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 Ulander algorithm 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

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

C) Steps

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).

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).

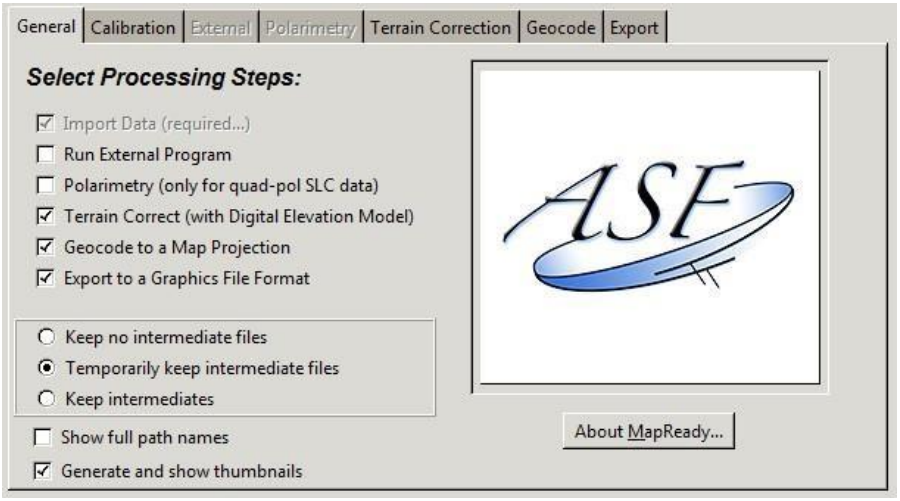


Figure 2: Correct set-up for the General Tab

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.

