



The PRETORIA CENTRE

of the

Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

NEWSLETTER NOVEMBER 2007

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

Date and time Wednesday 28 November at 19h15
Chairperson Hein Stoltsz
Beginner's Corner **"The Fate of the Universe"** by Percy Jacobs
What's Up Danie Barnardo

+++++ **LEG BREAK - Library open** +++++
MAIN TALK

"Clepsydras, Merkets, Astrolabes and Armilaees" *

by

Johan Smit

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

The next social/practical evening will be held on Friday 23 November at the Pretoria Centre Observatory, which is also situated at CBC. Arrive anytime from 18h30 onwards.

* See page 2

INSIDE THIS NEWSLETTER

LAST MONTH'S MEETING & SUMMARY OF MAIN TALK ON 28 NOVEMBER	2
ASSA PRETORIA CENTRE DARK SKY WEEKEND DECEMBER 7 – 8, 2007	3
PROVISIONAL NOTICE OF POSSIBLE TRIP TO BOTSWANA	4
VENUS EXPRESS & THE GRAND CANYON OF TETHYS	5
THE METONIC CYCLE, THE SAROS, AND THE MOON. PART 3	6
VOYAGER 1 EN 2 — NA 30 JAAR.....	7
LAST MONTH'S OBSERVING EVENING.....	7
OBSERVATORY MAINTENANCE — 20 YEARS AGO !	8
OH DEAR! A LONG WAY TO GO IN THE FIGHT AGAINST LIGHT POLLUTION	8
NOW FOR SALE AT THE CNA.....	8
DAWN	9
THE THREAT OF NEO'S & WEERLIG-FONTEINE IN OKLAHOMA.....	10
THE RINGS OF URANUS & REUSE VUURBAL IN NEW MEXICO	11
THE CRAB NEBULA.....	12
PRETORIA CENTRE COMMITTEE	12

Last month's meeting — Tony Viljoen

Michael gave an interesting talk on this event from 1908, the cause of which has been a mystery for most of the 20th century. This impact was the biggest on Earth for many hundreds of years.

What happened was the result of an explosion in the remote Siberian wilderness near the Podkamennaya Tunguska river. The local people reported seeing a fiery body in the sky and immediately afterwards a mighty noise like thunder was heard. The explosion was equivalent to the energy of a 10-12 megaton bomb, which is about 1000 times the energy of the Hiroshima bomb. The forests in the area were 'flattened like matchsticks' over an area of about 2000 square kilometres. The noise was heard some 1000km away, and the tremor was felt in St Petersburg and was measured to go around the earth twice by seismic instruments.

Remarkable lights were seen in the northern sky and people were able to read newspapers at night for some days afterwards. The local people thought that the area was 'enchanted'.

The explosion took place near the Tunguska river in an area now called the Krasnoyarsk Krai. 13 years passed before Leonid Kulik from the Soviet Academy of Sciences in 1921 came to the area. From the local people he heard that the heat was felt 60km away. They spoke of a fireball, a horrid noise, people were knocked off their feet and reindeers were incinerated. Kulik led an expedition there in 1927. He experienced resistance from the people to take him to the site because they felt the area to be enchanted. He persuaded a man called Petrov with gifts to show him the site. The site was very inhospitable with mosquitoes like "flying crocodiles". In April 1927 he reached the area and saw utter devastation, a vast sea of fallen trees strewn radially from the epicentre. He mapped the fallen tree area, and wanted to discover some remains of the bolide, but found no crater.

Even though he led more expeditions there up till 1938, he found no crater or remains on the ground.

In 1946 Kazantsev thought the event might be a nuclear explosion by comparing it to Hiroshima, where trees at the epicentre are still standing, and those further away are strewn radially. No unusual radiation was found at the site though. In 1959, 60 and 63, Wilhelm Fast led expeditions to the site and mapped the treefall. Up till 1989 the area was only investigated by Russians as it was a sensitive military area.

Since then theories about it are:

Fiery Gods
Alien spacecraft
Antimatter
Nuclear explosion
Tiny black hole.

If it was an object crossing earth's orbit, it could be a:

- comet, mainly a ball of ice
- meteorite, a chondrite stony or carbonaceous, or iron.

It is unlikely to be a comet, as the incoming path does not match cometary orbits, and it would likely break up in the upper atmosphere. Recent research shows the body to be most likely a stony meteorite, which if entering at 16km/sec at 45 degrees would explode at the correct 5-6 km height. This would support the findings by Korina (1987) of iridium in the peat layer, and also the 25 micron particles of copper/nickel/gold found by Galli and Longo (1991) in tree samples from trees dated to 1904 – 1914 period.

4000 square kilometres of this area has recently been set aside as a national reserve.

