



Po Box 105
 Louis Trichardt
 0920
 23°05'15.2" South
 29°54'48.2" East

MARCH 2011 NEWSLETTER

NAKED EYE PLANETARY MOVEMENTS DURING MARCH

Mercury rises just after sunset but is too close to the Sun to be clearly visible.

The “**morning star**” **Venus** is above the eastern horizon a few hours prior to sunrise and impossible to miss at mag -4. The planet will appear as the “evening star” from around mid-September till the end of the year.

In last months newsletter we read that **the hottest planet in the solar system is Venus.**

Where is the coldest place?

Typical temperatures on the edge of the solar system in the Oort Cloud (100 000 AU’s away) where our STAR still exerts its presence, is a few degrees **above absolute zero**. That’s just a few degrees above -273°C; it takes sunlight **2 years** to get there! And a further 2 years for that light to get to the nearest star to the Sun, Proxima Centauri. 100 000 AU’s from the Sun it’s **very cold!** And looking back at our Sun it’s just another **average star**, one of **200 billion** ones that make up our galaxy The Milky Way.

Mars remains close to the Sun and difficult to observe this month, it will reappear in our morning skies around mid-April.

Jupiter is another planet that will be difficult to observe as it moves ever closer to the Sun this month before appearing in the morning sky in May.

Saturn is above the eastern horizon shortly after 20:00 on the 1st of the month. By the 31st the planet shining at mag. +1 will be above the horizon two hours earlier. This is an ideal time to view the planet and small telescopes will clearly show the famous rings and possibly (depending on size of aperture) the planet’s brightest moon and the solar systems second largest one, Titan.

| Satellite name | Belongs to planet: | Diameter |
|----------------|--------------------|-----------------|
| 1. Ganymede | Jupiter | 5 262 km |
| 2. Titan | Saturn | 5 151 km |
| 3. Callisto | Jupiter | 4 820 km |
| 4. Io | Jupiter | 3 660 km |
| 5. Moon | Earth | 3 475 km |
| 6. Europa | Jupiter | 3 122 km |
| 7. Triton | Neptune | 2 707 km |
| 8. Titania | Uranus | 1 577 km |
| 9. Rhea | Saturn | 1 529 km |
| 10. Oberon | Uranus | 1 523 km |

A list of the 10 largest moons and their diameters can be seen in the table above. Our own Moon relegated down to 5th position. Bigger than Mercury, another unique thing about Titan is its atmosphere which is **four** times as dense as the Earth's. It's rich in organic molecules and it's thought that the chemistry is very **similar** to that of the primordial Earth before life began.

MOON PHASES FOR MARCH

Distances, times and apparent diameters from Virtual Moon Atlas coordinates for Louis Trichardt

