

## Venus Express en route to probe the planet's hidden mysteries

The European spacecraft Venus Express has been successfully placed into a trajectory that will take it on its journey from Earth towards its destination of the planet Venus, which it will reach next April.

A virtual twin sister of the Mars Express spacecraft which has been orbiting the Red Planet since December 2003, Venus Express is the second planet-bound probe to be launched by the European Space Agency.

Venus Express will eventually manoeuvre itself into orbit around Venus in order to perform a detailed study of the structure, chemistry and dynamics of the planet's atmosphere, which is characterised by extremely high temperatures, very high atmospheric pressure, a huge 'greenhouse effect' and as-yet inexplicable 'super-rotation' which means that it speeds around the planet in just four days.

The European spacecraft will also be the first orbiter to probe the planet's surface while exploiting the 'visibility windows' recently discovered in the infrared waveband.

The 1240 kg mass spacecraft was developed for ESA by a European industrial team led by EADS Astrium with 25 main contractors spread across 14 countries. It lifted off on board a Soyuz-Fregat rocket, the launch service being provided by Starsem.

Venus Express is currently distancing itself from Earth at full speed, heading on its five-month, 350 million kilometre journey inside our Solar System. After check-outs to ensure that its on-board equipment and instrument payload are in proper working order, the spacecraft will be 'mothballed', with contact with Earth being reduced to once daily. If needed, trajectory correction manoeuvres can go ahead at the half-way stage in January.

When making its closest approach, Venus Express will face far tougher conditions than those encountered by Mars Express on nearing

the Red Planet. For while Venus's size is indeed similar to that of Earth, its mass is 7.6 times that of Mars, with gravitational attraction to match.

To resist this greater gravitational pull, the spacecraft will have to ignite its main engine for 53 minutes in order to achieve 1.3 km/second deceleration and place itself into a highly elliptical orbit around the planet. Most of its 570 kg of propellant will be used for this manoeuvre.

A second engine firing will be necessary in order to reach final operational orbit: a polar elliptical orbit with 12-hour crossings. This will enable the probe to make approaches to within 250 km of the planet's surface and withdraw to distances of up to 66 000 km, so as to carry out close-up observations and also get an overall perspective.

The Venus Express spacecraft Exploring other planets to better understand planet Earth.

The Venus Express mission is planned to last at least two Venusian days (486 Earth days) and may be extended, depending on the spacecraft's operational state of health.

Venus Express largely re-uses the architecture developed for Mars Express. This has reduced manufacturing cycles and halved the mission cost, while still targeting the same scientific goals. Finally approved in late 2002, Venus Express was thereby developed fast, indeed in record time, to be ready for its 2005 launch window.

However, Venusian environmental conditions are very different to those encountered around Mars. Solar flux is four times higher and it has been necessary to adapt the spacecraft design to this hotter environment, notably by entirely redesigning the thermal insulation.

Whereas Mars Express sought to retain heat to enable its electronics to function properly, Venus Express will in contrast be aiming for

maximum heat dissipation in order to stay cool.

The solar arrays on Venus Express have been completely redesigned. They are shorter and are interspersed with aluminium strips to help reject some solar flux to protect the spacecraft from temperatures topping 250°C.

It has even been necessary to protect the rear of the solar arrays – which normally remain in shadow – in order to counter heat from solar radiation reflected by the planet's atmosphere.

Following on from the twenty or so American and Soviet missions to the planet carried out since 1962, Venus Express will endeavour to answer many of the questions raised by previous missions but so far left unanswered. It will focus on the characteristics of the atmosphere, its circulation, structure and composition in relation to altitude, and its interactions with the planet's surface and with the solar wind at altitude.

# PERTH OBSERVATORY VOLUNTEERS' GROUP

## PERTH OBSERVATORY STAFF

DR JAMIE BIGGS  
RALPH MARTIN  
DR ANDREW WILLIAMS  
RICK TONELLO  
GREG LOWE  
JANET BELL  
DI JOHNS  
ARIE VERVEER  
JOHN PEARCE  
MARC APPELHOF

DIRECTOR AND GOVT ASTRONOMER  
ASTRONOMER  
ASTRONOMER  
ASTRONOMER ASSISTANT  
ASTRONOMER ASSISTANT  
ADMINISTRATION OFFICER  
CLERICAL OFFICER  
TECHNICAL MANAGER  
MECHANICAL TECHNICIAN  
MAINTENANCE PERSON/CLEANER