(The information for the talk was derived from two issues of Sky and Telescope and the Discover magazine).

Summary of main talk on 28 November

The talk will be about ancient astronomers, what they did, how it advanced our knowledge of astronomy, what instruments they used and how these instruments work.

**ASSA Pretoria Centre Dark Sky Weekend
Friday December 7th – Saturday December 8th 2007**

Members of the Centre, family and friends are invited to a Dark Sky Weekend at the Ezulweni Guest Farm, near Warmbaths. Ezulweni is run by Mike Haslam and Joy Hodgson who are long time friends of the Centre.

Four American Indian tepees have been erected, but campers can also bring their own tents / caravans. Tepees can accommodate 3 single people or a couple. Camping / caravan charges will be R40.00 per person per night. The tepees also cost R40.00 per person per night. Bedrooms are available, charges for which can be found on the Ezulweni website:

www.ezulweniparadise.com

An ablution block has been constructed. It consists of :

- two flush toilets
- two showers
- two handwash basins

A large army tent has been erected, which will be used as a "lapa", where camping guests can socialize around a camp fire, make a potjie, or use the braais. Wood will be provided for braais. A cash bar will also be available.

If people do not want to self-cater, meals can be booked in advance and these are served in the main house.

Meals per person

Breakfast R35.00

Light lunch: R35

Dinner with glass of wine: R75

Sunday lunch: R75 with glass of wine

Please book directly with Joy and Mike, indicating which type of accommodation you will be using i.e tepee, own tent / caravan, or bedroom. Please pay in advance, and take your proof of payment with you when you go if you make a direct deposit.

Payment details:

M.B. Haslam

Nedbank Centurion

Branch Code 16-21-45

Account Number: 1621014495

Contact details:

Joy Hodgson

Marketing Manager

Ezulweni

Post Suite 197

P/Bag X1604

BELA BELA

0480

Mobile: 082 921 5973 e-mail : paradise4joy@gmail.com

Directions to Ezulweni from Pretoria: Mike and Joy's place is on the Warmbaths – Thabazimbi Road (R516)

Either

Via N1 (Pietersburg) - 2 toll gates : R5.80 and R27.00.

Take off ramp 224 marked "Bela Bela (Warmbaths), Settlers, CODRINGTON" which takes you onto the old R101 and is 10 km shorter.

Or

Follow the R101 from Pretoria via Hammanskraal to Bela Bela (No tollgates).

There is a set of robots just before you enter Warmbaths and you will see lots of thatched buildings on your left. Cross railway bridge to another set of traffic lights. Filter left just before the lights and this road takes you around a sharp right hand curve. Just a short distance past the curve, take slip road to left. (look out for all signs "Forever Resort, Rustenburg, Thabazimbi, Mabula, Mabalalingwe")

Pass the entrances to **Forever Resort** and **Bela Bela Hospital**.

Keep in left lane to traffic circle. Peel off left at circle look for signs to Mabula, Rustenburg, Thabazimbi.

Take a speedometer reading. Ezulweni entrance gate is 19.3 km from this circle.

Landmarks on your right as you get near the entrance gate:

Mufasa Poles and Thatch.

90kms speed limit (with two crosses - two road deaths)

Afrikana Indigenous Nursery

North Thatch and Builders- yellow sign

A small sign on the left which says "Koedoeskop 60 km".

Slow down & indicate that you are turning right

The entrance gate is a few metres further: orange board "**Portion 76, Droogekloof, Mike & Joy**"

Go through this gate, (please close it after you) turn LEFT at the following T junction & follow Paradise Road!

GPS co-ordinates of our entrance gate: **S 24 deg 52 min 12.0 sec**
E 28 deg 06 min 39.1 sec

GPS co-ordinates of observing site: **S 24 deg 51 min 57.6 sec**
E 28 deg 06 min 22.1 sec

Height: **1068 metres**

Provisional Notice of Possible Trip to Botswana — Michael Poll

This is an edited version of an e-mail from Paul Sheller.

Paul Sheller (Private Bag 28, Maun, Botswana Tel: 267 686-581 Cell: 267 72525912 Email: ndsmaun@dynabyte.bw) has proposed a trip to Botswana. Paul had been based in Botswana for the last 34 years – was at one time a Bushman Development Officer for the Botswana Govt. in the Central Kalahari, then worked in the western Kalahari and Ghanzi Districts (again for Govt.) for some years, then moved up to the Maun area and started a data processing business (Ngami Data Services) which does a lot of different types of surveys (medical, natural resources and management, etc) and Geographic Information Services. He then expanded his operations and started a safari company called Audi Camp – and started concentrating on mobile safaris into the Kalahari.

