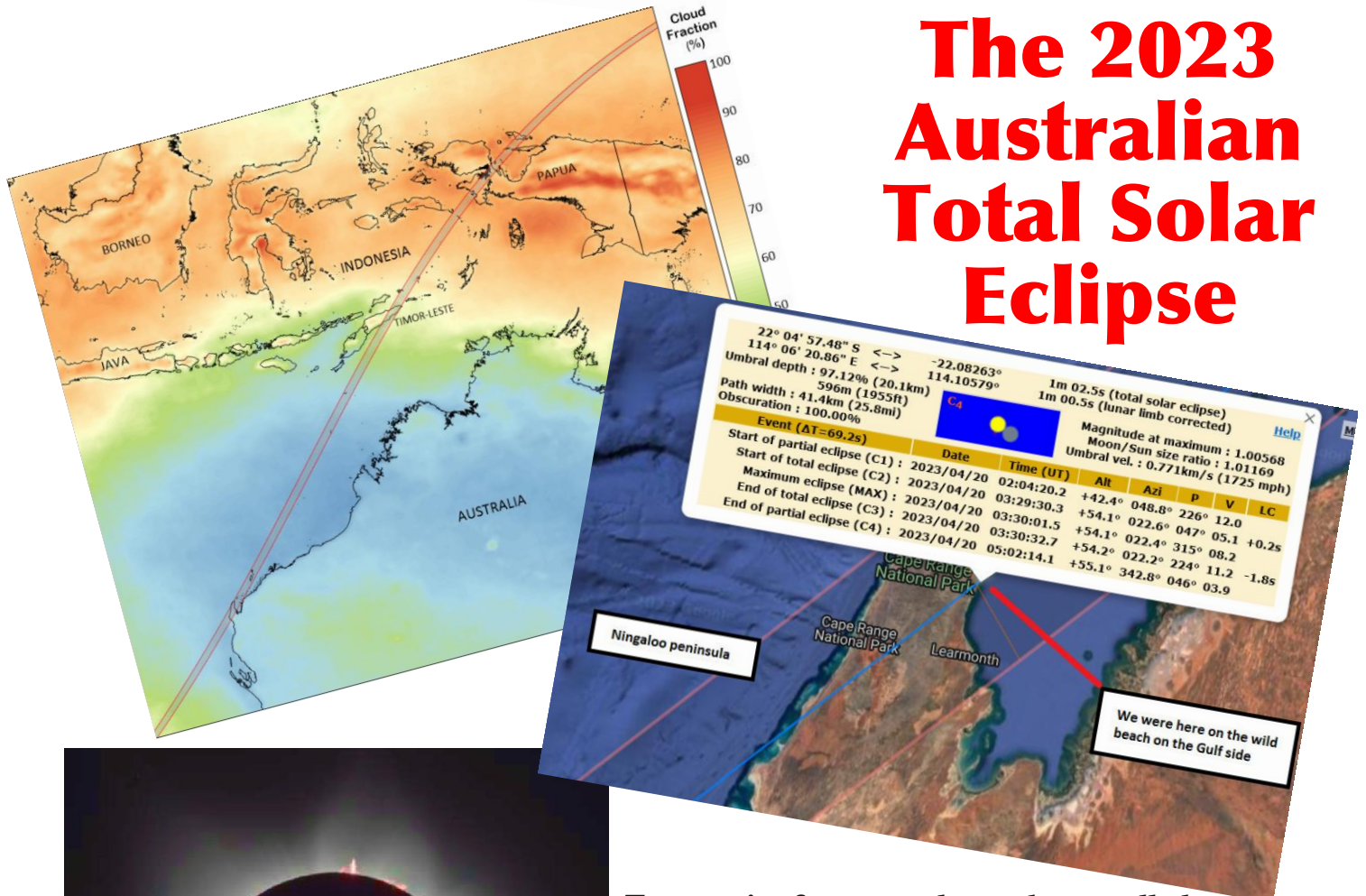


The 2023 Australian Total Solar Eclipse



Two stories from members who travelled to Australia to see the eclipse on the 20th April, 2023. Only a narrow strip of land in the far North West region of Western Australia, the Ningaloo Peninsula would be under the narrow path of the 40km width of the total eclipse track. Getting there proved a challenge. Top, Cloud forecast map showing clear skies in Australia. Above, Total eclipse shadow area across the peninsula. Left, Large bright prominences along the top edge of the Sun.

CONTENTS

- Page 2 Australian Eclipse By Mike Frost
- Page 6 Our Oz Eclipse By Gray & Cheryl Bachelor
- Page 9 Revd Dr William Pearson and Hawkshead Grammar School By Mike Frost
- Page10 A Picnic in Preston By Mike Frost
- Page12 The Powerhouse Museum, Sydney By Mike Frost

Australian Eclipse

By Mike Frost

On April 20th 2023, the Moon's shadow touched down on the Earth's surface and a solar eclipse took place. Unfortunately, the UK saw none of it, as the eclipse was mostly visible across Australasia and south-east Asia. The positions of Sun and Moon in their orbits meant that the two objects had almost exactly the same angular diameter. This in turn meant that, at the start of the eclipse, the Moon's umbra didn't quite reach the Earth's surface and the best that could be seen was an annular eclipse, over the southern reaches of the Indian Ocean. The path soon changed to being a short duration total eclipse, which just grazed Australia in its north-west corner, before passing over the eastern part of the island of Timor, the newish nation of Timor L'Este, and the Indonesian part of the island of Papua.

Whilst Timor L'Este and Papua were appealing destinations (I saw and enjoyed the eclipse of 2016 from Tidore, Indonesia) the weather prospects on land were best from Australia. Apart from one or two difficult-to-get-to islands, the only viable option for observing totality was the Ningaloo peninsula, which contained one small tourist-oriented town, Exmouth and the Australian air-force base at Learmonth, which co-hosted a civilian airstrip. So, I joined an Astro-Trails tour to Exmouth.

