

Oldest recorded solar eclipse helps date the Egyptian pharaohs

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Credit: University of Cambridge

Researchers have pinpointed the date of what could be the oldest solar eclipse yet recorded. The event, which occurred on 30 October 1207 BC, is mentioned in the Bible, and could have consequences for the chronology of the ancient world.

Using a combination of the biblical text and an ancient Egyptian text, the researchers were then able to refine the dates of the Egyptian pharaohs,

in particular the dates of the reign of Ramesses the Great. The results are published in the Royal Astronomical Society journal *Astronomy & Geophysics*.

The biblical text in question comes from the Old Testament book of Joshua and has puzzled biblical scholars for centuries. It records that after Joshua led the people of Israel into Canaan - a region of the ancient Near East that covered modern-day Israel and Palestine - he prayed: "Sun, stand still at Gibeon, and Moon, in the Valley of Aijalon. And the Sun stood still, and the Moon stopped, until the nation took vengeance on their enemies."

"If these words are describing a real observation, then a major astronomical event was taking place - the question for us to figure out is what the text actually means," said paper co-author Professor Sir Colin Humphreys from the University of Cambridge's Department of Materials Science & Metallurgy, who is also interested in relating scientific knowledge to the Bible.

"Modern English translations, which follow the King James translation of 1611, usually interpret this text to mean that the sun and [moon](#) stopped moving," said Humphreys, who is also a Fellow of Selwyn College. "But going back to the original Hebrew text, we determined that an alternative meaning could be that the sun and moon just stopped doing what they normally do: they stopped shining. In this context, the Hebrew words could be referring to a solar eclipse, when the moon passes between the earth and the sun, and the sun appears to stop shining. This interpretation is supported by the fact that the Hebrew word translated 'stand still' has the same root as a Babylonian word used in ancient astronomical texts to describe eclipses."

Humphreys and his co-author, Graeme Waddington, are not the first to suggest that the biblical text may refer to an eclipse, however, earlier

historians claimed that it was not possible to investigate this possibility further due to the laborious calculations that would have been required.

Independent evidence that the Israelites were in Canaan between 1500 and 1050 BC can be found in the Merneptah Stele, an Egyptian [text](#) dating from the reign of the Pharaoh Merneptah, son of the well-known Ramesses the Great. The large granite block, held in the Egyptian Museum in Cairo, says that it was carved in the fifth year of Merneptah's reign and mentions a campaign in Canaan in which he defeated the people of Israel.

Earlier historians have used these two texts to try to date the possible eclipse, but were not successful as they were only looking at total eclipses, in which the disc of the sun appears to be completely covered by the moon as the moon passes directly between the earth and the sun. What the earlier historians failed to consider was that it was instead an [annular eclipse](#), in which the moon passes directly in front of the sun, but is too far away to cover the disc completely, leading to the characteristic 'ring of fire' appearance. In the ancient world the same word was used for both total and annular eclipses.

The researchers developed a new eclipse code, which takes into account variations in the Earth's rotation over time. From their calculations, they determined that the only annular eclipse visible from Canaan between 1500 and 1050 BC was on 30 October 1207 BC, in the afternoon. If their arguments are accepted, it would not only be the oldest solar eclipse yet recorded, it would also enable researchers to date the reigns of Ramesses the Great and his son Merneptah to within a year.

"Solar eclipses are often used as a fixed point to date events in the [ancient world](#)," said Humphreys. Using these new calculations, the reign of Merneptah began in 1210 or 1209 BC. As it is known from Egyptian texts how long he and his father reigned for, it would mean that

Ramesses the Great reigned from 1276-1210 BC, with a precision of plus or minus one year, the most accurate dates available. The precise dates of the pharaohs have been subject to some uncertainty among Egyptologists, but this new calculation, if accepted, could lead to an adjustment in the dates of several of their reigns and enable us to [date](#) them precisely.

More information: Colin Humphreys et al, Solar eclipse of 1207 BC helps to date pharaohs, *Astronomy & Geophysics* (2017). [DOI: 10.1093/astrogeo/atx178](#)

Provided by University of Cambridge

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