CANOPUS

The Astronomical Society of Southern Africa

Johannesburg Centre

Monthly Newsletter for September 2002

Contents:

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

Editorial

Spring is once again upon us, although nights are still quite fresh, and with it, one of the Astronomer's major irritations, cloud, now makes it's regular appearance. Even if only one little cloud is in the sky while you're observing, guess where it will park - right where you're looking. When it's not cloudy, the sky is looking very good at present and Venus is still up there in the evenings like a laser pointer and some of the other planets are starting to creep up into the morning skies. Orion is also looking very good in the mornings.

For those of you who follow satellites, the International Space Station and Hubble have made some bright passes (especially the former) in both morning and evening. Once it is completed, the ISS will be the 3rd brightest object in the sky, easily outshining Jupiter and Venus - amazing!

We've gleaned a few articles from the NASA websites and email lists and can now ease your minds regarding the asteroid predicted to collide with the Earth sometime in the future - this will now occur until sometime in the 2800s, by which time I guess we needn't worry overly much.

Brian Fraser supplies the tables of astronomical occurrences as well as forwarding a report on another Supernova discovery, and **Eben van Zyl** lets us in on how Henrietta Swan Leavitt formulated her theories surrounding Cepheid variables.

Bruce Dickson has done some tests on filters and presents the results**; Chris Stewart** explains some of the niceties of Physics and **Evan Dembskey** presents another in his series on "The Web between the Worlds".

ECLIPSE chasers - remember we have a solar eclipse on 4th December. If you would like to be there, contact a committee member, or Brian Fraser for further details on how to get to the area of interest. Time and accommodation is running out - so don't delay or you will miss this big event.

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, 11th of September, 2002 at 20:00.

Quantum Computing

By: **Evan Dembskey**

Telescope Making Classes

Would you like to make your own telescope?…or finish off a partially completed one? Well your opportunity has arrived (once again). Join the Telescope Making Class being held under the guidance of Brian, Evan and Chris. Contact Brian on (016) 366-0955 if you are interested. You may also subscribe to the email list server by sending an email to *assa_telescopemaking-request@list.to* with the word SUBSCRIBE in the body of the message. It will mail you back asking for confirmation - just follow the instructions.

To send email to all subscribers to the list, merely send a single message to *assa_telescopemaking@list.to* and the list server will distribute the message to everyone concerned.

Other ASSA Lists

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

SOHO Comet 500 discovered

A small object spotted by Rainer Kracht of Elmshorn in Germany has been officially confirmed as Comet 2002 P3 (SOHO). It is the 500th comet discovered with SOHO.

It made its closest approach to the Sun at 16:05 Universal Time on Monday, 12 August. Diane McElhiney won a contest run by the SOHO science team for guessing that date and time for SOHO-500. Her prediction was too early by only 103 minutes.

For more information, images and movies see
http://sohowww.nascom.nasa.gov/pickoftheweek/

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*There is a theory which states that if ever anybody discovers exactly what the Universe is for and why it is here, it will instantly disappear and be replaced by something even more bizarre and inexplicable. There is another theory which states that this has already happened. (... **Douglas Adams**)*

ASSA Jo'burg Centre - Calendar of Events

Month	Day/ Date	Event	Details
Sep	Fri 6	*Public viewing*	
	Mon 9	Committee Meeting 17:30	
	Wed 11	**Monthly Meeting**	Quantum Computing **Evan Dembskey**
Oct	Mon 7	Committee Meeting 17:30	
	Wed 9	**Monthly Meeting**	Eyepieces and telescope mounts **Chris Stewart**
	Fri 11	*Public viewing*	
Nov	Fri 8	*Public viewing*	
	Mon 11	Committee Meeting 17:30	
	Wed 13	**Monthly Meeting**	"Consciousness Mapping" **Prof Marilyn Lucas**
Dec	Tue 3	Star Party at Tshipese before	ASSA Star Party
	Wed 4	**Solar Eclipse 2002**	
	Mon 9	Committee meeting	
	Wed 11	**Year End Monthly Meeting** and Eclipse 2002 feedback	Informal get together and viewing
Jan 2003	Mon 6	Committee meeting	
	Wed 8	**Monthly Meeting**	A visit to Birr Observatory **Tony Hilton**
Feb	Mon 10	Committee meeting	
	Wed 12	**Monthly Meeting**	T.B.A.
Mar	Mon 10	Committee meeting	
	Wed 12	**Monthly Meeting**	T.B.A.

Reminders

2002	ASSA Symposium / hosted by Pretoria Centre/ At Aloe Ridge Hotel and Conference Centre LEONIDS Nov 19 **December 4, Solar Eclipse**
2003	Centenary of Flight **August: Mars opposition** **Mercury Transit**
2004	Centenary Sir Herbert Baker Library Building Johannesburg Centre to host 2004 ASSA Symposium **June 8, Venus Transit**

Annual Subscription Fees

There is a small change to the Johannesburg Centre's subscription fee structure for the 2002/3 year. The joining fee remains R50-00 and the Annual fee is now R125-00. The Family subscription fee is now R150-00. The Family membership is restricted to couples and their co-resident dependants and although all Family members receive full rights as members of the Centre, only one copy of the monthly magazine, Canopus, will be posted to the family address. We would like to urge you as members to pay your subs as early as possible to enable your committee to plan the Centre's projects for the year ahead.