Astro-Trails sent several hundred tourists up to Exmouth. Many flew up a couple of days before totality, staying in the Exmouth Escape resort – Nick James (BAA comet section director) was their guest astronomer. Two hundred flew in on eclipse day on two chartered planes; Dr John Mason (meteor section director) was guest astronomer for this group. And a small group opted to arrive in Exmouth by road, staying under canvas at the Ningaloo Caravan Resort. I was guest astronomer for this group. Although I lived in Australia for nearly a year from 1987-88, and toured the country quite a lot, I had never been to Western Australia, so I was very pleased to have the opportunity to visit the state.

We flew from Birmingham to Perth, starting out Easter Sunday and arriving just after midnight on Monday/Tuesday. Our base for the start of the tour was the port suburb of Fremantle. I know it best for the breeze off the Indian Ocean, the "Fremantle Doctor", which is often held to be responsible for an England batting collapse when the team play in Perth. Forty years ago, Fremantle had seen better days. It was no longer the gateway to the city that it had been when Perth was first established

as the primary settlement on the west coast. Then Australia won the Americas Cup yachting race, Fremantle was chosen to be the venue for the tournament, and money came flooding in for regeneration. These days it's an elegant resort with substantial harbour facilities, and a well-preserved old town which harks back to a century ago. I particularly enjoyed the "Little Creatures" brewpub by the harbour.

Unlike the other Australian colonies (for example New South Wales, Victoria, Tasmania), Western Australia was never meant to be a penal colony. There was only a little fertile land, mostly concentrated around the Swan River, on which Perth lies, and the intention was to offer land for free men to farm. However, the colony struggled to recruit, and eventually it was felt necessary to make use of convicts – though it was specified these should be for lesser offences. Fremantle has a prison, built by the convicts, which is now a museum.

There is also a town jail, overlooking the sea, where miscreants would be held overnight for minor offences. This jail is now opened as a small museum by local volunteers. I was persuaded to put my head and hands into the stocks to experience what typical punishment might have been like.

Above the jail is a time ball, which of course got me excited. I knew about the time ball at Greenwich, which is lowered every day at 1 PM to give a time signal to ships, with a cannon sounding too in case of fog. I knew Sydney also had a time ball but was only vaguely aware that Fremantle had one too (Wikipedia tells me there are another 60 around the world, if one counts variants such as the time ball in Time Square, New York, which is lowered to celebrate the new year).

In Fremantle I met the other members of my tour. We had 13 people from the USA, 8 from the UK, 8 from Scandinavia and 2 Aussies from New South Wales. For the



Nambung National Park, The Pinnacles. These are strange rock formations which have evolved over 20,000 years from eroded limestone.



Monkey Mia, a tiny coastal resort which has gained international fame for its friendly dolphins. Every morning they come ashore for their daily feed and visitors can paddle in the water and see these wonderful creatures up close.

first day of the tour, we had arranged a visit to the vineyards of the Swan Valley. This wine-growing region is in the Perth suburbs. We visited three separate vineyards, a chocolate manufacturer and a nougat manufacturer. We tasted, I counted, sixteen different wines, but as I was giving a pre-eclipse presentation that evening, I laid off on quantity. The presentation went OK, I think, so perhaps I got the balance correct.

We met our tour bus driver, Luke, for the first time; he was affable and full of information. For example, as we passed the Raffles Hotel in South Perth, he told us that this was where AC-DC, the great Aussie hard-rock band, played their early gigs. At that time Fremantle was not gentrified and so the road there from the Raffles was, indeed, the *"Highway to Hell"*. There's a statue of Bon Scott, their first lead singer, on the waterfront at Fremantle; this could be twinned with the statue of him in his hometown of Kirriemuir, Scotland, which I wrote about previously in MIRA.

We were all ready to go. Except that one of my party, his room-mate informed me the night before, was not well. I checked up on him the next day and he was feeling better, OK to travel.

We began making our way up the coast. Perth is a large sprawling city, but as soon as you leave it the territory becomes wild and sparsely populated. On our first day, we visited "The Pinnacles", an outcrop of curious monolithic stones in yellow sand, whose formation is something of a mystery. We also got to see Lake Thetis, a brackish pool featuring a collection of stromatolites, pancake-like bacterial colonies which are some of the oldest life forms on Earth. We overnighted in Geraldton, and then proceeded further up the

coast to the resort of Monkey Mia, in the large inlet of Shark Bay.

Monkey Mia is a great place, a relaxed resort, where a family of emus roam around the grounds. Several years ago, people at the resort began feeding visiting dolphins – this is now somewhat regulated, to prevent the animals becoming dependent on humans, but at 9 AM each day, crowds still gather to see a family of dolphins, and occasional visiting animals, receive a small handout of food (not enough to stop them needing to find food for themselves). We had a full program of activities at Monkey Mia; a sunset cruise in a sailing ship, a wildlife cruise to view the dolphins and dugongs out in the open water, a visit to the local aquarium, and a didgeridoo dreaming experience, eating bush tucker with local aborigines out in the bush. I would have loved to have done all these, but I needed a little down time, so chose to skip the aquarium visit.

I was enjoying a nap when my phone rang. The guy who had been ill at the start of the tour had collapsed at the aquarium. Could they call an ambulance? Yes of course!

By the time I had found his room-mate, the ambulance had arrived at the aquarium and transferred the poor guy to the medical centre in Denham, the only nearby town. The manager of the aquarium, acting above and beyond, kindly came to the resort to collect me and the room-mate. By the time we reached the medical centre, two things were apparent; our friend was badly dehydrated. And he had tested positive for Covid. We stayed with him for several hours whilst he was checked over and gradually rehydrated, eventually being given permission to leave.

What to do next? There was the option for our patient to



The NASA tracking dish at Carnarvon.

abandon the tour, perhaps even be flown back to Perth. But had the Covid spread? I tested and was negative. My girlfriend, who had had minimal contact with him, tested – and came back positive. The Covid was spreading on the bus.