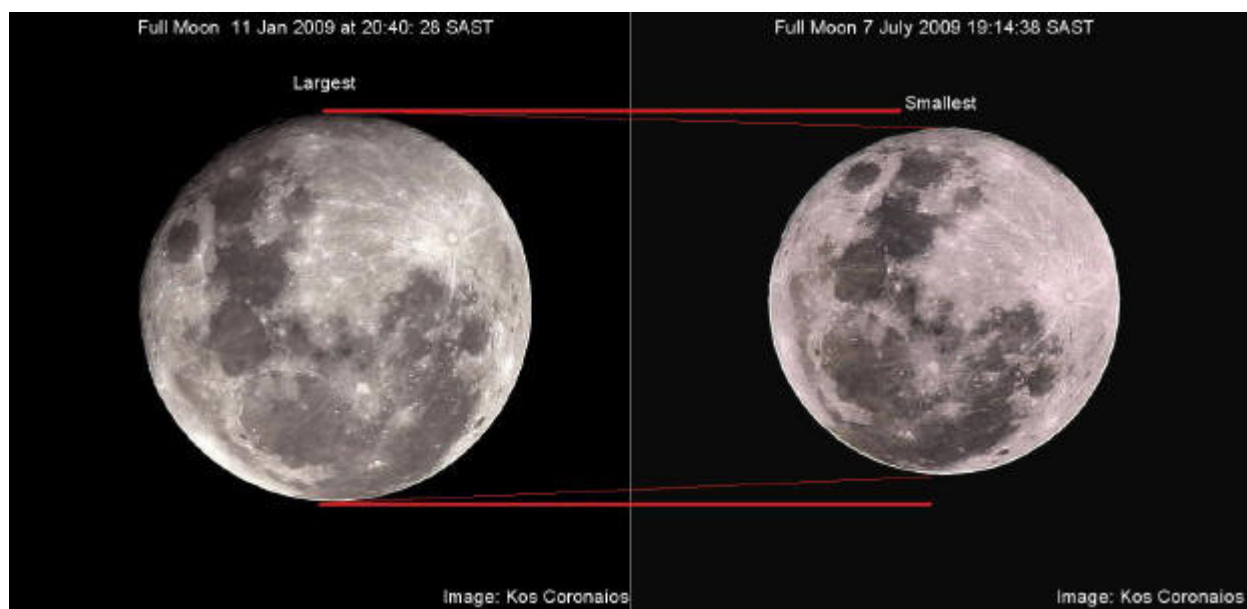
New Moon on the 4th, **First Quarter** is on the 13th, **Full Moon** is on the 19th and **Last Quarter** is on the 26th of March.

Astrophotography: Get your camera ready on the 19th March and capture the sunset and the closest moonrise.

Watch the sun set on the 19th March, and as it dips below the horizon, turn around and 4° above the eastern horizon will be the full Moon, which also happens to be the **largest** of the year.

Rising at 17:50 the 100% illuminated Moon will be as close as **356 388 km** to the Earth with an apparent diameter of over ½ ° (33.53'). Prior to that, at 15:32, invisible from our location as it was below the horizon it was closer by **1288 km**. The smallest Moon of the year will occur during October's full Moon on the 12th of the month.

Comparing the two images below one can see the difference between the closest (largest) and furthest (smaller) Moons of 2009.



GAMMA NORMIDS METEOR SHOWER

Information from ASSA Sky Guide 2011

Gamma Normids:

The duration of the **Gamma Normids** is from February 25th to March 22nd. The radiant is right ascension: RA 16:36 and declination: Dec -51. The zenithal hourly rate is 8 and start times are from 00:00 to 04:30 in the morning. The observing prospect is classed as **good** in the Sky Guide and the shower **peaks on the 13th March**.

A guide to observing meteors compiled by ASSA Section Director Tim Cooper can be obtained from Soutpansberg Astronomy Club

OCCULTATIONS

Occultation predictions for 23° 05' 15.2" South, 29° 54' 48.2" East. Time: Universal time in hours, minutes and seconds, D= Disappearance, R= Reappearance, GR= Grazing occultation at site.

Below are some of the brighter occultations visible from 23° 05' 15.2" South, 29° 54' 48.2" East just outside Louis Trichardt.

| DATE | TIME | STAR | MAG | EVENT |
|-------|----------|----------------------------|-----|-------|
| 12/03 | 16:54:56 | SAO 76974 / 103 Tauri | 5.5 | D |
| 12/03 | 17:53:05 | SAO 76974 / 103 Tauri | 5.5 | R |
| 17/03 | 17:06:16 | SAO 118001 | 5.9 | D |
| 17/03 | 19:59:53 | SAO 118044 / pi Leonis | 4.7 | D |
| 17/03 | 21:00:37 | SAO 118044 / pi Leonis | 4.7 | R |
| 24/03 | 00:23:51 | SAO 184014 / delta Scorpii | 2.3 | D |
| 24/03 | 01:49:26 | SAO 184014 / delta Scorpii | 2.3 | R |
| 27/03 | 02:33:37 | SAO 187504 / xi Sagittarii | 3.5 | GR |

