

Processing SAR Imagery

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Objectives

- Identify a subsection of a SAR image or create a mosaic
- Preprocess a SAR image
 - Perform radiometric and geometric calibrations
 - Reduce speckle



Outline

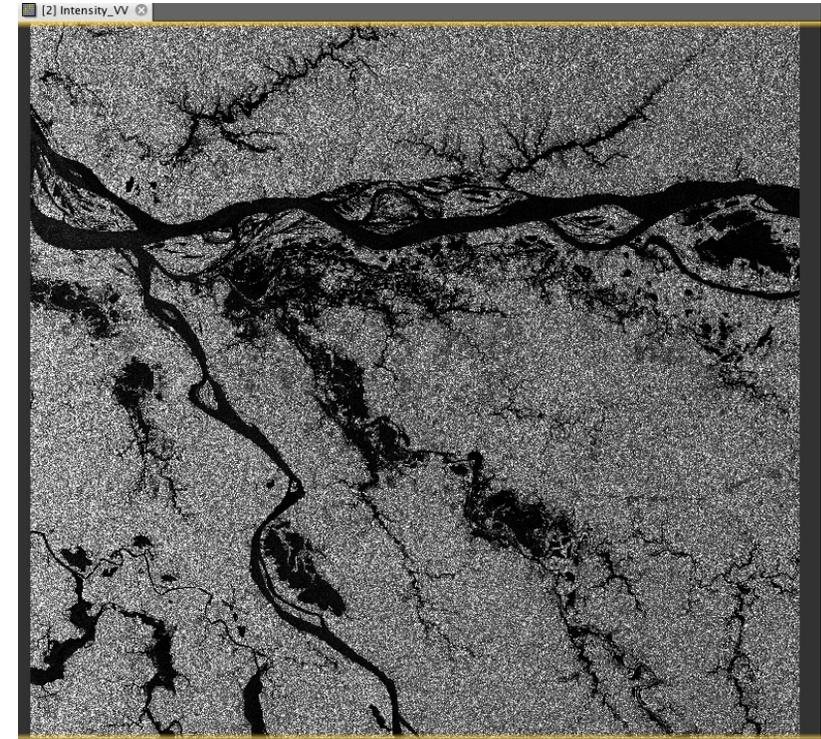
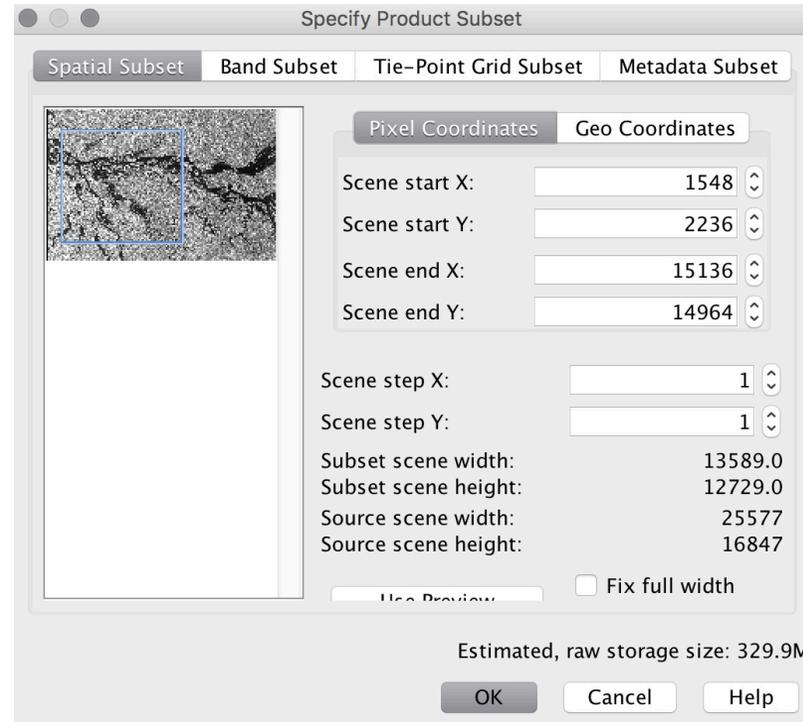
- Part 1: Identify a Subsection
- Part 2: Perform Radiometric Correction
- Part 3: Reduce Speckle
- Part 4: Perform Geometric Correction



