Abstract: Validating the VIIRS Day/Night Band Geolocation Accuracy at Different Scan Angles with Terrain Correction

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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 a Key Performance Parameter (KPP) for the JPSS mission and the data have been used operationally by the Alaska National Weather Service. As a result, validating the geolocation accuracy of the VIIRS/DNB has become more important for the mission. Specifically, investigating the effect of scan angle dependency and terrain correction for the VIIRS DNB on geolocation accuracy is very important for us to understand the performance of the DNB geolocation calibration. In this study, we selected validation sites at different altitudes, such as the Oil Platform Holly at sea level, and isolated nightlights on the Qinghai-Tibet Plateau at > 3 km altitude as primary validation point sources.

By comparing the geolocation errors before and after terrain correction of these sites, we found that geolocation errors at the Qinghai-Tibet plateau are greatly reduced from more than 1 km to within 200 meters after terrain correction. This suggests that terrain correction greatly increased geolocation accuracy at high elevations. On the other hand, at sea level, terrain correction has little impact on geolocation accuracy as expected. In addition, we also found that the geolocation errors are not correlated with scan angle or frame# for the validation sites. This validation capability of scan angle dependency and terrain correction is especially important for VIIRS DNB on JPSS J1 due to the changes of its onboard aggregation scheme at high scan angles.