Lunar Phase-angle Dependent DCC Observations from Suomi NPP VIIRS/DNB

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The Visible Infrared Imaging Radiometer (VIIRS) Day/Night Band (DNB) on the Suomi NPP has been used for a variety of studies involving both geophysical and social economic activities. This band has become an important band for the Key Performance Parameters (KPP) for the JPSS mission and the data have been used operationally by the Alaska National Weather Service. As a result, it is important to ensure the DNB data quality through extensive calibration/validation.

Deep Convective Clouds (DCC) are defined as those with brightness temperatures below 205K. DCC is known to have very stable high reflectance in the visible spectral range and therefore is used for satellite radiometer calibration. Lunar reflectance is also very stable, and reflected lunar radiance from the DCC can be used for validation. Suomi NPP VIIRS DNB can measure the reflected lunar radiance from the DCC at night from half-moon to full moon. Therefore, observed lunar radiance from DNB is useful for validation. Specifically, investigating the lunar phase angle dependent DCC observations from NPP VIIRS DNB is very important for us to understand the performance of the DNB calibration.

In this study, we selected VIIRS DNB lunar data in tropical region over the DCC. By analyzing the DNB measured lunar radiance against the lunar phase angle, we found that there is a good relationship between these two parameters. This can also be further compared with lunar models to validate the calibration.