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NRSC/DPA/March 2024

Level-2B ARD Product

EOS-04 Level-2B Terrain Normalized Analysis Ready Data (ARD) Product

EOS-04 is a follow-on mission of RISAT-1, launched on 14-February 2022 by PSLV C-52 launch vehicle. EOS-04 carries C-band Synthetic Aperture RADAR (SAR) payload which can be operated in various imaging modes with multiple resolutions (MRS, CRS, FRS-1, FRS-2) in single, dual, circular or full polarizations. The satellite has all weather, day and night imaging capability.
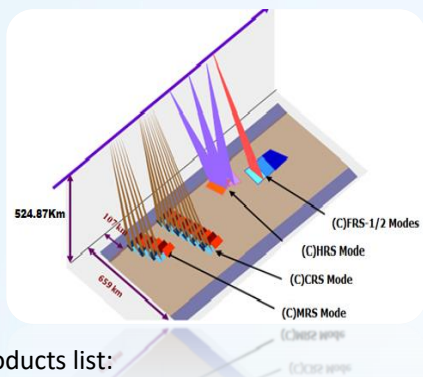
EOS-04 Products list:
- Level 1- Single Look Complex Slant Range Product
- Level 1 - Ground Range Product
- Level-2A Enhanced Terrain Geo-referenced Product
- Level-2B Terrain Normalized ARD Products
- Polarimetric value added products.

An improved version of currently operational EOS-04 Level-2A Enhanced Terrain Geo- Referenced Product is added to existing data products list of EOS-04, which is called Level-2B Terrain Normalized ARD Product. This is an Analysis Ready Data (ARD) product for EOS-04 SAR to allow for immediate analysis with a minimum additional user effort. For Level-2A data products, though the geocoding and the ortho-rectification process incorporates Digital Elevation Model (DEM) but the terrain induced variations particularly on hill-slope modulations have not been normalized by the local illuminated area. Due to the side-looking acquisition geometry of SAR, this un-normalized Radar backscatter is an overestimation over the true backscatter of the land cover.

Table-1: EOS-04 Level-2A and Level-2B product comparison

	Level-2A	Level-2B
FORMAT	GeoTIFF	GeoTIFF(Cloud Optimized)
Polarization wise Image Data (tiffs)	Image Data representation of Beta0	Terrain Normalized Image Data representation of Gamma0
Local Incidence Angle	Yes	Yes
Mask File	Mask file represents values as follows:	Mask file represents values as follows:
	1. Valid Image Data: 128	1. Valid Image Data: 128
	2. Layover Region: 16	2. Layover Region: 16
	3. Area Outside Image: 0	3. Area Outside Image: 0
		4. Shadow Region: 64
Area File	No	Local illumination Area in the Gamma plane used for terrain normalization. Float image in GeoTiff.
BAND_META. txt	Yes	Yes
product.xml	Yes	Yes
Thumbnail jpegs	Yes	Yes
Geolocation Accuracy	~50m (except Orbit Source=1)	<30m guaranteed due to registarion with Copernicus DEM
Auxiliary Files	No	XML schema, Browse Geo Jpegs, kmz file
Product usability	All terrain	All terrains except scenes with full Ocean

In EOS-04 Level-2B data products with ortho-rectification process as similar to Level-2A data products, terrain induced variations are normalized by the local illuminated area which is derived using EOS-04 state vectors with precise time stamping and DEM. Level-2B data products are available for ScanSAR (MRS and CRS) mode acquisitions. The product is in compliance with CEOS ARD NRB v1.0 product family specifications. The Table-1 depicts the comparison between Level- 2A and Level-2B products.
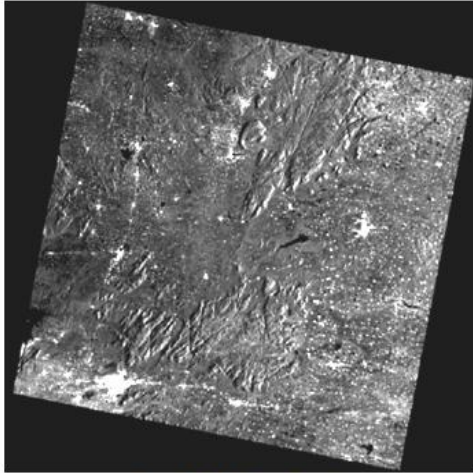
Web links:

bhoonidhi.nrsc.gov.in
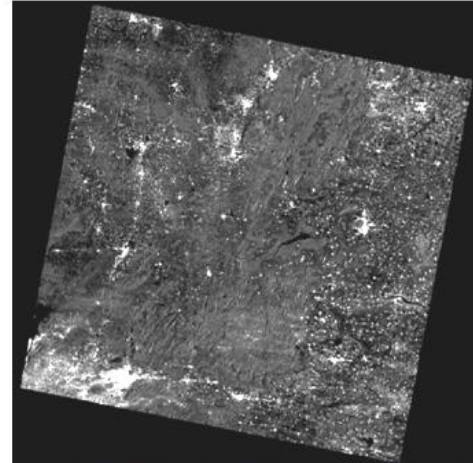**bhuvan.nrsc.gov.in**

For further details, please
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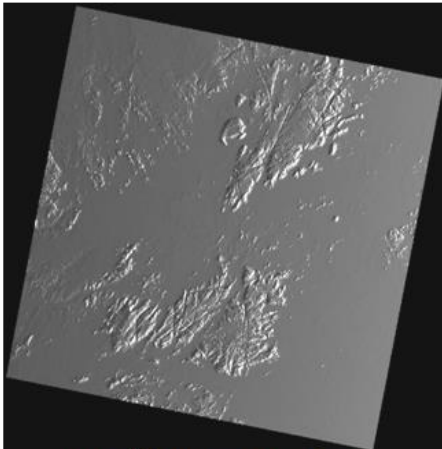**Level-2B ARD Product**

EOS-04 Level-2B Terrain Normalized Analysis Ready Data (ARD) Product
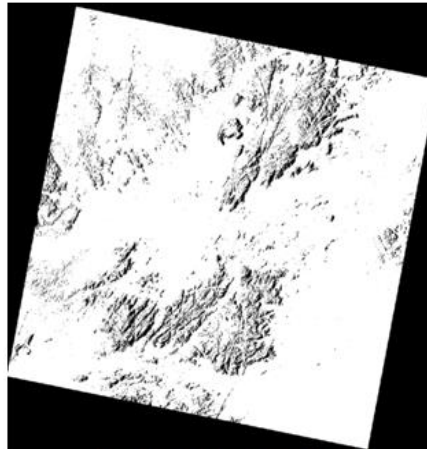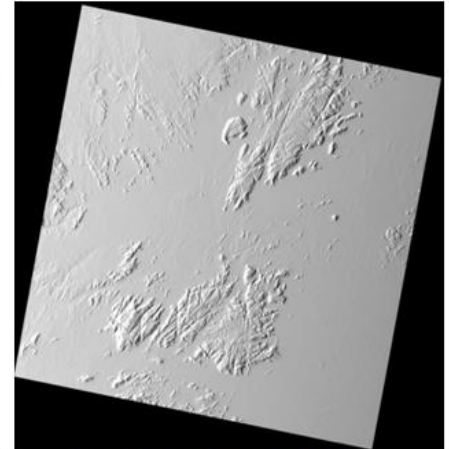

Level-2A Product

Level-2B Terrain Normalized ARD Product

Local Illumination Area

Layover Shadow Mask

Local Incidence Angle

The geolocation accuracy of Level-2B is guaranteed to be within 30m, irrespective of source of orbit, due to incorporation of precise SAR image registration with DEM and hence considered suitable for temporal studies. The normalization of backscatter values provides true backscatter of the land cover irrespective of plain or hilly terrain.

From 1st Feb 2024 onwards, Level-2B data products can be downloaded from Bhoonidhi web portal in OpenData_DirectDownload category. Prior date Level-2B data products can be ordered in OpenData_OnOrder category for MRS and CRS imaging modes with product specification as Z_Normalized Radar Backscatter.
https://bhoonidhi.nrsc.gov.in/bhoonidhi_resources/help/docs/EOS_04_Data_Products_Format_Document.pdf

Web links:

bhoonidhi.nrsc.gov.in
bhuvan.nrsc.gov.in

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