

Terrain Correct CEOS-Format Data in ASF MapReady

This data recipe is for users who wish to terrain correct CEOS-formatted data granules for legacy platforms including ERS-1, ERS-2, JERS-1, RADARSAT-1, or ALOS PALSAR. Radiometric correction steps using the <u>Ulander algorithm</u> are included. However, the correction is not as accurate as that found in commercial SAR processing products. *Note: most ALOS PALSAR data in the ASF archive has* been *radiometrically terrain corrected*.

In this document you will find

- A. Background
- B. Materials List
- C. Steps
- D. Sample Granule
- E. Before and After Images

A) Background

Radiometric correction involves removing the misleading influence of topography on backscatter values. *Terrain correction* is the process of correcting geometric distortions that lead to geolocation errors. The distortions are induced by side-looking (rather than straight-down looking or nadir) imaging, and are compounded by rugged terrain. Terrain correction moves image pixels into the proper spatial relationship with each other. Radiometric terrain correction combines both corrections to produce a more useful product for science applications.

B) Materials

- Windows PC
- ASF MapReady
- <u>Sample Granule (Level 1.5 ALOS PALSAR)</u>, or your own data
- Digital Elevation Model (DEM) that includes the area covered by the granule (available from many sources, including <u>USGS Earth Explorer</u> and <u>OpenTopography</u>)

C) Steps

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Step 1: Download Data

- a) Create a processing directory to house your data.
- b) Download a CEOS-formatted data granule (Level 1 ERS-1, ERS-1, JERS, and RADARSAT-1 -- or Level 1.5 ALOS PALSAR) from ASF Vertex and move to your processing directory.
- c) Download a *Digital Elevation Model (DEM)* and move to your processing directory.
- d) Download and install ASF MapReady

Step 2: Process the Data

- a) Open ASF MapReady.
- b) Under the **Input Files** section, ensure the data type is set to *CEOS* and click *Browse* and navigate to your working directory (Figure 1).

		î	
Add:	CEOS (Level 1)	-	Browse

Figure 1: Data type and Browse in the Input Files section

c) Double click on the granule name to load it into MapReady.

Step 3: Terrain Correct the Data

a) At the top of the interface select the **General** tab, under Select Processing Steps, click **Terrain Correct (with Digital Elevation Model)**, **Geocode to a Map Projection**, and **Export to a Graphics File Format** (Figure 2).



Figure 2: Correct set-up for the General Tab

b) Select the **Terrain Correction** tab (Figure 3), click on **Browse** next to the *DEM File* field, navigate to your working directory, and open your downloaded DEM file.

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- c) In the same window, check the following boxes:
 - i. Fill DEM holes with interpolated values
 - ii. Apply Geoid Correction
 - iii. Apply Terrain Correction
 - iv. Perform co-registration (FFT matching)
 - v. Also apply Radiometric Terrain Correction
 - vi. Interpolate Layover/Shadow Regions

General Calibration External Polarimetry Terrain Correction Geocode Export	
DEM File: C:\Users\amyers21\Downloads\ALPSRP131750800-L1.5\srtm_12_04.tif	Browse
Fill DEM holes with interpolated values	1
O Refine Geolocation Only	
Apply Terrain Correction	
🔽 Apply a user mask 💿 Automatically Mask 🔿 Mask from File	
Mask File:	Browse
Perform co-registration (FFT Matching)	
Also apply radiometric Terrain Correction	
Save Incidence Angles	
✓ Interpolate Layover/Shadow Regions	
🖵 Save Layover/Shadow Mask	
Save Clipped DEM	

Figure 3: Correct set-up for the Terrain Correction Tab

d) In the **Geocode** tab, set the *Map Projection* of your choice (Figure 4).

Map Projections UTM	Our Defined Our Defined Specify Height Avg Height Specify Pixel Size	Format: CEOS L1 Date type: Amplitude Terrain Correction: No Geocoding: UTM Zone <from metadata=""> Datum: WGS84 Resampling Method: bilinear Export: GeoTIFF (float)</from>
☐ Ignore projection errors	Datum: WGS84 🗘	Save Settings Load Settings

Figure 4: Map Projection tab setup with UTM as the projection

e) In **Export** tab, change the *Export Format* to *GeoTIFF (.tif)* for a GIS compatible output (Figure 5).

General Calibration Ext	ernal Polarimetry Terrain	Correction Geocode Export	
Export Format: GeoTIF	F (.tif)		
🗖 Output data in byte f	ormat (instead of floating p	oint)	
Sample mapping meth	nod: Statistical 2 Sigma 🗍	*	
• Export All Bands as Se	eparate Images		
O Export RGB Image ac	cording to Polarimetric sele	ction	
O Export Multiple Band	s in a Single RGB Image		
User Defined	O True Color	O False Color	
Red Band:	*		
Green Band:	*		
Blue Band:	*		

Figure 5: Export tab

f) Finally, set the *Destination Folder* and click **Process All** at the bottom of the screen (Figure 6).

put File	Bands Output File	Status	
)-ALPSRP131750500-H	15 UA HH, HV ALPSRP131	750800-HL5_UA.tif -	
npleted Files			1
	<u>a</u> a a a a a a a a a a a a a a a a a a	S	Clear Completed
File	Output File	Status	

Figure 6: Destination Folder (blue) and Process All (red) in the Input Files section

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D) Sample Granule



<u>ALPSRP131750800</u> – Level 1.5 ALOS PALSAR granule showing the Klamath Mountains in northern California. © JAXA/METI 2008.

E) Before and After Images



Klamath Mountains in northern California before (left, © JAXA/METI 2008) and after (right, ASF DAAC 2016; Includes Material © JAXA/METI 2008).

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