Part 1: Identify a Subsection

Subset

1. Select **Raster** and then **Subset** according to the parameters below
 - From this point on work **only with the subset image**
2. the subset image will appear in the product explorer window as image 2. The filename will start with subset_





Part 2: Perform Radiometric Correction

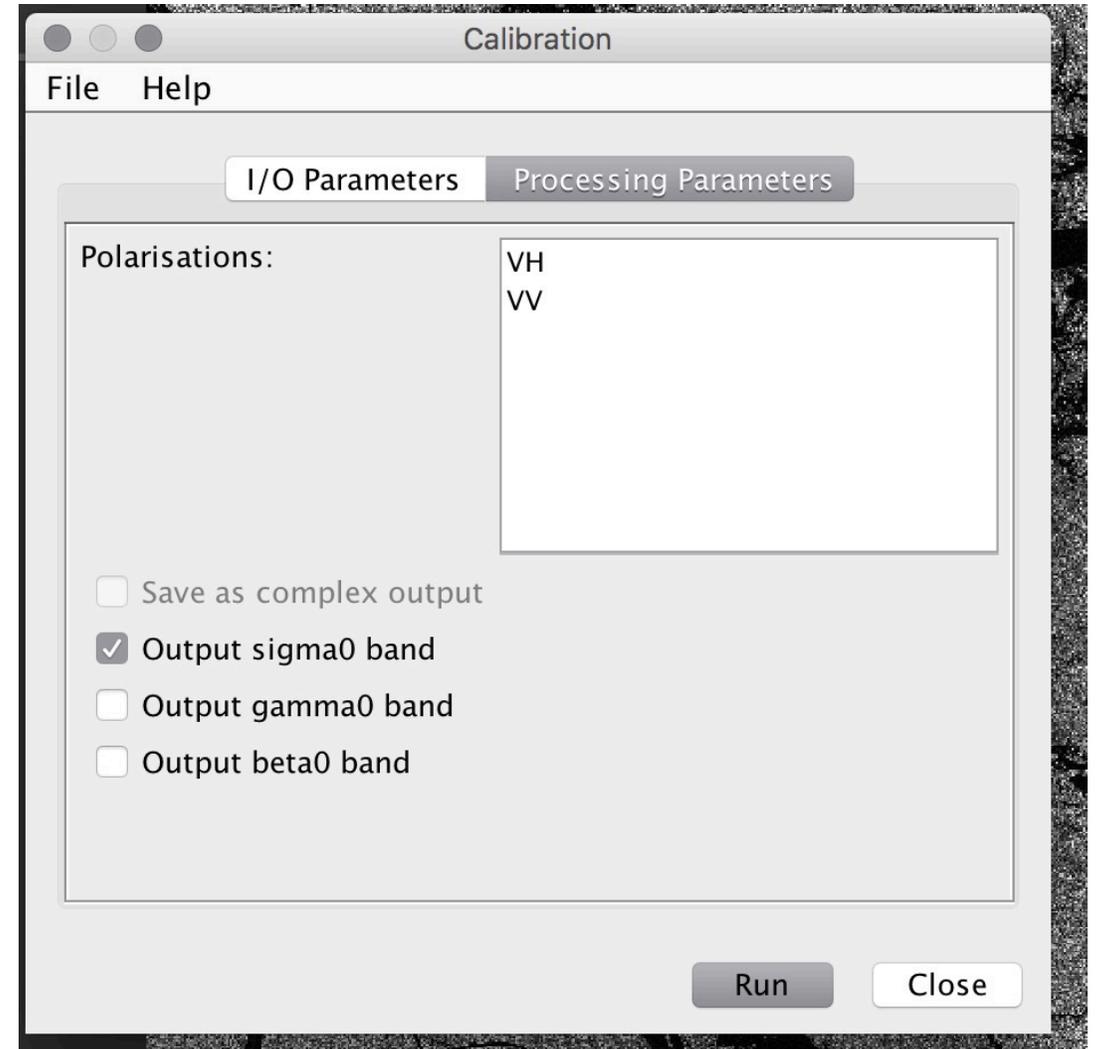
Background

- Calibration creates an image where the value of each pixel is directly related to the backscatter of the surface
- This process is essential for analyzing the images in a quantitative way
- It is important for comparing images from different sensors, modalities, processors or acquired at different times
- Main radiometric distortions are due to:
 - Signal loss as it propagates
 - non-uniform antenna pattern
 - difference in gain
