

Astro Flyer



JANUARY 2023

Club News

From The President

Following our Xmas dinner at the Bomaderry Bowling Club on the 16th – thanks to all who attended – we have had a working session @ the UOW campus to start the refurbishment of our observatory prior to its assembly. Thanks to all who attended!

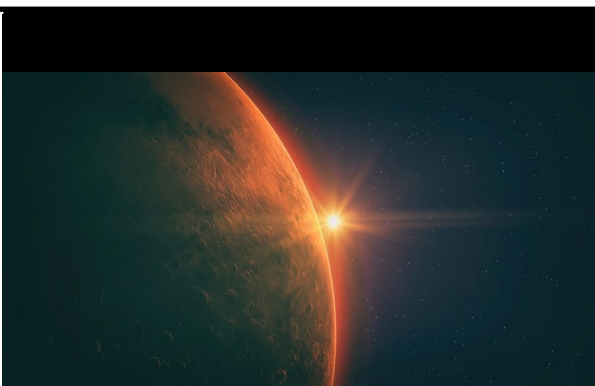
In the coming year we are going to try and refocus on practical astronomy and see if we can do some observing at our monthly meetings – weather gods permitting! To help with that over the next few months we will be assembling our observatory and fitting it out with necessary equipment. The savings we have made on the acquisition of the observatory structure will allow us to equip the facility with a very capable mount and telescope.

In the meantime keep on watching!
Best Regards,
Mark Town

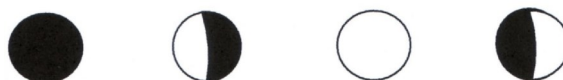
Next Meeting January 20th 7 for 7.30pm

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MOON PHASES



New Moon **First Quarter** **Full Moon** **Last Quarter**
Jan 22 **Jan20** **Feb 6** **start→Jan 15**

Viewing Nights

We are aiming, once daylight saving is over, to make observing at Friday meetings a priority if the weather permits.

New and Last Quarter moon phases are good times for Dark Sky Observing.

Jan 15 Last Quarter –dark sky observing after midnight

Jan 22 New Moon – dark sky observing all night

Jan 29 First Quarter – sky dark after midnight

Feb 6 Full Moon

**OUT THERE BY BOB TURNBULL
OBSERVATION OFFICER**

January February

Hi all you enthusiastic astronomers! Apart from an improvement in the night sky with at least better breaks with clear skies, temperatures have continued to be erratic.

Moon mid January 15th 10pm will be maximum libration (Map 116 & 117 page)
22nd 7am Moon at perigee (closest to earth, 356,569 kms. The Moon will be increasing in size into February.

Mercury wait for January 18 – 21 in the dawn for close to M25 low in the eastern sky near to the Tea Pot.

Venus appears in evening twilight in the low west with the Moon and Saturn in Capricornus

Jupiter will be in the low west near a dark Moon and Venus.

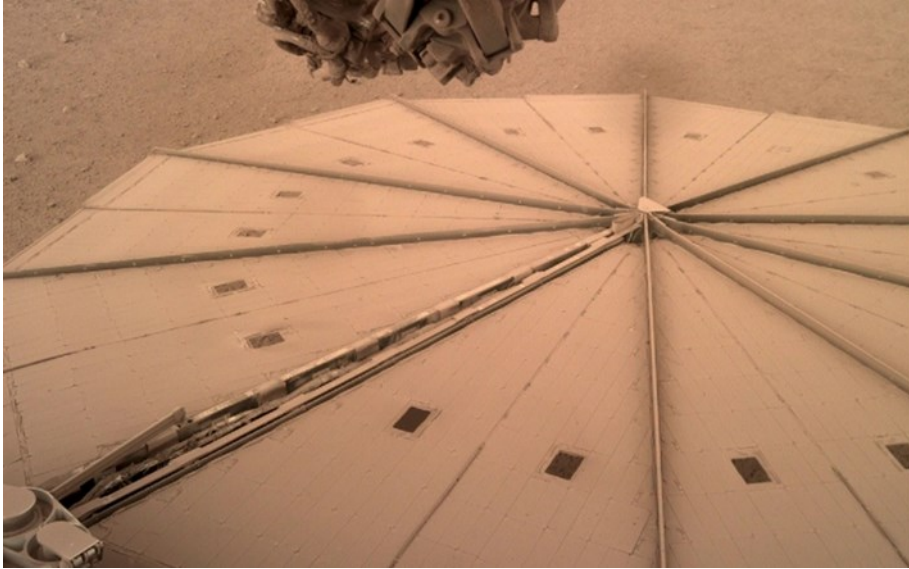
Appearance of the planets is on p22 for January and p28 for February of your copy of the Astronomy 2023.

