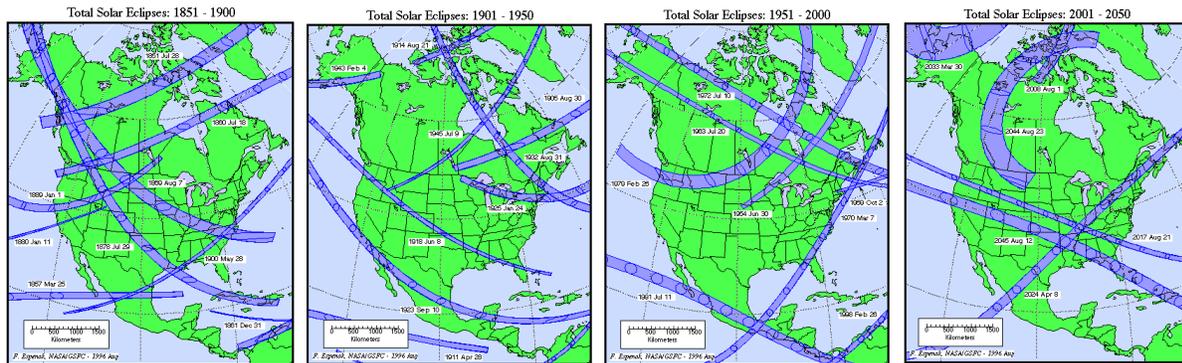
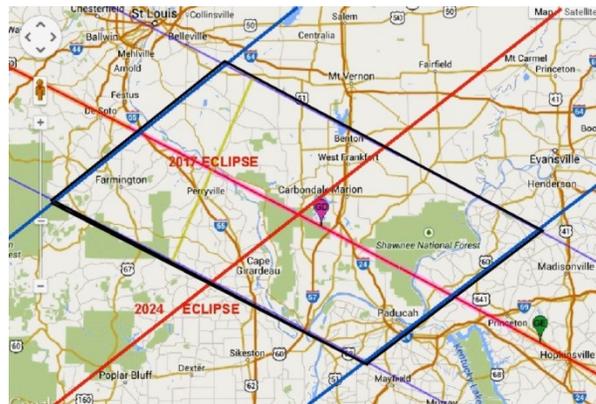


Project 5... X Marks the Spot!



The graphs above show the tracks of the lunar shadow during all of the total solar eclipses that have passed over the continental United States since 1851. The current eclipse for August 21, 2017 can be seen in the last figure to the right stretching from Oregon to South Carolina. Since 1851, and prior to the 2017 eclipse, there have been 13 total solar eclipses visible from the continental US. Each of these has been viewed with considerable enthusiasm and reported in newspapers across the country. One interesting thing about the paths of totality is that many of them intersect each other and define special 'x marks the spot' geographic locations where towns can boast about their good fortune to be Double-Eclipse locations.



Here is what that location will look like with the tracks overlain near Carbondale, Illinois. The crossing point is at Longitude 89d 16' 24.29" West Latitude 37d 38' 39.90" North, and if you enjoy Geocaching challenges, this may be a fun spot to place a cache for future Geocachers to enjoy! For any location along the red line for the 2017 eclipse, you will get to enjoy the maximum total solar eclipse duration of 2 minutes 40 seconds. Along the red line for the 2024 eclipse, the duration will be an even more impressive 4 minutes and 9 seconds.

This circumstance of the crossing points of some total solar eclipses is not one that was recognized before the 1900s because detailed eclipse tracks for historical events were not publically available at the time. They are very hard to produce with the hand-calculator technology available at those times. Also, for many of the favored locations, there were no

settlements nearby so we are pretty lucky that for the upcoming 2017-2024 eclipses there will be plenty of inhabited viewing sites nearby!

Over the course of hundreds of years, the track of the August 21, 2017 eclipse will be crossed by many tracks of earlier eclipses, and also tracks of future eclipses to come. Here is a list of the known crossing points (1851 to 2051), the state in which they occur, and the time between events.

Point	Eclipse 1	Eclipse 2	Years	Location
1	August 21, 2017	April 8, 2024	6	Illinois
2	August 21, 2017	March 7, 1970	47	South Carolina
3	August 21, 2017	June 8, 1918	99	Idaho

Graphical Solutions

From the following enlarged maps, and a supplementary map of the United States, use any method to estimate the longitude and latitude of the three crossing points along the path of the 2017 eclipse.

Map for [1851-1900] Map for [1901-1950] Map for [1951-2000] Map for [2001-2050]

Algebraic solutions

Near each crossing point, the curved track of the moon's shadow looks like a straight line. Solve the following pairs of equations for the latitude and longitude of the crossing points where X = longitude in decimal degrees and Y = latitude in decimal degrees.

Point 1: June 8, 1918 and August 21, 2017

$$1918 \text{ track: } y = 0.0983x + 32.858$$

$$2017 \text{ track: } y = 0.3519x + 3.337$$

Point 2: March 7, 1970 and August 21, 2017

$$1970 \text{ track: } y = -0.8918x + 104.77$$

$$2017 \text{ track: } y = 0.5231x - 8.5466$$

Point 3: April 8, 2024 and August 21, 2017

$$2024 \text{ track: } y = 0.4153x + 0.561$$

2017 track: $y = -0.6313x + 94.0$

Use GOOGLE Earth to locate these points and identify any interesting landmarks near them. If you are a geocacher, visit the location and leave behind a geo 'stash' for future geocashers to visit!