



# The PRETORIA CENTRE

of the

## Astronomical Society of Southern Africa

[www.pretoria-astronomy.co.za](http://www.pretoria-astronomy.co.za)

### NEWSLETTER JUNE 2010

#### Next meeting

**Venue:** The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.

**Date and time:** Wednesday 23 June at 19h15.

**Programme:**

- **Beginner's Corner:** "Space based telescopes" by Fred Oosthuizen
- **What's Up in the Sky:** by Johan Smit
- 10 minute break — library will be open
- **Main talk:** "Photos from Astronomical Conference – Sossusvlei, Namibia" and "Unusual Weather Phenomena in Southern Africa" by Trevor Gould
- Socializing over tea/coffee and biscuits

The chairperson at the meeting will be Pat Kühn.

Next observing evening: Friday 18 June at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate and follow the road. Arrive from sunset onwards.

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### Last month's meeting - by Percy Jacobs

At the May 10 meeting, we were pleased to have 12 visitors and 24 members attending. We hope to have the visitors join our Society and look forward to seeing them at our monthly meetings and monthly viewing evenings.

What's Up in the Sky for June was presented by Fred Oosthuizen. Fred took us through a few constellations with their interesting deep sky subjects within. Constellations such as Leo, Virgo, Scorpius, Sagittarius, Centaurus and Crux. Details are in the May news letter.

Johan Smit (our Chairman), presented "Basic Optics" as the Beginners Corner subject. As Johan mentioned, some of us may have learnt something new and some others may be just a little more confused. At least we have a far better idea of types of telescopes on offer.

The main speaker for the evening was committee member, Johan Hartmann, on "Spacecraft Instrumentation". Johan spoke to us about how instrumentation on spacecraft, not only covers the small visible part of the spectrum, but also at wavelengths beyond the visible spectrum. Johan also explained how at various wavelengths instrumentation on spacecraft can actually measure the health of crops around the globe, for example. Johan also showed us how resolution of the instrumentation has improved over time. We now have the ability to make use of instrumentation at differing wavelengths at high resolution rates that enables us to gain a better understanding of the Universe.

### Summary of coming presentation "What's Up in the Sky" - by Johan Smit

#### Sights and events to look out for during July 2010

Day	Hour	Event
1	9	Moon at apogee
3	14	Uranus 5.9S of Moon
4	14	LAST QUARTER
6	0	Uranus stationary
6	8	Mercury 4.9S of Pollux
6	10	Earth at aphelion
9	16	Moon furthest North (25.0)
10	11	Venus 1.0N of Regulus
11	19	NEW MOON Solar eclipse over Pacific Ocean. Not visible here.
12	22	Mercury 3.9N of Moon
13	11	Moon at perigee
14	13	Regulus 4.3N of Moon
14	21	Venus 5.4N of Moon
16	0	Mars 5.6N of Moon
18	7	Spica 3.1N of Moon
18	10	FIRST QUARTER
21	18	Antares 1.8S of Moon
22	11	Moon furthest South (-25.0)
23	15	Pluto 5.8N of Moon
26	1	FULL MOON
27	21	Mercury 0.3S of Regulus
28	3	Neptune 4.2S of Moon
28	23	Moon at apogee
30	21	Uranus 5.9S of Moon
31	8	Mars 1.8S of Saturn

### Kennisgewing

Vanaf Julie 2010 sal nuusbriewe slegs per e-pos uitgestuur word.

**Last month's observing evening report - by Michael Poll**

The evening started out cloudy, an thin stratiform layer with minimal sky holes. The cloud looked as though it was in for the evening, and may have kept some of our members away. Our numbers were more than made up by the annual visit of a large and enthusiastic group of third year medical students from Medunsa.

When the student s came we did get a glimpse of the moon, but then they were entertained by Johan with his open air auditorium, who gave his talk about distances in the Universe, illustrating how long it would take to get to various celestial places if one could travel at the speed of light. Part of the idea was for example, to give the distance to some bright star, and then point out the very same star with the laser. Not too successful while the talk was going on, (still cloudy) but we were able to show some of these stars later.

After the talk, we did get some holes in the cloud in the north, and we were able to switch between the moon and Saturn. The phase of the moon (half) was quite nice for viewing the features near the terminator, there was a nice collection of about half a dozen craters with central peaks. All of the students saw Saturn's rings. The rings were still not far from edge on - May 2010 is the last time they will appear so narrow for some years. The sky holes kept closing up, but we were able to show Sirius in the telescope, (all that was available at one stage!). However, after everyone had seen the moon and Saturn, the cloud started breaking up, so we were able to show other things. Were able to point out Spica and Arcturus, both of which were mentioned Johan's talk, and we soon got on to the southern objects, and showed them Theta Carinae (IC 2602) and Alpha Centauri.

