

HOW TO CREATE CUSTOM AERIAL SCENERY IN MSFS

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0 – Introduction

This guide will show you how to create an aerial scenery in MSFS.

Please do note that is tutorial will not show you how to install the prerequisites. It is also pretty much necessary to already have some knowledge of scenery development in MSFS.

We will be creating an aerial scenery for the airport ENFL - Florø Airport

0.1 – Prerequisites:

[Ortho4XP by Oscar Pilote](#) - Version as of writing is v130

[QGIS \(Standalone Installer\)](#) - Version as of writing is 3.14

[tiles2bing by Christine Winther](#) - Version as of writing is 0.0.2

MSFS SDK - Version as of writing is 0.5.1

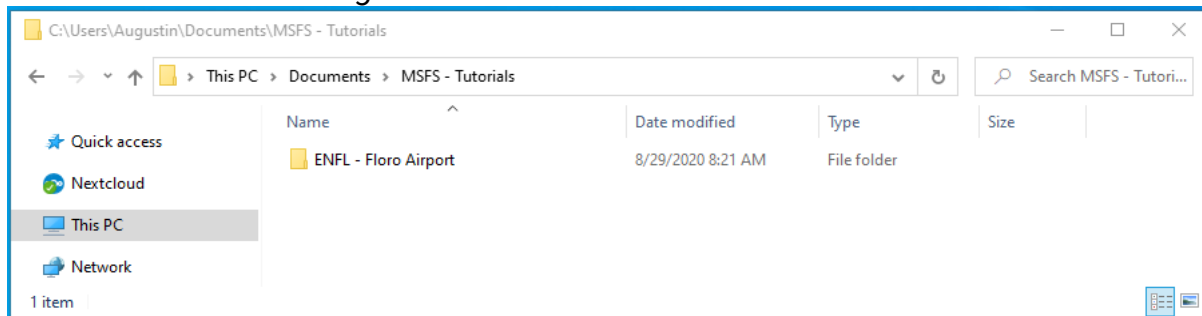
1 – Setting up our project

Create a project folder if you don't already have one.

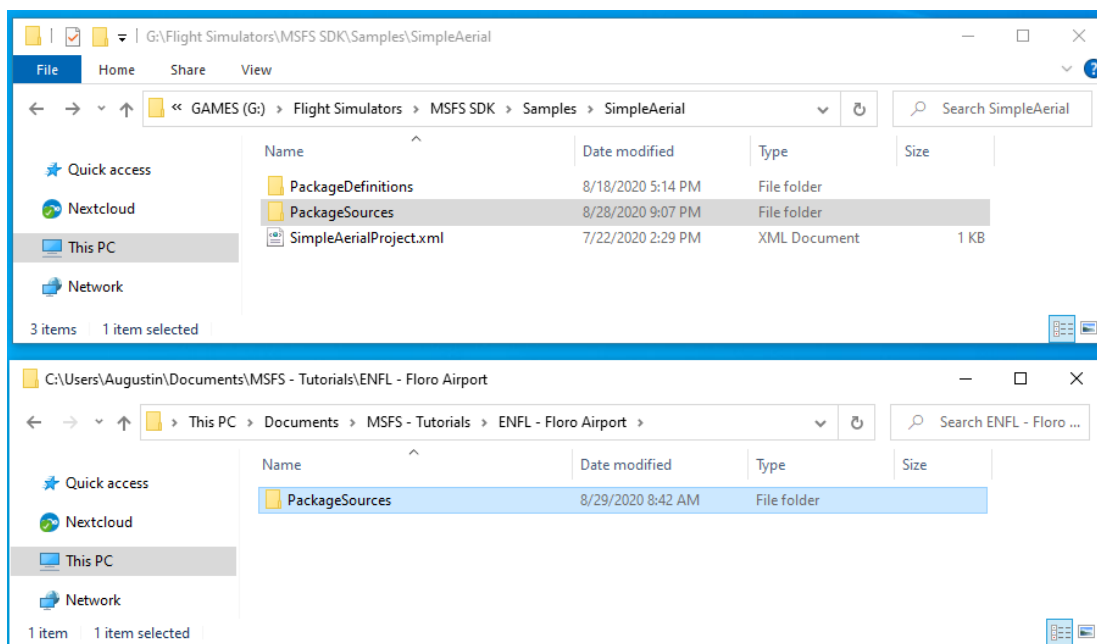
It doesn't matter where you place it, as long as the drive you are using has enough space.

I recommend naming the folder with the airport name.

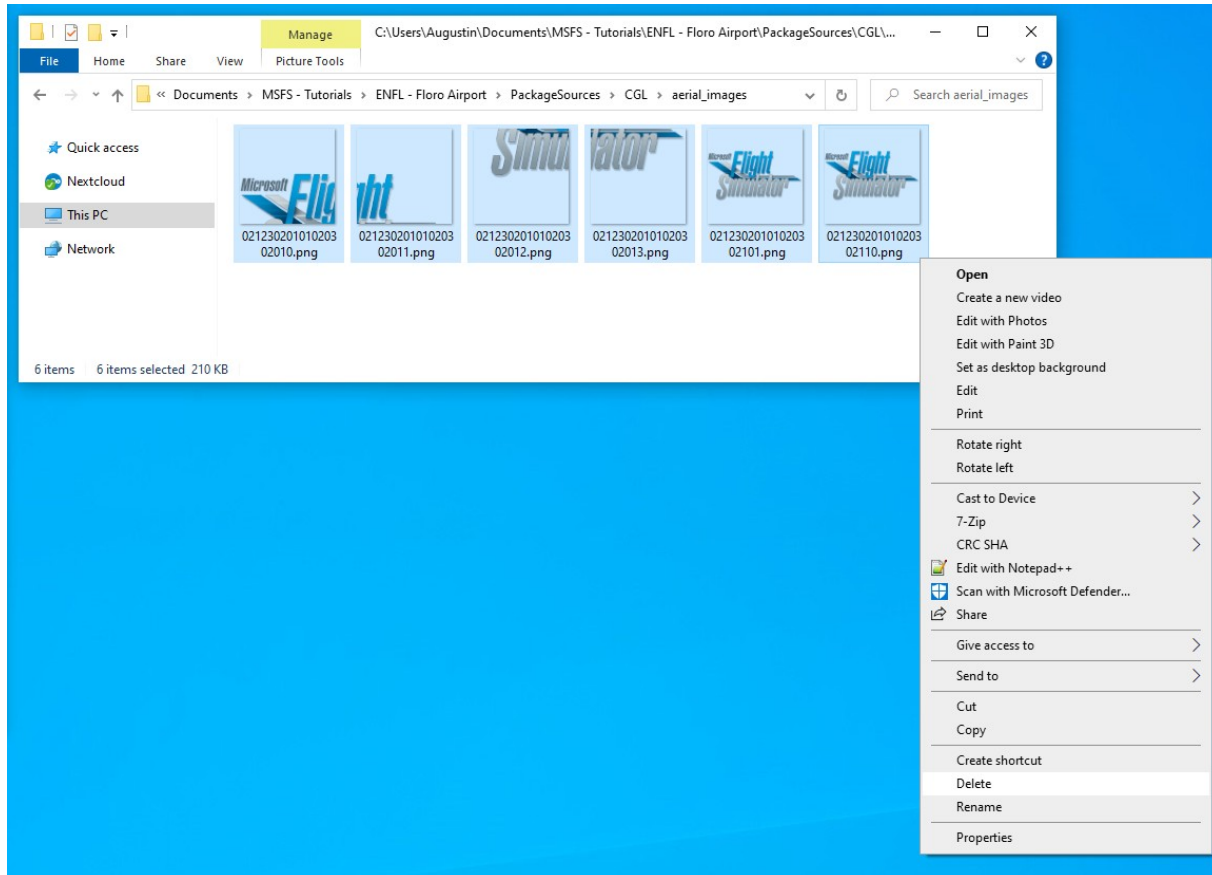
NOTE: Do not use non-English letters in the name