Please post your subscription fee, or deposit/transfer it directly into the Society's bank account at **NEDBANK**.
The Account information is as follows:-

Bank:		NEDBANK
Branch	Name:	Park Plaza
	Code:	19 21 42 44
Account	Type:	Current Account
	Number:	1921 013761
	Name:	ASSA Johannesburg Centre

Please remember to write your name on the deposit slip or to include your name as a reference on a direct transfer. Then fax the details to the Treasurer to let him know that you have paid via direct deposit or transfer so that you will be kept on the Canopus mailing list.

HOW DID HENRIETTA DO IT?

Henrietta Swan Leavitt was a clerk at Harvard College Observatory. Her interest in astronomy made her go to Chile to study the mysterious Cepheid variables in the Magellanic Clouds which were not visible from the latitude of Harvard.

These stars have very regular periods of variability from brightest to dimmest and their rise to brightest is steeper than their decline to dimmest. 3y 1912 Miss Leavitt had come to the conclusion that there is a linear relationship between the apparent magnitudes of these stars in the Small Magellanic Cloud and their periods of variability. The apparent magnitude of a star is, of course, dependent on its distance from the Earth. Henrietta correctly concluded that the stars in the Small Magellanic Cloud are all very approximately equally far from the Earth if the Cloud is very far away. This must be so because the magnitudes of the stars in the Cloud are all 12, 13, 14...and dimmer. There is therefore a linear relationship between the apparent magnitudes and the absolute magnitudes of these stars, i.e. m - M must have a constant value for the stars in the SMC.

Miss Leavitt found that the brighter the Cepheid i.e. the smaller the magnitude number, the longer is the period of variation. This finding formed the basis of the Period Luminosity Law.

When Henrietta returned from the South and announced this relationship she was told by the astronomer in charge, one E C Pickering, that her job was to classify stars, not to formulate theories -- some men in authoritative positions are like that!

Henrietta's work was published in the Harvard Observatory Circular No 173 of 1912 under the title "Periods of 25 Variable Stars in the Small Magellanic Cloud". The two diagrams are tracings of Leavitt's original graphs. Diag 1 shows the distribution of apparent magnitudes against the periods of variability in days and diagram 2 shows the distribution of apparent magnitudes against the logarithms of the periods. From Diag 2 one can see at a glance that the apparent magnitudes of the Cepheid variables are proportional to the logs of the periods. This became known as the Period Luminosity Law. The periods of the Cepheids can be measured very accurately and once the period is known the corresponding brightness could be read off on the Y-axis... The apparent magnitude is then an indicator of the brightness of the particular star, provided the apparent magnitude could be converted into absolute magnitude

When the absolute magnitude of a star is compared to the apparent magnitude of the star, its distance can be calculated from the formula:

$\log P = (M - m - 5) \div 5$,

where P is the star's parallax, **M** its absolute magnitude and **m** its apparent magnitude.

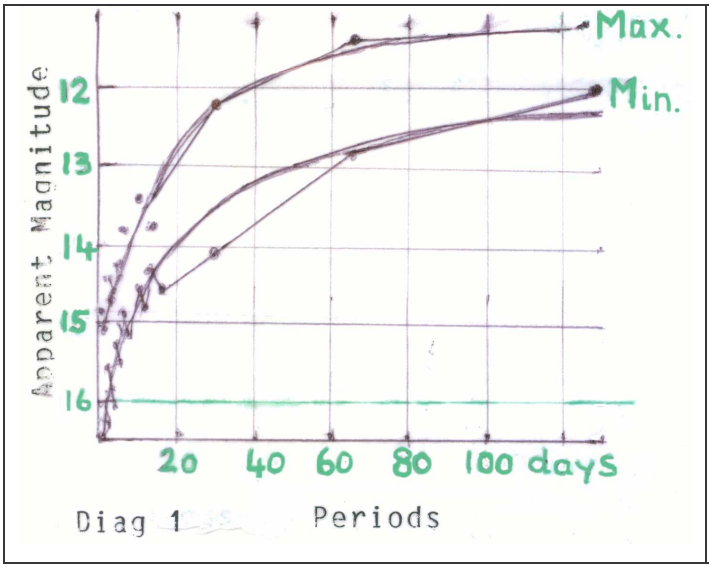
When the parallax is divided into 1, we obtain the distance in parsecs and when this is multiplied by 3,25, we get the distance in light years.

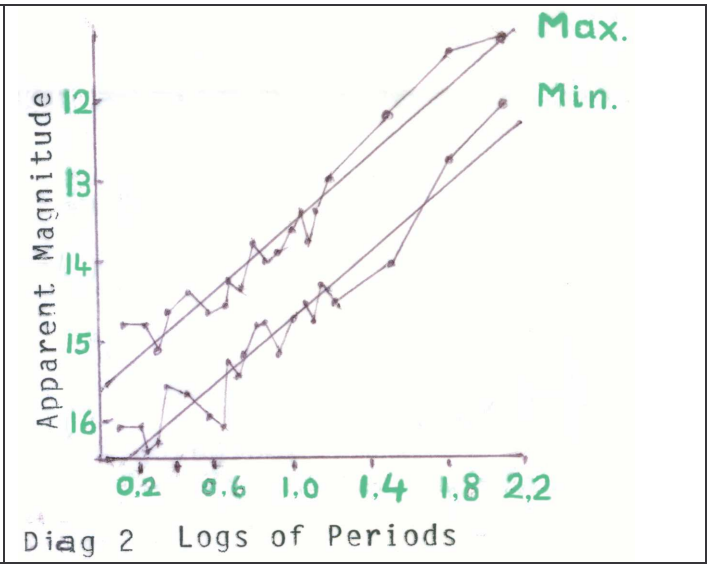
The Period Luminosity Law could therefore be used to determine stellar distances. Up to that time distances no further than 300 light years could be measured by the trigonometrical method, but no farther. Within that sphere there are about 5000 stars and of these about 1000 have had their distances determined. By using the Period- Luminosity Law distances of hundreds of thousands and even millions of light years could be measured.