The moon was a bit bright for a lot of our favourite nebulous objects, but we did have a look at a few double stars: Alpha Librae (a very wide one), Sigma Scorpii (unequal components), Beta Scorpii, and Gamma Virginis (Porrima) – the latter pair closed up in about 2005, but is now opening up. It seemed to be split in Danie's telescope, but this writer could not be sure if he could see the stars separately in his telescope. When cleanly split, Porrima shows two equal components.

In the event, this was quite a successful evening, particularly for the students, as when the previous group came last year it was totally clouded out.

The first row of photographs left to right show Michael Poll with students. On the photograph below left show Michael Poll and Johan Smit with students. The one below right shows Danie Barnardo with students.



### Observing evening for CBC delegates - by Michael Poll

Christian Brothers College is hosting a teacher's conference over the weekend of July 30<sup>th</sup> 2010, for approximately 25 persons. (The theme is "Religion and Science"). The Headmaster, Mr. Ross, has enquired of the Centre, via Gordon Brittz, whether we could arrange an observing evening for the delegates on Friday July 30<sup>th</sup>. Michael has confirmed with Johan and Gordon that we will do this.

Members of the Pretoria Centre will be aware that CBC has allowed us to use their facilities for our meetings, free of charge, for more than 20 years. The feeling is that we need to put on a good show, with as many telescopes as possible, as a way of showing our gratitude to CBC. Accordingly, if you have telescope, please bring it along! The intention is to start as soon as it gets dark, so, if possible, please be set up by then.

Gordon has indicated that the delegates may not want to go on too late. However, we have said that we will stay as long as they want us to – there will be so many things to see that they may not want to stop! However, as many telescopes as possible are needed, so that if they do want to finish early, they will not have to queue to have a look at anything.

### Coming occultation of a star by Pluto - by Brian Fraser

There is a predicted occultation of a star by Pluto on July 4<sup>th</sup> 2010 at about 4 am. 3 or 4 teams will be coming out from the USA, bringing with them some high-speed and very sensitive CCD cameras.

One will go to Boyden, one will probably go to the Northern Cape somewhere and we will probably have 2 cameras locally. One will probably use the 25" at Aloe Ridge hotel and the other may be on the Innes telescope at the observatory.

The star is about 13.1 in the Infrared band and Pluto is about 13.9 so the drop in brightness will be small.

If anybody would like to attempt this at home please let me know. They may be looking for assistants to help out at Aloe Ridge and at the observatory as it requires more than one person to operate camera, computer, telescope etc. Anybody like to volunteer to assist? They will probably do a test run the night before and possibly also on the 1<sup>st</sup> July.

I do not have the star charts yet but will be getting them shortly. To observe the event you would ideally use a CCD camera with an I or R filter operating as fast as possible. But then any other observation would be valuable. Visual observing will probably be too difficult.

Brian Fraser's e-mail address is [fraserb@intekom.co.za](mailto:fraserb@intekom.co.za)

### Star Party 6 - 8 August 2010

**Members who will not be attending the Karoo Star Party can attend this one, which will be closer to home.** The West Rand Astronomy Club will be hosting a Weekend Away Star Party at the Mountain Sanctuary Park from 6<sup>th</sup> to 8<sup>th</sup> August 2010.

The Mountain Sanctuary Park is a private nature reserve in the Magaliesberg, about 120km north-west of Johannesburg and 90km west of Pretoria.

The night sky is beautiful from this site and if conditions are favourable, the Coal Sack in the Southern Cross and the Small Magellanic Cloud can be seen.

Accommodation options are chalets, log cabins or camping.

Those bringing telescopes stay free, **if camping**. 10 large campsites have been reserved for those with telescopes. These campsites border a central field where the telescopes will be set up. Please join us for a weekend of star gazing under dark skies.

#### Bookings

Please contact Elizabeth at Mountain Sanctuary Park by **30 June 2010**.

Tel: (014) 534-0114 (08H00 - 17H00, 7 Days a week)

eMail: [owen@mountain-sanctuary.co.za](mailto:owen@mountain-sanctuary.co.za)

Website: [www.mountain-sanctuary.co.za](http://www.mountain-sanctuary.co.za) (continued on next page.)

**Be sure to mention you are booking for the WRAC Star Party and whether you are bringing a telescope. For more information contact**

Kenny Nevill on 082 335 1983, email: [kenny@wrac.org.za](mailto:kenny@wrac.org.za).

If bringing a telescope, please email Doryn Jolly, [doryn@wrac.org.za](mailto:doryn@wrac.org.za) to let her know you are bringing a telescope and the type of telescope. Terms and conditions apply.

### **Star Gazer's Deep Space Atlas, Outdoor Viewing (New Edition)**

The new edition Atlas is probably the most valuable and versatile tool for star gazers in South Africa. Beginners may now, with ease, gaze up at the starry heavens and find the constellations and experienced observers may use their telescopes to its full potential. Never before has star gazing been easier!

