

Hi all, a little confusion happened in the club over emails sent this month. Rest assured that the October 20th meeting will occur at the Uni in West Nowra.

I am working on a short video showing my experiences viewing the Total Solar Eclipse near Rexburg, Idaho, USA on August 21st, 2017 (USA time). I have the right music, the still shots, and the raw video I need to do this. Now, I just have to put it all together. I'll see you at the meeting for the showing.

Frank Gross President

## **Club Meetings and News from Committee**

The next Club Meeting is to be held on Friday October 20th 2017 at 7.00 pm for 7.30pm start at Shoalhaven Campus, University of Wollongong. Nowra.

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**MOON PHASES** 





## **Viewing Nights**

Club viewing nights are selected to provide viewers with the best possible conditions for good viewing. They are held on specific Saturdays at different locations around Nowra.

The next club viewing night will be on Saturday Oct 14th (back-up night Sun Oct 15th) at Woncur Road, South Nowra.

Head South down The Princes Highway, turn right at BTU Road. Woncur Road is the first street on the left).

More viewing nights page 17

## OUT THERE Bob Turnbull OBSERVATION OFFICER

## **OUT THERE NOVEMBER-DECEMBER**

Maybe the lack of rain has enabled some of us to get out at night to continue viewing?. Let's hope so. You may already know, Wollongong Science Centre and Planetarium have upgraded their planetarium projection system and maybe our club can arrange a visit in day time at a weekend to witness this excellent Planetarium and inspect the many other interesting exhibits, plus the Astronomy Shop and Café.

The last time I did this with our members was about six years ago, but it was about 5 hours before we left to return home.

We are nearly at the end of the viewing year, but there are no Christmas holidays for our Universe to continue it's never ending display.

Since I gave a comprehensive guide for October and some of November I'll deal with some of the Late November and December.

#### CONSTELLATIONS

December, Perseus (all sky map 3) will display in the Northern evening sky. Appearing like the lower case "y", and is the North Western extreme of the Milky Way, and is next to the Andromeda galaxy. These are linked to Pegasus by Alpheratz as part of the Great Square.

You can read much of the mythology (If you are interested) about the connections with Astronomical objects and find this helps with your mind's eye map of the solar system. Your Astronomy Magazine has much of this included for your entertainment (But don't take it too seriously)

## Your Astronomy Magazine has much of this included for your entertainment (But don't take it too

## PLANETS

### MERCURY

Visible in the western twilight during the first week of December to be again visible in late December morning sky.

#### MARS

Rises about 2am in midmonth, moving from Virgo to join Jupiter in Libra during the last week of the year.

#### JUPITER

In early eastern sky in early January

Clear Sky and good viewing. Bob Turnbull

## Sky Objects By Eugene O'Connor



A Search for Southern Doubles

#### **Episode 9: Pisces, The Fish**

Despite our dearth of Spring rains so far, ironically, our eastern sky now teams with water constellations, namely, The Water-Bearer, Aquarius, Pisces Austranis, The Southern Fish and our constellation of doubles for the month, Pisces, The Fish (pl). Although this constellation shuns glamour and can be passed over in favour of the nearby rising Pegasus and Andromeda, it nevertheless contains many attractions, not least of which is the gas planet, Uranus. More on that later.



**Finding Pisces:** Although Pisces is now the first point of the Vernal Equinox, or that constellation that the sun enters to mark the end of winter in the northern hemisphere, having demoted Aries from that honour, it remains a relatively obscure constellation. It contains only one Messier object, the dim but rewarding M 74, a face-on spiral of magnitude 10, an easy object in amateur scopes, several interesting radio galaxies, the Pisces Dwarf galaxy and stars nearly all of magnitude 4, it is rich in colourful double stars.