## POVG VOLUNTEERS

MIKE FREEMAN  
ELAINE WALKER  
JOHN MORRIS  
BEVAN HARRIS

CHAIRPERSON  
VICE CHAIRPERSON  
SECRETARY  
TREASURER AND NEWSGROUP MODERATOR  
(CONTACT: NGC2070@gmail.com)  
NEWSLETTER EDITOR  
(CONTACT: CALLIDES@INET.NET.AU)

JEFF ALCROFT

## OBSERVATORY VOLUNTEER LIST

JEFF ALCROFT  
DICK ALDERSON  
IRENEUSZ BARAN  
TREVOR BEARDSMORE  
LYALL BELL  
FRANK BILKI  
TONY BESTON  
RIC BOELEN  
GIUSEPPE COLETTI

DAVID EMRICH  
MARK EMMONS  
KEITH FORD  
MIKE FREEMAN  
LYNDA FREWER  
BEVAN HARRIS  
MARK HASLAM  
KAREN KOTZE  
ROB LONEY

ANDREW MACNAUGHTAN  
LEN MARTIN  
JACQUIE MILNER  
JOHN MORRIS  
TIM ROBERTS  
LLOYD ROBINSON  
ELAINE WALKER  
MATTHEW ZENGERER

## PROBATIONARY VOLUNTEERS

ASHER ABRAHAM  
VAL SEMMLER  
NOREEN TOWNSEND

**POVG**

Perth Observatory Volunteers Group



PERTH OBSERVATORY  
337 Walnut Road, Bickley WA 6076  
<http://www.wa.gov.au/perthobs>

2005/06

## Volunteer Training & Meeting Nights

Below are listed the training nights scheduled for 2006.

The vollies decided at a recent meeting that they would like to rationalise the training/meeting night schedule. They decided that scheduling a meeting on the third Monday of the month would be more convenient. We have checked for clashes with Observatory events and so far none have been identified. (Naturally, flexibility needs to be maintained and the meeting date will be changed from the strict schedule as the need arises.)

Training is important for our volunteers, they enjoy it, and we need to support these staff members in return for the assistance they render.

All staff are directed NOT to ROSTER ANY ACTIVITY THAT WILL INTERFERE WITH TRAINING night attendees access to the lecture theatre and the VOF (and associated telescopes).

Also, could you please bring the details of this message to the attention of all staff under your direct supervision.

Your co-operation is appreciated.

Jamie Biggs.

16th January (Changed from 23rd January)  
20th February (Changed from 27th Feb)  
20th March (Changed from 27th March)  
18th April (Note: Tuesday)  
15th May (Changed from 15th May)  
19th June  
17th July  
21st August  
18th September  
16th October  
20th November  
18th December (Maybe we'll cancel this one - it's very close to Xmas)

## JOIN THE POVG NEWS GROUP

If you've got any news, information or pics post them on the newsgroup. To join simply send your email address to Bevan Harris at:

**[ngc2070@gmail.com](mailto:ngc2070@gmail.com)**

To unsubscribe send an email to:

**[perthobsvollies-unsubscribe@yahoo.com.au](mailto:perthobsvollies-unsubscribe@yahoo.com.au)**

To modify your subscription, visit the group website at:

**<http://au.groups.yahoo.com/mygroups>**

# Stardust returns home

After a 2.88-billion-mile (4.63 billion kilometers) journey that would astonish the most dependable postal worker, NASA's Stardust spacecraft completed a delivery that was years in the making. The payoff? Scientists now have the first direct samples of cometary material.

An infrared camera captures Stardust's sample-return capsule as it descends to the Utah Test and Training Range. This image was taken from NASA TV. NASA [larger image]

At 2:12 a.m. PST, Stardust released the sample-return capsule, which weighs about 100 pounds (45.36 kilograms). The container entered Earth's atmosphere above the Pacific Ocean at nearly 29,000 mph (46,000 kilometers per hour) — the fastest reentry of a probe ever. The capsule slowed and released a drogue parachute about 20 miles (32 km) above the surface. The main chute deployed after the vessel descended to 1.9 miles (3 km) above Utah. The capsule decelerated and safely landed at the U.S. Air Force's Utah Test and Training Range, southwest of Salt Lake City.