 - saturation
 - speckle



Calibrate

1. In the product explorer window highlight the subset filename and then Select **Radar > Radiometric > Calibrate** and use the default parameters for both tabs I/O parameters and Processing Parameters
2. The new image will appear in the product explorer box as image 3 and will have a filename ending in `_Cal`





Part 3: Reduce Speckle

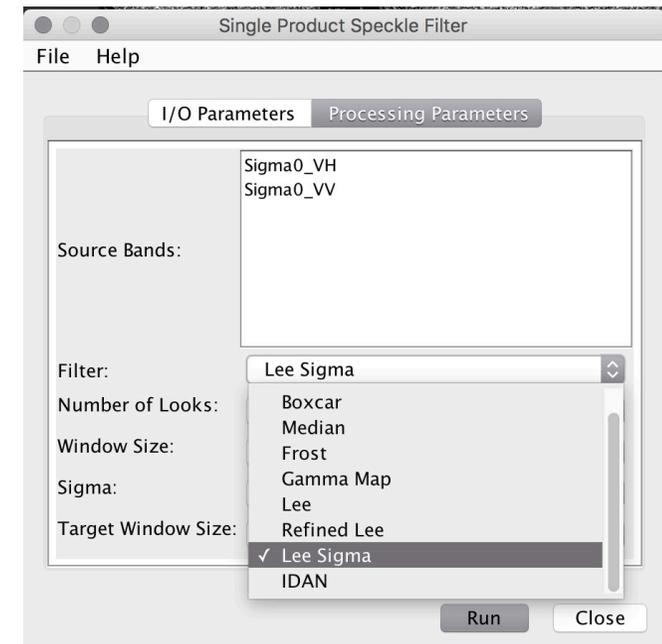
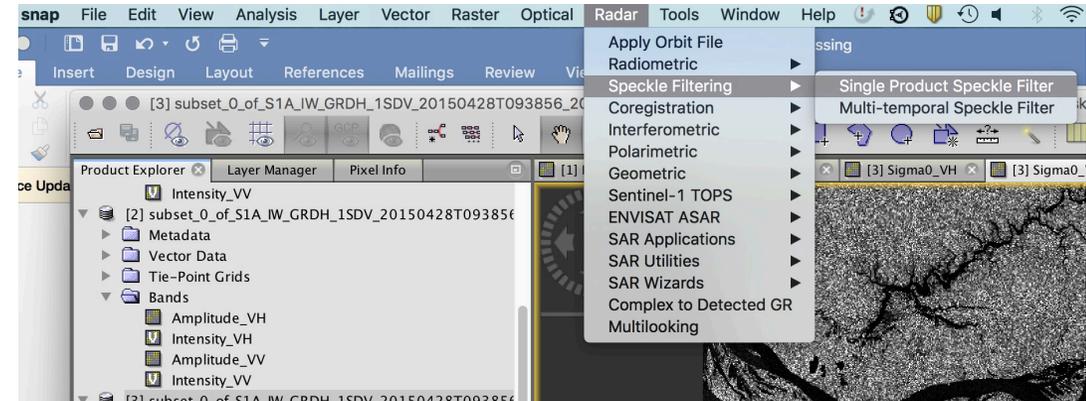
Background

- Speckle is part of radar images and makes interpretation difficult because the “salt and pepper” effect corrupts information about the surface
- There are many techniques to extract information from radar images that will have lots of speckle
 - You can use speckle filters or Multilook the image
- In this case, we will use a speckle filter



