RISAT-1 SigmaSAR (Beta.2.0.) - User Manual

1. Overview

SigmaSAR (Beta version 2.0.) software is the follow-on of version 1.0. developed at Microwave Remote Sensing and Data Processing Division, MRSDPD/MRS&GDPG/DPPA&WAA/NRSC to generate Sigma Naught Backscatter Images for Level-1 Ground Range, Level-1 Slant Range and Level-2 and Level-2A GeoTIFF data products of FRS-1 ,FRS-2, MRS and CRS operational modes of RISAT-1 .

The software has been updated to generate Sigma Naught Backscatter Images for Level-2A Georeferenced   GeoTIFF data products of FRS-1, MRS and CRS acquisitions of RISAT-1.

RISAT-1 Level-2 Terrain corrected Geo-Referenced Product named as "Level-2A Enhanced Terrain corrected Geo-Referenced Product" is an improved version which was released to the user community in   2016. Though Level-2 and Level-2A are geometrically at par in planar regions, Level-2A product has significant improvement of geo location accuracy in hilly regions .The product includes Layover Mask and Local Incidence angle along with the files already defined for the Level-2 product. This product uses the True height values even in highly undulating terrains.

RISAT-1 Data Products Format (Version 1.4) may be referred for further details. SigmaSAR (Beta Version 2.0.) can generate Sigma Naught Backscatter Images for L2A products taking into consideration the Local Incidence Angle Map with improved accuracy in normal terrain and more so in hilly terrain .

2. Installation Guidelines

The beta version 2.0. has been developed as a Console Application for Windows and Linux   systems for 32-bit and 64- bit architecture.

3. How to Install in Windows

3.1. Separate executables are available for 32-bit and 64-bit systems and the corresponding archived folder can be downloaded and untarred.

3.2. For L2-A Enhanced Georeferenced GeoTIFF data products, unrar SigmaSAR_L2A_64bitwin_Enhanced.rar and navigate to the L2A_64BIT.exe and run it .The console opens up as shown:
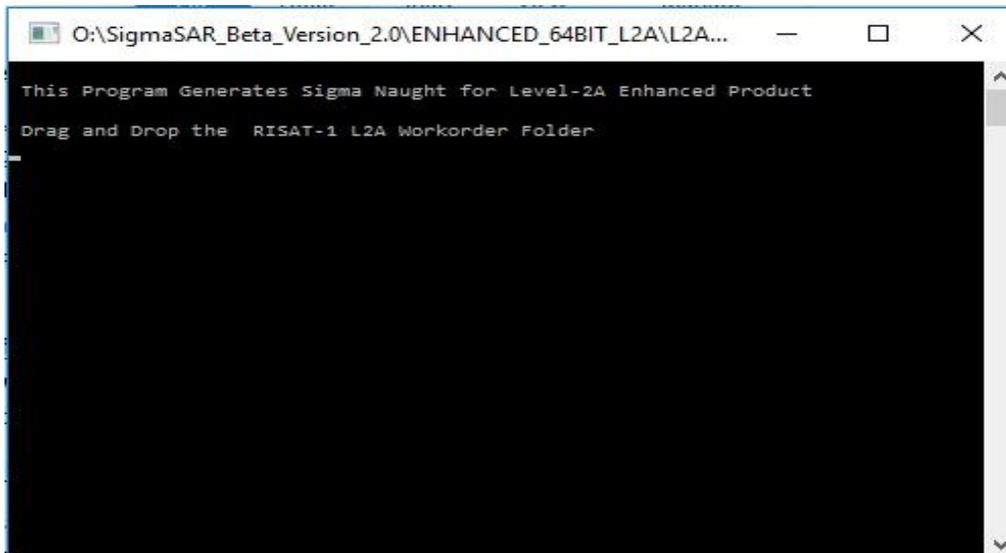

Figure 1: Console Application for L2A-Sigma Naught Generation

3.3. The user can give the RISAT-1 L2A Work Order folder as the input.

Figure 2: Data Format Structure of RISAT-1 Level -2A Enhanced product

3.4.The RISAT-1 L2-A data structure is as shown in Figure 2 and the software fetches the required files and the Local Incidence Map file for further processing.

3.5. The Sigma Naught Products are generated in the same input folder in the GeoTIFF format for Level-2A. The masked region of the image is assigned a dummy value of -60dB.   For the valid workable regions, Sigma Naught is generated taking into account the local incidence angle. The region outside the image are assigned a dummy value of 0.0..   In order to improve the   product visually, dynamic range adjustment may be applied and this would not affect the Sigma Naught values.

