The PRETORIA CENTRE
of the
Astronomical Society of Southern Africa
www.pretoria-astronomy.co.za

AUGUST 2004 NEWSLETTER

The next meeting of the Pretoria Centre will take place at Christian Brothers College, Pretoria Road, Silverton, Pretoria.

Date and time	Wednesday 25 August at 19h15
Chairperson	Wayne Mitchell
Beginner's Corner	"Light Pollution" by Tim Cooper
What's Up	by Koos van Zyl

++++++++++ LEG BREAK - Library open ++++++++++++

Main Topic "Archaeoastronomical Aspects of the Great Zimbabwe / Mapungubwe Cultural Complex" by Richard Wade

The meeting will be followed by tea/coffee and biscuits as usual.

The next social/practical evening will be held on Friday 20 August at the Centre Observatory, which is also situated at CBC. Arrive anytime from 18h30 onwards.

INSIDE THIS NEWSLETTER

LAST MONTH'S MEETING - 28th JULY - by Michael Poll

The meeting was attended by about 60 members and visitors. The meeting started with the Centre AGM. Neville Young was the deserving recipient of the Jack Bennett award. Tony Viljoen did "What's Up" and showed us constellations to look for, and how open clusters and globular cluster were concentrated along the plane of the Milky Way.

The main topic was a beautifully illustrated talk by Dries van Zyl, entitled "South African Weather And Atmospheric Phenomena". Dries showed us some slides of clouds in the night sky, and various atmospheric phenomena involving the sun – for example the oblate sun at sunset, and the different colours of light at different times of day. This was followed by many interesting pictures of various cloud types. The last part of the talk explained the cause of lightning and highlighted the different lightning associated phenomena – there were many pictures of lightning strikes, with an analysis of the causes of the different patterns of each strike.

This was a very interesting talk, and if a thunderstorm prevents us from looking at the stars, then we will at least be able to study the thunderstorm instead.

WHO'S WHO?

Our centre membership is nearly 100 strong and has been as high as 150. At our monthly meetings, we meet for 2 hours and do not see each other for another month. It is easy to forget who you chatted to or sat next to. Those with a higher profile - speaking regularly or chairing meetings - are known to most by name, but cannot return the courtesy.

In the past we have used name tags and will now do so again. Sample name tags were shown at the July meeting and found favour. Our treasurer and membership secretary Rynhardt van Rooyen. will have the tags of paid up members at the August meeting, so please do get yours from him.

These tags should also be worn at public viewing evenings or astronomy exhibitions. Not only will people remember you more easily, but the Pretoria Centre also gets good exposure. We will soon be publishing a list of names and telephone numbers in the newsletter. This will help you to contact someone you have met at the monthly meetings and can be used to arrange lifts if necessary.

LAST MONTH'S OBSERVING EVENING - 23rd JULY
by Michael Poll & Johan Smit

We were nine people at last month's observing evening, but many objects were observed. Mercury was next to Regulus, setting in the north west. The disc of the planet Mercury was seen in the Centre 12 inch telescope. Also with this instrument Jupiter and the Moon were viewed, the Moon being quite spectacular.

In the south-west the Carina region was setting, but we looked at Theta Carinae, and NGC 3532. Higher in the south there was Omega Centauri, the Jewel Box and Alpha Centauri, all of which were viewed in the 12 inch. With the large magnification, Alpha Centauri appeared widely split. A search for NGC 5128 was unsuccessful. In the west we *may* have seen the galaxy M83.

The Scorpius – Sagittarius region was well placed. We saw the Sagittarius star cloud (M24), the open clusters M25, M7 and M6, and the Lagoon Nebula, M8. There are many globular clusters in this region, we looked at M22 in Sagittarius and M4 in Scorpius.

The northern sky is interesting at this time of year. In the north-east, the constellations of Lyra, and Cygnus were rising, and Aquila was well up. In Lyra we looked at the Ring Nebula (M57) and Epsilon Lyrae. The latter is a fairly close naked eye pair, but each component is double – hence the star is known as the "Double-double". We did not see the components separately in a 6 inch telescope, but the images seemed to be elongated.

We looked at the colourful double star Albireo (Beta Cygni), and the globular cluster M13 in Hercules. Finally we looked at the "Coathanger Cluster" a group of stars in the constellation Vulpecula. Six stars make a straight line, and another four make the "hook" for the hanger. Vulpecula ("The Fox") is near Altair, the brightest star in Aquila. In spite of the distinctive shape, the Coathanger is not a true cluster, but a chance line up of stars at different distances. These northern hemisphere objects will again be available at the August 20th observing evening.

