Wednesday, March 13, 2019

NASA's Solar Dynamics Observatory Catches Lunar Freeze Frame.

Observe the Moon file: Transit in Astronomy.

A transit is, in astronomy, the passage of a celestial object between the observer and another object.

The first object then seems to move in front of the second.

If the observer's situation is not specified, the observer is implicitly on the Earth.

The term "transit" is used in cases where the nearest object has an apparent diameter much smaller than the farthest object.

When the intercalating object has an angular diameter greater than the second, the phenomenon is an occultation.

If the observer is immersed in the shadow of the transiting object, it is an eclipse. When the angular diameter of the nearest object is smaller but nevertheless close to the second object, we speak of annular eclipse.

Each of these phenomena are the visible effects of syzygy.

An example of transit involves moving a planet between the Earth and the Sun, which can only occur with Mercury or Venus.

However, since the planets farther away, like Mars, the Earth can transit in front of the Sun.

The term can also refer to the movement of a natural satellite in front of the planet around which it turns, for example the Galilean satellites of Jupiter.

Transit requires three celestial objects to be aligned.

It happens more rarely than four celestial objects are.

Such a case occurred on March 21, 1894, around 23:00 UTC, when Mercury transited in front of the Sun from Venus and Mercury and Venus transited the Sun from Saturn.

Observing a transit or occultation of a body in front of the Sun, or a partial eclipse of the Sun with the naked eye or with the help of an observation instrument can be very dangerous and cause irreversible blindness.

Smoked glass or photographic films are not enough to protect the eyes against all radiation emitted by the Sun and blindness can occur a few hours after the observation.

Suitable filters, usually provided for the occasion by astronomical journals, should be provided.

In France, these filters must bear the NF mark.

An observation projecting the image of the Sun is harmless because it is indirect.

It suffices to make it with a simple magnifying glass and a sheet of paper.

It is necessary to ensure that the concentration of light rays will not lead to a fire.

The occultation of Mercury by Venus in 1737 was observed by John Bevis at the Royal Observatory at Greenwich.

This is the only mutual planetary occultation ever to have been described in detail. A transit of Mars before Jupiter on September 12, 1170, however, was observed by the monk Gervase at Canterbury and by Chinese astronomers.

In the eighteenth century, the pair of transits of Venus in front of the Sun in 1761 and 1769 made it possible to measure the value of the

astronomical unit. It is also to observe this transit in 1769, (and to look for the southern continent) that Captain James Cook of the Royal Navy made a trip from England to Tahiti.

From the Earth, it is possible to visualize a transit of an object of the solar system in front of the Sun only if it is located below Earth's orbit.

From the point of view of the planets, only Mercury and Venus are in this case.

It is nevertheless a rare phenomenon, which in the case of Venus never occurs more than twice a century, two separate observations of about 8 years. The last transits of Venus before the Sun took place in 1874, 1882, June 8, 2004 and June 6, 2012.

The next will take place on December 11, 2117.

Mercury, closer to the Sun than Venus, transits more frequently between the Earth and the Sun: about 13 times per century.

The last transits took place on November 15, 1999, May 7, 2003, November 8, 2006 and May 9, 2016; the next will take place on November 11, 2019.

In rare cases, one planet can pass in front of another, seen from the Earth.

The next phenomenon of this type will occur on November 22, 2065 at about 12:43 UTC, when Venus, close to its superior conjunction, with an angular diameter of 10.6" will pass Jupiter with an angular diameter of 30.9"

The transit will however be made at 8 ° from the Sun and will not be observable without protection.

Just before, Venus will obscure Ganymede, satellite of Jupiter, around 11:24 UTC

Between 1700 and 2200, there will be only 18 transits of planets from Earth. In addition, none will occur between 1818 and 2065.

On the evening of March 6, 2019, the Moon started to transit the Sun, then doubled back and retraced its steps in the other direction..

At least, that's what it looked like from the perspective of NASA's Solar

Dynamics Observatory, or SDO in orbit around Earth.

SDO sees lunar transits regularly, when the Moon passes in front of its view of the Sun.

The Moon's unusual apparent behavior during this particular transit is a phenomenon similar to retrograde motion:

When a celestial object appears to move backwards because of the way that different objects move at different speeds at different points in their orbits.

In this case, the first part of the transit — when the Moon moves left to right, appears to be "reverse" motion.

SDO overtakes the Moon, moving at about 1.9 miles per second perpendicular to the Sun-Earth line compared to the Moon's 0.6 miles per second, making the Moon appear to move in the opposite direction you would see if you were standing still on Earth.

The second part of the transit when the Moon appears to pause and rewind happens as SDO enters the dusk part of its orbit and begins moving away from the Moon, nearly parallel to the shadow it's casting through space.

At that point, the Moon once again moves faster than SDO when compared to the Sun-Earth line overtaking it.

