september 2005

canopus

monthly newsletter of the johannesburg centre of assa

Old Republic Observatory, 18a Gill Street, Observatory, Johannesburg
PO Box 412 323, Craighall, 2024

Artist's concept of 10th 'planet' courtesy of NASA/JPL

contents

notice of next meeting – assa johannesburg

The next monthly meeting of the Johannesburg Centre of the Astronomical Society of Southern Africa will be held at the old Republic Observatory, 18a Gill Street, Observatory, Johannesburg on Wednesday 14 September 2005 at 20h00. Guest speaker:

Robert Groess

"Amongst the Vagabonds: Pluto and its icy siblings"

"The Planets" series, hosted by **Dave Gordon**, will feature **Pluto** in conjunction with the guest speaker to make this evening a **PLUTO SPECIAL**

upcoming meetings calendar

12 October meeting: **Dries van Zyl** – 'Weather and atmospheric phenomena'
9 November meeting: **Okkie de Jager** – 'HESS'

assa johannesburg committee members & volunteers for 2005/2006

Portfolio/Interest	Name	E-mail	Contact details
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Library	Ilse von Willich	N/A	
Library	Atze Herder	awherder@wol.co.za	(011) 648 3729 or 083 456 4159
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Viewing, ATM	Bruce Dickson	bdickson@telkomsa.net	
	Evan Dembskey	evan@dembskey.org	

ATM: Amateur Telescope Making classes held on the premises of Parktown Boys High School on most Saturday afternoons.

ASSA Johannesburg Centre's mailing-list subscriptions:
Announcements and discussion, send a blank email to: **assajhb-subscribe@yahoogroups.com**
ATM class' mailing list, send a blank email to: **assaatm-subscribe@yahoogroups.com**

10th "planet" discovered

edited version of NASA/JPL article

A planet larger than Pluto has been discovered in the outlying regions of the solar system.

The planet was discovered using the 48-inch Samuel Oschin Telescope at Palomar Observatory near San Diego, California, and was announced by planetary scientist Dr. Michael Brown of the California Institute of Technology on Friday 29 July 2005.

The planet is a typical member of the Kuiper belt, but its sheer size in relation to the nine known planets means that it can only be classified as a planet. Currently about 97 times further from the Sun than the Earth, the planet is the furthest known object in the solar system, being the third brightest of the Kuiper belt objects, and lies 45 degrees outside the plane of the ecliptic.

"It will be visible with a telescope over the next six months and is currently almost directly overhead in the early-morning eastern sky, in the constellation Cetus," said Brown, who made the discovery with colleagues Chad Trujillo, of the Gemini Observatory in Mauna Kea, Hawaii, and David Rabinowitz, of Yale University, New Haven, on January 8, 2005.

Brown, Trujillo and Rabinowitz first photographed the new planet on October 31, 2003. However, the object was so far away that its motion was not detected until they reanalyzed the data in January of this year. In the last seven months, the planet has been studied to better estimate its size and its motions.

The size of a solar system object can be inferred by its reflectivity. And while the reflectance of the planet is not yet accurately known, the amount of light it does reflect puts a lower limit on its size. "Even if it reflected 100 percent of the light reaching it, it would still be as big as Pluto," says Brown. "I'd say it's probably one and a half times the size of Pluto, but we're not sure yet of the final size." Observations using NASA's Spitzer Space Telescope put an upper limit on its size since Spitzer is unable to detect the new planet. Therefore the overall diameter must be less than 2,000 miles (3,200 km), according to Brown.

Brown's team has submitted a name for its proposed planet to the IAU, but until an official statement is given, its designation will remain 2003UB313. The media have popularised rumours that the planet has been called Xena, named after the lead actress in the TV series "Xena, Warrior Princess".

For more information and images see:
www.nasa.gov/vision/universe/solarsystem/newplanet-072905-images.html
www.astro.caltech.edu/palomarnew/sot.html

editorial

Robert Groess

Firstly, a very big thank you to the overwhelmingly positive response I've received with regard to the August edition. I would also like to thank those who have sent in countless articles for Canopus, and while not every article may see the light of day, I do appreciate your submissions very much.

And now, it gives me great pleasure in introducing you to SALT Astronomer, Dr. Encarni Romero Colmenero, who will feature regularly in Canopus with her own column. There are six permanent SALT Astronomers who take turns in commanding the giant reflector in the heart of the Klein Karoo, and Encarni was the first to be appointed as such in November 2004. She is no stranger to South Africa, having worked at SAAO in Cape Town for the past six years, and as such has seen SALT being born and grow up in front of her eyes. We look forward to Encarni's reflections (11m and others) on her astronomical world in months to come.