It turned out that the distance of the Small Magellanic Cloud is 200 000 light years and that of the Large Magellanic Cloud 170 000 light years. Henrietta Leavitt was thus quite correct when she pointed out that the Magellanic Clouds must be very far away. In one leap astronomers' abilities for measuring distances had leapt from 300 light years to millions of light years.

If there were one or two Cepheid variables within a distance of 300 light years, its absolute magnitude could be calculated accurately, but there are none within this sphere of distance. The next article will explain how astronomers got around this problem of standardising the magnitudes of the Cepheid Variables.

Jan Eben van Zyl





Asteroid 2002 NT7 Removed from IMPACT RISKS page

Don Yeomans
Manager, Near-Earth Object Program
Jet Propulsion Laboratory
August 1, 2002

Recent positional observations of asteroid 2002 NT7 have been used to update and improve this object's orbit and as a result, all possibilities for an Earth impact in the next 100 years have been eliminated. This object's orbit, along with the orbits of all near-Earth objects, will be improved continuously as additional observations become available. When the orbital information is sufficiently accurate, the future orbital extrapolations of these near-Earth objects will be carried out for more than 100 years.

http://neo.jpl.nasa.gov

Asteroid 2002 NY40 Whizzes Past Earth

'Near miss' asteroid whizzes past Earth
CBC News (Canada)
August 18, 2002

EDMONTON - Star gazers got their telescopes and binoculars ready over the weekend, trying to spot an asteroid which came closer to the Earth than any space rock of its size has in 77 years.

The 800-metre-wide asteroid whizzed over North American skies late Saturday, missing the planet by about 530,000 kilometres, slightly farther away than the Moon but still a "near miss" by astronomers' standards.

Star gazer David Roles said it was a moment he'll never forget. "Oh I'm really happy that we got a glimpse of it," he said. "Because it's not very often we see an object that close to the Earth."

Point your browser to the following URL to get the full story:

http://www.cbc.ca/stories/2002/08/18/asteroid020818

*Have you noticed since everyone has a camcorder these days no one talks about seeing UFOs like they use to. (... **Steve Wright**?)*

NASA APPOINTS CONTOUR MISSION INVESTIGATION TEAM

NASANews@hq.nasa.gov
RELEASE: 02-161
26 Aug 2002

NASA Administrator Sean O'Keefe today announced that Chief Engineer Theron M. Bradley Jr. will lead a team to investigate the apparent loss of the CONTOUR mission space probe. The investigation team will independently examine all aspects of the CONTOUR mission, which has been out of contact with controllers at the Johns Hopkins University Applied Physics Laboratory (APL), Laurel, Md., since a scheduled engine firing Aug. 15.

In May, Bradley joined the agency as Chief Engineer to provide independent technical review of NASA's programs and projects. He's a distinguished U.S. Navy engineer who was instrumental in the initial design of the nuclear propulsion plant for Nimitz class aircraft carriers and the advanced reactor design for Los Angeles class submarines. Bradley also served as a civilian with the U.S. Department of Energy and the Department of Defense in numerous leadership and management positions.

The team will include a team of internal NASA investigators from space science, as well as other aerospace disciplines, and external experts with extensive experience in accident examinations. The group is expected to report its initial findings to NASA Headquarters in six to eight weeks.

Among the team members selected to work with Bradley are retired Navy Admirals J. Paul Reason and Joseph Lopez.

Admiral Reason is a member of NASA's Aerospace Safety Advisory Panel (ASAP). He's an aerospace consultant and former four-star Commander in Chief of the U.S. Navy's Atlantic Fleet. The ASAP was established by Congress in January 1967 after the Apollo 204 Command and Service Module spacecraft fire and is chartered to review, evaluate and advise on agency program activities, systems, procedures and management policies that contribute to risk, and to provide identification and assessment for the NASA Administrator.

Admiral Lopez is one of the two flag officers in the U.S. Navy to achieve the rank of four-star admiral after direct commission from enlisted service. The retired admiral is the former commander of NATO forces in southern Europe and has played a leadership role in numerous accident investigations. He currently directs Global Government Operations as an executive with Houston-based KBR (Kellogg, Brown & Root).

On Aug. 15, CONTOUR's STAR 30 solid-propellant rocket motor was programmed to ignite at 4:49 a.m. EDT, giving CONTOUR enough boost to escape Earth's orbit. At that time, CONTOUR was about 140 miles above the Indian Ocean and out of radio contact with controllers. The CONTOUR mission operations team at APL expected to regain contact at approximately 5:35 a.m. EDT to confirm the burn, but NASA's Deep Space Network (DSN) antennas did not acquire a signal. Since then, there has been no contact with CONTOUR. Commands pre-programmed into the spacecraft's flight computer system, designed to instruct the spacecraft to try various alternate methods of contacting Earth when contact is lost, also have not worked to date.

Images from a Spacewatch ground-based telescope at Kitt Peak, Arizona, show three objects at the location where CONTOUR was predicted to be, images which may indicate the spacecraft has broken apart. Mission controllers at APL will continue listening for signals from the spacecraft periodically until early December, when CONTOUR will come into a more favorable angle for receiving a signal from Earth.

CONTOUR is a Discovery-class mission to explore the nucleus of comets. The Principal Investigator is Dr. Joseph Veverka of Cornell University, Ithaca, N.Y., who selected APL to build the spacecraft and manage the mission for NASA.

