

Optimizing Astrophotography and Image Analysis of the Orion Nebula, Milky Way Stars, and the Moon in Guam

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Telescopes and astrophotography are effective tools to explore the sky. However, amateur astrophotography is a great challenge due to air pollution, artificial lights, and telescope equipment. Guam is a tropical island in the Western Pacific and near the equator with minimum air and light pollution. The objectives of my study were: (1) To determine the effect of DSLR camera setting (ISO) and image stacking on quality of astronomy objects using a budget telescope system and (2) to optimize, analyze, and measure images for collecting information and data from targets. My targeted objects were the Orion Nebula, Milky-Way stars, and the Moon. A set of 30-80 images of selected objects were taken at various ISO, stacked, and post-processed with software. The objects were analyzed and measured by ImageJ software. The image of Orion Nebula taken at ISO 1600 exhibited great details and large area of the nebula. Stacking 20-30 images reduced the noise level in the images of Milky-way stars and Orion Nebula by 80%. Stars in the image stacked at 60 images showed the number 2.5 times greater than those in the image without stacking. Stacking images of the Moon greatly increased its brightness and clarity. Various signal intensity and hue exhibited at different locations in the Orion Nebula, indicating various gas elements for the formation of star. The diameters of selected Moon's craters measured by ImageJ matched the literature reported data. The result suggested that using a budget astrophotography system in Western Pacific produce impressive images for astronomy study.