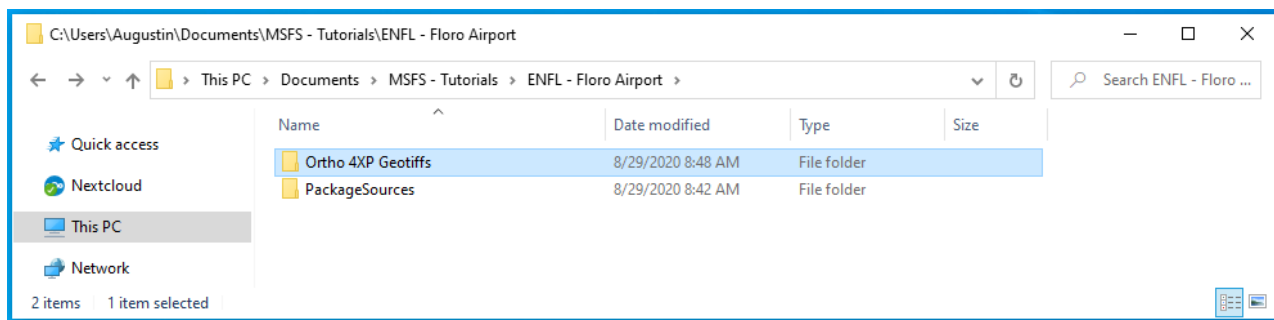
Copy and paste the **PackageSources** folder from **MSFS_SDK_LOCATION\Samples\SimpleAerial** to your project folder



Delete the sample aerial images inside `YOUR_PROJECT_FOLDER\PackageSources\CGL\`
`aerial_images`