Additional information about CONTOUR is available on the Internet at:

http://www.contour2002.org

Tests of Orion filters

Bruce Dickson

I tested the Orion "Sky glow" and "Ultra block" filters using my instruments last night. My overall impression is that they both work well, with the Ultra block filter being a very close second to a Meade OIII filter. I found that they are really only suited to larger aperture instruments.

I chose a night with extremely poor seeing caused by light scattered from dust in the atmosphere. The objects were at varying altitudes, and were examined using my ETX 4" and LX200 12". Here is a summary of my results

Object	Common Name	No Filter	Sky Glow	Ultra Block
M57	Ring Nebula (Lyra)	Not visible in 4", barely visible in 12" (very poor contrast caused by light pollution)	Donut visible in 4" with averted vision, good view in 12"	Donut barely visible in 4" with averted vision, superb view in 12"
M17	Swan Nebula (Sagittarius)	Visible in both instruments - contrast was poor.	Easily visible in both instruments - much better contrast	Easily visible in both instruments - excellent contrast, but object is faint in 4"
M11	Wild Duck Cluster (Scutum)	Visible in both instruments - contrast was poor.	Barely visible in 4", improved contrast in 12"	Barely visible in 4" using averted vision, excellent contrast in 12" but the stars appear very green.

Conclusion

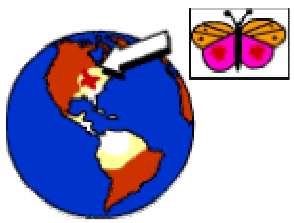
Both filters work well provided enough light is collected. I recommend that the minimum aperture for the Sky Glow filter should be 6", while the Ultra Block needs at least 8" to be really effective. Neither is really useful in a small aperture instrument from the city - partly because it is not possible to get ones eye fully dark adapted.

I found that reflection from the filter was more pronounced than I have seen using filters mounted on the rear cell of my LX 200. This means that an observer needs to be well shielded from ambient light. Draping a dark cloth over one's head works well.

Bruce Dickson

Physics and the Knowledge of Ignorance

It has often been noted that the major catalysts for the progression of knowledge, historically speaking, are not only discoveries of new truths, but also realisations that in fact, we know less than we thought. The progress of knowledge can therefore be charted by the way our ignorance increases to encompass more and more as time goes by. Perhaps the best example of this is in physics, to some the bedrock of our scientific understanding of the universe, and to most an industry selflessly devoted to keeping numbers of people with strange hair, wearing leather elbow patches and sandals with socks, off the streets.



Newton's Laws

In not quite the beginning, there was Newton, and he discovered Newton's laws. The good thing about Newtonian mechanics is that in theory, given knowledge of where everything is and how fast it's moving, you can calculate where it's going to be in the future. This is very nice and ordered, and as anyone who has ever tried to keep track of a teenager knows, pointlessly naive. In particular, if you look at systems with more than two objects in, it's very hard to find out what the system's going to do. And since a butterfly somewhere flapped its wings and, as a side effect, created chaos theory, we have learned that even some systems previously thought to be fairly well behaved, fail to be predictable after a distressingly short time. So a great step towards ignorance was made.

Einstein's Theory of Relativity

After a long time when things were deterministic[1], along came Einstein. He was very clever, with particularly strange hair, and was definitely a sandal-wearer, replete with socks, towards the end of his life. He said that actually, things don't just move about in space, they bend space as they do so. This seemingly bizarre idea led to the general theory of relativity, described by many as the most stunningly beautiful and neat piece of work ever done (albeit only by those who should get out more, and stop wearing sandals). Einstein's equations are harder to write than Newton's. Apart from a few witty little catch phrases like 'E=mc2', they tend to have Greek letters everywhere. What they do achieve, however, is a huge step forward in ignorance as they show us that, if you take into account the fact that objects bend space, we can't really be sure about two-body systems any more. They generally turn out to be unpredictable too. We do, however, retain our knowledge that when we have just one thing to look at, it behaves in a nice, orderly manner.

Quantum Mechanics

Or so we thought. Quantum mechanics, in contrast to Einstein's relativity, was developed by a committee, and hence is messy, awkward, and still argued about now, 70 years since its conception. The serious sandal wearers frequently get excited about different 'interpretations' of the theory; for example the idea that perhaps there are loads of possible different universes, and that the universe splits in some way whenever a choice is made. In spite of not being all that popular among the elbow-patched, this idea has been pushed into the popular world by various sci-fi writers. One thing which is agreed on, however, is that our little single object is now not so well-behaved. Heisenberg formulated this very neatly in his 'uncertainty relation', the gist of which is that we really know nothing at all about anything. The only saving grace is that if we have a system with nothing in it at all, we could be pretty certain what was going on.

Quantum Field Theory

But not for long. A bunch of people decided that ignorance had just not gone far enough, and set about inventing quantum field theory. The most famous of these was perhaps Richard Feynmann, who was really astoundingly clever, and wore sandals[2]. They reasoned that, just as you can make up zero by adding one and minus one, so you can have nothing made up of things and anti-things. So instead of just a vacuum with nothing in it, there can be particles popping into existence along with anti-particles, floating round a bit, annoying physicists, and meeting up again to disappear. Thus we are now really not sure of what is going on when we have nothing. It remains to be seen what sort of ignorance the future holds. Perhaps if we ever manage to come up with a quantum theory of gravity, our ignorance may reach levels hitherto only dreamed about, with potentially far-reaching effects on our view of the universe.

1 At least for two-piece systems.
2 He did refrain from wearing socks with them on many occasions, but made up for this by playing the bongos.