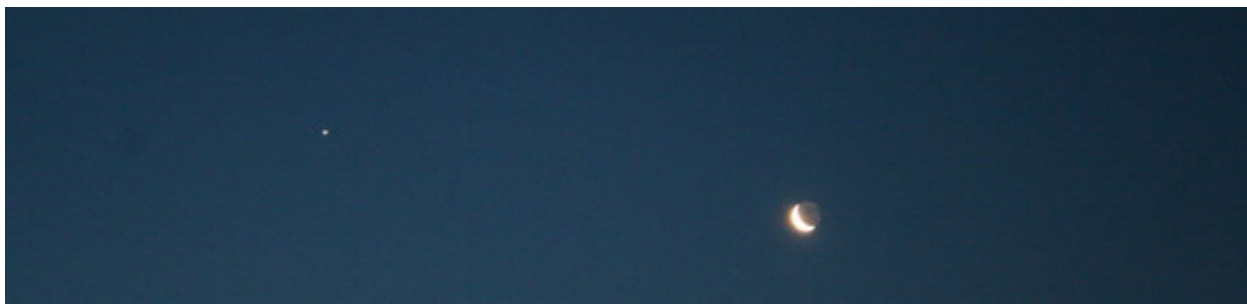
The above image shows the lunar occultation of alpha Scorpii on the 5th May 2007.

A couple not to miss this month (highlighted in yellow) is the lunar occultation of delta Scorpii on the morning of the 24th of the month, as well as the grazing occultation of xi Sagittarii on the 27th.

EVENTS NOT TO BE MISSED IN MARCH

(Separations are given in degrees, minutes and arc minutes, while Position Angles (PA's) angles are in degrees from the brighter object.)
V=Visual, P=Photographic opportunity, B=Binocular, T=Telescope, O=Occultation, MT= Meteor Shower peak

| Date | Time | Event | Description |
|-------|-------|-------|--|
| 01/03 | 20:30 | V | Saturn and Spica (alpha Virginis) rising in the east. |
| 02/03 | 04:30 | V | Venus above the waning crescent Moon in the east. |
| 04/03 | | | Western Cape, Southern Star Party (4th to the 6th). |
| 13/03 | 00:00 | MT | Gamma Normids meteor shower peaks. |
| 13/03 | 20:30 | VPB | Open cluster M35, 1/2° from the Moon. |
| 15/03 | 18:30 | VPBT | A clear view to the west is needed to see Mercury 2° below Jupiter, difficult! |
| 17/03 | 19:30 | V | Regulus 4 1/2° from the bright Moon. |
| 19/03 | 17:50 | VPBT | Full Moon, largest of the year. Moon at perigee. |
| 20/03 | 19:30 | V | The Moon in the middle, flanked by Saturn and Spica rising in the east. |
| 24/03 | 00:23 | O | Lunar occultation of delta Scorpii. |
| 26/03 | 18:00 | | Soutpansberg Astronomy Club observation evening. |
| 27/03 | 02:33 | O | Lunar occultation of xi Sagittarii. |
| 31/03 | 04:30 | VPT | Grouping of the waning Moon, Venus and Neptune in the east. |



Last months close approach of the crescent Moon and Jupiter was just grand and look at that Earth Shine!

SOUTHERN STAR PARTY (4th to the 6th March 2011)



IYA 2009 brought astronomy and science to the general public in many various ways. The global success of this initiative can be measured and seen in the interest and increase of star parties and astronomy outreach events all around the world. In South Africa star parties are being held across the country. Four astronomy events not to miss this year are: The *Southern Star Party* the *Waterberg Planetary Festival (WPF 2011)*, the *Karoo National Star Party* and *SCOPE X*.

If you are in the Western Cape area or plan on travelling there do so at the beginning of March and join some of the top astronomers in the country for the first of many Southern Star Parties (SSP's).



Don't miss this one, it promises to be a wonderful experience!

If you are in the area book and get there, you will not be disappointed!
Some of the text below from their web site <http://southernstarpary.wordpress.com>

The Southern Star Party on the 4 – 6 March 2011 will be held on a farm between **Bonnievale and McGregor**. Although individual dark-sky observing is still paramount, a number of group events are also planned.

