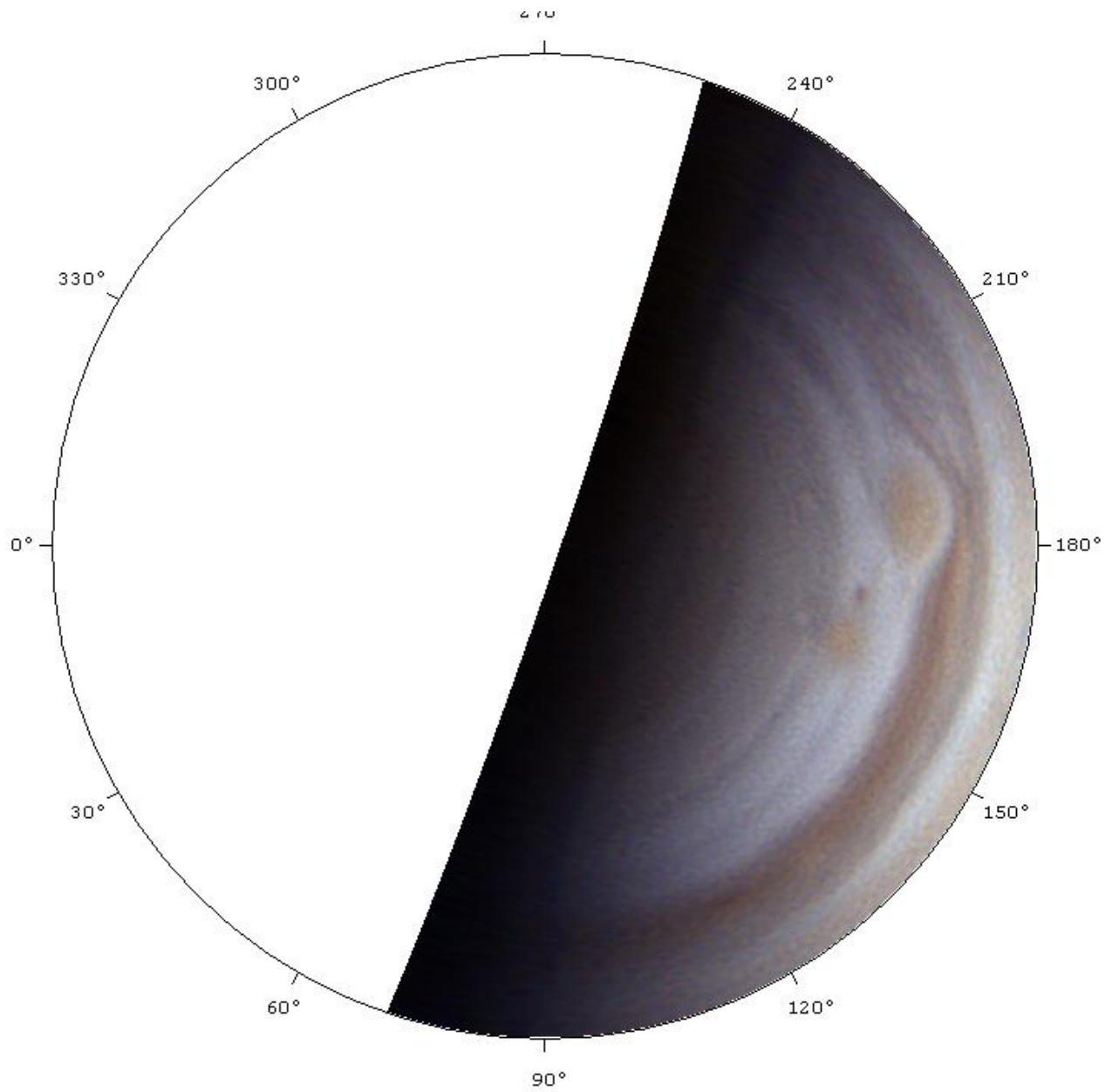
Many thanks to John and George Gargett for finding the WinJUPOS tutorial, featured in November's *Sky at Night Magazine*.

