



JNCC Sentinel-1 Backscatter Data Provision Service

SAR processing Methodology

DEFENCE AND SPACE

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SAR Processing Overview

Satellite: Sentinel-1 A/B **Revisit Time:** 6 days (InSAR configuration)

INPUT product: S1_GRD_HR VV-VH (Sentinel-1 Interferometric Wide Swath Mode Ground Range Detected High Resolution Level-1 Product)

OUTPUT (SAR derived observables generated by the processing)

- 1) Terrain corrected absolute backscattering coefficient Sigma0 and Gamma0 linear scale (**suffix: TC**)
- 2) Terrain corrected and Radiometrically Normalised Kellndorfer (with Local incidence angle projected on the slant range plane) backscattering coefficient Sigma0 and Gamma0 linear scale and after speckle removal in linear and db scale (**suffix: RTC**)
- 3) Terrain corrected and Radiometrically Normalised Small method backscattering coefficient Gamma0 linear scale and after speckle removal in linear and db scale (**suffix: FTC**)

Script language: Bash LINUX calling functions libraries, embedding the SAR defined processing chains, and configuration file.
Use of POSITIONAL parameters to allow few processing combination

Script features

- Selection of polarisation (VV or VH or VV and VH);
- Reading directly Sentinel-1 (A/B) data in ZIP;
- Option to apply a multi-looking process;
- Option for assembly (up to 3 slices)
- Option for Precise Orbit Ephemerides correction (RESORB, POEORB); in case not available use one in the product
- Option for selection of image interpolation method during Terrain Correction;
- Option for DEM selection: SRTM 3 sec or External DEM (APGB 5m);
- Radiometric Normalisation. Both the local incidence angle correction or local illuminated area correction (terrain flattening based [RD-2]) can be implemented to compensate the topography and normalise the local variation of the scattering;
- Option for selecting different Output Coordinate Reference Systems (British National Grid, Irish Grid TM75 – EPSG 29902 , UTM-WGS84);
- Option for the Speckle filtering (Refined Lee, GammaMap)
- Output format: GeoTIFF-BigTIFF format;
- Logging

Positional parameters to be provided to the script for options selection

\$1 → type of products to be processed: =1 GRD ; =2 SLC ## inserted to allow modularity for future SLC processing

\$2 → number of slices to be processed (up to 3 adjacent slices):

\$3 → polarisation to be processed: =1 (VV&VH); =2 (VV); =3 (VH)

\$4 → Dem used in the processing: =1 (APGB); =2 (SRTM)

\$5 → Precise orbits: =1 (RESORB if not found use the one in the product); =2 (POEORB)

\$6 → Multilooking factor: =1 (Az=1 & Rg=1); =2 (Az=2 & Rg=2) etc:

\$7 → Image interpolation method during terrain correction: =1 (nearest neighbour) =2 (bilinear) =3 (BICUBIC_INTERPOLATION)

\$8 → DEM Resampling method during terrain correction: =1 (bilinear) =2 (e.g.: Bicubic INTERPOLATION)

\$9 → CRS for Terrain Corrected outputs: =1 (OSGB 1936 - EPSG:27700); =2 (EPSG:29902); =3 (UTM WGS 84)

#{10} → determines the type of applied speckle filter: 1 (=Refined Lee); 2 (=GammaMap)

Processing script orchestration

