Study of factors affecting the depth of lunar craters using trigonometric

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Abstract

This study aimed to investigate the depth of lunar craters during the first quarter moon (waxing 8th day) and the last quarter moon (waning 8th day), as well as to examine the effect of the elevation angle on the calculated crater depth during the waning 8th day. Photographs were taken using a Dobsonian telescope connected to a Canon EOS 80D DSLR camera. Image data were collected on October 15, 2025 (waning 8th day) between 02:00–04:30 and on October 29, 2025 (waxing 8th day) between 20:00–21:30. The images were analyzed to determine the lunar radius, shadow length, and crater rim relative to the lunar terminator. Trigonometry and basic mathematical principles were applied to calculate and compare the depths of lunar craters. The results showed that the calculated crater depths from both lunar phases were similar. However, the measurements obtained during the waning 8th day were more accurate than those from the waxing 8th day by 4.16%. In addition, it was found that the elevation angle had a significant effect on measurement error, with increasing elevation angles directly corresponding to greater deviations in the calculated crater depth. Therefore, the elevation angle has a greater influence on the measurement error in calculating lunar crater depth than whether the observation was conducted during the waxing or waning phase of the Moon.

Keywords: Lunar crater, Elevation angle, Trigonometric