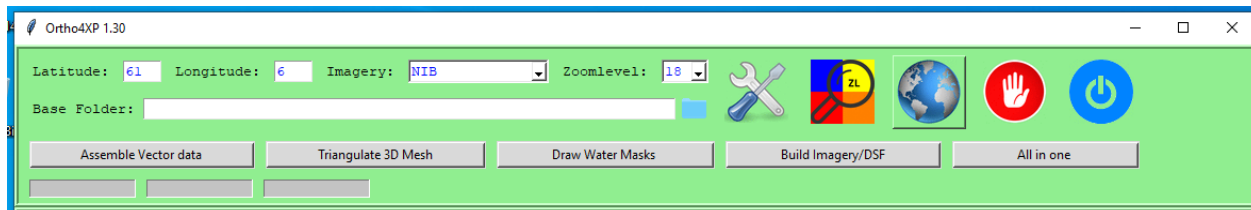


Create a folder for the `.tif` files we will be downloading via Ortho4XP



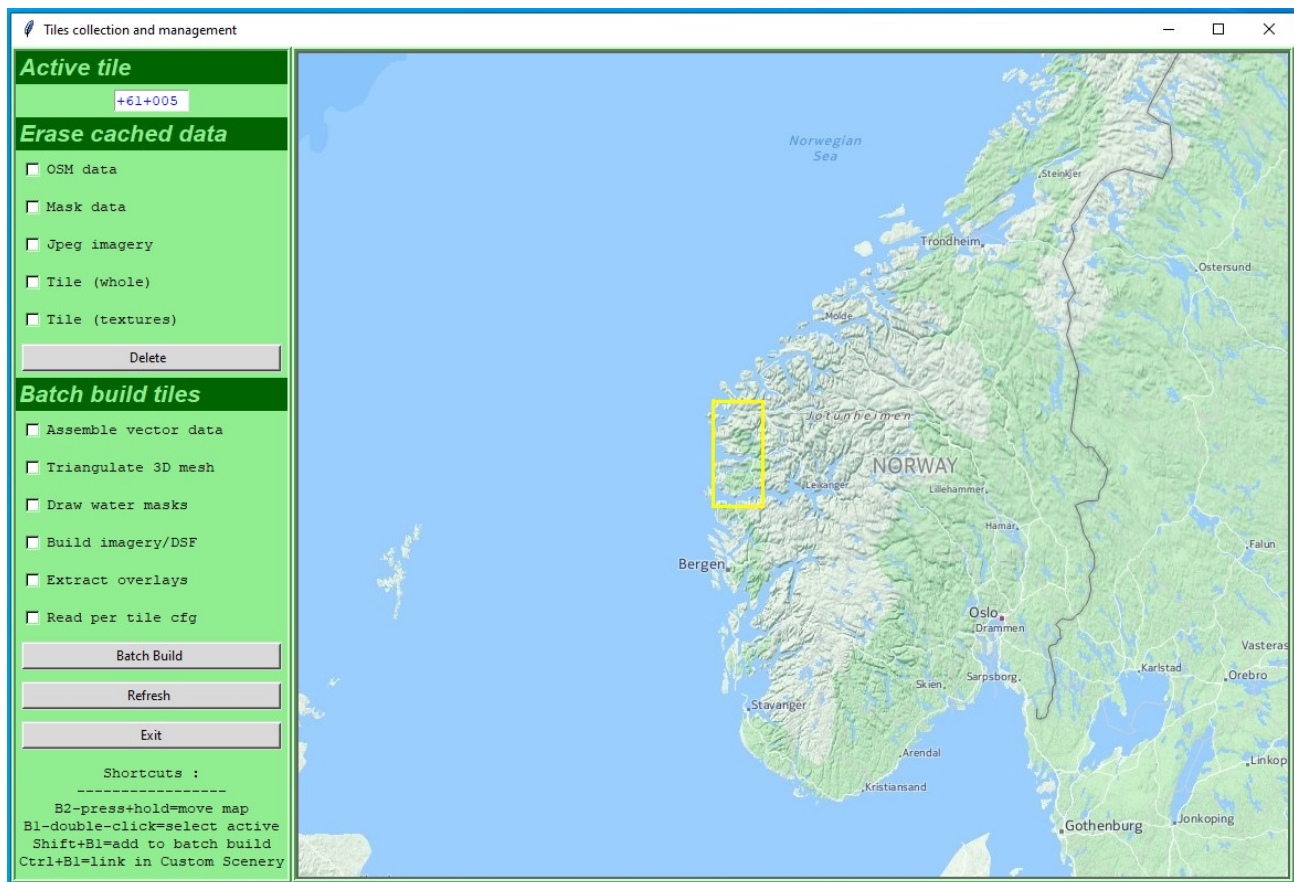
2 – Downloading our aerial imagery

Open up Ortho4XP, and click on the world icon

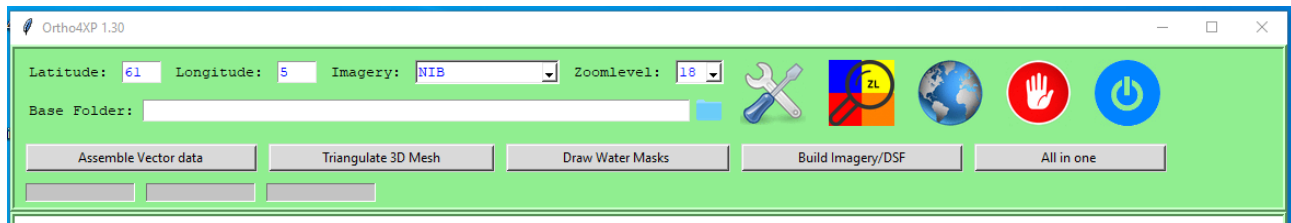


Find the tile that your airport resides in.

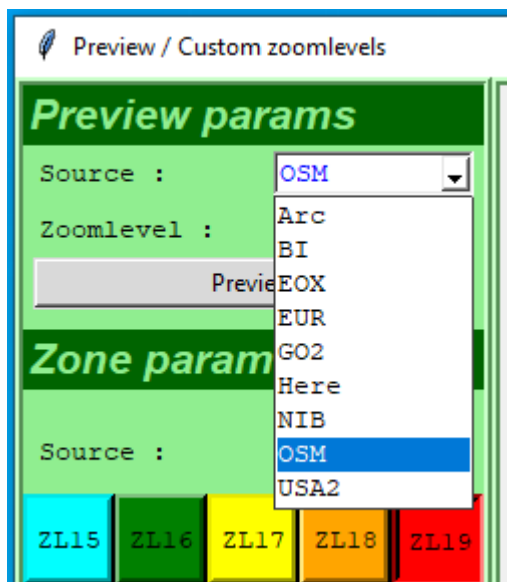
Double click the left mouse button on the map to select a tile. The tile will receive a yellow border when selected. Once selected, exit out of the map window



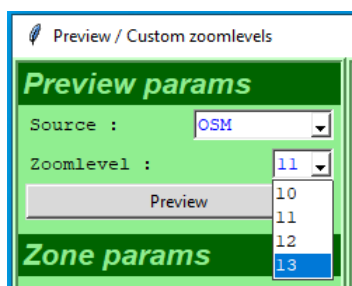
Back in the main menu of Ortho4XP, click the multicolored ZL icon



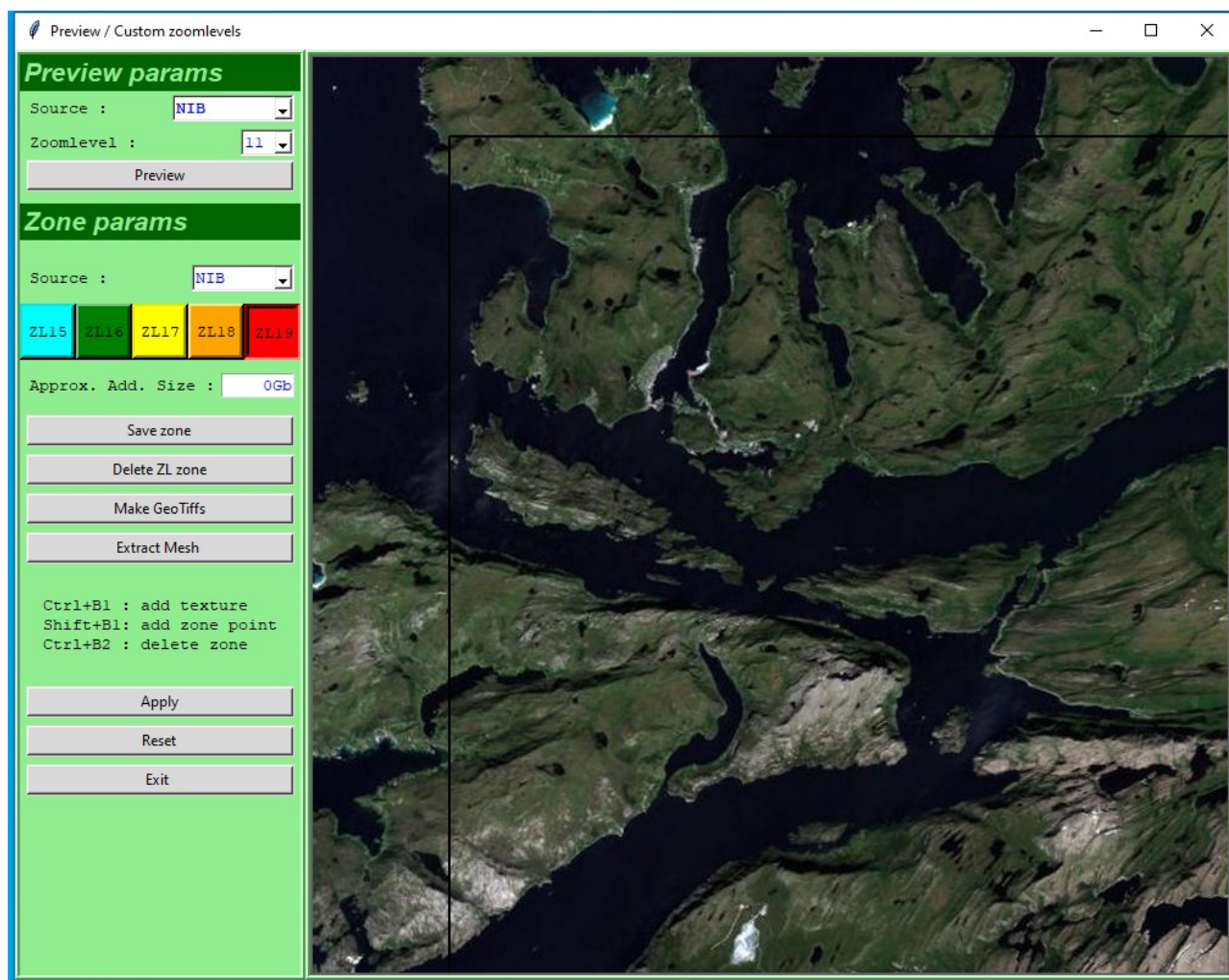
In the ZL windows, select a *Preview source*. This will be the background image in the ZL window, so that we have a reference on where we are selecting tiles..