Chris Stewart

NASA DEVELOPS 'MARSOWEB' SITE FOR FUTURE MARS EXPLORATION

NASANews@Ames
RELEASE: 02-92AR

"Marsoweb," an interactive Web site developed by NASA, is helping scientists select suitable landing sites for future missions to Mars.

Scientists preparing for NASA's next Mars mission, the twin Mars Exploration Rovers scheduled for launch in June and July 2003, are able to view more than 44,000 high-resolution images of Mars collected by the Mars Global Surveyor. Some show detail at less than three meters per pixel. These images are registered with context images and maps of thermal properties, rock abundance, slope roughness and geology acquired by the Viking and Global Surveyor orbiters and with altimeter and mineralogical data returned by Global Surveyor, which is still operating at Mars. The Web site provides scientists with special software tools to facilitate their interpretation of the data.

"The Center for Mars Exploration (CMEX), in collaboration with the NASA Advanced Supercomputing (NAS) Division at NASA Ames, created this Web site to make sure that future Mars lander projects can benefit fully from all the available remote-sensing data to allow them to select the best landing sites - namely, those that combine scientific appeal and mission safety," explained Dr. Geoffrey Briggs, scientific director of CMEX, located at NASA Ames Research Center, in California's Silicon Valley.

Ames' CMEX planetary geologist and project lead Dr. Virginia Gulick of the SETI Institute and Glenn Deardorff, a visualization technologist in the NAS Division at NASA Ames who has an undergraduate degree in geophysics, developed Marsoweb over the past three years to make a significant contribution to the ongoing Mars exploration program.

"It is easy to be overwhelmed by the great variety of available data relating to a candidate landing site," said Gulick, who serves on a NASA committee guiding the landing site selection process. "By pulling everything together and adding advanced visualization and analysis tools, we've enabled people to focus on studying the candidate sites and not lose time worrying about how to display, manipulate and compare all the relevant, but disparate, data sets," she said.

"More than 100 sites on Mars have been considered by dozens of planetary scientists who are involved in analyzing candidate landing sites," said Deardorff. "Marsoweb provides a resource for them to increase their productivity as they wade through the available data."

The goal of the Mars Exploration Rover mission is to learn more about Mars' geologic and climate history, both of which are closely tied to the history of water on the red planet and to the possibility that life may have evolved there. Scientists are using orbital data to help them select landing sites of geological interest -- where water was once available and the past environment may have been conducive for life. Orbital images reveal many regions that evidently have been shaped by water and the Thermal Emission Spectrometer on Global Surveyor has identified a region where the mineral hematite, an iron oxide sometimes formed in the presence of water, is abundant. Mars provides a wealth of exciting landing sites, but most of them present surface hazards to the current generation of landers.

"The main goal of Marsoweb has been to provide online analysis and visualization tools so the science community can interpret the highest resolution images in their regional context and with the benefit of the other remote-sensing information that is available," Gulick said. "We rely on those images to identify sites of highest science interest and we need data at multiple resolutions, as well as other data to identify sites that are relatively free of hazards," she said. "Providing the information in a user-friendly format is essential."

Marsoweb includes an interactive feature developed by Deardorff that allows scientists to view Mars' surface in perspective and from any angle to help assess prospective landing sites from a collection of more than 400 images. This Marsoweb software feature contains a Virtual Reality Modeling Language (VRML) component that provides a 3-D image of the surface of Mars. Using the VRML, users can enjoy zooming through the canyons and valleys of Mars or over its volcanoes and desert dunes. Another time-saving feature of the Web site allows scientists to rapidly superimpose high-precision elevation data from the Mars Orbiter Laser Altimeter (MOLA) on images of the surface.

In addition to its use by the science community, Deardorff said Marsoweb also has proven popular with the general public. "It's also becoming an effective public outreach vehicle for people wanting to know more about Mars," he said. "Since its inception in August 1999, Marsoweb has

been viewed by more than 44,000 distinct users, resulting in more than 1,880,000 'hits,'" he added.

Deardorff and Gulick said they are continuously updating and improving the Web site. They welcome suggestions for improvement from both the science community and the general public. In addition to integrating data from Global Surveyor, they also are planning to add Mars Odyssey data as they become available. Mars Odyssey is the other spacecraft currently in orbit around Mars and carries its own suite of unique remote-sensing instruments. Each mission incorporates new remote-sensing instruments that introduce new challenges for scientists to understand and to compare with what they already know about Mars, based on data taken from previous missions. Gulick said a goal of the Marsoweb effort is to remove the barriers that such new remote-sensing instruments typically impose on comparing data sets and allow the focus to be on science. In addition to incorporating all the latest spacecraft data, they also have plans to create an electronic notebook to enable scientists to collaborate with each other, store images, annotations and other data.

Deardorff said developing the Marsoweb is the culmination of a childhood dream. "Being able to develop a virtual presence of another planet has been the most satisfying part of the whole process," Deardorff said. "It's like projecting the eyes and ears of humans into another world."

The Marsoweb project is a joint collaboration between the NASA Ames Center for Mars Exploration, the NAS Exploratory Computing Environments Group at NASA Ames and the Mars Exploration Program Office at NASA's Jet Propulsion Laboratory, Pasadena, Calif. The project is funded by NASA's Office of Space Science through its Mars Data Analysis Program and through NASA Ames' Applied Information Systems Research Program.

For more information about Marsoweb, see the project Web site located at:

http://marsoweb.nas.nasa.gov

To view publication size images, please refer to the link below:

http://www.amesnews.arc.nasa.gov/releases/2002/02images/marsexp/marsexp.html

Another Supernova discovered by Berto Monard

Thu, 1 Aug 2002

(This is number 4!!)

