

A study of the Lunar apparent area by the Lunar libration

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Abstract

The purpose of the Project is to find the Luna apparent area that can be observed from any point on Earth. By gathering photos of the moon taken at Thailand. Then the images were analyzed to find the farthest position in the longitude and latitude by comparing the map of the moon. And calculate the Luna apparent area.

The results of the study, the distance between the Earth and the moon will turn to the angular diameter of the Moon and will affect the apparent area of the moon. Libration phenomenon that occurs on a daily basis to make the observer can see the surface of the moon than a single observation. The study finds the luna apparent area from latitude libration, longitude libration and daily libration is 57.17%, 58.46% and 50.85% respectively.

Introduction

"Luna" natural satellite only one of the Earth. Tidal Lock makes the moon rotating around its own rotation asynchronous. The rotation period and orbital period around the Earth are equal. As a result, the moon turns toward one side to the Earth. But the moon orbits the Earth, the distance between the Earth and moon are to change over time. Because its orbit is oval. The axial tilt moon. And the tilt of the orbital plane will result in the observer on Earth can see the surface of the moon changes. Be born the phenomenon libration. This is a phenomenon that affects the apparent area of the moon.

Materials and Method

1.A studies the latitude and longitude libration.

- Shoot the Moon during the phase over 50% by using the smartphone camera (connected to an 8-inch telescope).
- Put distance between the surface of the Earth to the moon shots each day. To find the Luna angular diameter.
- Find the image's center and the farthest position in the longitude and latitude by comparing from the moon map.
- Calculate the Luna apparent area.

2. A studies the daily libration.




- Shoot the moon on the rise and fall continuously on the near horizon as possible and analyzed as well as the first.

Results and Discussion

1.A studies the latitude libration and longitude libration.					2. A studies the daily libration.				
Libration	The angle on The Equator	Area _{far side} (km ²)	Area _{far side} (%)	% Apparent Area (%)	Libration	The angle on The Equator	Area _{far side} (km ²)	Area _{far side} (%)	% Apparent Area (%)
Latitude	81.75	16,232,185.1	42.83	57.17	Longitude	89.02	18,627,055.8	49.12	50.85
Longitude	80.26	13,742,276.5	41.54	56.46					

Conclusions

From the study it can be concluded that the phenomenon of libration are three type

<p>1. Libration in longitude results from the eccentricity of the Moon's orbit around Earth; the Moon's rotation sometimes leads and sometimes lags its orbital position.</p> <p>**The area appeared to be 58.46%</p>	<p>2. Libration in latitude. results primarily from the tilt of the moon's orbital plane with respect to the ecliptic (Earth's orbital plane)</p> <p>**The area appeared to be 57.17%</p>	<p>3. Daily libration. results from the rotation of the Earth. The difference in perspective between the rising and setting of the Moon appears as a slight turning of the Moon first to west and then to east</p> <p>**The area appeared to be 50.85%</p>
		

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Reference

- Bruce McClure: <http://earthsky.org/space/how-much-of-the-moon-can-we-see-from-earth-lunar-libration>. 5
 David R. Williams : <http://nssdc.gsfc.nasa.gov/planetary/factsheet/earthfact.html>