



# WAS NEWS

Monthly Newsletter of the Worthing Astronomical Society

Official website: [www.was.org.uk](http://www.was.org.uk)

Affiliated websites: [www.observatory99.freemove.co.uk](http://www.observatory99.freemove.co.uk)



Number 171

January 2004

## ALMANAC All times U.T.

### January / February

#### LUNAR

January	Date	Time	Rise	Set
Full Moon	7 <sup>th</sup>	15.40	15.29	08.35
Last Quarter	15 <sup>th</sup>	04.46	00.23	11.21
New moon	21 <sup>st</sup>	21.05	08.20	15.32
First Quarter	29 <sup>th</sup>	06.03	10.45	00.52
<b>February</b>				
Full Moon	6 <sup>th</sup>	08.47	16.52	08.14
Last Quarter	13 <sup>th</sup>	13.40	01.01	10.02
New moon	20 <sup>th</sup>	09.18	07.44	17.23
First Quarter	28 <sup>th</sup>	03.24	09.47	02.12

#### EARTH

January	Sunrise	Sunset
7 <sup>th</sup>	08.05	16.08
15 <sup>th</sup>	08.00	16.20
21 <sup>st</sup>	07.54	16.29
29 <sup>th</sup>	07.44	16.43
<b>February</b>		
6 <sup>th</sup>	07.32	16.58
13 <sup>th</sup>	07.19	17.11
20 <sup>th</sup>	07.06	17.23
28 <sup>th</sup>	06.49	17.38

#### PLANETS (As at January 29<sup>th</sup>.)

	Constellation	Rises	Sets	Mag.
<b>Mercury</b>	Sagittarius	06.44	14.47	-0.2
Very low in the south east				
<b>Venus</b>	Aquarius	09.12	20.23	-4.1
Low in the south west				
<b>Mars</b>	Pisces	10.10	00.07	+0.7
Visible in the south west				
<b>Jupiter</b>	Leo	20.12	09.21	-2.4
Well placed				
<b>Saturn</b>	Gemini	13.54	06.11	-0.4
Visible most of the night				
<b>Uranus</b>	Aquarius	08.40	18.49	+5.9
Unfavourable				
<b>Neptune</b>	Capricornus	07.55	17.05	+8.0
Unfavourable				
<b>Pluto</b>	Serpens cauda	04.06	13.44	+13.9
Unfavourable				

#### PHENOMENA

Day	Hour	January
4 <sup>th</sup>	18	Earth at perihelion [147 M. km.]
6 <sup>th</sup>	14	Mercury at stationary point
7 <sup>th</sup>	01	Saturn 5°S. of moon
12 <sup>th</sup>	13	Jupiter 3°S. of moon
17 <sup>th</sup>	09	Mercury at greatest elongation W.24°
20 <sup>th</sup>	04	Mercury 5°N. of moon
24 <sup>th</sup>	19	Venus 3°N of moon
26 <sup>th</sup>	05	Mars 2°N of moon

### February

2 <sup>nd</sup>	09	Neptune in conjunction
3 <sup>rd</sup>	05	Saturn 4°S of moon
8 <sup>th</sup>	16	Jupiter 3°S of moon
19 <sup>th</sup>	14	Mercury 3°N of moon
22 <sup>nd</sup>	02	Uranus in conjunction

#### Minima of Algol

January 23 <sup>rd</sup>	05.24	26 <sup>th</sup>	02.12	28 <sup>th</sup>	23.00	31 <sup>st</sup>	19.48
February 15 <sup>th</sup>	03.54	18 <sup>th</sup>	00.48	20 <sup>th</sup>	21.36	23 <sup>rd</sup>	18.24

