

CANOPUS

The Astronomical Society of Southern Africa

Johannesburg Centre

Monthly Newsletter for August 2003

Contents:

Editorial

Notice of Monthly Meeting

Welcome to new MembersThe Committee

Calendar of Events.....The Committee

New acquisitions for the LibraryLerika Cross

Variable Stars VEben van Zyl

Chairman's ChatDave Gordon

Alcatel and CorotChris Stewart

The Roberts Papers.....Brian Fraser

Word of the DayChris Stewart

Mars FestivitiesDave/Lerika

The World's Largest Observatory.....Richard Overy

Richtersveld TripChris Middleton

In The Sky This Month.....Brian Fraser

**The Sir Herbert Baker Library, 18a Gill Street, Observatory, Johannesburg
P.O.Box 93145, Yeoville, 2143**

Editorial

Our A.G.M. which was held on the 9th of July was very well attended, and after the various section reports were presented, elections were held for you to choose your new committee for the 2003/4 Johannesburg Centre year. While the votes were being counted, we took a short break from the proceedings to enjoy a few snacks and some of Sharon's delicious Gluhwein). Dave also had a set of photos on his PC from the extreme dark-sky expedition to Lady Grey and from these we could all see what cold was all about. At the end of the counting, we had some new members joining the committee for next year (*see below*).

Mars continues to grow in size and brightness as the Earth prepares for it's overtaking maneuver on the night of 26th / 27th August. Already some of the surface features are becoming discernable at relatively low magnifications and cameras with a half-way decent zoom lens will be able to record this. Remember to set aside some August Friday nights to join us at the observatory where we will be using the 26" telescope for some "close-ups" of the Red Planet. See "Mars Festivities" in this issue and get more information from the Web-site. We will be having a Cheese & Wine and Viewing evening on the 22nd including two speakers between 20:00 and 21:00

Eben van Zyl continues his "Variable Stars" theme with the next in his current series which covers the interesting lives of Novae, and our **Chairman Dave Gordon** keeps in touch with another Chairman's Chat which covers the recent visit to Lady Grey. **Brian Fraser** as always lets us know about some of the interesting events taking place during the next 2 months. **Richard Overy's** son visited Kitt Peak in the USA a little while back and he gives us a summary of the instrumentation located at this relatively new and very active observatory.

Please remember to pay your annual subs as per the loose insert. This year, the last issue of Canopus to be delivered to those who don't pay on time is the September issue - i.e. if your subs are not received by 23rd of September, you will miss out on at least that issue.

The Editor

chris@penberthy.co.za

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Notice of Monthly Meeting

The Monthly Meeting of the Johannesburg Centre of the Astronomical Society will be held in the Sir Herbert Baker Library, 18a Gill Street, Observatory, on Wednesday, 13th of August, 2003 at 20:00.

Topic:

Double Stars

By: **Chris Middleton**

Telescope Making Classes

Would you like to make your own telescope?...or finish off a partially completed one? Well here's your opportunity. Join the Telescope Making Class being held under the guidance of Brian, Vince and Chris.

Contact Chris on (011) 763-3301 or email cstewart@alcatel.altech.co.za if you are interested.

ASSA Lists

(*Subscribe by sending email to "To Subscribe" address with "SUBSCRIBE" in the body of the message*)

	To Subscribe	To send messages
ASSA Jo'burg Centre:-	assa_announce-request@list.to	assa_announce@list.to
ASSA Telescope Making:-	assa_telescopemaking-request@list.to	assa_telescopemaking@list.to

Public Viewing (*weather permitting*)

Public viewing nights are held subject to suitable weather conditions on the Friday nearest First Quarter, and are held at the Old Republic Observatory, 18a Gill Street, Observatory, Johannesburg. Starting time around 19:30. See the ASSA event calendar for the proposed viewing dates. Please check with **Constant** on 972-6038 or email- tabbie@icon.co.za to ensure that viewing IS taking place on the specified evening.