Keep in touch with major pages on the iNet for NASA website. In particular read all about the Artemis 1 moon missions attempt to return astronauts to the lunar surface.

Good viewing.

Bob Turnbull

Astro Events from Frank Gross



These Are Probably The Last Photographs From InSight on Mars



Ivan Petricevic

Posted on November 8, 2022

NASA is really preparing to say goodbye to its InSight Lander after massive accumulations of dust have covered its solar panels, making it impossible for the lander to recharge its batteries to continue operating. These are probably the last two-photographs captured of the lander on Mars.

Almost four years after its successful landing on Mars, two years on Mars, NASA's InSight lander is running out of power. So, these photographs, released on October 30, may be the last photographs of the Martian surface and parts of the lander people on Earth will see. The photograph shows a partially dust-covered seismometer in the foreground. A second image shows the shovel of the lander removing soil from the Martian surface.

Astro Events from Frank Gross

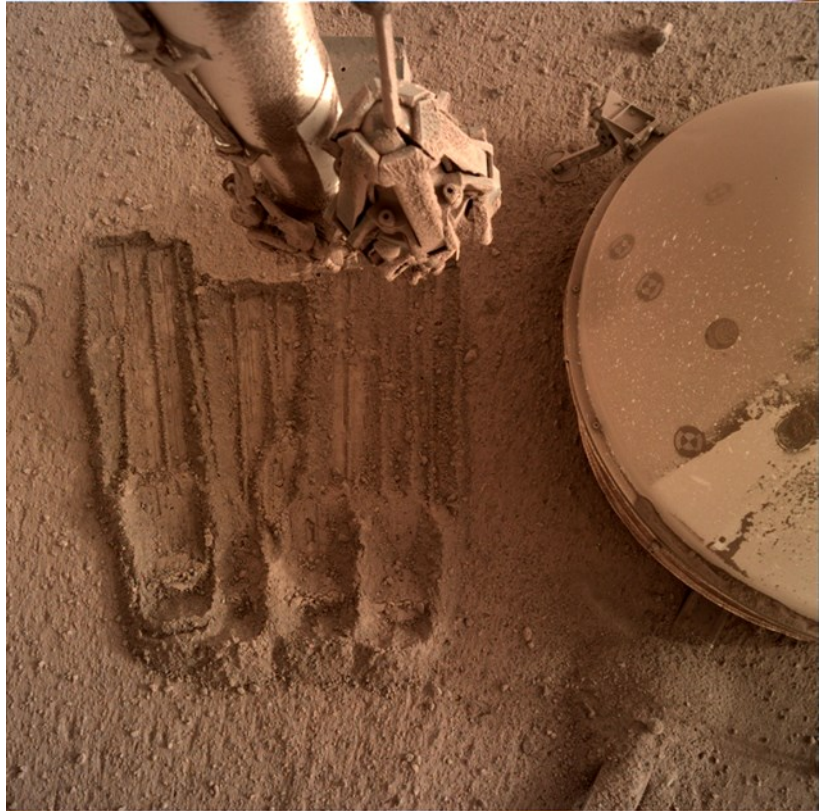
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Wind-blown Dust

Wind-blown dust is thickening on the spacecraft's solar panels. It causes its power generation to decline. Therefore, the team is taking steps to continue as long as possible.