Pisces, is only spotted clearly in dark skies and immediately south of the most south westerly star in the Great Square of Pegasus (see map below). You will notice that the bulk of it brighter stars form the open cord of two star chains with the anchor point Alpha Pisces, Alrisha, meaning a *well rope* or *knot*,

1). Alpha Psc. RA 02.02; Dec +02.46, Sep 1.9" PA 270°. This is a true binary star visible in good conditions in a moderate scope. It separated nicely at X150 in my 10" F5 machine and both stars are white. It is 182 ly away and has a period of 700 years. Notice from the orbit projection below that this classy double star is slowly closing when viewed from earth. Best viewed before the year 2300!

#### Sky Objects By Eugene O'Connor



02020+0246 STF 202AB (Alrisha)



2). Zeta Psc. RA 1.13.7; Dec +07.35. mag 5.2/6.3. Sep 22.8".PA 62°.

This wide double is easily found by moving north east on the eastern shaft of the Pisces fork. (see map below). The wide separation of this pair makes it an easy object for small scopes. A contrasting white and blue grey pair with several stars in a medium power field make this an outstanding pair.

3). 35 Psc. RA 00.15'; Dec.+8.49'. mag 6.1/7.5, Sep 11.4'. PA 148°.

Travelling further northward on the eastern shaft and located half way between Delta and Omega Psc is an asterism of mag 6 stars in the shape of a cross. 35 marks the top of the cross and medium power reveals it as a magnificent delicate pair of white and gold stars.

The final doubles lie towards the end of the north-eastern shaft and the second fish in the group (located near the young lady's shoulder in her Tat!)

4). Phi Psc. RA 1.13.7; Dec +24.35'. mag 4.7/9.1; sep 7.8" PA 226°. This orange and white pair are both a pleasant colour and brightness contrast but easily split in a small scope.

5). Psi Psc. RA 1.05.7'; Dec +21.28'. mag 5.3/5.5; sep30" PA 161°.

Near the last pair is a cluster of stars composed of Psi 1,2 and 3 and Chi Psc. Of these, Psi 1 immediately stands out as a fine wide pair of almost equal magnitude. The primary is white while the companion has a tinge of blue. This pair has been observed for 200 years and show no change. Either fixed or an extremely long orbit period.

Finally, you will notice on the map below the presence of Uranus, our distant blue planet. It now shines at magnitude 5,7 and easily stands out among dimmer stars surrounding it. Its movement is slight over the coming month and I will show you at the next meeting how to spot it in the weeks ahead.

# Sky Objects By Eugene O'Connor







Listed Doubles In Pisces and general position of Uranus, looking east after dark in October 2017.

#### A fresh look at older data yields a surprise near the Martian equator

Scientists taking a new look at older data from NASA's longest-operating Mars orbiter have discovered evidence of significant hydration near the Martian equator -- a mysterious signature in a region of the Red Planet where planetary scientists figure ice shouldn't exist.

A new paper suggests hydrogen—possibly water ice—in the Medusa Fossae area of Mars, which is in an equatorial region of the planet to the lower left in this view.

Scientists taking a new look at older data from NASA's longest-operating Mars orbiter have discovered evidence of significant hydration near the Martian equator -- a mysterious signature in a region of the Red Planet where planetary scientists figure ice shouldn't exist.

Jack Wilson, a post-doctoral researcher at the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland, led a team that reprocessed data collected from 2002 to 2009 by the neutron spectrometer instrument on NASA's Mars Odyssey spacecraft. In bringing the lower-resolution compositional data into sharper focus, the scientists spotted unexpectedly high amounts of hydrogen -- which at high latitudes is a sign of buried water ice -- around sections of the Martian equator.





An accessible supply of water ice near the equator would be of interest in planning astronaut exploration of Mars. The amount of delivered mass needed for human exploration could be greatly reduced by using Martian natural resources for a water supply and as raw material for producing hydrogen fuel.

#### Cont...2

By applying image-reconstruction techniques often used to reduce blurring and remove "noise" from medical or spacecraft imaging data, Wilson's team improved the spatial resolution of the data from around 320 miles to 180 miles (520 kilometers to 290 kilometers). "It was as if we'd cut the spacecraft's orbital altitude in half," Wilson said, "and it gave us a much better view of what's happening on the surface."