Sigma Naught (dB)	Significance
Float value calculated	For the VALID unmasked region
-60 dB	INVALID Value (Masked Region from Layover /Mask File)
0.00	Region outside the Geo-referenced Image

 3.6. For Windows-32 bit systems, navigate to the corresponding folder and click on the "L2A_32BIT.exe" application.

3.7. For Level-2 products, navigate to the corresponding folder and click on the "RISAT1_L2_64BIT" application and the Console opens up as shown below.
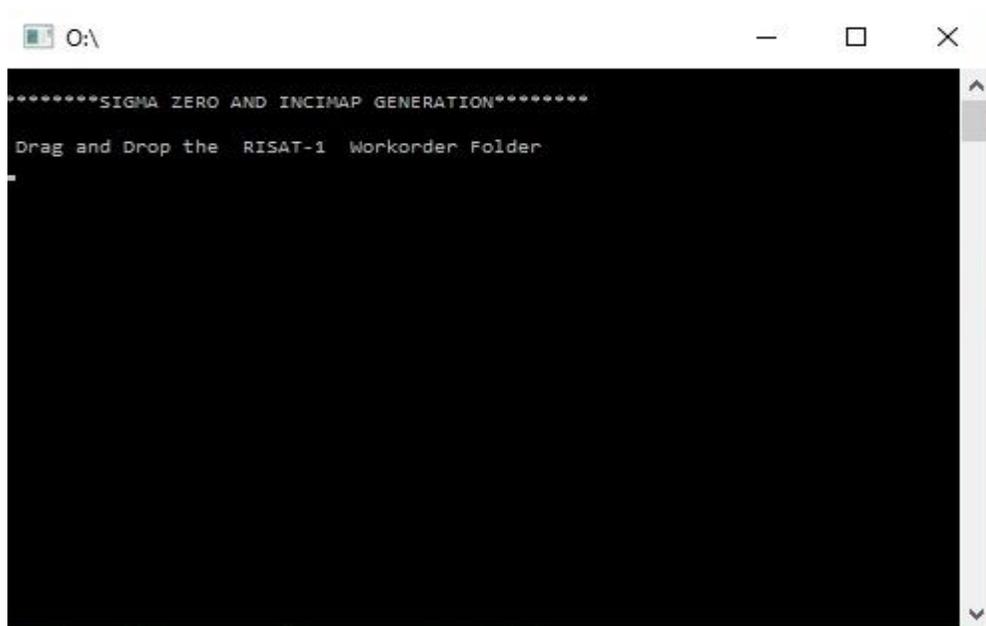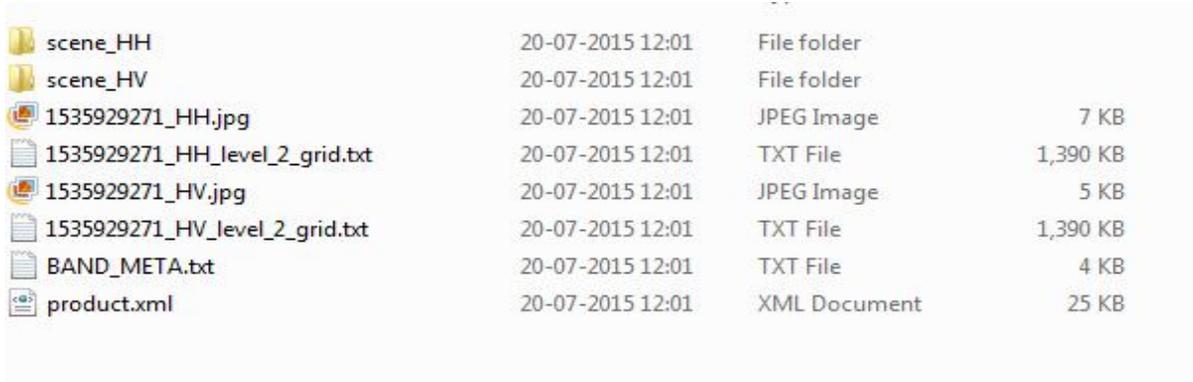
Figure 3: Console Application for RISAT-1 Level-2 Sigma Naught

3.8. The user can give the RISAT-1 Work Order folder as the input.

| scene_HH | 20-07-2015 12:01 | File folder | |
scene_HV	20-07-2015 12:01	File folder	
1535929271_HH.jpg	20-07-2015 12:01	JPEG Image	7 KB
1535929271_HH_level_2_grid.txt	20-07-2015 12:01	TXT File	1,390 KB
1535929271_HV.jpg	20-07-2015 12:01	JPEG Image	5 KB
1535929271_HV_level_2_grid.txt	20-07-2015 12:01	TXT File	1,390 KB
BAND_META.txt	20-07-2015 12:01	TXT File	4 KB
product.xml	20-07-2015 12:01	XML Document	25 KB

Figure 4: RISAT-1 Data Format Structure for Level-2

3.9.The RISAT-1 Level-2 data structure is as shown in Figure 4 and the software fetches the required files for further processing.