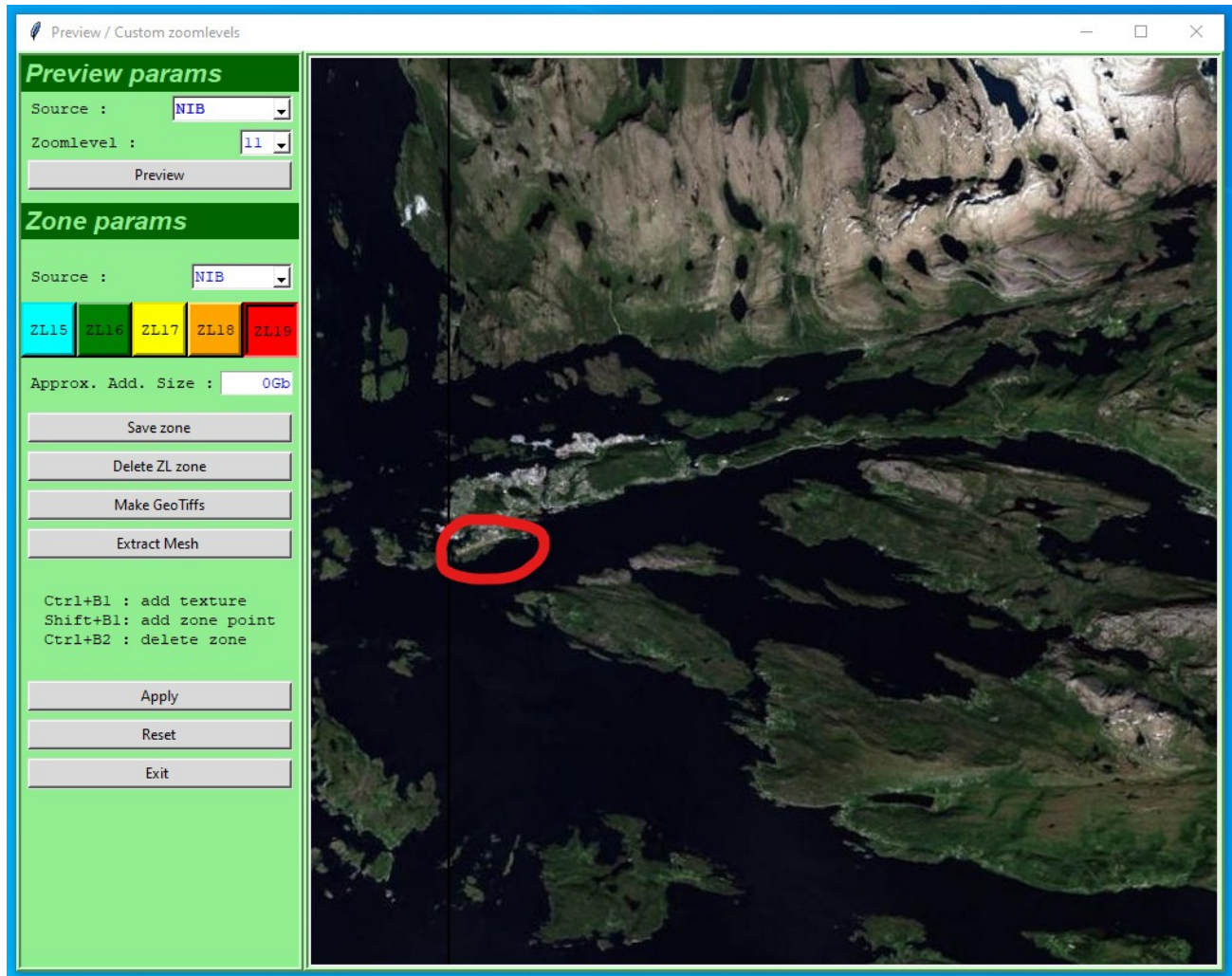
Select Zoom level 13. The closer in we see the preview, the better precision we have with selecting tiles we want to download. After this, click preview



Now you will see an aerial image of the tile we select in the preview window, to move around, hold down the right mouse button and drag. Time to find the airport.

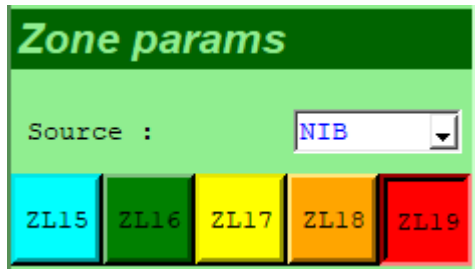


After some searching, I found my airport! As you can see it's quite small on the preview window (since I forgot to select zoom level 13). This is why having the Preview Zoom Level to 13 is important!

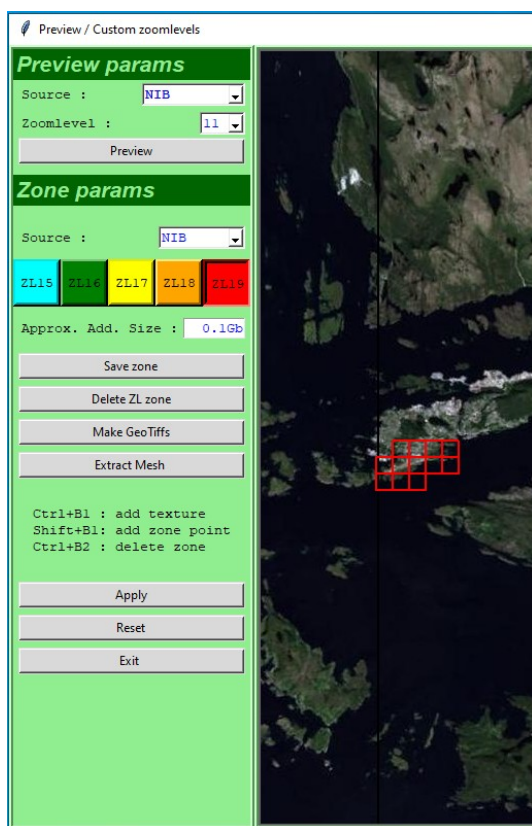


Now it's time to select which source we want to download from, and what ZL (Zoom Level, *higher number, more crisper image and more disk space*) we want.

