Kompsat-5 Sigma Naught Equation

Satellite Operation & Application Center

Korea Aerospace Research Institute

K5 RCS Equation

- **K5 RCS Equation**

$$RCS[dBsm] = 10log_{10}\left[CALCO \sum_{\{i,j\}\in D}^{N} \left\{\left|\left(I_{i,j}\cdot RF\right)^2 + \left(Q_{i,j}\cdot RF\right)^2\right|\right\}\right]$$

  - CALCO is calibration constant, RF is rescaling factor, $I_{i,j}$ and $Q_{i,j}$ are real and imaginary pixel values at i^{th} row and j^{th} column, respectively.
  - CALCO & RF can be found in attributes of K5 image file with the name of “Calibration Constant” and “Rescaling Factor”, respectively.

K5 σ^0 Equation (L1A)

- **K5 σ^0 Equation for L1A (SCS) Product**

$$\sigma^0[dB] = 10log_{10}\left[\frac{CALCO}{N(\rho_C\rho_L)}\sum_{\{i,j\}\in D}^{N}\left\{\left|\left(I_{i,j}\cdot RF\right)^2+\left(Q_{i,j}\cdot RF\right)^2\right|\left|\sin(\theta_{i,j})\right|\right\}\right]$$

  - CALCO is calibration constant, RF is rescaling factor, $I_{i,j}$ and $Q_{i,j}$ are real and imaginary pixel values at i^{th} row and j^{th} column, respectively.
  - N is number of pixels, $\rho_C\rho_L$ are column and line pixel spacing, θ is local incidence angle.
  - CALCO & RF can be found in attributes of K5 image file with the name of "Calibration Constant" and "Rescaling Factor", respectively.
  - ρ_C can be found in attributes of K5 image file with the name of "Column Spacing".
  - ρ_L can be found in attributes of K5 image file with the name of "Line Spacing".
  - θ can be calculated using GIM layer data as follows:

$$\theta[deg] = GIM * GIM_{RF} - GIM_{Off}$$

    - GIM_{RF} is "Rescaling Factor" and GIM_{Off} is "Offset" in GIM layer attributes of K5 image file

K5 σ^0 Equation (L1C & L1D)

- **K5 σ^0 Equation for L1C (GEC) & L1D (GTC) Product**

$$\sigma^0[dB] = 10log_{10}\left[\frac{CALCO}{N(\rho_C\rho_L)}\sum_{\{i,j\}\in D}^{N}\left\{\left|\left(I_{i,j}\cdot RF\right)^2+\left(Q_{i,j}\cdot RF\right)^2\right|\right\}\right]$$

  - CALCO is calibration constant, RF is rescaling factor, $I_{i,j}$ and $Q_{i,j}$ are real and imaginary pixel values at i^{th} row and j^{th} column, respectively.
  - N is number of pixels, $\rho_C\rho_L$ are column and line pixel spacing, θ is local incidence angle.
  - CALCO & RF can be found in attributes of K5 image file with the name of “Calibration Constant” and “Rescaling Factor”, respectively.
  - ρ_C can be found in attributes of K5 image file with the name of “Column Spacing”.
  - ρ_L can be found in attributes of K5 image file with the name of “Line Spacing”.