

Evidence of Eta Aquariid Outbursts Recorded in the Classic Maya Hieroglyphic Script Using Orbital Integrations

J.H. Kinsman (1), D.J. Asher (2)

(1) Independent researcher, Atlanta, Georgia, USA (jhkinsman@gatech.edu), (2) Armagh Observatory, College Hill, Armagh BT61 9DG, UK (dja@arm.ac.uk)

Presently there is no firm evidence that the ancient Maya civilization recorded specific dates of meteor showers or outbursts in the corpus of Maya hieroglyphic inscriptions [1]. Although many of the over 2,000 dates record rulers' births, accessions to kingship and deaths, many inscriptions remain vague or untranslated and thus provide an opportunity for new interpretations. Given that a majority of the ancient Maya dates occur in the Classic Period, AD 250–909, the authors decided to investigate Eta Aquariid outbursts since the orbit of parent Comet 1P/Halley is well known [2] and came closest (post-perihelion) to Earth's orbit around AD 500; the Eta Aquariid shower corresponds to the post-perihelion encounter of the Halley meteoroid stream with Earth. In contrast, the comet's orbit (pre-perihelion) was at a greater distance from Earth's orbit during the same period (the Orionid shower corresponding to the pre-perihelion encounter). Furthermore, recent orbital analysis by Sato and Watanabe confirmed that enhanced activity of the Eta Aquariids in 2013 was due to dust trails produced by Halley in 1198 BC and 911 BC [3]. By investigating the stream closest to Earth's orbit the authors surmised that chances would be greatest for outbursts due to recent revolutions of Comet Halley.

The ancient Maya area covers the northern latitudes from about 14° to 21.5° N and western longitudes from about 87° to 93° W, including the modern Central American countries of eastern Mexico, Guatemala, Belize, El Salvador and western Honduras. Although the Eta Aquariids are considered primarily a southern latitude shower, the radiant would have been visible to the Maya in the east for more than three hours before morning twilight. Lacking recorded radiant information, by comparing the date and time of any modeled outbursts to events recorded on or near that date in the inscriptions, a reasonable decision could be made on the likely correspondence of an event to a meteor outburst.

Using the RADAU algorithm [4] as implemented in the MERCURY integrator package [5], the authors numerically integrated meteoroid-sized particles released by Comet Halley in 1404 BC and later, under the influence of planetary perturbations and solar radiation pressure, concluding that several Eta Aquariid outbursts

were likely noted in the ancient script. Most of these outbursts were due to recent (within a few centuries) revolutions of Comet Halley, however a few were possibly due to resonant behavior found in some of the older (of the order of a thousand years) Halley trails.

References

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