You would no doubt have seen the list of committee members which will serve for the current year – some portfolios retaining the status quo even though there was significant emphasis on trying to breathe great change into the committee. Truth be told, there are particular committee members who are very well suited to their portfolios and decisions were essentially unanimous in (re)electing them to their positions. There are also numerous new committee members who have been welcomed onboard and we look forward to an exciting and entertaining 2005/2006.

This issue of Canopus promotes the hype about one "planet", provisionally named "Xena", while downplays the hype about another, Mars. At first I wasn't going to consider putting in anything about the Mars hoax, but since it has acquired such momentum of it own, I have decided to put in a little piece Karen Breytenbach wrote to expose the hoax as a matter of clarification.

One thing I would like to encourage is the use of some pictures and diagrams in Canopus. There have been reasons why images have not been reproduced with satisfactory quality in times gone by, but with the experience passed on to me from those editors and some tricks I've adopted, together with our printers who do a great job in terms of quality, I think it is indeed feasible to enhance the graphic content of Canopus which would make it even more pleasing to the eye.

Thank you once again for your interest in reading Canopus and as always, I welcome any feedback you may have.

The Editor.

chairman's chat

Brian Fraser

We are now into the new year, have a fresh committee with many new faces and look ahead to an interesting year of astronomy. Already your committee have lined up an interesting list of speakers that will take us through to about the year end.

Our year started off on a sour note with yet another burglary at the Sir Herbert Baker building, which houses our meagre possessions, which are now even more meagre with the loss of more than half the chairs from the hall. So now we could not hold meetings there, even if we wanted to. We are having discussions with our landlords, SAASTA, to use a storage room at the bottom of the hill which we hope will be more secure.

I am writing this the day after our Jupiter viewing evening and can report that it was a huge success with over 100 visitors. Huge thanks to the handful of members who helped out, especially with the bringing of telescopes and the providing of catering.

The keenest aspect of amateur astronomy for me is taking part in observational astronomy. By that I include the observing of variable stars, occultations, minor planet occultations, lunar occultations and observing the occasional meteor showers. There are other amateurs who also observe sun spot activity and monitor comets. All of which can be done in the backyard with a small telescope.

Our group of active minor planet observers is very small. Nevertheless, we have managed to observe 5 events in the past few months. However our results would be a lot more valuable if we had positive results from more observers, for in each case we had only one positive "hit". If any of our members would like to do some real valuable worthwhile astronomy, at your leisure, in your own backyard, then please let me know. We would love to have your observations.

Clear skies,
Brian Fraser

encarni's reflections

Encarni Romero Colmenero – erc@saao.ac.za

Hi there,

First of all, let me introduce myself. As you may have read above, my name is Encarni (pronounced 'N'-'car'-'knee') and I am one of the Southern African Large Telescope (SALT) astronomers. In fact, I have the honour of being the first ever SALT astronomer, which caused me no end of troubles (and interviews) when my over-proud father mentioned it to a local journalist friend of his, who misunderstood 'first' as being 'lead', and promptly printed an article in the local paper announcing my being the director of the largest telescope in the southern hemisphere! Luckily for me, my father lives in Spain, so nobody at the SAAO or at SALT found out about it. Shhh!

Over the next few months, I will be sharing what I consider to be interesting titbits of my astronomical world with all of you, and I do sincerely hope you also find them at least a little bit entertaining. Let me know what you think anyway - feedback (even negative feedback) is always good.

Anyway, I was not going to talk about SALT at all in my first ever appearance in Canopus, but the latest SALT news are so exciting that I'm afraid I can't help myself.

In early August, Dr. Darragh O'Donoghue, whose team have developed the imaging camera on SALT (called SALTICAM) and Dr. David Buckley, project scientist for SALT, were at the telescope for the commissioning of SALTICAM. They took some stunning UBVRI images of some famous night sky objects, and the most amazing lightcurves of an eclipsing binary system I have seen… at 200 milliseconds time resolution! Unfortunately I can't give you a sneak preview of these until they have been officially released, but I promise to post them then. So it looks like we are pretty much ready for the beginning of the SALTICAM Performance Verification phase on the 23rd of August, when we will finally start taking scientific data for all of the international SALT partners. Hurrah!

And on that happy note, I sign off. Until next month!
Encarni.

discovery lands safely

by Thom Patterson (CNN)

The space shuttle Discovery touched down Tuesday morning, August 9, 2005, completing NASA's first shuttle mission since Columbia broke apart during re-entry in February 2003.

