

# Raster Visualization

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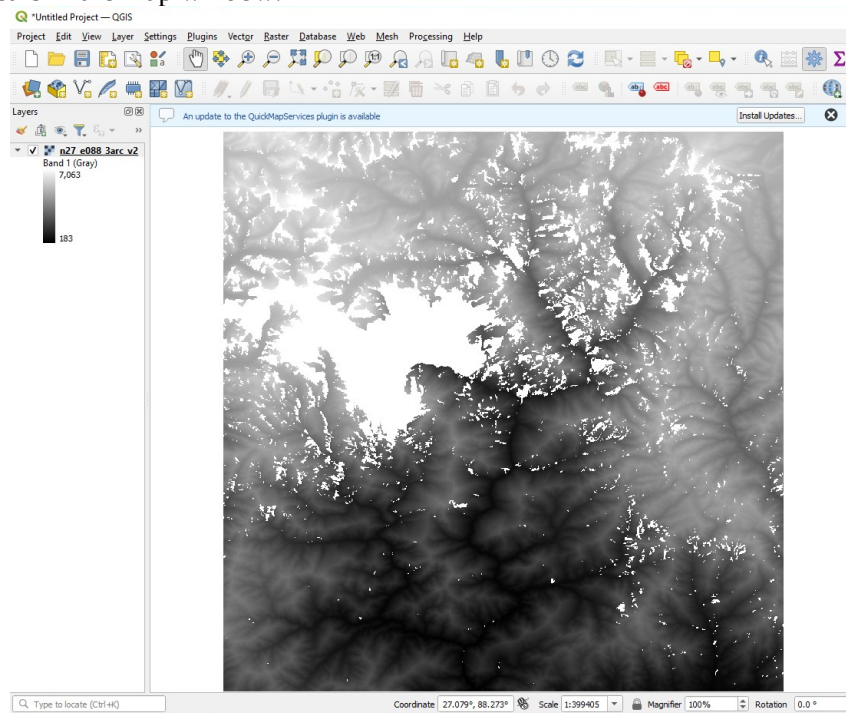
Raster processing is a technique employed to extract valuable information from raster data and conduct analysis. It involves various processes like Image enhancement, filtering, classification and others.

These exercises involve basic visualization of satellite imagery considering first the case of single band image and second, the case of multi-band imagery.

## Single Band Image (SRTM dataset)

SRTM dataset is an elevation dataset where the band represents elevation values. When represented as an image, the lower elevation values are depicted in darker shades of grey and higher elevation values are depicted in lighter shades of grey.

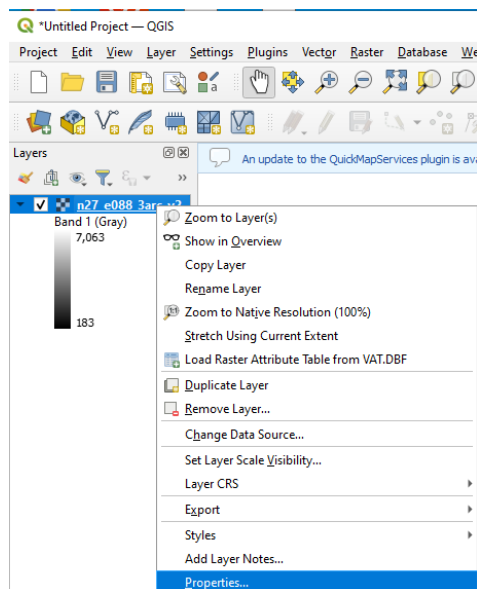
1. Open the QGIS window, click drag and drop the SRTM GeoTIFF file to import it. Once added the image will be visible in the map window and the filename will be displayed in the layer panel. Try toggling the checkbox in the layer panel to see if the image disappears and reappears in the map window.