Through all of this, he has always had a keen interest in the stars, and has picked up quite a bit of information from the Bushman and the Bakalagadi people about their lore of the stars. Some 6 years ago he acquired his first Meade SCT 8" telescope. In the last few weeks he has upgraded to a 10" scope, and says it is absolutely stunning. He has asked if a group of people would be interested in coming up to an area like this for a combined safari/astronomy tour. He says this is just a suggestion, but to keep it in mind and see if there is any interest down here.

This e-mail is circulating amongst ASSA Committee members who are passing it on to the Centres to gauge if there is any interest. The following questions have been asked and naturally more information is needed.

how many people can be accommodated
how long would the trip be
when roughly would it be
what kind of transport is required
cost.

Even if this trip takes place, it will obviously not be in 2007, but please make a note of the possibility. Please let me know, without obligation, if you would be interested. If there is any further information I will bring it to the November 28th monthly meeting.



Venus Express

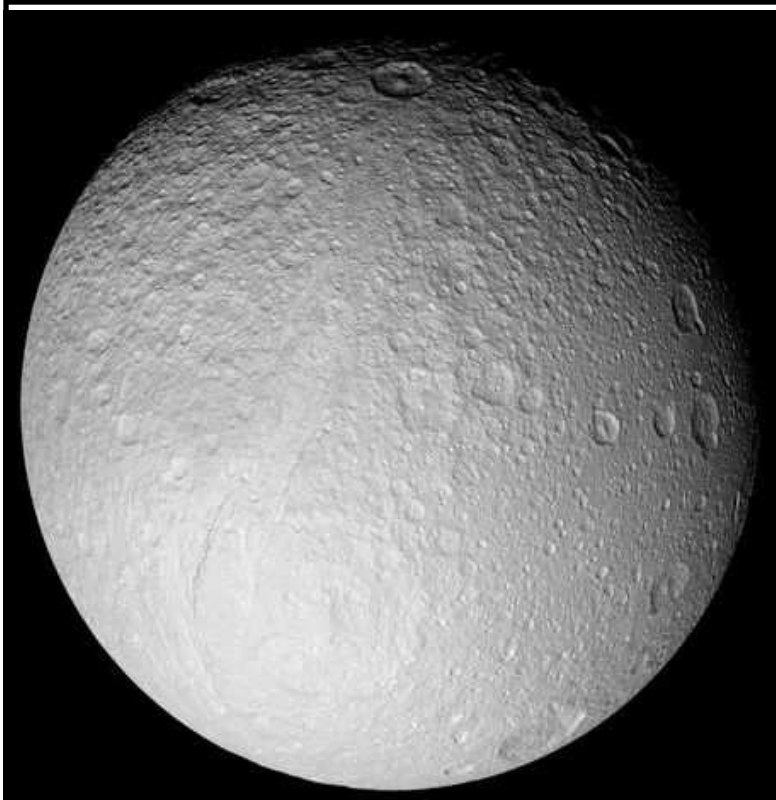
Venus Express has now orbited Venus for 500 Earth days, completing as many orbits. While the satellite maintains steady and excellent performance, the planet continues to surprise and amaze us.

Among many other findings that have surprised scientists, Venus' atmosphere seems extremely fickle. Recent observations with the Visible and Near-Infrared Mapping Spectrometer have shown that Venus' atmospheric structure changes quite rapidly, from day to day. The meteorology of the planet, including its deep atmosphere, is highly variable.

The polar dipole is the name given to a giant double-vortex, each of which is about 2000 km across, similar to the eye of a hurricane. The double-vortex has been seen at both the north and south poles, rotating in opposite directions (clockwise at the north pole and counter-clockwise at the south pole). Observations with Venus Express show that the vortex at the south pole also changes its shape rapidly, from one orbit to the next.

The image shows an artist's impression of Venus Express orbiting Venus.

See website http://www.esa.int/SPECIALS/Venus_Express/index.html



The Grand Canyon of Tethys

Tethys [pronounced TEE-thiss] is a moon of Saturn that is very similar in nature to two of its other moons, Dione and Rhea. Its density indicates that it is composed almost entirely of water ice.

There is an enormous trench on Tethys that is approximately 65 kilometers wide and covers three-fourths of Tethys' circumference. The diameter of the moon is about 1000 km. A simple calculation with $L = \left(\frac{3}{4}\right) \pi D$ shows that the trench is about 2400 km long. Scientists have theorized that the trench, named Ithaca Chasma, was caused by the moons' liquid crust hardening before its interior.

Tethys also has a vast expanse of young plains that stretch across its surface.

With this full-disk mosaic, Cassini presents the best view yet of the south pole of Tethys. Ithaca Chasma cuts across the

disk. Much of the topography seen here, including that of Ithaca Chasma, has a soft, muted appearance. It is clearly very old and has been heavily bombarded by impacts over time.