Speckle Reduction

1. In the product explorer window highlight the calibrated filename and then Select **Radar > Speckle Filtering > Single Product Speckle Filter**
2. Use the default parameters in the I/O tab
3. In the Processing Parameters tab there are a number of different filters on a pop-up window



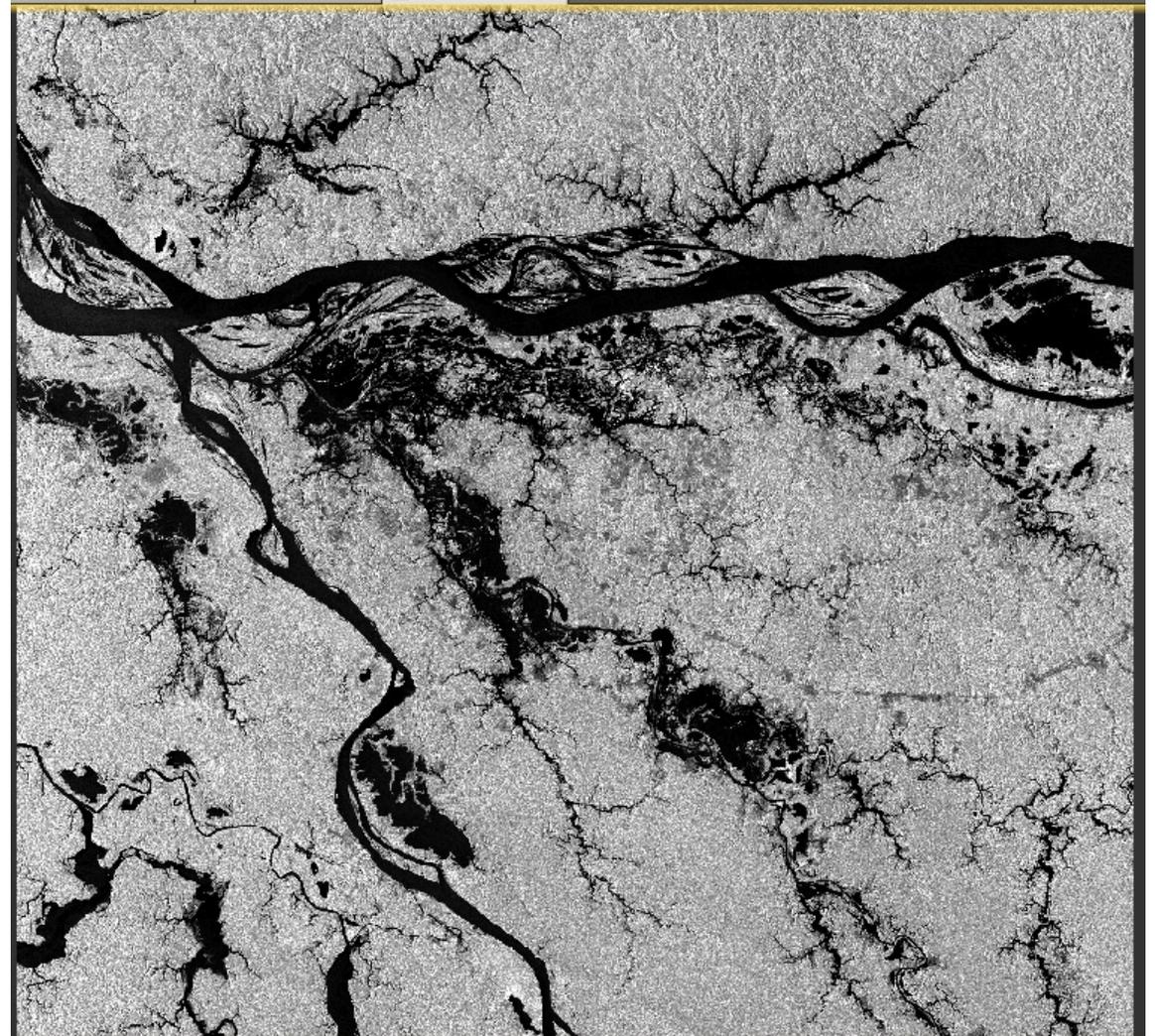
Speckle Reduction

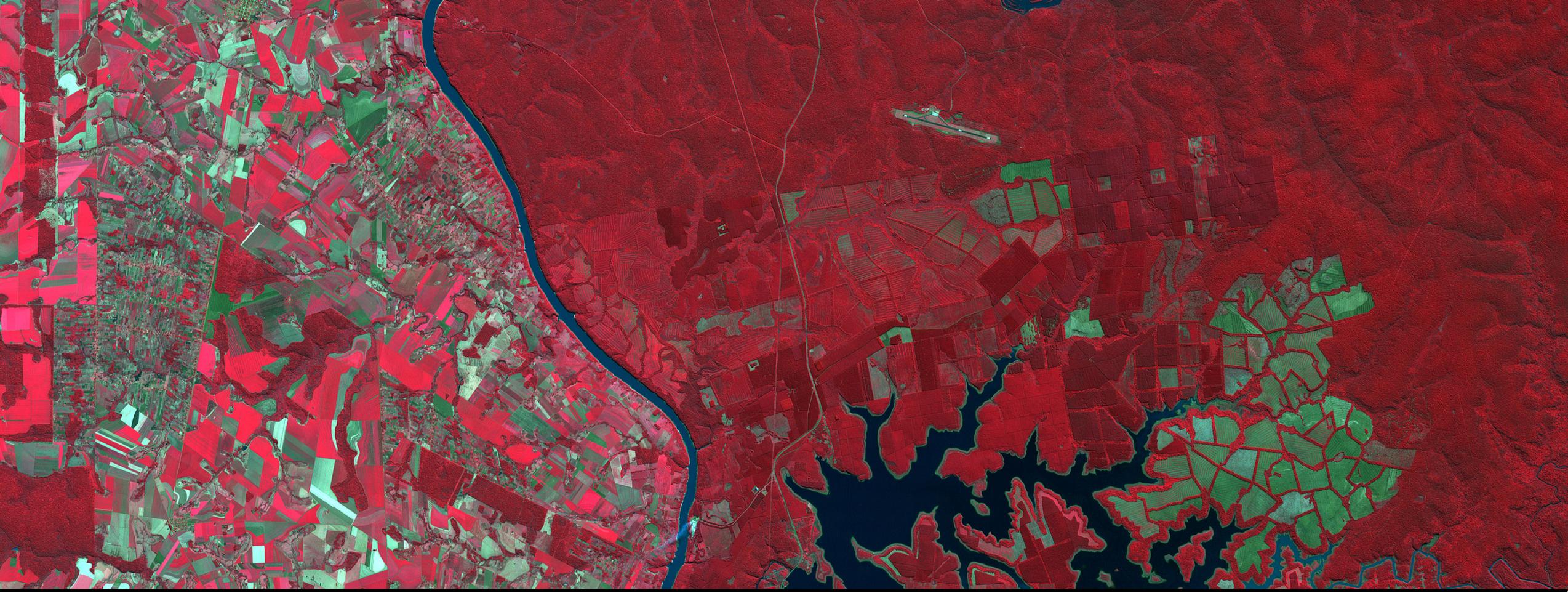
4. We will choose the Lee Sigma filter, however you can test different filters and select the one with the best results for you. You can also play around with varying the window size
 - The larger the window the larger the speckle reduction but the larger the resolution loss. In this case, the parameters specified are the default



Speckle Reduction

5. The filtered image will appear in your Product Explorer window with the extension `_spkl`
6. Display the image to see the results of the speckle reduction filter