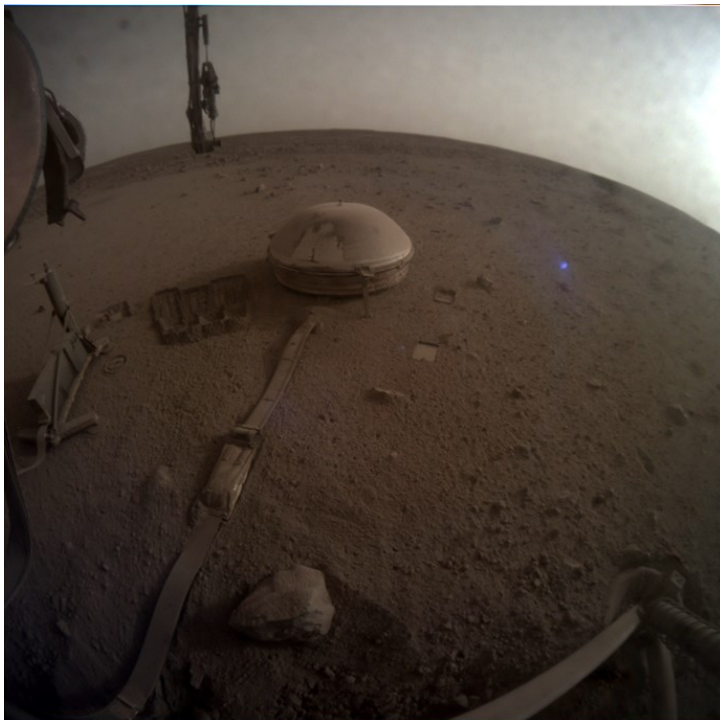
It is expected that the finale will take place within around ten days. InSight was launched to Mars on May 5, 2018. On November 26, the spacecraft reached the red planet.

The lander has performed beyond expectations revealing incredible details about Mars, its weather, and, more importantly, its interior. The lander has also recorded the sound of hundreds of Marsquakes. InSight has helped scientists on Earth understand that Mars is still a dynamic planet.



A robotic arm of InSight is seen in this photograph. Image Credit: NASA.

The Day



Another photograph snapped by InSight shows parts of its dust-covered Seismograph. Image Credit: NASA.

“The day is coming when I will shut up, ending my nearly four Earth years (more than two Mars years) of studying the Red Planet.

As my time on Mars draws to a close, my team is helping to ensure that scientists can make the most of everything I have collected,” reads a message posted on the mission’s Twitter account on November 1.

And while we all knew InSight would eventually become inoperational due to the massive amount of dust covering its solar panels, everyone probably hoped that by some “miracle,” Martian winds would come to the rescue of InSight, blow off some of the dust, allowing the lander to recharge.

Unfortunately, this has not happened, and mission scientists are preparing to say goodbye to a historic mission on the surface of Mars.

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A Light Show



NASA Observes “Light Show” On Mars
Posted on November 10, 2022

NASA has announced that the MAVEN mission witnessed two kinds of ultraviolet aurora simultaneously. What's incredible is that this was for the first time in its eight years orbiting Mars.

Mars, our neighbouring planet, has usually been considered to be a barren desert world where not much goes on. But this is far from the truth. In fact, Mars is a very active planet, both in its interior and exterior. Several missions on Mars, as well as those orbiting the red planet, have provided us with unprecedented insight into the planet.

