CANOPUS

The Astronomical Society of Southern Africa

Johannesburg Centre

Monthly Newsletter for April 2004

Contents:

The Sir Herbert Baker Library, 18a Gill Street, Observatory, Johannesburg
P.O.Box 412323, Craighall, 2024

Editorial

We have had our fair share of Astronomical news this last month - some interesting and some not so good. Bruce Dickson forwarded an email to your committee, advising us of the death of a friend of our society, Janet Mattei and you may read the mail further on in this issue. The other news was the discovery of the most distant body in our Solar System - Sedna which has a highly elliptical orbit which lasts 10,500 years. We have also heard of the plans the implement a permanent Base on the Moon and to put people on Mars within a few years - let's hope it doesn't take too long – I'd like a vacation on Mars.

We have also received some updated information about the Total Solar Eclipse in 2006 which will pass across North Africa through places such as Libya and Egypt - so if any of you have relatives in either of those places, now is the time to start making arrangements for a quick visit - and even if you don't have any unsuspecting cousins, uncles, aunts etc**...** you can still arrange a tour to view this eclipse by visiting some of the websites referenced in the article in this issue.

The major Planets are still putting on a good show with Jupiter having been at it's brightest at the end of March - though it will of course still be magnificent for some time to come.

Eben van Zyl continues his Mars series with a piece entitled Getting to know Mars and our **Chairman Dave Gordon** submits an interesting Chairman's Chat which may give some of you Cosmologists out there a bit of a headache. **Brian Fraser** has, as always, supplied us with good reasons for looking upwards over the next couple of months, and we have also gleaned some articles from the Space Agency websites.

ScopeX is now just around the corner. We hope to see as many of you as possible during the day and hope you'll all join us for the Star Party starting at 18:00. So please diarise Saturday 24th April for a great time and I'm sure you will have a most enjoyable Astronomical day.

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, 10th of March, 2004 at 20:00.

IMPACT CRATERS.

By: **Dr. Smart**

Beginners Class

Starts at 19:00 on the same evening as the Monthly Meeting
Topic: **T.B.A.**
By: **Jerome Jooste**

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

ASSA Jo'burg Centre:- To subscribe to the new ASSA announce list, send a blank mail to: *assajhb_subscribe@yahoogroups.com.*

You will receive instructions by return mail. ASSA Jo'burg centre members are strongly advised to subscribe to this list to receive late-breaking announcements (e.g. venue changes for meetings).

Amateur Telescope Making:- *assaatm_subscribe@yahoogroups.com*

Imaging:- *assaimaging_subscribe@yahoogroups.com*

and finally, a periodic digest of general news relating to astronomy and space exploration
Zastro_subscribe@yahoogroups.com

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 717-1397 or email- *tabbie@icon.co.za* to ensure that viewing IS taking place on the specified evening.

ASSA Jo'burg Centre - Calendar of Events

Month	Day/ Date	Event	Details
Apr	Mon 5	Committee Meeting	Maybe *(this is Easter Monday)*
	Wed 14	**Monthly Meeting**	Impact Craters **Dr. Smart**
	Fri 23	*Public Viewing*	
	Sat 24	*** * * ScopeX 2004 * * ***	*At the Military History Museum*
May	Mon 10	Committee Meeting	
	Wed 12	**Monthly Meeting** *(at the Planetarium)*	Pre-Venus Transit Meeting
	Fri 14	*Public Viewing*	
Jun	Mon 7	Committee Meeting	
	Wed 9	**Monthly Meeting**	T.B.A.
	Fri 21	*Public Viewing*	
Jul	Mon 12	Committee Meeting	
	Wed 14	**Annual General Meeting**	T.B.A.
	Fri 16	*Public Viewing*	
Aug	Mon 12	Committee Meeting	
	Wed 14	**Monthly Meeting**	T.B.A.
	Fri 13	*Public Viewing*	
Sep	Mon 12	Committee Meeting	
	Wed 14	**Monthly Meeting**	T.B.A.
	Fri 10	*Public Viewing*	

Reminders

2004	**March - Centenary:** Sir Herbert Baker Library Building *Johannesburg Centre to host 2004 ASSA Symposium* **June 8:** Venus Transit
2006	**March 29:** Total Solar Eclipse