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

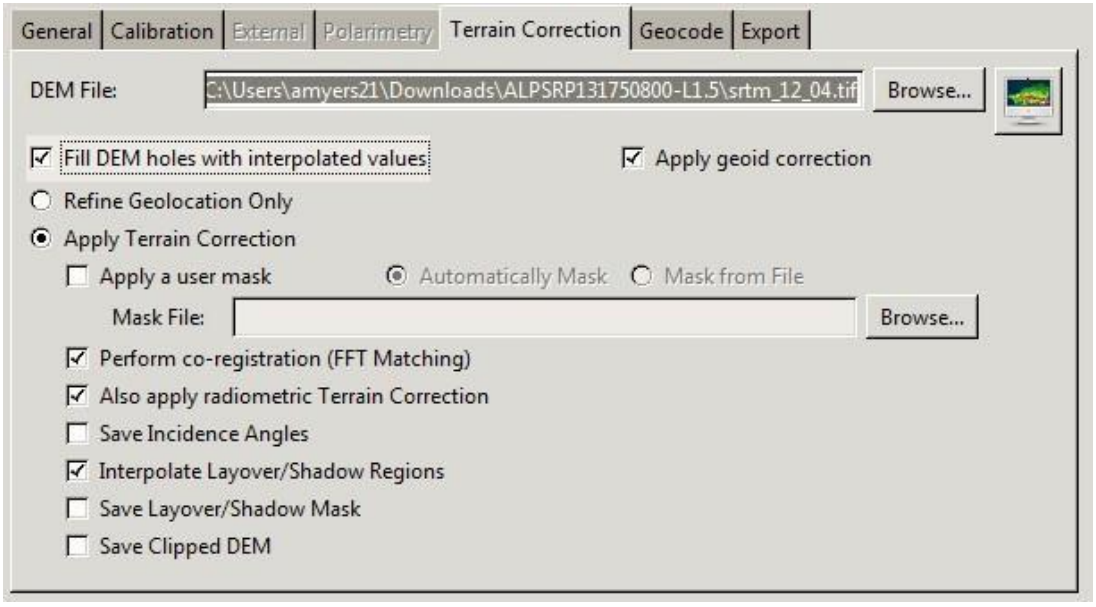


Figure 3: Correct set-up for the Terrain Correction Tab

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

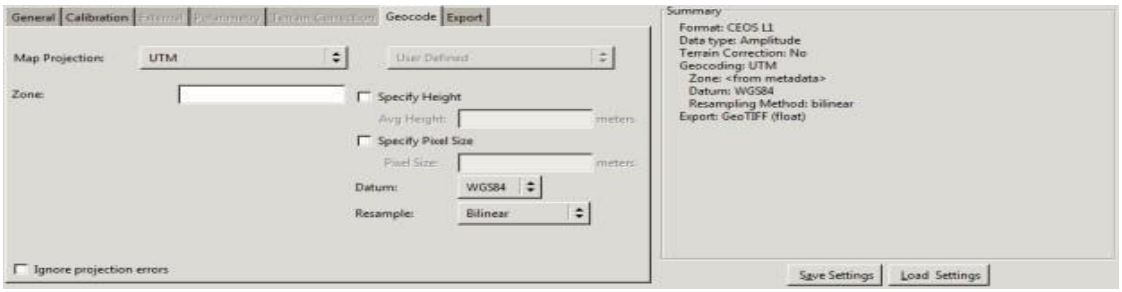


Figure 4: Map Projection tab setup with UTM as the projection

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

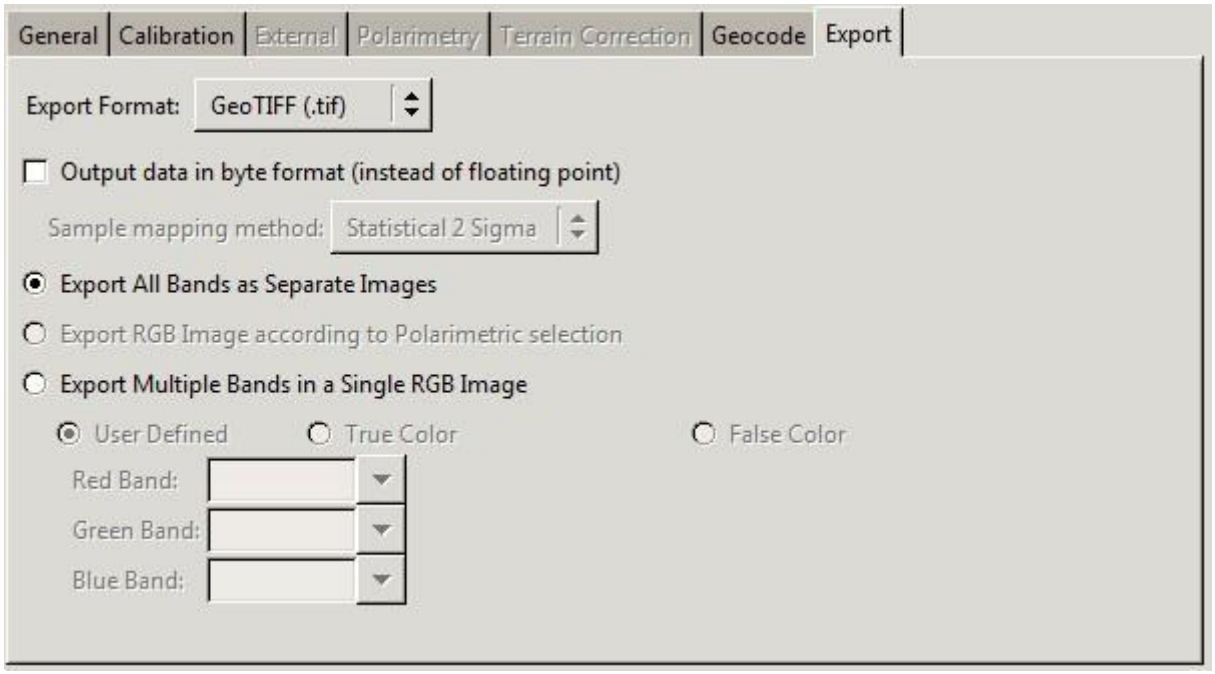


Figure 5: Export tab

