



Absolute Radiometric Calibration of FORMOSAT-2 Satellite Imagery

The absolute radiometric coefficients of FORMOSAT-2 radiometric model had been regularly updated via the on-orbit vicarious and cross radiometric calibrations. The FORMOSAT-2 radiometric model is briefly expressed as follows:

$$C(b,p,G(b,j),R(b))=A(b,p,G(b,j))*R(b)+C(b,p,G(b,j),0)+N(b,p,G(b,j),R(b))-----(1)$$

Where the notations of Eq.(1) are given in the following:

- Spectral band: b : 0 for PAN band, from 1 to 4 for B_b MS bands
- Pixel: p : from 1 to 12000 for PAN band, from 1 to 3000 for MS bands
- Number of pixels per band: $P(b):P(0)=12000$ for PAN band, $P(1)$ to $P(4)=3000$ for MS bands
- On-board gain for the spectral band b : $G(b,j)$: j from 1 to 10, which $G(b,1)=1$
- Mean radiance level of the scene in the b spectral band (in standard radiance unit $\frac{W}{m^2 \cdot sr \cdot \mu m}$): $R(b,$
- Output signal (in 8bits binary scale): $C(b,p,G(b,j),R(b))$
- Detection noise (in 8bits binary scale): $N(b,p,G(b,j),R(b))$
- $C(b,p,G(b,j),0)$ (in 8bits binary scale): offset of the output code
- $A(b,p,G(b,j))$: conversion factor for the input radiance to the output signal code for the gain $G(b,j)$ and the relative response of each pixel ($\rho(b,p)$) compared to the absolute radiometric coefficient over the whole set of pixels of the band ($K(b)$). This term can be expressed as:

$$A(b,p,G(b,j))=\rho(b,p)*K(b)*G(b,j)-----(2)$$

The latest update of the absolute radiometric coefficients values are listed in the following table, and these coefficients are converted into to so called “Physical Gain” in the product’s Dimap file.”

FORMOSAT-2 Absolute Radiometric Coefficient				
Pan	B1	B2	B3	B4
0.512856	0.510055	0.495465	0.4873245	0.579608

