

TRANSIT OF VENUS: 2004 JUNE 8

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Abstract: Witness a celestial event unseen by any human now alive. A transit of Venus will be well underway on June 8, 2004, when the Sun rises in the eastern United States. Observers may see the waning minutes of the transit, the third and fourth contacts, the “black drop” effect, and other rare spectacles. Coupled with stories of past expeditions to time transits, this 2004 highlight is an excellent opportunity for the education community. See the Transit of Venus page at *Paper Plate Education* for details (<http://analyzer.depaul.edu/paperplate/>).

In 1677 Edmond Halley proposed worldwide expeditions to time a transit of Venus—the movement of the planet across the disk of the Sun—to quantify the distance of an astronomical unit, or AU. Transits of Venus generally occur in pairs—eight years apart—that are separated by about 120 years. No one is known to have seen the 1631 transit, the first in the era of the telescope. The only two astronomers who saw the 1639 transit failed to time it. Global efforts to time transits of Venus occurred for the 1761/1769 and the 1874/1882 transit pairs. After June 8, 2004, the next transit of Venus will be June 6, 2012.

For educators, transits of Venus and their respective expeditions—past and future—are an educational opportunity in multiple disciplines. Previous transit expeditions—yielding stories of adventure, hardship, defeat, triumph, and discovery—illustrate the dedication of explorers who spanned the globe in international efforts to resolve a leading scientific question of the day. For example, wartime circumstances forced Guillaume le Gentil of France to witness the 1761 transit at sea, where he could obtain no accurate timing, rather than at his intended site in India. Le Gentil waited overseas eight years for the 1769 transit, only to be thwarted by unseasonable clouds the morning of the event. In his 8-year quest to time a transit, le Gentil was impeded by war, suffered bouts of dysentery, escaped near-imprisonment in Manila, and endured stormy months at sea. However, the cloudy conditions on transit day in 1769 were only the beginning of his woes.

As an observational event, the 2004 transit is only moderately demanding. The latter portion of the transit will become visible at sunrise and will last less than an hour, as seen from the eastern United States. This requires protective eyewear and telescope filters, a low horizon to the east-northeast, and clear skies. A recommended viewing tool is Gene Zajac’s modified version of a Sun Gun (see 1999 *GLPA Proceedings*, page 79), which permits a crowd to watch safely a projection of the Sun, the transiting planet, and Sunspots. The European Southern Observatory is

coordinating global transit timings that simulate the historic endeavors. Planetarians in the United States who intend to broadcast live feeds of the transit should remember that the transit actually begins the night of June 7, 2004, in U.S. time zones, though it is not visible in the U.S. until after sunrise on June 8, 2004.

Caution: You may safely view the transit of Venus *only if* you use proper solar filters. Do not stare at or view the Sun without proper filters, even at sunrise, for irreparable eye damage may result.

Look for the infamous “black drop” effect at third contact, when the disk of Venus just touches the edge of the Sun and begins the planet’s apparent egress from the Sun. Near contact a meniscus appears between the planet and the Sun, and circular Venus briefly elongates. Ultimately reducing the accuracy of the timing, the “black drop” effect becomes the limiting factor in determining the Astronomical Unit via transit timings.

Sky charts, historic images, links, graphics, an Internet caveat, and other details relating to this rare celestial highlight can be accessed from the Transit of Venus page at *Paper Plate Education* (<http://analyzer.depaul.edu/paperplate/>).

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