#### Lunar Occultation's

Times as at W.A.S. Observatory

Date	U.T.	S.A.O.No	Mag	Phase
January				
26 <sup>th</sup>	17.37.42	128823	7.0	Diss
26 <sup>th</sup>	20.20.32	128862	9.3	Diss
26 <sup>th</sup>	20.58.23	109322	9.1	Diss
28 <sup>th</sup>	18.39.28	92804	8.8	Diss
28 <sup>th</sup>	21.03.30	92804	8.2	Diss
29 <sup>th</sup>	22.04.12	93185	7.8	Diss
29 <sup>th</sup>	23.22.23	93205	6.8	Diss
30 <sup>th</sup>	00.16.18	93219	9.3	Diss
30 <sup>th</sup>	21.57.49	93560	8.4	Diss
30 <sup>th</sup>	23.04.40	76120	8.9	Diss
31 <sup>st</sup>	18.46.20	76613	5.4	Diss
31 <sup>st</sup>	20.52.49	76635	7.0	Diss
31 <sup>st</sup>	21.19.21	76636	7.2	Diss
Feb				
1 <sup>st</sup>	23.00.35	77163	8.0	Diss
2 <sup>nd</sup>	23.25.05	78245	8.4	Diss
3 <sup>rd</sup>	19.46.26	79122	7.9	Diss
3 <sup>rd</sup>	20.48.21	79142	6.7	Diss
3 <sup>rd</sup>	12.33.55	79164	7.8	Diss
4 <sup>th</sup>	00.23.53	79243	7.4	Diss
4 <sup>th</sup>	00.45.36	79253	7.9	Diss
4 <sup>th</sup>	02.45.17	79316	7.9	Diss
4 <sup>th</sup>	18.26.58	79869	6.2	Diss
9 <sup>th</sup>	00.45.14	118946	7.0	Reapp
9 <sup>th</sup>	01.15.47	118952	7.0	Reapp

This is only about 12% of the predictions for the WAS. Observatory.

Dave Wells

## Editors Note

And a Happy New Year to you too!

I do hope that you all had a festive and relaxing Christmas – unless of course you were involved in the Beagle 2 mission - more of that elsewhere in this Newsletter.

As compensation however NASA has delivered some marvellous pictures from the Red Planet – more of that later.

As in life so also with spaceflight – some good news, and some bad news.

Rob

## Reports

### The Planets in January 2004

Glen Thomas - Planetary Section Director

**Mercury** presents itself in the predawn skies, but it will be hard to find if you have an obstructed SE horizon (see table below). Waiting until March, a half Mercury year later, will allow you to find Mercury east of the Sun and higher in the evening sky than this month.

Date	Time	Alt°	Az°
Jan 10	07:23	7.2	136
Jan 13	07:21	7.0	137
Jan 16	07:19	6.4	137
Jan 19	07:17	5.7	136
Jan 22	07:15	4.9	135
Jan 24	07:14	4.3	134

**Venus** is now unmistakable in the SW during evening twilight and will continue to climb until late March.

**Mars** is still high in the evening sky and a good target for observation. The phase is now noticeably gibbous as Earth continues to draw ahead on its faster orbit.

**Jupiter** continues to dominate the sky throughout much of the night, rising before **22:00**, but still best place during the small hours either side of its **04:00** transit.

**Saturn** is just past opposition and is now at its best. It is visible in Gemini from dusk to dawn and reaches an altitude of over **60°** by **23:00**.

**Uranus, Neptune and Pluto** are not favourable.

The largest asteroid, **1 Ceres**, is moving NW through Gemini and will be 1° north of 46  $\tau$  Geminorum on **Jan 22/23**. At magnitude +7.0, steadily held binoculars should be sufficient to see this minor planet.

December Lecture Reviewed – Report By Vanessa Wegner

## The Relevance of Astronomy to Human Culture

Dr Francisco Diego

Dr Diego opened the lecture with a quote from T H Huxley, “sit down like a little child and be prepared to give up every preconceived notion, follow humbly wherever and to whatever abyss nature leads, or you shall learn nothing”. Our awareness, eagerness to learn and questioning of our place in the universe is indeed what differentiates us from animals. Always mankind has tried to make patterns and some kind of sense out of what can be seen in the universe, the ancient Egyptians being one of the earliest examples of observation, science and religion being brought together to explain celestial movements and patterns. The sky goddess Nut is portrayed in Egyptian tombs and temples as a naked female stretched across the sky, the sun god Ra is shown as entering her mouth, passing through her body and emerging from her birth canal.