Welcome to new Members

Christopher Sanderson Bernard Steyn

We wish you clear skies and many happy years of observing

For Sale

Meade LXD-55 8"

Meade LXD-55 8" Schmidt-Newtonian reflector telescope (2002 model) with UHTC coatings, including dual axis motor driven equatorial mount, tripod & Autostar controller plus Series 4000 26mm eyepiece. As new, still in original packaging and still under manufacturers warranty, selling well below current new price, R15,500.

Contact Mike on 082-532-7870.

Celestron 14" SCT

I am considering selling my Celestron SCT 14 telescope. Is one of the members interested and can make an offer ?

Alain Thijs
member ASSA

email:- allimpex@icon.co.za

ASSA Jo'burg Centre - Calendar of Events

Month	Day/ Date	Event	Details
Aug	Fri 8	Mars Viewing with 26" Innes telescope	Starts about 20:00
	Mon 11	Committee meeting	
	Wed 13	Monthly Meeting	Double Stars Chris Middleton
	Fri 15	Mars Viewing with 26" Innes telescope	Starts about 20:00
	Fri 22	Mars Viewing with 26" Innes telescope plus Cheese and Wine party	Starts about 20:00
	Fri 29	<i>Public viewing</i>	
Sep	Mon 8	Committee meeting	
	Wed 10	Monthly Meeting	Gravity and Time-Space Karin Cyrus
	Wed 24 to Sun 28	* STAR PARTY * - Extreme Dark Sky excursion to Richtersveld	<i>Event Moderator:</i> Chris Middleton - Cell: 082-920-3107
	Fri 26	<i>Public viewing</i>	
Oct	Mon 6	Committee meeting	
	Wed 8	Monthly Meeting	Practical Astrophotography Tony Halliday
	Fri 24	<i>Public viewing</i>	
Nov	Mon 10	Committee meeting	
	Wed 12	Monthly Meeting	Astronomical MASERS Derck Smits
	Fri 28	<i>Public viewing</i>	
Dec	Mon 8	Committee meeting	
	Wed 10	Monthly Meeting	T.B.A.
	Sat 13	* YEAR END STAR PARTY *	T.B.F. (<i>O.K. - Finalised</i>)
		<i>No Public viewing in December</i>	

Reminders

2003	Centenary of Flight August 27th : Mars opposition
2004	Centenary: Sir Herbert Baker Library Building <i>Johannesburg Centre to host 2004 ASSA Symposium</i> June 8: Venus Transit
2006	March 29: Total Solar Eclipse

New acquisitions for Library

The following books have been donated by Exclusive Books - Hyde Park:-

Beyond Pluto (Exploring the outer limits of the Solar System) by John Davies

Comets, Meteors and Asteroids by John Man

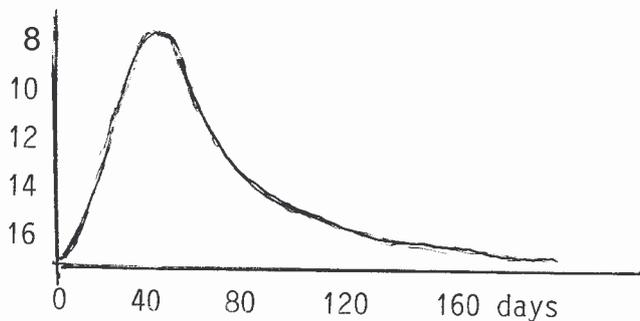
The Moon (A Biography) by David Whitehouse

The Science Book edited by Peter Tallack

Lerika Cross

VARIABLE STARS V

Novae are stars which suddenly become very bright and give the appearance of being "new" stars which they are not. All novae have the same kind of light curve.



The sudden brightening, averaging 8 or 9 magnitudes i.e. an increase in brightness of 22000 times is followed by a sharp decline in brightness and later by a slow decline in magnitude, running into hundreds of days.

The fastest novae brighten by 11 to 13 magnitudes. The greatest range in brightening was shown by V476 Cygni, which brightened through 15 magnitudes from 17,2 to 2,0.