You can see that there is plenty of turbulence evident to the left of the Great Red Spot, and that a gap has emerged between the oval BA system¹ and the GRS. Nice white-spot features are evident too, and there's a very distinctive dark feature to the left of the oval BA system. I'm in the process of finding out if it's an impact feature.

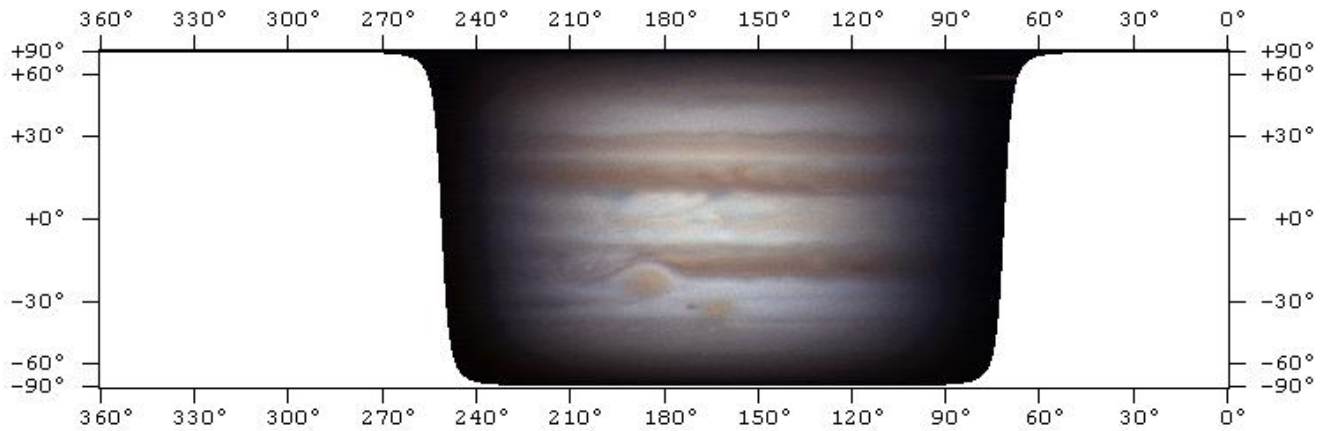


WinJUPOS also offers the opportunity of showing the captured data in other forms, too – see the next page!

¹ A red spot a third the size of the GRS that formed in 2000 from the merging of three white ovals [[Wikipedia](#)].



Longitudes in System 2, planetographic latitudes
Stereographic polar projection



Longitudes in System 2, planetographic latitudes
Cylindrical projection

GENERAL ARTICLES

Totality Down Under

Neil Haggath



It's often said that total solar eclipses are addictive. A cliché it may be, but it's dead right. This year saw my fifth total eclipse expedition, and my longest-distance one yet – to see the eclipse of 14 November in Queensland, Australia.

Prior to this trip, my record stood at two successes in four attempts. The two successes were in Bulgaria in 1999 and Turkey in 2006; my two failures were both intercontinental trips – Hawaii in 1991 and China in 2009. (Yes, I have the unenviable record of *not* seeing two successive eclipses of the same saros series!) So this time, I hoped to make it three out of five, and to break the long-haul jinx!

This eclipse was an unusual one, in that almost all its track was over ocean; the only land it crossed was a small area of Australia. It began by just touching the northern coast of the Northern Territory, east of Darwin, then crossing the Cape York Peninsula of Northern Queensland; the track included the major resort town of Cairns. After that, the rest of the track crossed several thousand kilometres of Pacific, without even touching a single island! So Queensland had the monopoly; the hotels around Cairns could charge whatever they liked during that week – and did! In fact, most of the accommodation was block-booked by tour companies three or four years in advance.