Recovery helicopter Vertigo 1 first reached the landing site and searched the area. Locating the vessel was difficult because of the darkness and the capsule, about the size of an automobile tire, is the same color as the salty desert floor. Eventually, the container was located, dou-

ble bagged, placed aboard the helicopter, and taken to a clean room at the nearby Dugway Proving Ground. NASA officials commented that the reentry, descent, and recovery occurred flawlessly.

In January 2004, Stardust passed through the coma of Comet 81P/Wild (pronounced "Vilt") 2. Using its tennis-racket-shape collector, the probe gathered approximately an ounce (28 grams) of dust grains from the comet's coma. Aerogel, a thin substance attached to the collector, captured the particles as they sped by at 5 times the speed of a rifle bullet. The comet samples were then secured in a return capsule, which was safely stowed until today.

Stardust contributed greatly to astronomers' knowledge of comets, long before the sample return. In 2004, it returned close-up views, including the nucleus, of Wild 2. The results amazed scientists.

"We thought Comet Wild 2 would be like a dirty, black, fluffy snowball," explains Stardust Principal Investigator Donald Brownlee. "Instead, it was mind-boggling to see the diverse landscape in the first pictures from Stardust, including spires, pits, and craters, which must be supported by a cohesive surface."

Stardust also flew within about 2,050 miles (3,300 km) of the main-belt asteroid Annefrank before it met Comet Wild 2. The

observations revealed the asteroid is darker than expected and about 5 miles (8 km) long — approximately twice the size predicted from Earth-based observations.

Why send a spacecraft to meet a comet? Comets are relics from when the solar system formed around 4.5 billion years ago. By learning more about comets, scientists will understand how the solar system formed and evolved.

Although the capsule is safe on Earth, the journey is not over for Stardust. About 20 minutes after it jettisoned the container, the spacecraft fired its thrusters and moved into a solar orbit. At this time, NASA has no plans to extend Stardust's mission.

Beyond thrilling scientists with the delivery of comet dust, Stardust also delighted many skygazers in the western United States. As the return capsule darted across the sky shortly before 2 a.m. PST, people living under clear skies in an area from San Francisco to Salt Lake City to Seattle had the chance to see it. The capsule reached maximum heating and became its brightest as it passed over Nevada. It took the capsule only about a minute to travel from the northwest coast of California to the landing site in northwestern Utah.