Some novae repeat, e.g. RS Ophiuchi which displayed maxima in 1898, 1933, 1958 and 1967 and U Scorpii in 1863, 1906, 1936 and 1979.

Slower novae range in brightness from 8 to 11 magnitudes and remain at maximum for longer periods than the fast novae; sometimes for months on end. RT Serpentis, 1915, remained at maximum of 10,5 for 10 years and then very slowly dimmed to magnitude 14.

The spectra of novae are typified as Q. Novae whose spectra were known before their brightening had spectra of types A and B. They were thus bright giants before they became novae. Stars that are F and G giants become pulsating Cepheid variables. Ordinary F and G types of which the Sun is one, being G2, may have a different fate in store for them.

At maximum the spectra are continuous and very bright in the ultraviolet. After maximum, lines of hydrogen appear and become stronger. Then these lines become dimmer and molecular bands appear, showing that a drop in temperature takes place. This is because the overlying layers of the stars are cast off as nebulae which form shells around the stars. Ultimately strong Wolf-Rayet bands appear in the spectra, showing ionised atoms of Helium, carbon, oxygen and nitrogen.

Some of the atoms lose up to five electrons. These bands indicate temperatures in excess of 35000°K,

The novae then take on the appearance of a ring because there is less gas in the line of sight than in the sides of the nebulae, e.g. the Ring Nebula in Lyra situated at 18 53,6 +33 02 and the Helix nebula at 22 29,6 -20 48. Time exposure photographs are needed to show the nebulae in the Helix. The star in the centre is a white dwarf, which shows that its overlying layers of gas have been cast off, thus giving the ring appearance. In a small telescope these nebulae have the appearance of the disc of a planet, so they were originally called "planetary nebulae" and the name stuck although they have nothing whatsoever to do with planets.

The remaining star is usually a shrunken white dwarf about 2% of the Sun's size and a temperature as high as 100 000 degrees. The high temperatures are responsible for the ultraviolet radiation which gives a typical greenish-blue appearance of doubly ionised oxygen (OIII).

Photographs taken through a red filter show the outward movement of the gases in the nebulae.

Novae usually occur near the plane of the Milky way and a world-wide patrol has been established, consisting of amateur astronomers who each have a certain area of the sky allotted to them, which they photograph repeatedly. In this way novae will not easily escape detection.

The casting off of shells of gas is due to the star reaching a stage where it has consumed a certain percentage of its hydrogen fuel. The radiation from the centre then suddenly decreases so that the gravitational force of the overlying layers causes them to collapse catastrophically on to the nucleus of the star, crushing it to a density of a white dwarf, 8000 times the density of lead, i.e. 90 000 grams per cubic centimetre and a size of 30 000 kilometres or thereabouts. This tremendous crushing raises the temperature to anything from 35000 to 100 000 degrees Kelvin which is responsible for the ultraviolet radiation from the remaining star. Then a rebound takes place and the gases are hurled out.

Jan Eben van Zyl

Chairman's Chat

Extreme Dark Sky Excursion near Lady Grey

26 – 29 June 2003

As the car reached the summit of Joubert's Pass, the GPS read 2240m. Behind us, Lady Grey nestled serenely in the valley far below; ahead – the Lammergaai nature reserve, and our dark sky observing home for the next three nights.

The guest house was roomy and comfortable. Electric blankets on the beds – outstanding. Anthracite heaters in the dining room and lounge – perfect. A large kitchen to prepare delicious food, debate, argue, joust and resolve – heaven!

The dining room table was permanently enshrouded in star charts, astronomy books and telescope accessories. The kitchen was quickly adopted as the official eating area. As is typical of any self-catering arrangement, we all brought far too much food. We ate like kings and drank (sometimes non-alcoholic beverages!) like thirsty hunting dogs on a dry salt pan.