Some of these events include an astrophotography presentation by renowned astrophotographer Dr. Dieter Willasch, his images feature regularly on Nasa's "Astronomy picture of the day", I for one look forward to his presentation titled "*What Astrophotography Teaches Us About the Deep Sky*". Willie Koorts will show us "*How to Care for and Clean Your Telescope*" as well as present "*What's Up in the Sky Tonight*". *Lucas Ferreira* and I will handle different presentations on "*Astrophotography*".



Other events will include: a practical in the form of binocular star hops and a "*How to Observe the Deep Sky*" workshop by *Auke Slotegraaf*, as well as an "*Astronomy Pub Quiz*" on Saturday afternoon which promises to be fun and informative. So brush up on your astroknwoledge!

There will also be a “**For Sale**” table set up, so bring your gadgets, books, telescopes etc. for display. And bring some money to do some shopping. The organisers have also provided a “social house” with windows blacked out and low lights, that will be available for taking a break from stargazing. Make yourself a cup of coffee or pour a glass of wine and share your experiences, stories, knowledge with the other partygoers.

Edward Foster will be setting up an exhibition of posters and give a talk about the **incredible** connection between astronomy and geology entitled: **Fossils, Light and Time** as well as presenting “**Astronomy for the Beginner**” on both days.

The towns of **Bonnievale**, **McGregor** and **Robertson** are all near by and well worth exploring. And then there is the dam to take a dip or sit in the shade of a tree next to the river and read some of your stargazy books...

It promises to be a lovely weekend under the stars and *Willie Koorts*, *Edward* and *Lynnette Foster*, *Martin Lyons*, *Suki Lock* and *Auke Slotegraaf* are hard at work to make it happen, so make a note of this date.

For more information you can contact southernstarpary@gmail.com

or visit their web site at <http://southernstarpary.wordpress.com>

FROM SPACE WEATHER.COM

RECORD-SETTING ASTEROID: Tiny asteroid 2011 CQ1 **buzzed Earth** on Feb. 4th even closer than we thought.

According to JPL's Near Earth Object Program office, the **meter-wide** space rock was only **5480 km** (0.85 Earth radii) over the Pacific Ocean at closest approach. That makes it the nearest non-impacting object in their catalogue. **The encounter was so close, Earth's gravity altered the course of the asteroid by a whopping 60 degrees.**

| Asteroid | Date(UT) | Miss Distance | Mag. | Size |
|----------|----------|---------------|------|------|
| 2011 CQ1 | Feb 4 | 0.03 LD | 32.1 | 1 m |

And from NASA/JPL Near-Earth Object Program Office by Don Yeomans and Paul Chodas February 4, 2011

Asteroid 2011 CQ1 was discovered by the Catalina Sky Survey on February 4 and made a record close Earth approach 14 hours later on February 4 at 19:39 UT (14:39 EST). It passed to within 0.85 Earth radii (5480 km) of the Earth's surface over a region in the mid-Pacific. This object, only about one meter in diameter, is the closest non-impacting object in our asteroid catalog to date. Prior to the Earth close approach, this object was in a so-called Apollo-class orbit that was mostly outside the Earth's orbit. Following the close approach, the Earth's gravitational attraction modified the object's orbit to an Aten-class orbit where the asteroid spends almost all of its time inside the Earth's orbit.

The close Earth approach changed the asteroid's flight path by about 60 degrees. Because of their small size, object's of this size are difficult to discover but there is likely to be nearly **a billion objects of this size** and larger in near-Earth space and one would expect one to strike Earth's atmosphere every few weeks on average. Upon striking the atmosphere, small objects of this size create **visually impressive fireball** events but only rarely do even a few small fragments reach the ground.

IRIDIUM FLARE

Visit www.heavens-above.com for predictions for your locality.