3.91. The Sigma Naught Products are generated in the same input folder in the GeoTIFF format for Level-2.

3.92. For Windows-32 bit systems, navigate to the corresponding folder and click on the "RISAT1_L2_32BIT" application.

3.93. For Level-1 Products, navigate to the corresponding folder and click on the RISAT1_L1_64BIT" application. In the console, give the Level-1 product work order as the input. The RISAT-1 Ground Range (MLG) and Slant Range(SLC) data structure is as shown below:
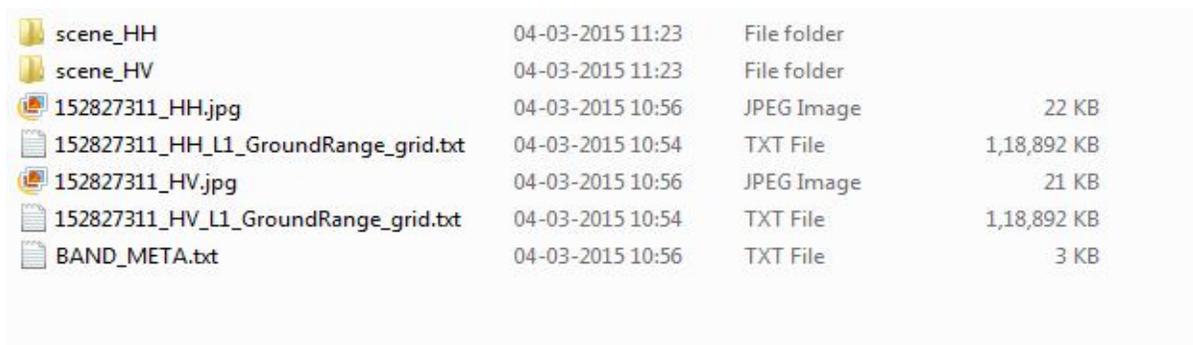
scene_HH	04-03-2015 11:23	File folder	
scene_HV	04-03-2015 11:23	File folder	
152827311_HH.jpg	04-03-2015 10:56	JPEG Image	22 KB
152827311_HH_L1_GroundRange_grid.txt	04-03-2015 10:54	TXT File	1,18,892 KB
152827311_HV.jpg	04-03-2015 10:56	JPEG Image	21 KB
152827311_HV_L1_GroundRange_grid.txt	04-03-2015 10:54	TXT File	1,18,892 KB
BAND_META.txt	04-03-2015 10:56	TXT File	3 KB

Figure 5a: RISAT-1 Data Format Structure for Level-1 MLG(Ground Range)

Figure 5b: RISAT-1 Data Format Structure for Level-1 SLC(Slant Range)

3.94. The software fetches the further files for processing and generates the output in standard TIFF format for Level-1 products.

3.95.For Windows-32 bit systems, navigate to the corresponding folder and click on the "RISAT1_L1_32BIT" application.

4. How to Install in Linux

4.1. Separate executables are available for Level-2A Enhanced GeoTIFF , Level-2 GeoTIFF and Level-1 CEOS input data.

4.2. Download the zip folder and navigate to the corresponding exe path.

4.3. For Level-2A Enhanced Products, navigate to SigmaSAR_L2A_Linux.tar and untar the folder. Open a terminal; navigate to the directory containing the folder. Type "source export". Then type "./l2aexe" space "Input work order folder" . Then press enter.

4.4. Open a terminal and type". /LEVELONELINUX" without the quotes followed by the Level -1 work order folder.

4.5. For level-2 GeoTIFF products, open a terminal and type "source export" . This fetches the required library path. Then type". /LEVELTWOLINUX" without the quotes, followed by the Level-2 work order folder.

4.6. For the Level-1 CEOS products, the Sigma Naught product is generated in the Tiff format. For the Level-2A Enhanced and Level-2 GeoTiff products, the output files are generated in GeoTiff format.

ReadMe.txt file is included for further assistance.

References: RISAT-1 Data Products Format (Version 1.4) may be referred for further details.

SigmaSAR GUI- based application will be uploaded shortly. For queries and feedback please contact haripriya_s@nrsc.gov.in, sitakumari_evs_@nrsc.gov.in, prasad_avv@nrsc.gov.in.