The Metonic Cycle, the Saros, and the Moon. Part 3. — Michael Poll

The Saros

There is a cycle of co-incidence of periods which is called the Saros, and it is comprised of 223 lunar synodic months and 19 eclipse years.

$$223 \times 29.5306 \text{ days} = 6\,585.32 \text{ days} = 18 \text{ years} + 10 \frac{1}{3} \text{ or } 11 \frac{1}{3} \text{ days}$$

$$19 \times 346.6200 \text{ days} = 6\,585.78 \text{ days}$$

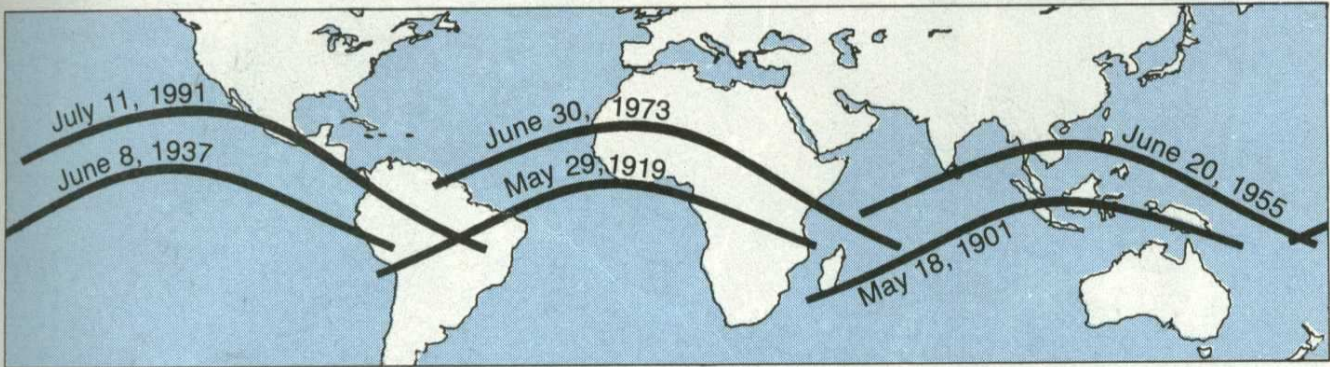
The Saros predicts an eclipse with the Earth moon and sun in almost identical configuration, meaning that the eclipses are similar in geometry and place in the sky, but the eclipse will not be visible at the same location on Earth – the one third of a day difference means that each subsequent eclipse is displaced westwards by 120 degrees because the Earth rotated by this much in that time. The alternative of 10 or 11 days depends on the number of leap years in the period. A single Saros cycle lasts for more than 1200 years and includes between 68 and 75 solar eclipses. A number of Saros cycles run concurrently, for example, the dates for Saros Cycle number 136 are given in the table. Note that this cycle happens to give a series of very long solar eclipses because the eclipses occur when the moon is near perigee (so it looks bigger) and the Earth is near aphelion (so that the sun looks smaller):

Date	Duration
1919 May 29	6 mins 51 secs The eclipse where it was shown that gravity can bend a ray of light
1937 June 8	7 mins 04 secs
1955 June 20	7 mins 08 secs Longest solar eclipse ever recorded
1973 June 30	7 mins 04 secs
1991 July 11	6 mins 53 secs
2009 July 22	6 mins 39 seconds Longest of the 21 st Century

The paths of the moon's shadow for the eclipses in the table are shown in Figure 1, except the path for the eclipse 2009 is not shown – the path for this one is parallel to, and north of, the one for 1955 June 20th. The 2009 one starts in Pakistan, passes over Tibet and central China and out into the Pacific. The eclipse paths move northward because the moon is in a slightly different position near its ascending node at subsequent eclipses. Eventually the paths will move so far north that the umbra of the moon's shadow will miss the Earth completely, so there will be no more total eclipses in the cycle. This Saros cycle will close with a series of partial eclipses and end when the penumbra of the moon's shadow also misses the Earth. Eclipses that occur near the descending node move southwards.

In the first part of these articles it was noted that the phases of the moon repeat about every 29½ days, which is a day or two less than a calendar month. This means that the phases of the moon drift backwards through the months, occurring about a day earlier each month. For example:- first quarter for the last four months of 2007: September 19th at 19h00, October 19th at 11h00, November 18th at 01h00, and December 17th at 13h00. This means that the first quarter is currently drifting through the Centre Observing Evenings, an observation that prompted this series of articles in the first place. Generally, observing evenings are about 4 weeks apart, but considering that there is 5 weeks between the Observing Evenings of October and November, the moon will be well past first quarter by November 23rd. Next year the near full moon will drift through the observing evening for some months.