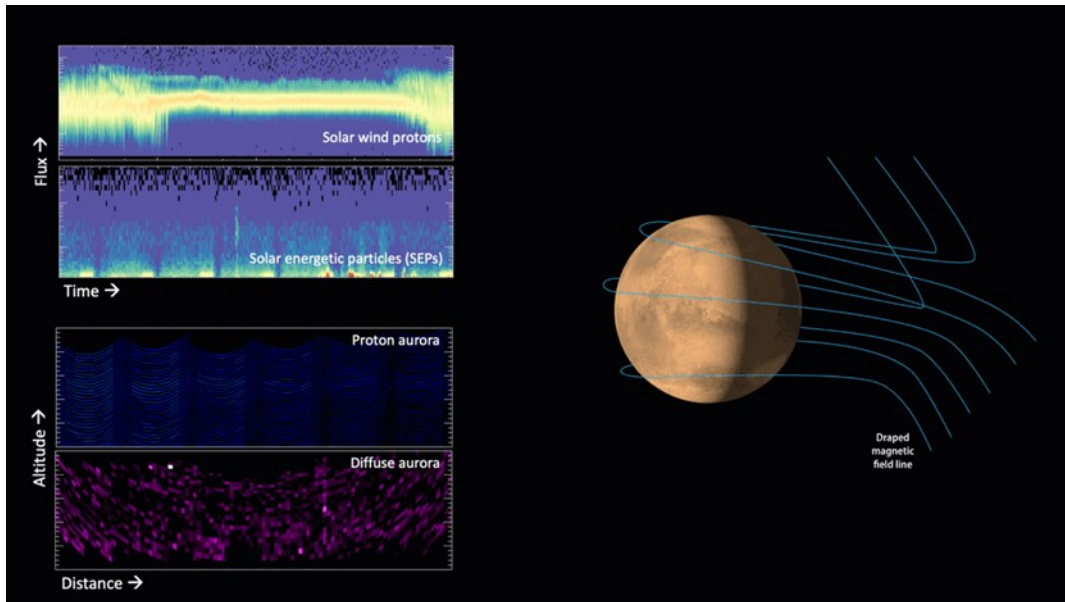
These new data have forced us to rethink everything we thought we knew about Mars. One mission specifically, InSight, provided never-before-seen data on the interior of the red planet. The mission, which is now likely to have come to an end, provided scientists with incredible data showing the red planet is geologically active. But scientists have not been researching Mars only from the surface. Several orbiters have provided much-needed data on Mars as well.

MAVEN

One such mission is called MAVEN, which is short for Mars Atmosphere and Volatile Evolution. NASA has announced that the MAVEN mission witnessed two kinds of ultraviolet aurora simultaneously. What's incredible is that this was for the first time in its eight years orbiting Mars. NASA selected MAVEN as part of its now-canceled Mars Scout Program to study the planet's atmosphere and ionosphere, including their interaction with the Sun. As the only asset on Mars that can simultaneously monitor the Sun's activity and the thin Martian atmosphere, this orbiter is unique. MAVEN team members also accurately predicted when the developing solar storm would reach Mars based on real-time analysis and simulations of solar eruptions from NASA's Moon to Mars Space Weather Analysis Office.

Astro Events from Frank Gross

Cont...4



This GIF shows the observations made by MAVEN. NASA. (This animation does not work in the Newsletter. To view this go to the NASA website Ed.)

Mars lacks a global magnetic field to shield it against the damaging radiation solar storms can bring. This means accurate space weather forecasting is vital to protecting current missions and future human explorers. In August, a series of solar flares, which are intense bursts of radiation, were produced by an active region of the Sun. There was also a coronal mass ejection (CME) that followed the flare activity. A CME is a massive explosion of gas and magnetic energy that leaves the Sun and propagates across the solar system. Mars was impacted a few days later by this interplanetary CME. As a result of this CME, the MAVEN spacecraft observed a solar energetic particle (SEP) event.

It was among the brightest ever observed. MAVEN's SEP detector observed solar energetic particles accelerating ahead of the CME on Aug. 27. The strength of the solar storm was measured by many of MAVEN's instruments. Four instruments were used for this analysis: the Extreme Ultraviolet Monitor, the Magnetometer, the Solar Wind Ion Analyzer, and the Solar Wind Electron Analyzer.

