Dr. Sten Odenwald
NASA - ADNET Sys

NASA
May 9, 2012
inferior conjunction

about 10th December

about 10th June
1631...

Predicted but not visible in Europe
1639

Jeremiah Horrocks correctly predicts, and first observes, ‘new’ Venus transit.

William Crabtree also sees it.
1761 Transit seen by 176 people.
Atmosphere discovered by Mikhail Lomonosov

Public reaction?
1761 The Atmosphere
1761 The Black Drop Effect

2004
Drawing by Mario Frassati
The Black Drop Effect

1922 – D’Arturo - instrumental astigmatism

2001 – Schneider, Pasachoff and Golub (1999). TRACE optical observations of Transit of Mercury at 0.5” resolution – Limb-darkening and PSF

Note – Mercury has no atmosphere but still shows black drop effect.
1769

400 sightings published.

Captain Cook’s Tahiti chronicles
1769  Norrington’s observation from Pennsylvania
1874 December 8, Many photographs taken, few useful. Congress allocates $75,000 for international scientific expeditions.

Simon Newcomb
THE LAST TRANSIT OF VENUS.

Progress toward completion of the records of the expeditions to observe the phenomenon—the Sun’s distance.

Satisfactory results as was possible. The indications at the present state of the calculations point to a smaller distance than that announced from Great Britain, and it is probable the usually received distance of 91,000,000 miles may be somewhat near the distance as determined by the American photographic observations. The distance found by the British astronomers is based on observations of the time of the four contacts.
Let the astronomers gratify their perverted taste by having transits in their own houses, but let them understand that the Government will not lend itself to open and shameless astronomical junketing.
1882 December 7

Massive public interest.
An image of the 1882 transit of Venus recorded at Lick Observatory, California.

Photograph of the 1882 transit of Venus taken at Vassar College by Maria Mitchell and her students. (Picture courtesy of Vassar College Library)
The Transit of Venus March
Some things never change...

The prospect of a Democratic victory is extremely alarming to Republican politicians, and they become more desperate as that prospect brightens; but it has had no more to do with the depression of business than with the last total eclipse of the sun, or the next transit of Venus.

“Senator Chea Campaign Demagoguery”
Washington Post
September 27, 1884
The Astronomical Unit

Tycho Brahe ca 1595........................5,000,000 miles

Kepler ca 1610..............................15,000,000 miles

Giovanni Cassini 1672.....................87,000,000 miles

1882 Venus Transit..........................92,720,000 miles

1895 Simon Newcomb value based on all transits good to +/- 50,000 miles
Modern AU studies

1928 – Spencer Jones – Triangulation of Eros +/- 17,000km


1964 – JPL Radar ranging Venus - +/- 100 km

1965 – Rabe - Perturbations in Eros orbit. +/-10,000km

1 AU =

149,597,870 km +/- 1 km
To detect optical spectral lines against Telluric background:

Doppler Shift

10 km/s relative requires

\[ \frac{\lambda}{d\lambda} > 30,000 \]
1940 – Rupert Wildt – Amount of CO2 to raise temp > 212 F

1961 – Carl Sagan – Venus Greenhouse Heating

1962 – Mariner 2 – Confirmed temperature 425 C

1967 – Venera 4 – In situ spectroscopy
    CO2 as dominant constituent

2004 – Transit of Venus – High-R spectroscopy from Earth
    Teneref Vacuum Tower Telescope
    Upper atmosphere studies (65-85 km)
    Composition,
    Structure,
    Wind patterns
Application to studying Exoplanets
Transiting Exoplanet Atmospheres

Examples:

Richardson et al (2007)          Thermal       HD 209458b
Ben-Jaffel (2007)                Hydrogen      HD 189733b
First Webcast - over 50 million viewers!
European Southern Observatory - The VT-2004 project,

2763 participants - 1000 school classes.

1 AU = 149,608,708 km ± 11,835 km
Adopted value = 149,597,871 km
NOAA - GOES-12 satellite soft X-ray imager
Transit of Venus June 6, 2012

First contact 00:04
Second contact 00:22
Greatest 03:29
Third contact 06:36
Fourth contact 06:54
Washington DC Area:

Start: 6:03 PM

Sunset: 8:26 PM

Ends: Midnight
2012 TRANSIT OF VENUS
SUN-EARTH DAY: SHADOWS OF THE SUN
Live Web Cast on June 5th, 2012

Event Locations!
Find a Transit of Venus event near you on our Google Map

Technologically Through Time, Issue #73
A Brief History of the Transit of Venus
There have been 53 transits of Venus across the Sun between 2000 B.C and 2004 A.D. History says that Jeremiah Horrocks was the first human to ever witness a transit by Venus in 1639, but could other more ancient people have also seen it too?

This year’s grand celebration is on June 5, 2012, the Transit of Venus! We have teamed up with NASA Edge to bring you an exciting...
Yes...
There is an App for that!!!

Timing the transit of Venus with the Transit of Venus phone app – Steven van Roode
If you miss the transit this time...

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you can try again in.....2117!