Dear SN watchers,

Berto Monard discovered another SN than SN 2002cy. The host galaxy NGC 5468 also produced SN Ia 2002cr [vsnet-campaign-sn 418].

New SN is discovered on July 27.77 UT when it was mag about 16.5. It was confirmed on July 28.70 UT with mag about 16.4. The position of SN 2002ed is reported as R.A. = 14h06m38s.2, Decl. = -5o27'29" (2000.0), which is 55" east and 15" south of the center of a face-on spiral (SAB(rs)cd) galaxy NGC 5468. It was also detected on the KAIT images taken on July 24-29, but was not seen on July 23 image (limiting mag 17.5) taken by Berto.

SN 2002cr was discovered this May in the same galaxy. It was of type Ia, and reached its maximum (mag about 14.2) around May 13. It can still be seen at mag about 17.8, so you can enjoy "double explosion" for a while. The discovery image can be seen at:

ftp://vsnet.kusastro.kyoto-u.ac.jp/pub/vsnet/SNe/sn2002ed/

NGC 5468 also produced SN Ia 1999cp. So this galaxy is quite prolific. Such examples that 3 SNe in 3 calendar years are:

NGC 664 Sb: SNe 1996bw, 1997W, 1999eb

NGC 6754 SAB(rs)bc SNe 1998X, 1998dq, 2000do

All of them including NGC 5468 are open spiral galaxies, which is active in star formation.

Sincerely Yours,
Hitoshi Yamaoka, Kyushu Univ., Japan
yamaoka@rc.kyushu-u.ac.jp

Submitted by: **Brian Fraser**

REHEARSAL READIES SCIENTISTS FOR NASA'S NEXT MARS LANDING

MEDIA RELATIONS OFFICE
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CALIFORNIA INSTITUTE OF TECHNOLOGY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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With less than a year to go before the launch of NASA's Mars Exploration Rover mission, scientists have spent the last few weeks at a high-tech summer camp, rehearsing their roles for when the spacecraft take center stage.

"The purpose of this test is really to teach the science team how to remotely conduct field geology using a rover, rather than to test the rover hardware," said Dr. John Callas, science manager for the Mars Exploration Rover mission at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "We sent one of our engineering development rovers out to a distant, undisclosed desert location, with the science team back at JPL planning the operations and sending commands, just as they'll do when the actual rovers are on Mars."

The 10-day blind test, which ran from Aug. 10 to 19, used the Field Integrated Design Operations testbed, called Fido, which is similar in size and capability to the Mars Exploration Rovers. Although important differences exist, the similarities are great enough that the same types of challenges exist in commanding these rovers in complex realistic terrain as are expected for the rovers on Mars.

"The scientific instruments on this test rover are similar to the Athena science payload that will be carried by the Mars Exploration Rovers," said Dr. Steve Squyres, principal investigator for the Mars Exploration Rover mission at Cornell University, Ithaca, N.Y. "We're using the test rover now to learn how to do good field geology with a robot. When we get to real Mars rover operations in 2004, we'll be able to use everything we're learning now to maximize our science return."

"The test rover has received and executed daily commands via satellite communications between JPL and the remote desert field site. Each day, they have sent images and science data to JPL that reveal properties of the desert geology," said Dr. Eddie Tunstel, the rover's lead engineer at JPL.

The Mars Exploration Rovers will be launched in May and June 2003. Upon their arrival at Mars in January 2004, they will spend at least three months conducting surface operations, exploring Mars for evidence of past water interaction with the surface and looking for other clues to the planet's past.

The science team of more than 60 scientists from around the world will tell the rovers what to do and where to go from the mission control room at JPL. This month's test is one of several training operations that are planned before landing.

The rovers are currently being built at JPL and will be shipped to the Kennedy Space Center in Florida early next year to begin preparations for launch. Shortly before the launch, NASA will select the landing sites.

More information about the rover mission is available at

http://www.jpl.nasa.gov/news/fact_sheets/mars03rovers.pdf
or
http://mars.jpl.nasa.gov/mer .

A description of the Fido rover is available at

http://mars.jpl.nasa.gov/mer/fido
or
http://fido.jpl.nasa.gov .

More information about the Mars Exploration Program is available at

http://mars.jpl.nasa.gov .

The Mars Exploration Rover mission is managed by JPL for NASA's Office of Space Science, Washington, D.C. JPL is a division of the California Institute of Technology in Pasadena.

25 YEARS LATER, VOYAGER MISSION KEEPS PUSHING THE SPACE ENVELOPE

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RELEASE: 02-156

A quarter-century after NASA's twin Voyager spacecraft departed Earth to visit outer planets, the historic mission is flying a race against time.

During the first 12 years after launch in 1977, the Voyagers chalked up a wealth of discoveries about four planets and 48 moons, including fast winds on Neptune, kinks in Saturn's rings and volcanoes on Jupiter's moon Io. As scientists and engineers mark the mission's silver anniversary, they hope at least one Voyager will pass beyond the boundary of the Sun's influence before the onboard nuclear power supply wanes too low to tell us what's out there. Voyager 1 is now the most distant human-made object, about 85 times as far from the Sun as Earth is. Voyager 2 is now about 68 times the Sun-Earth distance.

"After 25 years, the spacecraft are still going strong," said Dr. Edward Stone, Voyager project scientist since 1972 and former director of NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif. "Back in 1977, we had no way to know they would last so long. We were initially just on a four-year journey to Jupiter and Saturn."

