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Choice of Object: The Two-Day Old Crescent Moon

Reasons for Choosing this Target

I've always spent a lot of time watching the moon and observing its phases with my naked eyes. Its beauty is subtle but immense. The moon is also a great source of mystery in world literature.

In ancient Chinese mythology, Chang 'e is a woman that lives on the moon. The story goes "Ten suns had risen together into the skies and scorched the Earth, thus causing hardship for the people. Houyi the archer shot down nine of them, leaving just one Sun, and was given the elixir of immortality as a reward. He did not consume it straight away, but let Chang'e keep it with her, as he did not want to gain immortality without his beloved wife. However, while Houyi went out hunting, his apprentice Fengmeng broke into his house and tried to force Chang'e to give the elixir to him. She took them instead of giving them to Fengmeng. Then, Chang'e then flew upward toward the heavens, choosing the Moon as a residence, as she loved her husband and hoped to live nearby him."[1]

Chang'e is the namesake of the Chinese Lunar Exploration Program.

Original Plan (Photograph Eclipse)

The eclipse pictures didn't turn out because our photos were over exposed. As a result, we could not develop and stack regions that had too much light. See Appendix.

Revised Plan and Description of The 2-Day Old Moon

The 2-day old moon appears as a thin, silver sliver. There are many noticeable craters in the region that is lit up. It's about 8% of the moon's phase.

Image Capture Procedure

500 images taken about once per second as the Crescent Moon was setting. Each exposure is only 1/500 of a second long.

[1] https://en.wikipedia.org/wiki/Chang%27e

Image Processing Procedure

1. Using PlanetarySystemStacker, which can handle 100 images (approximately) at a time, we chose the 14 sharpest images of the first 100 images in the series. We were able to do this because PlanetarySystemStacker ranks the sharpness of the images for us.
2. We then used the software to stack the 14 images together. It does so by dividing the focused region into about 50 focus points and lines them up because the photos are potentially warped.
3. Then we played around with a few indexes to adjust the sharpness on the edge.
4. Eventually we put the photos through apple's photos to increase contrast, making it a little brighter.

Conclusions

We have determined with on-line sources[2] that the big visible crater is Mare Crisium. "Mare" is sea in Latin, because astronomers thought that "Maria" were seas, but they are actually formed by volcanic eruptions.[3] Its diameter is 556 km. It was named by Giovanni Riccioli. Mare Crisium can be seen with the naked eye. One other unusual fact about Mare Crisium is that it is the site of the crash landing of the Soviet Lunar 15 probe in 1969, shortly after the first moonwalk by Apollo 11.

A final note with regard to the attempted eclipse photo, is that exposure is important. Trial and error is a necessary process, and you only get a short chance to get it right during each eclipse.

[2] https://www.popastro.com/moonwatch/moon_guide/observing8.php

[3] https://en.wikipedia.org/wiki/Lunar_mare

The Two-Day Old Crescent Moon

The original high-resolution version of this image is posted at:

https://brianhill.github.io/astronomy/projects/TwoDayOldMoon.html

Appendix

The most-well-lit portion of the Moon is substantially over-exposed. Below is a sample image. This was due to our inexperience in photographing lunar eclipses.

Note that the photo below is actually a monochrome image that has been tinted to have the same color as we remember seeing that eclipse on that morning.