The neutron spectrometer can't directly detect water, but by measuring neutrons, it can help scientists calculate the abundance of hydrogen -- and infer the presence of water or other hydrogen-bearing substances. Mars Odyssey's first major discovery, in 2002, was abundant hydrogen just beneath the surface at high latitudes. In 2008, NASA's Phoenix Mars Lander confirmed that the hydrogen was in the form of water ice. But at lower latitudes on Mars, water ice is not thought to be thermodynamically stable at any depth. The traces of excess hydrogen that Odyssey's original data showed at lower latitudes were initially explained as hydrated minerals, which other spacecraft and instruments have since observed.

Wilson's team concentrated on those equatorial areas, particularly with a 1,000-kilometer stretch of loose, easily erodible material between the northern lowlands and southern highlands along the Medusae Fossae Formation. Radar-sounding scans of the area have suggested the presence of low-density volcanic deposits or water ice below the surface, "but if the detected hydrogen were buried ice within the top meter of the surface, there would be more than would fit into pore space in soil," Wilson said. The radar data came from both the Shallow Radar on NASA's Mars Reconnaissance Orbiter and the Mars Advanced Radar for Subsurface and Ionospheric Sounding on the European Space Agency's Mars Express orbiter and would be consistent with no subsurface water ice near the equator.

How water ice could be preserved there is a mystery. A leading theory suggests an ice and dust mixture from the polar areas could be cycled through the atmosphere when Mars' axial tilt was larger than it is today. But those conditions last occurred hundreds of thousands to millions of years ago. Water ice isn't expected to be stable at any depth in that area today, Wilson said, and any ice deposited there should be long gone. Additional protection might come from a cover of dust and a hardened "duricrust" that traps the humidity below the surface, but this is unlikely to prevent ice loss over timescales of the axial tilt cycles.

"Perhaps the signature could be explained in terms of extensive deposits of hydrated salts, but how these hydrated salts came to be in the formation is also difficult to explain," Wilson added. "So for now, the signature remains a mystery worthy of further study, and Mars continues to surprise us."

Wilson led the research while at Durham University in the U.K. His team -- which includes members from NASA Ames Research Center, the Planetary Science Institute and the Research Institute in Astrophysics and Planetology -- published its findings this summer in the journal Icarus.

Cont...3

#### Bus-Size Asteroid Zooms by Earth in Close (But Harmless) Encounter

An asteroid about the size of a bus gave Earth a close shave this morning (Oct. 2), cruising well inside the orbit of the moon.



The roughly 26-foot-wide (8 meters) space rock, known as 2017 SX17, zoomed within 54,100 miles (87,065 kilometers) of our planet at 6:20 a.m. EDT (1020 GMT) today. For perspective, the moon orbits Earth at an average distance of about 239,000 miles (384,600 km).

At the time of closest approach, 2017 SX17 was traveling at about 16,350 mph (26,310 km/h) relative to Earth, according to researchers at the Center for NEO (Near-Earth Object) Studies, which is based at NASA's Jet Propulsion Laboratory in Pasadena, California.

2017 SX17 was discovered on Sept. 24, 2017. The asteroid has already been studied by several telescopes and observing campaigns, including the Steward Observatory and Mt. Lemmon Survey in Arizona and the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS 1) at Haleakala Observatory in Hawaii.

Such observations have allowed researchers to determine that the space rock completes one lap around the sun every 467 Earth days. Today's flyby serves as a sort of prelude to another close encounter 10 days from now. On Oct. 12, the asteroid 2012 TC4 will come within a mere 27,000 miles (43,500 km) of Earth's surface.



The asteroid 2012 TC4 is estimated to be 39 feet to 88 feet (12 to 27 m) wide, putting it in the same size class as the space rock that exploded over the Russian city of Chelyabinsk in February 2013.