Part 4: Perform Geometric Correction

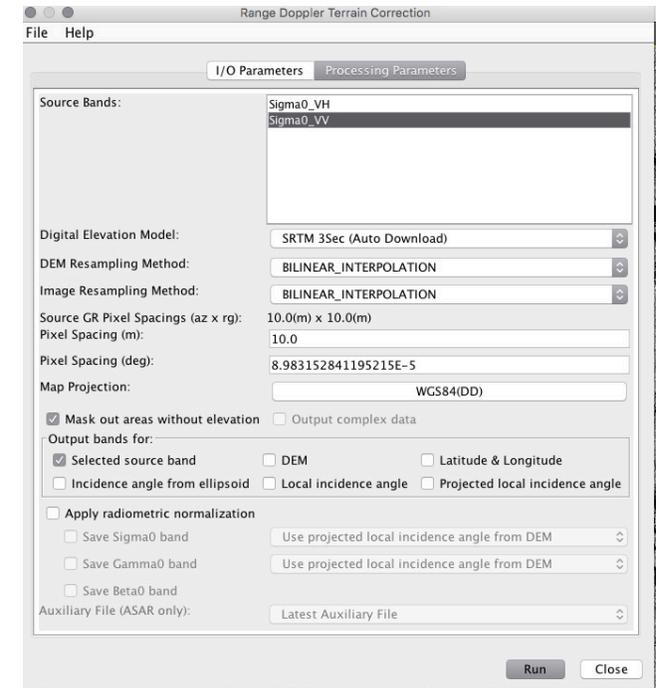
Terrain Correction

- The image will be corrected due to geometric distortions. These are due to:
 - slant range
 - layover
 - shadow
 - foreshortening
- The algorithm uses a DEM to make corrections
- The current image is in the orientation that the satellite made the observation
- The terrain corrected image will be in its correct orientation and georectified