SOURCE: <http://www.astronomy.com/asy/default.aspx?c=a&id=3848>

Location: E115 49, S31 55		PERTH, WESTERN AUSTRALIA Rise and Set for the Sun for 2006												Astronomical Applications Dept. U. S. Naval Observatory Washington, DC 20392-5428										
		Zone: 8h East of Greenwich																						
	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Day	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
01	0514	1926	0541	1919	0606	1852	0628	1813	0648	1739	0708	1720	0718	1723	0706	1741	0634	1800	0555	1818	0520	1841	0504	1909
02	0515	1926	0542	1918	0607	1851	0628	1812	0649	1738	0709	1720	0718	1724	0705	1741	0633	1801	0554	1819	0519	1842	0504	1910
03	0516	1926	0543	1917	0607	1850	0629	1811	0650	1737	0719	1720	0718	1724	0704	1742	0632	1801	0553	1820	0517	1844	0503	1910
04	0516	1927	0544	1916	0608	1848	0630	1809	0650	1737	0719	1720	0718	1725	0704	1742	0630	1802	0551	1820	0517	1844	0503	1910
05	0517	1927	0545	1916	0609	1847	0630	1808	0651	1736	0719	1720	0718	1725	0703	1743	0629	1802	0550	1821	0516	1845	0503	1911
06	0518	1927	0546	1915	0610	1846	0631	1807	0652	1735	0719	1719	0718	1725	0702	1744	0628	1803	0549	1822	0515	1846	0503	1912
07	0519	1927	0547	1914	0610	1845	0632	1806	0652	1734	0719	1719	0717	1726	0701	1744	0627	1804	0548	1822	0515	1847	0503	1913
08	0520	1927	0548	1913	0611	1844	0632	1804	0653	1733	0719	1719	0717	1726	0700	1745	0625	1804	0546	1823	0514	1847	0504	1913
09	0520	1927	0549	1913	0612	1842	0633	1803	0654	1732	0719	1719	0717	1727	0659	1746	0624	1805	0545	1824	0513	1848	0504	1914
10	0521	1927	0550	1912	0613	1841	0634	1802	0655	1732	0719	1719	0717	1727	0658	1746	0623	1805	0544	1824	0512	1849	0504	1915
11	0522	1927	0551	1911	0613	1840	0634	1801	0655	1731	0719	1719	0717	1728	0657	1747	0621	1806	0543	1825	0512	1850	0504	1916
12	0523	1927	0552	1910	0614	1839	0635	1800	0656	1730	0719	1719	0716	1728	0656	1748	0620	1807	0541	1826	0511	1851	0504	1916
13	0524	1926	0552	1909	0615	1837	0636	1758	0656	1729	0719	1719	0716	1729	0655	1748	0619	1807	0540	1827	0510	1852	0504	1917
14	0525	1926	0553	1908	0615	1836	0637	1757	0657	1729	0719	1719	0716	1730	0654	1749	0618	1808	0539	1827	0510	1853	0505	1918
15	0526	1926	0554	1907	0616	1835	0637	1756	0658	1728	0719	1719	0715	1730	0653	1749	0616	1808	0538	1828	0509	1854	0505	1918
16	0527	1926	0555	1906	0617	1834	0638	1755	0658	1727	0719	1719	0715	1731	0652	1750	0615	1809	0537	1829	0509	1855	0505	1919
17	0527	1926	0556	1905	0618	1832	0639	1754	0659	1727	0716	1719	0715	1731	0651	1751	0614	1810	0535	1829	0508	1855	0506	1920
18	0528	1925	0557	1904	0618	1831	0639	1753	0700	1726	0716	1720	0714	1732	0650	1751	0612	1810	0534	1830	0508	1856	0506	1920
19	0529	1925	0558	1903	0619	1830	0640	1752	0700	1726	0716	1720	0714	1732	0649	1752	0611	1811	0533	1831	0507	1857	0506	1921
20	0530	1925	0558	1902	0620	1829	0641	1750	0701	1725	0716	1720	0713	1733	0648	1753	0610	1811	0532	1832	0507	1858	0507	1921
21	0531	1924	0559	1901	0620	1827	0641	1749	0702	1725	0717	1720	0713	1734	0647	1753	0608	1812	0531	1833	0506	1859	0507	1922
22	0532	1924	0560	1900	0621	1826	0642	1748	0702	1724	0717	1720	0712	1734	0646	1754	0607	1813	0530	1833	0506	1900	0508	1922
23	0533	1924	0561	1859	0622	1825	0643	1747	0703	1724	0717	1721	0712	1735	0645	1754	0606	1813	0529	1834	0505	1901	0508	1923
24	0534	1923	0562	1858	0622	1823	0643	1746	0704	1723	0717	1721	0711	1735	0644	1755	0604	1814	0528	1835	0505	1902	0509	1923
25	0535	1923	0563	1857	0623	1822	0644	1745	0704	1723	0717	1721	0711	1736	0643	1756	0603	1815	0527	1836	0505	1903	0509	1924
26	0536	1922	0563	1855	0624	1821	0645	1744	0705	1722	0718	1721	0710	1737	0641	1756	0602	1815	0526	1836	0505	1904	0510	1924
27	0537	1922	0564	1854	0624	1820	0645	1743	0705	1722	0718	1722	0709	1737	0640	1757	0600	1816	0525	1837	0504	1904	0511	1925
28	0538	1921	0565	1853	0625	1818	0646	1742	0706	1722	0718	1722	0709	1738	0639	1758	0559	1816	0524	1838	0504	1905	0511	1925
29	0539	1920			0626	1817	0647	1741	0707	1721	0718	1723	0708	1739	0638	1758	0558	1817	0523	1839	0504	1906	0512	1925
30	0540	1920			0626	1816	0647	1740	0707	1721	0718	1723	0707	1739	0637	1759	0556	1818	0522	1840	0504	1907	0513	1925
31	0541	1919			0627	1814			0708	1721			0707	1740	0635	1759			0521	1841			0513	1926

# Vollie Group Minutes

Perth Observatory Volunteer Group Inc

Minutes of Meeting November 28th 2005-11-29

Present. G.Lowe. E.Walker. J.Morris. L.Martin. M.Freeman.  
N.Townsend. B.Harris.

J.Biggs. D.Emrich. A.MacNaughton. T.Beston.

L.Robinson.

Apologies. J.Alcroft. D.Alderson. G.Coletti. M.Zengerer. R.Bolen.  
F.Bilki.