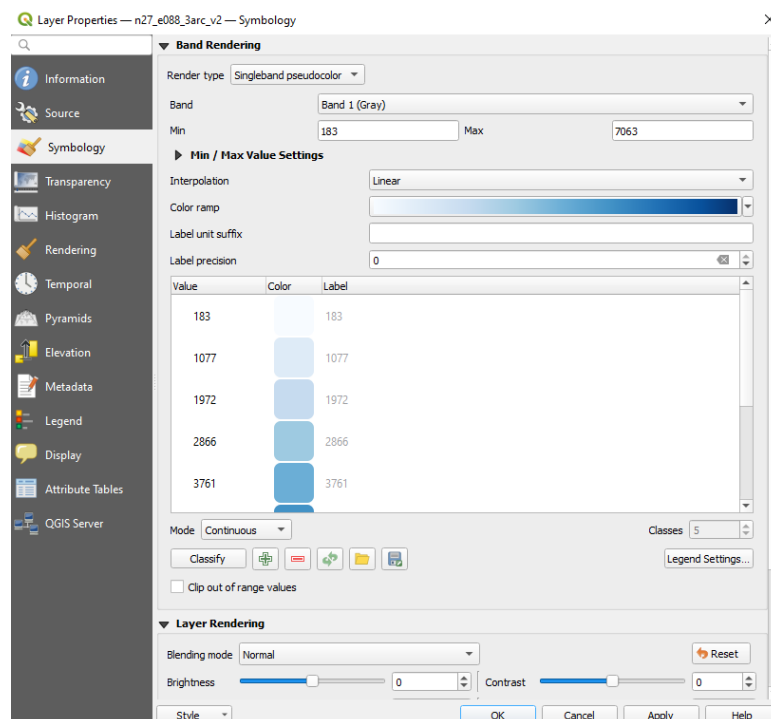
The added image is a grey scale representation of an image with a single band. Here, the band represents elevation values. Bright pixels correspond to higher elevation, while dark pixels indicate lower elevations. Do note that the void space is observed as there is no data for that location.

It might be beneficial to use a range of colours as opposed to greyscale representation of elevation values. The subsequent step involves enhancing visualization using single pseudocolour to accurately depict the elevation.

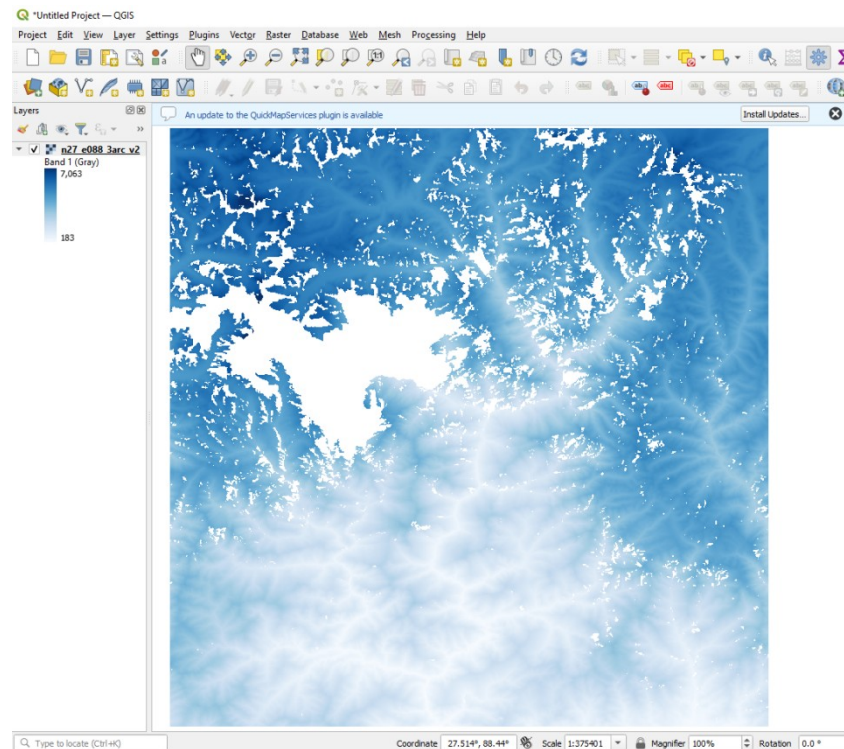
2. Right click on the SRTM layer in the layer panel and select properties



3. In the symbology tab select the render type> Singleband pseudocolour and choose a colour ramp from the list.



4. The SRTM data will now be visible on the QGIS map in the selected color scheme. Here, blue indicates high elevation and white indicates low. Other colour schemes can be selected as well.