Star atlases are generally complicated and awkward to use and, at times, an enthusiastic beginner would be left feeling somewhat despondent. But, the carefully designed and revolutionary features included in the new Deep Space Atlas, have been implemented with both the beginner and experienced star gazer in mind.

As a beginner, you may be interested in knowing more about the stars, but are not sure how and where to start. The "Where do I Start" section and the "Sky Tour" exercise, will guide you step by step, from the time you step outside, to locating and observing a remarkable celestial object such as a star cluster, gaseous nebula or double star. The Atlas is also an invaluable tool for more experienced observers in possession of a pair of binoculars, or a small or large telescope, who wish to look for visually challenging objects such as galaxies.

Added information such as distances, and velocities at which these celestial objects travel through space, as well as the Author's Notes, are included to make your observations more inspiring. Viewing the hundreds of objects included in the Atlas would take several years, ensuring you many hours of observing pleasure. Explanations of the Milky Way and meteors (shooting stars) are also included.

Dew resistant and wire bound pages, white stars on a black background, finder circles, southern hemisphere star maps, direction pointers, horizon lines and an abundance of celestial objects to observe, are just some of the features which places the Atlas in a class of its own, one that has revolutionized recreational astronomy!

Wayne Mitchell offers on-line support to users of the Atlas which is accessible via a website, [www.deepspaceatlas.com](http://www.deepspaceatlas.com)

### ***Your Voyage to the Stars is About to Begin...***

**Author:** Wayne Mitchell.

**ISBN:** 978-0-620-41105-9.

**Edition:** Second edition.

**Published:** April 2010.

**Size:** A5 (210x150 mm).

**Pages:** 270. Laminated covers and varnished inner pages.

**Cost:** R399. **Registered postage:** R65.

**Special offer! The first 100 copies are offered at R299, thereafter R399**

**Orders:** Contact Wayne at e-mail: [wayne.mitchell@penbrogroupe.com](mailto:wayne.mitchell@penbrogroupe.com)

**Cell:** 072 465 7739.

**Release date:** mid June.

### **Most distant galaxy cluster ever seen**

Like a location from the film Star Wars, this galaxy cluster is far, far away and with origins a long, long time ago. With the ungainly name of SXDF-XCLJ0218-0510, this cluster is actually the most distant cluster of galaxies ever seen. It is a whopping **9.6 billion light years** away, and X-ray and infrared observations show that the cluster hosts predominantly old, massive galaxies.

<http://www.universetoday.com/2010/05/10/team-finds-most-distant-galaxy-cluster-ever-seen/>

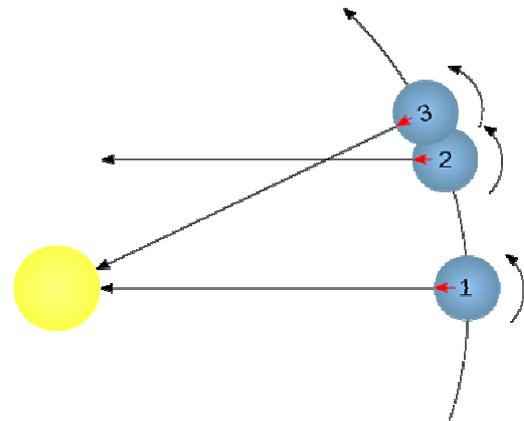
## Basics: Timekeeping - by Pierre Lourens

### Apparent Solar Time

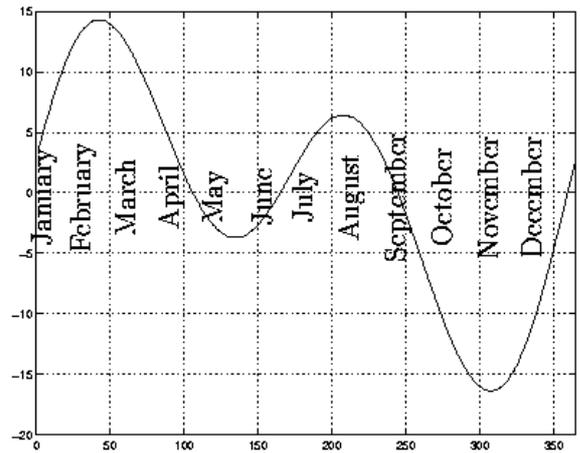
Sundials measure time based on the actual position of the Sun in the local sky. This time is called the apparent (or local) solar time. Noon is the precise moment when the Sun is on the meridian (which is an imaginary circle passing from north to south through the zenith) and the sundial casts its shortest shadow. Before noon, when the Sun is on its way to the meridian, the apparent solar time is ante meridian (a.m.) and past noon the apparent solar time is post meridian (p.m.).