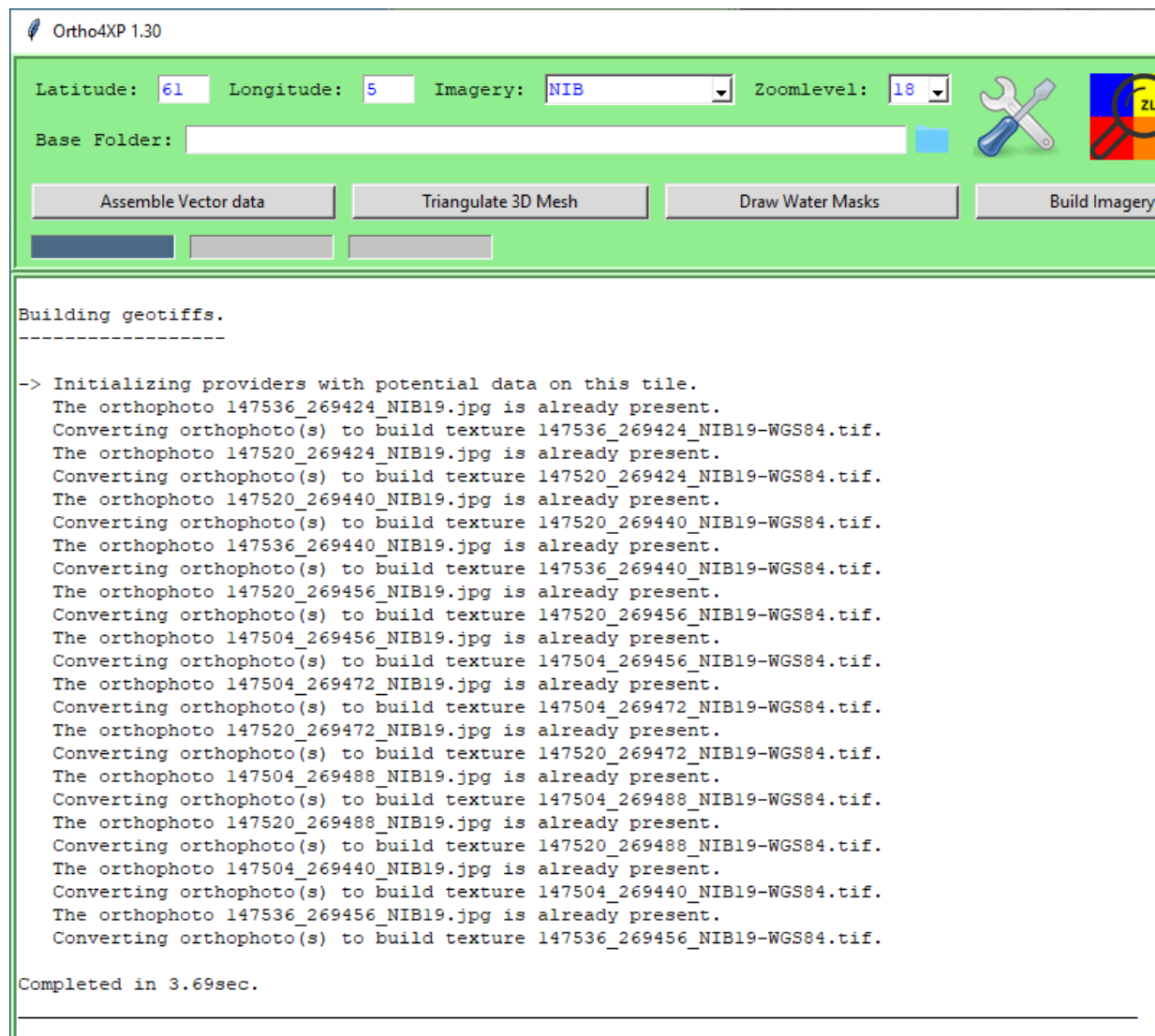
Use the source that has the best quality aerial imagery on your project location, and select a Zoom Level. I'm going to use ZL19 to get the best possible aerial image.



To select the tiles you want to download, Hold down CTRL and click the left mouse button. To delete a tile, hold down CTRL and press the right mouse button. Once you have selected your tiles, click on "Save zone", and "Apply". Finally click on "Make GeoTiffs". *Note down how many tiles you have by height and width. In my case I have 3 tiles high, and 5 tiles width.*

