View Radiometrically Terrain Corrected (RTC) Images in QGIS

This data recipe is for users who wish to view an RTC image in QGIS.

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A) Background

The standard output of the RTC process is a gamma0 power image. This format supports statistical assessments of the data. However, when displayed in GIS software, data in power format is dark, making it difficult to use for visual analysis. There are two common ways to deal with this in a GIS environment: convert the power scale to amplitude, or convert it to decibels (dB). A comparison is available in Section D; however, dB-converted images are generally preferred for visualization.

B) Materials List

A. Windows, Mac, or Linux
B. RTC Image
- Options to obtain image:
  o Download and unzip this sample granule
  o Download an RTC ALOS PALSAR image using Vertex
  o Process an RTC image from Sentinel-1 Data
C. QGIS

Note: You will be prompted to enter your Earthdata Login username and password, or must already be logged in to Earthdata before the download will begin.

C) Steps

1. Open QGIS

2. Load a RTC image

a) Click **Layer > Add Layer > Add Raster Layer** or use **Add Raster** icon 🗒️
b) Browse to the directory of your RTC image
c) Hold down the *Shift* or *Ctrl* key on your keyboard to select multiple images
d) Click **OK**
e) You will see the image load in the legend area

Note: The maximum file size QGIS supports is 4GB for classical TIFF, but no limits for BigTIFF. See Step 6 if you would like to create a subset of your image.

3. Open the **Raster Calculator**

a) Navigate to **Raster > Raster Calculator** from the main menu
b) Calculate the following conversions, double-click on file names to add to expression (Figure 1):

- Amplitude: *sqrt("RTC filename")*
- Decibel (dB): *10 * Log10("RTC filename")*

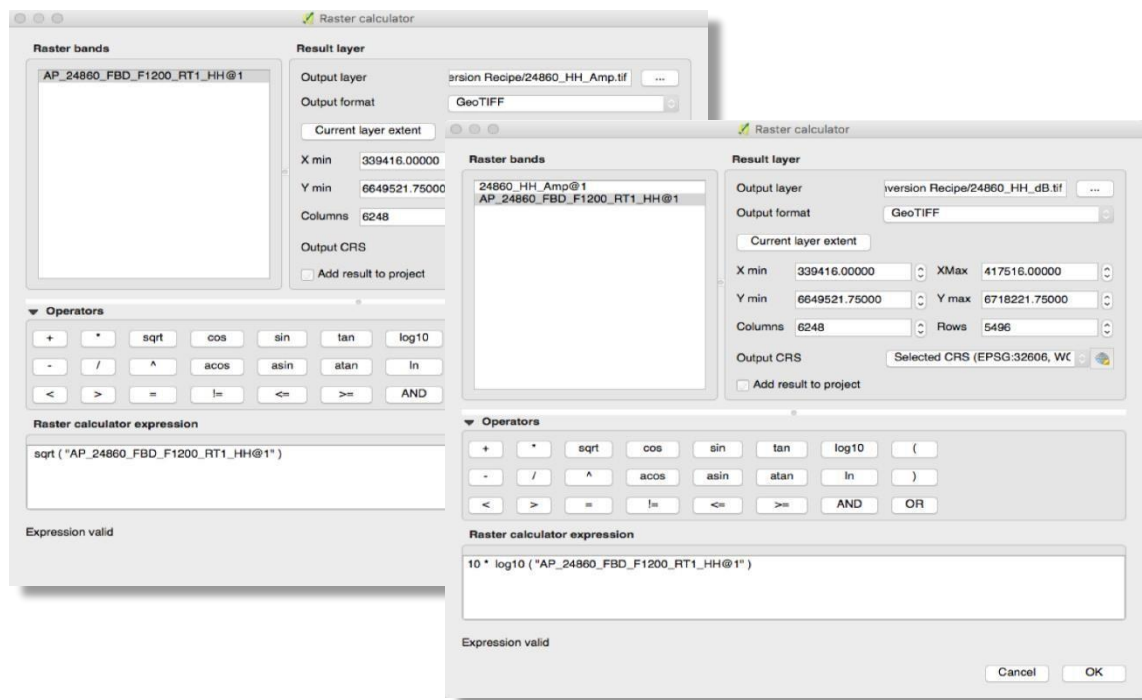c) Set the *Output Layer* to a filename and directory of your choice and select **OK**

Figure 1: Raster Calculator dialog

4. Improve Visualization at all Spatial Scales

a) Right-click on the image in the *Layers Panel* and select **Properties**
b) In the *Layer Properties* window click on **Style** (Figure 2).

