Radiometric Calibration Assessment of Commercial High Spatial Resolution Multispectral Image Products

Kara Holekamp[1], David Aaron [2], and Kurtis Thome [3]

Radiometric calibration of commercial imaging satellite products is required to ensure that science and application communities can better understand commercial imaging satellite properties. Inaccurate radiometric calibrations can lead to erroneous decisions and invalid conclusions and can limit intercomparisons with other systems. In addition, the user community has little or no insight into the design and operation of commercial sensors or into the methods involved in generating commercial products. To address this calibration need, the NASA Stennis Space Center (SSC) Applied Sciences Directorate (ASD) established a commercial satellite imaging radiometric calibration team consisting of three independent groups: NASA ASD, the University of Arizona Remote Sensing Group, and South Dakota State University.

Each group independently determined the absolute radiometric calibration coefficients of available high–spatial-resolution commercial 4-band multispectral products, in the visible through near-infrared spectrum, from GeoEye™ (formerly Space Imaging®) IKONOS, DigitalGlobe® QuickBird, and GeoEye (formerly ORBIMAGE®) OrbView. Each team member employed some variant of a reflectance-based vicarious calibration approach, requiring ground-based measurements coincident with image acquisitions and radiative transfer calculations. Several study sites throughout the United States that covered a significant portion of the dynamic range of the sensors were employed. Satellite at-sensor radiance values were compared to those estimated by each independent team member to evaluate the sensor's radiometric accuracy. The combined results of this evaluation provide the user community with an independent assessment of these commercially available high-spatial-resolution sensors' absolute calibration values.

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