We decided to continue with the tour, as Monkey Mia was some way off the beaten track; our next destination, Carnarvon, had better facilities. We asked people on the bus to test themselves, and to wear masks on the bus (one or two refused – their choice). The next morning in Carnarvon, we had three more positives.

Nonetheless, we continued north, next stop Exmouth. Actually, the first stop was just outside Carnarvon. The town is pretty much antipodean to Florida (the actual opposite point is to the west, in the Indian Ocean), and so all spaceflights launched from Cape Canaveral would also fly overhead at Carnarvon. So, during the nineteen sixties, it was an important tracking station for NASA. The tracking dishes are still present, but the site has now been developed into an excellent museum, staffed by enthusiastic locals. In its heyday, one in ten in the town were employed by the tracking station, so there are video testimonies of their activities. And a full-scale model of the lunar module. And a signed photo of Buzz Aldrin, who visited the site to open a new gallery.

I enjoyed the museum, but I was beginning to feel ill as the bus sped northwards. We stopped to let everyone take photos as we passed the sign marking the Tropic of Capricorn. Amusingly, the sign is in a large layby, so that vehicles stopping to take pictures don't disrupt the flow of traffic on the main road. By the time we rolled into Exmouth I felt dreadful. As tour leader, I had to liaise with the campsite manager, getting everyone to their (pre-erected) tents. We were also joined at the campsite by eight Hong Kong- and China- based astronomers, who immediately set about building impressive rigs of telescopes.

Of course, all I wanted to do was lie down quietly and die. But, although I'd got everyone else to their tents, I couldn't find mine. For about an hour I was wandering round the campsite, dealing with enquiries from the rest of the tour and trying to find our tent, before going back to reception to ask for help. Our tent, it turned out, was slightly separate from the others, not on the marked area of the campsite map. I could have done without an hour's delay finding it.

That evening I tried to get some food at the campsite restaurant. I had almost no appetite, although I was keen to drink lots of water to make sure I was hydrated. My friends Anne and Dave, who were not on our tour but had arrived in Exmouth by campervan, bumped into us in the restaurant, and told me, candidly, that they had never seen me look flatter. As I left the restaurant I threw up.

Meanwhile, I was discussing with my Astro-Trails bosses what to do next. We had a series of excursions set up, starting with a dark sky stargazing session that evening, and then snorkelling the next day, plus the trip I had really been looking forward to, swimming with the whale sharks (whales, not sharks) who congregate off Exmouth. Astro-Trails now had well over a hundred astronomers in town; our group of thirty-plus at the campsite and the rest, Covid-free, at the Exmouth Escape Resort. The decision was to postpone the star-gazing for our group and to make attendance on the two water-based tours dependent

on a negative Covid test. Instead of joining everyone else at the Escape Resort, we would view the eclipse from the campsite.

Of course, I tested positive for Covid. The "T" line on my Covid test shone like hydrogen-alpha. Even if I had had the energy to be able to swim with the whale sharks, I wouldn't have been allowed on the bus.

Having waved off the lucky covid-negative tourists on the excursion buses, I spent the day doing as little as I could get away with. In the evening, Nick James came over and gave us a sky-orientation tour from the campsite. There was quite a lot of pointing out things we could barely see, like the Milky Way, because of the campsite lights.

Eclipse day dawned. There was a little cloud to the south, but over Exmouth the skies were completely clear. The eclipse started just after ten o'clock. Several of my fellow campers decided to watch the eclipse from the public viewing area on the beach, but most stayed in the campsite. It turned out to be a good location. We were in control of our environment, so there was no disruption from the other campers on the site. The Hong-Kong group probably wouldn't have moved anyway, as they had set up their many scopes and had already done night-time astrophotography. I had a word with the campsite management and got them to put a sack over the camp streetlights just in case they came on during totality.

Our camp site was shady and so were able to see wonderful pinhole crescent effects in the gaps between the leaves. And, of course, I brought out my trusty kitchen colander. My friends Anne and Dave joined us – they had travelled from their home in Exmouth, Devon, to Exmouth, Western Australia, by cruise ship and campervan, taking weeks over the trip.

Totality occurred at 11:29, in completely cloudless skies. For fifty-four seconds, we had a glorious eclipse. The



The camp site was shady and wonderful pinhole crescent effects could be seen in the gaps between the leaves



Close-up of the pinhole crescent effects when the Sun is nearly covered.

eclipse began with a prolonged diamond ring at second contact, and a roar from the crowd on Exmouth Beach as the corona revealed itself. We are closing in on solar maximum, so the corona is becoming chaotic, and indeed it was spiky in most directions. To the left of the disk, there was a whole string of prominences – the uppermost of these was quite extraordinary, a thin prominence, arched like a croquet hoop. We didn't have a clear horizon, so I didn't get chance to check for colours there. Jupiter was visible just above the Sun, and Venus was visible lower in the sky; Mercury and Saturn were around too, but I didn't see either.

For us in the campsite the most unexpected phenomenon was not visual but aural. A large flock of galahs – pink and grey cockatoos, with a reputation for skittishness and stupidity – decided it was time to roost and came shrieking over our heads during totality. I had set up my iPhone to record the eclipse, and the squawking drowned out everything – but, of course, not one of the little buggers actually flew through my field of view. The progress of the eclipsed Sun through the Moon's shadow was visible though and just as the Sun reached the edge of the shadow – of course – totality ended with another prolonged diamond ring. I checked the sheet we'd laid out, as I did just before totality, but there was no sign of any shadow bands, perhaps the air wasn't turbulent above us.

We celebrated in the usual fashion – commemorative bottles of champagne appeared from nowhere (I think there was a shop in Exmouth selling them). I had to quickly eat the fruit salad I'd kept over from breakfast to give me a plastic carton to drink from! For me, there was a sense of relief, we'd had a difficult journey to get to this point, but despite all the Covid we had managed to get everyone to Exmouth and seen the eclipse.