Space weather

To determine when the structure would arrive and impact Mars, we used space weather models of CME propagation, explained Christina Lee, a U.C. Berkeley space physicist. Lee is a member of the MAVEN mission team and collaborates with the Moon to Mars Space Weather Analysis Office. "This allowed the MAVEN team to anticipate some exciting disturbances in Mars' atmosphere from the impacts of the interplanetary CME and the associated SEPs," she explained. A solar storm unleashed particles that bombarded Mars' atmosphere, causing bright ultraviolet auroras. Using MAVEN's Imaging Ultraviolet Spectrograph (IUVS) instrument, diffuse and proton aurora was observed.

Why does this matter?

But what makes this observation so important and incredible? Timing played a part in why this extraordinary duo was spotted simultaneously. The dust storm season is over on Mars, which occurs every year when Mars approaches the Sun the closest.

It is due to these dust storms that water vapor can reach high altitudes in the atmosphere. UV radiation breaks it up here, releasing hydrogen atoms. The planet's dayside is lit up by ultraviolet emissions when the solar wind hits all this extra hydrogen. A diffuse aurora was visible all over the nightside as energetic particles penetrated deeper into the atmosphere, accompanying the proton aurora and creating an even more dynamic aurora.

So, as you can see, Mars continues revealing its mysteries, secrets, and, most importantly, its beauties. The planet is showing us what a dynamic world it is. It also reaffirms theories and evidence that in the very distant past, Mars was a planet very similar to today's Earth.

Solar Sprays by Harry Roberts

Planet Earth enjoys a ‘strong’ magnetic field, the product of the unusual Earth/Theia collision in the earliest stages of the Solar System. This protects us from much of the Sun’s otherwise lethal radiation. At the base of its ‘convection zone’ the Sun’s field is ~100,000Gauss. “*Sunquakes*”, Zirker, J.B, 2003.p185. (John Hopkins Uni Press.)

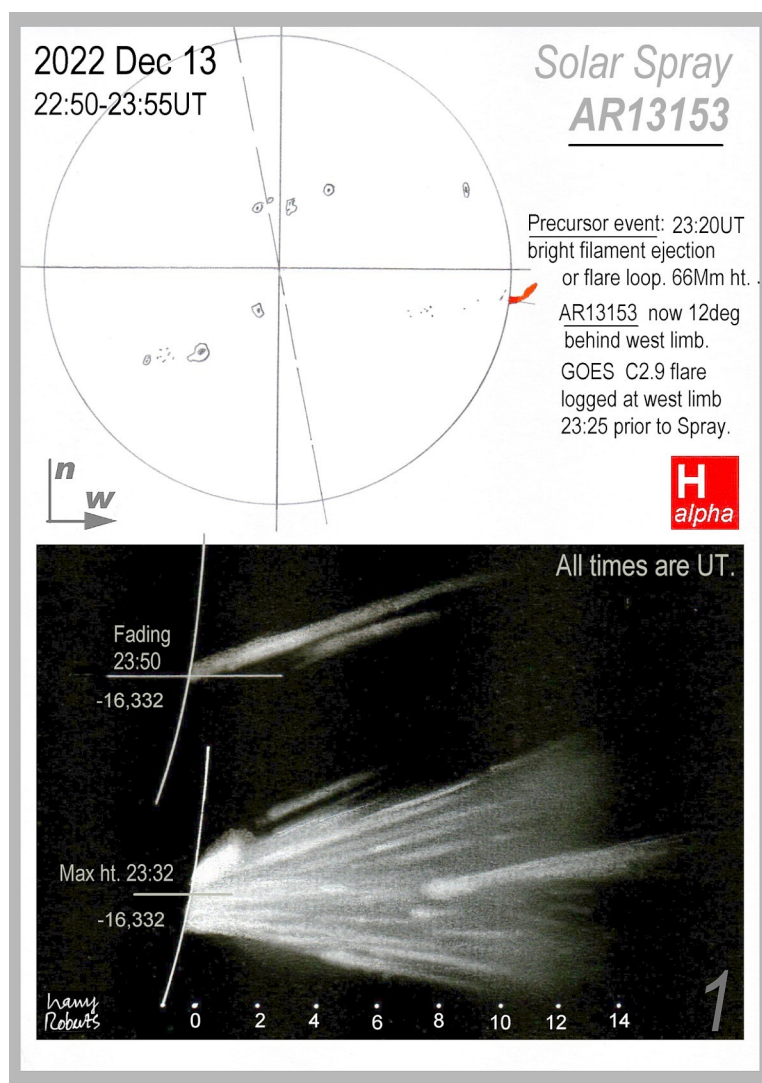
Earth’s fields are a more modest 3Gauss. “*The Cosmos*”, Pasachoff & Filippenko (Cam.Uni.Press) 2019, p216. Solar fields sculpt most of the structures visible on our star. Amongst the spots and various transients, surges, plages, filament ejections etc, we get “sprays”.