Our observing location was an open field 100 or so meters from the main house. No crime or petty theft to worry about as we simply left our scopes under canopy for the duration of the weekend. Our biggest challenge to and from the observing site was negotiating mine fields of fresh cow pats, and ensuring we didn't fall over sleeping cattle at night. Many a time we were forced to wake sleepy cows to negotiate our entry and exit from the field.

After delicious dinner every evening, it was time to don protective clothing – layers and layers of protective clothing. The observing group: Christopher Middleton, Tony Halliday, Mary MacKinnon, John Somers Vine and myself resembled Michelin men on steroids. Newspaper in the shoes or three pairs of thermal socks. Long underwear and two additional layers of trousers. At least four layers on the torso and the obligatory, beanie, balaclava, scarf ... and John's "Liewe Heksie" Belgian hat. The challenge: to beat -6 to -10 degree Celsius deep freeze. Hey, we're tough astronomers – no problem!

As we all waddled out for our first evenings observation, I could not help but reflect on the

madness and passion of the amateur astronomer. A rare breed teetering on the edge of certifiable insanity. What a pleasure!

We arrived at our scopes and all stood mouths agape for a few moments; five friends staring stupidly into the early evening sky. It was crystal clear night sky with Carl Sagan's *Billions and Billions* shining back at us, challenging us to recognise even the brighter constellations in a sky so filled to the chock brim with crystalline diamonds. Tony asked for his dark glasses because the Magellanic Clouds were irritatingly bright.

Suddenly, five people attacked the coverings on their scopes like a hoard of starving war refugees at a food distribution point. No sooner were lens caps discarded when the first whoops of joy shattered the silence of the Lammergaai reserve. Christopher used some base adjectives to describe the sheer magnificence in his eyepiece. The exclamations of delight were not too dissimilar to that of a Tai harem during happy hour. The Hollywood Objects now in new found glory: Omega Centauri, Centaurus A, Jewel Box, Tarantula Nebula, Sombrero Galaxy ...

Moments later, four curious observers turned to an uncharacteristically quite Tony Halliday and enquired:

"Tony, what's that strange smell coming from your area?"

"Oh, its nothing," he sheepishly replied. "I've just attached a 12 volt battery pack to my 6 volt hand controller and completely fried the electronics!"

10pm was break time each evening. Back to house for a second course of dinner left-overs and a steaming mug of hot chocolate/coffee. Lots of excited chatter on what we had just then observed and the plan of attack for round two.

By the time of our return, the sky had rotated sufficiently for a whole new set of delights to behold. Now it was time to try out my new oxygen III filter. Carina and the Keyhole Nebulae – dust lanes and gas clouds de-lined with knife

edge definition. Lagoon and Trifid Nebulae – thick with nebulosity and texture. The Swan and Eagle Nebulae detail, size and complexity as we had never before observed.

While Christopher and John embarked on a double star festival, Mary and I marvelled over two objects we had given our own adoptive names: The Chinese Lantern (NGC 3293) and Star City (NGC 3532). All this while, Tony worked feverishly to digitally capture the perfect image of Mars.

Evening number two started with a gusting wind sporting needle-like teeth that cut straight through the protective layers of clothing. The wind meant astro-photography was out of the question and seeing was significantly worse than the previous evening. The mid-time snack was a welcome break from the wind and we all felt a little dejected as we trundled back to base. After an extended astronomy debate around the table we emerged for round two to find the wind had

completely disappeared and the skies were crystal clear; even better than the previous night.

The final evening saw the farm management entourage arrive for a special tour of the skies presented by all of us. They were treated to various objects in four different telescopes. What an impression we must have made with our enthusiasm to share knowledge about the menagerie of objects overhead. The farm manager, Dick, offered to build us an observatory for our next visit!

What a wonderful TOTAL astronomy experience. As the big man in the terminator so aptly put it - I'll Be Buck!

Dave Gordon

(Due to space constraints, Chris Middleton's table of objects is not inserted here but will be on view on our web-site)

Alcatel kicks off Corot satellite program for French space agency

Paris, July 22, 2003 - Alcatel Space signed a 15 million euro contract with the French space agency CNES today, covering the third and final part of the Corot program. Corot encompasses the development and construction of a space observatory satellite intended to study stars and detect new planets. The total program value is 35 million euros.

