CANOPUS

The Astronomical Society of Southern Africa

Johannesburg Centre

Monthly Newsletter for January 2000

Contents:

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

Editorial

Happy New Year to all of our Readers. Here is your January 2000 issue of Canopus - not a bumper issue as was the last, but chock-a-block with notices and events for the year to come.

Our thoughts go out to the Engineers and Programmers from NASA's Jet Propulsion Laboratory at the apparent 100% loss of the Mars'98 mission - both MCO and MPL are now presumed lost, although efforts to communicate with MPL still continue at present. Although the "faster, better, cheaper," guideline has meant more missions for less money, one feels that maybe a little more could be spent to build in extra redundancy for a better chance of success. For one, the Galileo mission comes to mind - now way past it's original design life, and almost finished with a secondary mission, from which a lot of useful information is being garnered. And Voyager, after all these years still active and still able to use one or two of it's instruments for some useful science. *We have included the latest MPL status.*

Danie's variable of the month is a little different in this issue - please read it very carefully and give him your feedback. This can be sent directly to Danie, can be done via one of Your Committee members, or even eMailed directly to the editor.

Another member has graduated from the ASSA's University of Telescope Making - Congratulations Mary**!** We have included a picture of your 'scope with You and John sharing the limelight.

Brian supplies the Astronomical Calendar for January and February and has also supplied a table of the major planets' rising and setting times for 2000. For this issue only the whole table has been produced on page 11, and for subsequent issues, the applicable 2 months will be added together with Brian's Astronomical Calendar. Wolf Lange has submitted a write-up on the Year End Star Party and some snipperts have been picked up from NASA and included for interest sake.

Bill Wheaton is recovering from surgery and will hopefully, one of these (not too distant) days, once again be in a position to provide us with his interesting and well-written articles. ***Get Well Soon Bill.***

And once again, a plea for articles - we need them to make your magazine interesting and Informative.

The Editor

Chris chris@aqua.co.za

Committee of the Johannesburg Centre of the ASSA for 1999/2000		
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Vice Chairman	Evan Dembsky	680-9304
Secretary	Wolf Lange	849-6020
Treasurer	Greg Corbett	606-3730
Librarian	Ed Finlay	616-3202
Curator of Instruments	Frans van Nieuwkerk	609-8158
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Notice of Meeting

The **January** meeting of the Johannesburg Centre of the Astronomical Society will be held in the Sir Herbert Baker Library, 18a Gill Street, Observatory, on Wednesday the 12th of January, 2000 at 20:00.

Topic:

Computers in Astronomy

A demonstration on the use of computers in our chosen field.

By:

Chris²

Future Meetings

February 9th	METSOC 1999	Trevor Gould
March 8th	Marconi	Tony Voorvelt
April 12th	Planetarium Meeting	T.B.A.

We will be asking Dr Nicholson of HartRAO to present a lecture at one of our meetings.

Dark Sky Viewing

On the Saturday nearest New Moon at Tom Budge's Farm in the Magaliesberg. Remember that this is by arrangement only as most observers will be following specific viewing programmes and if you don't have your own 'scope, you should contact one of the observers (e.g. at the monthly meeting) to arrange some viewing time with them.

5th February	1st July	**Year End Star Party 2000**
4th March	26th August	*"Under the Full Moon"*
1st April	23rd September	9th December
6th May	28th October	
3rd June	25th November	

Jo'burg Centre Outings for 2000

Your Committee is making arrangements for several outings during the year. Amongst these are some old favourites as well as a couple of new ones which should prove interesting. The annual jaunt to Swinburne in August will be replaced this coming year with a trip to Nylsvlei around June/July which should be more Astronomically beneficial and less financially draining. We will also be trying to arrange 2 trips to Boyden as well as trips to Hartebeeshoek, the Tswaing Crater and the Science & Technology Museum. We will also be looking at the possibility of arranging visits to other ASSA Centres during the year - more information to follow.

Other Talks

Tony Voorvelt will be giving a talk on the last Friday of February titled "From Candle to Laser" in the 26" telescope building. There is a charge of R10 for adults and R5 for children/senior citizens and the talk, which starts at 19:30, will last for approximately 45 minutes.