Only 500 years ago people’s perception was that our planet was motionless, indeed we still refer to the sun rising and the moon rising although this is not accurate but this is what our senses tell us. The shapes formed by stars have been constant but the planets movements proved very hard to explain. During the 1300’s and 1400’s Europe was dominated by the Catholic Church. The belief instilled by the church was that God had made all the stars and objects in the sky, therefore it was impossible for new stars to be born. Astronomers and scientists had a huge problem explaining a new star or supernova. Just before Galileo Tycho Brahe managed to measure the position of the stars very accurately, he accomplished this despite not having a telescope. He wanted to see if Copernicus was correct in his theory that the planets were orbiting the sun. This was an amazing theory, particularly without the aid of a telescope. The Catholic Church forbade his book as his findings directly contradicted catholic teaching.

In 1600 Galileo built his own telescope. His observations of the moon showed that it was not smooth. This was a very important discovery because it revealed that it was another world subject to the forces of the universe. Galileo discovered the moons of Jupiter and the phases of Venus. This was not theology but fact, Galileo was saying that if a telescope was pointed at the moons and planets these things are evident, the Catholic church denied the truth of Galileo’s discoveries and persecuted him for propounding such discoveries.

## Notices

### Donation Of Slides to WAS

Graham Boots

Member, Michael A. Marshall has kindly donated the following four sets of slides to the society.

Each set has a cassette containing an accompanying narration. These are available for loan to members by contacting Graham Boots on 01903 505346.

*The best of the Space Shuttle 1977 ~ 84 - 40 colour slides*

*The story of our Universe- 40 colour slides*

*Voyager 1 encounters Saturn - 40 colour slides*

*Voyagers Encounter Jupiter - 40 colour slides*

At the Observatory we have many sets of slides belonging to the society.

Complete list is available from the Curator upon request

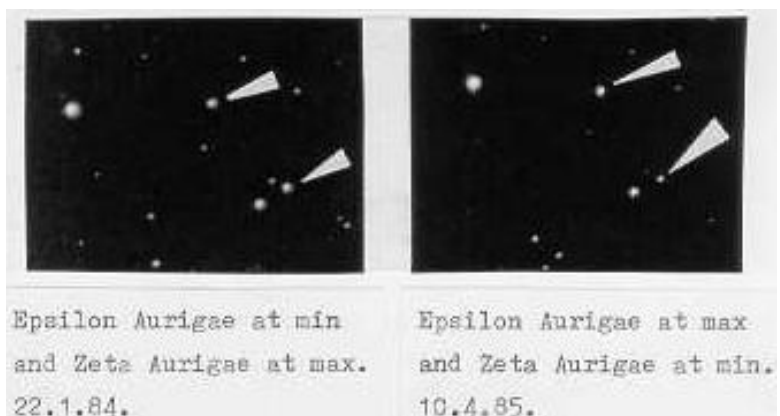
## Articles

### Long Period Eclipsing Binary Stars.

Alex Vincent.

Most eclipsing binary stars have short periods of hours, days with durations of eclipses lasting several hours. Algol (Beta Persei) is the most famous and has a period of 2.87 days and duration of ten hours.

There are some eclipsing binary stars, which have much longer periods of months and even years and durations of many days, weeks and months. Epsilon Aurigae has the longest known period of any known eclipsing binary, which has a period of 9892 days (27.1 years) and duration of 700 days of which 371 are total.



The next stage in this journey of discovery involved the rainbow. Newton was co-incidentally born in the same year Galileo died. Amongst many other things he worked on prisms and he discovered that rainbows are made out of white light.

