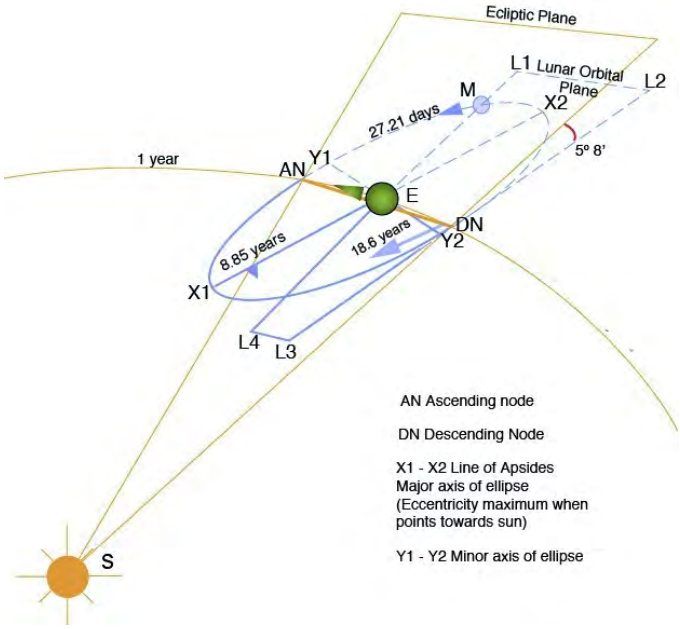
AUGUST IS ECLIPSE MONTH

Just two weeks before the much-anticipated total eclipse of the Sun on August 21, the full Moon passed through the northern part of the Earth's dark umbral shadow, creating a shallow eclipse of the Moon visible in Earth's Eastern Hemisphere.

As with any lunar eclipse, the Moon will sweep through the Earth's shadow from west to east, even as the Moon travels across our sky from east to west.

Any lunar eclipse can only happen at full Moon, when the Moon is opposite, or nearly opposite, the Sun in Earth's sky. That's the only time that it's possible for the Moon to sail through the Earth's shadow. Of course, to watch this lunar eclipse, you have to be on the night side of our world while the eclipse is taking place.

Why do we not have a lunar eclipse at every full moon? The lunar orbital plane is inclined to the plane of the Ecliptic by some 6° and the only time Sun - Earth and Moon are in line are at the two cross-over points, the Ascending Node (AN) and the Descending Node (DN).



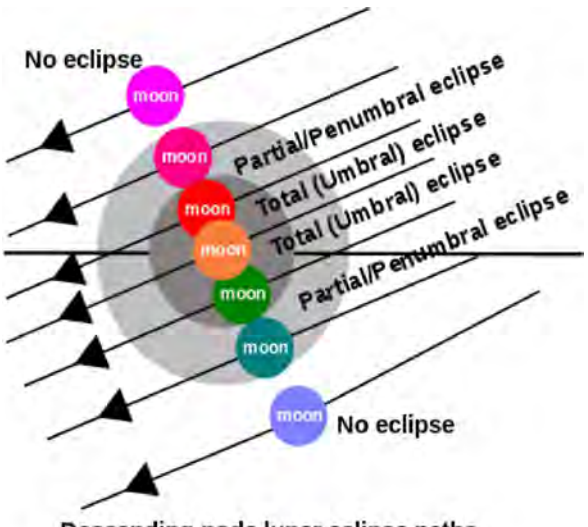
The lunar nodes are the orbital nodes of the Moon, that is, the points where the orbit of the Moon crosses the ecliptic. The ascending or north node is where the moon crosses from south of the ecliptic to north of the ecliptic. The descending or south node is where it crosses from north of the ecliptic to south of the ecliptic.

Eclipses occur only near the lunar nodes: Solar eclipses occur when the passage of the Moon through a node coincides with the new Moon; lunar eclipses occur when passage coincides with the full Moon. A lunar eclipse may occur if there is a full moon within 11° 38' (Celestial Longitude), of a node, and a solar eclipse may occur if there is a new moon within 17° 25' of a node.