These Friday Month-end talks are presented regularly by Tony, and we will try to give notice of them, with titles, whenever they are scheduled.

VARIABLE OF THE MONTH

For some years, I have supplied "Variable of the Month" articles but perhaps the beginning of the year 2000 is a good time to pause and assess the value if any of the articles.

Response from readers over the years has been absolutely zero. This means that either the articles have been so perfect that no comment is possible or else that they are so trivial as to merit no comment. I have no quarrel with the lack of response - we all accept that with some exceptions, people join the Centre or read Canopus in order to be entertained and not to do any significant work. That is perfectly natural.

But one does need to know how to write the articles for maximum utility (or entertainment) value. The "General Catalogue of Variable Stars" contains well over 30 000 entries and it would be a simple matter to ask our esteemed Editor simply to cover them all in order of Right Ascension. This will take care of his needs for the next 2727 years, before starting on all the variables discovered from now on.

The "Variable of the Month" articles have, however, contained rather more than bare range, position and comparison star data. I have tried to cover a mix of different types, such as Miras, U Gems, RCrB's, EB's and novae. Stars were chosen to suit beginners in many cases. Where possible, I have tried to provide an interesting background or anecdote as well as practical observing hints. I have no idea whether these are of use to man or beast. What is needed now from Canopus readers is some feedback regarding the contents of the articles so that future ones can be made as reader friendly as possible.

Enjoy variable stars in the new Millennium whether at the eyepiece, CCD monitor screen or the depths of your armchair.

But enjoy!

Your ever variable,

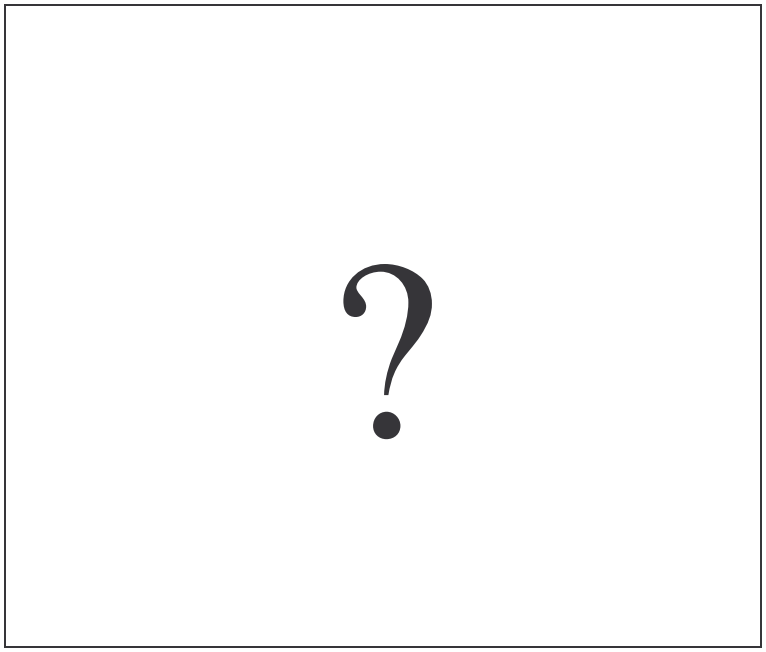
Danie Overbeek.

Readers,

Please forward your comments and general feedback to Danie either directly, via snail-mail to our postal address, via eMail to the editor, or via a Committee member at a monthly meeting.

The Editor

Chart for Variable of the Month



Chasing the Leonid Meteor Shower 1999

All the experts were predicting a spectacular showing by the Leonid meteor shower in 1998, 1999 or perhaps next year. If not then it will be another 33 years before the earth passes through the right part of space. It didn't quite happen in 1998, so this year looked to me like a good bet to see 100,000 meteors in an hour. (Or maybe 25,000 in 15 minutes). Of course your little part of the planet has to be pointing in the right direction for this to happen and you have to have clear skies. As the weather in Gauteng had been mostly cloudy in the days leading up to November 17th, I decided to pack my bags and go west. According to the TV weather map the clear skies were west of that traditional line that runs Northwest from about Knysna to the Kalahari so I decided to head west towards Upington and keep monitoring the sky conditions as I went along.