The Corot satellite will be based on the Proteus platform, one of five ordered by CNES last summer to be used for scientific missions. Alcatel Space previously signed a contract for the Corotel spaceborne telescope. Today's contract covers engineering services, plus satellite integration and testing.

CNES's Corot mission is a world's first. Its primary aim is to study internal structure of stars, using a method known as astroseismology (study of star oscillation and pulsation, which indirectly allows characterization of the interior). Corot is a dedicated astronomy mission. Operating for three years, it will study the internal structures of thousands of stars to determine their mass, age and composition. This is of course a key to understanding our universe. The various chemical elements making up the universe are formed in stars at different stages of their evolution. Corot will use very-high-precision stellar photometry

methods to measure the changes in the luminous flux received from stars over a long period of time (150 days).

The second objective of the Corot mission is the detection of planets outside the solar system, based on measurements of changes in the luminous intensity received. Scientists believe they will be able to detect 10 to 40 medium-sized planets, similar to those in the solar system. These planets will be candidates for further exploration, since their size and chemical composition could be compatible with the presence of water. It is the task of Corot to demonstrate the existence of these planets, to determine how many there are and the environments that facilitate development. At the same time, Corot could also help discover dozens of new gaseous giants, rounding out current discoveries.

Corot will be placed into an inertial polar orbit at an altitude of about 850 kilometers. The satellite's attitude will also be inertial, with its line-of-sight remaining constant for an observation period of up to five months. The complete mission will offer at least five complete observation periods, totaling two and a half years. A Rocket launch is planned for in 2006.

The Corot satellite will be built on the standard Proteus platform, a multimission low-orbit platform developed and built by Alcatel Space, and validated in flight by the Jason 1 oceanographic satellite. Launched in December 2001, Jason 1 has delivered excellent mission and satellite performance in service. The Corotel afocal telescope supplied by Alcatel Space reflects the company's long experience on the Helios observation program, in particular the telescopic stability requirements for this mission. Corotel is a "self-baffled" instrument, enabling it to shield all signals outside the field of view. It will weigh about 150 kilograms, be 3 meters high and has a 270 mm entrance pupil.

This contract continues the collaboration between Alcatel Space and CNES, begun in 1996 with initial development of the Proteus platform. Corot is the first extrasolar exploration mission for this platform.

"Corot is a fundamental mission for European astronomy," emphasizes Yannick d'Escatha, President of CNES. "Rising to the major challenge of exploring our universe, CNES is delighted to offer researchers a satellite whose instruments will drive considerable progress in the study of stars and detection of extrasolar planets. It is vital that both France and Europe participate in the race to discover the underlying principles behind the universe, based on this experiment, the first of its type anywhere in the world."

Pascale Sourisse, Chairman and CEO of Alcatel Space, noted: "We are very proud to carry out this scientific mission in conjunction with CNES, our partner in the development of the Proteus multimission platform - now one of the most cost-effective vehicles for today's space missions."

Submitted by **Chris Stewart**

The Roberts Papers



Tim Cooper, Braam van Zyl, Matie Hoffman and Brian Fraser in the library of Boyden observatory scrutinising the Roberts papers. This team is involved in a project to publish the variable star observations made by A W Roberts between 1891 and 1920. The estimate is that there are some 60,000 to 80,000 observations to capture.

Brian Fraser

GIBBOUS:

Your word of the day from
www.yourdictionary.com

Today's Word: Gibbous (Adjective)

Pronunciation: (gĭb'ŭs)

Definition 1: Convex, protuberant, protruding; more than half but less than fully illuminated, as the moon; humpbacked.

Usage 1: The original Latin word for hump, "gibber" (gĭb'ŭr), was used in medicine in reference to hunched backs in the 19th century. It gave rise to "gibberous" with the same meaning as today's word. Just remember to distinguish "gibber" from the word for an incomprehensible language, "gibber," from which we get "gibberish." These words are pronounced with a soft 'g' (jĭb'ŭr). The adverb for today's word is "gibbously" and you have your choice of nouns: "gibbousness" or "gibbosity."