FOR THE COMPUTER GURUS

The software that controls research-grade telescopes can control your telescope too. LINUX Journal, January 2004 Issue 117, p.

NEWSLETTER DELIVERY

If you don't receive the newsletter in future, or if you receive it too late, or if your address changes, contact Rynhardt van Rooyen

ASSA SYMPOSIUM

The Astronomical Society of Southern Africa will hold its 6th Biennial Symposium from October 14-16. The Thursday and Friday will be dedicated to paper sessions, and the Saturday will include visits to Broederstroom and HartRAO.

The venue for the paper sessions will be the War Memorial Auditorium in Johannesburg, adjacent to the Zoo.
At this stage, there is a call for papers, and anyone prepared to give a paper should contact Brian Fraser at 016-366-0955 or fraserb@intekom.co.za

WATER ON MARS - PART 2.

by Michael Poll

Early Mars was wet, but was it warm, or cold?

The theory for a "warm early Mars" suggests that there was a greenhouse effect created by a carbon dioxide (CO_2) atmosphere at a pressure of 5 bars (i.e 5 times the Earth's atmospheric pressure). This would have created an early period of rainfall. The evidence for this scenario is the existence, in ancient highlands, of small valley networks (Figure), resembling terrestrial run-off channels. If this theory is correct, then huge amounts of gas have been lost, because the current Martian atmospheric pressure is only 6.1 millibars, which is about 0.12% of the original. The gas would have been lost either into space, (it could have been eroded by the solar wind), or the CO_2 reacted with liquid water on and below the surface, to form carbonate rock.

Proponents of the "cold early Mars" theory argue that it would have been difficult to sustain a green house effect given that the early sun was only 75% as bright as it is today, and Mars receives only 40% of the solar radiation that the Earth does. Also there is no observational evidence of the required volume of carbonate rock – it would have to be 50 metres thick. It is also argued that the valley networks result from various geologic processes, some of which could occur even now. For example, it is noted that many large valley networks are located on or near the rims of large craters, suggesting that the impact that created the crater also thawed the surrounding ice rich crust, causing discharges of water that created the valleys. Hot ejecta may even have affected the entire planet, causing thawing of the polar caps and ice in the ground that was near the surface. Surface temperatures could have remained above freezing for 1000 years. Because only the largest impacts would have had these effects, valley network formation would have declined after the bombardment of the early solar system declined.

Where is the missing water?

As previously noted, it has been calculated that, at the time the large outflow channels were formed, Mars may have had enough water to create the equivalent of a global ocean between a half and one kilometre deep. If Mars had enough water to form such an ocean, where is the water now? There are three potential reservoirs – the atmosphere, the polar caps and the upper crust.

Currently, the amount of water in the atmosphere is negligible - if it condensed evenly onto the surface, it would be 0.015 millimetres deep.

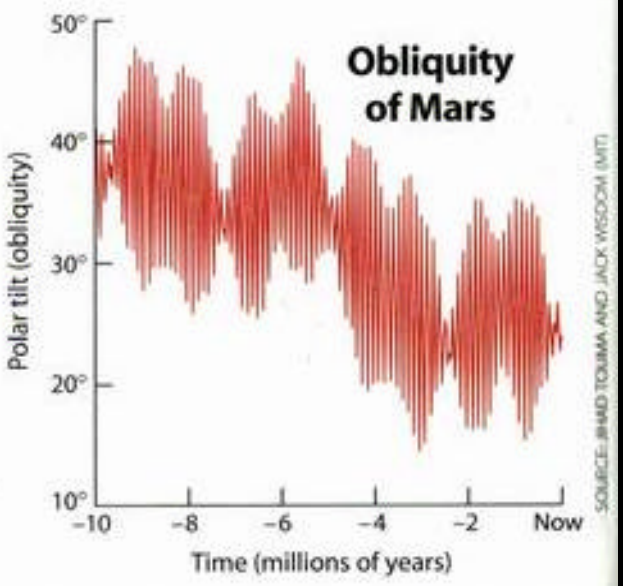
The equivalent of a few tens of metres of the "1 km deep ocean" would have been removed by the breaking up of water molecules into hydrogen and oxygen by the action of ultra violet light with subsequent loss of hydrogen. The polar caps are the largest visible reservoirs of water, but calculations show that they contain only the equivalent of about 20 – 30 metres of the "1 km deep" ocean.