That evening, I ventured gingerly outside the campsite for the first time, to visit the music festival across the road – I needn't have bothered, the music was so loud that we could listen to the "hits since the 1960's" medley from our tent. I fell asleep somewhere round 1995. Next morning, we set off all-too-early, with a long journey south ahead of us. We were worried there might be traffic jams out of Exmouth but the roads were clear and we completed the 800 km journey to Kalbarri on time.

Kalbarri was a lovely resort. The area had taken a hit a year or two ago from a cyclone but was now recovering. Inland, the Kalbarri National Park offered great views over and down to the Murchison River, in particular from the Skywalk and "Nature's Window", a natural rock arch. The town sits at the head of the river estuary, with lovely views out so sea across the river, especially at sunset. South of the town the rugged coastline, site of many shipwrecks, gave us some great coastal walks. And best of all our hotel was just opposite the local sports ground, where a herd of forty or so kangaroos came to graze at dawn and dusk – we had seen plenty of dead 'roos by the roadside, but precious few live ones until now!

We had one more opportunity for dark sky observing, on our last night in Kalbarri. We had a vote on which of the locations we had visited would be best for dark sky observing and decided on the car park for one of our cliff walks. It turned out to be a good choice. The car park

was deserted, so when the coach driver switched off the lights, the only other light disrupting our view was sky glow from Kalbarri, ten miles north, and even that was hidden behind a slight rise. All the sights Nick had promised us from the campsite – the Milky Way, Large and Small Magellanic clouds, the Southern Cross, were now instantly visible. The thin crescent of the Moon, and Venus, were just setting as we began our stargazing. I was well enough to deliver a laser-assisted tour, pointing out the Southern Cross and the Jewel Box nebula; Omega Centauri, the brightest globular cluster in the sky; Eta Carinae, which was the second-brightest star in the sky for a few days in the 1840s, and might yet be our next supernova; Alpha and Beta Centauri and Canopus. I was OK on the southern stars but struggled with the more familiar but unusually oriented equatorial and northern constellations. I could cope with Orion, on its side and could locate Gemini, with Mars interloping, but although I found the question mark which marks the head of Leo, now upside-down and back-to-front, I didn't spot Denebola until someone kindly pointed it out to me. I think we all enjoyed the chance to view southern stars from a dark sky, a chance we had missed in Exmouth.

The last day on the road took us back to Perth, stopping at the "pink lake", the Hutt Lagoon, which did indeed have a pinkish tinge, caused by algae; and the huge white sand dunes of Jurien – we climbed the dunes but passed on the chance to snowboard (sandboard) down them, as our coach driver had regaled us with tales of broken collar bones amongst previous passengers. Then back to a hotel in central Perth. With Covid still around in the passengers, there was no call for a final team meal, so the tour fizzled out a little. We took the chance to spend the morning exploring the city on the free city centre bus services, and then we caught a taxi to the airport for the flight home.

This was a difficult tour. The rampant Covid, which affected at least ten on board the bus, made life complicated, and spoilt much of the holiday. Trying to lead a tour whilst fighting off my own Covid was hard work. But we survived. And not only survived, but saw southern night skies, kangaroos, echidnas, emus, dolphins and dugongs. And stromatolites and pinnacles. And, of course, a beautiful solar eclipse in cloudless skies.

Our Oz Eclipse

By Gray & Cheryl Bachelor

Shock news! Legendary sunshine disappears in Australia

The next total solar eclipse to be visible in Britain is 67 years away and you'll need to be in Devon or Cornwall but if you want the full black sun experience before 2090, then travel is the only option – we begin our plans at least 2-3 years ahead and the last eclipse on April 20th 2023 was no different.

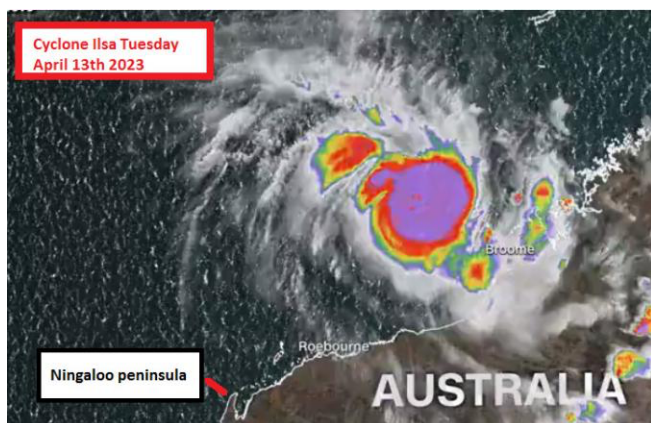
Choosing a location is a ritual and it starts with understanding the track of totality, cloud cover history and likely weather patterns, then to look at where be interesting to be and what the logistics would be to stay there.

The solar eclipse of April 20th 2023 was interesting for a few reasons – it was a hybrid eclipse meaning the eclipse would change from annular to total and back to annular along the path. Despite a very long track it would cross very few land masses and that cloud cover forecast over the more interesting locations – Timor Lesse and Papua - would rule them out as equatorial Melanesia would be just coming out of the rainy season; and so cloud cover forecast was up in the 70-80% range. That left a small strip of land in Western Australia 1200km north of Perth – access was difficult and there were few settlements – accommodation was limited, transport was limited and so prices would be eye-watering and with likely more risk of scamming.

Choosing the spot

A view of the eclipse track and an analysis of the typical cloud cover expected for April 2023, thanks to Jay Anderson, see <https://eclipsophile.com/hse2023/>

So we decided to head to the Ningaloo peninsula in Western Australia and so chose to stay outside the zone and do the 5hr drive there the night before and so make Carnarvon our base – to keep costs down. In fact we found some digs right next to the old Nasa tracking station used in the Gemini and early Apollo missions. We reserved on AirBnB 15 months before. Unfortunately 9 months later the owner told us the house was being sold and we had a frantic period over Xmas 2022 to find accommodation – and of course now everyone had doubled and tripled their prices. Fortunately we found someone on Facebook who was starting a conversion job on



Cyclone Ilsa hitting the coast a week before the eclipse, with winds up to 250km/h

part of their garage and so we took a flier on committing to them but we had to wait until almost our departure to see a picture of the finished place that awaited us. They had done a good job and we wouldn't have to sleep on a camp bed or in their freezer.