Suggested Usage: In his conversation with today's contributor, Tim Ward asked, "Surely we've all suffered from the effects of engorging ourselves at family gatherings, when our already less-than-healthy statures assume a much more gibbous appearance?" My daughter's stomach is currently unusually gibbous with my first granddaughter, a much happier gibbosity.

Etymology: Today's word is a reduction of Latin *gibb'ŭrŏsus* "hump-backed, hunch-back" from *gibber* "hump, hunch," which in Late Latin became *gibbus* "hump, bow." Today's word comes from Katy Brezger's backyard: "Now the gibbous moon in its grandeur presides over the manicured backyard and stops just short of The Woods. Strange dancing shadows sway in the summer windstorm. The large umbrella squatting on the picnic table even succumbs to the heavy breezes, turning this way and that as the wind gasps and blows. The Woods forebode even as they beckon, the wind tearing back the overcarriage just enough to cast illuminations on the old tractors. Oh, there be monsters, and madness looms." Katy's imagination and many others pervade the YD Agora; go there today:-

(<http://www.yourdictionary.com/cgi-bin/agora/agora.cgi>).

Dr. Language, yourDictionary.com

submitted by **Chris Stewart**

Mars Festivities

by *Dave Gordon*

Hi Folks

Lerika, thank you for this excellent idea.

The following suggestion for Mars Festivities 2003

Mars General Viewing using the 26 inch Innes Telescope:

- * Friday 8 August 8pm - 10pm, members free, general public R30 donation
- * Friday 15 August 8pm - 10pm, members free, general public R30 donation
- * Friday 22 August Mars Party with invited speaker and cheese and wine.

Members R30, general public R50

Prof Lew Ashwal from Wits University GeoSciences - "Mars Meteorites" 20:00 to 20:30

Dave Gordon - "Mars Bytes" from 20:30 to 21:00

Mars Viewing and Cheese and Wine table in the 26" dome from 21:00 to 22:30

Booking is essential - contact Lerika Cross on 082 650 8002 or email lerika@icon.co.za.

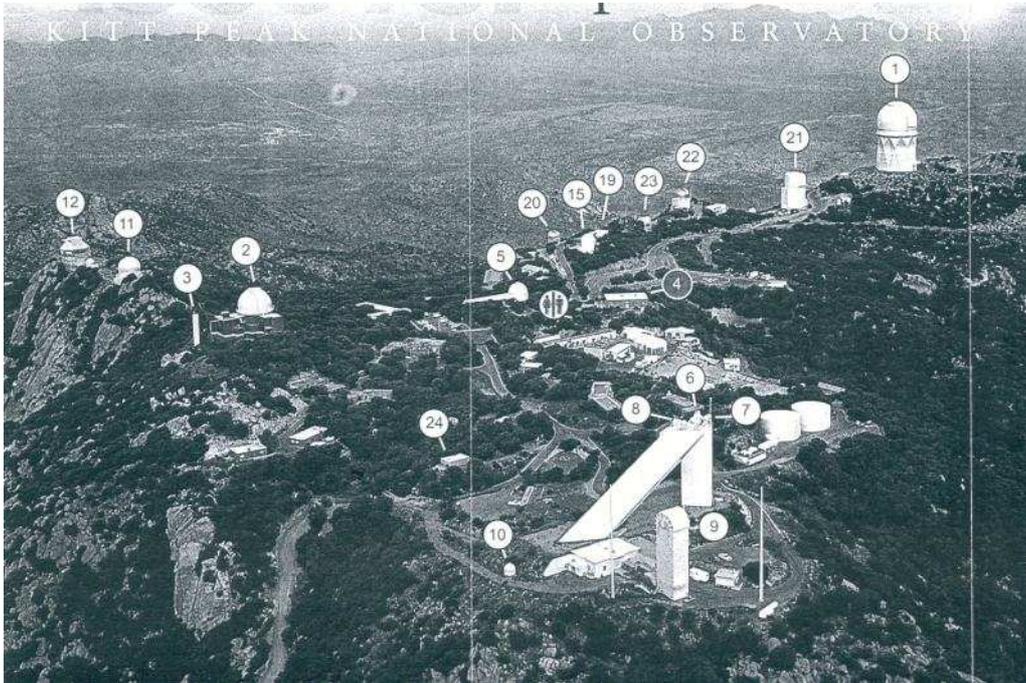
If there is a big enough response, we can set additional viewing dates.

