

2018 Mar 21

3D DEM Visualization in QGIS 3.0

The other day I just happened to be looking through ESRI's ArcUser magazine (Winter 2018) while waiting for a process to finish on my computer, and came across an article on visualizing DEM using multidirectional hillshade - [Create Amazing Hillshade Effects Quickly and Easily in ArcGIS Pro](#). Inspired by this article, I thought I would try do the same thing in QGIS 3.0. Below is a short tutorial on how to visualize a DEM in 3D with QGIS 3.0. I'm thinking that the more I use QGIS (especially the newest update) the more I like it.

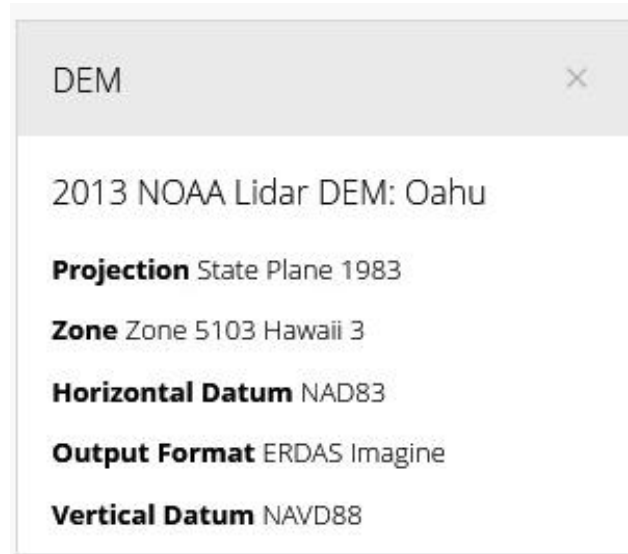
A quick note on traditional vs multidirectional hillshade:

Traditional Hillshade: hillshading illuminated from 315 deg azimuth - so only single source of light

Multidirectional Hillshade: a combination of hillshading illuminated from 225, 270, 315, and 360 deg azimuth - 4 different sources of light

1. Download DEM

First, you'll need a DEM for your area of interest. For this tutorial, I downloaded a 1 meter DEM for Diamond Head Crater from [NOAA Data Access Viewer](#). Below is the specs I used for my download.

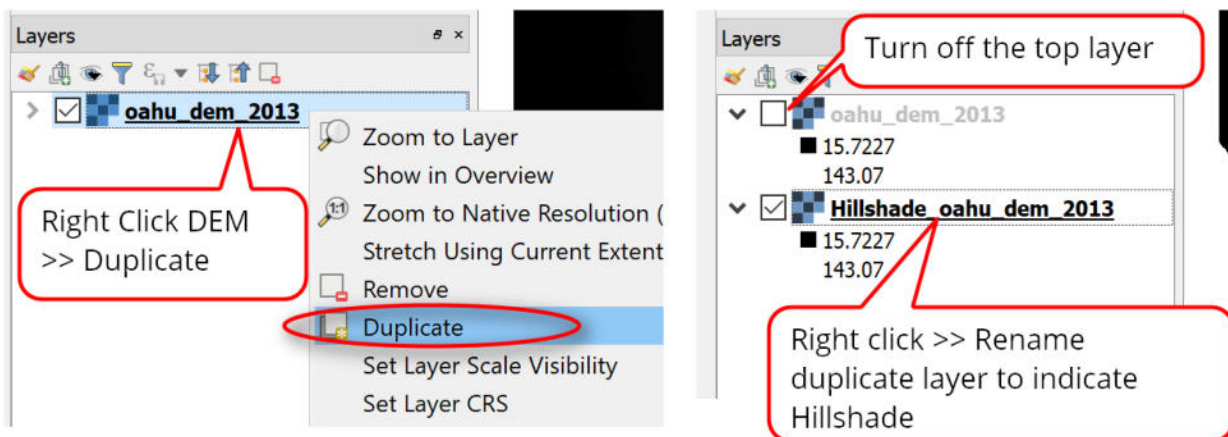


After you download your DEM, unzipped it. You're going to then use QGIS 3.0 to view it