The shuttle landed at 5:11 a.m. (14:11 SAST) at NASA's secondary landing site at Edwards Air Force Base in California, the 50th landing at Edwards. With Discovery safely back on Earth, NASA officials breathed a huge sigh of relief.

The landing capped a 14-day mission largely designed to improve safety on future shuttle journeys, although the program has been suspended while NASA investigates its failure to solve the problem of foam falling from the shuttle's external liquid fuel tank during launch. The shuttle spent most of the mission docked to the space station, delivering much-needed supplies and performing maintenance on the outpost.

Discovery's path to Edwards began with the spacecraft firing its engines over the Indian Ocean to slow it enough to re-enter Earth's atmosphere over the Pacific.

Shuttle pilot James Kelly steered Discovery on a trajectory leading it near Los Angeles and Oxnard, California, before touch down.

NASA officials vowed to land the orbiter on that Tuesday at one of three locations after weather conditions forced them to scrub the shuttle's scheduled return a day earlier. The Kennedy Space Center in Florida was NASA's first choice. Edwards their second and White Sands Missile Range in New Mexico their third. Weather conditions at Edwards included clear skies and light winds, "excellent conditions for a space shuttle landing," NASA said.

Officials would have preferred to land at Kennedy Space Center to avoid the cost and inconvenience of flying the shuttle back to its launch site from the alternative landing strips.

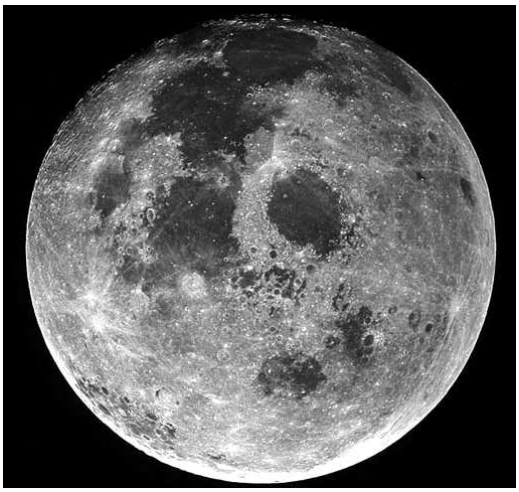
Discovery will stay in California for nine or 10 days before being ferried back to Florida on the back of a specially designed aircraft.

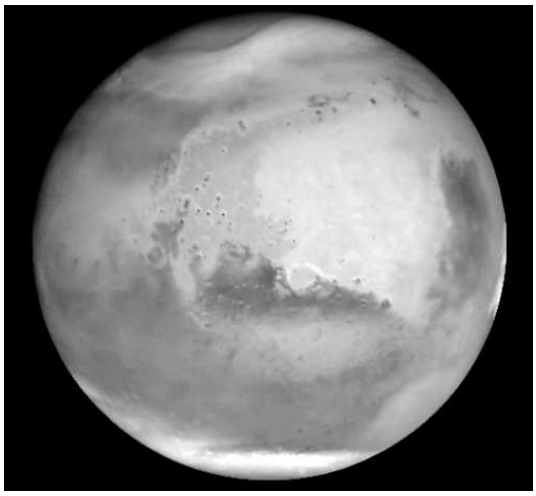
NASA administrator Michael Griffin said he didn't want to guess on when the next shuttle, Atlantis, would launch but said the agency would try hard to get back into space by the end of the year.

mars hoax

by Karen Breytenbach – excerpt of a press release sent to news24.com, amongst others

Reports are circulating via e-mail, suggesting that on 27 August 2005 Mars will appear as large to terrestrial observers as the Moon. These statements are bogus and misleading.





"We've been inundated with enquiries regarding this e-mail, which has been circulating for some time," says [Brian] Fraser. "This e-mail, with the subject line 'Mars is going to be a second moon of earth for a day', started off as a confusing note in 2003, about the Earth-Mars proximity of that year. It has been re-circulated this year, and mistakes are being added to it as it passes around, which is pretty typical for bogus e-mails. But you can ignore it. Under no circumstances will Mars appear as large as the moon."