William Herschel is famous for building giant telescopes, the largest being 24 feet in length. Herschel carried out more work on the rainbow. There is a story that one day whilst working with a prism Herschel left the room for about 10 to 15 minutes, when he returned the rainbow had moved but the thermometer was still measuring hot energy. The last colour of a rainbow is red, Herschel concluded that there must be another colour, hence he discovered infrared.

William Huggins observed spectra and realised that the chemical elements of the stars and planets are the same as the planet earth, pointing to the universality of life. In Harvard during the early part of the twentieth century a group of girls called "computers" classified stars using their spectra, one "computer" classified about half a million! During the 1920's Hubble overcame another milestone by measuring the distance of Andromeda. During the mid 1900's we discovered that some of the forces we were using in destructive ways were the same forces present in the stars, such as hydrogen. Indeed we now know that all the chemical elements present in the universe come from stars, we really are made of stardust.

Dr Diego concluded the lecture with some thought provoking and disturbing questions. We live on a planet, which has a transparent atmosphere, and this has allowed us to make thousands of years of observations. If we imagine that the Earth was permanently covered with cloud, how would we have evolved? Or would we have evolved at all? Today light pollution and cloud obscure much of the skies, but ironically mankind is not so interested in observing, questioning and exploring the universe as our ancestors. One wonders therefore if we are still evolving.

Dr Diego's inspiring and charismatic delivery of the lecture provoked many questions from the audience and much lively debate, an exciting and thought-provoking lecture to end the year.

Below is a list of some long period eclipsing binaries.

STAR	MAX	MIN	PERIOD (days).
Mu Sgr	3.79	3.92	180.45.
BM Cas	8.78	9.31	197.27.
RZ Oph	9.65	10.4	261.92.
Zeta Aurigae	3.7	4.2	972.16.
OW Gem	8.2	10.0	1258.59.
Eta Gem	3.15	3.90	2983.49.
AZ Cas	9.26	9.50	3402.
V695 Cyg	3.73	3.89	3784.3
VV Cep	4.80	5.36	7430
Epsilon Aurigae	2.92	3.83	9892

longer for favourable eclipses or indeed the next eclipse. Below are some examples.

STAR.	MID-ECLIPSE.
OW Geminorum	2008 November 24.
Epsilon Aurigae	2010 August 4.
Eta Geminorum	2012 October 2
VV Cephei	2018 April 12.

*Last months article by member Michael A Marshall entitled 'Which Universe are we in?' was sent to print in its 'unproved' state. Mea Culpa! This I'm afraid was an editorial error and we reproduce the correct version in full below. I would take this opportunity to apologise to Michael for transforming an intelligent, well composed and thought provoking article into gobbledegook. - Ed*

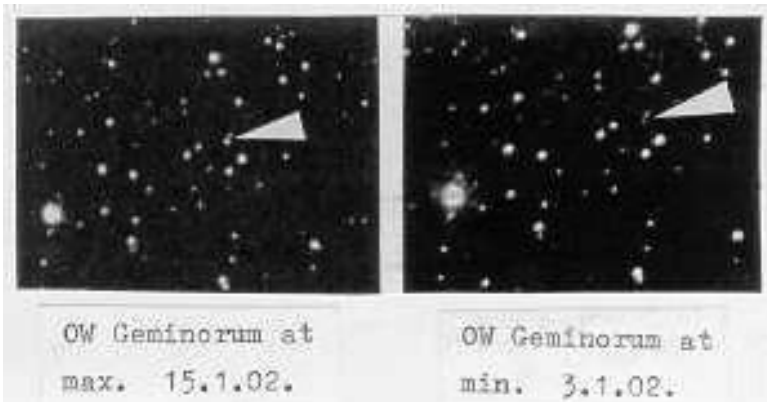
### Which Universe are we in?

Michael A Marshall

In her September talk on Cosmology Caroline Beevis reminded us that there is a universe that we cannot see (but one that is an entity), apart from the universe that we can see (but one that is not an entity). Entity here is as a house that exists as a whole at any one time. A non-expert as myself faces a stumbling block when reading, hearing or thinking about Cosmology without realising which universe is being considered.