Sprays. Define. The most comprehensive account of the H-alpha Sun is Zirin’s “*Astrophysics of the Sun*” (Cambridge Uni Press, 1988). “..flares may blow away overlying material...bits flying out in a wide angle. This (Spray) occurs in the most violent flares only” p270. Spray velocities can reach 2000km/s.

Sprays are seldom seen. The reason is their velocity. If one occurs at the limb it will be seen, as the ejecta moves across our line of sight. But if it’s on the solar disc the speed of approach shifts the emission wavelength blue-wards, out of the narrow H-alpha band, and is thus invisible!

Doppler Shift. However, if the H-alpha filter in use permits rapid tuning by manual tilting, the ejecta may be seen off-band (blue-wards) ‘in approach’ when the “Blue Wing” is searched. Many such events were logged in SC23, see below, a few in SC24 and thus far, only one or two in SC25.

Escape Velocity. Solar escape velocity is 618km/sec (Dunn, 1968) and sprays do escape the Sun, as do Coronal Mass Ejections or CME.



Solar sprays by Harry Roberts

Cont...2

Spray Event 2022, Dec14. A rather poor a.m. session with winds to 35km/h and much cloud, showed AR13153 all but gone behind the SW limb. At 23:18 Ha logs began, showing a tall slender flare arc 65Mm high above the few (f) spots (Fig1). This shrank to a remnant and at 23:25 a bright Spray rapidly arose at the site. The Spray was of a complex 'V'shape, with streamers, some comet-like with "heads" that faced the (unseen) flare site.

It attained a height maximum of 150Mm by 23:35 (Fig1). The timing scale is in seconds of sidereal drift.

The peak spray velocity may then be computed. The flare event (only a GOES C2.9) was likely sited in large AR13153 now mostly gone past the west limb. Our line of sight is then ~'normal' to the ejecta's trajectory, and the maximum height is not affected by perspective or Doppler shift. Timing chords showed that height to be 154Mm over 10mins, i.e. 256Km/sec. or almost half solar escape velocity of 618Km/sec. An impressive event!

It then began to fade overall; a final remnant was logged at 23:50 (Fig1).

The C2.9 flare is hardly Zirin's "...most violent flare"? Likely limb attenuation is to blame here and the flare was much stronger.

Great Sprays. In SC23 (2004 Dec 1, 18yrs ago!) the writer was treated to a much larger Spray at the solar west limb in AR540. Co-worker Monty Leventhal alerted me to the event. His very fine 35mm photo of the Spray is shown (Fig2). Fig3 shows several of our later logs of the event. Timing chords gave the ejecta heights. Dark filaments on the disc were seen to 'peel off' into space!



SC25: Comparisons. Year 2022 has been much effected by bad weather, with only half the logs usually made. Just two years into Solar Cycle 25 it is hard to draw firm conclusions about its activity levels.

We recall **SC23** had the *strongest flares yet recorded*, with 13 above GOES X5.7 (Jan Janssen's datum) including the 'strongest yet' at X28!