Roughly once every 26 months the orbits of Earth and Mars bring the two planets into relatively "close" proximity, this being a bit over 56 million km. Nevertheless Mars is quite small, only about 6,700km in diameter, i.e. about half the size of Earth. Therefore even at a "close" approach, the planet appears to the naked eye as no more than a bright point of light. The Johannesburg Planetarium has set up a Web page at **www.wits.ac.za/planetarium** explaining how the 2005 encounter compares with that of 2003. NASA provides further details on their site, **science.nasa.gov/headlines/y2005/07jul_marshoax.htm**

The 2005 closest approach to Mars will be on 30 October (not 27 August), Fraser advises. "Mars is already very attractive: it's right overhead just before sunrise. As the year progresses, so it will move over to the western morning sky, and by October it will appear in the evening sky. This has been a spectacular year for astronomical phenomena, and Mars is no exception: but it will not appear as large as this e-mail suggests. We urge anyone receiving the mail not to forward it, but to simply delete it."

through my looking glass

Ed Finlay

The winter triangle of stars is still prominent in the north at this time of the year. About 20 degrees above the horizon west of north you can see Vega, the fifth brightest star in the heavens. At about 18 degrees above the horizon to the north east is Deneb, the nineteenth brightest star and almost on the meridian at 58 degrees altitude is Altair, the twelfth brightest star. They stand out above all other stars so they are easy to find.

Vega, the first star of the constellation Lyra, is a dazzling white star of magnitude 0.04; it was the first star to be photographed by the daguerreotype process at the Harvard Observatory (July 17, 1850). Because of the precession of the Earth's polar axis, this was the pole star 14,000 years ago.

Deneb marks the tail of Cygnus the Swan and has a magnitude of 1.26. Lying at the head of Cygnus, is the famous wide double star, Albireo. The orange component is magnitude 3.9 and the blue 5.11. Agnes Clerk wrote at the end of the 19th century, "perhaps the most lovely effect of colour in the heavens". We have a copy of one of her books, "The System of the Stars" in our library. Look it up sometime!

Altair, magnitude 0.8 is the first star of the constellation Aquilla, the Eagle. It was the standard first magnitude star in Pogson's photometric scale. Historically, it was used to determine lunar distances at sea, and it was a fundamental for Flamsteed in his solar observations. Spectroscopic studies show that Altair is rotating at 258 km/s, a truly remarkable speed. One Altair day is completed in 61½ hrs. By comparison, the Sun takes more than 25 Earth days to complete one revolution.

Look for M57, the famous Ring Nebula between the stars Beta and Gamma Lyrae. This was the first planetary nebula to be discovered. Antoine Darquier, of Toulouse noted it in 1722. It was Sir William Herschel who first called this type of object a 'planetary', not because he imagined them to be planets but because they reminded him of the discs or globes of planets; and their predominantly green colour was similar to the greenish tint of the planet Uranus which he discovered in 1781.

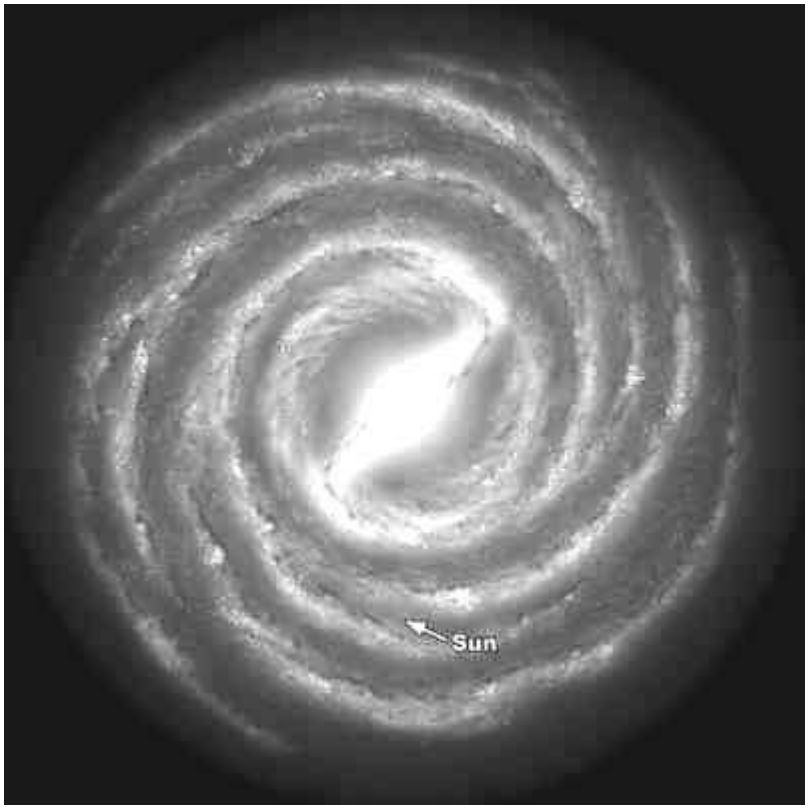
A planetary nebula is the ejected product of an old star with a mass no greater than 1.4 solar masses, in the first stages of its final evolution to a white dwarf. Material thrown off from its outer layers expands to form a gaseous "bubble" or shell. The ring-like appearance is actually an optical illusion owing to reflection, scattering and ionization of the central stars' light at the outer boundaries of the nebula with relation to our line of sight. Using an 8inch telescope my logbook records a small, faint blue-green luminous ring, like a smoke ring.
More next month,
Ed.