The next topic was where exactly to set our pitch for the big day – we like to find a spot away from crowds and ideally one with some scenery. 2019 we had been in the Atacama in a remote hilltop location at Almarante LaTorre, 2017 had been in remote country in the Warm Springs tribal nation and 2016 had been on a remote beach near Luwuk in Sulawesi. In Ningaloo we considered the Indian Ocean beaches but a 3hr drive on sand roads would leave few options if the weather changed and we had to move or the place got inundated with people and we risked being blocked in.

We arrived a week before and set about visiting locations and quizzing locals – unfortunately we learnt local rangers were going to block all roads and tracks to the National Parks and their fantastic gorges, somewhat reluctantly we decided on the massive beach, 25km long on the eastern Gulf side of the peninsula. As we figured out it would take thousands to fill it and we could escape and move if clouds came in. Whilst the normal seasonal forecast for April in Western Australia is good, it was still cyclone season and one rolled in just as we arrived and hit the coast about 200km north – smashing buildings and churning up dust.

In the run up to eclipse day, clouds were in strong evidence and the local clear sky forecast for “eclipse day” was sandwiched between cloudy days - but with eclipses we always travel in hope. 1999 was almost a wash out for us in Northern France yet we did get a glorious sighting. In 2008 a hole in a solitary cloud allowed a clear view in Santandu in Xinjiang in the Gobi desert. 2009 was totally fogged out in Moganshan, near Hangzhou, so we missed it. 2015 in The Faroe's one camera was blown over in a storm at totality but we just saw the ring of fire in a gap in the clouds before they snapped shut and a Faroese family even managed to capture a picture of us with a rainbow from the partially eclipse Sun behind us. So we are always keeping in mind the chance of disappointment but also for extreme elation when everything falls into place.



Vital protection for flying sand and providing shade for our control centre. Note the custom telescope cover and our solar powered setup with custom spade support!



Sunspots being eaten by the advancing Moon. The contour of the Moon is real not due to a dodgy lens or wobbly tripod!

This year we also wanted to have a better setup for our photos and so a grand project started to make a solar powered rig that we could partly take with us and partly buy some stuff on arrival. But to match what we had tested here in Coventry before going. Naturally the rig became more elaborate with a high-tech astro camera, 100mm aperture f7.4 scope, portable mount, fan-less PC, wifi hotspot, solar panel, battery. Of course the big question then was what could we take in hand and checked baggage – especially as we would use multiple airlines – and each has a different approach – pieces, weight, incremental fees, whole piece fees etc etc. Then there was the topic of protecting the gear and what we could take as hand luggage. We made some custom packaging including a reinforced shoulder carrier for the telescope which included a piece of plastic gutter to act as a cradle and easily be accepted by airport security. In the end, after all the hours sweated over weight and size of luggage, we had no problems – the kit even got safely ferried on a tiny water craft later in the trip.

The days before the eclipse are busy – location reconnaissance, monitoring traffic, getting provisions for self sufficiency, watching the weather, preparing the kit, practicing setup and planning a routine for totality.

The evening before the eclipse we returned to our chosen beach spot by driving 1km along the beach and marked a place to park. We were happy to see that very few people were there - we stayed till dusk and set off the 20km back to our digs in Exmouth – we enjoyed a fantastic red sunset from the dust the cyclone had churned up on the way back.

Eclipse day

At 3am we awoke to make breakfast and we left to head back at our spot – Cheryl managed to navigate to get us exactly back to our “secret” pile of stone - quite a feat with a long drive in the pitch dark on an almost deserted beach. Pretty much bang on the centre line. Brilliant!

One worry was that south of us were pretty heavy clouds – the good news was that there was a breeze from the north which seemed to be pushing it back. Yes, of course the Sun would be in the north and so we expected clear skies.

We started to setup and had planned to get our gear polar aligned in the dark and then enjoy sunrise. Despite all the preparation, in all the excitement and weird antipodean setting Gray just couldn't get the mounts polar aligned and it took a while before it was realised that the mounts were facing north not to the south pole – duh! By then the sky was lightening quickly so a very hurried alignment was done. So with lost time we missed one of the few chances we had to do

some Milky Way shots – oh well next time.

With the gear in place we decided to have breakfast and watch dawn – but the wind really picked up and delivered a terrible hazard for astro and photography gear. . . a sand blast! So we really had to scramble to quickly string up a tarpaulin and make sure we were well protected – using the car also as a windbreak. This worked well as it doubled up as a sun shade too.

After breakfast we could chat a bit to some of the other few visitors on the beach but the critical task was to make sure everything was really ready – it was and so with an alarm set & with gear in place the first question is when exactly will we be able to detect “first contact” – this is a thrilling moment as it says “we're on” and the cameras can really start to roll.

Eclipse glasses to the fore, solar filters on and we do some tests to see that indeed images are safely being captured on disk and that apertures and focus were good. This time there had been some great Sun spots visible so these had been very useful for adjusting focus – Cheryl used a different approach by setting a high f number to get a deep depth of field. She adjusted apertures and f numbers with test frames and made plans for changes as the light level falls towards totality.

For us between 1st and 2nd contact we are in a groove – enjoying the excitement and anticipation of first timers around us – taking care to keep an eye on our images but secretly being excited for the main event which crept nearer.

We met an international group who had stumbled across the eclipse by chance and who were curious about our setup – one of them, Jamie, a lad from Essex became very interested – Cheryl shared some tips so that he could use his own camera as Gray made a quick solar filter for him – soon he was hooked and in fact stayed till 4th contact.