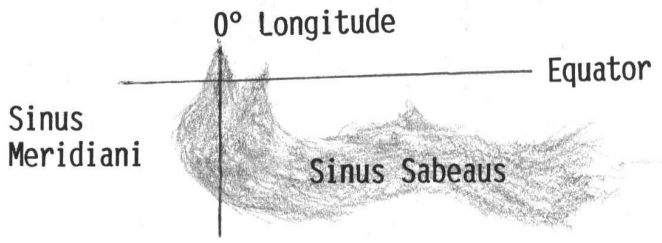
Welcome to new Members

Clifford and Elsje de Witt

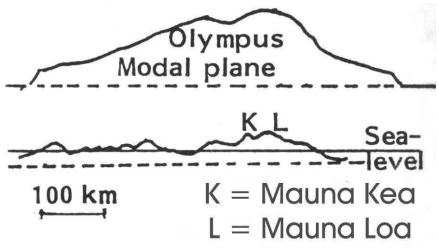
We wish you clear skies and many happy years of observing

Get to know Mars - 1

OLYMPUS MONS. The line of zero longitude on Mars is taken as passing through a sharp pointed area of dark surface. It is named Sinus Meridian and it forms part of the dark area Sinus Sabaeus.



From this line of longitude, situated 178° West and 17° North of the Equator, lies Olympus Mons. Previously it was called Nix Olympia, the Snows of Olympus, a name given to it by Giovanni Schiaparelli, because from time to time a bright spot occurred there. Mariner 9 and the Viking probes in 1972 and 1976 showed Nix Olympia to be a vast volcano. Now Mars Global Surveyor which has been orbiting Mars since 1997 has accurately measured by means of its radar altimeter that the height of the top of the mountain above the modal plane (the most average elevation of the surface of Mars) to be 21 km 287,4 metres and that its base extends over 600 km with cliffs 1 km high around the periphery. It is thus 2,4 times the height of Mt. Everest and its base would cover the whole Orange Free State and most of Natal. It is so big that if an astronaut were to land on its sloping side, he would not be able to see the mountain. All that he would be able to see is a very gently sloping lava-covered surface having a slope of 1 in 12. Beyond 40 to 50 kilometres from his vantage point, the surface vanishes below the horizon. Similarly, if the astronaut stood at the edge of the caldera, 65 km wide, he would not be able to see the rim on the other side -- it would be below the horizon. The only way to see Olympus Mons is to orbit the planet in a space vehicle. By comparison the Earth's largest volcanoes, Mauna Loa and Mauna Kea in the Pacific Ocean, pale into insignificance.



Olympus Mons compared to the biggest volcanoes on Earth

The bright spot has turned out to be clouds of fine crystals of carbon dioxide which, from time to time, condense out of the atmosphere. The sparse scattering of craters in the solidified lava of the slopes, indicate that the last flows of lava from the caldera could not have taken place more than 10 to 100 million years ago and that it is geologically very young, not more than one-fifteenth of Mars' lifetime. During thousands of millions of years the volcano erupted a great amount of lava which was driven upwards by steam. Because the gravity of Mars is only 0,38 that of the Earth, the escape velocity from Mars is only 5,2 km/sec compared to the Earth's 11,2 km/sec. That is why the Martian volcanoes have such enormous sizes. Because of the very low temperature on Mars, the steam gushed out, would immediately have crystallised into fine globules of ice. It is unimaginable with what force the torrential falls of ice particles which flowed like water, sweeping great watercourses in the sandy soil. These watercourses are still visible today.

To the east of Olympus Mons, but still on the Tharsis Highlands there another three vast volcanoes in a straight line north-east to south-west: Ascreaus Mons 18,2 km high, Pavonis Mons 14,1 km and Arsia Mons 17,8 km high. All this water from the steam gushed by these volcanoes, swept over Tharsis and on the east swept into Valles Marineris, the greatest canyon anywhere in the Solar System. The waters collected over the low-lying areas to the North: Chryse Planitia, Acidalia Planitia, Utopia Planitia and Vastitas Boreal is and formed a great ocean. It is not known how long this ocean lasted. It has however long since soaked into the soil where it

today is being discovered as permafrost and has also evaporated into space so that Mars is today considered to be utterly dry. At full blast the steam and lava which gushed out of Olympus Mons' 65 km wide caldera must have been a sight visible from the Earth 10 or more millions of years ago.