the bar at the centre of the milky way

edited excerpt from a University of Wisconsin, Madison News Release

Using NASA's Spitzer Space Telescope, astronomers have created a detailed survey of the structure of the Milky Way. Based on this evidence, they think the shape of the Milky Way is more complex than a plain old spiral. Our galaxy seems to have a long central bar, approximately 27,000 light-years in length. From our vantage point going around the Sun, we see this bar at a 45-degree angle.

The survey using the Earth-trailing infrared telescope in orbit about the Sun, provides the fine details of a long central bar feature that distinguishes the Milky Way from more pedestrian spiral galaxies.



Above: Simulation of our Milky Way Galaxy (UW-Madison)

"This is the best evidence ever for this long central bar in our galaxy," says Ed Churchwell, a UW-Madison professor of astronomy and a senior author of a paper describing the new work in an upcoming edition of Astrophysical Journal Letters.

The group of astronomers surveyed some 30 million stars in the plane of the galaxy in an effort to build a detailed portrait of the inner regions of the Milky Way. The task, according to Churchwell, is like trying to describe the boundaries of a forest from a vantage point deep within the woods: "This is hard to do from within the galaxy."

Spitzer's capabilities, however, helped the astronomers cut through obscuring clouds of interstellar dust to gather infrared starlight from tens of millions of stars at the centre of the galaxy. The new survey gives the most detailed picture to date of the inner regions of the Milky Way.

Galactic bars are far more prevalent than previously anticipated. Approximately 70% of all spiral galaxies have a central bar when imaged in the near infrared. This contrasts strongly with the previous assumption that bars are few and far between!

amateur telescope makers' dialog

compiled by Chris Stewart

Actual e-mail exchange between two ATM exponents:

ATME1:
I'll happily bring my two telescopes (6" and 7") and assist wherever else I can.

ATME2:
Would have thought the 10-inch would be finished by then.

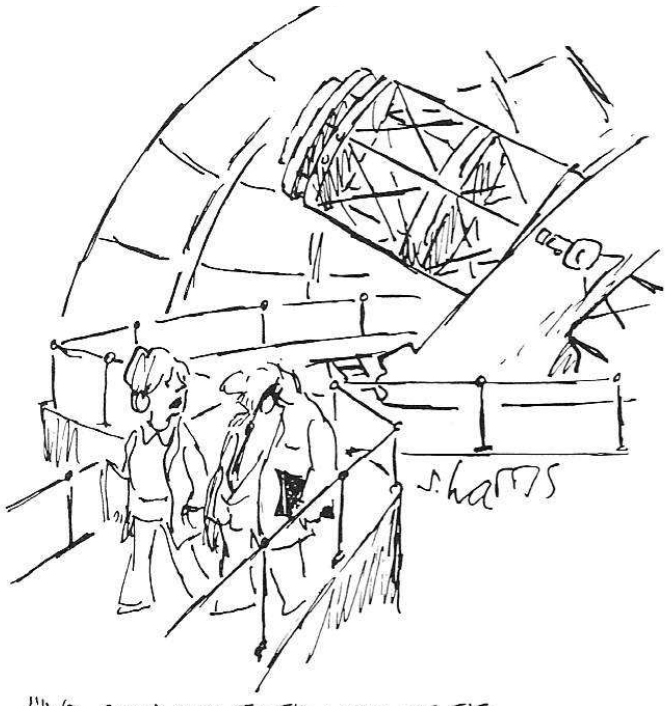
ATME1:
Another coat of paint to go.

ATME2:
On the mirror!?! <gasp!>

ATME1:
Well, I couldn't afford the SiO_2 coating but found some really reasonably priced marine varnish and, seing [sic] I do go to the coast from time to time, thought that this would be quite appropriate. Only thing is, it takes forever to dry…

ATME2:
I'm relieved to hear that, 'cause paint is a whole different matter from varnish. (Paint doesn't show off the grain nearly as nicely.) I painted all my old eyepieces matte-black, because they didn't come with anti-reflection coatings and I heard they perform better if they are anti-reflection coated. They looked nice. But now I have new eyepieces.

