The Moon as the Earth's Mirror

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The state of the vegetation on earth is an important indicator of our planet’s well-being. In this project, we tested the hypothesis that the prevalence of smartphones and other cameras could be utilized to monitor global vegetation health through earthshine observations. We analyzed whether the red channel from these observations could capture variations in chlorophyll absorption, despite the limitations imposed by built in IR-cut filters; additionally, we connected this with the concept of a citizen science project, with the intent of augmenting satellite-based remote sensing data with that produced by citizen scientists worldwide. At first, a series of earthshine images from various locations at different times were collected. The images were processed and normalized. Any data heavily influenced by other factors (e.g cloud cover) was filtered out. Satellite data for comparison was processed. A normalized earthshine flux was then compared to an integrated NDVI to verify the expected inverse relationship between the two. Measurements with various cameras showed that the red channel of earthshine images could be used to reliably record changes in chlorophyll absorption, and thus vegetation health. Since virtually anyone with a smartphone can participate, the potential for obtaining good spacial and temporal coverage of the earth’s surface is high. Next steps will include more data to further verify the inverse relationship between the normalized earthshine flux and the integral NDVI and the implementation of the citizen science project.

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