### Mean Solar Time and Standard Time

On the Earth, the sidereal day is shorter than the solar day. At position 1, the Sun and a certain distant star are both on the meridian. At position 2, the Earth has rotated 360° and the distant star is on the meridian again (time 1→2 = one sidereal day). But it is not until a little later, when the Earth is at position 3, that the Sun is on the meridian again (time 1→3 = one solar day). Or more simply, time 1→2 is the time it takes for a complete rotation of the Earth, but because the revolution of the Earth around the Sun affects the angle at which the light from the Sun strikes a fixed position on the Earth, time 1→3 is how long it takes before the Sun is on the meridian again.



The actual length of the solar day varies throughout the year due to the difference in the speed of revolution of Earth around the Sun. Due to this effect, a watch will not remain perfectly synchronized with the sundial over the year. Hence it is much more convenient to define a time in terms of the average of the apparent solar time. This is called the mean solar time and is the basis of standard time. The mean solar day is taken to be 24 hours long. This is the definition of an hour. The value of the difference between mean and apparent solar time is called the Equation of Time. The Equation of Time is not a mathematical equation at all, but a correction ( $\Delta$ ) that is added to the apparent solar time (AST), read from a sundial, to obtain the mean solar time (MST) :



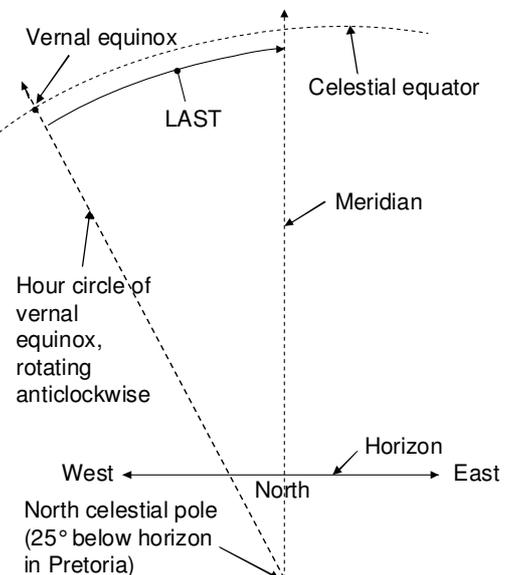
$$MST = AST + \Delta$$

$\Delta$  can be positive or negative. The Equation of Time ( $\Delta$ ) is plotted on the graph as a function of date. (However, the graph has to be shifted up/down, depending on whether the longitude where the sundial is located, is moved further west./east)

For purposes of navigation and astronomy (especially interferometry in radio astronomy), it is useful to have a single time for the entire Earth. For historical reasons, this "world" time was chosen to be the mean solar time at Greenwich, England (longitude 0 degrees), and this time is called Universal Time (UT). South African Standard Time (SAST) is the mean solar time at longitude 30° East. It is 2 hours ahead of UT. E.g., when it is 5 o'clock in the morning in South Africa, it is still only 3 o'clock in the morning in England.

### Sidereal Time

Relative to the stars, the Earth's rotation period is 23



hours, 56 minutes and 4.091 seconds. It is very nearly 4 minutes less than 24 hours. (All these are mean solar times.) This period is time 1→2 in the first figure on the previous page. This period is called a sidereal day and clocks running at this rate indicate the sidereal time. Sidereal time, or more precisely Local Apparent Sidereal Time (LAST), is defined as follows. (See the illustration at the bottom of the previous page.) It is the angle (measured along the celestial equator clockwise, facing north) between the hour circle of the vernal equinox (of the northern hemisphere) and the meridian, at that time and that longitude on Earth. The angle is expressed in units of sidereal time: 24 hours of sidereal time  $\equiv$  360°. (This angle is also called the "right ascension" (RA) of the meridian. A concise definition of LAST is then as follows: **LAST is the RA of the meridian.**) At the moment when the vernal equinox crosses the meridian, LAST is 00:00.

### **Tweede Nasionale Karoo Sterpartytjie kry groot aftrek**

Chris de Coning van ASSA se Cape Centre is besig met die finale reëlings vir 'n bustoer na Danie Barnardo se Tweede Nasionale Karoo Sterpartytjie (sien bladsy 8 van hierdie nuusbriëf).

### **ASSA Symposium 2010**

#### **First announcement and invitation to submit papers**

The Society will hold its 2010 Symposium on 7, 8 and 9 October 2010 at the Council for Geoscience, Pretoria Road 280, Silverton, Pretoria. The Symposium will be hosted by the Pretoria Centre of ASSA.

The symposium will be focusing on light/spectrum pollution, but will not be limited to these topics. All other aspects of astronomy will be allowed during the Symposium.

We wish to invite both professional and amateur astronomers to present papers at the symposium.

The organizing committee is calling for abstracts (non-technical overviews of the papers that will eventually be presented. No mathematical or diagrammatic content required).