The universe we cannot see is the one that exists everywhere at the same time after the Big Bang: we can only see Andromeda 2.2 million years younger than it is at the present time. The characteristics of this universe can nonetheless be extrapolated from those of the historical but visible universe and be kept in our minds. For example, the expansion rate of the present universe extrapolates to 71 kilometres per second per million parsecs (21.8 per million light years) according to WMAP. Considering that light travels at 300,000 Kilometres per second, and dividing the second figure into the third, galaxies at a distance of nearly 14,000 million light years distant at the present time must surely be receding at the speed of light as to return no light themselves as if having reached a black horizon.

Many years ago I was criticized by a WAS member for this calculation, because according to Einstein distances shrink as recession approaches the speed of light. I take the criticism as a red herring as this horizon distance is not observable but is in the mind as if looking from



Several other stars have been suspected as being eclipsing binaries such as V644 Cen, XX Cam, Rho Cas, V532 Oph and others. That of V532 Oph has a suggested period of more than 6000 days. Deep fades have been noticed on several occasions and thought to be due to eclipses and in most cases no period has been suggested, due to the fact that one cannot deduce a period from one suspected eclipse.

Also there are two stars, which are thought to be even longer, and these are BU Gem with a suggested period of 32 years and WY Gem with a period of 64 years. It is thought that the former was in eclipse sometime between 1960 and 1976 and mid eclipse around 1968. This means that its next minimum will be in 2032.

Not all these long period eclipsing binaries are always well placed due to solar conjunction and one has to wait

outside the universe for sake of understanding - God's view as the member angrily accused.

The present but unobservable horizon of great extent is obviously different from what we might one day see beyond what WMAP can presently see: we might see the minute extent of the birth of the Big Bang, albeit on the scale of some 15,000 million light years radius when accepting that expansion of the universe was slower in the past. The implication of this scale distortion was remarked in the July 2002 WAS News article "Does the Universe Have an Outside?"

Another difference between the two universes is one concerning the dimensional order. The one we see out there at any one time since the Big Bang takes the form of a spherical shell, other shells sitting at different times in history. That is to say it has two spacial dimensions (albeit curving into the third as intuition tells us) and one time dimension that takes us to different shells. The universe we cannot see outside our minds at any one time occupies not one shell but all shells. That is to say it has three special dimensions, and one dimension of time that takes us to any one time in the history of the universe. Does that not support the view that the second universe is an entity whilst the first is not?

The question left is what is the full extent of the universe now and what is it leading to in the future? As Caroline says, the universe is considered to be open in the sense that it will continue to expand, and as WMAP says the expansion rate is increasing. Added to that it is considered that before the time of the formation of photons, which travel at the speed of light, the very early universe was expanding at a rate vastly exceeding the speed of light. The implication here is that light from most of the universe presently and back in time has not reached us to be noticed and considered: we seem to know less about the full extent than we know about the nature of the dark matter. My provisional answer stands as explained in the aforementioned article.

### *What's on the Box*

**Monday 19<sup>th</sup> January 2004**



16.00-17.00 ~ **Mars**

**D**ead or Alive? - The Landings - How NASA scientists put together the unmanned mission to the red planet. It's one of the most ambitious space projects ever - and one mistake could be fatal.

**Tuesday 20<sup>th</sup> January 2004**



20.00-21.00 ~ **Rocket Men of Mission 105**

Join four individuals as they take part in the most complex engineering task in humanity's history, and travel to the International Space Station to carry out vital construction work.