The plane of the lunar orbit precesses in space and hence the lunar nodes precess around the ecliptic, completing a revolution (a Saros Cycle) in 6798.3835 days or 18.612958 years. A series of eclipses that are separated by one saros is called a saros series. The current eclipse is part of saros 119

HISTORY

The earliest discovered historical record of what we call the Saros is by Chaldean astronomers in the last centuries BC. It was later known to **Hipparchus**, **Pliny** and **Ptolemy**. The name "Saros" was applied to the eclipse cycle by **Edmond Halley** in 1691, who took it from the Suda, a Byzantine lexicon of the 11th century. The word apparently comes from the Babylonian word "saru" meaning the number 3600. In each successive saros the path of the Moon is shifted either northward or southward due to the fact that the saros is not an exact integer of draconic months (about one hour short).



Descending node lunar eclipse paths

Lunar eclipses occurring near the Moon's ascending node are given odd saros series numbers. The first eclipse in such series passes through the southern edge of the Earth's shadow, and the Moon's path is shifted northward each successive saros

On August 21, 2017 a total eclipse of the Sun will be visible from within a narrow corridor that traverses the United States. **The path of the moon's umbral shadow begins in the northern Pacific and crosses the U.S. from west to east through parts of the following states: Oregon, Idaho, Montana, Wyoming, Nebraska, Kansas, Missouri, Illinois, Kentucky, Tennessee, North Carolina, Georgia, and South Carolina**. The moon's penumbral shadow produces a partial eclipse visible from a much larger region covering most of North America.

The map shows the path of the 2017 total solar eclipse in intermediate detail for locations across the United States. The path of totality is shaded for clarity, and lines of maximum eclipse have been plotted (in yellow) at 10-minute intervals.

ECLIPSE BULLETIN:
"Total Solar Eclipse of 2017 August 21 is the ultimate guide to this highly anticipated event". Written by two of the leading experts on eclipses, **Fred Espenak** and **Jay Anderson**, the bulletin is a treasure trove of facts on every conceivable aspect of the eclipse. The exact details about the path of the Moon's shadow can be found in a series of tables containing geographic coordinates, times, altitudes, and physical dimensions. A set of high resolution maps plot the total eclipse path across the USA. They show hundreds of cities and towns in the path, the location of major roads and highways, and the duration of totality with distance from the central line.
Local circumstances tables for more than 1000 cities across the USA provide times of each phase of the eclipse along with the eclipse magnitude, duration and Sun's altitude. Additional tables cover the eclipse circumstances for cities in Canada, Mexico, Central and South America and Europe. An exhaustive climatological study identifies areas along the eclipse path where the highest probability of favorable weather may be found. A travelogue highlights key locations in the eclipse track from Oregon through South Carolina. Finally, comprehensive information is presented about solar filters and how to safely observe and photograph the eclipse.

Why do people watch Solar Eclipses?
Apart from the excitement of being part of a relatively rare natural phenomena, the unique experience of seeing the Diamond Ring and the awe of a sudden darkened environment in the middle of the day, **is there something to be learned from the experience?** Is it more than just another story to tell your friends?


The vast extend of the Sun's corona, only visible during totality

Yes, there are things to be seen and studied about our Sun that cannot be researched in any other way, except during the period of totality. The atmosphere of the Sun is composed of several layers, the main parts are the photosphere, the chromosphere and the corona. It's in these outer layers, that the Sun's energy, which has bubbled up from the Sun's interior, is radiated away and detected as sunlight.
The lowest layer of the Sun's atmosphere is the photosphere. It is about 500 kilometres thick at a temperature of about 6,000°C . This is what we normally see as the Sun, where the Sun's energy is released as visible light. The photosphere is also the source of solar flares: tongues of fire that extend thousands of miles above the Sun's surface. Solar flares produce bursts of X-rays, ultraviolet radiation, electromagnetic radiation and radio waves. **The next layer is the chromosphere**. It is seen as a reddish glow as super-heated hydrogen burns off. But this red rim can only be seen during a total solar eclipse. At all other times it is too weak to be seen against the brighter photosphere. **The third layer is the corona.** It also can only be seen during a total solar eclipse. It appears as white streamers or plumes of ionized gas that seem to flow outward into space along mysterious field lines. The nature of these lines must somehow be connected to internal workings of the Sun, reflecting magnetic forces of immense proportions. For as yet unknown reason temperatures in the corona can get as high as 2 million degrees C.

AK, with EarthSky and Wikipedia Notes