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As its name suggests, 2012 TC4 was first spotted five years ago. Astronomers have been tracking the space rock for weeks now, as part of an exercise to help find and follow asteroids that may pose a threat to Earth in the future. (2012 TC4 itself poses no threat until at least 2050.)

Astronomers have discovered nearly 17,000 near-Earth asteroids to date — a tiny fraction of the millions thought to lurk out there in our neck of the cosmic woods.

#### NASA's Webb Telescope to witness galactic infancy



Scientists will use NASA's James Webb Space Telescope to study sections of the sky previously observed by NASA's Great Observatories, including the Hubble Space Telescope and the Spitzer Space Telescope, to understand the creation of the universe's first galaxies and stars. The Hubble Ultra Deep Field is a snapshot of about 10,000 galaxies in a tiny patch of sky, taken by NASA's Hubble Space Telescope.

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After it launches and is fully commis-

sioned, scientists plan to focus Webb telescope on sections of the Hubble Ultra-Deep Field (HUDF) and the Great Observatories Origins Deep Survey (GOODS). These sections of sky are among Webb's list of targets chosen by guaranteed time observers, scientists who helped develop the telescope and thus get to be among the first to use it to observe the universe. The group of scientists will primarily use Webb's midinfrared instrument (MIRI) to examine a section of HUDF, and Webb's near infrared camera (NIRCam) to image part of GOODS.

"By mixing [the data from] these instruments, we'll get information about the current star formation rate, but we'll also get information about the star formation history," explained Hans Ulrik Nørgaard -Nielsen, an astronomer at the Danish Space Research Institute in Denmark and the principal investigator for the proposed observations.



The Astro Flyer

#### Cont...5

Pablo Pérez-González, an astrophysics professor at the Complutense University of Madrid in Spain and one of several co-investigators on Nørgaard-Nielsen's proposed observation, said they will use Webb to observe about 40 percent of the HUDF area with MIRI, in roughly the same location that ground-based telescopes like the Atacama Large Millimeter Array (ALMA) and the Very Large Telescope array (VLT) obtained ultra-deep field data.

The iconic HUDF image shows about 10,000 galaxies in a tiny section of the sky, equivalent to the amount of sky you would see with your naked eye if you looked at it through a soda straw. Many of these galaxies are very faint, more than 1 billion times fainter than what the naked human eye can see, marking them as some of the oldest galaxies within the visible universe.

With its powerful spectrographic instruments, Webb will see much more detail than imaging alone can provide. Spectroscopy measures the spectrum of light, which scientists analyze to determine physical properties of what is being observed, including temperature, mass, and chemical composition. Pérez-González explained this will allow scientists to study how gases transformed into stars in the first galaxies, and to better understand the first phases in the formation of supermassive black holes, including how those black holes affect the formation of their home galaxy. Astronomers believe the center of nearly every galaxy contains a supermassive black hole, and that these black holes are related to galactic formation.

MIRI can observe in the infrared wavelength range of 5 to 28 microns. Pérez-González said they will use the instrument to observe a section of HUDF in 5.6 microns, which Spitzer is capable of, but that Webb will be able to see objects 250 times fainter and with eight times more spatial resolution. In this case, spatial resolution is the ability of an optical telescope, such as Webb, to see the smallest details of an object.

Pérez-González said in the area of HUDF they will observe, Hubble was able to see about 4,000 galaxies. He added that, with Webb, they "will detect around 2,000 to 2,500 galaxies, but in a completely different spectral band, so many galaxies will be quite different from the ones that [Hubble] detected."

With NIRCam, the team will observe a piece of the GOODS region near their selected section of HUDF. The entire GOODS survey field includes observations from Hubble, Spitzer, and several other space observatories.

"These NIRCam images will be taken in three bands, and they will be the deepest obtained by any guaranteed time observation team," explained Pérez-González.