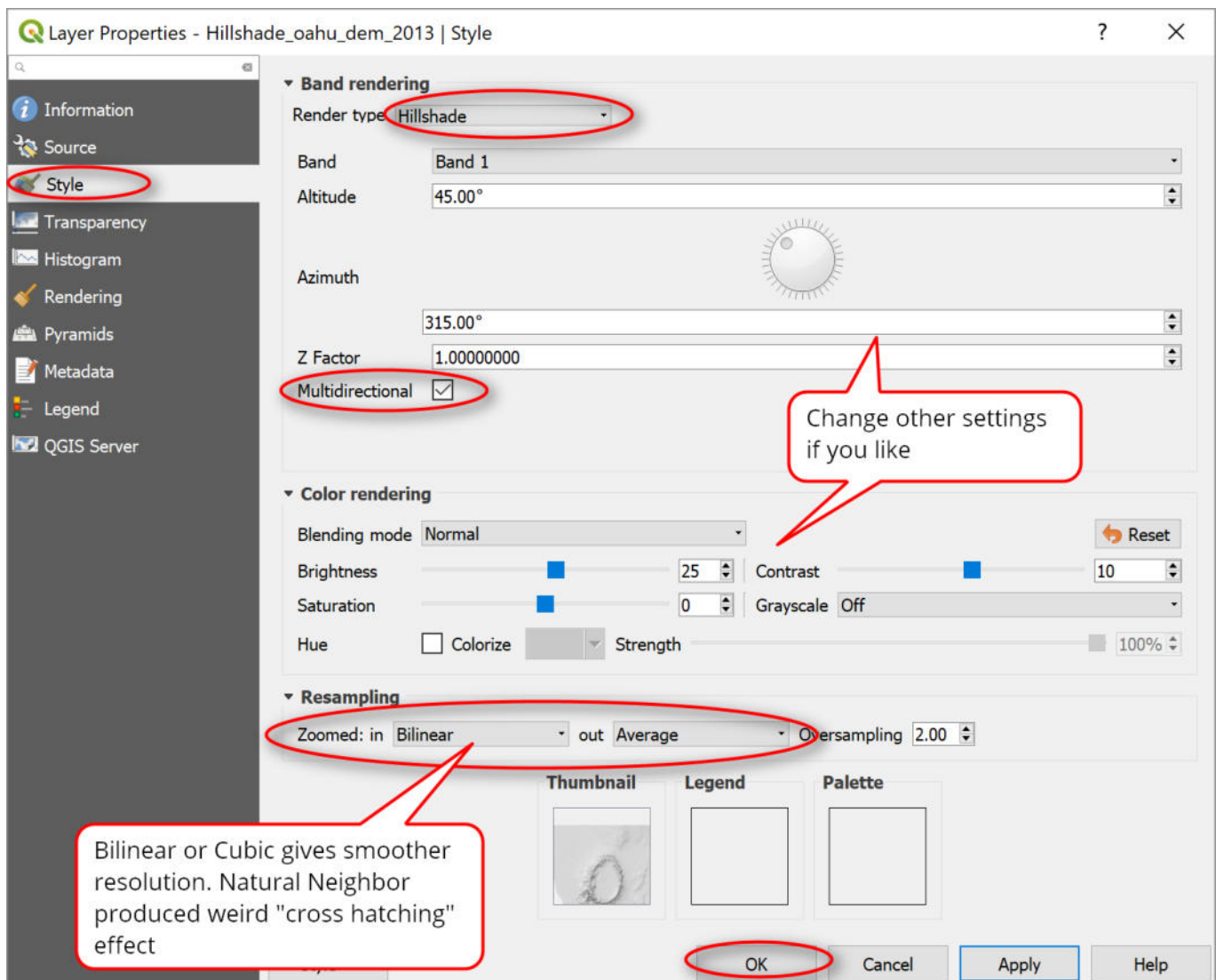
2. Create Multidirectional hillshade

I am using QGIS 3.0 and I assume you have it installed already. So here's what you're going to do. First, add the DEM to the QGIS, then make a copy of it. You'll end up having 2 DEM layers for viewing purposes: 1) colored DEM used for drapping over 2) the hillshade. You are not actually creating a new layer or doing anything to the actual DEM.

