

Applying the 1.6 μ m Nonlinearity Correction to AATSR GBT Products

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This TN describes the procedure to retrospectively apply the nonlinearity correction to the 1.6 μ m reflectances in L1B products generated before 14 December 2004. The need to use this correction is explained in AATSR product quality disclaimer

http://envisat.esa.int/dataproducts/availability/disclaimers/ATS_TOA_1P_Disclaimers.pdf

and is described in detail in PO-TN-RAL-0539 "1.6 μ m Nonlinearity Correction".

NOTE: Care must be taken to ensure that this correction is only applied to L1B products generated using GC1 file

ATS_GC1_AXVIEC20020123_073430_20020101_000000_20200101_000000. Failure to do so will result in the correction being applied twice. The name of the GC1 file used is contained in the DSDs at the end of the product SPH.

1. Read in AATSR L1B product – DO NOT apply any corrections at this stage (i.e. adjustments for solar zenith angle)

NADIR_REFL = AATSR_1_6UM_L1B_NADIR_TOA_REFLECTANCE

FWARD_REFL = AATSR_1_6UM_L1B_FWARD_TOA_REFLECTANCE

2. Convert back to raw, normalised detector count

NADIR_SIGNAL = -0.816*(NADIR_REFL/19.2)

FWARD_SIGNAL = -0.816*(FWARD_REFL/19.2)

3. Convert back to reflectance using nonlinearity correction

NEW_NADIR_REFL = 100*PI*(A0 + A1*NADIR_SIGNAL +
A2*NADIR_SIGNAL^2

A3*NADIR_SIGNAL^3)/I0

NEW_FWARD_REFL = 100*PI*(A0 + A1*FWARD_SIGNAL +
A2*FWARD_SIGNAL^2

A3*FWARD_SIGNAL^3)/I0

Where

PI = π

A0 = -0.000027

A1 = -0.1093

A2 = 0.009393

A3 = 0.001013

I0 = 1.553mWcm⁻² = solar spectral radiance