THERE WILL BE NO NEWSLETTER, NO MONTHLY MEETING AND NO OBSERVING EVENING IN DECEMBER. A COPY OF "SKY GUIDE AFRICA SOUTH 2008" WILL BE SENT TO EACH MEMBER AS SOON AS THEY ARE RECEIVED FROM THE PUBLISHERS.



Voyager 1 en 2 - na 30 jaar

'n Sending wat slegs vyf jaar sou duur herdenk nou sy 30ste verjaarsdag. Wetenskaplikes ontvang steeds inligting van Voyager 1 en 2 terwyl hulle die interstellêre ruimte nader. Voyager 1 is alreeds 100 AE ver. Hierdie twee ruimtetuie was deel van die opwinding en kultuur van die 1980's en 1990's. Liedjies en boeke is geskryf, rolprente is gemaak en blyspele is opgevoer oor die moontlike ontmoeting met ander intelligente wesens. Voyager 1 en 2 se goue plate, wat deur Carl Sagan en sy kollegas saamgestel is, bevat inligting oor die aarde, sy mense en geluide sowel as sy posisie in die ruimte. Ons wag steeds op 'n antwoord.....

Lees gerus die boek "**Murmurs of Earth - The Voyager Interstellar Record**" deur **Carl Sagan**. Links onder is 'n kunstenaarsvoorstelling van een van die Voyager ruimtetuie. Regs onder is 'n afbeelding van een van die goue plate. So 'n plaat is aan elkeen van die twee ruimtetuie geheg.

Besoek webwerwe www.nasa.gov/voyager en <http://voyager.jpl.nasa.gov/>



Last month's observing evening — Michael Poll and Johan Smit

The weather! We had 20 mm of rain that night. Only Johan and Michael went to the observing evening. Even if the weather is not promising, we have to visit in case any newcomers arrive. We saw clouds but not the Magellanic sort – they were what the meteorologists call nimbo-stratus. We saw showers, but not the meteoric kind. We saw a lot of grey light, but not the sort that requires averted vision – it was staring in our faces. Johan took the opportunity of sweeping sub-atomic particles off the observatory floor, at least some of which may previously have been inter-planetary, even if not interstellar.

In fact this is first time Michael has recorded meaningful rain in October since 2003 and the first time he has recorded more than 100 mm in October since October 2000, when 221 mm fell. October 2007 delivered 162 mm which is the fourth wettest October since his records began in 1973.



OBSERVATORY MAINTENANCE — 20 YEARS AGO!

This picture above was taken on August 29th 1987 at our Centre's observatory at CBC. From left to right the persons are: Mauritz Geyser, Michael Poll, Mike Haslam, Neville Young, Name forgotten*, and Cor Rademeyer.

*If anyone recognizes him, please let me know.— Editor.

Some residents said they felt vulnerable and were like sitting ducks waiting in the dark for criminals who knew security gates and systems would be off.

But some callers said that if people had fewer security lights more electricity could be saved.

An irate caller from Rooihuiskraal said: "Why must people have five or six lights on their walls? It is a waste of electricity.

"I suggested to my neighbour that he remove some globes and he told me to f* off."**

OH DEAR! A LONG WAY TO GO IN THE FIGHT AGAINST LIGHT POLLUTION.

The cutting on the left is from the Pretoria News dated October 29th 2007, and refers to the power cuts we had at that time.

Now for sale at the CNA

A publication of Sky & Telescope magazine about a half century of the greatest moments in space exploration:

"Space - 50 years and counting"

Dawn

On September 27, 2007, NASA's spacecraft **Dawn** was lofted into space atop a Boeing Delta 2 rocket from Kennedy Space Center, Florida, USA, beginning a 3 billion km journey. Shortly after launch, **Dawn** signaled ground control to say that all was well. The spacecraft was oriented properly and was receiving power from its massive solar arrays.

Its mission: Fly to Vesta (a large asteroid) and Ceres (a dwarf planet), and explore them up close for the first time. If all goes well, the spacecraft will make its first encounter with Vesta in October, 2011. It will orbit Vesta for some time and make observations of it. Then it will set off for Ceres. It will reach Ceres in February, 2015, and do the same there.

Ceres was once classified as an asteroid, but was reclassified in 2006 as a dwarf planet, along with Pluto.

What is particularly interesting, is that **Dawn** has engines employing "ion propulsion". They use electrical energy derived from solar energy, and ionized xenon gas as propellant. These kind of engines are suitable for applications where only small accelerations are needed, but for a long time.

The photograph below left shows the rocket carrying **Dawn** as it lifts off from the launch pad. Below right is an artist's illustration of **Dawn** at Ceres.