Jan Eben van Zyl

Chairman's Chat April 2004

Insomniac Cosmologist

It is 3.30 am and I cannot sleep. My head is filled with theories of the universe and I feel I must burden you with them …

My telescope is a time machine. I can look back in time but *never* forwards. The bigger the telescope, the older the light it will reveal to my eyes. Nicholas Copernicus' universe was comparatively very small because the very best lenses he had to work with were imbedded in his eyeball. Galileo's universe was slightly larger because he used optical aid to look further back in time at older light than the unaided human eye is able to detect. Edwin Hubble's universe was comparatively enormous; the realisation that those patches of nebulosity were not part of the Milky Way, but "island universes" outside of, and not too dissimilar from, our own galaxy. Today, astronomer's universes are gigantic – they use redshift, background microwave radiation, type 1A supernovas and distant quasars as yardsticks to estimate the currently generally accepted size of the universe.

I have just seen the HST press release picture known as the Ultra Deep Field – the result of photographing the same spot in space and time for 11,3 days. The result, the caption at the bottom of the picture reads, are 10 000 galaxies just 700 million years old. In essence, a photograph of the oldest light to date: 13 billion years, the newspaper article reads. Supposedly, we are looking at a small fraction of time just before the birth of the universe. This "popular theory" has been bothering me for a long time. It all seems a little too convenient: a neatly packaged great pop that *creates* everything. I don't like it and I don't buy it. Why have we fallen into the trap of *deifying* the big bang. When we humans don't understand some thing, we form a singularity out of the problem. It becomes our one and only ultimate creator.

There was not just one big bang that created everything. There have been many big bangs in the past. There are big bangs going on right now in distant universes. We just cannot see them. Remember, telescopes only detect light from the distant past. We have absolutely no idea what the universe actually looks like RIGHT NOW just a few hundred light years outside of planet Earth.

Let me take one step backwards in my reasoning. We humans rely solely on the electromagnetic spectrum to tell use the story of what the universe ACTUALLY looks like and how it is behaving right now. But in essence, it can only tell us what the universe WAS doing in the past. The signals tell us that the further away the object is from Earth, the faster it *is* (or should that be *was*) moving away from us. This forms the basis of current popular theory: an expanding accelerating universe. But this evidence is based on old light; on historical light. The further back in time and space that astronomers see in modern telescopes, the closer they look towards the time of this universe's big bang. But that is history. It makes sense to my logic that objects observed closest to the time of the point of initiation will have been travelling faster than objects closer to us right now. But, those objects are not necessarily still accelerating away from us right at this moment in time.

Remember the basic law of energy conservation – energy is neither created nor destroyed. So, no energy has been created since our own particular big bang. The energy has merely been transferred into the dynamics of galaxies, black holes and everything else that populates the modern universe. If we were in an accelerating universe, where would the energy be coming from RIGHT NOW to power the acceleration. This, to me, flies in the face of the basic laws of physics.

The way I understand it: space time can be compared, rather crudely I might add, to the skin

of an expanding balloon. Every physical particle of matter that has *ever been* is on the surface of that balloon. As space and time expand, all particles (galaxies, etc) on the balloon's surface move away from each other. It's not the galaxies that expand but rather the space between them. When the balloon started inflating, the particles on the surface moved faster away from each other, and relative to one another, than when the skin surface of the balloon is stretched and inflating more slowly. Our most powerful telescopes look back to the time just after the big bang and that's why we see most distant objects (from the most distant past) moving faster away than objects closest to us.

But what is everything doing RIGHT NOW?

Using the balloon analogy, if the surface were expanding RIGHT NOW, everything outside of the Milky Way should be flying away from everything else, regardless of the relatively weak force of gravity. If the balloon surface were contracting, all objects would be seen to be moving towards each other. However, because of light time delay, if our current universe started contracting relatively recently, we would observe only the nearest objects moving towards us. Our telescopes (being the time machines they are) would still observe the most distant objects racing at accelerating speeds away from us.

The closest galaxies to us, including the Larger and Smaller Magellanic Clouds, are collapsing in on the Milky Way. Our sister galaxy, Andromeda (M31), has an estimated closing velocity on us of 35 kilometres per second (Burnham vol. 1) … the galaxy's light is blue-shifted with respect to us. Our next nearest spiral galaxy, M33 – Pinwheel Galaxy in Triangulum – is, according to Burnham (vol.3) "one of the few galaxies that does not show a redshift". It has a net computed closing velocity of 20 kilometres per second.

These are objects in our immediate vicinity. The light is still young from these objects. They give us the most up to date evidence of what is actually happening in the universe. They are closing in on us and I don't believe the weakest force in the universe – gravity – has everything to do with it.

The older the light is, the further away the object, and the less reliable the evidence for what is happening in the universe at this instant. What if the universe has already started to re-collapse … within the last 2.3 million years or so? We would have no evidence of the contraction whatsoever – save the nearest galaxies showing evidence of a closing velocity.