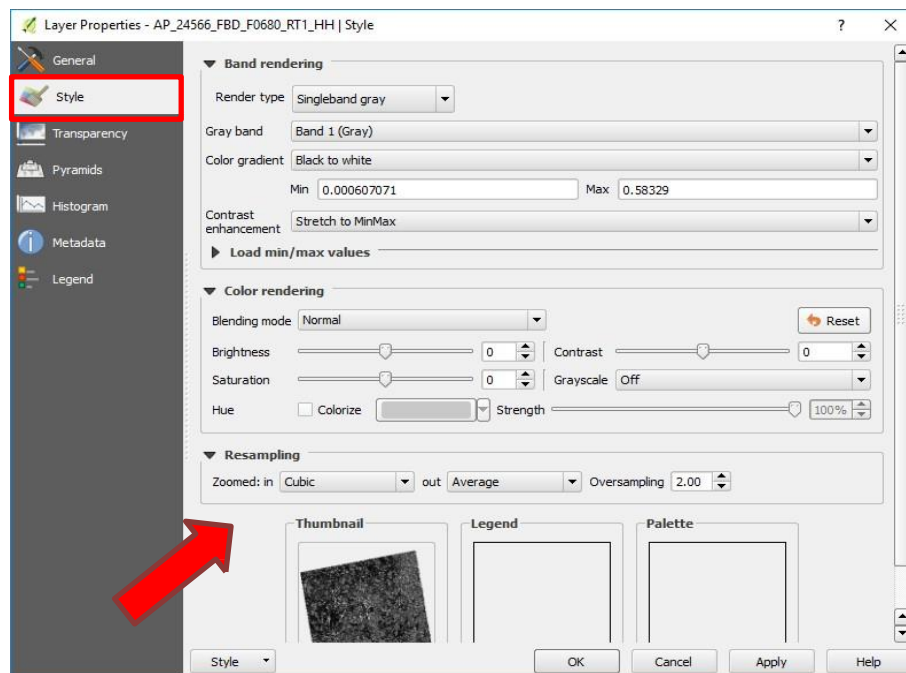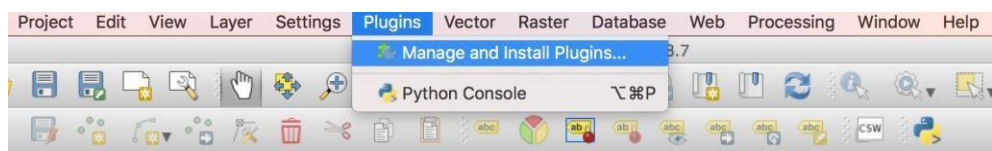c) Change the resampling method for *Zoomed: in* to **Cubic**, and *Zoomed: out* to **Average,** select **OK**

Figure 2: Layer Properties dialog

5. **OPTIONAL**: Add a base layer to compare image features to known landmarks

   a) Load the **OpenLayers Plugin** into your QGIS system via the *Plugins/Manage and Install Plugins…* Item in the menu bar at the top of the QGIS interface

   b) Open a base layer by using the top menu, *Web* > *OpenLayers plugin*

   Note: The base layer used in Figure 1 can be found in Web > OpenLayers plugin > Google Maps > Google Hybrid

   c) In the *Layers Panel* in the lower left corner, drag and drop the base layer so that it is below the log-ratio layer.

6. **OPTIONAL:** Create a Subset of your Image

If the data you are using is too large or you simply have a particular area of interest, you may use the **Clipper** tool in QGIS to crop your image and cut down on processing time.

a) Navigate to **Raster > Extraction > Clipper…** from the main menu

b) In the **Clipper** dialog select the product you would like to clip (Figure 3)

c) There are *two ways* to clip your image:

1. Select the extent by click-dragging your cursor on the canvas. You may adjust the extent coordinates as you see fit (x, y)
2. Use a Mask layer (shape file) to clip out a particular shape