The World's Largest Observatory

While on business in Tucson, Arizona, our eldest son, David, visited the US National Observatory at Kitt Peak, about 89km from Tucson. With 22 optical and 2 radio telescopes it is no doubt the world's largest astronomical observatory. Situated at an altitude of 2190m, above the Sonoran Desert, it was selected in 1958 after a three-year survey of more than 150 sites.

It is used by about a dozen different institutions.

Kitt Peak National Observatory:



1. 4m Mayall getting the mirror up the narrow winding road up the side of the mountain was apparently a pretty hairy job. The yoke weighs 250 tons!
2. 2,1m
3. 0,9 m Coude Feed
4. 0,4m (Visitor Centre) visitors may join the Nightly Observing Program but need to book a month ahead.

Western Kentucky University Observatory

5. 1,3m

National Solar Observatory

6. 2m McMath-Pierce (main heliostat)
7. 0,9m McMath-Pierce (E. aux., heliostat)
8. 0,9m McMath-Pierce (W. aux. heliostat)
9. 0,7m Solar Vacuum Telescope
10. 0,1m Razdow

Wisconsin, Indiana, Yale, NOAO Observatory

11. 0,9m
12. 3,5m

National Radio Astronomy Observatory

14. 25m VLBA (Very Long Baseline Array) - (not visible)

Case Western Reserve University Observatory

15. 0,6 Burrell Schmidt

Edgar O Smith Observatory

16. 1,2 Calypso

Michigan, Dartmouth, MIT Observatory

17. 1.3m McGraw Hill

18. 2,4m Hiltner

MIT/NASA Observatory

19. 0,18 ETC/RMT (Explosive Transient Camera/Rapidly Moving Telescope). For tracking UFOs?

Southeastern Association for Research in Astronomy

20. 0,9m

Steward Observatory (University of Arizona)

13. 12m

21. 2,3m Bok Reflector. For keeping an eye on the Boks?
 22. 0,9m Spacewatch
 23. 1,8m Spacewatch
 Wisconsin Hydrogen-Alpha Mapping
 24. 0,6m
 Not visible: Nos: 13, 14, 16, 17, 18

Kitt Peak National Observatory also operates the 6m Wipple Telescope in the Tucson area.

Considering this and other US installations, some also with very Large telescopes, plus the Hubble and a couple of other space instruments, the amount of observational and research work going on around the world must be truly astronomical!

Richard Overy

RICHTERSVELD TRIP 21 - 27 SEPTEMBER

CHECK OUT THE NATIONAL PARKS WEBSITE FOR MORE INFORMATION ON THE RICHTERSVELD PARK.

Here is the deal.

We head to Upington, Springbok, Steinkopf, Port Nolloth, Alexander Bay and into the metropolis of Sendelingsdrift on the edge of the park. (last bit gravel road)

As the distance is vast I have been asked to arrange a longer booking period. Note that the Wednesday 24 is a public holiday.

The Park will provide a house for us at a cost of R 100.00 per day per person. The house has full ablutions, a kitchenette, fridge deep freeze and electricity. It is outside the Park but we will have a Ranger with us at night who will facilitate access to the Park. We will leave our scopes erected within the Park and I will take Manjane or one of my other lackeys to sleep in a tent alongside the scopes after our observing so we don't have to pack up every night.