As luck would have it the TV weatherman was just about spot on, for as we passed Kuruman the sky got steadily clearer and at Upington it was absolutely brilliant. So we stopped at a little B&B farm about 50 km north of Upington on the Kalahari Gemsbok park road and hit the sack intending to get up at about 2 am. My internal alarm clock doesn't work well in these conditions and it wakes me up 2 hours early, just to make sure I don't miss the event. So I sat out on a deck chair from about midnight enjoying the most fantastic skies you can imagine. The brightish moon spoiled things a little, but I was able to see down to mag 6.0 with the unaided eye.

There were a few sporadic meteors here and there and then suddenly one or two that were obviously Leonids. I called Val and together we settled down just before 3 am to do some serious observing, recording our observations as they happened.

It started slowly, with 2 or 3 a minute and built up to about 15 a minute at the peak. Most of them were brighter than mag 2 and left a smoke trail. There were only a couple that were brighter than Jupiter and they looked spectacular, but none that rivalled the moon in brightness.

It felt like we were attending a cosmic fireworks display. At times there were 2 or 3 in the sky at the same time. They were shooting in all directions all over the sky.

At about 4 am twilight just became visible, and my tape ran out and I had to go inside and fetch another one. The tape was soon replaced but the light in the east was intruding on the display and I called it a day (or night) at about 4.20 am. I believe the peak seems to have been at about 4.15 am.

It was quite spectacular. We saw 410 meteors in just less than 100 minutes. Can you imagine what that display of 100,000 meteors in an hour must look like? They say it might happen next year.

Guess where I am going to be.

Brian Fraser

The 1999 Year End Star Party

They came in "drips and drabs" from all corners of Gauteng, braving storms, rain and hail, to meet at Tom Budge's farm in the hills of the lower Magaliesberg to party. 24 eventually arrived of which 4 left early as it started to rain quite strongly and the prospects looked bleak for any improvement in the weather. However, the true RPP spirit of amateur astronomers broke through: "Resilience, persistence and patience", and all those who stayed beyond 8pm were duly rewarded with clear skies and used Mary's "home built" 8" and Frans van Nieuwkerk' 3.5" Newtonian scopes to great effect, to observe Jupiter, Saturn, the Pleiades, Orion and several other objects and stars.

Chris Steward, ably supported by his wife, made sure the braai fire started early and lasted well into the night, despite the rainy weather. John Scott dressed to a "T" in his yellow oilskins gave encouragement to Erica Ashford and her friend Renee, to consider building their own telescope in 2000. Sharon Tait (not Stone!) brought a whole bunch of friends about 2 hours after everyone else had arrived. They apparently got lost and got back on track after getting directions from a pub in the vicinity. (Now I have heard everything!).

Many envious eyes were cast into the interior of the main building where Zebra and wild animal skins cast over luxurious sofas and armchairs invited for relaxation in front of an open hearth fire. Unfortunately the whole place was locked and guarded by two vicious looking Dobermans who turned out to be docile and friendly.

The rainy part of the evening was spend in an almost completed chalet with "open door" ablution facilities. Many a tale was spun and glass was downed whilst devouring large chunks of various meats and lengthy pieces of boerewors, deliciously braaied over bushveld wood. Some attempts were made on pointing out to the unsuspecting the nearby infamous Vlakplaats prison and "torture" centre which had received many months of attention from the TRC hearings. Soon however when the skies cleared we moved onto an open lawn, the telescopes were set up and the viewing solicited many an "Oh" and an "Ah' from the visitors and members alike.

From about 11h00 people started to leave the scene, finding their way down the precarious mountain pass back to civilisation.

A word of appreciation to Tom for letting us use his facilities (albeit not all of it) for free. Next time we hope you'll join us for an ASSA star or other party.

Wolf Lange

NASA Space Science News for Dec. 15, 1999

Alerted by a supernova patrol, scientists have used NASA's Chandra X-ray Observatory to capture a rare glimpse of X-radiation from the early phases of a supernova.