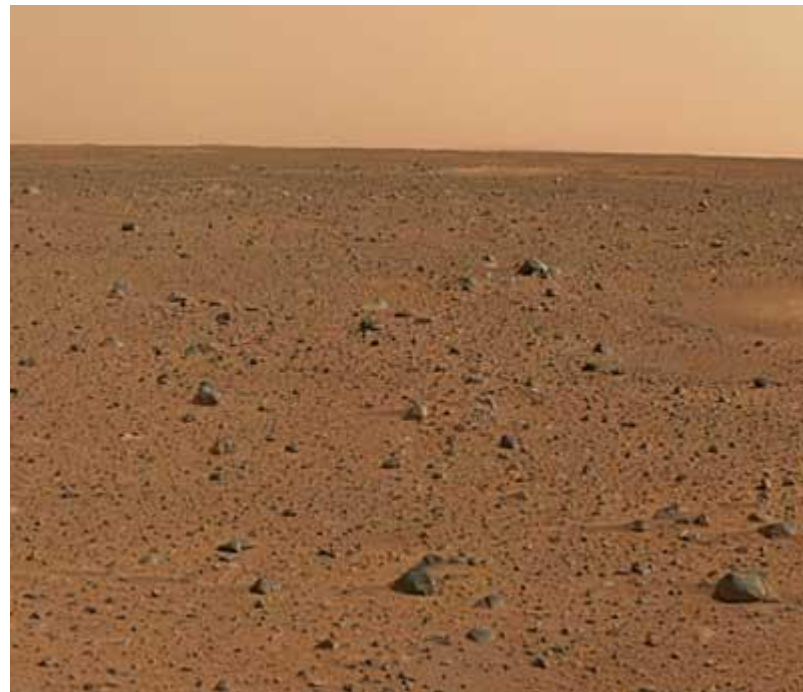
### **WAS News News**

*(First the good news....)*

**First color image from Spirit rover thrills scientists**

**William Harwood**

**T**he sharpest picture ever taken on the surface of Mars was unveiled today, a remarkably detailed color mosaic showing the rock-strewn vista directly in front of the Spirit rover that stretches all the way to misty mesas and hills on the distant horizon.



Project managers were ecstatic with the initial results from Spirit's Panoramic Camera, or pancam, a stereo camera system that will give scientists an unprecedented view of the red planet's surface in the weeks and months ahead.

The image released today was merely a slice of the wrap-around panoramic views expected to be downlinked over the next few days. But it is more than enough to whet the scientific appetite of the rover team.

"We're seeing a panoramic mosaic of four pancam images high by three wide," said camera designer Jim Bell of Cornell University, showing off the first color picture from the pancam. "There are actually 12 million pixels in this image, it's 4,000 high by 3,000 wide, and showing it like this is spectacular, you get this kind of grand vista. But it doesn't do it justice. To really do it justice, you have to start zooming in and looking at it very closely and exploring all the incredible detail that's in this image." He then did just that, narrating a sort of digital flight through the scene, zooming in to show the sort of detail on the surface a human astronaut with 20-20 vision would see while walking about.

"It's approximately the colour you would see with your eyes if you were standing there," Bell said. "The resolution, of course, is pretty much the resolution you would see. Pancam has 20-20 vision; it's three to four times better than any previous mission that's gone to Mars.

"In fact, these pictures are the highest-resolution, highest-detail pictures of Mars ever obtained. They are absolutely spectacular. You're getting a glimpse into the kind of detail that we're seeing at just this one part of the landing site. We're looking at one little wedge in front of the rover. We've still got the entire terrain all the way around to build up around us at this kind of resolution."

*(...then the bad news)*

### **Mars Express mothership hears nothing from lander**

To the despair of European space officials, the Mars Express orbiter has failed to detect a signal from the Beagle 2 lander Wednesday in the first opportunity for the mothership to establish communications with the baby craft that should have touched down on the Martian surface on Christmas Day.

Friday January 9<sup>th</sup> 2004. 16.05 GMT

With Mars Express straining to detect any whisper from the surface of Mars yesterday, the 'super-sensitive' search mode failed to find the missing Beagle 2 lander, officials announced today.

It took ground controllers a lengthy amount of time to sort through the data gathered by Mars Express orbiter while it operated in the so-called canister mode.