There was a large Sun spot group that we had some fun estimating when they would get “eaten” by the body of the Moon. It was about 30mins after 1st contact and a sure sign we were well on our way. About an hour in the coverage was about 70% and some people began to notice the dimming light and as we crept up to the 75min mark an eerie twilight was obvious – the blue sky had a deeper hue – shadows appear less harsh and our eyes adapted. A quick look around revealed cloudless skies so the anticipation notched up further. More checks – batteries swapped, memory cards



Bailey's beads and Yeh! Black Sun! 26MP Astro camera, 740mm f7 0.4mS.



Mid totality. Fantastic prominence, its height was estimated at 3 times the width of the Earth

checks, computer disk space checked and on we go – readying the wine for our totality ritual – in the creepy low light levels the thrill gets even stronger as one senses the linear path of the universe – we can't escape – we will see the eclipse – we are definitely in the right place at the right time!

On our screens and with our eclipse glasses we watch the crescent of light get thinner and thinner, quickly gazing around without our glasses to take in the twilight that begins to descend, it seems quieter, just the gentle lapping of the waves. The wind has dropped – stopped, all around is hushed – fewer bird tweets. Time seems to slow down – it's an illusion – the Moon's shadow is racing towards us at 1700km an hour – the anticipation builds and Gray shouts out to will the Sun and Moon on, to their unstoppable conclusion, "Come on you beauty!"

Nearly there, we get ready for the dramatic act – just at the right time – a tiny sliver of Sun and then it's "Filters off" and then glasses off to see the in-bound diamond ring – multiple it seems and immediately one noticed some massive features visible in the Sun's atmosphere – quickly checking cameras were still rolling – Gray didn't change exposure settings for totality the settings appeared alright – Cheryl opened the aperture a bit and we had time in the 60 very short seconds of totality to marvel at the incredible black Sun – but also the dynamic energy and violence of the solar atmosphere - the Moon was just a bit bigger so the prominences and flares were vivid, and wow what a massive prominence.

There's awe and there's awe – this one seemed so incredibly intense perhaps it was the short duration, perhaps it was the drama of the cyclone, the game of cat and mouse to find a serene spot but it was clear the Sun had put on a fantastic display – it was very active and so we were very very happy – not just happy – utter elation, some distant excited cries from the few others nearby. We soak it up, keeping an eye that the kit rolls smoothly – but remembering to look and looking to remember!

Then remembering a last look around at not just at screens to see the half-light, the temporary night sky, even planets and stars – to really look and remember to remember what's on show. No sooner that it has started and we were ready for filters & glasses back on. Just as we had the outbound diamond ring and the calm of the crescent sun under filters re-emerged. More than 2 years of planning successfully delivered a fabulous experience – and our kit had worked well – so we opened our wine and had a good hug, praised our own efforts and made an exuberant toast to nature. We examined our pictures and were stunned, these were the highest resolution and quality of image that we ever

had from an eclipse – so we could share some of them with the groups around us as they wandered over to share their experience – one teacher from Melbourne said he had taught his secondary grade kids for 10 years about eclipses and now he could speak from direct experience. Some young people were just hyper from their emotions – a young couple came and sat with us to share experience of the eclipse – they told us the excitement had almost been too much as they were expecting a baby in a few weeks – fortunately things calmed down but they were definitely inspired. So now we could relax and enjoy the wind-out to 4th contact – even occasionally forgetting to capture a sequence - chat a bit and relive the magic.

Our spot on the beach only had half a dozen groups spotted around and they began to drift away so in the end we were alone so we had a swim and had our lunch and enjoyed the tranquillity in the Sun. Nature carried on oblivious of the drama caused to puny humans by a geometric alignment of gigatons of matter across 150 million kilometres, illuminated by trillions of photons that are reckoned to have spent aeons trying to escape our nearest star. The humans marvelled at their mathematical ability to predict such alignments and to allow them to be exactly in place – even if it means travelling to the other side of the world to be on a mere strip of land and then dare to challenge the elements to deliver the rights skies to see the event for one whole minute!

A couple of footnotes: On the way back we stopped in at the excellent Gwoonwardu Mia Aboriginal heritage & culture centre, where we learned something of indigenous experience in the plantations and forced separation and indoctrination of children. We met and donated some of our gear to Kenn and Tommy – community leaders in Carnarvon – with its rich space exploration connections tracking the Gemini and Apollo missions. Then we "swung" by Bunaken in Indonesia on the way back to re-tread our 2016 eclipse steps and to stay with a family we helped during Covid. The night skies weren't kind as it was transitioning from the wet season so we had few observing opportunities but snorkelling and photographing the corals and turtles made up for it.

About our photos: From our eclipse images, Cheryl made some time elapsed videos of the whole eclipse, Gray has produced a series of details and of black Sun views using stretching to emphasise the corona.

During the event we made contact with the Perth Astronomy Club and David Brooke, ASWA, also did a talk for their Society and used some of Gray's pictures.

Next stop: Mexico April 8th 2024 !



Gray with Kenn and Tommy in Carnarvon

Revd Dr William Pearson and Hawkshead Grammar School

By Mike Frost

You will have seen many articles by me about Revd Dr William Pearson (1767-1847), one of the co-founders of the Royal Astronomical Society. Pearson was the Rector of South Kilworth, Leicestershire, and observed for many decades from this location. But he was born in Whitbeck, Cumbria, on the western edge of the Lake District (the village is literally yards inside the national park, on the eastern side of the A595 road which runs at the foot of the Fells) and went to school as a boarder at Hawkshead Grammar School, in the centre of the Lakes, between Coniston Water and Windemere.

The school was opened in 1585 by Edwin Sandys of Esthwaite, Cumbria, Archbishop of York, who wanted to found a school to promote protestant Christianity. The school was for boys only. One famous headmaster was Edward Christian, brother of the Bounty mutineer Fletcher Christian (who did not attend the school).