They say the house has enough bedding but I know that Atlantic wind and it can get extremely cold. (Not as cold as Lady Grey I might add).

BOOKING FOR THE HOUSE:

The house has been reserved from the Sunday night 21 September until Saturday night (inclusive) the 27 September. If you wish to join us within these dates I must advise the park in case we run out of beds and they have to bring in more.

SHOPPING FOR ALL THINGS MUST BE DONE PRIOR TO ARRIVAL:

The closest town for provisions is Port Nolloth. (return trip 300km). Next Springbok (return trip 600 km). 90 % of people run out of film. 100 % of people leave to return to the Park within 5 years.

RICHTERSVELD WEB SITE:

http://www.parks-sa.co.za/frames.asp?mainurl=parks/national_parks.html

DEPOSIT:

THE PARK REQUIRES A FIFTY PERCENT DEPOSIT SO PLEASE PAY ME BY THE 18 JULY 2003
 [four hundred Rand per person secures]

Chris Middleton

The Sky this Month

August 2003

dd hh	dd hh
4 14 Neptune at opposition	22 10 Jupiter in conj. with Sun
5 08 FIRST QUARTER	23 14 Saturn 4.1 S of Moon
6 15 Moon at perigee	24 10 Uranus at opposition
11 14 Neptune 4.9 N of Moon	26 04 Jupiter 0.4 N of Regulus
12 05 FULL MOON	27 08 Jupiter 4.3 S of Moon
13 00 Uranus 4.5 N of Moon	27 10 Mars nearest to Earth
13 18 Mars 2.1 S of Moon	27 18 NEW MOON
14 15 Mercury greatest elong. E(27)	27 20 Venus 3.7 S of Moon
17 13 Mercury greatest brilliancy	27 22 Mercury stationary
18 18 Venus in superior conjn.	28 18 Mars at opposition
19 14 Moon at apogee	29 01 Mercury 9.3 S of Moon
20 01 LAST QUARTER	29 22 Pluto stationary
21 06 Venus 0.6 N of Jupiter	31 18 Moon at perigee
22 03 Venus 0.0 N of Regulus	

September 2003

dd hh	dd hh
3 13 FIRST QUARTER	20 03 Saturn 4.6 S of Moon
7 01 Mercury 6.1 S of Venus	23 11 Equinox
7 20 Neptune 5.0 N of Moon	24 04 Jupiter 4.4 S of Moon
9 06 Uranus 4.4 N of Moon	24 18 Mercury 4.5 S of Moon
9 14 Mars 1.5 S of Moon	26 04 NEW MOON
10 18 FULL MOON	26 21 Venus 2.3 S of Moon
11 03 Mercury in inferior conjn.	27 08 Mercury greatest elong. W(17)
16 09 Moon at apogee	28 08 Moon at perigee
18 20 LAST QUARTER	29 14 Mars stationary
19 13 Mercury stationary	30 11 Mercury greatest brilliancy

LOCAL TIMES of RISE and SET for the MAJOR PLANETS, 2003

Site Location: Long. **+28.0** deg. Lat. **-26.0** deg. Local Time - UT **+2.0** hrs.

Date	Sun	Mercury	Venus	Mars	Jupiter	Saturn
	Rise Set					
Aug 09	6.43 17.44	8.04 19.45	6.38 17.31	19.23 8.24	7.18 18.29	4.19 14.52
Aug 19	6.35 17.48	7.47 19.50	6.39 17.48	18.35 7.40	6.46 18.00	3.44 14.17
Aug 29	6.25 17.53	7.14 19.28	6.39 18.05	17.43 6.52	6.13 17.30	3.09 13.42
Sep 08	6.15 17.57	6.19 18.25	6.36 18.21	16.52 6.04	5.40 17.00	2.33 13.07
Sep 18	6.04 18.01	5.24 17.07	6.32 18.37	16.05 5.17	5.07 16.31	1.57 12.31
Sep 28	5.53 18.05	5.05 16.45	6.28 18.53	15.23 4.33	4.34 16.01	1.19 11.54