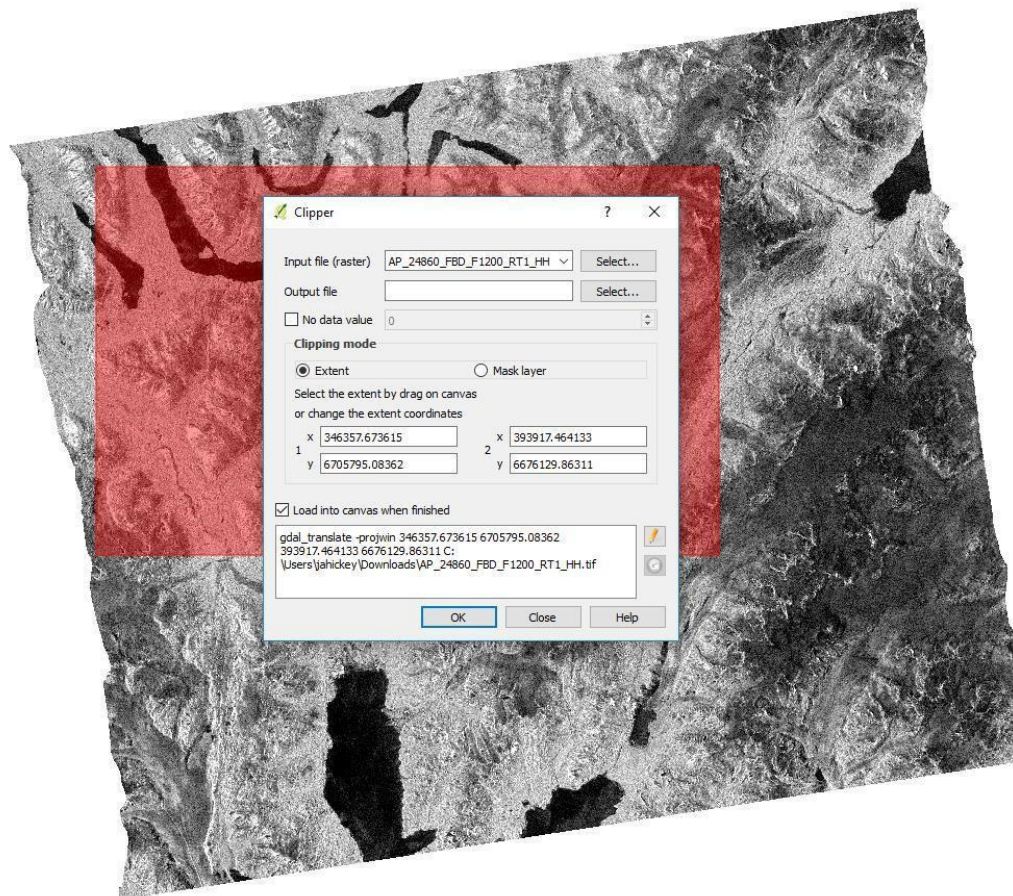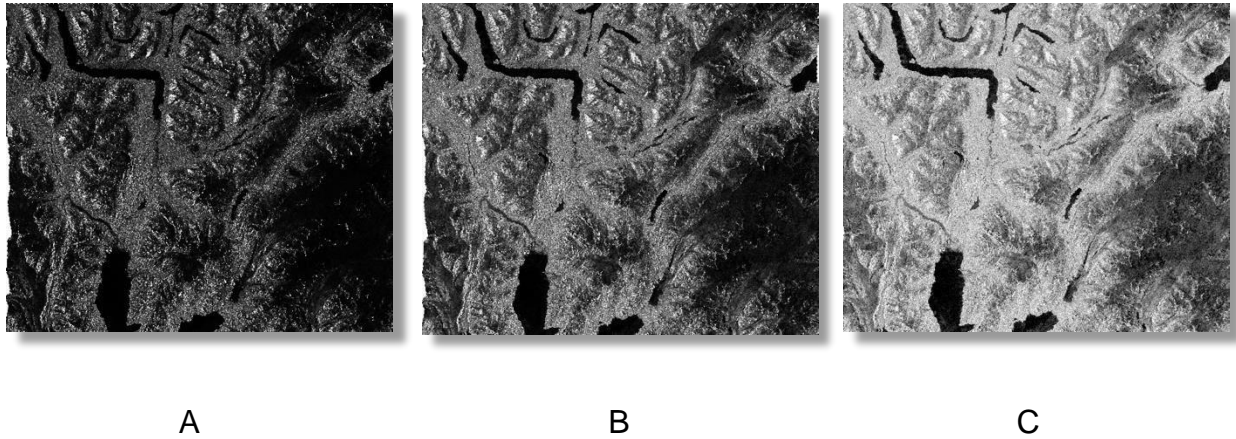d) Set the *Output file* to a filename and directory of your choice, click **OK**

Figure 3: Clipper dialog

D) Example Images

A B C

Figure 4: Portion of the Chugach Mountains, including Resurrection Bay and Kenai Lake, Alaska. ALOS PALSAR RTC images in (A) gamma0, (B) amplitude, (C) dB. Credit: ASF DAAC 2017; Includes Material © JAXA/METI 2010