I caught this Iridium Flare in the image above on the 30th January at 20:02 at mag. -6 heading towards the Small Magellanic Cloud. The 50 second exposure at an ISO setting of 640 was more than enough to capture the satellite as it flared, capturing our neighbour's bright lights as well! The flare is caused by sunlight being reflected from one of the satellites three main mission antennae or MMA's. The MMA's are highly polished aluminium surfaces and reflect sunlight when the angles are just right. There are over 80 of these communication satellites in low Earth orbit (780 km), operated by the Iridium LLC Consortium.

NanoSail-D photo COULD WIN YOU as much as \$ 500.00

Photographers who catch NanoSail-D in the act of landing could win as much as \$ 500.00. Visit <http://spaceweather.com> for prediction of flyby's for your location as well as further information on the competition.

NanoSail-D is the first solar sail to circle Earth in low orbit. Amateur and professional astronomers as well as casual sky watchers can participate. The solar sail will occasionally be visible to the naked eye when sunlight glints off the spacecraft's 10 m² sail, producing a spectacular flash similar to an Iridium Flare.

On the 21st January the NanoSail-D unfurled the 10 m² sail 650 km above the Earth's surface, becoming the first solar sail to orbit the Earth. For the next few months it will skim the top of the atmosphere, slowly descending in a test of "drag sails" as a means of de-orbiting space junk. If it all goes according to plan the spacecraft will disintegrate like a meteor in late April or May this year, dispersing harmlessly more than 100 km high.

Visit <http://nanosail.org> for more information on the satellite as well as the photo competition. Another site for predictions is <http://www.heavens-above.com>.

Credit for the article below from <http://science.nasa.gov/science-news/science-at-nasa/2011/24ja-solarsail/>
Author: Dr. Tony Phillips | Credit: Science@NASA

NanoSail-D spent a month and a half stuck inside its mothership, the Fast, Affordable, Science and Technology SATellite (FASTSAT). FASTSAT was launched in November 2010 with NanoSail-D and five other experiments onboard. High above Earth, a spring was supposed to push the breadbox-sized probe into an orbit of its own with room to unfurl a sail. But when the big moment arrived, NanoSail-D got stuck.

"We couldn't get out of FASTSAT," says Dean Alhorn, NanoSail-D principal investigator of the Marshall Space flight Center in Huntsville, AL. "It was heart-wrenching—yet another failure in the long and troubled history of solar sails."

Team members began to give up hope as weeks went by and NanoSail-D remained stubbornly and inexplicably onboard. The mission seemed to be over before it even began.

And then came Jan. 17th. For reasons engineers still don't fully understand, NanoSail-D spontaneously ejected itself. When Alhorn walked into the control room and saw the telemetry on the screen, he says "I couldn't believe my eyes. Our spacecraft was flying free!"



An artist's concept of a solar sail in Earth orbit

The biggest moment, however, was still to come. NanoSail-D had to actually unfurl its sail. This happened on Jan. 20th at 9 pm CST.

Activated by an onboard timer, a wire burner cut the 50lb fishing line holding the spacecraft's panels closed; a second wire burner released the booms. Within seconds they unrolled, spreading a thin polymer sheet of reflective material into a 10 m² sail.

Only one spacecraft has done anything like this before: Japan's IKAROS probe deployed a solar sail in interplanetary space and used it to fly by Venus in 2010. IKAROS is using the pressure of sunlight as its primary means of propulsion—a landmark achievement, which has encouraged JAXA to plan a follow-up solar sail mission to Jupiter later this decade.

NanoSail-D will remain closer to home. "Our mission is to circle Earth and investigate the possibility of using solar sails as a tool to de-orbit old satellites and space junk," explains Alhorn. "As the sail orbits our planet, it skims the top of our atmosphere and experiences aerodynamic drag. Eventually, this brings it down." Indeed, mission planners expect NanoSail-D to return to Earth, meteor-style, in 70 to 120 days.

NanoSail-D could pave the way for a future clean-up of low-Earth orbit. Drag sails might become standard issue on future satellites. When a satellite's mission ends, it would deploy the sail and return to Earth via aerodynamic drag, harmlessly disintegrating in the atmosphere before it reaches the ground. Experts agree that something like this is required to prevent an exponential buildup of space junk around Earth. Alhorn and colleagues will be monitoring NanoSail-D in the months ahead to see how its orbit decays. They'd also like to measure the pressure of sunlight on the sail, although atmospheric drag could overwhelm that effect.