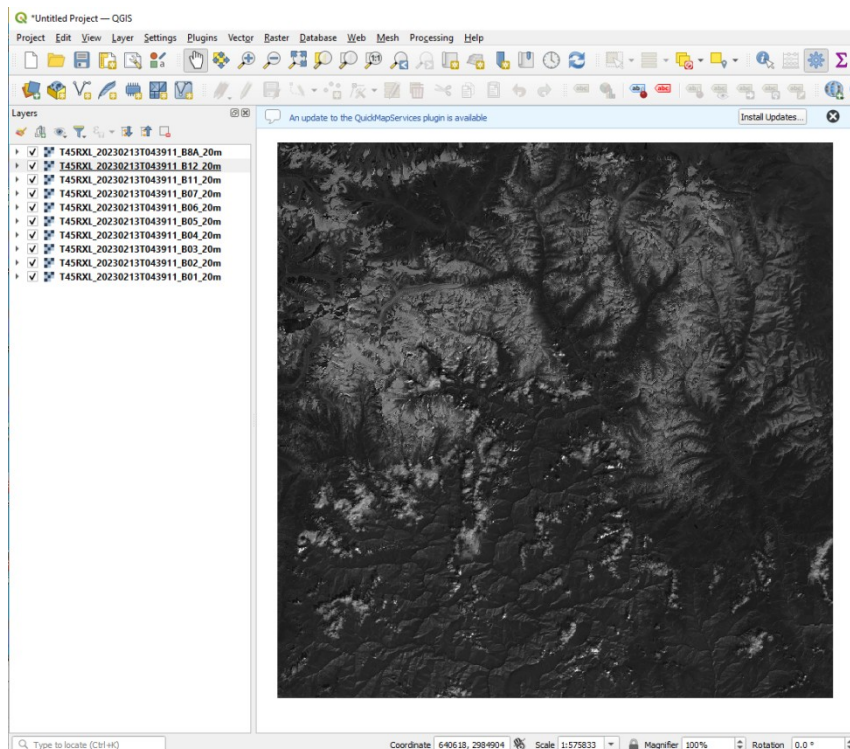


## Multispectral image (Sentinel Dataset)

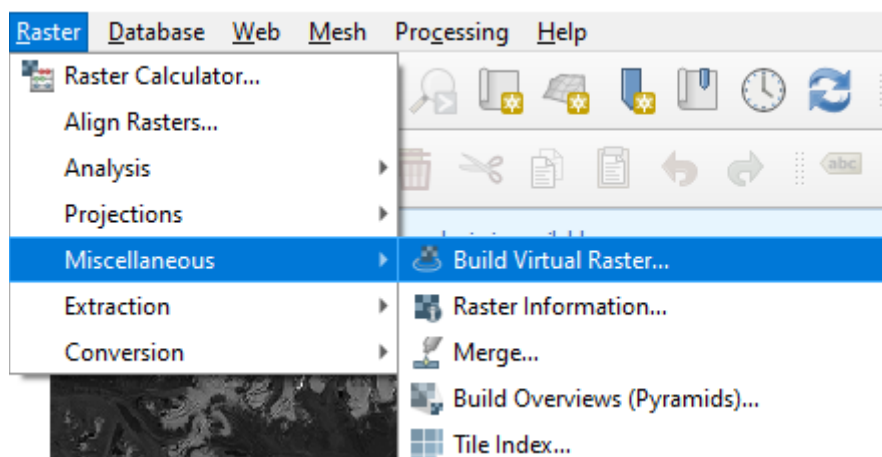
Multispectral satellite images, as the name suggest, has multiple spectral bands. Individual bands can be represented in greyscale or pseudo-color mode. However to create informative color composites in QGIS, satellite bands must be assigned to red, green and blue visualization channels.

In this exercise, we will work with 10 bands of the Sentinel- 2 satellite imagery. The objective is to create a composite image by stacking the 10 selected bands and representing information in the form of true colour and false colour composites.

1. Drag all 10 Sentinel-2 data files into QGIS.

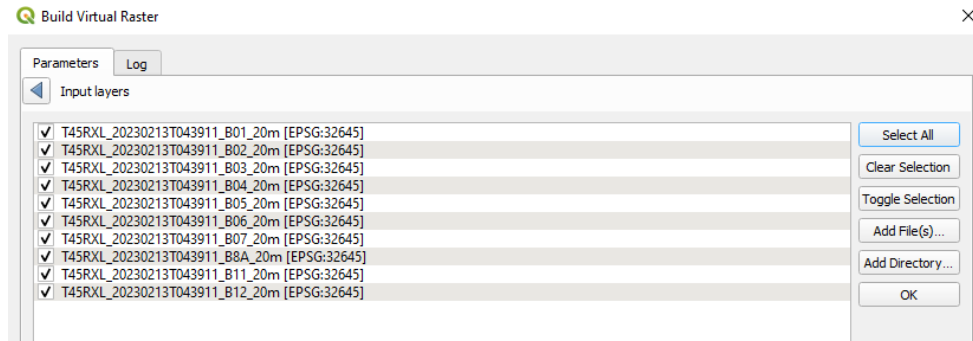


2. We need to consolidate these 10 images into a single image through the use of Virtual Raster. Click on Raster tab > Miscellaneous> Build Virtual Rater.