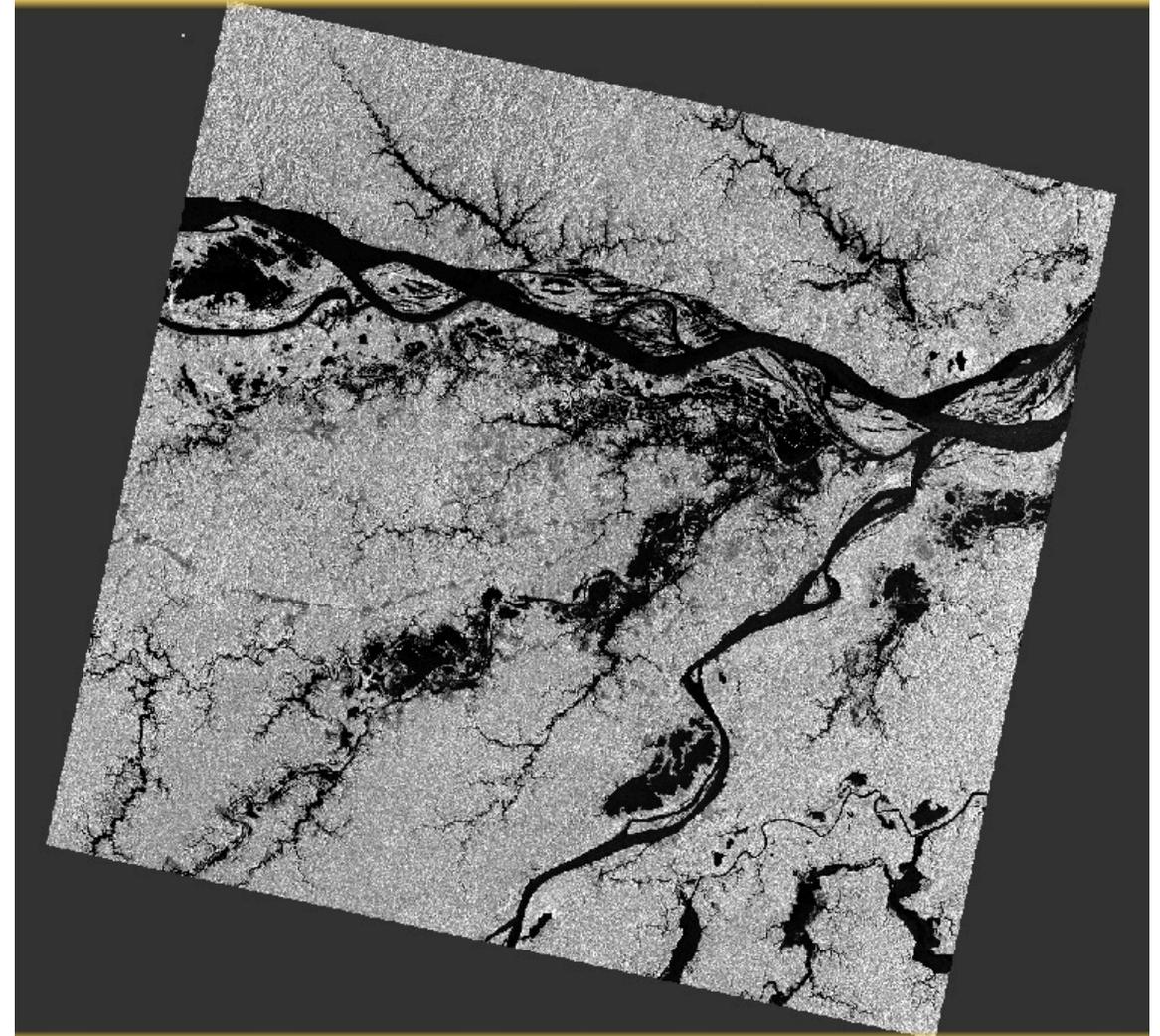
Terrain Correction

1. Select the filename of the last image (_spk) and then select **Radar > Geometric > Terrain Correction > Range-Doppler Terrain Correction**
2. Keep the default values and hit run
 - Note: under processing parameters you can opt to use an SRTM 3sec DEM (which is automatically downloaded) or you can select other DEM's from the pop down list, including your own DEM