Verbal papers may be submitted in two categories:

- Short papers, for delivery in 20 minutes, with 10 minutes for discussion and questions.
- Long papers, for delivery in 40 minutes, with 20 minutes for discussion and questions.

A third available category is:

Presentations in the form of displays. These may use one standard folding table (about 1800 X 600 mm in size) and a poster board behind it to display any subject pertaining to astronomy.

Authors should indicate in the abstract in which category the paper is being submitted. Please make submissions in .doc (MS Word) or Adobe PDF format. Only e-mailed submissions, with the file attached, will be accepted. Full contact details (including e-mail address) and the full title of the paper **MUST** be submitted with the abstract. The latest date for submission is 31 July 2010.

Please indicate a preferred date and time to present your paper.

The Symposium committee reserves the right to accept or reject papers and to decide in which session of the Symposium it will be placed, although all efforts will be made to accommodate presenters.

Persons interested in attending the Symposium, delivering a paper or presenting a display should contact the Symposium committee at:

[symposium2010@pretoria-astronomy.co.za](mailto:symposium2010@pretoria-astronomy.co.za)

More details and a subscription form can also be downloaded from:

<http://www.pretoria-astronomy.co.za>

Alternatively, the phone contact is: Andrie van der Linde at: 083 632 4894

### Tramp stars

So-called "tramp stars", flung from their galaxies in past gravitational interactions, could exist in great numbers outside the Milky Way Galaxy. A new study investigating the disruptive effects of galaxies merging or tugging on each other shows that there should be numerous stars thrown from their habitual confines during such interactions and into intergalactic space. From a planet encircling one of those lonely stars, the heavens would make for pretty dull viewing.

If you were on a planet orbiting a sun-like star that were halfway between us and the Andromeda Galaxy, you would look out in the night sky, and you would see no stars at all with the naked eye. You would see a few distant, blurry, fuzzy patches, and those would be the faraway galaxies.

See also page 12 of this newsletter.

<http://www.scientificamerican.com/article.cfm?id=wandering-stars>

### Milky Way may have a huge hidden neighbour

A large satellite galaxy may be lurking, hidden from view, next door to our own. Sukanya Chakrabarti and Leo Blitz of the University of California, Berkeley, suspected that the gravity of a nearby galaxy was causing perturbations that have been observed in gas on the fringes of the Milky Way. "We did a large range of simulations where we varied the mass of the perturber and the distance of closest approach," says Chakrabarti. In the best-fitting simulation, the unseen galaxy has about 1 per cent of the Milky Way's mass.

That's a lot. It means the object has roughly the same mass as the Milky Way's brightest companion galaxy, the Large Magellanic Cloud. By further studying the distribution of gas, Chakrabarti hopes to pinpoint the galaxy's location so that astronomers will know where to look for it.

This parallels the way astronomers discovered Neptune in the 1840's from irregularities in the motion of Uranus caused by gravitational tugs from the more distant Neptune.

<http://www.newscientist.com/article/mg20327213.500-milky-way-may-have-a-huge-hidden-neighbour.html>



### Second Karoo Star Party

The ASSA Pretoria Centre wants to hold its second National Karoo Star Party during the long weekend of 6 to 9 August 2010 about 20 km north of Britstown in the Karoo, right next to the N12 at the Kambro Padstal. The reason for this locality, apart from the fabulous Karoo skies, is that it is almost exactly halfway between Gauteng and the Cape Town area, so we can all drive the same distance to the site. The first event of this type was held during April 2009 and proved to be a big success. The Karoo lived up to its reputation and provided magnificent views to those lucky enough to be present.

More information from:

- Johan Smit, cellphone: 072 806 2939, e-mail: [JohanS@firsttech.co.za](mailto:JohanS@firsttech.co.za)
- Danie Barnardo, cellphone: 084 588 6668, e-mail: [daniebar@telkomsa.net](mailto:daniebar@telkomsa.net)

To book, please contact Wilma Strauss, the Manager of Kambro directly at 083 305 6668 or at e-mail: [kambro@worldonline.co.za](mailto:kambro@worldonline.co.za). You can also view their website (with a report on the star party that took place last year) at: <http://www.kambroaccom.co.za/>

## Extremophiles

Extremophiles are life forms that can survive under extreme conditions. On Earth, life forms are found in places such as those listed below. This raises our hopes that extraterrestrial life may eventually be found.

