Lunar Crescent Visibility

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Motivation and History: Lunar Calendars (Christian, Hindu, Jewish, Muslim)

Questions and Answers

When does lunation occur? (Answered, ahead of time, to arbitrary accuracy)

When is the new crescent first visible to the human eye (aided or unaided)? (Very hard to answer ahead of time.)

The Problem: Pictorially (moon, sky, atmosphere, observer)

Relevant Coordinates and Quantities (arc of descent, arc of light, arc of separation

The Problem: Conceptual Elements

Astronomy (positions of Sun and Moon; size, age, illumination of crescent)

Physics (illumination, scattering, absorption, contrast)

Physiology (human vision)

Psychology

GAC work: One of our MOON printouts

Approaches to the problem:

Experimental - Look for the very young moon at various locations on various dates, in various conditions, report yes/no

First Work by Schmidt (76 data points collected from 1859-1880))

NASA Moonwatch Program (1534 data points collected from 1987-1990)

Empirical

Babylonians

Ilyas

Altitude/Azimuth Criterion

ILDL based upon experimental data

Approaches to the problem:

Theoretical

Bruin: rephrased the question as: "When is the best time to look?"

Schaefer: most sophisticated yet

Elements of a Solution

Relative brightness (contrast) of background sky and lunar crescent as a function of background illumination, time (complicated by atmospheric effects and changing altitude, azimuth of crescent)

Sensitivity of human vision (psychology)

GAC work: Sky brightness vs time

Detector (so far photodiode) CCD? Cooled diode?

Agreement with theory?

What can anyone do?

LOOK for the crescent! Report conditions, and results to USNO, NASA, or us.

Take pictures: film, CCD.