Astronomers can only look at *historical* electromagnetic evidence, not current evidence. This is because light *only* travels at 300000 km per second and we have only been scientifically inspecting known regions of the electromagnetic spectrum for a few hundred years. Gamma Ray Bursts (GRBs) are nothing new in the universe. They are only new to us because we detected them, by accident, in what we (currently) think is the most energetic part of the electromagnetic spectrum.

I wonder if there are events or objects, nearby or far, that do not run physical characteristics or properties in the human-understood electromagnetic spectrum?

Imagine a scenario in which light is instantaneous. In other words, light (or all electromagnetic radiation for that matter) has no travel time. We would then be able to *see* the most distant objects as they appear and behave right now. We could then say for certainty that the universe was expanding around our immediate vicinity *and* at the most distant points. I've often wondered if gravity is instantaneous; if a massive object were to just suddenly appear in space and time, whether its gravitational effects would be felt instantaneously everywhere in the universe, or if gravity has the same travel time as light?

Like many of my fellow society members, I wasn't brave enough to attempt a classical education in quantum physics and applied mathematics. This has left me short of the tools I often fondly desire in order to put my personal theories into some form of scientifically acceptable evidence. I am a chronically frustrated armchair physicist. Consequently, my cosmology will never be taken seriously by those who have cut their teeth via the academia. Having proposed the ideas above without the requisite physics, I feel like a caveman wielding a light sabre at a herd of incredulous mammoths.

But, it's now 5.30 in the morning and my mind roams freely and unbounded through theories of the universe, space and time … and it feels wonderful.

Fellow Canopus readers, I would like to experience your theories of the universe and everything. That's why I joined this society! Get your fingers flying on those keyboards and send your theories for our May Canopus to chris@penberthy.co.za

Our own particular universe could be collapsing in on itself right now and we would know nothing of it.

So I would like to unleash my own theory on you. Here goes …

I think the oldest light that I have looked at through my 10 inch telescope is estimated to be about 300 million years old.

Sad news about Janet Mattei

23 March 2004 01:35
From the AAVSO Discussion group.

(The below message is forwarded from Dr. Mario Motta.)

Dear members, staff, and friends of the AAVSO.

It is my very sad duty to inform you all that Dr. Janet Mattei died at 4:20 PM today 3/22/04 at the Peter Bent Brigham Hospital after a long battle with Acute Myelogenous Leukemia.

In typical Janet fashion she fought a heroic battle with this deadly disease for the past 7 months, but in the past few weeks it overcame her. Last Tuesday she asked that I inform her friends worldwide when this time came for her. Last evening she slipped into a coma, and passed away just minutes ago.

The AAVSO has lost a strong leader who has guided our organization to greatness. The world of astronomy has lost a patron of her field. Amateur astronomers the world over have lost a mentor who bridged the world of amateurs and professionals. I, along with many others the world over who knew her well, have lost a dear friend who will be deeply missed.

Information about services will be forthcoming soon.

Mario Motta, MD

Submitted by **Bruce Dickson.**

MOST DISTANT OBJECT IN SOLAR SYSTEM DISCOVERED

NASANews@hq.nasa.gov

RELEASE: 04-091

NASA-funded researchers have discovered the most distant object orbiting Earth's sun. The object is a mysterious planet-like body three times farther from Earth than Pluto.

"The sun appears so small from that distance that you could completely block it out with the head of a pin," said Dr. Mike Brown, California Institute of Technology (Caltech), Pasadena, Calif., associate professor of planetary astronomy and leader of the research team. The object, called Sedna for the Inuit goddess of the ocean, is 13 billion kilometers (8 billion miles) away, in the farthest reaches of the solar system.

This is likely the first detection of the long-hypothesized "Oort cloud," a faraway repository of small icy bodies that supplies the comets that streak by Earth. Other notable features of Sedna include its size and reddish color. After Mars, it is the second reddest object in the solar system. It is estimated Sedna is approximately three-fourths the size of Pluto. Sedna is likely the largest object found in the solar system since Pluto was discovered in 1930.

Brown, along with Drs. Chad Trujillo of the Gemini Observatory, Hawaii and David Rabinowitz of Yale University, New Haven, Conn., found the planet-like object, or planetoid, on Nov. 14, 2003. The researchers used the 48-inch Samuel Oschin Telescope at Caltech's Palomar Observatory near San Diego. Within days, telescopes in Chile, Spain, Arizona and Hawaii observed the object. NASA's new Spitzer Space Telescope also looked for it.

