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SAR Data Processing Division Microwave Data Processing Group Signal and Image Processing Area Space Applications Centre Ahmedabad

Document Control & Data Sheet

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Reviewed by

Approved by

(Jalpa Modi) Division Head, SDPD/MDPG/SIPA (V. M. Ramanujam) Group Head,MDPG/SIPA

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1. Introduction

1.1 EOS-04 SCANSAR Single Look Complex (SLC) Product Definition

The Level-1 Single Look complex (SLC) Slant Range Product for EOS-04 ScanSAR imaging modes viz. Medium Resolution ScanSAR (MRS) and Coarse Resolution ScanSAR (CRS) [1] will contain burst-wise complex data on similar lines as Sentinel TOPS SLC data product. For each polarization combination, GeoTIFF files for each beam is provided in the data product, which consists of concatenated bursts' data. Relevant information to access and use the burst data is provided in an xml file "product.xml" along with the data product.

The product directory structure for an example MRS (6 Beam ScanSAR) product is shown in Figure-1 below.

Product directory name: <WorkOrder>

Polarization: 2 (HH, HV); Number of beams: 6



Figure 1 EOS-04 ScanSAR SLC Data Product Structure

Product xml file contains information to enable reading data from GeoTIFF files. Table -1 provides the xml tags corresponding to burst wise data.

XML Tag	Description	Remarks		
swath	Beam Index (0 to M-1)			
burstList count	Number of bursts (N)			
linesPerBurst	No of records in burst buffer for			
	each burst			
samplesPerBurst	No of complex samples in each			
	record of burst buffer for each	For oach boam		
	burst (repeated N			
swathPRF	PRF(records per second)	times)		
swathRange	Range spacing of			
Sampling	samples(meters)			
swathImaging	Start Time of beam(seconds)			
StartTime				
swathImaging	End Time of beam(seconds)			
EndTime				
burstld	Burst Index (0 to N-1)			
numValidLines	No of records of valid data in			
	burst buffer			
numValidSamples	No of complex samples of valid			
	data in each valid record of			
	burst buffer			
firstValidLine	Record number in burst buffer	For oach hurst		
	where valid data starts from	(repeated N		
firstValidSample	Complex sample number in each	(repeated N times)		
	valid record of burst buffer	times		
	where valid data starts from			
firstValidLineTime	Start time of valid data in burst			
	buffer (seconds)			
firstSampleRange	Minimum range of burst buffer,			
	i.e. range of first sample of the			
	burst buffer (meters)			

Table 1 XML Tags Required for Mosaicking Burst Wise ScanSAR SLC Data Product

GeoTIFF files contain interleaved I-Q processed sample values in *signed short int* data type. The data is geotagged with geographic information available in both the GeoTIFF file as well as the xml file. Figure-2 shows an example image for a burst wise ScanSAR SLC beam for dual polarization data. Figure-3 explains the meaning of xml tags and their usage in accessing the valid data in the GeoTIFF files. It shows the placement of data of N bursts of one of the beams.



Figure 2 Example of a Burst Wise ScanSAR Beam Image for Dual Polarization ScanSAR SLC Product



Figure 3 Usability of XML Tags for Mosaicking Burst wise ScanSAR Data Product

1.2 EOS-04 burst wise ScanSAR SLC Mosaicking Utility Version 1.0

Detailed algorithm for mosaicking the burst wise EOS-04 ScanSAR SLC data products is provided in EOS-04 Data Products format document [1] section 5.1. A utility has been developed both for Linux and Windows platforms to mosaic the burst wise EOS-04 ScanSAR SLC products. Following sections provide a user guide for execution of this utility.

