A Light Contamination Ranking Index-based Method for Automating VIIRS Day/Night Band Stray Light Correction

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The Day/Night Band (DNB) of the Visible Infrared Imaging Radiometer Suite (VIIRS) onboard Suomi-NPP represents a major advancement in night time imaging capabilities. The DNB senses radiance that can span 7 orders of magnitude in one panchromatic (0.5-0.9 μm) reflective solar band and provides imagery of clouds and other Earth features over illumination levels ranging from full sunlight to quarter moon. When the satellite passes through the day-night terminator, the DNB sensor is affected by stray light due to solar illumination on the instrument. Current operational stray light correction for VIIRS DNB at IDPS is based on monthly stray light correction Look-up-Table (LUT) for northern and southern hemisphere. Granules with stray light around new Moon are first visually inspected for minimum light contamination such as artificial light, aurora or other light sources and then are selected for stray light correction LUT generation. After May 2015, LUTs accumulated over past one year have been annually recycled and applied to operational stray light correction. This poster developed a light contamination ranking index (LCRI)-based algorithm to automate DNB granule selection and stray light correction LUT generation. This method provides means to evaluate the light contamination quantitatively. In this method, an evaluation region is defined across multiple granules in one orbit with most likely stable signals. The pixel radiance in the prescribed evaluation region is quantitatively scored with Light Contamination Index (LCI) and percentage of pixels with radiance ratio value above the threshold is evaluated. Imagery quality score can be assessed as percentage of bad pixels in the region of interest. The LCI of DNB images are ranked and images with LCI below certain threshold are selected to ensure containing minimum artificial lights, aurora, or other light sources. This poster demonstrated the effectiveness of LCRI-method in constructing stray light correction LUT and removing stray light from DNB images.