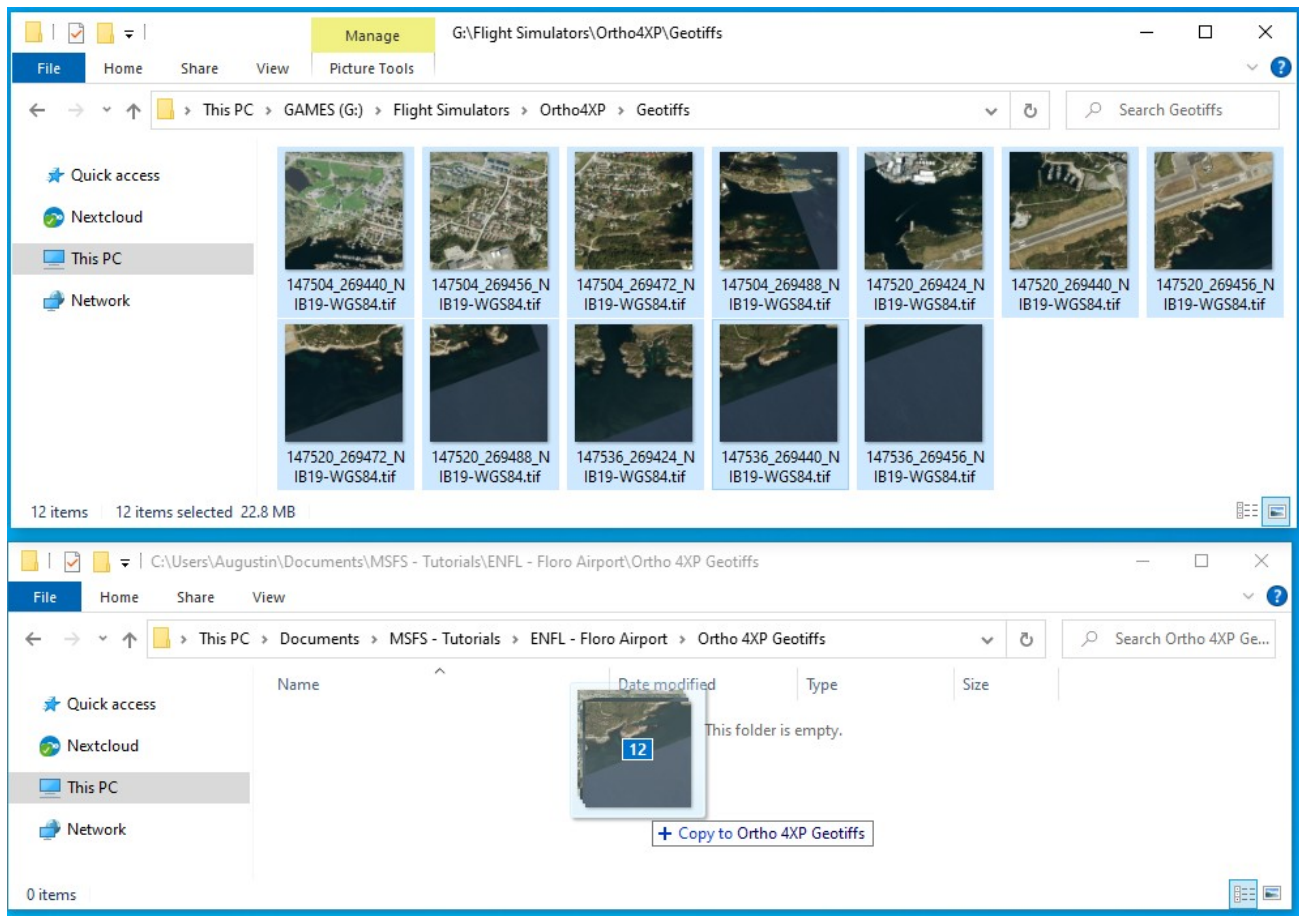


You will then see in the main menu on Ortho4XP that the log is showing the downloading and converting of the aerial images

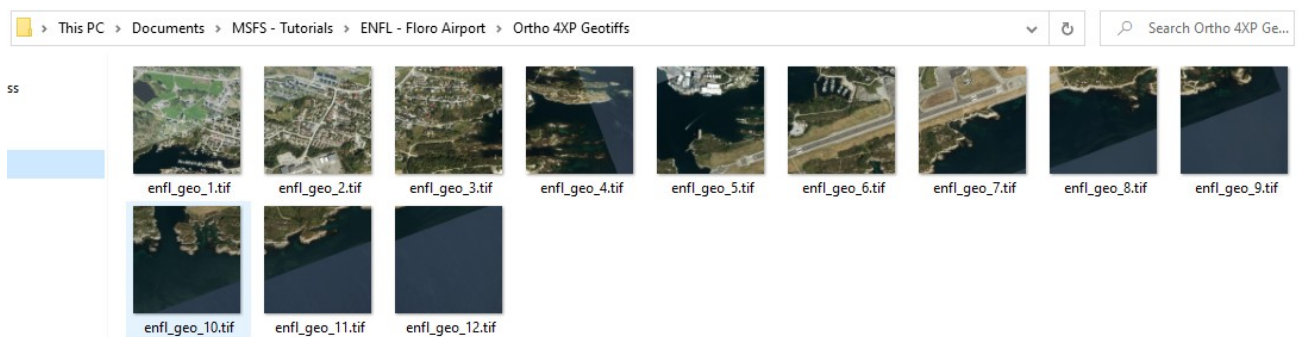


You can now exit out of Ortho4XP

Copy the downloaded **.tif** files from **ORTH04XP_LOCATION\Geotiffs** to your project folders **.tif** file folder we created earlier