- In QGIS open add your DEM to the Layers Panel
- Make a copy of the DEM. Right Click on your DEM >> Duplicate
- Optional - In your Layers Panel, rename your second copy of the DEM to indicate that this layer will have the Hillshade effect applied to it - like the screenshot below:

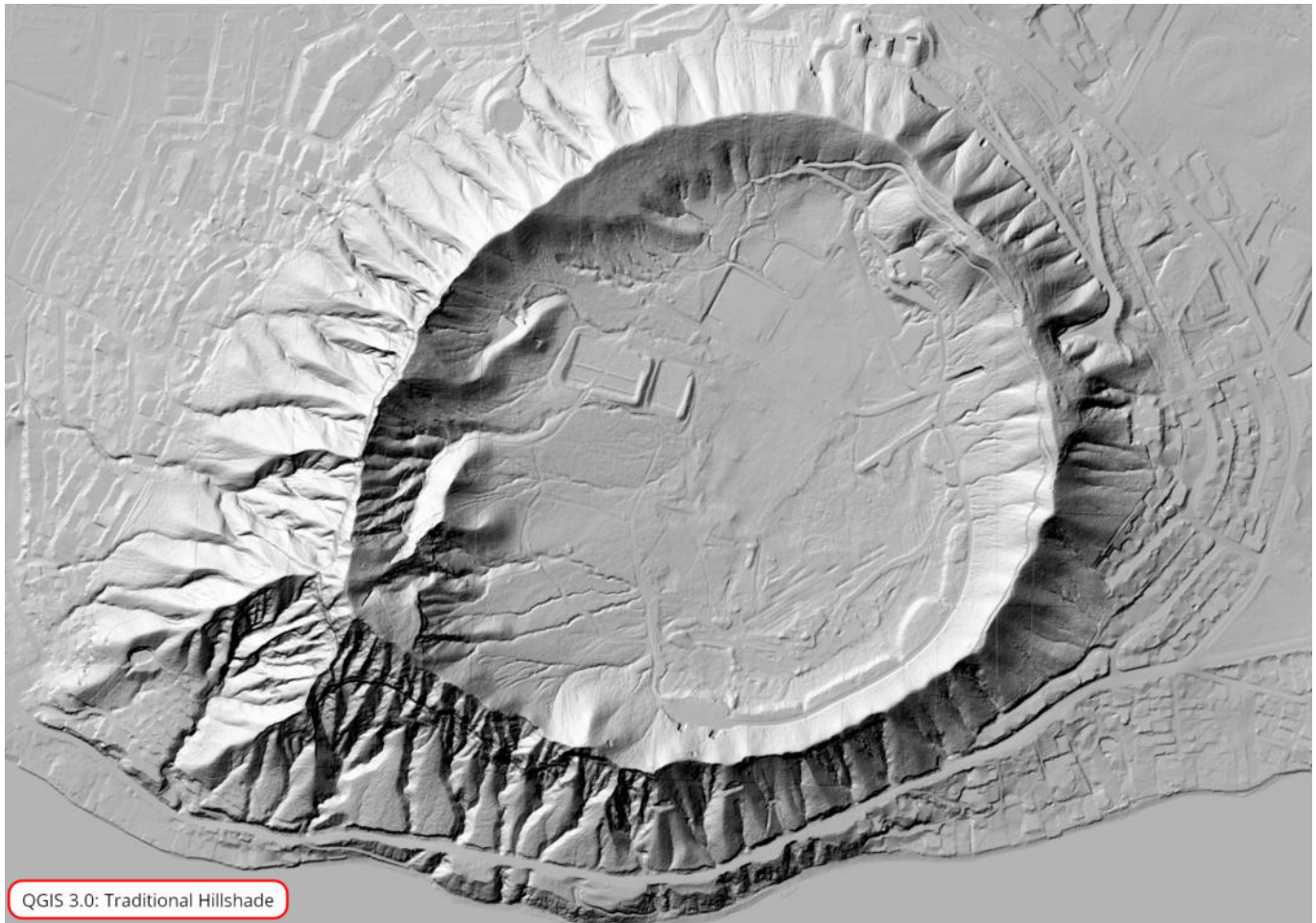


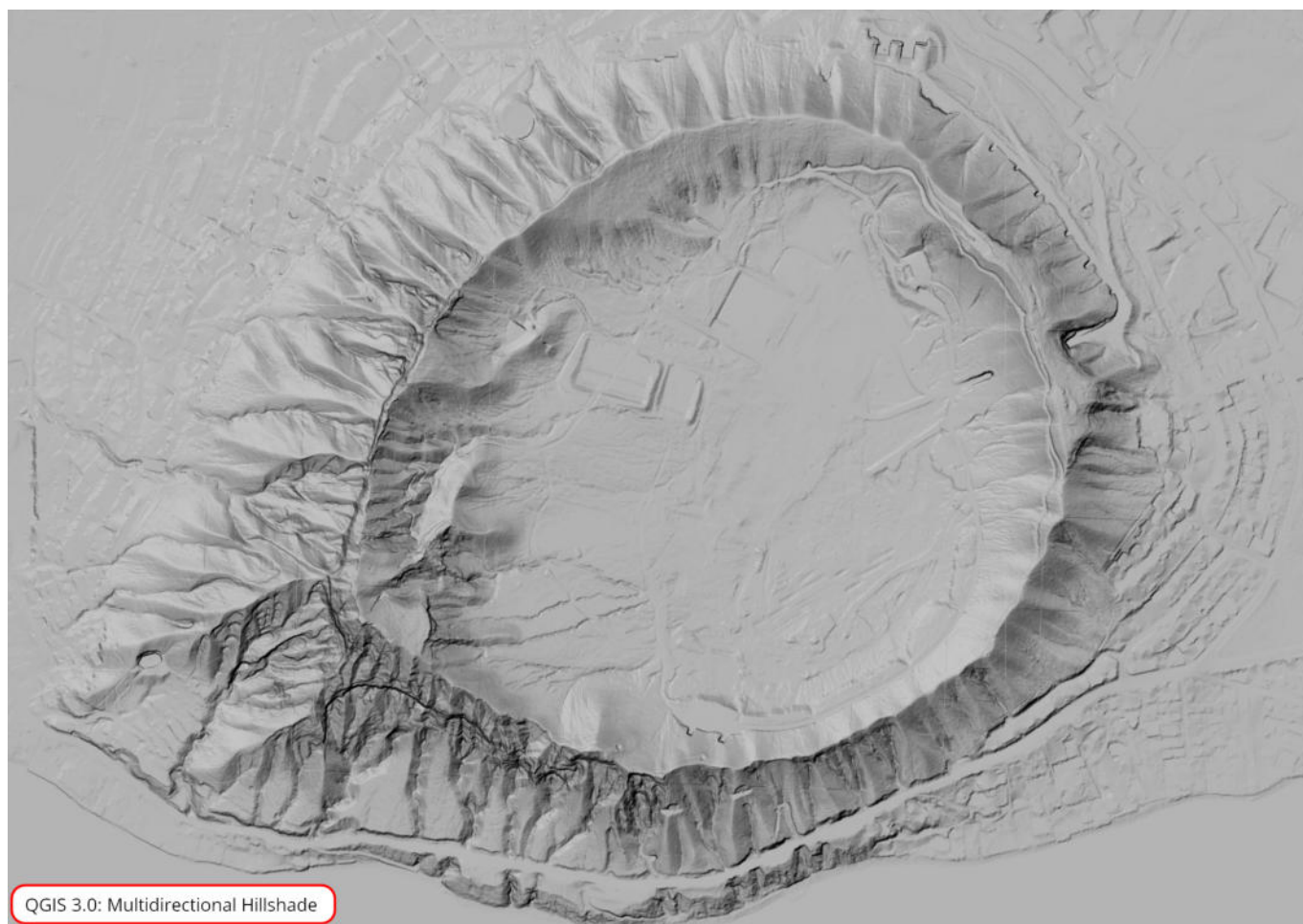
- Turn off the top layer because you're going to create the hillshade effect on the second layer first.
- Right click on Hillshade_oahu_dem_2013 >> Properties >> Style
 - Render type: Hillshade
 - Multidirectional: check the box
 - Resampling: Use either Bilinear or Cubic and Average to get a smoother looking hillshade. The default Natural Neighbor produced weird cross hatching effect.