Websites for the **Dawn** mission:

<http://www.universetoday.com/2007/09/27/dawn-is-gone/>

http://science.nasa.gov/headlines/y2007/27sep_dawn2.htm?list50005

Websites for **Dawn's** ion propulsion engines:

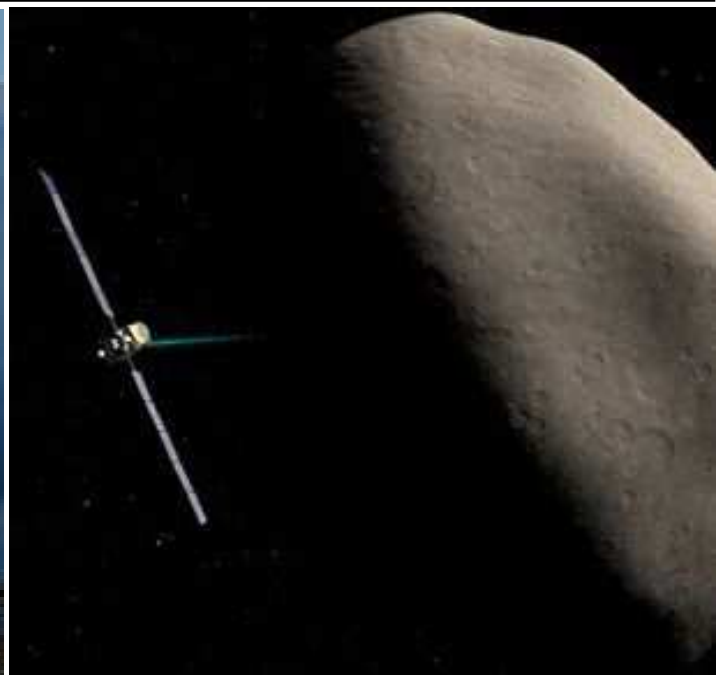
http://www.nasa.gov/mission_pages/dawn/news/dawn-20070913f.html

<http://nmp.nasa.gov/ds1/tech/sep.html>

See the April 2007 newsletter about spacecraft **Rosetta**, which will explore a comet and two asteroids.

See website <http://near.jhuapl.edu/> about spacecraft **NEAR**. This craft orbited Eros (a large asteroid) and eventually landed on it.

See the February 2007 newsletter about spacecraft **New Horizons**. It is on its way to Pluto, the Kuiper belt and beyond.



The threat of Near- Earth Objects



Near-Earth Objects (NEOs) are meteoroids, asteroids, and comets whose orbits lie close to Earth's. They can also sometimes cross our planet's orbit.

NEOs pose a potential threat to life on Earth. It has gained much public attention in recent years, partly due to Hollywood movies, but also through increased scientific understanding of NEOs and their potentially destructive consequences.

The crash of Comet Shoemaker-Levy 9 into Jupiter in 1994 showed that collisions are still happening even today in our solar system.

More than 3400 Near-Earth Asteroids (NEAs) have been found to date, which is only a fraction of their suspected total population. "1036 Ganymed", with an approximate diameter of 41 kilometers, is the largest NEA. It is currently estimated that there are about 1100 NEAs with diameters larger than 1 kilometer. They are large enough to produce global catastrophe if they were to hit Earth.....

The image is an artist's illustration of a NEO hitting Earth.

See website http://www.planetary.org/explore/topics/near_earth_objects/threat.html

Weerlig-fonteine in Oklahoma

'n Amateur sterrekundige was met sy videokamera op soek na meteore – maar in plaas van meteore het hy 'n bisarre verskynsel van omgekeerde weerligstrale gevind. Hulle staan algemeen bekend as "Sprites", "Elves", "Blue Jets" of "Gigantic Jets".

Hulle is geweldige weerligontladings vanaf die bokant van donderwolke na die ionosfeer. Hulle vertak en strek 80+ km vanaf die wolke soos fonteine wat opwaarts spuit. Dis die eerste keer dat dit in die VSA afgeneem is. Links is twee van die beelde.

As jy dit self wil probeer waarneem, moet jy dit in die nag soek bokant 'n verafgeleë donderwolk agter die horison. 'n Donderwolk wat nader is, versper jou uitsig na die bokant daarvan.

Sien webwerf <http://spaceweather.com> vir 23 Augustus 2007.