The school's most famous pupil was William Wordsworth. Pupils often carved their names into the desks, and Wordsworth's name can be seen (protected by a Perspex cover these days) on a desk near the door. Wordsworth and Pearson's times at the school overlapped and Wordsworth wrote in 1843, *"His manners, when he came to Hawkshead, were as uncouth as well could be; but he had good abilities, with skill to turn them to account; and when the Master of the School, to which he was Usher, died, he stepped into his place and became Proprietor of the Establishment. He contrived to manage it with such address, and so much to the taste of what is called High Society and the fashionable world, that no school of the kind, even till he retired, was in such high request. . . I often used to smile at the tales which reached me of the brilliant career of this quondam clown, for such in reality he was in manner and appearance before he was polished a little by attrition with gentlemen's sons trained at Hawkshead, rough and rude as many of our Juveniles were."*

The school closed to pupils in 1909. These days it is a museum, open to the public 11:00-16:00, Thursday to Monday, April 1st to October 31st. You enter the museum into the main school room, and there is a staircase to an upstairs room, with a side room which was the headmaster's study. On the staircase is a display case, which changes every year to reflect some different aspect of the school's history. This year the display case features William Pearson.

I was alerted to the exhibition by Ellie Evans, who works as a conservation and collections specialist at the museum. Ellie is doing a PhD in heritage studies at the University of Cumbria – among other things, she is studying the many stone circles in the Lake District and gets to fly drones around them. She works part-time at Hawkshead Grammar and one of her jobs is to put together the special displays. When Ellie was researching the Pearson display, she came across the work Carolyn Bedwell and I had been doing to commemorate Pearson's time as the rector of South Kilworth, Leicestershire. Carolyn and I corresponded with her to try to answer some of her questions.

At the end of June, I was going to attend the picnic of the Society for the History of Astronomy at the Jeremiah Horrocks Observatory, Preston. I decided to make a long weekend of it and travel up to the Lake District. And so on Friday June 29th I arrived in Hawkshead and visited the museum. I had been once before, about twenty years ago, but there was no Pearson exhibition then.

The centre of the Pearson exhibition is a book which Pearson donated to the school, a copy of James Ferguson's Lectures on Select Subjects in Mechanics, Hydrostatics, Pneumatics and Optics, with the use of the Globes and the Art of Dialing, and the Calculation of the Mean Times of Full and New Moons and Eclipses. This is clearly a book of practical astronomy. The book is open at a page which describes how and why to make corrections to local time using the Equation of Time. Ferguson suggests using a celestial sphere (a globe showing the constellations rather than the continents) and so the book is accompanied by Cary's Celestial Globe of 1815.



Above, view of the outside view of the museum.
Right, Cary's New Celestial Globe (1815) The label reads *"This celestial globe shows the stars and constellations as they were observed in 1800. 'Cary's New Celestial Globe on white are correctly laid down upwards of 3500 Stars selected from the most accurate observations and calculated for the year 1800. With the extent of each Constellation precisely defined by Mr Gilpin of the Royal Society."*





The display case featuring the Pearson exhibition.

There are also copies of illustrations from the book, and some number-intensive calculations from the museum archives, which might be by Pearson.

I spent some time in the museum, looking round the other exhibits, and then had a chat with Ellie and with Joanne Heather, the museum clerk. There is another temporary exhibition about the life of William Carter Preston, a local boy whose architecture studies were interrupted by the Great War; he died in active service in the closing months of the war. I liked the way in which the museum's scope is expanding outwards from the life of William Wordsworth to encompass the stories of other boys from the Lakes.

The Pearson exhibition isn't large but if you find yourself in Hawkshead it's certainly worth dropping by. The exhibition runs until the end of the season, October 31st.

<https://www.hawksheadgrammar.org.uk>
The museum is open 11:00-16:00 Thursday-Monday until 31st October

A Picnic in Preston

By Mike Frost

Every year, the Society for the History of Astronomy holds a picnic in an astronomical location somewhere around the country. For 2023, they accepted an invitation from Preston and District Astronomical Society to hold their picnic at their observatory in Moor Park, Preston. Florence and I were already up in the Lake District for the weekend (see previous article), so we stopped off on the way back south to join the picnic.

The observatory is in the north-west corner of Moor Park, a municipal park to the north of the city centre. On the opposite side of the park is Deepdale, the stadium of Preston North End. There's a supermarket close to the ground where we loaded up with picnic provisions; there was also a traffic

jam, so we were a little late arriving and the introductory talk was just about to start. Our host was Professor Derek Ward-Thompson, Director of the University of Central Lancashire's (UCLan) Jeremiah Horrocks Institute of Maths, Physics and Astronomy. The Moor Park observatory is named for Jeremiah Horrocks, the first man to predict and then observe a transit of Venus, in 1639. At that time Horrocks lived in Much Hoole, five miles south of Preston.

But Moor Park wasn't the first public observatory in Preston. Derek told us about the history of astronomy in the town, starting nearly two hundred years ago with the Preston Institution for the Diffusion of Knowledge, founded in 1828, from which UCLan can trace its formation. One of the

founder members was Moses Holden, who lectured in astronomy across the north of England. The first observatory in the town dates from later in the 1800s, and the Preston Scientific Society. They had a reflecting telescope originally owned by Alderman R G Watson, with a speculum mirror made by James Cooke of Preston. In 1881, the telescope was donated to a public observatory in Deepdale. The James Cooke telescope, which suffered from tarnishing of the speculum mirror, was replaced by a Thomas Cooke refractor, a more practical instrument which is still in use in the Moor Park Observatory.



Although the Deepdale observatory was used for many years, it was not ideal, and it was decided to re-locate to a new site in Moor Park, under the directorship of George Gibbs. The new observatory opened on March 29th 1927, a very famous day in the history of north country astronomy – England’s last-but-one total solar eclipse, with 24 seconds of totality visible from Preston. A crowd of thirty thousand thronged Moor Park to see the eclipse at 6:30 in the morning – many had partied all night in the park (there is also photographic evidence of some people playing tennis during totality). Preston, unlike much of the Lancashire and Yorkshire, did see some of the totality through gaps in the cloud.