Try to see what happens when you checked (multidirectional hillshade) and unchecking (traditional hillshade) the Multidirectional hillshade box. Here's are two views of a traditional hillshade and a multidirectional one. It looks to me like there is less shadowing in the multidirectional hillshade (which would make sense if

illumination is coming from multiple directions) then the traditional one - this though I think makes it have less contrast (?) so things don't seem to pop out as much??

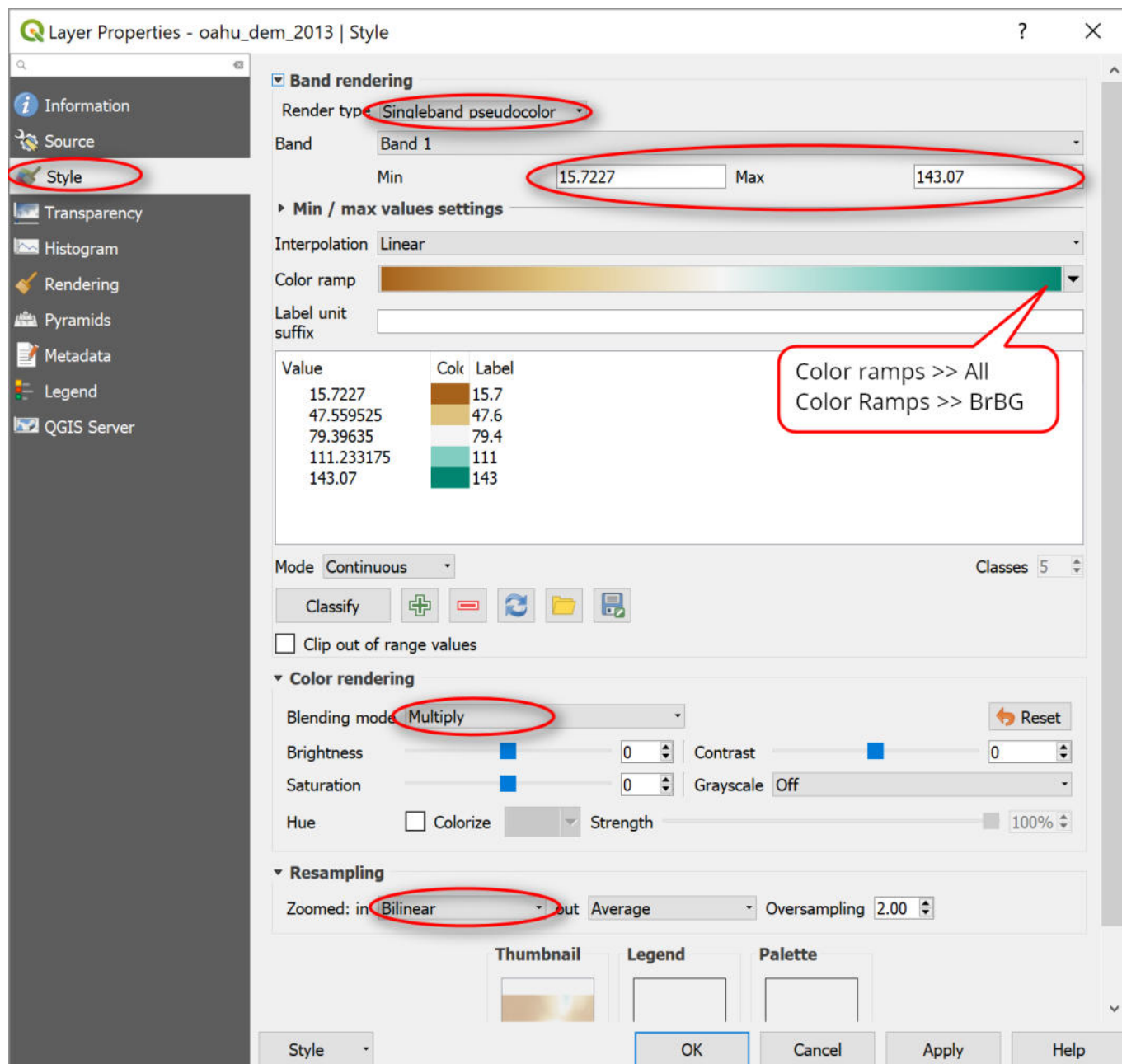




3. Drape Colored DEM Over Hillshade

After you create the multidirectional hillshade, you're going to just change the color of the top DEM layer and "drape" it on top.