- Steaming hot pools and scalding undersea hydrothermal vents, where there is no sunlight.
- The most frigid polar regions are home for a few organisms.
- Microbes thrive in the Dead Sea, in water eight times saltier than the ocean.
- Acidic hot springs and geysers.
- The most alkaline environments in the world are soda lakes, which can have a pH as high as 12. A number of microbes enjoy those caustic conditions.
- Living cells were found in a mud core taken from 1.6 km below the sea floor.
- Communities of microorganisms have been found hunkered down in groundwater as far as 5 km below the surface of the land.
- Even the deepest part of the ocean, the Mariana Trench, which plunges 11 km below the surface of the Pacific Ocean near Guam, is inhabited.
- In the most parched place on Earth, the Atacama Desert, it rains only a few times a century. Microbes have been found there.
- Some microbes like nothing better than to be nestled in a toxic sludge of heavy metals like zinc, arsenic and cadmium.
- Incredibly, the bacterium *Deinococcus radiodurans* can withstand about 2000 times the dose of ionizing radiation that would kill a human, making it the most radiation-resistant organism known.
- Microbes can survive for many millennia.
- Bacteria were isolated from permafrost samples drilled in Siberia, northwestern Canada, and Antarctica that were estimated to be up to half a million years old.

<http://www.newscientist.com/article/dn14208>



## Why the Universe may be teeming with aliens

**WANTED:** Rocky planet outside of our solar system. Must not be too hot or too cold, but just the right temperature to support life. It sounds like a simple enough wish list, but finding a planet that fulfills all of these criteria has kept astronomers busy for decades. Until recently, it meant finding a planet in the "Goldilocks zone" - orbiting its star at just the right distance to keep surface water liquid rather than being boiled off or frozen solid.

Hunting for a planet that can support life? There's more to it than looking for Earth's distant twin. It's becoming increasingly clear that the question of what makes a planet habitable is not as simple as finding it in just the right spot. Many other factors, including a planet's mass, atmosphere, composition and the way it orbits its nearest star, can all influence whether it can sustain liquid water, an essential ingredient for life as we know it. As astronomers explore newly discovered planets and create computer simulations of virtual worlds, they are discovering that water, and life, might exist on all manner of weird worlds where conditions are very different from those on Earth. And that means there could be vastly more habitable planets out there than we thought possible. "It's like science fiction, only better," says a climate scientist who studies planets inside and outside of our solar system.

The scene above depicts pools of brine on an imaginary desert planet.

<http://www.newscientist.com/article/mg20026831.600-why-the-universe-may-be-teeming-with-aliens.html>

### Life on Jupiter's moons Europa or Callisto?

- Jupiter's moon Europa is considered one of the most biologically interesting worlds in the solar system. There are several reasons for this, among them:
  1. The likely presence of a sub-surface ocean of liquid water (perhaps as much as 150 km deep) on Europa, and which could provide a medium and solvent for life.
  2. Intense radiation from Jupiter's magnetosphere striking ice on Europa's surface and releasing oxygen, which if it finds its way into the ocean could provide a fuel for life.
  3. The possible presence of undersea volcanic vents on Europa, which could furnish energy and nutrients for organisms.

<http://www.daviddarling.info/encyclopedia/E/Europa.html>

- The first indication that Jupiter's moon Callisto might be of astrobiological interest came in October 1998, with the publication of a paper proposing the theory that Callisto, like Europa, might have an underground ocean of water and perhaps the basic ingredients for life.

<http://www.daviddarling.info/encyclopedia/C/Callistoocean.html>

### Life on Mars?

Scientists have long speculated about the possibility of life on Mars owing to the planet's proximity and similarity to Earth. Although fictional Martians have been a recurring feature of popular entertainment, it remains an open question whether life currently exists on Mars, or has existed there in the past.

The primary mission of the two Viking Landers of 1976 was to carry out experiments designed to detect microorganisms in Martian soil. They found exotic chemistry, but an (almost) general consensus discarded this as evidence of life.

However, one cannot state dogmatically that there is no life on Mars or never was any. There are still a lot of places on Mars which are different from those where the Viking Landers landed, and where a search for past and present life can be made.

The Phoenix mission landed a telerobot in the polar region of Mars on May 25, 2008 and it operated until November 10, 2008. One of the mission's two primary goals was to search for a 'habitable zone' in the Martian regolith where microbial life could exist, the other main goal being to study the geological history of water on Mars.

Several future missions to search for life on Mars are being planned.

- [http://en.wikipedia.org/wiki/Life\\_on\\_Mars](http://en.wikipedia.org/wiki/Life_on_Mars)
- <http://www.msss.com/http/ps/life/life.html>
- <http://www.spacetoday.org/SolSys/Mars/MarsThePlanet/MarsLifeSearch.html>

### Life on Saturn's moons Titan or Enceladus?

The Cassini spacecraft has found numerous hydrocarbon lakes on Titan since it arrived at Saturn in 2004. But as it mapped the moon, it discovered far more lakes on the north pole than the south. Since the north pole was experiencing winter during Cassini's observations, researchers suggested that the lakes might be a seasonal phenomenon, filling with methane rain in the winter, then evaporating in the summer. But a new study argues that the lakes are much longer lived, moving between the poles over timescales set by gradual changes in Saturn's orbit. This would give a longer time for life to evolve.