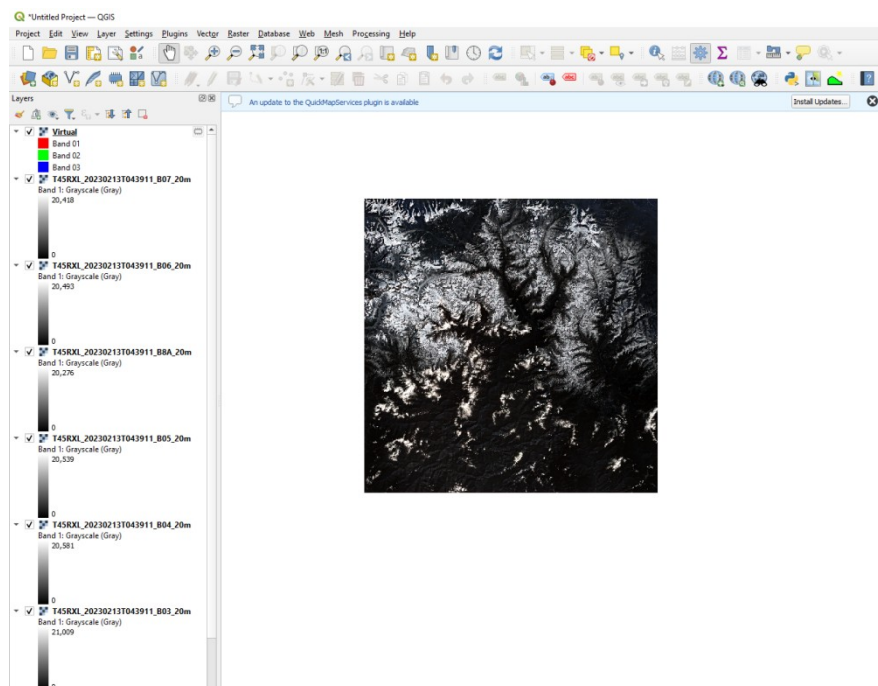
3. Click on the ... button next to Input layers to select the layers you would like to generate a virtual raster with.

4. In the resulting window, ensure that the bands are in order. Note, here Band 11 and Band 12 are wrongly placed. Click and drag them to the bottom of the band list. Click Select All, click OK



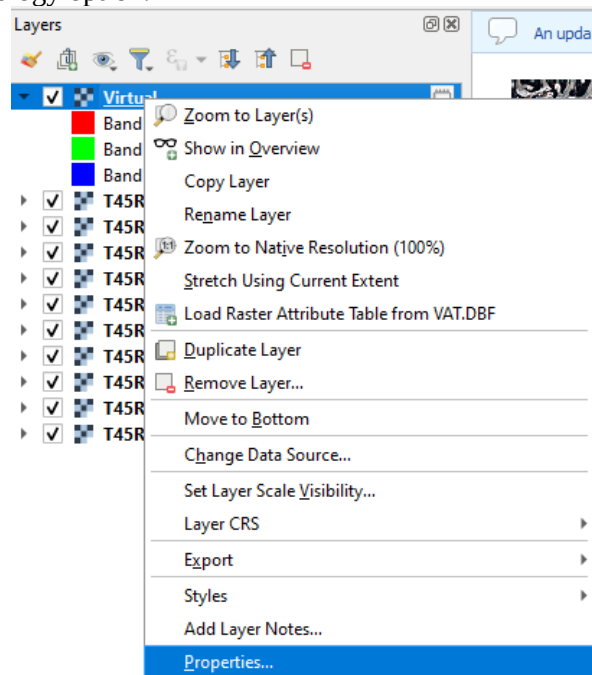
5. Tick the box to place each input file into a separate band and click run

6. Once the virtual Raster is generated, the other layers are redundant and may be removed by right-clicking and selecting remove. The QGIS view is as follows:



After generating the stacked image, the next steps involve visualizing it through a simple true colour composition and false colour composition.

7. On the resulting virtual layer right click and select the properties to change the colour of the band under symbology option.