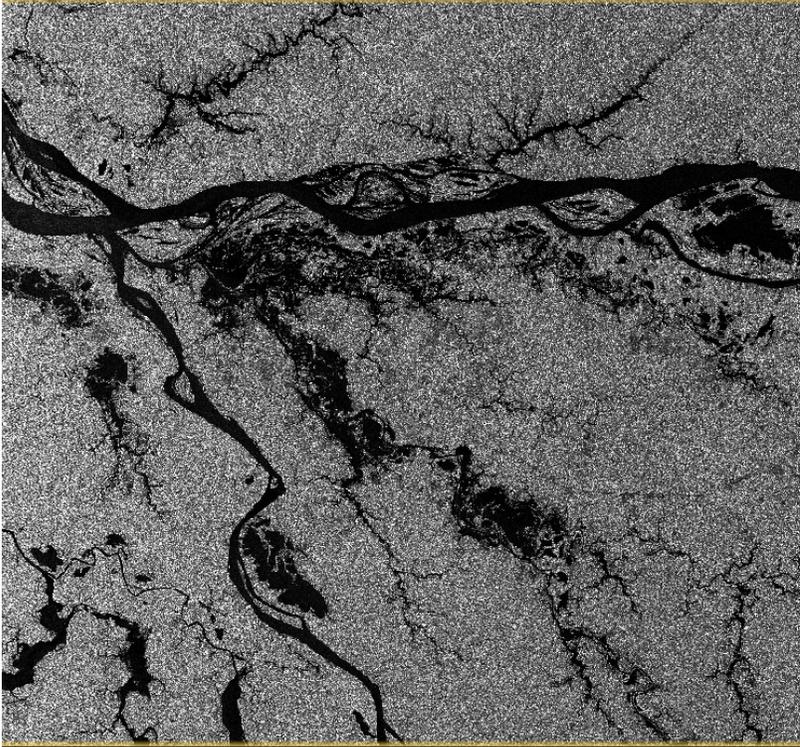


Terrain Correction

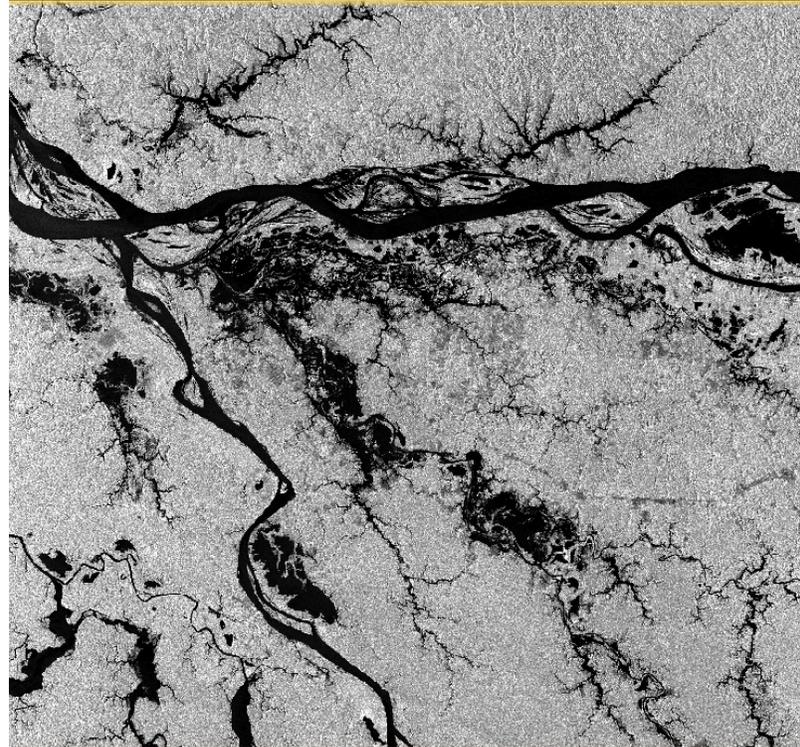
3. The new image will appear in the product explorer window with extension `_TC`
4. Display the new image
5. For analysis and results, backscatter values are presented as dB. In order to go convert σ^0 into dB highlight `Sigma0_VH` and left click. A menu will pop up.



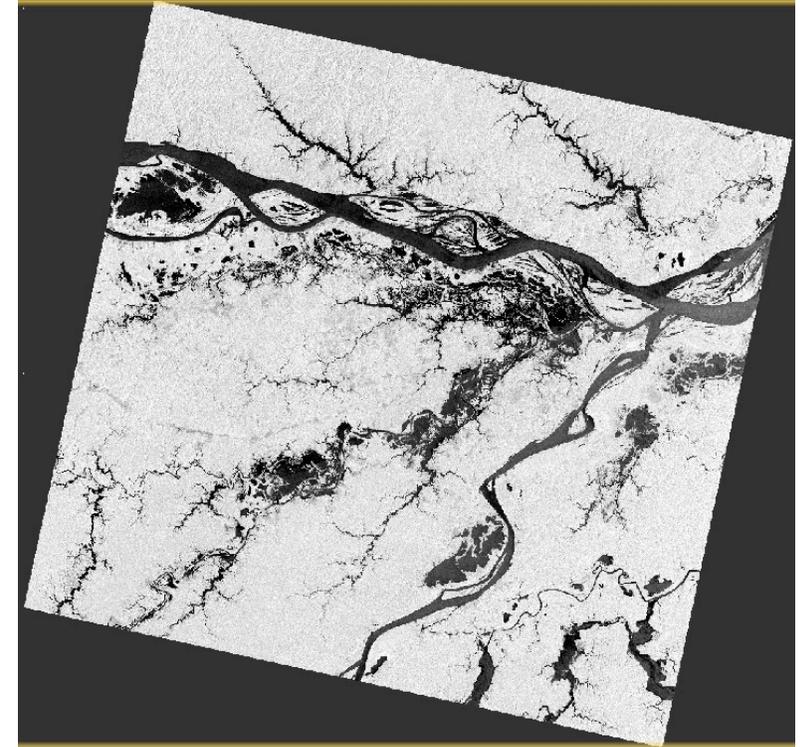
Processed Images



Original



Reduced Speckle



Terrain Corrected