Sedna is extremely far from the sun, in the coldest know region of our solar system, where temperatures never rise above minus 240 degrees Celsius (minus 400 degrees Fahrenheit). The planetoid is usually even colder, because it approaches the sun only briefly during its 10,500-year solar orbit. At its most distant, Sedna is 130 billion kilometers (84 billion miles) from the sun, which is 900 times Earth's solar distance.

Scientists used the fact that even the Spitzer telescope was unable to detect the heat of the extremely distant, cold object to determine it must be less than 1,700 kilometers (about 1,000 miles) in diameter, which is smaller than Pluto. By combining available data, Brown estimated Sedna's size at about halfway between Pluto and Quaoar, the planetoid discovered by the same team in 2002.

The elliptical orbit of Sedna is unlike anything previously seen by astronomers. However, it resembles that of objects predicted to lie in the hypothetical Oort cloud. The cloud is thought to explain the existence of certain comets. It is believed to surround the sun and extend outward halfway to the star closest to the sun. But Sedna is 10 times closer than the predicted distance of the Oort cloud. Brown said this "inner Oort cloud" may have been formed by gravity from a rogue star near the sun in the solar system's early days.

"The star would have been close enough to be brighter than the full moon, and it would have been visible in the daytime sky for 20,000 years," Brown explained. Worse, it would have dislodged comets farther out in the Oort cloud, leading to an intense comet shower that could have wiped out some or all forms of life that existed on Earth at the time.

Rabinowitz said there is indirect evidence that Sedna may have a moon. The researchers hope to check this possibility with NASA's Hubble Space Telescope. Trujillo has begun to examine the object's surface with one of the world's largest optical/infrared telescopes, the 8-meter (26-foot) Frederick C. Gillett Gemini Telescope on Mauna Kea, Hawaii. "We still don't understand what is on the surface of this body. It is nothing like what we would have predicted or what we can explain," he said.

Sedna will become closer and brighter over the next 72 years, before it begins its 10,500-year trip to the far reaches of the solar system. "The last time Sedna was this close to the sun, Earth was just coming out of the last ice age. The next time it comes back, the world might again be a completely different place," Brown said.

NASA's Jet Propulsion Laboratory, Pasadena, Calif, manages the Spitzer Space Telescope. For more information about the research and images on the Internet, visit:

http://www.spitzer.caltech.edu/Media/releases/ssc2004-05

For information about NASA on the Internet, visit:

http://www.nasa.gov

Water at Martian South Pole

ESA News
17 March 2004

Thanks to ESA's Mars Express, we now know that Mars has vast fields of perennial water ice, stretching out from the south pole of the Red Planet.

Astronomers have known for years that Mars possessed polar ice caps, but early attempts at chemical analysis suggested only that the northern cap could be composed of water ice, and the southern cap was thought to be carbon dioxide ice.

Recent space missions then suggested that the southern ice cap, existing all year round, could be a mixture of water and carbon dioxide. But only with Mars Express have scientists been able to confirm directly for the first time that water ice is present at the south pole too.

Mars Express made observations with its OMEGA instrument to measure the amounts of sunlight and heat reflected from the Martian polar region. When planetary scientists analysed the data, it clearly showed that, as well as carbon dioxide ice, water ice was present too.

The results showed that hundreds of square kilometres of 'permafrost' surround the south pole. Permafrost is water ice, mixed into the soil of Mars, and frozen to the hardness of solid rock by the low Martian temperatures. This is the reason why water ice has been hidden from detection until now - because the soil with which it is mixed cannot reflect light easily and so it appears dark.

However, OMEGA looked at the surface with infrared eyes and, being sensitive to heat, clearly picked up the signature of water ice. The discovery hints that perhaps there are much larger quantities of water ice all over Mars than previously thought.

Using this data, planetary scientists now know that the south polar region of Mars can be split into three separate parts. Part one is the bright polar cap itself, a mixture of 85% highly reflective carbon dioxide ice and 15% water ice.

The second part comprises steep slopes known as 'scarps', made almost entirely of water ice, that fall away from the polar cap to the surrounding plains. The third part was unexpected and encompasses the vast permafrost fields that stretch for tens of kilometres away from the scarps.

The OMEGA observations were made between 18 January and 11 February this year, when it was late summer for the Martian southern hemisphere and temperatures would be at their highest. Even so, that is probably only –130 degrees Celsius and the ice that Mars Express has observed is a permanent feature of this location.

During the winter months, scientists expect that carbon dioxide from the atmosphere will freeze onto the poles, making them much larger and covering some of the water ice from view.