Moor Park Observatory was open to the public until 2002 and was then renovated and re-opened in 2017. Stewardship of the observatory passed from the town council to the university after George Gibbs’s death. Subsequent directors of the astronomy department and observatory included Vin Barocas, who was BAA president 1970-72. Under Barocas’s stewardship, the university also opened a research observatory (for developing instrumentation and training students) at Alston Hall, to the east of Preston. One of the earliest multi-mirror telescopes was developed at the observatory; their most recent telescope, a 0.7m altazimuth reflecting telescope, is named for Moses Holden; it’s the third-largest telescope in the UK at present. I visited the Alston Hall observatory in 2004, shortly before the transit of Venus that year. I attended a memorable residential



course at Alston Hall, visiting the transit-themed flower festival at St Michael’s church, Much Hoole.

After Derek had finished his introductory talk, we had our picnic. Unfortunately, the weather was not co-operative, cool with occasional rain, so we ate our sarnies inside the observatory. I got to talk to an old friend, Paul Marston, who had organised the pre-Transit course. Paul also runs the university’s remote learning course “*Great Astronomers of History*”, which I took in 2005. I helped Paul with some of his chapter on Jeremiah Horrocks, taking pictures of the matriculation book at Emmanuel College Cambridge, where Jeremiah and I were both students, albeit 350 years apart. As a surprise, Paul had brought along copies of the course textbook for all the participants in the picnic. Much appreciated!

After a cuppa, our second speaker stepped up. Graham McLoughlin, of PADAS and the SHA, has researched Preston astronomers extensively, and gave us a magic lantern talk on George Gibbs and others. Gibbs had left behind a large archive of material, photographs and drawings, so there was plenty to show us about the running of the observatory in its early days. Gibbs was a talented man, who invented the heliochronometer, a type of modern sundial which could give accurate times. About a thousand were built up to the start of the Great War and some can now be purchased online as antiques, at a cost of a few thousand pounds. Graham brought one along to show us.

By the time Graham had finished his talk, the weather had perked up a little, and we were able to venture outside. Dermot from PADAS was able to set up a solar telescope, which showed an impressive active group of sunspots on the solar surface.

We took a group photograph, and that was it for the picnic. Enjoyable afternoon.

<http://www.star.uclan.ac.uk/observatories/history-of-astronomy-in-preston/>
<https://www.uclan.ac.uk/about-us/special-collections/jeremiah-horrocks>
<https://www.ukaa.com/guides/pilkington-gibbs-heliochronometer-119>



The Powerhouse Museum, Sydney

By Mike Frost

In August, unexpectedly, I made my second visit of the year to Australia. This time it was to the other side of the country, New South Wales, and the steel works at Port Kembla, fifty miles south of Sydney in the Illawarra area. I worked at this steel mill for ten months in 1987-88, installing an automation scheme. Of all the places I have ever worked, Australia is my favourite. Whilst Port Kembla itself, a steel town, is not a beautiful place, the coastline in the Illawarra district is breathtaking – beach after beach, backed by a steep escarpment with stunning views from lookouts. And Sydney is one of the world's greatest cities. I have friends in Illawarra and friends in Sydney, so I had plenty to do in my spare time.

On the middle Saturday of my trip, I caught the train up to Sydney, to meet up with a couple of astronomical friends of mine who are associated with the Powerhouse Museum in Ultimo, central Sydney. Toner Stevenson used to work at the museum and at the Sydney Observatory (currently under renovation) and has just published a book on "Eclipse Chasers" about Australian solar eclipses – I reviewed it for the BAA and enjoyed reading it. Andrew Jacob is the current curator of astronomy at the Powerhouse. So, I had two knowledgeable guides to show me round.



A replica of the Strasbourg Astronomical Clock

on the pollution we put into our atmosphere, including an extraordinary souvenir clock given as a souvenir to the people of Maralinga, South Australia, on whose land we, the British, tested several atomic bombs in the 1950s.

Best of all is a series of interactive, voice driven displays. My favourite was an installation by Rafael Lozano-Hemmer. Speak any word clearly into a microphone and it is generated in cloud by an array of 1600 water vapour atomisers. What word to say? I was tempted to be rude, but settled for "eclipse", "chaos" and ... "Mira".

A curious, fun, rather thought-provoking exhibition.



A Goddard rocket

The exhibits include many memorabilia of space, a Moon rock from Apollo 16, a rocket made by Robert Goddard, first man to launch a space rocket, a soviet-era space suit (loaned to the museum by the USSR, which then dissolved, leaving the museum with no-one to return it to!) and a model of the Lunokhod lunar rover. There are also objects of historical importance – a copy of the astronomical Strasbourg clock, and an early Newcomen steam engine shipped from the Whitbread brewery in England.

But the most enjoyable exhibition, which they were very keen to show me round, was a new display, Atmospheric Memory. The exhibition is almost uncategorisable, cutting across many disciplines. The theme derives from writings by Charles Babbage, inventor of the computer. He suggested that because words were spoken into a medium, the atmosphere, it might be possible to recover historically spoken language by tracing atmospheric movements backwards – a rather wild concept and something of a flight of fancy even to Babbage. But the exhibition takes the idea in all sorts of directions – there's a model of Babbage's difference engine, some of his correspondence with Ada Lovelace, writer of the first computer program; a dissected Alexa (which, of course, permanently listens, records and analyses speech, potentially allowing historical speech to be recovered). There's a section



Cloud Display
Rafael Lozano-Hemmer, 2019

Temporary text display made with 1600 ultrasonic water atomisers, controlled by a voice recognition system. This display writes any words spoken into the intercom using pure water vapour. The atomisers are typically used for cold water humidifiers and aromatherapy devices. The installation uses AI speech-to-text algorithms to transcribe whatever is being said, from single words to full sentences. To participate, please speak into the intercom while pressing the button