This leaves about 95% of Mars water unaccounted for, and it is suspected that the water is stored as ice and water in a thick layer of frozen ground extending to depth of 2 – 5 km at the equator and 6 – 13 km at the poles. Ground ice could be present as large deposits in the northern plains as a result of the existence of the early ocean and the subsequent freezing. The ground water would be mostly in the form of ice, because Mars is very cold - it is further from the Sun than the Earth, and internal heat production is far less than that of earth. The ground water would have frozen as internal heat production de-

clined. The gradual freezing of the groundwater may explain the decline in outflow channel activity over the last 1 –2 billion years.

Why were there periods of melting?
It is suggested that the episodes of flooding in Mars history were caused by large stores of groundwater escaping from beneath a layer of permafrost. These outflows probably created transient lakes or seas and the ocean.

A few causes of flooding were suggested in Part I – for example volcanic activity and impacts, but the most likely explanation for the periodic melting of Mars' surface, or near surface ice deposits, is the effect of changes in obliquity of Mars axis (Figure). Currently Mars' axis is tilted at an angle of 24°, but it was discovered in the 1990s that the tilt of its axis varies chaotically because, unlike the Earth, Mars does not have a large moon to keep its spin axis stable. If the tilt is more than 45°, surface temperatures at mid to high latitudes in summer would remain above the melting point of ice for some months at time. This would cause large amounts of ice to melt from the summer polar cap. There would be a corresponding increase in atmospheric pressure that would allow liquid water to flow across the surface. At mid latitudes, previously stable ice deposits could melt and form the gullies.



Today the tilt (obliquity) of Mars's polar axis is very similar to Earth's. But this tilt varies between 15° and 35° over 100,000 years, with even wilder swings (0° to 60°) on 10-million-year time scales. These swings may trigger huge changes in the Martian climate, as the vast caches of water ice stored in the polar caps and subsurface are vaporized and driven into the atmosphere.

Conclusion
Although the evidence for a large reservoir of sub surface water on Mars seems strong, the evidence is indirect. However there is little doubt that water has played a major role in the geologic and climatic history of Mars in the form of rain, floods, and standing bodies of water.

Integrated networks of small valleys, like this one in Mars's southern highlands, may hark back to wetter times in the planet's distant past. The largest craters here are roughly 20 km in diameter.

References
In Search of Martian Seas
J Kelly Beatty
Sky & Telescope November 1999 p 38

The Iceball Next Door
Stephen M Clifford
Sky & Telescope August 2003 p 30

MESSAGE FROM CHAIRMAN - NEVILLE YOUNG

At the inaugural meeting of the elected 2004/2005 committee, the committee members agreed that Neville Young will chair the committee and the Pretoria centre for the next year.

Michael Poll reverts to his familiar vice-chairman position (held last year by Tim Cooper) while also being our centre link to the national ASSA committee and also taking over the librarianship from Janet Cooper. Tim and Janet are taking a break from committee duties simply because it is well-deserved. Janet is entertaining a lifelong wish to nurse and so started training early this year - long and unsociable working hours. Frikkie le Roux has uncertain work committments so has stepped down too. Other portfolios remain the same as indicated on the back page of the newsletter.

I became a member of the Pretoria Centre in 1985 (when I met long-standing members Michael Poll, Mike Haslam, Frikkie le Roux, Mauritz Geyser). In 1986 I joined the committee as secretary and have held other portfolios such as membership secretary, newsletter editor and additional member since then with a complete break for one year in the early 90's.

Previous chairmen since 1986 have been Prof Walter Wargau, Michael Poll and Louis Barendse. It is important to remind ourselves that the famous Jack Bennett was doing his last stint as chairman in 1985. The committee has taken a policy decision that no chairman should serve for longer than 3 years to avoid the potential stagnation that can arise. Many committee members have also served regularly since 1985. The continuity has surely been of great value to the centre, but I would certainly like to see a broadening of responsibilities and infusion of new ideas from the wider membership.

MY ROLE

I am not the most knowledgeable amateur astronomer in this centre. In our club, there are those who can navigate the naked eye sky with ease; those who can converse intelligently about relativity and cosmology; those who can grind mirrors; those who have built their own observatories; those with astrophotography skills; those who can cleverly process software images. I see the chairmanship as coordinating these various skills for the benefit not only of the individuals, but for the club and South African astronomy and - more broadly - to the benefit of science in general.