So the spacecraft now sees it move in the other direction: the same direction that a stationary observer on Earth would see.

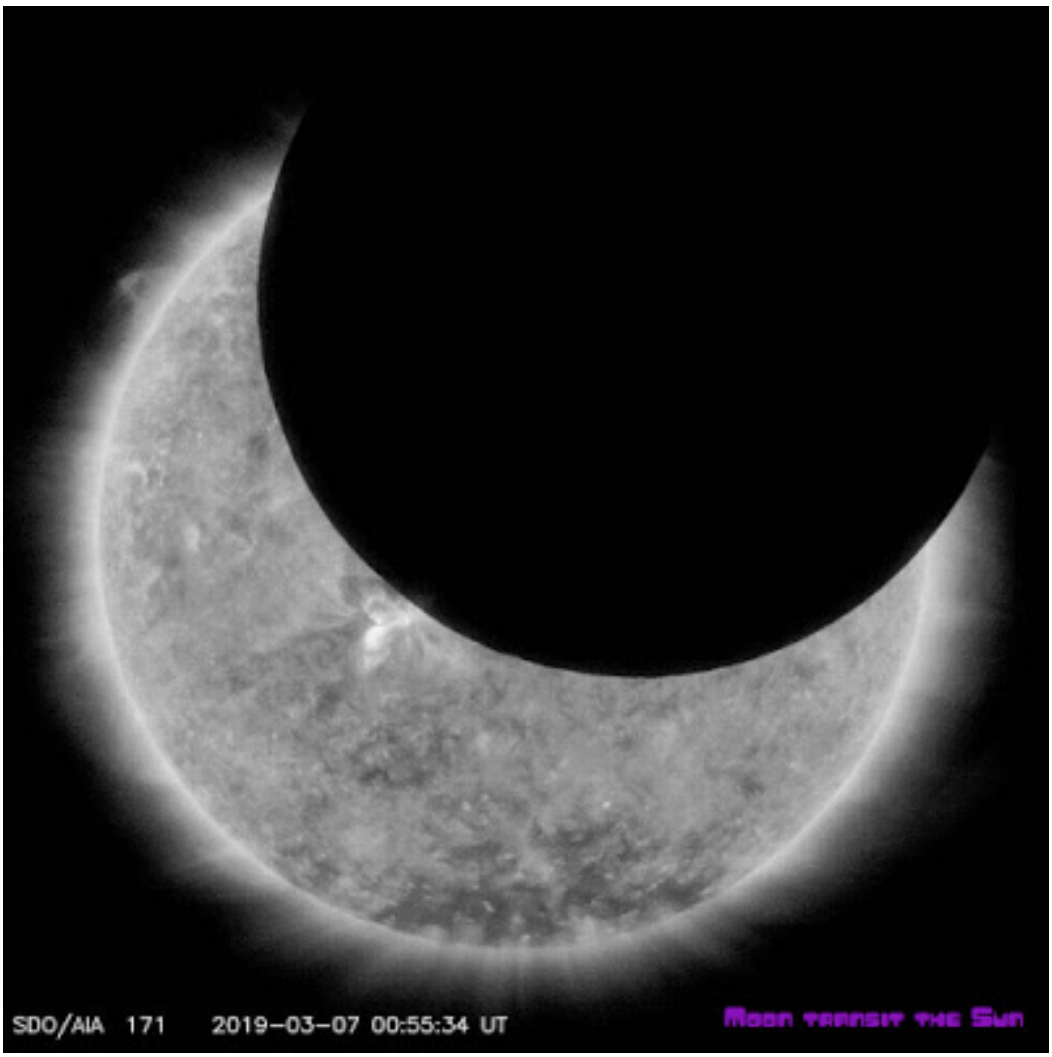
This isn't the first time that SDO has seen the Moon seem to move in two different directions during a lunar transit.

This time, the Moon just happened to remain in SDO's sight as it began the dusk part of its orbit, leading to the freeze-frame effect.

This lunar transit lasted about four hours, from 5 p.m. to 9:07 p.m. EST, and, at peak, the Moon covered 82 percent of the Sun's face.

The Moon's edge appears sharp because the Moon has no atmosphere. On the other hand, Earth eclipses of the Sun have a blurry edge when seen by SDO, because the gases in Earth's atmosphere let through only part of the Sun's light.

The relative speeds and positions of the Moon, the Sun and NASA's Solar Dynamics Observatory resulted in this unusual lunar transit where the Moon appears to pause and reverse course.



All original images black and white as all original images of the sun which is, subsequently, colorized that I made since the video source, will be in the magazine issue 10 plus 11 in 30x30 format and available in photos set of 38 34.75cm images as a gift with the next magazine.

This story has been updated with higher-resolution, higher-frame rate data of the transit.

Original animated gif

Credits: NASAGoddard-SDO

Posted by Veronica IN DREAM at 7:20 PM