Mars Express and OMEGA will now continue looking for water ice and minerals across the surface of the planet. In May, another Mars Express instrument, the Mars Advanced Radar for Subsurface and Ionospheric Sounding (MARSIS), will begin collecting data, looking for water underground.

It will be particularly exciting when MARSIS looks at the south pole because, once planetary scientists know how deep the ice reaches, they will be able to calculate exactly how much water there is. Knowing this is very important to understand how Mars evolved and if it ever harboured life.

An email about the 2006 Solar Eclipse

From: Peter Tiedt [mailto:rigel@stars.co.za]
Sent: Thursday, March 04, 2004 8:39 PM
To: webmaster@assajhb.co.za
Subject: Canopus Submission

The Africlipse Website has received a major update for the Total Solar Eclipse of 2006.

Detailed predictions for all countries covered by the eclipse, GPS tracks of the umbral path, and tour information have all been provided.

Click on the following links:

General 2006 Page - *http://www.eclipse.za.net/html/2006.html*

2006 Desert Tour to Egypt and Libya - *http://www.eclipse.za.net/html/2006tour.html*

2006 Detail - *http://www.eclipse.za.net/html/2006det.html*

2006 Predictions - *http://www.eclipse.za.net/html/loc_cir.html*

Please advise any errors and / or omissions

Thanks
Peter Tiedt

STANDING BODY OF WATER LEFT ITS MARK IN MARS ROCKS

Jet Propulsion Laboratory,
Pasadena, Calif.
RELEASE: 04-100

NASA's Opportunity rover has demonstrated some rocks on Mars probably formed as deposits at the bottom of a body of gently flowing saltwater.

"We think Opportunity is parked on what was once the shoreline of a salty sea on Mars," said Dr. Steve Squyres of Cornell University, Ithaca, N.Y., principal investigator for the science payload on Opportunity and its twin Mars Exploration Rover, Spirit.

Clues gathered so far do not tell how long or how long ago liquid water covered the area. To gather more evidence, the rover's controllers plan to send Opportunity out across a plain toward a thicker exposure of rocks in the wall of a crater.

NASA's Associate Administrator for Space Science Dr. Ed Weiler said, "This dramatic confirmation of standing water in Mars' history builds on a progression of discoveries about that most Earthlike of alien planets. This result gives us impetus to expand our ambitious program of exploring Mars to learn whether microbes have ever lived there and, ultimately, whether we can."

"Bedding patterns in some finely layered rocks indicate the sand-sized grains of sediment that eventually bonded together were shaped into ripples by water at least five centimeters (two inches) deep, possibly much deeper, and flowing at a speed of 10 to 50 centimeters (four to 20 inches) per second," said Dr. John Grotzinger, rover science-team member from the Massachusetts Institute of Technology, Cambridge, Mass.

In telltale patterns, called crossbedding and festooning, some layers within a rock lie at angles to the main layers. Festooned layers have smile-shaped curves produced by shifting of the loose sediments' rippled shapes under a current of water.

"Ripples that formed in wind look different than ripples formed in water," Grotzinger said. "Some patterns seen in the outcrop that Opportunity has been examining might have resulted from wind, but others are reliable evidence of water flow," he said.

According to Grotzinger, the environment at the time the rocks were forming could have been a salt flat, or playa, sometimes covered by shallow water and sometimes dry. Such environments on Earth, either at the edge of oceans or in desert basins, can have currents of water that produce the type of ripples seen in the Mars rocks.

A second line of evidence, findings of chlorine and bromine in the rocks, also suggests this type of environment. Rover scientists presented some of that news three weeks ago as evidence the rocks had at least soaked in mineral-rich water, possibly underground water, after they formed. Increased assurance of the bromine findings strengthens the case rock-forming particles precipitated from surface water as salt concentrations climbed past saturation while water was evaporating.

Dr. James Garvin, lead scientist for Mars and lunar exploration at NASA Headquarters, Washington, said, "Many features on the surface of Mars that orbiting spacecraft have revealed to us in the past three decades look like signs of liquid water, but we have never before had this definitive class of evidence from the Martian rocks themselves. We planned the Mars Exploration Rover Project to look for evidence like this, and it is succeeding better than we had any right to hope. Someday we must collect these rocks and bring them back to terrestrial laboratories to read their records for clues to the biological potential of Mars."

Squyres said, "The particular type of rock Opportunity is finding, with evaporite sediments from standing water, offers excellent capability for preserving evidence of any biochemical or biological material that may have been in the water."