Of course, no one in their right mind travels that sort of distance *just* for an eclipse; you make a holiday of it. Especially when, as in this case, the weather prospects for the Great Event are distinctly dodgy – northern Queensland isn't called a rainforest for nothing... I had never yet been to Australia – it would be my 40th country! – so I intended to make the most of touring the country before the eclipse.

This was my first eclipse trip without my long-time friend and travelling companion, Don Martin. We were both going, but not together this time; Don had been to Australia before, and we had completely different itineraries for what else we wanted to do there. For me, being both an eclipse chaser and a diver, this one presented an unusual opportunity; Cairns is the main resort for the famous Great Barrier Reef.

Booking my trip was a major exercise in logistics, involving several different companies. For the eclipse arrangements and the accommodation in Queensland, I booked through Explorers Tours, a company that specialises in, among other things, eclipse trips. Their group of 240 people would be based in the small resort of Palm Cove, 25 km north of Cairns and just a couple of kilometres from the centreline; totality there would last 2 minutes 3 seconds.

While Explorers offered various tours, they also offered an 'eclipse-only ground itinerary' for those who wanted to join them only for the eclipse and to do their own thing for the rest of their holiday; I took advantage of this option. For the rest of my trip, I booked the flights and hotels through Thomas Cook, with hotels in Bangkok, Sydney and Alice Springs. (I had 24-hour stopovers in Bangkok on the way there and again on the way back, to break the long journey.) I had three nights in Sydney, four in Alice Springs, then five in Palm Cove with Explorers, leaving Australia the day after the eclipse. From Alice, which is just about the

exact geographical centre of the continent, I went on a three-day camping and hiking tour of the 'Red Centre', booked online through a local company based in Alice.

In Sydney, I delighted in telling people about the two major connections between my town of birth and their city. I hope most readers will know what they are, but just in case...

- It's where Captain Cook came from. Of course, he wasn't exactly born in Middlesbrough, as the town didn't yet exist in his day – but he was born in the then village of Marton, which is now a suburb of the town. And Botany Bay, where he first landed in Australia, is now part of Sydney.
- We built their bridge! As is well known in these parts – and acknowledged there in the historical exhibits – the iconic Sydney Harbour Bridge was built between 1924 and 1932 by Dorman Long of Middlesbrough, which later became Cleveland Bridge and Engineering Company. The Tyne Bridge in Newcastle is of course a scaled-down version; it was built as a prototype, to prove the design.



Wherever you look in Sydney, the heritage of former British colonialism is obvious. The city's main park is called Hyde Park – though it's much smaller than its London namesake. Close to it, you find Oxford Street, Regent Street, Bayswater Road ... and there are districts called Kings Cross, Charing Cross and Paddington. The names of surrounding towns include Epping, Lewisham, Croydon, Guildford, Cheltenham ... even Scarborough! And the world-famous Bondi Beach has an early-20th-century pavilion building that wouldn't look out of place in any British seaside resort.

Next, I flew to Alice Springs, joining the Outback tour the following day. The main objective of this trip was to visit another Australian icon, Uluru (formerly known as Ayers Rock), but it also included Kata Tjuta (another rock formation, formerly known as The Olgas) and the spectacular Kings Canyon. The tour group turned out to be a multinational bunch – eleven people and six nationalities, not including our Aussie guide! We spent two nights camping, at

Kings Canyon and Uluru, and did three hikes – one each day, at each of the three aforementioned locations.

Among the group were two Dutch ladies, who also turned out to be astronomers and eclipse chasers. We later took the same flight from Alice to Cairns, and they also stayed at Palm Cove, in a hotel a few hundred metres from mine.

The tour began with a 6 a.m. pickup and several hours' drive. People tend to think that Uluru is 'near' Alice Springs, but it's actually 300 km away. Our first destination was Kings Canyon; we spent three hours walking through it, in the heat of the afternoon. This was the toughest of the three walks, so it was good to get it over first. It began with a pretty hard climb, and then got easier. The initial climb is known as Heart Attack Hill!

It was a bit warm for hiking, at 35°C! The major risk is of course dehydration; a few people have actually died on these walks, simply because they were too stupid to carry enough water.