Seriously though, in the days of chemically-deposited silver coatings, some people did put a thin layer of lacquer varnish on the mirrors. True, the varnish degraded the image, but not nearly as badly as the tarnishing did, and then the coating lasted much longer.



assa events

African Astronomical History Symposium

Second Announcement

Dates: 2005 November 8 & 9

Venue: New lecture room facility at SAAO, Cape Town.
(Map: **www.saao.ac.za/pr/visitingct.html**)

Website: **www.saao.ac.za/assa/aahs**

Email: **aahs@saao.ac.za**

Contact: Dr I.S. Glass, SAAO, P.O. Box 9, Observatory, 7935
Tel: (021) 447 0025 Fax: (021) 447 3639

Timetable

1 August 2005	Registration / Proposals for talks opens. (Please do not leave until the last minute. Uncertainty is our greatest enemy and can lead to costly problems!). Please note that the venue can accommodate about 80 participants.
15 October	Last day to notify us of proposed talks.
7 November	Pre-conference wine and cheese, McClean telescope, SAAO.
8 November	AAHS, Ethno-astronomy sessions. Conference dinner, Wild Fig, Courtyard Hotel.
9 November	AAHS, Classical astronomy sessions.
10 November	Opening of SALT

Costs

The registration charge of R100 will cover tea, coffee, biscuits, the pre-conference reception and a copy of the proceedings.

Conference Dinner

We envisage having a dinner at the Wild Fig restaurant on 8 November, at a cost of R115 per person. This is a part of the Courtyard Hotel close to SAAO, Cape Town.

Opening of SALT

Many participants, especially those from up-country, may wish to visit Sutherland for the opening of the Southern African Large Telescope, which is now scheduled for 10 November. It is evident that the official guests of the Department of Science and Technology, the National Research Foundation and the SALT partner institutions will fill up all the space available within the dome for the event. It therefore appears that conference participants, if they want to be there, will have to be content with watching events on a large-screen TV in the Visitor Centre. There will be an opportunity to visit the telescope dome after the opening.

obituary

It is with sadness that I must report the passing of Pam Cook on 16 July. Pam was one of the more prolific Solar observers in this country, whose regular flow of observing reports to the Section was only curtailed by circumstances. Her rare intellect and a warm personality will be missed by all who knew her; it was my privilege to have done so for almost two decades. Her husband Jack (also a long-term amateur astronomer and ATM exponent) provides the following commentary. Our thoughts are with Jack and his family in this time of sorrow.

Regards,
Chris Stewart

Astronomy and Pam Cook

Pam's lifelong interest, and forte, was mathematics. When there were no "serious" things for her to apply her mind to, she loved to sit with pencil and paper, working through some or other self-set problem for her own satisfaction and amusement. If she was not happy with the conclusions she reached then... she would return to the start and worry the problem until she arrived at the result that she sought and believed was correct.

It seemed natural that Astronomy offered a perfect outlet for Pam's talents. Pam found many astronomical views and conclusions controversial to her thinking. When this was so, she would delve deeper and deeper into the matter, quite regardless of time and effort, until she was satisfied with the outcome, whether or not she could disprove the “book”.

Pam was delighted to view sky objects, either unassisted or using a telescope. However, she was never at a loss because of viewing conditions, she would simply use her desk and writing materials to immerse herself far into her current interest; a happy way to have the best of things, come rain, cloud or any other obstacle to good viewing.

Pam became very interested in Solar activity, and recording and pondering events that she observed. She liked to discuss matters with Jim Knight, the Director of that Section of ASSA. Intelligent conversation was one of her basic needs.