The rings of Uranus

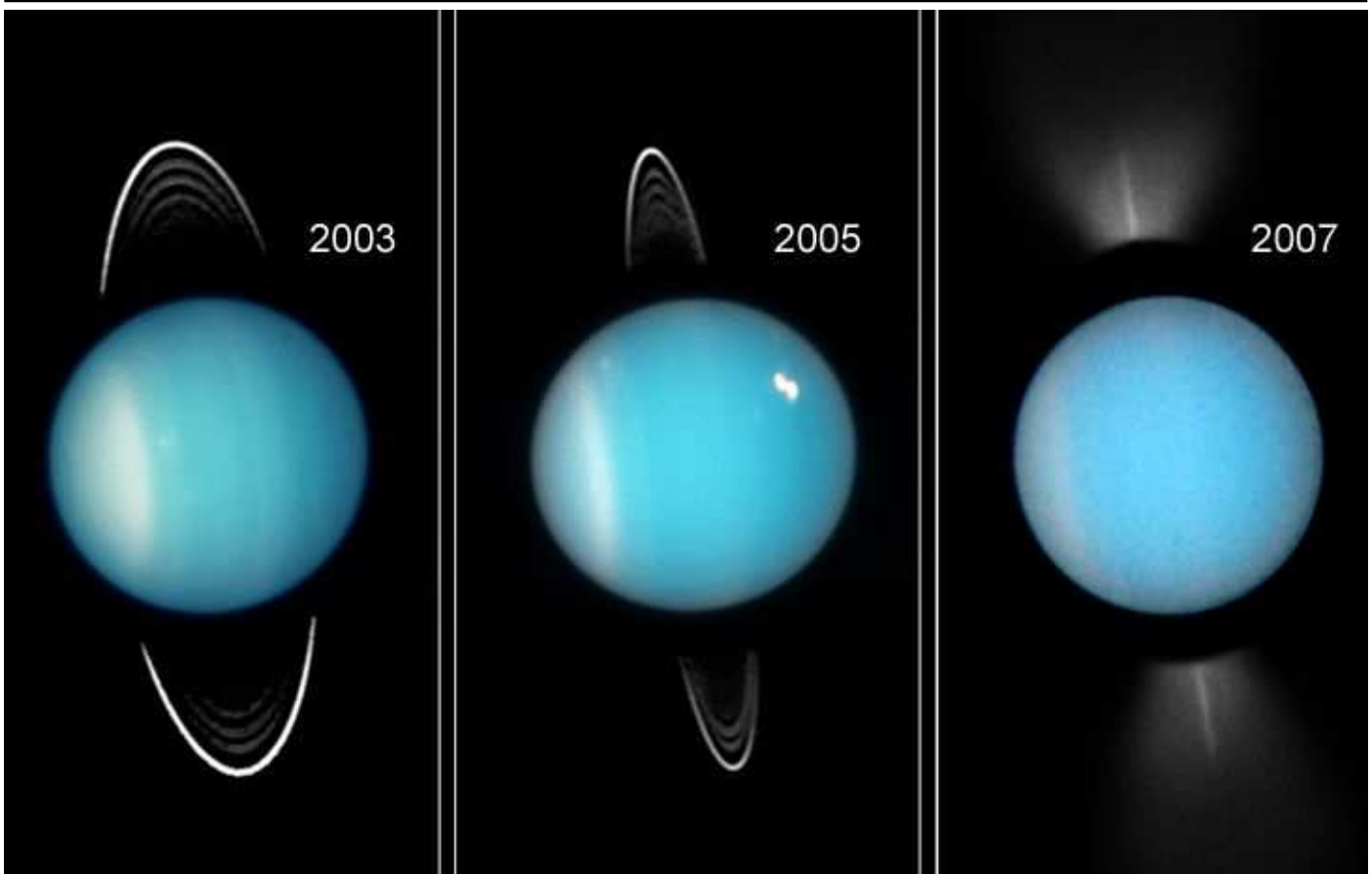
A rare image of the ring system of the planet Uranus has been captured by NASA's Hubble Space Telescope, using the onboard JPL-built and designed Wide Field Planetary Camera 2.

The view, tilted edge-on to Earth, was photographed on August 14, 2007. Earthbound astronomers only see the rings' edge every 42 years as the planet follows a leisurely 84-year orbit about the sun. However, the last time the rings were tilted edge-on to Earth, astronomers didn't even know they existed.

The fainter outer rings appeared in 2003 Hubble images, but were not noticed there until they were seen in 2005 Hubble images, which prompted astronomers to analyze the previous ones more carefully. Uranus has a total of 13 dusty rings.

In the image, the edge-on rings appear as spikes above and below the planet. The rings cannot be seen running fully across the face of the planet because the bright glare of the planet has been blocked out in the Hubble photo. A small amount of residual glare appears as a fan-shaped image artifact, along with an edge.

Uranus is the 7th planet from the sun. Its diameter, without the rings, is about 51,000 kilometers at the equator. Its rotation axis is tilted so much that it lies almost in the plane of its ecliptic. See website <http://www.windows.ucar.edu/tour/link=/uranus/uranus.html> for a wealth of information about Uranus.

