Prediction and survey of moonlight power generation amounts –Development of new electricity generation system "Mr. Nisshin Geppo"

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We have developed "Mr. Nisshin Geppo", a device equipped with a solar panel on an equatorial mount for an astronomical telescope. It can generate power while tracking the sun and the moon automatically. In the previous studies, we created a predictive formula for the amount of moonlight power by using an LED bulb, which simulated the power of moonlight. However, the error between the actual amounts and the predicted amounts of moonlight power generation was 64.5%, so we thought that there were some problems regarding the accuracy of the predictive formula. In this study, we have improved on previous predictive formulas by creating a new kind of predictive formula.

Two experiments were carried out in this study:

Experiment 1) Simulated moonlight power experiment: We changed the color of the LED bulb's light with cellophanes. We measured the amounts of generated power for each cellophane color. We found each wavelength of light had a different influence on the solar panel. The amounts obtained approximated the actual amounts with the relation between the wavelengths and the light's energy (moonlight spectrums). We measured the laboratory's brightness with a "Sky Quality Meter" (SQM) and also took the magnitude into consideration.

Experiment 2) Actual moonlight power experiment: We generated power with "Mr. Nisshin Geppo" and measured the amount of moonlight power. At the same time, we also measured the magnitudes of the night sky with SQM. We calculated the predicted amounts by considering the obtained magnitudes and the new predictive formula.

As a result, we calculated the error between the actual amounts and the predicted amounts. In addition, we considered further improvements for the accuracy of this new predictive formula. Details of this study will be presented during the poster session.

Keywords: Moon, Electricity Generation, Tracking