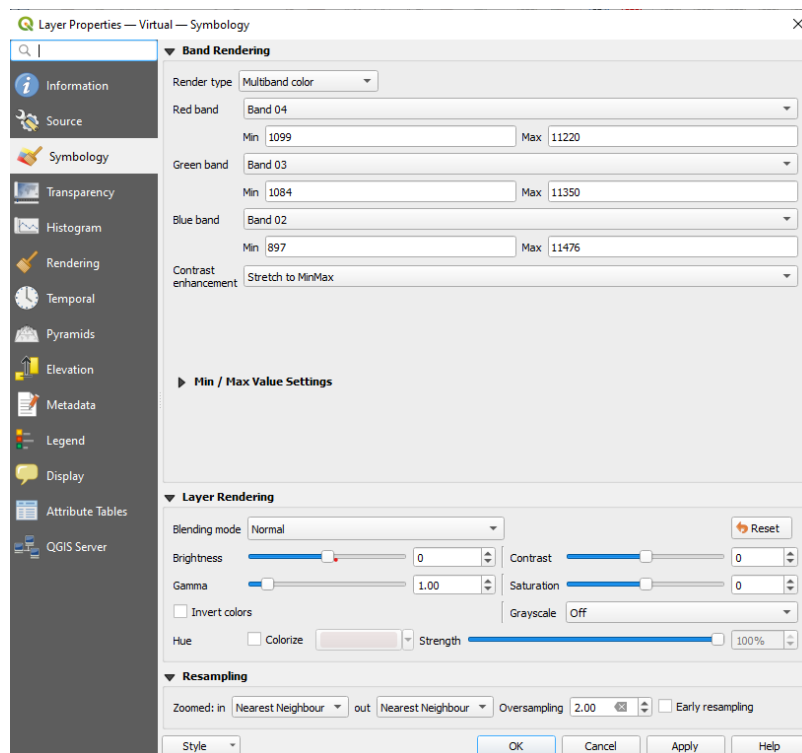


List of Sentinel-2 bands and their corresponding wavelengths and resolutions are provided here as reference. You may also check these details online if you are working with any other satellite.

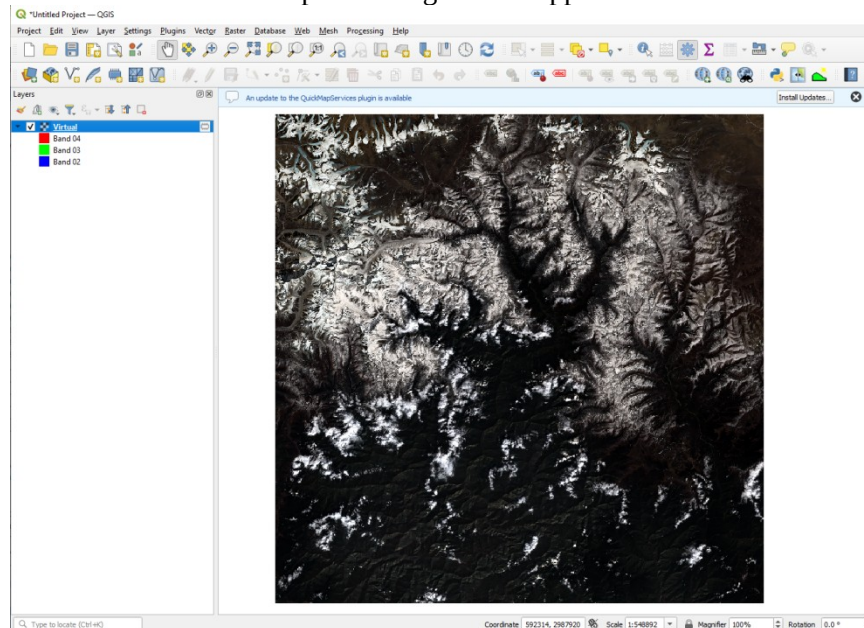
Sentinel-2 Bands	Central Wavelength (µm)	Resolution (m)
Band 1 - Coastal aerosol	0.443	60
Band 2 - Blue	0.490	10
Band 3 - Green	0.560	10
Band 4 - Red	0.665	10
Band 5 - Vegetation Red Edge	0.705	20
Band 6 - Vegetation Red Edge	0.740	20
Band 7 - Vegetation Red Edge	0.783	20
Band 8 - NIR	0.842	10
Band 8A - Vegetation Red Edge	0.865	20
Band 9 - Water vapour	0.945	60
Band 10 - SWIR - Cirrus	1.375	60
Band 11 - SWIR	1.610	20
Band 12 - SWIR	2.190	20