If there is life on Titan, it would likely involve chemicals that are noxious and disgusting to humans.

- <http://www.newscientist.com/article/dn18224-longlived-titan-lakes-are-boon-to-life.html>
- <http://www.space.com/scienceastronomy/titan-life-stink-100410.html>

About the possibility of life on Enceladus, see

- January 2010 newsletter, pages 4 to 7.
- February 2010 newsletter, pages 4 to 6.
- <http://www.newscientist.com/search?doSearch=true&query=Enceladus>

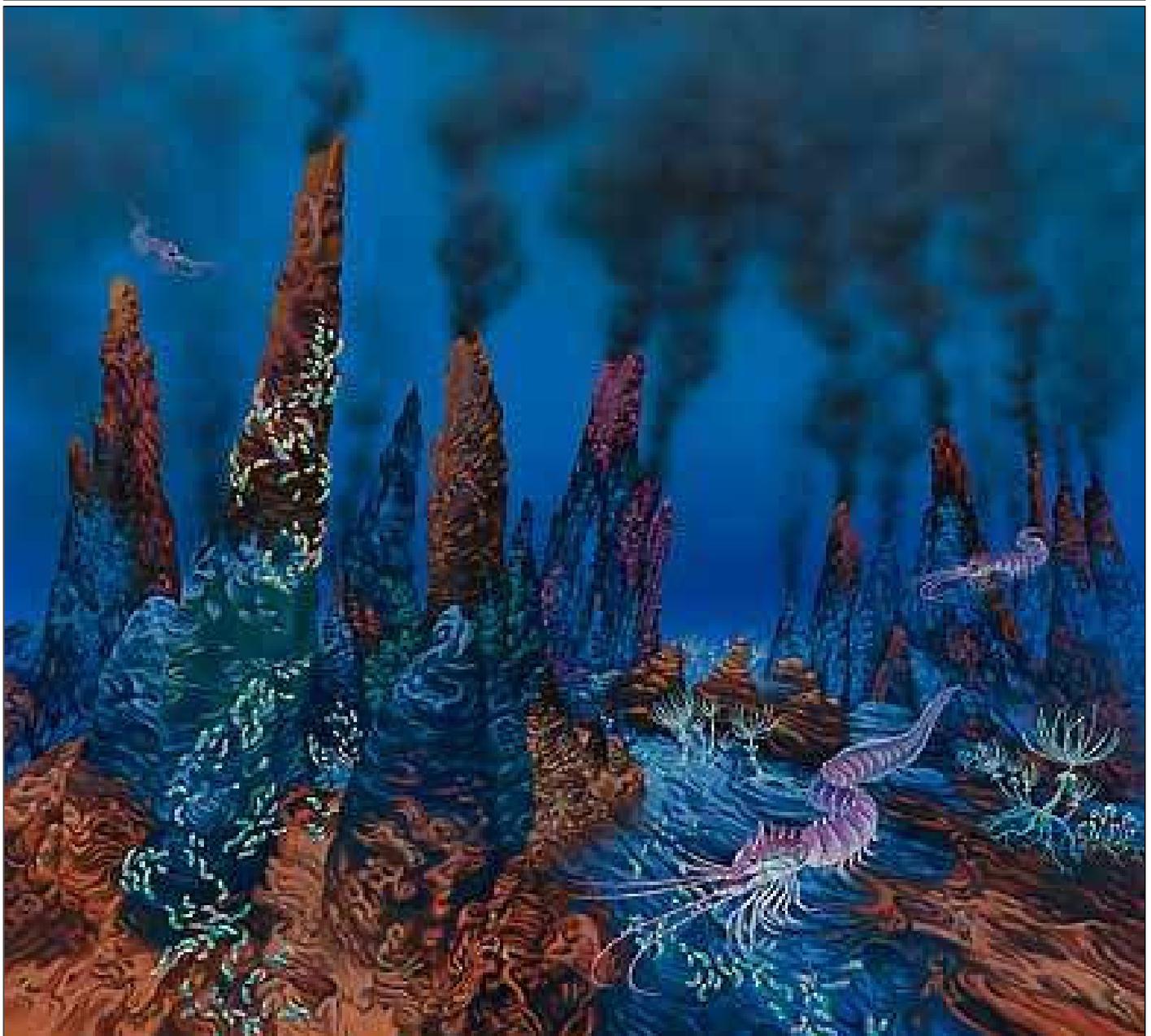
### Top 10 controversial pieces of evidence for extraterrestrial life

<http://www.newscientist.com/article/dn9943-top-10-controversial-pieces-of-evidence-for-extraterrestrial-life.html>

### Give your imagination free rein

Below is an artist's representation of an imaginary scene on a water world around another star or on Europa or Callisto. At the bottom of its ocean, smokers are found similar to those at the mid-Atlantic ridge on Earth. Life forms are abundant here. Despite heat and pressure they have adapted and survived.

