

Radiometric & Geometric Calibration of ROCSAT-2 Image

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ABSTRACT: The Taiwan first remote sensing satellite ROCSAT-2 has been successfully launched on May 20, 2004, and after transferring into its mission orbit, the 2 meter resolution image also been quickly delivered and processed. The Image Quality Subsystem (IQS) in the Image Processing System (IPS), has to perform the image quality check, also the radiometric and geometric in-orbit calibration during this phase. These results will be applied for modifying the Calibration Parameter File (CPF).

The CPF used for the Level 1A and Level 2 (or further high level) image processing contains two parts, radiometric and geometric calibration. This paper focuses on in-orbit activities during the two months after ROCSAT-2 transferred to its mission orbit. The in-orbit calibration activities are necessary to verify and eventually adjust the calibration parameters from the first set determined on-ground. For the radiometric calibration, we use the raw data to get the relative Gain estimation and Dark Current measurement. The calibration method will be demonstrated in this paper. We also compare the on-ground and post in-orbit calibration result.

The geometric calibration data consist in : 1. the analytical functions ($\psi_x(b,p)$, $\psi_y(b,p)$), which are the rotations about X_{LOS} and Y_{LOS} for each band and pixel; 2. the transfer matrix from R_{LOS} to R_{PIP} while R_{LOS} is defined from the main plate cube and R_{PIP} is defined from the PIP cube. Compared with the Ground control truth with the Level 2 image, we find the location error is mostly due to the Misalignment between R_{LOS} and R_{PIP} . We use GCPs as measurement, IPS location function as model calculation, the image viewer for GCP (line, sample) identification, and statistic estimation to get the bias. Once the GCPs and the image data number are large enough, the residuals and noises can also be estimated for the satellite ancillary data, which can be viewed as the satellite knowledge error.