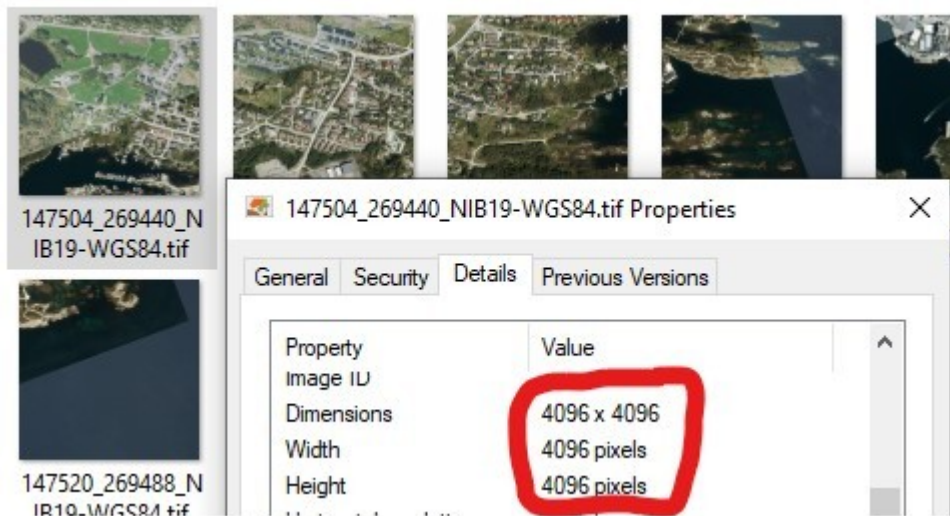


I would also recommend to rename them for simplicity sake

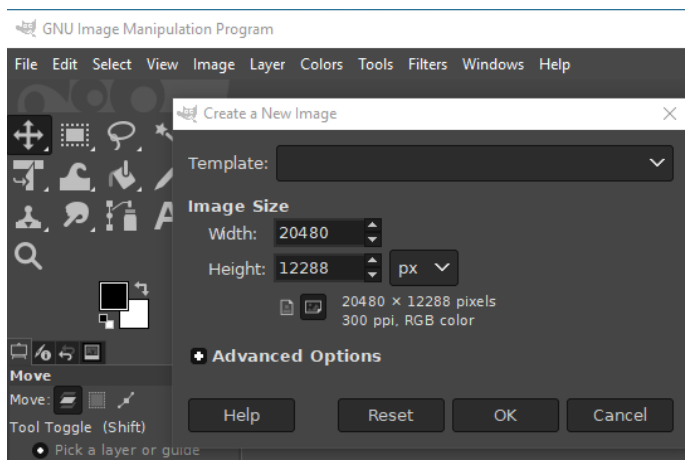


3 – Editing our aerial imagery

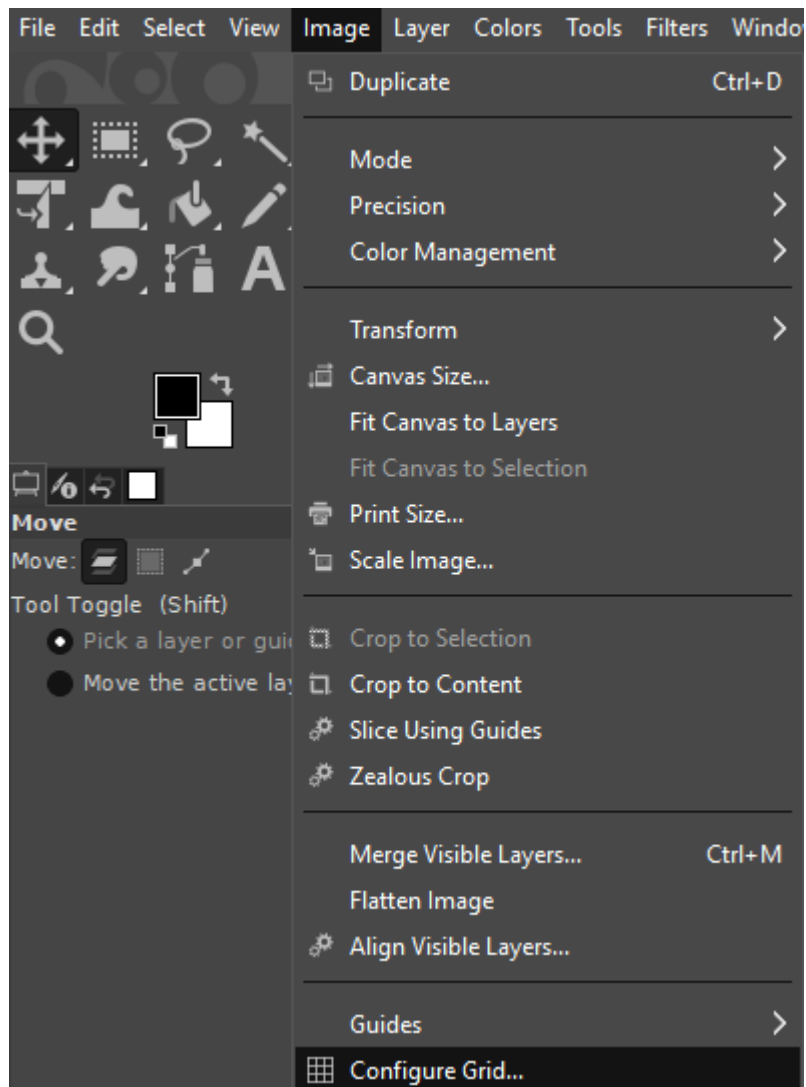
I'll start of by finding out what size my `.tif` files are. And I see that they are `4096x4096 px` (Right click `.tif` file and select properties).



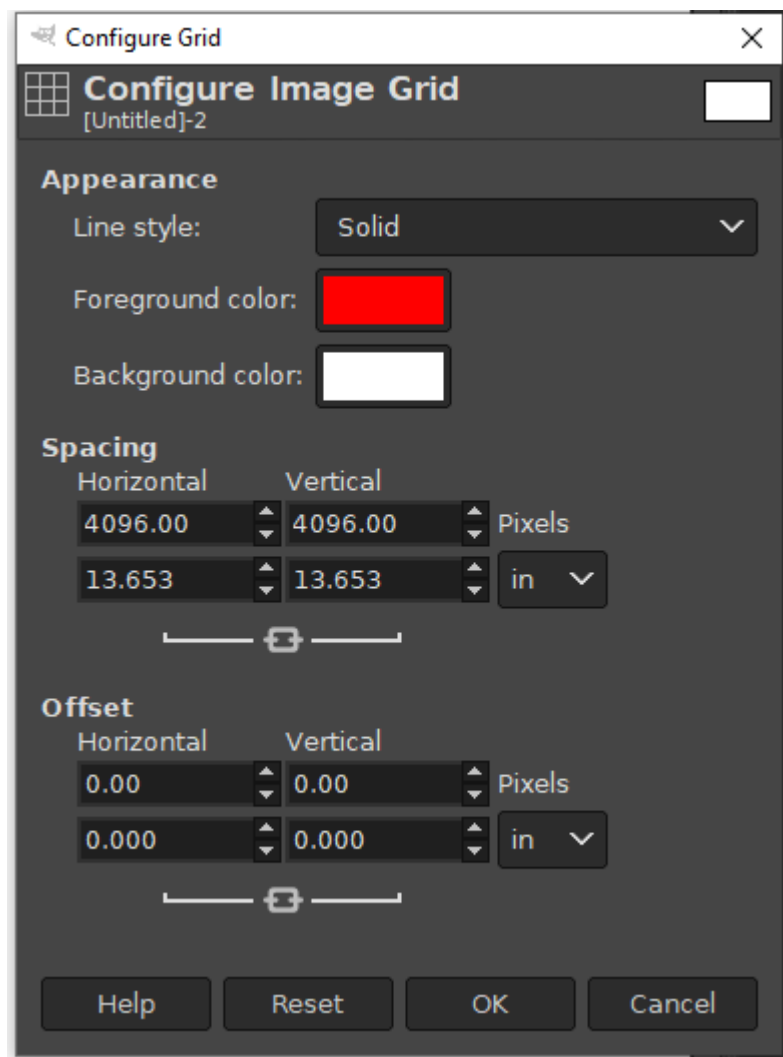
So I start up my preferred image editing software, [GIMP](#). And I start a new image with `4096px*3` for the height, and `4096px*5` for the width. 3 and 5 are the numbered we noted down when we selected tiles in the ZL window in Ortho4XP