Engineers at NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., expect Opportunity and Spirit to operate several months longer than the initial rover's three-month prime missions on Mars. To analyze hints of crossbedding, mission controllers programmed Opportunity to move its robotic arm more than 200 times in one day, taking 152 microscope pictures of layering in a rock called "Last Chance."

JPL, a division of the California Institute of Technology in Pasadena, manages the Mars Exploration Rover Project for NASA's Office of Space Science, Washington. For images and information about the project on the Internet, visit:

http://www.nasa.gov
http://marsrovers.jpl.nasa.gov
http://athena.cornell.edu

STATEMENT BY NASA ADMINISTRATOR ABOUT SENATE BUDGET RESOLUTION

NASANews@hq.nasa.gov
RELEASE: 04-092

"I am extremely pleased by the Senate's adoption last week of a budget resolution for Fiscal Year 2005 that assumes the President's budget request for NASA.

"The Senate's action is a critical first step. The President's budget request for NASA will allow us to safely return our Space Shuttle fleet to flight status and to meet our commitments for the International Space Station. The budget also allows us to begin thoughtful and responsible implementation of the Vision for Space Exploration to return to the moon and continue our exploration of Mars," NASA Administrator Sean O'Keefe said today.

The amendment crafted by Senator Jeff Sessions (R-Ala.) was adopted by the Senate with the support of Chairman Don Nickles (R-Okla.). This effort was the culmination of hard work both in Committee and during Senate debate on a bi-partisan basis. The budget resolution sets the broad parameters for spending and revenue of the federal government for each fiscal year.

For information about NASA and agency programs on the Internet, visit:

http://www.nasa.gov

SCOPEX 2004 EVENT SCHEDULE (as at 29 March)

Note:

- **By 10am** – All entries for the ATM competition to be submitted to the Help Desk and exhibits set-up for viewing by visitors and ATM Judges
- **By 11am** – All entries for the Astrophotography competition to be submitted to the Help Desk and displayed for judging

TIME	AUDITORIUM	LECTURE ROOM (Upstairs of exhibit Hall)
11am	**MARS - How to get there!** by Emmanuel Petrakakis	MAD SCIENCE SHOW by Experilab
12h00	**ZOOM JOURNEY TO THE STARS** By Gerrit Penning	
1pm - **Astrophotography and ATM competition** – announcement of winners		
2pm - **Telescope Guided Tour** (starts at Mirror Grinding stand)		
2pm	**COMETS** by Case Rijsdijk	MAD SCIENCE SHOW by Experilab
3pm	**LIFE IN THE UNIVERSE** by Prof Anthony Fairall	
4pm	**ARE WE ALONE?** **If there's life out there, what would it be like?** Introductory talks followed by an open debate Case Rijsdijk - Chairman • **The molecular origin of life** - Prof Rob Veale • **Are there other planets out there, how do we go about finding them?** - Prof Hartmut Winkler • **What is the probability of life out there?** - Prof Derck Smits	MAD SCIENCE SHOW by Experilab
5pm – **Raffle Draw**		
6pm	**WHAT's UP IN THE SKY TONIGHT** by Dave Gordon	
6pm – 9pm **STAR PARTY** on the Lawns Telescope owners and commercial sponsors will have telescopes set-up - Come tour the night sky through a telescope, bring a picnic and join us!		
Throughout the day in the Lecture Room: • Experilab's Mad Science Shop; • Interactive workshops on building an elementary telescope and how to use a planisphere.		

CREDENTIALS OF PRESENTERS

- Prof Anthony Fairall: Professor of Astronomy at UCT, Planetarium Director at the Iziko South African Museum, Cape Town
- Case Rijsdijk: President of ASSA and previously of the South African Astronomical Observatory
- Prof Derck Smits: Professor of Astronomy, UNISA
- Prof Rob Veale: School of Molecular and Cell Biology, Wits
- Prof Hartmut Winkler: Professor of Physics, RAU
- Gerrit Penning: Boyden Observatory Educational Assistant and Chairman, ASSA Bloemfontein Centre
- Dave Gordon: Chairman, ASSA Johannesburg Centre
- Emmanual Petrakakis: Founding member of the Mars Society

ASTROPHOTOGRAPHY COMPETITION JUDGES

Case Rijsdijk and Dennis du Plooy (PhotoWeb SA)

ATM COMPETITION JUDGES

Chris Stewart and Dave Blane

KEY EXHIBITORS

- Exhibits by the owners of home built and commercial telescopes
- Department of Science and Technology exhibits:
    - Winners of the Southern Skies Challenge Competition from World Space Week 2003
    - Square Kilometre Array (SKA) exhibition
    - SA Science Lens brochures
- Photoweb SA (Telescopes and photographic equipment)
- Universal Image (Telescopes and photographic equipment)
- Experilab (Science related toys, gadgets, etc)
- Telescope SA (Telescopes)
- Oleg Toumilovitch (Russian telescopes/night vision equipment)
- Planetarium (Books)
- Exclusive Books (Books)
- African Itch – Solar Eclipse tour to Turkey for 2006

Our annual Telescope and Astronomy Expo!