That night, we stayed at a permanent camp site near the canyon. It was a cloudless night, and for an astronomer the sky doesn't get any better than this. Late at night, once the camp lights were turned off, there wasn't a light within tens of kilometres, so the sky was absolutely pristine; the Milky Way was visible from horizon to horizon, and I saw the Magellanic Clouds for the first time. When Orion rose – upside down, of course! – it was dazzlingly bright. Most of us chose to sleep under the stars, in the open – though it got a bit chilly at night.

As an astronomer, I have the handicap of having lousy eyesight. As well as being extremely short-sighted, I have a degree of 'night myopia'; even in a good sky, my naked-eye (meaning with my glasses) limiting magnitude tends to be about a magnitude brighter than that of most people. If I take my glasses off for any reason, I can't see stars at all – not even Sirius. But this night, I woke up at 1 a.m., and without my glasses on I could immediately see and recognise Orion! The stars appeared as big fuzzy blobs, but I could see all the seven main stars.

The next morning was another long drive to Uluru. After checking in at the campsite there and having lunch, we drove to Kata Tjuta, another rock formation a few kilometres away, whose aboriginal name means 'Place of many heads'. There we did another spectacular – and hot – afternoon hike. This time, we even saw a couple of kangaroos in the wild – a mother and baby, though the latter had left the pouch. The timing was a bit unfortunate, as a few hours later we were eating a traditional Aussie barbie, including kangaroo steaks!

Before returning to camp, we watched the sunset at Uluru, which was quite beautiful. You don't watch the Sun set over the rock; you watch from west of it, with the Sun setting behind you, to see the effect of the varying light on the rock, which seems to change colour before your eyes.

The next morning, we got up at 4 a.m., had breakfast while it was still dark, and drove to the opposite side of the rock to see the sunrise. Then we did our final walk – a nice easy one on the flat, around the base of Uluru. It's about 9 km round the base; however, you can't quite walk all the way round, as one area is especially sacred to the Anangu aborigines, and is closed to outsiders. For the same reason, there are some parts of the walk where you're not allowed to take photos.



Finally, there was the long drive back to Alice, arriving at 6 p.m. It had been a long and tiring three days, but a fantastic experience.

The next day, I had a free day in Alice – not that there's much to see or do there – followed by an evening flight to Cairns, to join the Explorers group in Palm Cove.

By the way, there's a road sign in Alice Springs that brings home the sheer scale of Australia. One main road passing through the town is the Stuart Highway, which crosses the entire north–south width of the continent, from Darwin in the north to Adelaide in the south. Alice is near the halfway point of the highway, and there isn't much else in between. At one road junction, there's a sign saying 'Darwin, 1502 km'!

I had three full days in Palm Cove before Eclipse Day – and I had activities planned in advance. The first day, I went on a trip to the rainforest. This began with the Kuranda Railway, which runs from Cairns to the village of Kuranda, high in the mountains of the Great Dividing Range; it's one of the most spectacular railway journeys in the world. I returned by the Skyrail, the world's longest cable-car ride – 7.5 km of it, travelling above the forest canopy.

I spent the next two days diving. This was, in fact, a disappointment – I have to say that I wasn't particularly impressed with the famous Great Barrier Reef! The dives I did during those two days were decidedly average but ridiculously overpriced; I don't even rate it among the top five places where I've personally dived. (I've been to Palau, which even the Aussies acknowledge as far and away the best diving on the planet, so everywhere else is an anticlimax – but there are also other places, such as Phuket, which I regard as far superior to what I saw here.) However, I was told that the best parts of the Reef are beyond the range of the day boats, and can only be reached on live-aboard boats.

Two fellow CaDAS members, Stephen and Julia Goudge, were also in Palm Cove with the Explorers group and were staying at the same hotel as I was. Also there were three of my friends from Mexborough and Swinton A.S. in South Yorkshire, whom I've known for about 20 years. Don, meanwhile, was based in Port Douglas, 30 km further north. While my holiday

ended with the eclipse, Don's began with it; he didn't arrive in Australia until a couple of days before.

