The Eclipse Chaser Who Led an Expedition Behind Enemy Lines During the Revolutionary War

If you’re one of the 32 million Americans living in the path of the April 8 total solar eclipse, you’ve essentially won the cosmic lottery. Across parts of 15 states and directly above cities like Dallas, Indianapolis, Cleveland and Buffalo, the moon will completely obscure the face of the sun, causing the midday skies to darken, the air to grow cooler and the wispy corona of the sun to emerge. One of nature’s most breathtaking sights will be right outside your front door. Reaching the path of totality wasn’t as easy for Samuel Williams, a minister, astronomer and Harvard University professor who led an expedition to a total solar eclipse on October 27, 1780. For reasons of scientific interest and nationalistic pride, the government of Massachusetts decided to finance the mission (the first instance of state-sponsored scientific research in United States history), which led Williams into enemy territory during the Revolutionary War. Throughout history, those precious few moments of totality­—and the rare natural conditions that result—have proved conducive to scientific discovery. During a total solar eclipse in 1868, a French astronomer became the first person to observe helium, spotting the element in the spectrum of the usually invisible corona. In 1919, a pair of astronomers who were watching an eclipse verified Albert Einstein’s general theory of relativity by measuring how the sun distorts the light from other stars. The great scientific problem of Williams’ day was determining longitude while at sea. Latitude, the parallel lines that measure a north-south position on Earth’s surface, can be derived fairly easily from the length of the day or the height of the sun and other stars above the horizon. But no natural reference points exist for longitude, the east-west lines that converge at the poles. One approach to the longitude problem was the lunar distance method, which takes advantage of the relationship between longitude and time. The earth rotates 360 degrees in 24 hours, meaning one hour of time is equivalent to 15 degrees of longitude. “Most longitude schemes were based on this principle and relied on an observer determining the time both where they were and, simultaneously, at a reference point with a known geographical position,” notes Royal Museums Greenwich. “The difficult part was knowing what time it was at the reference location.” Before accurate clocks were widely available, astronomers could figure out this time difference by comparing the distance between the moon and a particular star in their location versus the reference location. Because the position of the moon during totality and the timing of totality itself were unmistakable, Williams knew that making careful observations of both could help improve the lunar distance method. He was eminently qualified to gather this data: He graduated from Harvard in 1761 and excelled in science and math, missing commencement ceremonies because he was accompanying scholar John Winthrop on an expedition to observe the transit of Venus. At age 22, Williams became the minister of the town of Bradford, Massachusetts, often extolling the importance of reason in understanding God and Christian teachings during his sermons. He also made detailed lunar observations. In 1779, Harvard appointed Williams to a chair position, selecting him to replace Winthrop, who’d held the title prior to his death that May.