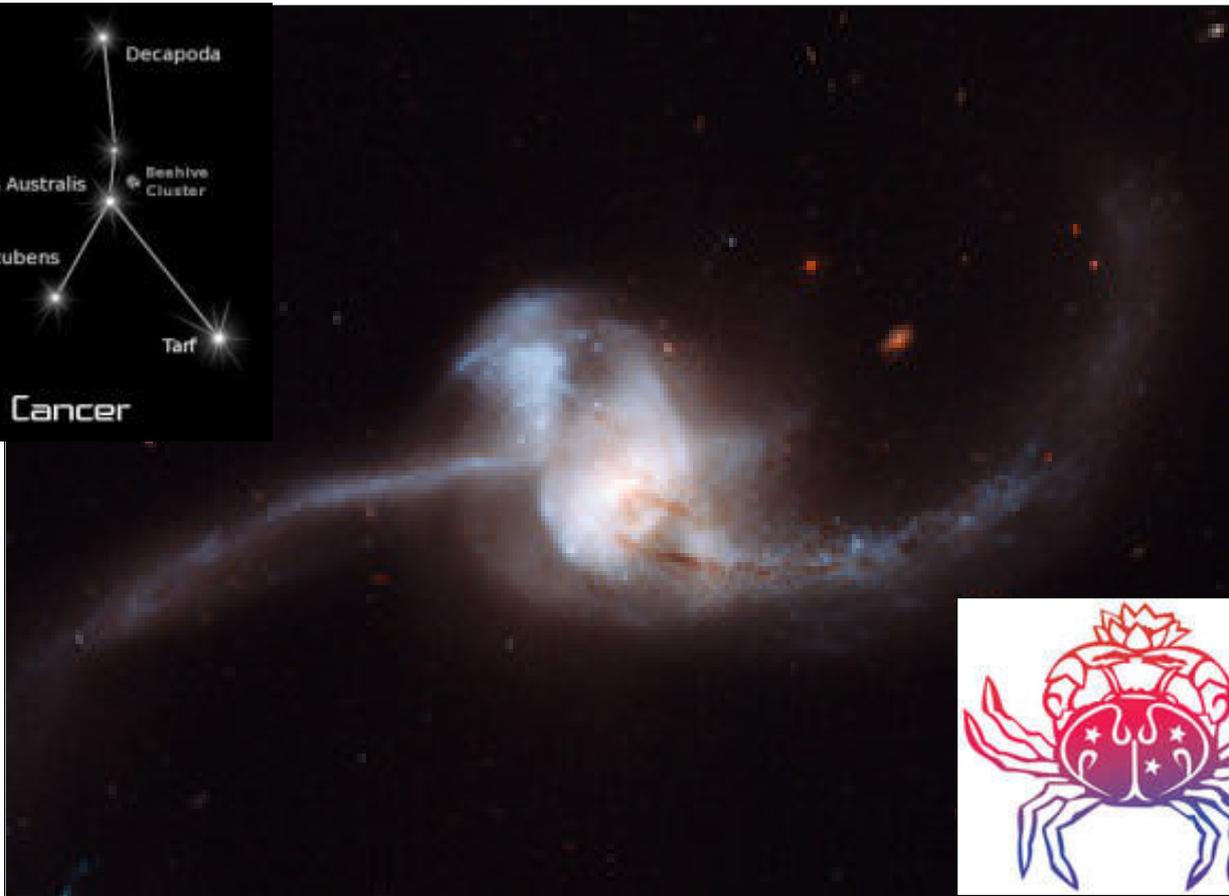
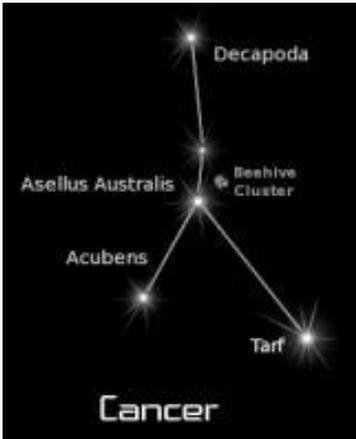
Is this scene just pure fantasy? Maybe not.



**Arp 243**

A recent NASA/ESA Hubble Space Telescope image captures what appears to be one very bright and bizarre galaxy, but it is actually the result of a pair of spiral galaxies, each of which resembles our own Milky Way, smashing together at breakneck speeds. The product of this dramatic collision, called NGC 2623, or Arp 243, is about 250 million light-years away in the northern constellation Cancer (the Crab), which is one of the twelve constellations of the zodiac.

<http://www.sciencecentric.com/news/article.php?q=09101321-sky-merger-yields-sparkling-dividends>



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