Up to the day before the eclipse, I hadn't seen Stephen and Julia. But after leaving the dive boat that day, I got on a bus in Cairns for the trip back to Palm Cove, and there they were. Only on an eclipse trip can you get on a bus, somewhere on literally the other side of the world, and see someone you know ... and just say 'Hello', matter-of-factly!

That evening, Explorers' resident expert Dr John Mason gave an eclipse briefing. Explorers had two different observing sites planned. The primary one was the beachfront at Palm Cove, while the secondary was some distance inland and at a height, in case the weather was poor at Palm Cove. The idea was that the decision as to which to use would be made the day before, according to the weather forecast. At least, that was the theory...

The reality was that, during the several days before the eclipse, the weather at Palm Cove could only be described as insane! It was totally unpredictable, and kept changing literally by the minute; there were times when it changed almost instantaneously from clear blue sky to chucking it down, and back again. It was impossible to predict ten minutes ahead, let alone the next day! John had been monitoring the weather reports and forecasts through several websites; he concluded that the weather at the inland site was equally chaotic, so there would be no gain in going there. The decision was made to stay put at the beachfront, and hope for the best. John predicted that 'This is going to be a nail-biter' – and seldom have truer words been spoken.

By the way, while doing astronomy on a beach was rather pleasant, it would not have been a good idea to go for a swim afterwards – see the notice on the right ...

On the day, a *very* early start was required. First Contact was at 05h44m local time, only nine minutes after sunrise. Totality began at 06h38m, with the Sun only 14° above the horizon. Many of us gathered in the hotel lobby at 4.30 a.m., and walked down to the beach to grab our spots. Stephen, Julia and I set up our kit together, at a spot just on the edge of the beach. By the time of sunrise, the entire kilometre-long beachfront was lined with thousands of people, both tourists and locals.

Conditions didn't look promising. The sky was about 30–40% cloud, with most of it low above the horizon – exactly where the Sun would be. We actually saw the Sun rise, but a couple of minutes later it disappeared behind a bank of thick dark cloud. We missed First Contact, and the Sun stayed behind that cloud through most of the partial phase. For the previous several days, clouds had been moving around at crazy speeds – but now Sod's Law came into play. This particular mass of cloud stayed stubbornly where it was, and any movement was imperceptibly slow. I estimated that the top of the cloud bank was pretty close to the altitude where the Sun would be at Second Contact – John's 'nail-biter' was spot on!

Up to about ten minutes before Second Contact, it looked as though we were out of luck. But then a brightening appeared at the top of the cloud bank, and we dared to hope... All of *three minutes* before Second Contact, the Sun emerged above the top of the cloud – and the



cheers must have been heard miles away! It remained in a cloud-free gap for the crucial two minutes; just about at Third Contact, some thin cirrus came across, but the beautiful Diamond Ring was easily visible through it. Most of the second partial phase also remained in view, either in clear sky or through thin cloud.

The appearance of the corona was typical of an eclipse near solar maximum – round and symmetrical, with streamers in all directions.

I knew that my aforementioned Dutch friends, Rita and Marianne, would be somewhere a few hundred metres along the beach – so as soon as the show was over, I walked along to find them. Marianne had previously told me that she wasn't going to photograph the eclipse; on previous trips, she had had the experience of being too busy with her camera to actually *watch* and enjoy the eclipse, so this time she planned simply to do the latter. I promised to e-mail her some of my images.

Don, meanwhile, had been less lucky; at his location, the weather didn't play ball, and he got only a few glimpses of totality through thin cloud.

I was using my Canon 400D digital SLR camera, with a 300mm zoom lens. This was my first successful attempt to photograph an eclipse with a digital camera; at my previous successful eclipse, six years ago, I was still using film. The biggest advantage of a DSLR is that it has a rapid-fire mode, which takes three shots per second for as long as you hold the button –



exactly what you need to capture the fleeting moments of the Diamond Ring.