Carl Sagan wrote a book called "The Demon-Haunted World - Science as a Candle in the Dark". It warns of the actual danger to human existence posed by pseudo-scientific beliefs. I consider it important that we promote real science in whatever way we can. Mahatma Ghandi said, "What you must do is insignificant, but it is very important that you do it".

(By the way, in the past, there has been an objection to calling our group a ‘club' - it did not imply that we are a scientifically serious endeavour. I have am quite happy with the term as I feel we do cater for a group which includes those with a general interest and no obligation to contribute scientific data.)

OUR MISSION

The constitution of ASSA states that one of the objects of the Society shall be "The encouragement and stimulation of the study and practice of astronomy".

Societies like ours serve as a breeding ground within which a fertile young mind may germinate to grow into another Bennett or Herschel or Einstein. Our specific role in developing that talent may be miniscule, but may have been essential. On the other hand, the talent that does germinate and grow may not be as identifiable as these famous men and may appear to be insignificant. We may never be aware of the impact we make on astronomy or science in general by simply allowing a young mind to see through a telescope and ask a question about the universe we live in. It is important that we are there to nurture that enthusiasm.

The role of the committee is to provide the environment which will foster our general mission as well as our personal enjoyment of astronomy. There are those who are so actively doing astronomy and making a contribution to astronomy, that they must not be pulled away to administer it. A committee member makes as significant a contribution by making the facilities available for the *do'ers* and while doing so can have fun experiencing astronomy more widely.

The role of the chairman is to coordinate the activities - not to do them all. I intend to rope in as many resources as possible within the centre. The accepted principle is that 20% of the people do 80% of the work. It is quite acceptable that some are purely passive members - they are surely making larger contributions in some other facet of life and participate in the centre for relaxation and interest. That is fine. I hope to widen the scope for those who would like to have more active involvement in the centre.

PROJECTS

A number of activities are being planned.

1) Lourens scope

Pierre Lourens has kindly donated the equipment to build a 14 1/2inch telescope to the centre. This provides us with a telescope building project requiring a wide range of expertise from metalwork to optics to observatory construction to electronics engineering. Johan Swanepoel is chairing a subcommittee aimed at commissioning the telescope before end of 2006.

2) Centre History

We have several boxes of paperwork relating to the centre history going back to the mid 1960's. It contains letters to and from the committee on issues ranging from personal membership to acquiring and transporting our 12" Newtonian at CBC. There are photographs of centre activities over the years. Using modern technology, we have started scanning the approximately 1000 documents onto CDROM. This has a twofold purpose: a) to immediately ensure that this valuable resource is not lost forever in some dusty garage and b) to be able to reproduce it in its entirety where required. This data source will allow someone to put their writing and historian talents to work either in the form of a local centre document or even in the form of a published book title to add to the library of South African astronomy. The data can also

be used to compile regular talks on our centre history at our monthly meetings. Scanning the documents is nearly done - the next step is to begin cataloguing the contents of the CDROM. Please don't hesitate if you would like to be involved.

3) Public Speaking

In the club are knowledgeable members, many of whom enjoy sharing this knowledge by way of talks not only at our centre meetings, but also to the general public. However, we do not all have the presentation skills to do justice to our knowledge, so we have negotiated a presentation skills course with the Toastmasters organisation. The first guinea pigs will be starting their course soon and thereafter we will make the course available to the general membership at rates and conditions to be finalised after the first course has been completed.

4) Membership Survey

In the late 80's we did a survey of interests, wishes and resources in our club. The format of our meetings, the content of the talks we arrange, the interest in group outings, the activities outside of monthly meetings are all areas where your answers to our questions will guide us to the society that suits us best. If you enjoy playing with data and statistics, your help in this project is most welcome.

5) Our Newsletter

It is long been our policy that our centre newsletter should reflect the activities of our centre and not be an attempt to duplicate Sky & Telescope or even the internet.

We have interesting personalities with stories to tell, we have activities to report back on and we now have a wealth of local centre history to document. This can fill our newsletter each month. A regular article profiling individual members can keep going indefinitely. Pierre Lourens currently edits the newsletter which does not mean he writes every article. The newsletter is an ideal opportunity for someone's budding or frustrated journalistic talents. Interested?