FULL STORY at:

http://science.nasa.gov/newhome/headlines/ast15dec99_2.htm

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RELEASE: 99-148

GALILEO SEES DAZZLING LAVA FOUNTAIN ON IO

During a recent close flyby of Jupiter's moon Io, NASA's Galileo spacecraft observed a fiery lava fountain shooting more than a mile above the moon's surface.

The images, showing a curtain of lava erupting within a giant volcanic crater, will be unveiled today during the American Geophysical Union's fall meeting in San Francisco. Galileo took the pictures on Thanksgiving night, November 25.

"We've finally caught a close-up of a massive volcanic eruption in action on Io," said Galileo project scientist Dr. Torrence Johnson of NASA's Jet Propulsion Laboratory, Pasadena, CA. "The erupting lava was so hot and bright, it over-exposed part of the camera picture and left a bright blur in the middle."

These lava fountains were hot enough and tall enough to be observed by the NASA Infrared Telescope atop Mauna Kea, HI. By combining data from this telescope and Galileo observations, scientists have their best chance ever to pin down temperatures of the extremely hot lava on Io.

The images show a region of giant calderas, or crater depressions, in Io's northern latitudes. They came from two of Galileo's onboard instruments -- the camera and near-infrared mapping spectrometer, which observes wavelengths invisible to the unaided eye.

Lava fountains provide the most spectacular volcanic show on Earth, although the fountains found in Hawaii and elsewhere on Earth rarely exceed a few hundred yards in height. Because their appearances are infrequent and brief, it is very difficult to target these events. "Catching these fountains was a one-in-500-chance observation," said Galileo scientist Dr. Alfred McEwen from the University of Arizona in Tucson.

New results from the most powerful volcano in the solar system, Loki, will also be discussed at the press conference. These include recent observations of Io by infrared telescopes in Hawaii and Wyoming, and two other Galileo instruments, the photopolarimeter radiometer and near-infrared mapping spectrometer. These data show large changes in the output of heat at Loki over time, with huge portions of the lava surface appearing to be of a uniform temperature.

The telescope observations show that Loki began a period of major eruption in early September, and Galileo caught the eruption in full force during its October flyby of Io. While observing Loki's 120-mile (193-kilometer) wide caldera, one Galileo instrument found a sharply defined region that was much hotter than the rest.

"We think the hot region is the site of the eruption that began in September," said Dr. John Spencer of Lowell Observatory, Flagstaff, AZ, a co-investigator for the photopolarimeter radiometer, which maps surface temperatures by measuring heat radiation. "Eventually the new lava may spill out to cover the rest of the caldera."

The Io flybys were challenging and risky, because Io lies in an area of intense radiation from Jupiter's radiation belts, and radiation can harm spacecraft components. In fact, radiation-related problems garbled some of the pictures taken by Galileo during its October 10 Io flyby. Galileo team members thought the images were a lost cause, but engineers at JPL's Measurement Technology Center were able to fix them with the help of LabVIEW software from National Instruments in Austin, TX.

"It would be like watching a scrambled cable signal on television, and then using software to unscramble the signal," Johnson said. "JPL engineers had to break the code that was inadvertently introduced by the radiation near Io."

"They only had one-fourth of the data needed to reconstruct the images," said Dr. Laszlo Keszthelyi, a Galileo research associate at the University of Arizona. "These guys found a way to intelligently guess the missing bits. It seemed to be mathematically impossible, but they pulled it off."

The new Io images are available at:
http://www.jpl.nasa.gov/pictures/io

Additional information and pictures taken by Galileo are available at:
http://galileo.jpl.nasa.gov

Mars Polar Lander Mission Status

December 15, 1999

Flight controllers for Mars Polar Lander have continued their attempts to communicate with the spacecraft so that they can be certain they have exhausted all possibilities before they conclude their search. While a recovery is still a possibility, the likelihood of hearing from the lander is considered remote at this point.