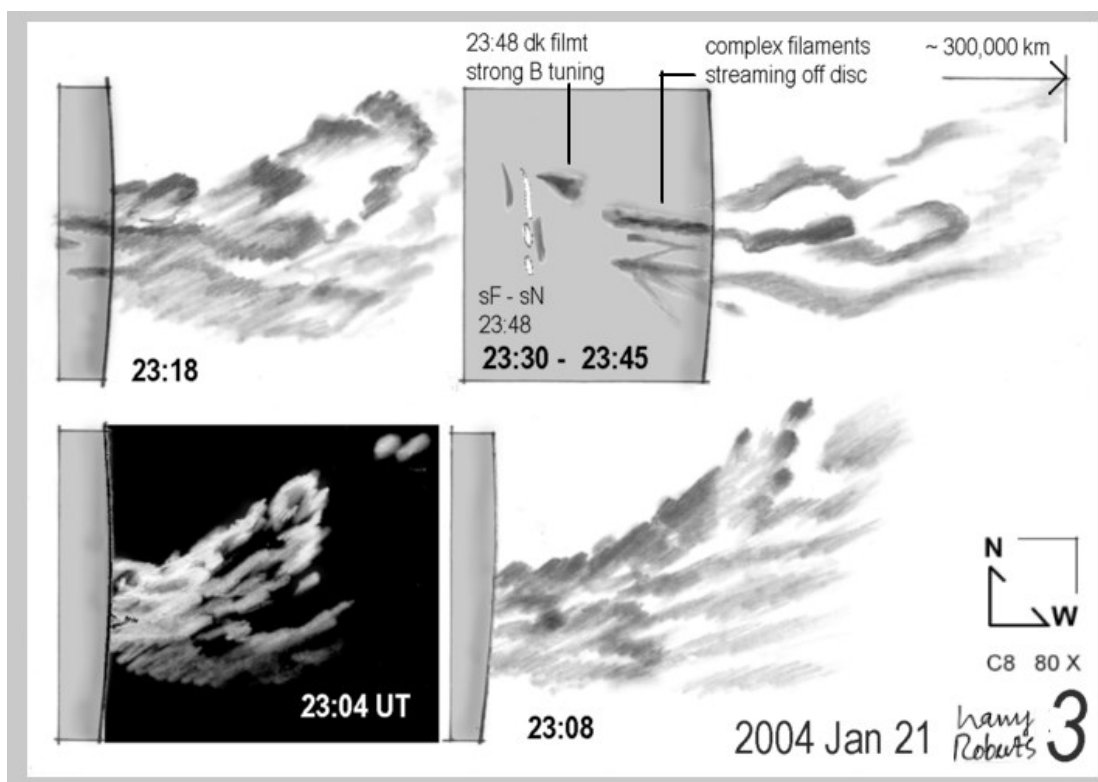
SC24 had much weaker spot counts and flare counts, yet still managed 3 flares stronger than GOES X5.7.

SC25's strongest flare thus far is an X2.2 in tiny AR12992 just behind the SW limb on April 20, 2022 (Itself a puzzling event!)

At this station no other strong Sprays have been recorded in SC25 thus far.

Solar sprays by Harry Roberts

Cont...3



Conclusion. Being just two years into SC25, any conclusions about its solar activity are likely to be wrong. That said, many current spot groups have numerous tiny spots in them, spread across large longitudes, but mostly with small faint penumbrae, if any penumbrae at all! They have short lives and (when Mt Wilson was still working) very weak umbral magnetic fields. Firm conclusions cannot yet be drawn, but spot fields are clearly weak and declining, it appears. A steady decline of solar umbral fields has been revealed by numerous researchers since the apparent peak in SC22. A discomfoting idea!

The Spray was captured by two GONG network scopes that can share our time zone, Big Bear 23:31UT and Learmonth WA 23:29. Sadly the algorithm that manages their images at the solar limb 'saturated' the Spray and little of its huge height was logged.

To conclude; sprays are rarely seen events, due to their high velocity, but when a flare on the disc appears a quick search off-band 'bluewards' may reveal a 'stealthy' Spray.

Best wishes for clearer skies.