6) Education

Even though they regularly attend meetings, I hear members saying they know too little about astronomy to interface with the general public at exhibitions or viewing evenings. Public astronomy knowledge is poor and after attending 6 months of club meetings, you are certainly able to impress almost anyone not involved in astronomy. Nevertheless, we can always learn more and I would like to see us start a program of graded knowledge certificates which a member could aspire to completing. The basic certificate would be navigation to Southern Cross, Scorpius and Orion.

CONCLUSION

This expansion of the centre activities will give more scope for active and longterm membership. The spinoffs will be more expertise and interaction within the centre, allowing each of us to get more out of our membership. The old adage "The more you put in, the more you get out" applies. I look forward to sharing my astronomy hobby with you over the next year.

ASTRONOMY EXHIBITION

Kolonnades in Sinoville

As part of our mission to popularise astronomy, our centre will be holding an exhibition at the Kolonnades shopping centre on Zambezi Drive in Sinoville. Rynhardt van Rooyen and Wayne Mitchell are organising the day and your help is needed. The Kolonnades management is very keen on our exhibition and will be providing plenty of support.

The day starts at 9am and continues through to a short viewing session in the evening. This is too long for a single session, so your committment is either for the morning session (till 13h00) or the afternoon session. The third session is observing from 18h00 till 20h00.

Our exhibition will consist of posters, astronomy computer programs, a slide show, telescope display and - of course - information about our centre. The remaining 2004 Skyguides and duplicate Sky and Telescope magazines will also be on sale. The solar system model will also be there to assist in answering questions.

These exhibitions are usually good fun and allow us to get to know each other more than the monthly meetings allow. You also stand a chance of bumping into an old friend doing their shopping at the Kolonnades. And don't forget - you know more aboout astronomy than what the general public does. If you are asked a dificult question, get the answer from one of your colleagues and learn in the process. We will have a relaxing meal in a local restaurant after the viewing.

Please do let Rynhardt know when you can help. Email him at rynhardt@pretoria-astronomy.co.za or call him at 011 441 3458.

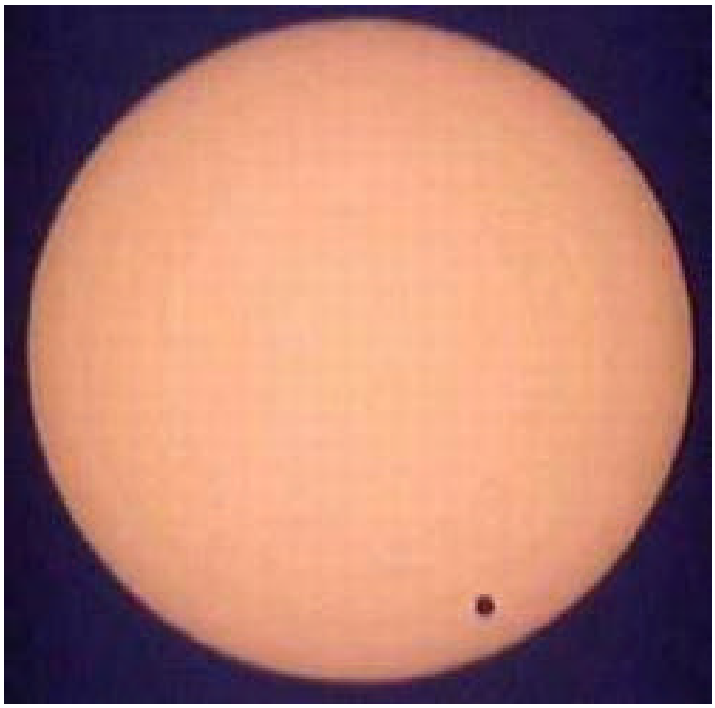
See you there - Neville

IMAGES OF VENUS TRANSIT

The images belowshow the transit of Venus across the face of the Sun, near the end of the transit . The transit took place on 8 June 2004. It was recorded by Mauritz Geyser and Koos van Zyl, two members of our Centre, from the roof of the Physics Department at the University of Pretoria. Images such as these were telecast on the website of the University and regularly updated.

Times when images were recorded are given.

12:34:23 Local Time (UT + 2 hours)



12:57:27 Local Time (UT + 2 hours)

13:09:30 Local Time (UT + 2 hours)

NEWS FROM THEO PISTORIUS

Theo Pistorius has settled into a home with his wife and children in Adelaide, Australia. He is working for a consulting company. He has joined ASSA - the Astronomical Society of Southern Australia ! Their website address is http://www.assa.org.au

They have a CCD imaging section he will begin to get active in.

Drop him an email at tpistori@bigpond.net.au.