"This particular search mode was built into the Mars Express communication system to detect signal 'beacons' from other craft at a future date. Beagle 2 does not have such a beacon due to mass constraints, however the search mode may be able to pick up other very faint signals generated at low power levels," the Beagle project says. "The data processing required to interpret the results of a canister mode search is complicated and takes many hours. Therefore the results will not be available straight away."

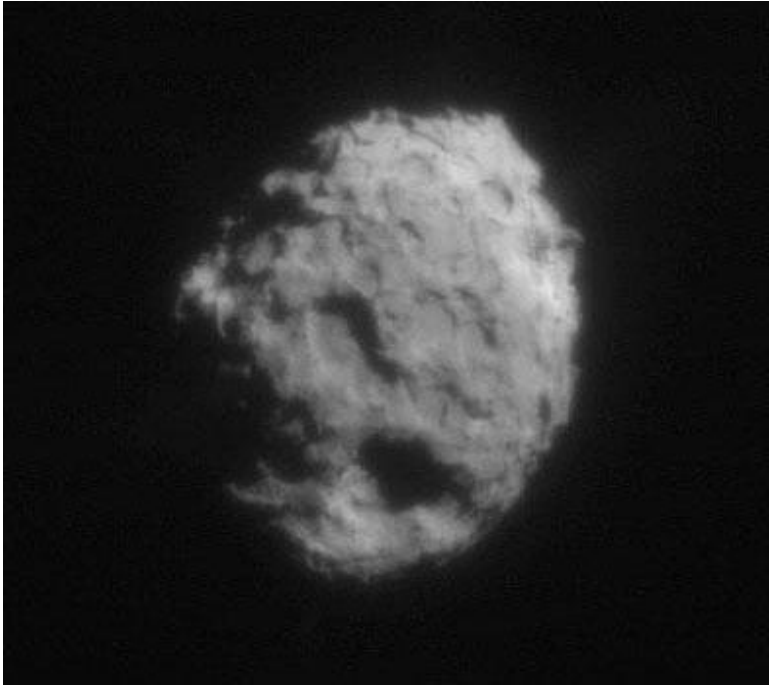
Search efforts will continue, including an attempt January 12 -- the last Mars Express overpass of the landing site that was pre-programmed into the lander before its separation from the orbiter on December 19. However, this window will only be available if nothing has happened to reset or alter the lander's timeline.

### **Scientists elated with initial Stardust comet flyby results**

**William Harwood**

(STORY WRITTEN FOR CBS NEWS "SPACE PLACE")

The Stardust probe flew through at least two significant jets of debris during its approach to comet Wild 2 today and captured a stunning image of the comet's icy heart showing overlapping pits and depressions where material boiled off in the past. At least five active jets can be seen in the black-and-white navigation camera image, along with a huge, partially shadowed pit that would hold dozens of Rose Bowl stadiums.



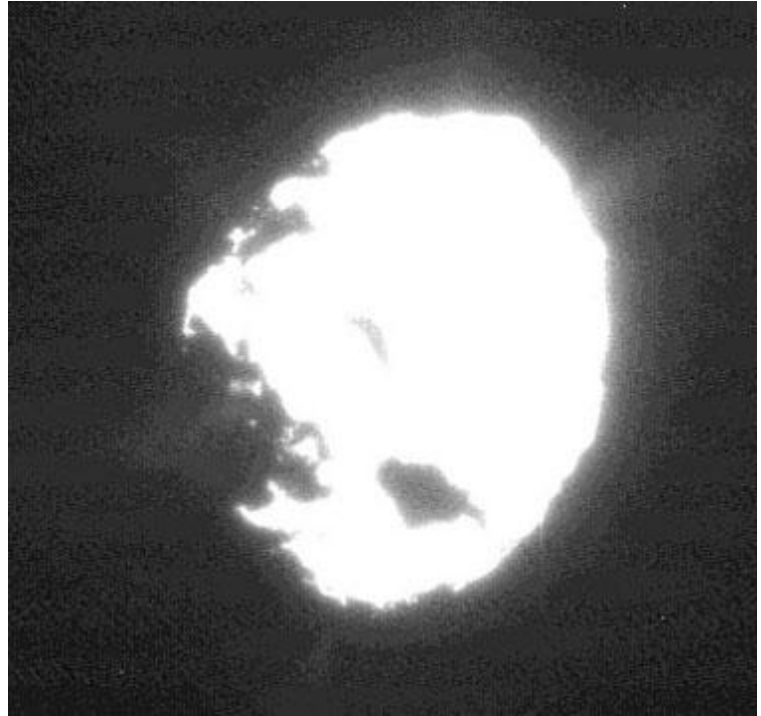
Comet wild 2 is shown in this image taken by the stardust navigation camera during the spacecraft's closest approach to the comet today. The photo was taken within a distance of 500 kilometers (about 311 miles) of the comet's nucleus with a 10-millisecond exposure. Credit: NASA/JPL