No matter what happens next, NanoSail-D has already made history: It has demonstrated an elegant and inexpensive method for deploying sails and become the first sail to orbit Earth. Eventually, the team will diagnose the sail's reluctance to leave FASTSAT—"and then we'll be batting a thousand," says Alhorn.

CRAB NEBULA BY DOUGE SHARPE



During last month's astronomy evening The Crab Nebula (M1) was one of the targets that we looked at. The lovely image above of this supernova remnant (SNR) was taken by Doug Sharpe from the UK and he writes "that based on current UK weather patterns, he only has a **10% chance** of viewing the heavens. **One** evening out of **seven** with a 3 hour slot is the best I can hope for during winter".

"In summer" he carries on "it does not get much better. It does not get dark enough to view until 23:30 and even then the blue comes out during imaging – not your black by any means!

And we complain about the weather!!

The combined stacked images consist of:

Luminance taken from Canon EOS and Mak Newt 190 (FL=1000mm) – 23 minutes total exposure @ISO 800

RGB from Atik and Equinox 80ED Pro (FL-500mm) – 25 minutes total exposure across RGB.

Software used, Paintshop Pro X3 to match the size and orientation.

OBSERVATION EVENING:

The Club's observation evening will be held on Saturday **26th March from sunset onwards**. Some of the deepsky objects that we will look at in the table below form part of the [Top 100 Deepsky Objects](#).

| <u>OBJECTS NAME</u> <u>MESIER or NGC #</u> | <u>TYPE</u> | <u>Mag</u> | <u>CON</u> | <u>DESCRIPTION</u> |
|---|------------------|------------|------------|--------------------------------------|
| NGC 104, 47 Tuc. | Globular cluster | 4 | Tucana | Stunning and bright globular cluster |
| Small Magellanic Cloud | Galaxy | 2.3 | Tucana | Close galaxy to the Milky Way |
| NGC 362 | Globular cluster | 6.6 | Tucana | |
| NGC 1068, M77 | Galaxy | 8.9 | Cetus | |
| NGC 1261 | Globular cluster | 8.4 | Horologium | |
| NGC 1291 | Galaxy | 9.4 | Eridanus | |
| NGC 1316, Formax A | Galaxy | 8.5 | Formax | |
| NGC 1365 | Galaxy | 9.6 | Formax | |
| NGC 1535 | Planetary | 10.4 | Eridanus | |
| NGC 1851 | Globular cluster | 7.3 | Columba | |
| Large Magellanic Cloud | Galaxy | .4 | Dorado | Close galaxy to the Milky Way |
| NGC 1904, M79 | Globular cluster | 8.4 | Lepus | |
| NGC 2070 | Bright nebula | 8.3 | Dorado | Tarantula Nebula |
| NGC 2516 | Open cluster | 3.8 | Carina | |
| NGC 2547 | Open cluster | 4.7 | Vela | |
| NGC 2548, M48 | Open cluster | 5.8 | Hydra | |
| IC 2391 | Open cluster | 2.5 | Vela | |

HYDRA (The Water Snake):

Hydra is the **largest** constellation in the sky, extending nearly 100°, but is far from prominent. The most easily recognisable feature is an asterism of five stars that make up the head, between the constellations Cancer and Canis Minor. A reasonably dark sky is required to trace out the length of the constellation, as the tail zig-zags its way ending at the constellation Libra. On the way there it passes some of the following constellations: Leo, Sextans, Crater, Corvus and Virgo.

The constellation will be at the zenith around midnight on the 1st of March. Towards month end at midnight, the snake's head will be near the western horizon with the tail overhead. The constellation can now easily be seen, giving one an idea of the length.

The second magnitude star **alpha Hydrae** is only 177 l.y. away. Also called Alphard (Arabic meaning solitary one), it shines like a beacon about 20° from the head of the snake and is the only star in the entire constellation brighter than mag. 3.