NIRCam can observe in the infrared wavelength range of 0.6 to 5 microns. Pérez-González explained they will use it to observe a section of GOODS in the 1.15 micron band, which Hubble is capable of, but that Webb will be able to see objects 50 times fainter and with two times more spatial resolution. They will also use it to observe the 2.8 and 3.6 micron bands. Spitzer is able to do this as well, but Webb will be able to observe objects nearly 100 times fainter and with eight times greater spatial resolution.

Because the universe is expanding, light from distant objects in the universe is "redshifted," meaning the light emitted by those objects is visible in the redder wavelengths by the time it reaches us. The objects farthest away from us, those with the highest redshifts, have their light shifted into the near- and mid-infrared part of the electromagnetic spectrum. The Webb telescope is specifically designed to observe the objects in that area of the spectrum, which makes it ideal for looking at the early universe.

#### Cont...6

"When you build an observatory with unprecedented capabilities, most probably the most interesting results will not be those that you can expect or predict, but those that no one can imagine," said Pérez-González.

#### Total solar eclipse viewed from space

While people across the nation gazed at August's total solar eclipse from Earth, a bread loaf-sized NASA satellite had a front row seat for the astronomical event.

On Aug. 21, 2017, RAVAN observed the sun during the solar eclipse. Here, an artistic rendering depicts RAVAN's view just prior to the event. PIC 4A



While people across the nation gazed at August's total solar eclipse from Earth, a bread loaf-sized NASA satellite had a front row seat for the astronomical event.

The Radiometer Assessment using Vertically Aligned Nanotubes, or RAVAN, CubeSat was developed to test and validate light-absorbing carbon nanotubes as a new method for measuring Earth's radiation imbalance, which is the difference between the amount of energy from the sun that reaches Earth and the amount that is reflected and emitted back into space. The measurement is key for predicting changes in the planet's climate.

RAVAN began collecting data from Earth's orbit on Jan. 25, 2017, and the technology demonstration was declared a success in early August.

But the solar eclipse on Aug. 21 gave researchers a unique opportunity to further test an important carbon nanotube attribute: its strong sensitivity to rapidly changing energy outputs. While designed to measure the amount of reflected solar and thermal energy emitted from Earth into space, during the eclipse RAVAN's highly sensitive nanotubes would be trained instead on the sun to detect changes in the amount of incoming solar energy.

Cont...7



Because the researchers knew the CubeSat's location and the percentage of eclipse it would measure, it was easy for the team to compare the satellite's data to the known solar irradiance. Due to RAVAN's position in orbit, it did not catch eclipse totality -- where the moon completely blocks the sun's light. Instead, from its position high above the U.S., RAV-AN was to collect data of an approximately 80 percent eclipse, similar as to what was observed from principal investigator Bill Swartz's home organization, the Johns Hopkins Applied Physics Laboratory in Laurel, Maryland, which leads the mission.

As the moon passed between Earth and the sun, RAVAN's instruments responded rapidly and accurately to measure the diminishing solar energy that was visible to the satellite's detectors. Swartz explained, "Although RAVAN routinely views the Sun for solar calibration, it tracked the sudden change in solar energy afforded by the eclipse as expected."

Now, with eclipse-tested technology, RAVAN is trained back at Earth as Swartz and his team continue to monitor the satellite's instrument performance, perform data analysis, and compare its measurements with existing model simulations of Earth's outgoing radiation.

RAVAN's current test and validation mission is the first step to enable a future constellation of CubeSats that would orbit Earth and provide continuous global coverage of Earth's radiation imbalance to improve on current measurements, which are taken by instruments housed on a few large satellites.

#### Cont...8

Having smaller satellites placed uniformly around the planet could offer an advantage when it comes to studying Earth's energy imbalance. "The radiant energy emerging from the Earth changes rapidly in time and space, particularly as viewed from a satellite constellation speeding along in low-Earth orbit," Swartz said. "The solar eclipse provided a unique opportunity to test the RAVAN measurement responsiveness in a controlled fashion, further proving the technique for Earth observation."