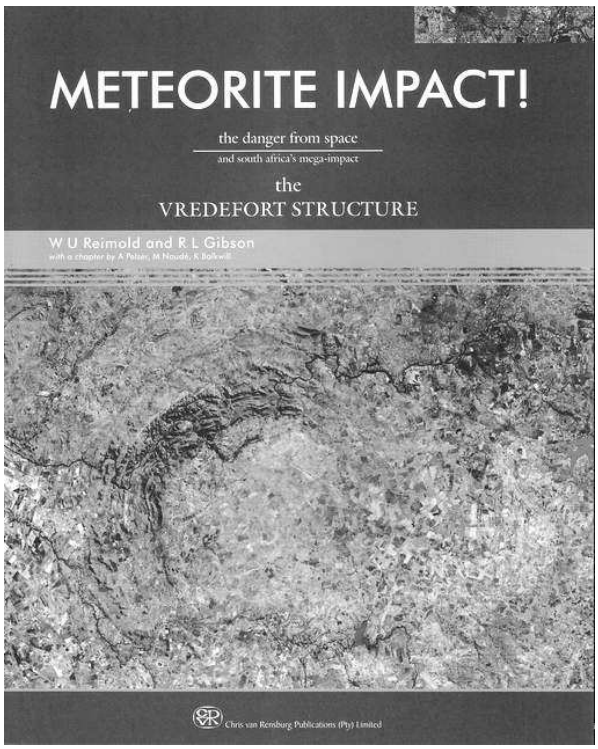
Pam passed away on 16th July 2005 after a long fight with illness. She is very much missed by her friends and family.

Jack Cook

books & media

Available to buy at **20% discount:**

Meteorite Impact!: the danger from Space and South Africa's mega-impact
The Vredefort Structure
by **WU Reimold** and **RL Gibson**
ISBN 1-919908-62-5



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Payments must be made out to:
ASSA Johannesburg Centre
(Details next page under subscription info.)

Discover!

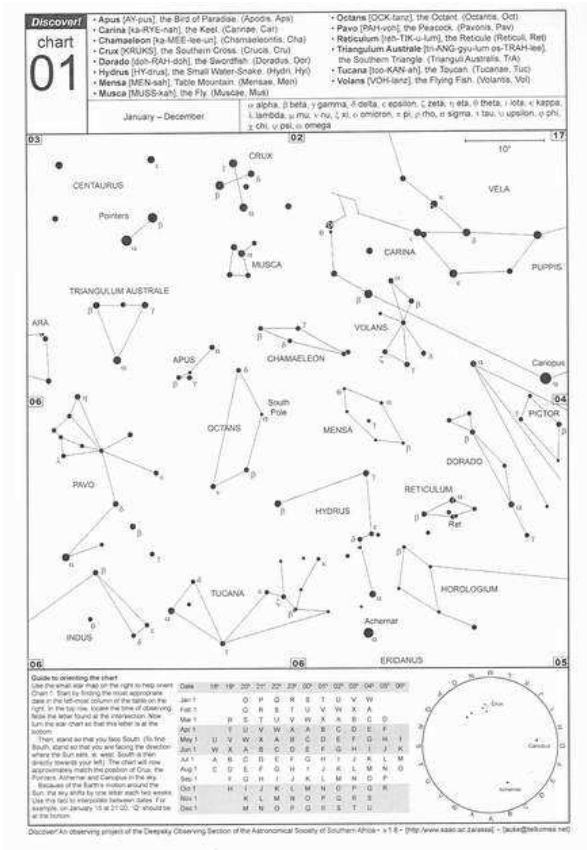
An observing project of the ASSA Deepsky Section

by Auke Slotegraaf

In line with ASSA Council's recent emphasis on practical observing, I've developed the "Discover!" project, a 32-page workbook aimed at teaching the rank beginner all the constellations visible from the southern hemisphere. For those familiar with the brighter constellations, it serves as an introduction to the deep sky by encouraging them to search for deepsky objects (star clusters, galaxies, etc.) hidden amongst the stars. Unlike other star charts, no deepsky objects are plotted on these maps - you have to discover them for yourself!

Once a map has been thoroughly examined, send your annotated star chart and observing notes to:
The ASSA Deepsky Section
Director: Auke Slotegraaf,
Forelle Crescent 8, Die Boord
Stellenbosch
7600
email: **auke@telkomsa.net**
Your observations will be returned along with detailed feedback!

This workbook (25 star charts) is available as a free download on the internet at:
www.saao.ac.za/assa/html/discover.html



urgent – subscription renewals for 2005/2006

REMINDER:
Thank you to all members who have paid their subscription fees for 2005/2006. For those of you that still need to renew your subscriptions, please note that the new (reduced) subscription rates for 2005/2006 have been set as follows:

Ordinary:	**R 120.00**
Pensioners/Students:	**R 60.00**
New Member Joining Fee	**R 50.00**

The family category has been done away with. Families pay the ordinary fee (i.e.: R 120 per family) as they are issued with one copy of Canopus per family. The subscription period corresponds to the Centre's administrative year, 1 July 2005 to 30 June 2006.

Details to pay directly into the Centre's bank account:
Please contact the Treasurer, Dave Gordon, (011) 702 1219, and notify him of your deposit/transfer.