In **Greek Mythology**, Hydra was the multiple headed monster slain by **Hercules** as one of his 12 labours. In another legend the constellation is linked with the story of the crow, Corvus, who was sent to fetch water in a cup, represented by the constellation Crater. Both constellations Crater and Corvus are found on Hydra's back. In **Egyptian mythology**, Hydra represented the river Nile.

Double Stars, Planetary Nebula, Galaxy, Globular & an Open Cluster:

ε (epsilon) Hydrae is a binary consisting of yellow and blue components of 3rd and 7th mag. for a small telescope. The star is the second brightest of the five stars that make up the head of Hydra, the brightest being ζ Hydrae.

27 Hydrae is a 5th mag. yellow giant with a wide 7th mag. binocular companion. The companion is itself a double in small telescopes. The star can be found just less than 2° west of bright alpha Hydrae.

54 Hydrae is a 5th & 7th mag. double and can be found at the tail of the constellation.

ι (iota) Hydrae is a 5th mag. blue-white star with an 8th mag. companion in binoculars or telescope and is the first star from alpha Hydrae (8° north) as you move towards the head of Hydra.

M 48 (NGC 2548) at mag. 5.8 is a large binocular cluster of around 80 stars of 9th mag. and fainter arranged in a triangular shape. The cluster is about 1500 l.y. away and can be found roughly 12° south of the head of Hydra. A rich field telescope and low power eyepiece is required to really appreciate this fine deepsky object.



M 83 (NGC 5236) is an **impressive 8th mag. spiral galaxy seen face-on** and is one of the brightest of its kind in the southern sky. M83 is also known for its frequent supernovas which occur every 10-15 years, with four having appeared in the last 60 years. Lying **20 million light years away** it is one of the few spirals in which the arms and central bar can be seen in amateur telescopes. Star hop from ι (iota) Hydrae, 7½ north using Wayne Mitchell's Star Gazers Deep Sky Atlas to find this galaxy. More information on the Atlas below.

M 68 (NGC 4590) is a small 8th mag. globular cluster requiring at least 6 inch aperture for the stars to be resolved. The globular cluster can be located roughly midway between β & γ Hydrae.

NGC 3242 also known as the **Ghost of Jupiter** is a 9th mag. planetary nebula. It appears as a hazy blue-green disk in a small telescope. It is located less than 2° south of Mu (μ) and contains an easily seen central star visible in amateur instruments. One would not say so looking at the image on the right. The nebula lies 2000 light years away.



STAR GAZERS DEEP SPACE ATLAS

A VALUABLE AND VERSITILE TOOL FOR STAR GAZING

- For **ANYONE** interested in the night sky, but has no idea where to start!
- For the **BEGINNER** and **SERIOUS** star gazer.
- Beginners may, with ease, gaze up at the starry sky and find constellations. Experienced observers may use a telescope to its full potential.

SPECIAL FEATURES

- **DEW RESISTANT PAGES** - Dew may be wiped off (cold nights).
- **STARS SHOWN AS VIEWED FROM HOME** - Most other books show the sky upside-down for S.A. because they are published for the northern hemisphere.
- **STEP BY STEP GUIDED SKY TOURS EACH MONTH** - Locate a constellation and/or celestial object the same evening after purchase.
- **WHITE TEXT ON BLACK PAPER** - Excellent reading at night with a red LED torch which maintains your “dark adaption”.
- **HUNDREDS OF OBJECTS TO OBSERVE** - Star Clusters, Gas Clouds, Galaxies, Dying Stars, Double Stars and Variable stars.
- **ON-LINE SUPPORT** - Wayne offers assistance to users via a website.

The Atlas is probably the most **valuable and versatile tool for star gazers** in the southern hemisphere. It is designed for South African star gazing in particular and for southern hemisphere star gazing in general. All levels of astronomy enthusiasts will benefit appreciably from this innovative and exciting edition. Beginners may now, with ease, gaze up at the starry heavens and find the constellations, and experienced observers may use their telescopes to full potential. Never before has star gazing been easier!