RAVAN was funded through a NASA Earth Science Technology Office (ESTO) program that demonstrates new technologies that, when validated, could be applied to a broad range of NASA Earth observation and science measurement needs. During their mission lifetimes, CubeSats like RAVAN are put through their paces to ascertain how well the new technologies and methodologies work in orbit.

Small satellites, including CubeSats, are playing an increasingly larger role in exploration, technology demonstration, scientific research and educational investigations at NASA, including: planetary space exploration; Earth observations; fundamental Earth and space science; and developing precursor science instruments like cutting-edge laser communications, satellite-to-satellite communications and autonomous movement capabilities.

## **Solar Snippets by Harry Roberts**

## AR12673 and 2674: "Elegant" Events at the Limb

**The West Limb**. As sunspots and filaments etc near the Sun's limb, or edge, we begin to see them as three dimensional, compared to the more 2D view of things on the disc. Of course, all the fascinating things we see at the limb also occur above the spots and filaments on the disc too – but we can't (usually) see them. So, it's exciting to watch a spot group pass behind the limb as we see it in 3D rather than 2D. With groups 12673 and 674 we have an even more interesting case, as 674 was just 10 deg longitude (Ln) behind the Delta group 2673 – i.e. they would <u>both</u> reach the limb about the same time – revealing any 'connections' there might be between them(Fig9-11)! Also there had been X-class flares (as noted) and one might erupt at the limb causing other rare events. In fact, this 'text book' scenario arose – to the writer's delight! (Fig12-14)



**'Quiet' Limb**: (Fig9-11) Gales marred observations at this time. Started on the 9<sup>th</sup> at 22:11UT, white light (WL) ended at 22:56; H-alpha began 2 min later, when a superb 'excited' prominence was logged above the 12674 (p) spot, sited some 18deg from the limb, and stretched some 120Mm to an apparent connection the disc at the equator, 0,126. At the N end it was 50Mm high. In parts it was excited to chromospheric brightness. This looked like a big ejection starting (Fig9), but it soon (23:10) faded to <0.5 chromosphere and settled into the shape shown Fig11, attached at the equator, with no connection to the southern 2673 site.

## **Solar Snippets by Harry Roberts**

#### Cont...2

Meanwhile the 2673 group lay some 8deg from the limb (-9,117) and displayed some fine surges. An M1 flare at 23:20 could not be seen in the group, but by 23:40 to 00:01 small bright post flare loops arose at the site, some are shown (Fig11), while the large surge flowed out and back to lat. -20 many times. The slender flare loops at this site developed to a height of 65Mm ~00:04, at one stage up to 75Mm (not shown). From ~23:40 the big stable prominence above the 2674 site, a quiet filament, extended a thin bright streamer southward and  $\sim$ 23:50 made connection, it seemed, to the bright post flare loops above 2673: a surprising sight that elevated the brightness of the S parts to chromospheric level. (Fig11)

Post Flare Limb (Fig12-14)."Elegant" is how Zirin (ibid. P296) described post flare loops. The flare loops of this cycle have been catalogued – with some good examples –but most were minor examples of the type. The last post flare loops the writer logged were in AR11167 in Mar 2011 that got to 100Mm in height. AR11748 in 2013 May hosted a dense 'nest' of loops after an X3.2, to the modest height of 33Mm. Yet none compared to the loops of AR10069, say, Aug 2002 (SC23) that reached 90Mm after an X3 flare. Yet, pre-sunrise on Sep 10, at 16:30 an X8.2 'Great' flare, behind the limb, created a display, seen first at 22:00, of most "elegant" loops to the writer's delight! The unseen flare in 2673 was very slow to fade (>24hr), and the bubble blown by it in the corona sets the right conditions. Zirin relates "(the) material appears to condense at the top and rain down the sides of the loop; spectra show these are real motions". "The base of the loops is in the two bright ribbons of the flare (at the surface)". "It is known that the loops form in an extremely hot (40X10.6e deg) and dense corona(l) cloud produced by the flare. (Ibid. P296).



