

Evaluation of RadCalNet Output Data Using Landsat 7, Landsat 8, Sentinel 2A, and Sentinel 2B Sensors

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Abstract

In 2013, the Committee on Earth Observation Satellites (CEOS) Working Group on Calibration and Validation (WGCV) Infrared and Visible Optical Sensors Subgroup (IVOS) established the Radiometric Calibration Network (RadCalNet), consisting of four international test sites providing automated in situ measurements and estimates of propagated top-of-atmosphere (TOA) reflectance. This work evaluates the 'reliability' of RadCalNet TOA reflectance data at three of these sites—RVUS, LCFR, and GONA—using Landsat 7 ETM+, Landsat 8 operational land imager (OLI), and Sentinel 2A/2B (S2A/S2B) MSI TOA reflectance data. This work identified a viewing angle effect in the MSI data at the RVUS and LCFR sites; when corrected, the overall standard deviation in relative reflectance differences decreased by approximately 2% and 0.5% at the RVUS and LCFR sites, respectively. Overall, the relative mean differences between the RadCalNet surface data and sensor data for the RVUS and GONA sites are within 5% for ETM+, OLI, and S2A MSI, with an approximately 2% higher difference in the S2B MSI data at the RVUS site. The LCFR site is different from the other two sites, with relative mean differences ranging from approximately -10% to 1%, even after performing the viewing angle effect correction on the MSI data. The data from RadCalNet are easy to acquire and use. More effort is needed to better understand the behavior at LCFR. One significant improvement on the accuracy of the RadCalNet data might be the development of a site-specific BRDF characterization and correction.