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

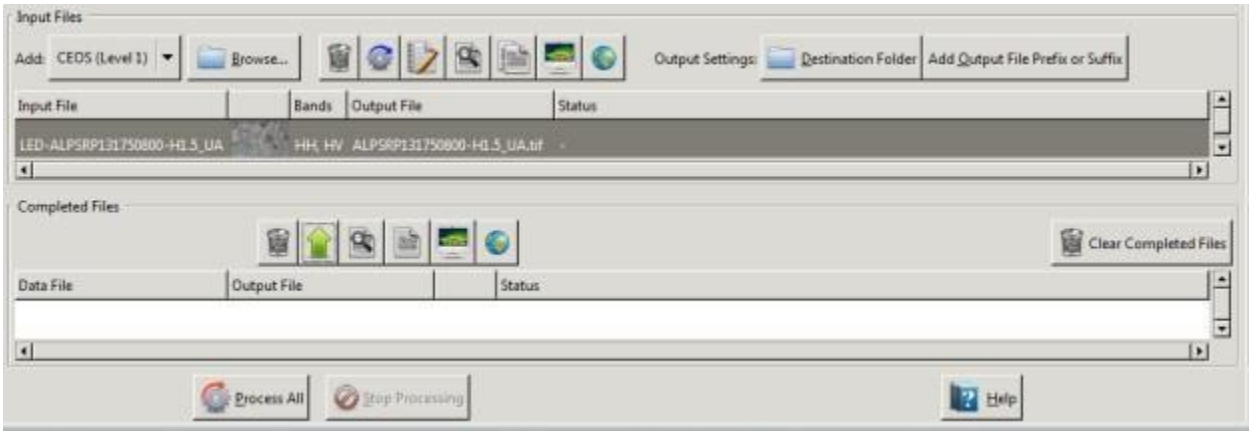
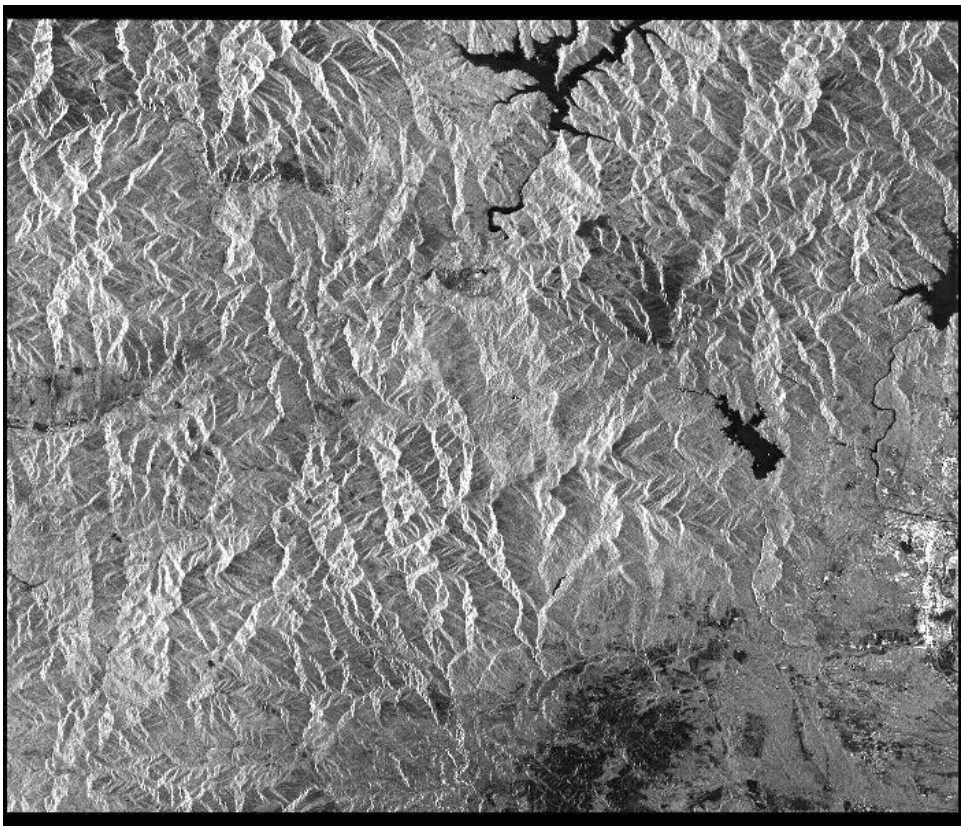


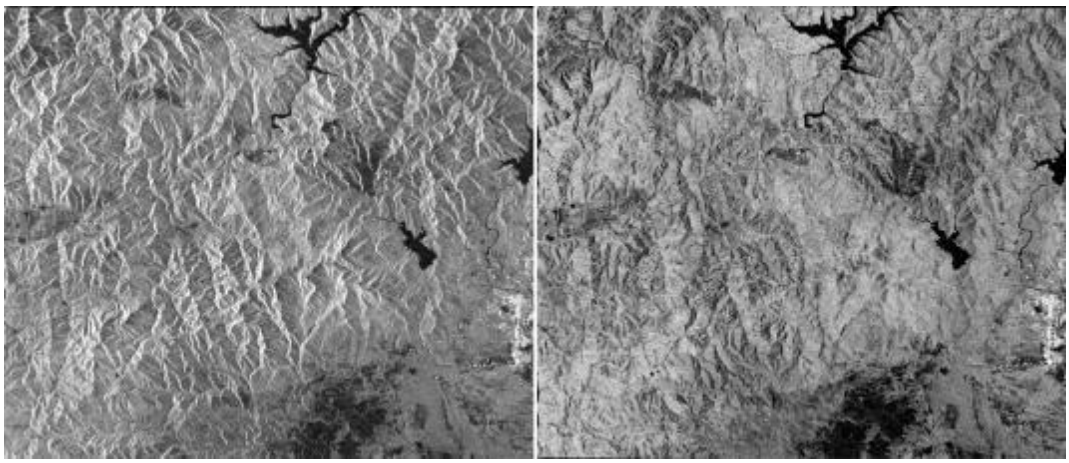
Figure 6: Destination Folder (blue) and Process All (red) in the Input Files section

D) Sample Granule



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

E) Before and After Images



Before *After*

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