Saturday, 24 April 2004
10 am to 9pm (Star Party from 6pm)

VENUE: SA Military History Museum - Johannesburg

Theme for this year is '**Life in the Universe**'

Please diarise and advertise the date,
contact us if you want to exhibit your self-made telescope or accessory,
want to enter the astrophotography competition, or
just want to offer your help on the day.

Contact Brian (brian.fraser@macsteel.co.za), Chris (Chris.Stewart@alcatel.co.za), or Lerika (lerika@icon.co.za) or check-out the website in due course for more detail.

http://www.assajhb.co.co

For Sale

Meade

LXD55 - 5" Refractor packed with :
Autostar 497 fully upgraded to 31EE Bios
26mm super plossl 4000

EQ mount + Tripod

Price: **R12000-00** o.n.c.o.

Contact: **Kevin.**

Home number	016 362-3429
Cell	083 327-3455
E-mail Bus:	kevin.pearce@liberty.co.za
E-mail Private:	pearcek@execnet.co.za

Meade

10" LX200 GPS SMT with UHTC
26mm Series 4000 Super Plossl

Smart-Suite Software and LPI

Imported complete with JMI Hard Case worth $450
(Seller has purchased the 12" LX200 GPS SMT with UHTC)

Price:	**R34,000-00**
Contact:	Ywain
Cell:	082-411-6373
Email:	ywain@penberthy.co.za

The Sky this Month

April 2004

dd hh	dd hh
2 19 Jupiter 3.4 S of Moon	19 04 Mercury 3.0 N of Moon
5 11 **FULL MOON**	19 14 **NEW MOON** *Eclipse*
7 03 Mercury stationary	23 10 Venus 1.6 N of Moon
7 05 Mars 6.8 N of Aldebaran	23 20 Mars 2.2 S of Moon
8 02 Moon at perigee	23 22 Moon at apogee
12 04 **LAST QUARTER**	25 06 Saturn 4.8 S of Moon
13 16 Neptune 5.3 N of Moon	27 18 **FIRST QUARTER**
15 05 Uranus 4.4 N of Moon	29 10 Mercury stationary
16 11 Venus 9.9 N of Aldebaran	30 02 Jupiter 3.6 S of Moon
17 02 Mercury in inferior conjn.	..

May 2004

dd hh	dd hh
1 20 Venus greatest brilliancy	17 23 Venus stationary
4 20 **FULL MOON** *Eclipse*	19 05 **NEW MOON**
5 13 Jupiter stationary	21 08 Moon at apogee
6 04 Moon at perigee	21 12 Venus 0.2 S of Moon Occn.
10 22 Neptune 5.5 N of Moon	22 15 Mars 3.1 S of Moon
11 11 **LAST QUARTER**	22 18 Saturn 4.8 S of Moon
12 12 Uranus 4.4 N of Moon	25 00 Mars 1.6 N of Saturn
15 00 Mercury greatest elong. W(25)	27 08 **FIRST QUARTER**
17 00 Mercury 2.6 S of Moon	27 12 Jupiter 3.6 S of Moon
17 13 Neptune stationary	

LOCAL TIMES of RISE and SET for the MAJOR PLANETS, 2004

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
Apr 10	6.22 17.56	7.13 18.19	9.56 20.16	10.24 20.51	15.57 3.26	12.10 22.41
Apr 20	6.27 17.46	6.05 17.27	9.57 20.08	10.13 20.38	15.15 2.44	11.33 22.04
Apr 30	6.32 17.38	5.06 16.44	9.49 19.56	10.03 20.25	14.35 2.03	10.57 21.29
May 10	6.37 17.31	4.41 16.20	9.29 19.36	9.52 20.14	13.56 1.23	10.22 20.53
May 20	6.43 17.26	4.45 16.11	8.53 19.04	9.39 20.03	13.17 0.45	9.47 20.18
May 30	6.48 17.23	5.11 16.15	7.57 18.16	9.26 19.52	12.39 0.09	9.12 19.44