Confirmation of Minutes. The Minutes were confirmed as a true and correct record

Moved B.Harris seconded L.Martin.

Business Arising from the Minutes.

1. M.Freeman referred to the proposed Corporate Viewing Night and requested further information. N.Townsend stated that the night was scheduled for December 8th at 8pm, invitations had been sent to a number of well known personalities, and to date there had been 13 acceptances. J.Biggs outlined the format for the evening and hoped that a number of Volunteers would be present, and requested that as the evening was an up-market presentation, everyone attending should be neatly dressed, with Volunteers using their name badges.

2. Car Stickers. L.Martin stated that he could get a limited number

of stickers

printed, and requested details on colour and wording, after discussion it was agreed that the wording should be "GET STARRY EYED VISIT PERTH OBSERVATORY" and if possible to incorporate the telephone number,

colour should be blue or black on a white background.

Treasurers Report. B.Harris said that there was no change in the financial situation.

General Business. J.Biggs gave details of the launch of the Internet Telescope Project which would occur on December 7th at 8.30pm with Minister Judy Edwards attending, all Volunteers and their families were welcome to attend.

N.Townsend tabled a number of examples of promotional material she had been able to get placed in various local papers, J.Biggs asked that all items in the Press regarding the Observatory should be saved, and to ensure that the Observatory had a copy

There being no further General Business the Meeting closed at 7.40pm

Next Meeting will be on January 16th 2006

---

## The Splendor of Orion: A Star Factory Unveiled

Scientists have created the most detailed portrait ever of the closest known star factory, the Orion Nebula. They have also uncovered new details about the stellar winds responsible for carving out the nebula's ghostly shapes.

Meanwhile, another research group identified a glowing gas cloud in another region of the night sky that might replace Orion when it fades from view in about 100,000 years.

Orion is located 1,500 light-years away and is the nearest region of massive star-formation to Earth. Located at the center of the Orion Nebula is a group of four young, massive stars; they are collectively referred to as the "Trapezium" because of the shape they make. The Trapezium is surrounded by a halo of 1,000 faint, low-mass stars similar to the Sun.

Like all massive stars, those in the Trapezium are radiating a stream of energetic X-rays called a stellar wind. However, the wind from the Trapezium is millions of times denser and more energetic than the flow from our own Sun.

When these powerful winds collide with the dense cloud of dust and gas surrounding the stars, they produce shock waves that erode and shape the clouds. Similar to how winds on Earth can sculpt sand dunes in a

desert, stellar winds from the Trapezium are carving out a relatively dust and gas free cavity filled with strange, ethereal scenes.

"Orion may seem very peaceful on a cold winter night, but in reality it holds very massive, luminous stars that are destroying the dusty gas cloud from which they formed," said astronomer Tom Megeath.

The Trapezium's stellar winds play a major role in the creation of new stars within the Orion Nebula. If the winds are strong enough, their shockwaves act as catalysts for star formation by pushing the clouds together into compact bundles.

Stellar winds in two of Orion's three star forming regions and found that some of the winds have been blowing continuously for nearly 1,500 years.

The Trapezium's winds are doing such a thorough job of carving up its cloudy cocoon that in about 100,000 years, the Orion Nebula as we know it will fade from view, scientists say.

Stargazers of the future need not despair, however, because astronomers have discovered a gas cloud in the constellation Cassiopeia that has just begun shining with newborn stars. Known as W3, the cloud will become the Grand Nebula and replace Orion as Earth's most visible stellar nursery just as Orion disappears.

The so-called proto-Trapezium stars are much younger than those found in Orion and appear to still be growing by accreting gas from their surrounding clouds.

The discovery of these stars may resolve a debate among scientists about how Orion's Trapezium formed in the first place. The Orion Nebula and the Trapezium within are of special interest to astronomers because it is believed that our own Sun was born in such an environment.

According to one Trapezium formation hypothesis, each of the four massive stars formed separately but then descended into the center of the nebula to form a clump. Another leading hypothesis is that the Trapezium stars never moved at all and formed together right where they are.

Because the proto-Trapezium stars in W3 are clustered together, Megeath's team suspects that the second hypothesis is correct.

When they mature, the proto-Trapezium stars will emit their own, powerful stellar gusts and ultraviolet light and carve out their own spectral skylines. Scientists are uncertain when this process will be complete or when the stars will reach their maximum brilliance, but think that it may around the time that Orion is scheduled to disappear.