Bank:	**Nedbank**
Acc. No.:	**1921 013761**
Acc. Name:	**ASSA Johannesburg Centre**
Acc. Type:	**Current Account**
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Branch No.:	**19 21 42 44**

Alternatively please mail cheques marked "**Not Transferable**" made out to "**ASSA Johannesburg Centre**", to PO Box 412 323, Craighall, 2024

IMPORTANT:
Please note that if you do not renew your subscriptions, you will be removed from the Canopus mailing list and may incur a "joining fee" if you wish to be reinstated as a fully paid up member. **"Open time" ends soon!!**

canopus classifieds

For Sale

Meade 208XT Autoguider Imager
CCD camera
Black and White
With all cables and Software.
R3000-00 ONCO
Please contact Bill Lockhardt
083 299 0124

For Sale

Meade ETX-70AT Telescope system
2.8 inch refractor
MA9mm (39X) and MA25mm (14X) multi-coated eyepieces, operating instructions, adjustable height field tripod, Autostar computer controller, Right angle viewfinder.
Excellent condition (bought in Jan 2005)
R3000
Contact Jeremy Elwell,
jeremy.elwell@gmail.com

the sky this month

september 2005

dd hh	dd hh
1 03 Uranus at opposition	15 10 Neptune 4.3N of Moon
1 07 Moon at apogee	16 15 Moon at perigee
2 00 Venus 1.2S of Jupiter	16 23 Uranus 2.2N of Moon
2 12 Mercury 2.5S of Moon	18 03 FULL MOON
2 20 Regulus 3.1S of Moon	18 03 Mercury superior conjunction
3 03 Pluto stationary	22 05 Mars 5.7S of Moon
3 19 NEW MOON	22 23 Equinox
4 16 Mercury 1.0N of Regulus	25 08 LAST QUARTER
6 11 Venus 1.7N of Spica	27 01 Pollux 1.5N of Moon
6 23 Jupiter 1.6N of Moon	27 22 Jupiter 3.1N of Spica
7 07 Spica 1.2S of Moon	28 08 Saturn 4.4S of Moon
7 09 Venus 0.5N of Moon	28 17 Moon at apogee
10 20 Antares 0.2S of Moon Occn.	30 03 Regulus 3.2S of Moon
11 12 FIRST QUARTER	

october 2005

dd hh	dd hh
1 11 Mars stationary	17 01 Venus 1.6N of Antares
3 11 NEW MOON ***Eclipse*** – 14.8%	17 13 FULL MOON Eclipse not visible
4 12 Mercury 0.7N of Moon Occn.	19 11 Mars 4.6S of Moon
4 13 Spica 1.2S of Moon Occn.	22 14 Jupiter at conjunction
4 16 Jupiter 2.1N of Moon	24 09 Pollux 1.5N of Moon
4 21 Mercury 1.9N of Spica	25 02 LAST QUARTER
5 23 Mercury 1.3S of Jupiter	25 20 Saturn 4.2S of Moon
7 06 Venus 1.3N of Moon	26 10 Moon at apogee
8 01 Antares 0.2S of Moon Occn.	26 21 Neptune stationary
10 19 FIRST QUARTER	27 11 Regulus 3.1S of Moon
12 17 Neptune 4.3N of Moon	30 04 Mars nearest to Earth
14 07 Uranus 2.3N of Moon	31 21 Spica 1.1S of Moon Occn.
14 16 Moon at perigee	

local times of rise and set for the major planets

site location: lat. **26.0 deg S** long. **28.0 deg E** local time – UT = **+2.0 hrs**.

Date	Sun		Mercury		Venus		Mars		Jupiter		Saturn	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Sep 8	6.14	18.00	5.53	17.17	8.11	21.00	22.37	9.44	7.59	20.33	4.12	15.02
Sep 18	6.03	18.04	6.09	18.03	8.06	21.14	22.09	9.12	7.25	20.02	3.36	14.27
Sep 28	5.51	18.09	6.17	18.42	8.02	21.28	21.36	8.37	6.52	19.32	3.00	13.52
Oct 8	5.41	18.13	6.22	19.16	8.01	21.43	20.56	7.56	6.19	19.02	2.24	13.16
Oct 18	5.31	18.18	6.27	19.46	8.02	21.56	20.13	7.13	5.46	18.33	1.47	12.40
Oct 28	5.22	18.24	6.31	20.10	8.05	22.07	19.21	6.22	5.13	18.03	1.09	12.03