

The Measurement of Night Sky Brightness using a DSLR camera

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Abstract

Brightness is the energy that the fixed star releases per unit time out. However, due to the fact that the human's eyes does not have enough resolution to recognize this level of energy. Astronomers thus configure the comparison rate of the brightness stars called Magnitude. A measure of the brightness of the sky with a DSLR camera becomes the measure of the brightness of the sky referenced by the Magnitude with analyzing data from photos, which shoot by a DSLR camera. The study aims to measure the brightness of the sky with DSLR camera. The equipment used in the study is DSLR camera, and the scope of the study is the sky of Phaya Tan park, Muang District, Yasothon Province. The observations started at 06.30 pm to 04.30 am on 14-15 January, 2016. The process of the study is using DSLR camera to take a photo of the sky all four directions such as North, East, South and West with 45 degrees of uprising angle in the different times. Then the photo will be related to the magnitude which is the least visible brightness and can be observed with the eyes by using Program Stellarium that measures the brightness of the sky in the area because the magnitude which is the least visible brightness can measure the brightness of the sky in the area.

The results of the study showed the average value of Magnitude by all time is 5.57. The sky is the brightest at 06.30 pm (Magnitude equals to 5.19) and the least brightness is at 12.30 am. (Magnitude equals 5.78).

Keywords: Magnitude and Light Pollution.

Introduction

Brightness is the energy that the fixed star releases per unit time out. The unit is used by Watt or Square meter, However, due to the fact that the human's eyes does not have enough resolution to recognize this level of energy. Astronomers compare the brightness of stars, which is called the "magnitude" or "apparent magnitude" which refers to the ranking of the brightest stars in the sky, which was visible from Earth. The author was to study to measure the brightness of the sky with a camera, a DSLR.

Methodology

1. Using DSLR camera to take a photo of the sky all four directions such as North, East, South and West with 45 degrees of uprising angle by setting up cameras: Camera mode: M, Shutter speed: 30 seconds, ISO: 1250, Aperture: 3.5 .
2. Searching the magnitude to find out the photo which is the brightness each time.

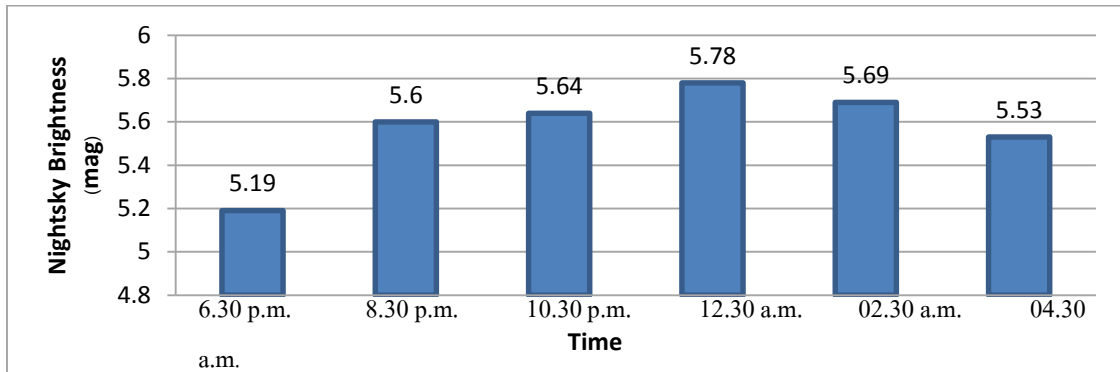
Achievements

The result of the study of a measure of the brightness of the sky with a DSLR camera is as follows:

1. Figures from the study have the sky brightness (average \bar{x}) each time which observed by the table.

Time	Co-ordinate	Altitude	Magnitude
06.30 p.m	(15.784139,104.153824)	45	5.19
08.30 p.m	(15.784139,104.153824)	45	5.60
10.30 p.m	(15.784139,104.153824)	45	5.64
12.30 a.m	(15.784139,104.153824)	45	5.78
02.30 a.m	(15.784139,104.153824)	45	5.69
04.30 a.m	(15.784139,104.153824)	45	5.53
The overall average Magnitude values.			5.57

2. Figures from the observation of the brightness of the sky each time represented by a graph.



Conclusion and Evaluation

A study of a measure of the brightness of the sky with a DSLR camera showed photos of the sky each time on 14-15 January, 2016 that the overall average figure of Magnitude equals 5.57. By each time, the Magnitude equals 5.19, 5.78, 5.69, 5.60, 5.64, 5.53 respectively and the study finds out that the average Magnitude of the star is the lowest at 06.30 pm ($\bar{x} = 5.19$) and the highest is at 12.30 am. ($\bar{x} = 5.78$). Therefore, this can conclude that the sky during dusk has much light pollution affects the brightness of the sky than midnight, which could come from the electric of the building where the people used in daily life, or install a standard lamp in the wrong situation. So, Magnitude of the star can explain the measurement of the brightness of the sky, which corresponds to the concept of Hipparchus who stated that the lower Magnitude has, the brighter of star will appear. On the other hand, the higher Magnitude has, the darker of star will appear as well.

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