

Preliminary Development of Radiometric Calibration Plan for FORMOSAT-8 Remote Sensing Instrument

Kuo-Hsien Hsu, Yun-Shan Lee

National Space Organization, 8F, 9 Prosperity 1st Road, Hsinchu Science Park, HsinChu, Taiwan

Email: khhsu@nspo.narl.org.tw; sunnylee@nspo.narl.org.tw;

Abstract: FORMOSAT-8 (FS-8) satellite constellation is scheduled to be launched in 2022, and will be operated by National Space Organization (NSPO), Taiwan. The revisit frequency of the FS-8 constellation will be 4 to 5 times per day. FS-8 is designed to be the earth observation satellite for land distribution, natural resources research, forestry, environmental protection, disaster prevention, rescue work, and other applications. Total 6 micro-satellites of FS-8 constellation will provide 1-meter panchromatic, 2-meter multispectral image resolution, and 1.28-meter panchromatic video resolution. Two kinds of sensors, plane and line sensors, are used for FS-8 RSI, and for such typical optical remoting sensing satellite, radiometric image quality is generally expressed in terms of some significant parameters, such as the radiometric resolution and calibration accuracy, that is represented by the equalization for the different response of the detectors (relative calibration) and establishing the rules for converting the digital numbers to radiance (absolute calibration), and noise level is quantified by the Signal-to-Noise ratio (SNR) based on a given radiance. Additionally, in terms of geometric resolution and sharpness, it is described by the Modulation Transfer Function (MTF) using a ground target site. In this paper, the calibration plan is well organized and presented for all necessary process of radiometric calibration activities performed in preflight and on-orbit phase, which purpose is not only to verify that the FS-8 radiometric performance shall meet the system specification, but also to determine the radiometric parameters of RSI.

Keywords: FORMOSAT-8 (FS-8), radiometric calibration, plane sensor, SNR, MTF