Contribution ID: **22** Type: **Oral Presentation**

O43 - Star-Counting Grid Frame: A Low-Cost Educational and Citizen-Science Tool for Monitoring Light Pollution and Night Sky Visibility in Cebu, Philippines

Wednesday, 25 November 2026 14:00 (15 minutes)

Light pollution is an increasing environmental concern that diminishes night sky visibility, limits opportunities for astronomical observation, and reduces public engagement with the natural night sky. This study developed and evaluated a Star-Counting Grid Frame, a low-cost and standardized observational tool designed to support astronomy education, citizen science, and community-based monitoring of night sky conditions in Cebu, Philippines. The instrument consists of a 4-by-4 grid frame that provides a fixed field of view for systematic naked-eye star counting. Observations were conducted across three environments representing varying levels of artificial illumination: an urban site in Cebu City, a peri-urban site in Banawa, and a rural site in Barili. Visible stars were recorded over multiple observation sessions and analyzed to examine differences in night sky visibility among locations. Results revealed a clear gradient in observable stars, with the lowest counts recorded in the urban environment, moderate counts in the peri-urban area, and the highest counts in the rural location. Statistical analysis confirmed significant differences among sites, demonstrating the measurable impact of artificial lighting on night sky visibility. The findings highlight the effectiveness of simple observational methods for documenting local light pollution conditions and raising awareness of dark-sky preservation. Beyond its research application, the Star-Counting Grid Frame offers an accessible platform for hands-on astronomy learning, public engagement, and citizen-science participation. Because it can be constructed from inexpensive and locally available materials, the instrument provides schools, communities, and astronomy outreach programs with a practical tool for promoting scientific inquiry and environmental awareness. The study demonstrates how low-cost observational approaches can contribute to astronomy education, public communication of science, and efforts to protect dark and quiet skies in developing regions.

Keywords: light pollution, dark and quiet sky, astronomy education, citizen science, night sky visibility, observational astronomy

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Session Classification: Contributor Session

Track Classification: Dark and Quiet Sky