- Right click on the top DEM (e.g. oahu_dem_2013) >> Properties >> Style
 - Rendered type: single pseudocolor
 - Make sure min/max values are correct for your DEM
 - Color ramp: Use drop down menu >> Select all Color Ramps >> BrBG (this is the one I'm using). To invert color ramp, right click inside the color box >> Invert Color
 - Blending mode: Multiple (this produces better effects than Normal blending with transparency)
 - Resampling: again use Bilinear or Cubic to get smoother effect
 - Optional Transparency: change transparent if you want. I have it at 50%.



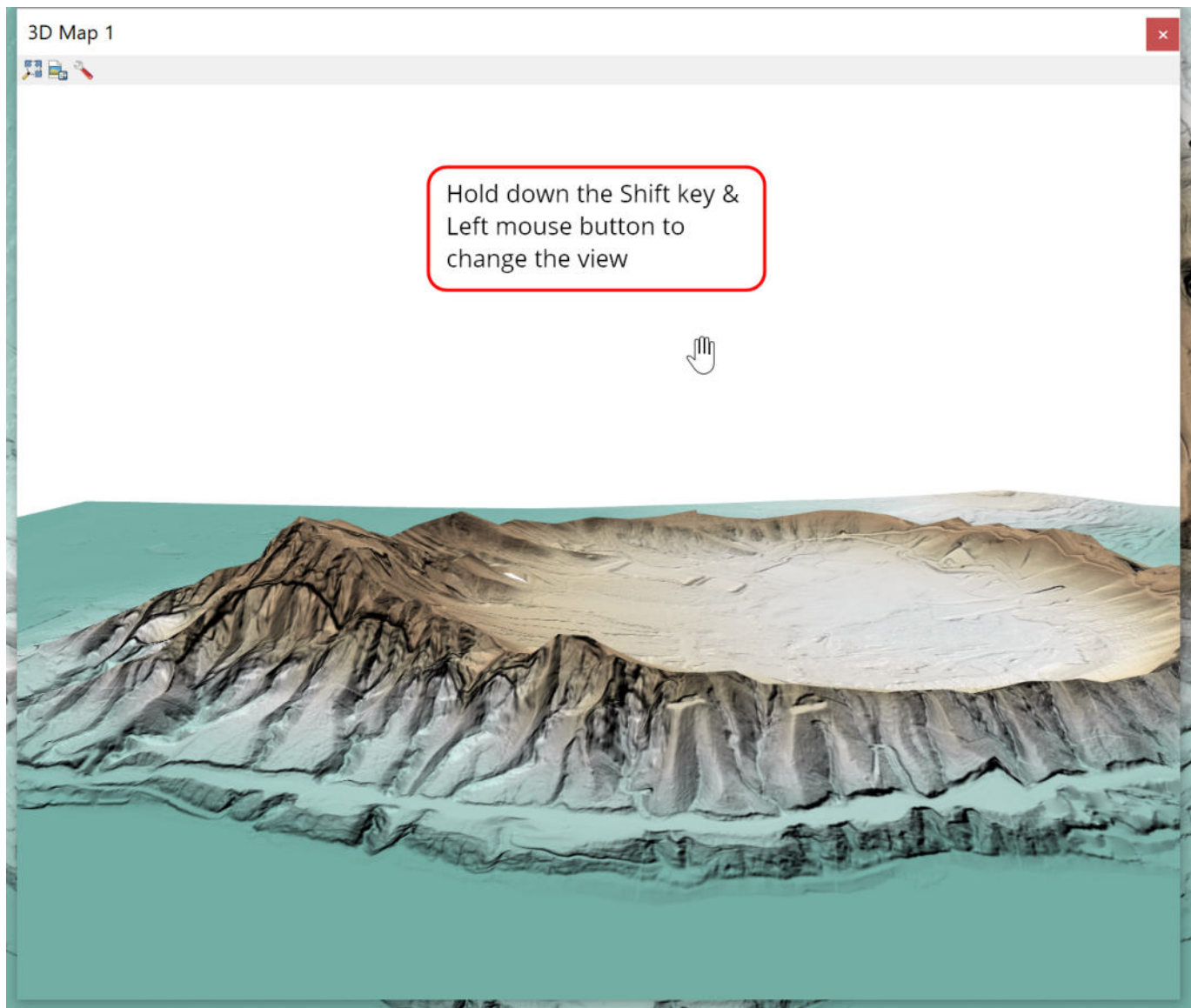
Here is a view with the colored DEM draped over the multidirectional hillshade. Play around with the setting options to get your desired effect.