1.2.1 EOS-04 ScanSAR SLC Mosaicking Utility (Version 1.0) for Linux Platform

```
Pre-requisites for exe: Java-1.8 and gdal-2.2.1 should be
installed
Steps:
1) copy mosaic SLC R1A.exe & R1A SLC Mosaic Generation.jar to
the folder from where you want to run exe.
2) To run exe:
./mosaic SLC R1A.exe arg1 arg2 arg3 arg4 arg5
arg1 : path to product directory (productpath)
arg2 : workorderId
arg3 : flag for generating mosaic amplitude file (1-generate,
0-do not generate)
arg4 : flag for dumping beam wise complex and amplitude files
(1-dump , 0-do not dump)
arg5 : flag for dumping burst wise complex and amplitude files
(1-dump, 0-do not dump)
for eq:
./mosaic SLC R1A.exe /eos04/product/ 21790416 1 1 1
     where "/eos04/product/" is the path to product directory
           "21790416" is the workorderId
           1 is the flag for generating mosaic amplitude file
           1 is the flag for dumping beam wise complex and amp
files
           1 is the flag for dumping burst wise complex and
amp files
3) Output will be generated in the product path as given below
:
productpath/workorderId/workorderId mosaic/
for eq:
/eos04/product/21790416/21790416 mosaic/
inside the output folder, number of folders (as per the
polarizations given in BAND META.txt) will be generated with
name scene XX ,
```

```
where XX is polarization
```

Each of the scene_XX folder contains
1) complex output file(mosaic.bin)
2) header file(mosaic.hdr) containing nscan,npix & datatype
3) amplitude file (mosaic.bin.Amp if flag=1 is passed)
4) beam wise folders containing beam wise complex
files(beam*.bin),amplitude files(beam*.bin.Amp) and header
files(beam*.hdr) based on flag passed
5) beam wise folders containing burst wise complex
files(beam*_burst*.bin),amplitude files(beam*_burst*.bin.Amp)
and header files(beam*.hdr) based on flag passed

NOTE: 1) beam*.hdr contains nscan & npix for beam (parameters are NSCAN & NPIX) as well as for burst (parameters are NSCAN_BURST* & NPIX_BURST*)

2) data type for amplitude file is float

1.2.2 EOS-04 ScanSAR SLC Mosaicking Utility (Version 1.0) for Windows Platform

Pre-requisites: Windows 10 with Java-1.8 and gdal-2.2.1 sholud be installed Steps: 1) Go to folder "exe" on command line and Type "run.bat" 2) To run exe, type below on the same command line: mosaic SLC R1A win.exe arg1 arg2 arg3 arg4 argv5 arg1 : path to product directory (productpath) arg2 : workorderId arg3 : flag for generating mosaic amplitude file (1-generate, 0-do not generate) arg4 : flag for dumping beam wise complex and amplitude files (1-dump, 0-do not dump) arg5 : flag for dumping burst wise complex and amplitude files (1-dump, 0-do not dump) for eq: mosaic SLC R1A win.exe F:\eos04\product\ 21790416 1 1 where "F:\eos04\product\" is the path to product directory "21790416" is the workorderId 1 is the flag for generating amplitude file 1 is the flag for dumping beam wise complex files 1 is the flag for dumping burst wise complex and amp files

3) Output will be generated in the product path as given below: productpath\workorderId\workorderId mosaic\ for eq: F:\eos04\product\21790416\21790416 mosaic\ inside the output folder, number of folders (as per the polarizations given in BAND META.txt) will be generated with name scene XX , where XX is polarization Each of the scene XX folder contains 1) complex output file(mosaic.bin) 2) header file(mosaic.hdr) containing nscan, npix & datatype 3) amplitude file (mosaic.bin.Amp if flag=1 is passed) 4) beam wise folders containing beam wise complex files (beam*.bin), amplitude files (beam*.bin.Amp) and header files (beam*.hdr) based on flag passed 5) beam wise folders containing burst wise complex files(beam* burst*.bin), amplitude files(beam* burst*.bin.Amp) and header files (beam*.hdr) based on flag passed NOTE: 1) beam*.hdr contains nscan & npix for beam (parameters are NSCAN & NPIX) as well as for burst (parameters are NSCAN BURST* & NPIX BURST*) 2) data type for amplitude file is float

2. References

[1] EOS-04 Data Products Format (July-2023) Version 1.2.4