The Voyager team at JPL still receives information almost daily from the durable spacecraft traveling beyond all the planets. The Voyagers are examining the far reaches of the solar wind, a gusty flow of particles hurled outward by the Sun. The eventual goal is to become the first spacecraft to taste interstellar space. Voyager 1, which launched on Sept. 5, 1977, flew past Jupiter and Saturn, then angled northward out of the plane of the planets' orbits. After Voyager 2 launched on Aug. 20, 1977, and completed its tour of Jupiter and Saturn, NASA extended the spacecraft's adventure with flybys of Uranus in 1986 and Neptune in 1989.

"A radio signal traveling at the speed of light takes nearly 12 hours to travel between Voyager 1 and Earth. That raises operational concerns," said Ed Massey, Voyager's project manager at JPL. " If something went wrong on board, at least a full day would lapse before a signal revealing the problem could reach Earth and commands to fix it could be returned. It could be too late." So the project team tries to anticipate any emergencies and program the spacecraft's computers with advance instructions on how to react to them, he said.

Both spacecraft are studying the vast bubble the Sun inflates around itself by outward pressure of the solar wind. The bubble has a boundary, called the heliopause, where this outward pressure is counterbalanced by inward pressure of the interstellar wind in our neck of the galaxy. The interstellar wind outside that boundary is a flow of atoms and other particles blasted from explosions of dying stars. The location of the heliopause varies with the level of solar activity during the Sun's 22-year sunspot cycle and with changes in the interstellar wind, Stone said. Some scientists suggest that, on a much longer time scale, the interstellar wind may occasionally press the boundary far enough inward to sway Earth's climate.

Voyager 1 is rushing toward the heliopause at about one million miles (1.6 million kilometers) a day. Whether it gets there before about 2020, while it still has adequate electrical power, depends on how far away the heliopause is. Recent estimates are that, depending on that distance, it would take Voyager 1 between seven and 21 years to reach the heliopause.

Voyager 1 has already discovered that the outbound solar wind around it is slowing from effects of inbound interstellar particles leaking through the boundary. A much better prediction of the boundary's location will come when the spacecraft encounters the termination shock, the zone where the solar wind begins piling up against the heliopause. That encounter may come within the next three years, Stone estimates.

Whatever their future holds, Voyager 1 and Voyager 2 have already earned a prominent place in the history of exploration. Among their big surprises: Jupiter's moon Io has active volcanoes. Jupiter's atmosphere has dozens of huge storms. Saturn's rings have kinks and spoke-like features. The hazy atmosphere of Saturn's moon Titan extends far above the surface. Miranda, a small moon of Uranus, has a jumble of old and new

surfacing. Neptune has the fastest winds of any planet. Neptune's moon Triton has active geysers.

Long after they fall silent, the Voyager twins will keep speeding away from our solar system, each carrying an "interstellar outreach program" of recorded sounds and images from Earth, Massey said.

More information about Voyager is available at:

http://voyager.jpl.nasa.gov

JPL, a division of the California Institute of Technology in Pasadena, manages Voyager for NASA's Office of Space Science, Washington.

STARDUST SPACECRAFT REACHES FOR COSMIC DUST

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NASA's Stardust spacecraft, on a mission to collect and return the first samples from a comet, began yesterday to collect tiny specks of solid matter, called interstellar dust grains, that permeate the galaxy.

"If you look at the Milky Way on a dark night you may see a black band stretching along the center. The band is interstellar dust blocking the light from distant stars. These are the particles that Stardust will be collecting," said Dr. Don Brownlee, an astronomy professor at the University of Washington, Seattle, and the principal investigator of the Stardust mission.

This dust, passing through the solar system like a wind, is made of particles smaller than one-hundredth the width of a human hair. The particles are made of varying amounts of most of the elements in the periodic table. The Stardust mission will use its special formulation of aerogel, the world's lightest solid, to try to capture these small solid particles as the spacecraft travels in the same direction as the dust stream until December 9, 2002.

"Stardust's tennis-racket-shaped particle collector has shoulder and wrist joints that will point one side of the aerogel collector material into the dust stream to collect interstellar dust," said Tom Duxbury, the project's manager at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "When Stardust encounters comet Wild 2 in early 2004, the reverse side of the collector will trap particles from the gas and dust escaping from the inside of the comet. When the dust samples return to Earth in 2006, we will extract and analyze the particles,"

The Stardust mission collects both ancient and young dust. Comets are made of interstellar particles that clumped together with ices more than 4.5 billion years ago. When the spacecraft flies past comet Wild 2, it will attempt to collect ancient dust samples stored for billions of years in, effectively, a deep freeze.

The mission began yesterday collecting a younger type of stardust: the free-flowing interstellar dust that was produced by the current generation of stars. Comparing the ancient and newer types of dust may provide clues to the evolutionary changes in the galaxy and the composition of the early galaxy. This is the second and final time Stardust will collect these dust particles. It previously collected samples during a six-week period in 2000.

Comet Wild 2 is a particularly good example of preserved interstellar dust because its path through space brings it no closer to the Sun than Mars' orbit, about 228 million kilometers (about 141 million miles) from the Sun. Before 1974, the closest Wild 2 came to the Sun was Jupiter, Brownlee said.

NASA's Galileo and Ulysses spacecraft both detected a stream of dust particles flowing between stars and into the solar system. The particles did not come from the Sun, but from another direction that showed their origin was outside the solar system.

Interstellar dust may have played a role in bringing the building blocks of life -- carbon and other organic materials -- to the young Earth. Similarly, comet impacts may have also brought these elements to Earth. Brownlee expects to find a lot of carbon in the interstellar dust particles. "When Earth-like planets form, comets and interstellar grains may bring carbon and organic material," he said.