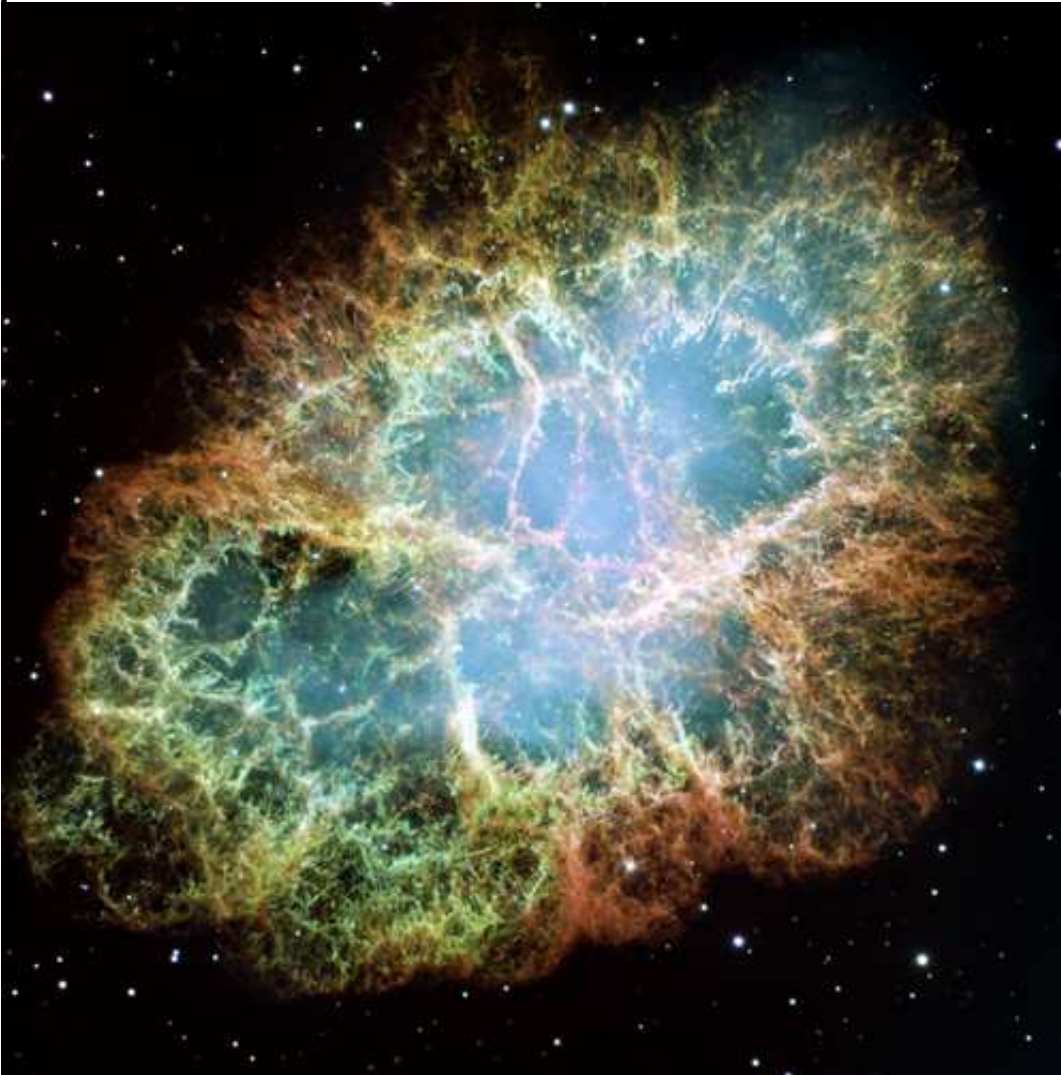


Reuse vuurbal in New Mexico

Interessante dinge het vroeg in September in New Mexico gebeur. Getuies sê dit het die nag in dag verander en het hul aan die volmaan herinner. Ten minste twee heelnag-kameras het die gebeurtenis vasgevang en een amateur sterrekundige het 'n opname van die radio-eggo's van die vuurbal se geïoniseerde stert gemaak. Sien 'n video-opname van die verskynsel op webwerf

<http://spaceweather.com> vir 14 September 2007

The Crab Nebula



The Crab Nebula (also known as Messier Object 1, M1 or NGC 1952) is a gaseous diffuse nebula in the constellation Taurus. This image combines 24 individual exposures obtained with HST through different colour filters.

It is the remnant of a supernova that was recorded by Chinese and Arab astronomers in 1054 as being visible during daylight for 23 days. Located at a distance of about 6500 light-years from Earth, it has a diameter of 6 light-years and is expanding at a rate of 1000 km per second. A pulsar in the center of the nebula rotates 30 times per second.

See a movie of X-ray images of the Crab nebula pulsar on website

<http://chandra.harvard.edu/photo/2002/0052/movies.html>

PRETORIA CENTRE COMMITTEE

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