TELESCOPE FOR SALE

Motor driven Celestron 8" with original tripod and set of lenses and filters. Speak to Peter at Queenswood Cash Converters at 082 451 7583. Asking price is R12 000.

WANTED: MAY 2004 ISSUE OF SKY AND TELESCOPE

I would like to buy a copy of this. If anyone has a copy for sale, please contact me. (Pierre Lourens)

SUBSCRIPTIONS TO SKY & TELESCOPE

People who want to subscribe to the astronomy magazine Sky & Telescope, must contact Mike Haslam. I recommend that people interested in astronomy should subscribe. It is worth the money.

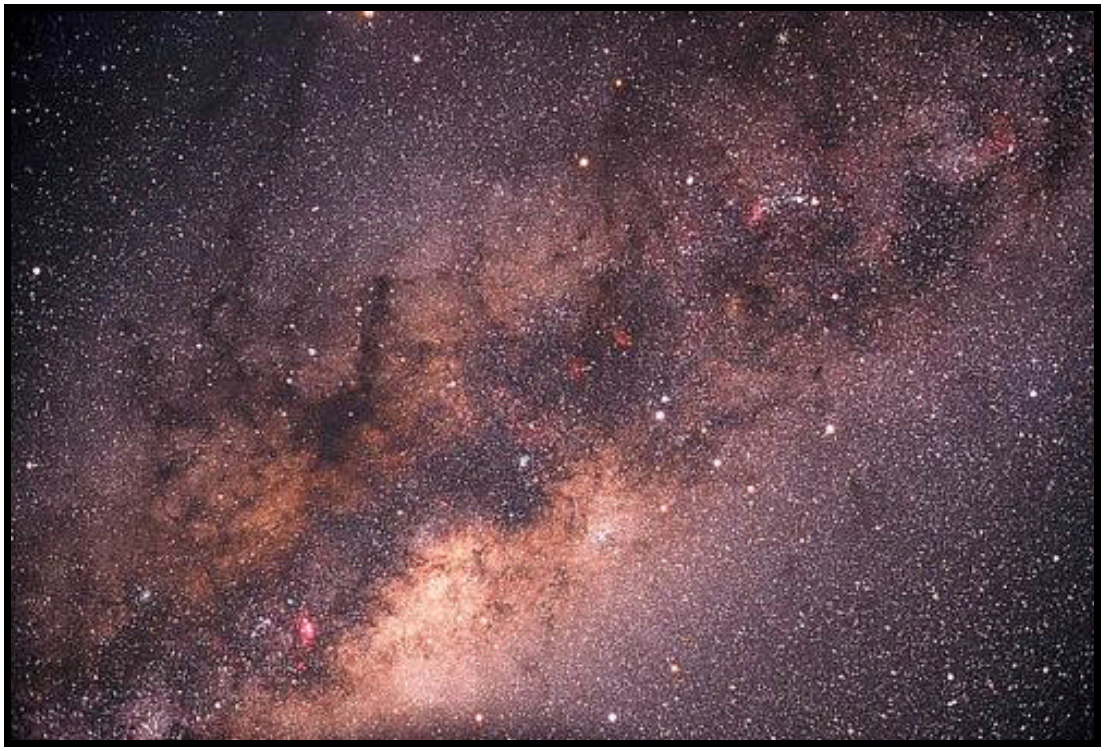
CONTRIBUTIONS TO NEWSLETTER

Members who want to send in contributions for the newsletter, should do so by the second Wednesday of a month, if they want it to be placed in the newsletter for that month.

ASTRONOMICAL WEBSITE ADDRESSES

USGS Space Science:	http://wwwflag.wr.usgs.gov/USGSFlag/Space/
PIGWAD maps:	http://webgis.wr.usgs.gov/
National Space Science Data Center:	http://nssdc.gsfc.nasa.gov/Spaceguard
Minor Planet Center:	http://cfa-www.harvard.edu/iau/mpc.html
MPC orbital elements:	http://cfa-www.harvard.edu/iau/Ephemerides/
SECEF:	http://sunearth.gsfc.nasa.gov/

ASTROPHOTOGRAPHY



This photo of the Milky Way was taken on 22 May 2004 from Nylsvlei using a Minolta X-300 camera mounted on a motor driven telescope. The exposure time was 15 minutes on Fujichrome Sensia 400 slide film with a 50mm lens at f2.8. Photo taken by Mauritz Geyser, one of our committee members.

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