While dusty material blowing away from the comet is optically thin, project manager Tom Duxbury said an astronaut hitching a ride on the Stardust probe would have been ripped to shreds as the spacecraft moved through the Wild 2's coma, the vast cloud of gas and dust released through sun-driven sublimation. Duxbury called it "your worst nightmare of a dust storm."

A spacesuited astronaut exposed to such debris "wouldn't exist anymore," he said. "You would have been sand blasted to little particles as fine as the dust."

But Stardust, protected by thick bumpers, survived intact as it flew within 143 miles of Wild 2's nucleus at 2:22:20 p.m. EST (1922:20 GMT) today. Signals confirming the event reached Earth at 2:44 p.m. Scientists did not expect - and did not want - to fly through any active jets of debris out of fear large particles could damage the spacecraft. No such jets were predicted, but the comet had other ideas. "The data is just being looked at on the jets," said Don Brownlee, the principal investigator. "It certainly was surprising because we expected to see the flux increase at close approach and then decrease. What we saw was this big burst of particles, which would have terrified us and made our job much more difficult if we would have known about it ahead of time!"

Said Duxbury: "There's a saying that ignorance is bliss. And this is something I was sure glad I was ignorant of. ... There were two significant jets we barreled right through. But as we know, we're here smiling, we did survive."



Five active jets are seen coming from the comet's surface. Credit: NASA/JPL

Stardust snapped 72 pictures of Wild 2's nucleus during today's approach. All of them will be downlinked over the next day or so and some may show more detail than the single photo released today.

"These pictures are really going to open up a new window into understanding how comets actually work," Brownlee said. "Seeing those pits, you realize there's some process going on you didn't realize even existed before."

The primary goal of the mission, however, is the collection and return to Earth of dust samples blown off the comet. Instruments on board the spacecraft clearly measured the bombardment as Stardust approached, leaving no doubt millions of particles were captured by the probe's aerogel-filled collector. The collector will be stowed over the next day or so and returned to Earth in two years when Stardust flies past.

"It was a very thrilling day for us," Brownlee said. "This is a very challenging and daring mission - Stardust flying into really unknown territory, the rock and dust clouds surrounding an active comet. We have successfully collected samples from a comet and we're bringing them home for analysis in laboratories all over the world."

## *Diary*

**January 14 2004** *The First 3 Minutes of the Universe* - Bob Turner F.R.A.S.

**February 11 2004** *Solar Neutrinos* - Dr. Robert C. Smith University of Sussex

**March 10 2004** *Member's Contributions* - Various Short Talks & Slides/Video display. Members show and describe their current activities

All Meetings (**bold**) are held on the second Wednesday of every month unless otherwise stated, at Heene Church Rooms, Worthing at 7.30 p.m. Meetings include the latest astronomical work, reports and, photographs by members. For further information please call 01903 521205, on the Internet at [www.was.org.uk](http://www.was.org.uk) or

Email: [glen.thomas@bigfoot.com](mailto:glen.thomas@bigfoot.com)

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### *Note to Contributors*

Contributions & Correspondence for the **February** issue of WAS NEWS should be with the Editor by **February 1st**. All material for inclusion should be sent to the Editor.

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