My plan was very simple. At Baily's Beads, immediately before Second Contact, I would hit the rapid-fire for five seconds; hopefully, at least a couple of those 15 shots would produce nice images of the Diamond Ring. During totality, I would take a sequence of images with a range of shutter speeds – fast exposures for the inner corona and prominences, and slower ones for the outer corona. Then at the moment of Third Contact, I

would hit the rapid-fire again for another five-second burst.

When it came to capturing both Diamond Rings, the strategy worked perfectly; I got a nice sequence of images at both contacts. A couple of them, about a second after Third Contact, even show the red band of the chromosphere, which we see for only a couple of seconds, while the much brighter photosphere is still completely covered. As for the images during totality, I managed a couple of decent ones. The longer exposures were ruined by camera shake, but they were overexposed anyway; as it turned out, a shutter speed of 1/20 second produced an image of the outer corona comparable with a half-second exposure on film.

Here are some of my better results. All were taken with the 300mm lens at ISO200 and f/8; the shutter speeds are indicated.



Diamond Ring at Second Contact, showing prominences. 1/250 s.



Outer corona. 1/30 s.



Diamond Ring at Third Contact, showing chromosphere. 1/250 s.

THE TRANSIT QUIZ

Answers to November's quiz

October's quiz was all about astronomers or scientists who have given their name to the specified object or class of objects in the sky. How many did you know? Did you know more than just their surname?!

1. Dark 'globules'. **Bart Jan Bok – Bok globules.**
2. The Coathanger (Collinder 399). **Dalmero Francis Brocchi – Brocchi's Cluster.**
3. A Chain in Virgo. **Benjamin (Benik) Jegischewitsch Markarjan – Markarian's Chain (of galaxies).**
4. The star with the greatest proper motion known. **Edward Emerson Barnard – Barnard's Star, in Ophiucus.**
5. Sunlight shining through lunar valleys just before and after a total solar eclipse. **Francis Baily – Baily's Beads.**
6. One of the most massive binary stars known (each component is around 50 solar masses), in the constellation of Monoceros. **John Stanley Plaskett – Plaskett's Star.**
7. A complete circle of light as seen from Earth when a massive object is exactly between us and a quasar. **Albert Einstein – an Einstein Ring.**
8. The main gap in Saturn's A-ring. **Johann Franz Encke – the Encke Division.**
9. A reflection nebula in Monoceros that changes its appearance from time to time (as an aside, it was the first object photographed with the 200-inch Hale Telescope at Mount Palomar, in 1949). **Edwin Powell Hubble – Hubble's Variable Nebula.**
10. The supernova of 1604, in Ophiucus. **Johannes Kepler – Kepler's Star.**

December's quiz

Every answer to the descriptions below starts with the letter 'A'.

1. Beta Cygni, a beautiful orange/greenish-blue double star.
2. Alpha Hydrae, which is in a region with no other bright stars nearby, hence its name, Arabic for 'The solitary one'.
3. The point in a body's orbit around a star that is farthest from the star.
4. Twentieth-century American astronomer best known for his catalogue of 2712 galaxy clusters.
5. A close approach in apparent position in the sky between two celestial bodies such that they appear just to touch.
6. Modern name for what were once thought to be different phenomena: Seyfert galaxies, quasars and BL Lacertae objects.
7. The English mathematician and astronomer who would have beaten Le Verrier to the discovery of Neptune, had he and the Astronomer Royal of the day (another 'A!') paid each other proper attention.
8. A joint undertaking of the SETI Institute and the University of California at Berkeley, and formerly known as the One-hectare Telescope.
9. A class of asteroids (one member is Toutatis, which will pass only 0.046 AU from Earth on 12 December) with orbits that cross that of the Earth and with orbital periods longer than one year.
10. A class of asteroids (Eros is a member) that approach but don't cross Earth's orbit but have a perihelion distance of no more than 1.3 AU.