Star Atlases are generally complicated and awkward to use and, at times, an enthusiastic beginner would be left feeling somewhat despondent. But, the carefully designed and revolutionary features included in the Deep Space Atlas, have been implemented with both the beginner and experienced star gazer in mind.

As a beginner, you may be interested in knowing more about the stars, but are not sure how and where to start. The “Where do I Start” section and the “Sky Tour” exercise, will guide you step by step, from the time you step outside, to locating and observing a remarkable celestial object such as a star cluster, gaseous nebula or double star.

The Atlas is also an invaluable tool for more experienced observers in possession of a pair of binoculars, or a small or large telescope, who wish to look for visually challenging objects such as galaxies.

The Atlas focuses on the visual aspect of astronomy, hence the subtitle “Outdoor Viewing”. It guides you, the observer, to find and observe a myriad of spectacular celestial objects other than just looking at pictures of these objects in a text book.

Added information such as distances, and velocities at which these celestial objects travel through space, as well as the Author's Notes, are included to make your observations more inspiring. Viewing the hundreds of objects included in the Atlas would take several years, ensuring you many hours of observing pleasure. Explanations of the Milky Way and meteors (shooting stars) are also included.

Dew resistant and wire bound pages, white stars on a black background, finder circles, southern hemisphere star maps, direction pointers, horizon lines and an abundance of celestial objects to observe, are just some of the features which places the Atlas in a class of its own, one that has revolutionized recreational astronomy!

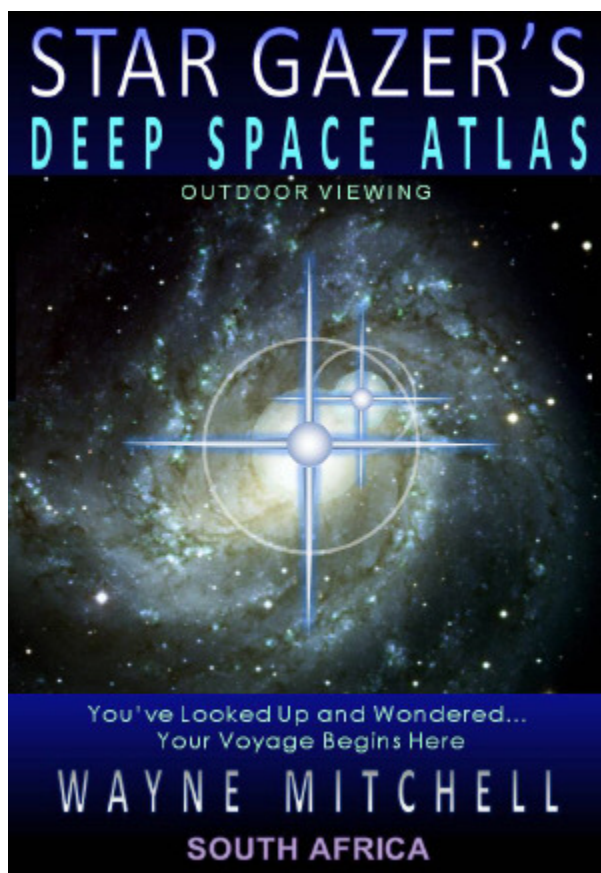
Wayne Mitchell, the author, offers on-line support to users of the Atlas which is accessible via a website, www.deepspaceatlas.com

Your Voyage to the Stars is About to Begin...

To order a copy, please contact Wayne.

The standard price is R 399.00 plus postage.

Wayne.mitchell@penbrogroupe.com



(All references for the newsletter unless otherwise stated: Astronomy made simple by Meir H Degani, observing the Constellations by John Sanford, Collins Gem Guide, The Night Sky, ASSA 2011 Sky Guide, Sky & Telescope, Astronomy Starter CD by ASSA. Photographs by the author unless otherwise stated and are all © copyright. SAC Logo courtesy of Laura van Zyl.)