The communication strategy in the coming week is based on the assumption that the clock on the spacecraft was reset. Commands will be transmitted to the spacecraft in the blind to initialize the clock. It will be assumed the spacecraft received the commands, and flight controllers will then proceed to command the spacecraft to turn on its UHF antenna. The 150-ft (45.7 meter) antenna at Stanford will then listen for the lander's UHF signal. If no signal is heard, then commands will be transmitted to the spacecraft to perform a number of "big sweeps" during which the lander uses its steerable medium-gain antenna to scan across the sky. Presumably, it would eventually scan across the area where Earth is and its carrier wave signal would be heard by the Deep Space Network.

In parallel with the communications attempts, the Mars Global Surveyor (MGS) spacecraft will start taking high-resolution images of the landing site to search for signs of the lander. The search area that the orbiter will be looking at is an ellipse roughly 20 km x 10 km. The orbiter may be able to spot the parachute or the shadow of the lander. Mars Global Surveyor will start imaging early Thursday morning (December 16), and it will take about 2 weeks to cover the search area with its high-resolution camera.

Source:

Mars Polar Lander Official Website

http://marslander.jpl.nasa.gov/

ZASTRO

A couple of issues ago, Evan wrote about a new eMail list which has been set up specifically aimed at the South African Amateur Astronomer (though not to the exclusion of others).

I joined this "community" and have been the recipient of some interesting eMails. I believe that a lot of good can come out of this list and have decided to reproduce Evan's short article once again, to encourage those who haven't already done so, to become members.

Editor

Hello,

I would like to invite you to join the Zastro community. The description of this community is:

"This list is intended primarily for South African amateur astronomers,
but all interested parties are welcome!"

You can join this community by going to the following web page:

http://www.onelist.com/subscribe/Zastro

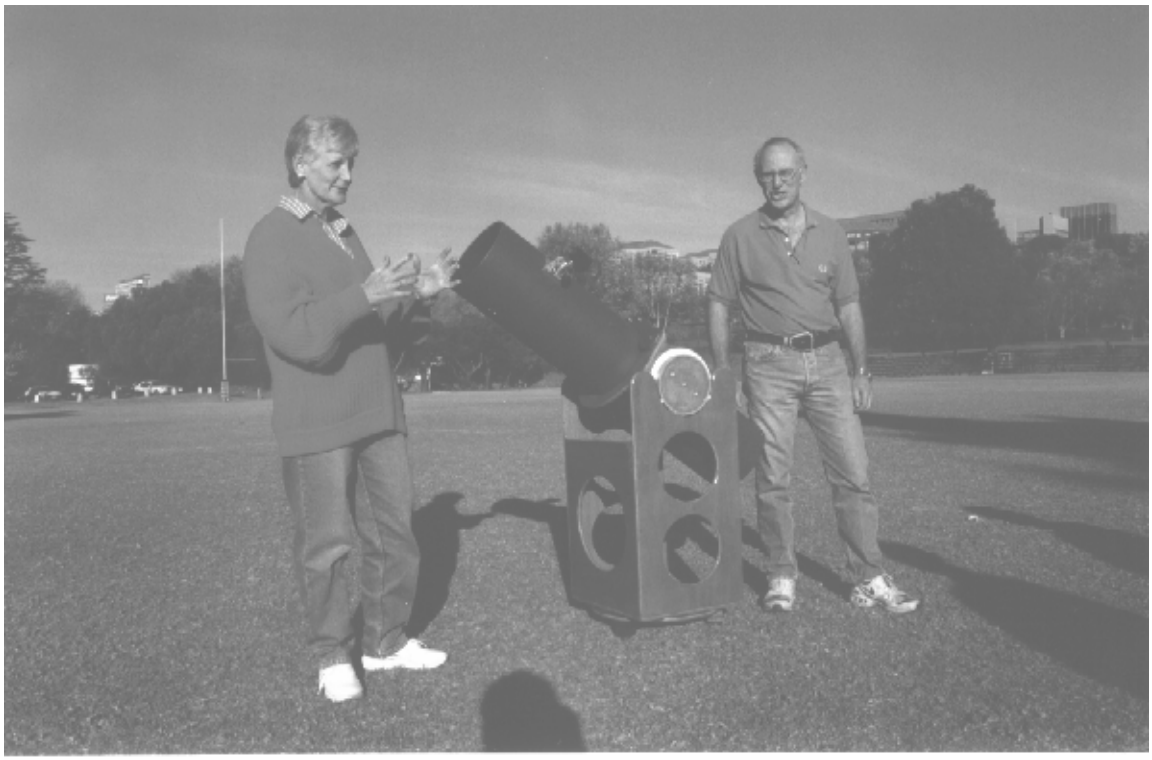
Or you can join by sending email to the following address:

mailto:Zastro-subscribe@onelist.com

Thanks,
Evan Dembskey
ejd@bigfoot.com

Telescope Making Class of '99

Time flies when you are having fun. It seems like just the other day when our first students of the year started in our 1999 telescope making class, but when one looks back, it was just after the schools started in January. Some of those first batch of pupils have finished their telescopes and 2 or 3 are still busy putting the final touches to their mirrors. In the interim others have joined the class, finished their mirrors and are now enjoying their telescopes, if and when they ever get to see through these clouds.



The attached photograph shows Mary McKinnon and John Scott with Mary's 8-inch that she finished this year. She started making the mirror about 4 years ago and has gradually put all the other bits and pieces together. The finished item is a telescope that anyone would be proud of. John Scott, teacher at Parktown Boys high (where we have our telescope making classes) helped Mary with some of the finishing touches. Other people helped her along the way, but she did most of the hard work.

The father of one of the school boys who made a telescope in the class was telling me that he was watching Jupiter with it one evening when he noticed the shadow of Io on Jupiter's disk. He decided to watch the shadow move right across the disk but before it had left the disk the shadow of one of the other moons appeared, so he decided to watch that one cross the disk too! He was bemoaning the fact that he only got to bed at 4 am in the morning. And this telescope just has an eyepiece from a broken binocular, no fancy megabucks optics. I'd say the telescope was pretty good to give you this kind of enjoyment.

Our youngest pupil this year was about 15 years old and the oldest was 75 during the year. And they all have had a lot of fun putting together their little telescopes. Next year we may be getting access to a kiln so that we can cast our own mirror blanks. At the moment we can only get blanks up to 200mm diameter but perhaps this will change in the new millennium.

Classes in 2000 will commence on Saturday afternoons once the schools go back, so if you want to come and join us, please give me a call.

Brian Fraser.

Tel 803-8291 evenings.

Star Week 2000

Greetings all

I'm stealing this opportunity to notify you of some interesting recent developments. No doubt some of you will also hear from Cliff Turk in due course.

Most of you will have received a copy of my proposal for a Dark-sky Week in 2000. I was very pleased to be informed that my proposal had been accepted as a project by the Council of the ASSA (Astronomical Society of Southern Africa) at a recent meeting, as a result of which a meeting was held at the SAAO in Cape Town on December 2 to discuss the project. To cut a long story short, it was decided to call it "STAR WEEK 2000" ("STERREWEEK 2000"), and the date set for the week of March 5 to March 12, 2000. It was also decided that the ASSA would organise the event in the Western Cape, but that all the centres throughout the country would be notified and encouraged to organise their own events during that time, making it a national event. The primary aim will be to create public awareness of our mostly dark skies as a tourist attraction, from which will follow reasons why light pollution should be controlled.

After the meeting at the SAAO I had a meeting with Jurgens Schoeman, Project Development Manager of the Western Cape Tourism Board. In short, they are prepared to support the project on the tourism side by getting Regional Tourism Organisations and local Tourism Bureaux involved. The ASSA will generate the necessary publicity materials, such as pamphlets and posters. Of course, the various media will be utilised to the full.

Please make a note of this forthcoming event, and think of ideas of how you could promote our night skies in your area, even if you are not situated in the Western Cape. Some ideas are: hosting talks and star gazing events at local schools etc.; requesting your local authorities to turn off certain lights for a few hours during that period; organising star parties at suitable venues; etc. etc.