# GOES X8 flare: Post flare loops

WL 100/2000. Ha 60/2000. 1.5A Lumicon. 80X

## **Solar Snippets by Harry Roberts**

#### Cont...3

At 22:20, the loops have reached 57Mm height, and are brightest at the tops, ~equal to the chromosphere. The 'legs' are about half that; fainter loops about 0.3 brightness. The footpoint sites are noted, the 2673 group, now only 3 to 7deg behind the limb, is noted. By 00:15 the loops broaden and reach 64Mm high; somewhat fainter – two lower (new?) loops retain disc brightness. A bright surge erupts at 00:22. Subtle changes occur continuous-ly. By 00:41, 8hr after the flare peak, the S footpoint has faded as the whole entity is tilted 30deg north of the radial line: due, we assume to changes within the unseen flare ribbons in the unseen spot group. Now 70Mm high, the display would last many hours more. At this point, 01:00, the session ended.

**Conclusion:** It had been an unexpected, even improbable, period of H-alpha transients! There was no 'let up' at any point. Many logs were made, some are presented here. Just 7 days ago the small spot, 2673, showed no activity, yet powerful flux emerged directly below it. Why? Elsewhere we plot, synoptically, this activity and precursor events at the site. This was the third rotation of "Hero" group 2665 that had rare rotation in the main spot, which triggered an M-class flare – but it hardly explains recent events. Perhaps coronal holes had blocked the reconnection of that spot's umbral fields – forcing a turn elsewhere? It's clear the flux that emerged from below 2673 was strong; why did mixed polarity arise at the one site. Throughout, 2673 was hemmed in on the NE side by a hole, while 2674 lay within the same hole.

Amazingly, (while writing) the red spot has returned, again small and quiet, for a FOURTH rotation! What will happen? Or has the 'Saga' ended?

Activity on the Sun comes in two main types: Active Region (AR) events and Quiet Region (QR) events; Active Regions means sunspots, mainly – and Quiet Regions means mainly, the big filaments that cause high prominences.

## More Club News continued from page 1

Club/Social Viewing Nights are on Saturday evenings "just" Before Sunset. Viewing nights are for members and invited guests. The contingency plan for poor weather on the proposed viewing night is to meet the next night (a Sunday night) but consult Jack first on Landline: 44232255, Mobile:0407 018 982

**Woncur Road**, South Nowra (Head South down The Princes Highway, turn right at BTU Road, Woncur Road is the street first on the left).

Dates for Club/Social Viewing Nights for 2017 On Saturday Nights As Follows:

Oct-14, Nov-11, Dec-9

## **More Monthly Meeting Information**

#### The AGM was held at the July monthly meeting. Elected officials for 2017 - 2018

President: Frank Gross Vice President: John Gould Secretary/Treasurer: Tracey Newcombe Public Officer; Frank Gross Observation Officer: Robert Turnbull Editor: Kaye Johnston Librarian: Chris O'Hanlon

The Committee: Robert Turnbull, Rudolf Henssen, Robert Spruyt, Jack Apfelbaum, Chris O'Hanlon, John Gould

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

Shoalhaven	The deadline for Articles for the Astro Flyer is The
Astronomers	First Friday of the Month.
PO BOX 1053 Nowra NSW 2541	Editor Kaye Johnston

#### **Club Video Projector Rental**

The Video Projector is available for club members for a small rental fee. If a club member would like to project a football game, cricket game onto a wall for a party this is the way to go. You will get up to a 100 inch diagonal picture on a light coloured wall with the Epson video projector. The projector has an inbuilt speaker but you can add your own speaker units if necessary. The unit s very easy to use and instruction would be given before the borrowing (2 days) occurs. The rental price is set at present at \$15 for two days.