Review: Celestron Advanced Equatorial Mount and Tripod by Andrew Wood

I have an interest in measuring the parameters of double stars*. This requires being able to find the object of interest and accurately track it. One of my set-ups is a Dobsonian with an Argo Navis computer. This enables easy finding of objects but doesn't track. The other set-up is a smaller refractor telescope on a mount that tracks, but with no easy system of finding objects – and I'm over the back-breaking-bending-and-twisting effort of star-hopping to objects in difficult parts of the sky.

Double star work doesn't require large aperture. My refractor weighs 6kg, so a mount with a large payload isn't necessary. So recently I purchased a Celestron Advanced Equatorial Mount and Tripod, a go-to set-up that I hoped would enable the easy location and tracking of objects of interest. This mount has a maximum capacity of 13kg, so should have no trouble accommodating the telescope.

It arrived 2 days after I ordered it, which, despite that it was listed as being in stock, I found a nice surprise.

Putting it together was not an Ikea-furniture-like exercise. It was all well packaged with easy to find components and within a few minutes the steel-legged tripod, accessory tray, mount, counterweight and hand-controller were all assembled.

Setting it up outside and attaching a 12V power supply, it took a little while following the manual and getting used to the hand-controller; but once I learned the system and how to do a two-star alignment, the go-to was very accurate and the tracking fantastic.

Within the menu is a setting that allows the input of RA and Dec, so finding objects not listed in the hand-controller database is easy – perfect for finding double stars. And it is proving to be able to do exactly what I hoped it could do for my interest in double star measurement.

One glitch. The declination axis didn't move immediately when finding an object, and I had to manually press the end of the cable into the slot to engage it. Irritating, but it only takes wedging a small piece of cardboard in to hold it properly – an easy fix not worth jumping up and down and sending it back to the supplier.



Review: Celestron Advanced Equatorial Mount and Tripod by Andrew Wood

Cont...2

This set-up will be used almost exclusively in my backyard. Once I had it polar-aligned I painted 3 white spots of the slab at the positions of the tripod legs. I simply need to lift it out of the storage shed a few feet away, put the tripod on the spots, and it's ready to go. Being one of the smaller systems commercially available, however, it is quite portable.

Using it visually for deep sky objects at a dark location, it could easily accommodate larger aperture in the form of an 8-inch SCT, for example. A 10-inch would be pushing its payload limit, and I wouldn't go any heavier. Listening to those gears during the go-to process (and it is quite noisy, I hope I don't disturb sleeping neighbours), I want the system to last a long time, and don't intend to push those limits.

Reading reviews on-line, there are users who use the VX mount for astrophotography. The consensus seems to be not to use a telescope more than 5kg in weight, however. This does not bother me, as my prime interest is not astrophotography, although I may try at some stage to see how it goes with short-exposures (I don't intend to add a guide system) and a dSLR. I also have a light 4-inch refractor that may prove useful.

This mount is at the lower end of equatorial go-to mounts currently available. In capability, its closest equivalent is the Skywatcher HEQ5. Both are currently available at less than \$2000. There is a capability (with add-ons) to operate the system remotely. I'm finding it perfect as is for my purposes. For smaller telescope use, this is a great mount with a lot of potential.

*Measuring the position angles and separation of components of double star systems over time allows the calculation of orbits and from this the masses of stars can be calculated. There are many double stars with very little orbital data, and this isn't something large professional observatories have much time for. It's a field where interested amateurs can make a practical contribution.

More Club News

The AGM was held at the May 2022 monthly meeting. Elected officials for 2022- 2023

The 2021 AGM has been postponed due to Covid.

Executive

President: Mark Town

Vice President: John Gould

Secretary : Andrew Wood

Treasurer: Frank Gross

Public Officer; Frank Gross

Operation Positions

Website Manager: Mark Town

Observation Officer: Robert Turnbull

Editor: Kaye Johnston

Librarian: Chris O'Hanlon

Equipment Officer: Vacant

Committee General Members:

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Larry Wakelin,

Chris O'Hanlon,

Check out the Astro Flyer on the web site: www.shoalhavenastronomers.asn.au

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**The deadline for Articles for the Astro Flyer is
The First Friday of the Month.**

Editor Kaye Johnston