For comparison, here's the same view I did in ArcGIS Pro. Both results look really good - although I think ArcGIS Pro's multidirectional effect (using default settings) has a slight edge over the QGIS one (also using default settings).

4. Create 3D Map View

You can now view/simulate 3D landscape (DEM) in QGIS 3.0 natively without a plugin.

- In QGIS, go to View menu >> New 3D Map View
- In the 3D Map 1 window: click the Configure button
 - Elevation: select your DEM or the hillshade
 - Make any changes to the other settings if you want
- In the 3D Map 1 window: hold down the shift key and the left mouse button to zoom in/out and rotate



Did you also know that you can customize the QGIS user interface by stacking and moving panels and map views around - try dragging and docking the panels in your user interface. The image below shows my user interface setup with the main map view or canvas on the left and the 3D Map view on the right.

Here is one of my favorite 3D visualization where I burned (Blending mode = burn) an aerial (ESRI Aerial base map) into the multidirectional hillshade in QGIS.

QGIS and ArcGIS Pro DEM Comparisons

My conclusion having used the same method for 3D DEM visualization in both QGIS 3.0 and ArcGIS Pro is that they're both very good and comparable. Of course you can do some comparisons and decide for yourself, but I think QGIS does a great job considering it is free. Anyway, below are some of my snapshots for comparison.

That's it for this post. I hope you enjoyed reading it. Feel free to drop me a note in the comments section or via email anytime.

Comments (7)

Newest First

Arie 5 years ago · 0 Likes

Thank you very much, It was very usefull

Gustavo 6 years ago · 0 Likes

Muchas gracias. Aprendí mucho!

J 7 years ago · 0 Likes

Really great post - very clear and concise and exactly what I was after, thank you!

DB 7 years ago · 0 Likes

Great instructions.
Thank you very much.

Jim 8 years ago · 0 Likes

Great stuff, Stephanie and very helpful! Thanks, - Jim

j 8 years ago · 0 Likes

Wow nice, thanks!

Grant 8 years ago · 0 Likes

Excellent. I wanted to do the multidirectional hillshade also and this has been so helpful. I learned a lot from this post. Thank you!

< Adding Basemaps in QGIS 3.0

A Simple Leaflet Web Map
Example >

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