You are also welcome to contact me at any time should you require more information about this project. My direct e-mail address is astronomer@skywatch.co.za

Best wishes,
Chris de Villiers
Corvus Observatory
Vanrhynsdorp, South Africa
http://www.skywatch.co.za

LOCAL TIMES of RISE and SET for the MAJOR PLANETS, 2000

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**	**Rise**	**Set**	**Rise**	**Set**	**Rise**	**Set**	**Rise**	**Set**	**Rise**	**Set**
Jan 01	05.20	19.02	04.39	18.27	02.45	16.05	8.59	21.58	13.18	00.49	14.26	01.41
Jan 11	05.27	19.03	05.10	18.56	02.51	16.21	8.55	21.42	12.41	00.11	13.46	01.01
Jan 21	05.35	19.03	05.48	19.21	03.01	16.37	8.51	21.25	12.05	23.34	13.07	00.21
Jan 31	05.43	18.59	06.30	19.40	03.13	16.52	8.46	21.08	11.31	22.58	12.28	23.43
Feb 10	05.50	18.54	07.07	19.47	03.29	17.04	08.41	20.50	10.58	22.23	11.51	23.04
Feb 20	05.57	18.46	07.11	19.28	03.46	17.12	08.35	20.32	10.26	21.49	11.14	22.27
Mar 01	06.03	18.38	06.10	18.29	04.03	17.17	08.29	20.15	09.55	21.15	10.38	21.50
Mar 11	06.08	18.28	04.52	17.29	04.21	17.19	08.23	19.57	09.24	20.41	10.03	21.13
Mar 21	06.13	18.17	04.16	17.01	04.37	17.19	08.17	19.40	08.55	20.09	09.28	20.37
Mar 31	06.18	18.06	04.14	16.52	04.53	17.16	08.11	19.23	08.25	19.36	08.54	20.01
Apr 10	06.22	17.56	04.31	16.52	05.09	17.13	08.05	19.07	07.56	19.04	08.20	19.26
Apr 20	06.27	17.46	05.01	16.58	05.24	17.09	07.59	18.51	07.27	18.32	07.46	18.50
Apr 30	06.32	17.38	05.45	17.10	05.40	17.06	07.53	18.37	06.59	18.01	07.12	18.15
May 10	06.37	17.31	06.42	17.34	05.56	17.05	07.46	18.23	06.30	17.29	06.39	17.40
May 20	06.43	17.26	07.44	18.10	06.14	17.07	07.39	18.10	06.02	16.58	06.05	17.05
May 30	06.48	17.23	08.27	18.44	06.31	17.11	07.31	17.58	05.33	16.27	05.31	16.30
Jun 09	06.52	17.22	08.40	19.04	06.49	17.19	07.22	17.47	05.04	15.56	04.58	15.55
Jun 19	06.55	17.23	08.22	18.59	07.05	17.31	07.13	17.37	04.35	15.24	04.24	15.20
Jun 29	06.57	17.26	07.34	18.22	07.19	17.46	07.02	17.27	04.06	14.53	03.49	14.44
Jul 09	06.56	17.30	06.28	17.20	07.29	18.03	06.50	17.18	03.36	14.21	3.15	14.09
Jul 19	06.54	17.34	05.40	16.28	07.36	18.21	06.37	17.09	03.05	13.49	2.39	13.33
Jul 29	06.50	17.39	05.31	16.11	07.39	18.38	06.23	17.00	02.34	13.16	2.04	12.56
Aug 08	06.43	17.44	05.55	16.36	07.39	18.55	06.08	16.50	02.02	12.43	1.27	12.19
Aug 18	06.35	17.48	06.27	17.28	07.36	19.11	05.51	16.41	01.29	12.08	0.50	11.42
Aug 28	06.26	17.53	06.48	18.18	07.32	19.27	05.33	16.31	00.54	11.33	0.12	11.04
Sep 07	06.15	17.57	06.57	18.58	07.27	19.42	05.15	16.21	00.19	10.57	23.34	10.25
Sep 17	06.04	18.01	07.00	19.29	07.23	19.57	04.55	16.11	23.42	10.20	22.54	09.46
Sep 27	05.53	18.05	06.57	19.52	07.19	20.14	04.35	16.00	23.04	09.42	22.14	09.06
Oct 07	05.42	18.09	06.50	20.06	07.18	20.31	04.15	15.49	22.24	09.02	21.33	08.25
Oct 17	05.32	18.14	06.31	19.56	07.19	20.48	03.54	15.37	21.42	08.21	20.51	07.44
Oct 27	05.24	18.20	05.40	18.53	07.24	21.06	03.33	15.25	21.00	07.39	20.09	07.03
Nov 06	05.17	18.26	04.38	17.24	07.33	21.24	03.11	15.13	20.16	06.55	19.26	06.21
Nov 16	05.12	18.33	04.15	17.04	07.45	21.39	02.49	15.01	19.31	06.11	18.43	05.38
Nov 26	05.09	18.41	04.17	17.25	08.00	21.50	02.28	14.49	18.45	05.27	18.00	04.56
Dec 06	05.09	18.48	04.28	17.58	08.16	21.57	02.06	14.37	18.00	04.42	17.17	04.14
Dec 16	05.12	18.55	04.47	18.32	08.32	22.00	01.45	14.24	17.14	03.58	16.34	03.31
Dec 26	05.17	19.00	05.14	19.05	08.46	21.58	01.24	14.11	16.30	03.14	15.52	02.50
Jan 05	05.23	19.03	05.48	19.33	08.58	21.51	01.03	13.59	15.47	02.31	15.11	02.09