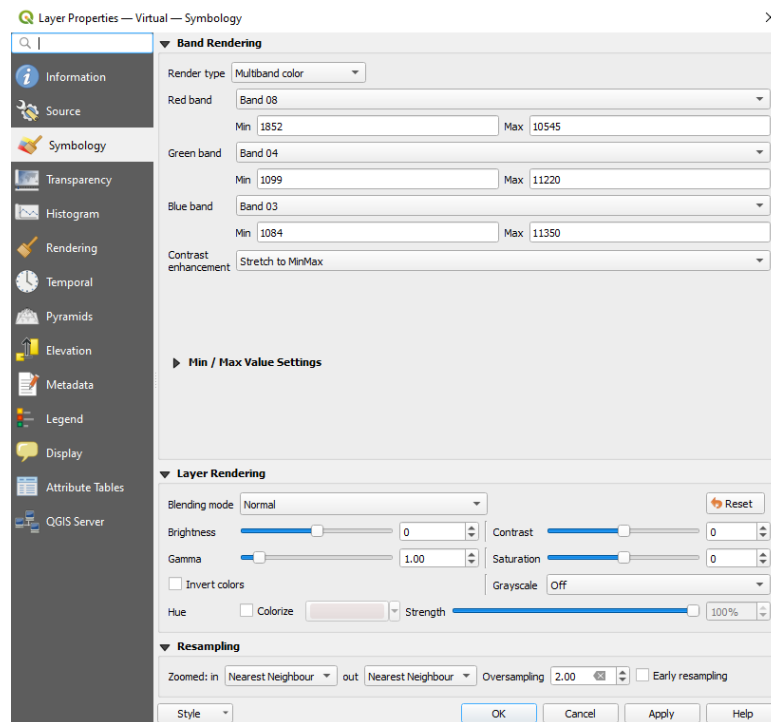
8. Use the symbology Setting and adjust the band rendering. Select Band 4 under red band , Band 3 under Green band and band 2 under Blue band to create True colour composite.



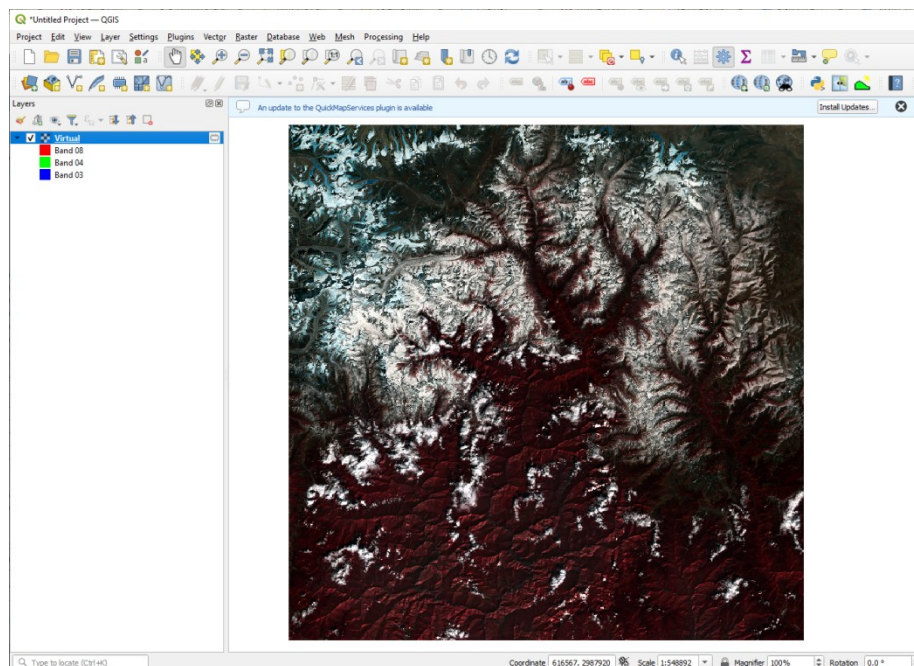
You can visualize True Color Composite image which appears as below



- In order to visualize the image in false colour composite, use the symbology Setting and adjust the band rendering. Select Band 8 under red band , Band 4 under Green band and band 3 under Blue band to create False color composite.



The image is now displayed as a False Color Composite. Note, any combination is a false colour composite as long as it is not the assignment of Band 4 to red band , Band 3 to Green band and band 2 to Blue band



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