The interstellar dust stream differs from the solar wind in that the solar wind is made of individual atoms, while the interstellar dust is made of small particles of rocks with complex compositions.

Stardust, a part of NASA's Discovery Program of low-cost, highly focused science missions, was built by Lockheed Martin Astronautics and Operations, Denver, Colo. and is managed by JPL for NASA's Office of Space Science, Washington, D.C. JPL is a division of the California Institute of Technology in Pasadena. More information on the Stardust mission is available at

http://stardust.jpl.nasa.gov .

Accommodation for 2002 Total Solar Eclipse

If, at this late stage, you are still planning to find accommodation in Messina for the 4 December Solar Eclipse ... forget it. The town is long since totally sold out. However, if you are willing to rough it a little, there is a farmer 20km west of Beitbridge offering accommodation for the event. It is a mere 20 km off the centre line with the eclipse at 8.19am local time.

The farmer is asking R100 per person. You will be allocated a camp site with access to toilet facilities. Ice, firewood and drinking water is included in the price; braai packs and beer will be on sale.

This is a dark sky site so bring your telescopes along. The location is far enough north to see constellations not visible from Johannesburg/Pretoria.

If you are interested, contact Dave Gordon on (011) 702-1219 or 083-746-2200.

In Search of Moon Trees

NASA Science News
August 13, 2002

Scattered around our planet are hundreds of creatures that have been to the Moon and back again. None of them are human. They outnumber active astronauts 3:1. And most are missing.

To read the full story about the moon trees, point your browser **:**

http://science.nasa.gov/headlines/y2002/13aug_moontrees.htm?list40309

And read a very interesting story about how these Moon Trees came to be.

Web Between the Worlds

"What's the Harm?" This is probably the most frequent question asked of skeptics, and it's an excellent question. The simple answer is, No, you won't die from reading your daily horoscope, unless you do it while standing under a large falling rock. BUT, superstitious beliefs and paranormal thinking easily leads to poor decision making, needlessly living in imaginary fears, and mass hysteria when these beliefs are held by groups.

http://www.dangerousideas.net/ will highlight the costs, in lives, families, and nations affected by this type of thinking, not only in the past, but the present as well, with commentary added.

I am always interested in fiddling with astronomy related software. Here is some sourcecode: *http://www.moshier.net/*

Starlore is designed as a reference point for astronomers of all levels. It's different from other astronomy forums because every user has their own homepage within the site. This consists of a homeworld and uniquely customised solar system that other users can visit. Worth taking a look at, has potential. Point your browser at http://www.starlore.net/

For beginners, there is the excellent *http://www.astronomynotes.com/* which I highly recommend.

For those interested in the study of the origin, current state, and future of our Universe take a look at Ned Wright's Cosmology Tutorial here: *http://www.astro.ucla.edu/~wright/cosmolog.htm*

Clear skies!
Evan Dembskey

The Sky this Month

September 2002

dd hh	dd hh
1 06 Mercury greatest elong. E(26)	14 12 Mercury stationary
1 07 Venus 0.0 S of Spica	17 09 Neptune 4.2 N of Moon
1 17 Saturn 2.5 S of Moon	18 18 Uranus 4.2 N of Moon
4 14 Jupiter 3.6 S of Moon	21 15 **FULL MOON**
6 10 Mars 3.9 S of Moon	23 05 Equinox
7 04 **NEW MOON**	23 06 Moon at apogee
7 16 Mercury greatest brilliancy	26 07 Venus greatest brilliancy
8 05 Moon at perigee	27 18 Mercury in inferior conjn.
8 17 Mercury 8.6 S of Moon	29 03 Saturn 3.0 S of Moon
10 03 Venus 8.1 S of Moon	29 17 **LAST QUARTER**
13 18 **FIRST QUARTER**	

October 2002

dd hh	dd hh
2 08 Jupiter 4.1 S of Moon	14 14 Neptune 4.4 N of Moon
5 02 Mars 4.2 S of Moon	15 05 Mercury greatest brilliancy
5 10 Mercury 5.4 S of Moon	15 22 Uranus 4.4 N of Moon
6 03 Mercury stationary	20 05 Neptune stationary
6 12 **NEW MOON**	20 08 Moon at apogee
6 15 Moon at perigee	21 08 **FULL MOON**
8 11 Venus 9.9 S of Moon	26 09 Saturn 3.0 S of Moon
10 07 Venus stationary	27 08 Mercury 4.1 N of Spica
11 12 Saturn stationary	29 06 **LAST QUARTER**
13 06 **FIRST QUARTER**	29 22 Jupiter 4.5 S of Moon
13 19 Mercury greatest elong. W(17)	31 12 Venus in inferior conjn.

LOCAL TIMES of RISE and SET for the MAJOR PLANETS, 2002

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
Sep 08	06.15	17.57	07.19	19.53	08.14	21.19	05.51	17.15	04.17	15.07	01.35	12.09
Sep 18	06.04	18.01	06.41	19.21	07.53	21.14	05.31	17.04	03.45	14.36	00.58	11.32
Sep 28	05.53	18.05	05.43	18.03	07.28	21.01	05.10	16.53	03.11	14.05	00.20	10.54
Oct 08	05.42	18.09	04.57	16.57	06.54	20.36	04.49	16.42	02.38	13.33	23.41	10.15
Oct 18	05.32	18.14	04.49	16.58	06.11	19.52	04.28	16.31	02.03	13.00	23.01	09.36
Oct 28	05.23	18.20	04.55	17.30	05.20	18.50	04.07	16.20	01.28	12.27	22.21	08.55