In the Sky this Month

January 2000

dd hh			dd hh		
3 04	Venus 2.7 S of Moon		14 13	**FIRST QUARTER**	
4 01	Earth at Perihelion		14 15	Jupiter 4.4 N of Moon	
4 12	Moon at apogee		15 16	Saturn 3.1 N of Moon	
6 06	Mercury 3.7 S of Moon		16 00	Mercury in superior conjn.	
6 18	**NEW MOON**		19 21	Moon at perigee	
7 10	Venus 6.6 N of Antares		20 22	Mercury 2.4 S of Neptune	
8 05	Neptune 0.1 N of Moon	Occn.	21 04	**FULL MOON**	*Eclipse*
9 05	Uranus 0.4 N of Moon	Occn.	24 18	Neptune in conj. with Sun	
10 18	Mars 1.9 N of Moon		28 05	Mercury 1.3 S of Uranus	
10 19	Venus 9.3 S of Pluto		28 08	**LAST QUARTER**	
13 01	Saturn stationary				

February 2000

dd hh			dd hh		
1 01	Moon at apogee		12 01	Mercury greatest brilliancy	
2 15	Venus 1.6 S of Moon		12 23	**FIRST QUARTER**	
4 14	Neptune 0.1 N of Moon	Occn.	14 19	Mercury greatest elong. E(18)	
5 13	**NEW MOON**	Eclipse	17 01	Moon at perigee	
5 14	Uranus 0.4 N of Moon	Occn.	19 16	**FULL MOON**	
6 07	Uranus in conj. with Sun		20 23	Mercury stationary	
6 19	Mercury 1.7 N of Moon		22 05	Venus 0.5 S of Neptune	
8 16	Mars 3.9 N of Moon		27 04	**LAST QUARTER**	
11 02	Jupiter 4.5 N of Moon		28 21	Moon at apogee	
12 00	Saturn 3.2 N of Moon				

LOCAL TIMES of RISE and SET for the MAJOR PLANETS, 2000

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	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Jan 01	05.20	19.02	04.39	18.27	02.45	16.05	8.59	21.58	13.18	00.49	14.26	01.41
Jan 11	05.27	19.03	05.10	18.56	02.51	16.21	8.55	21.42	12.41	00.11	13.46	01.01
Jan 21	05.35	19.03	05.48	19.21	03.01	16.37	8.51	21.25	12.05	23.34	13.07	00.21
Jan 31	05.43	18.59	06.30	19.40	03.13	16.52	8.46	21.08	11.31	22.58	12.28	23.43
Feb 10	05.50	18.54	07.07	19.47	03.29	17.04	08.41	20.50	10.58	22.23	11.51	23.04
Feb 20	05.57	18.46	07.11	19.28	03.46	17.12	08.35	20.32	10.26	21.49	11.14	22.27

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