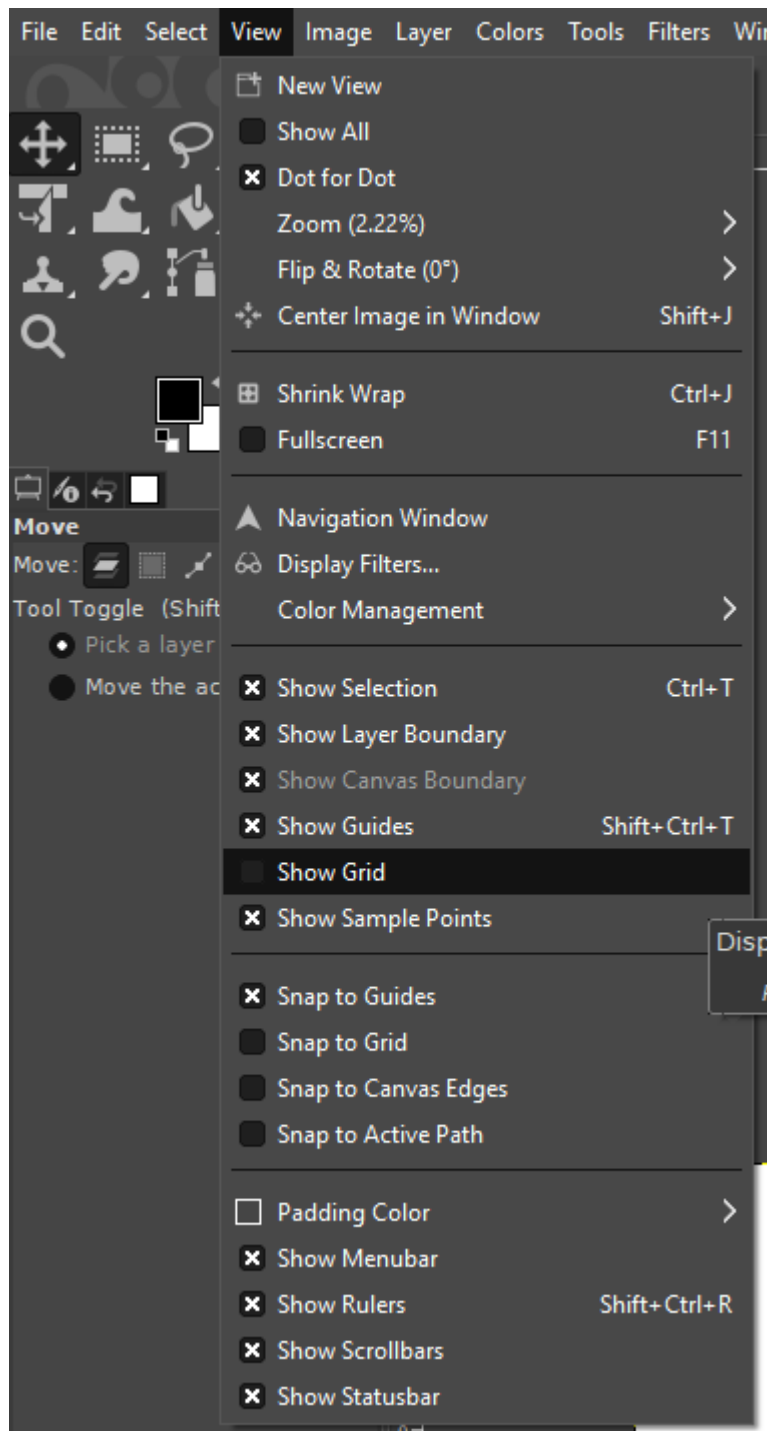
Now we need to configure the grid of our project



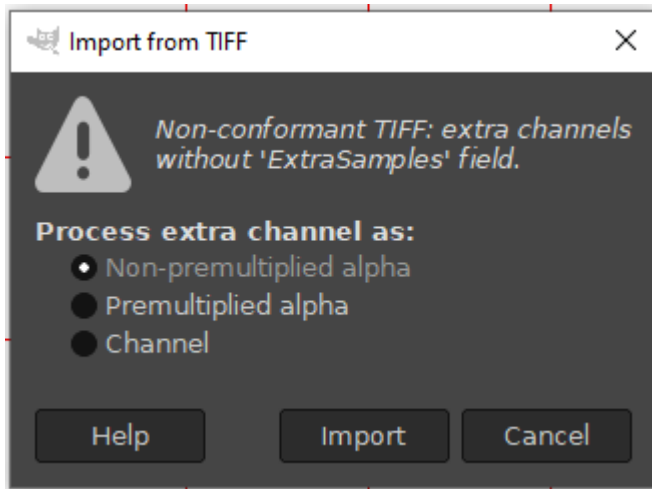
Set the grid to 4096x4096 since that is the size of the .tif's



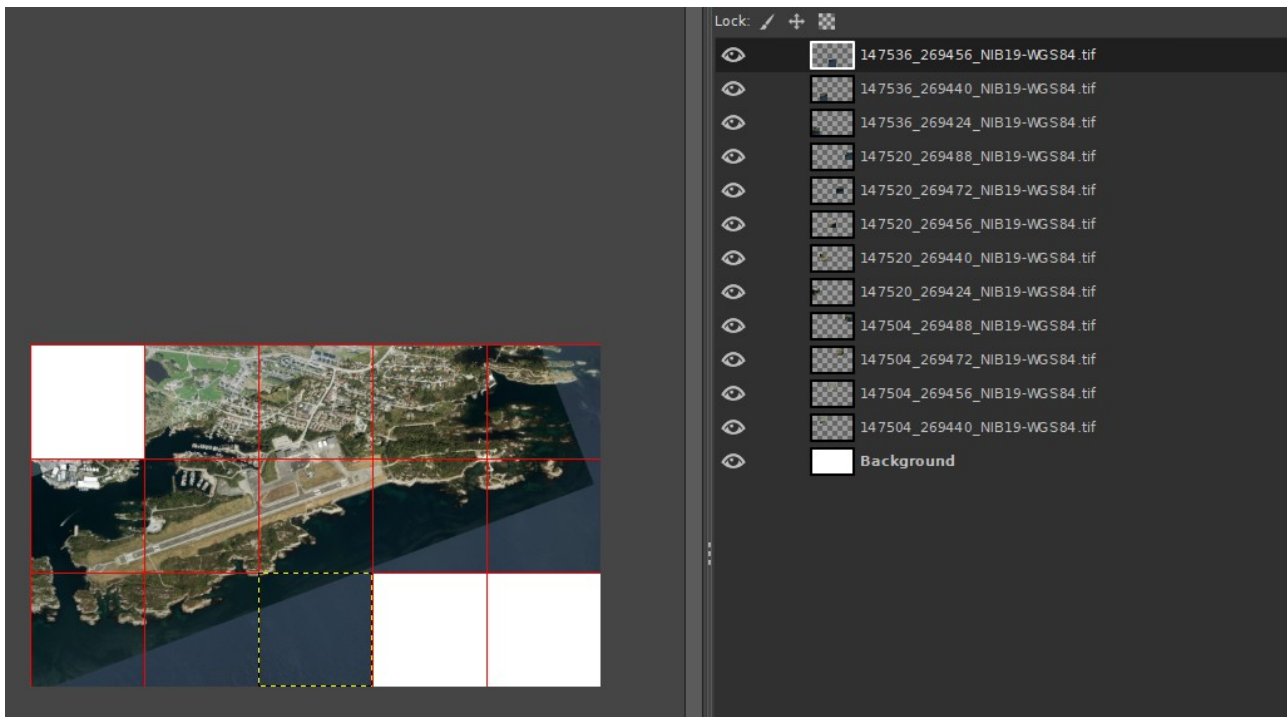
Then enable "Show Grid" and "Snap Grid"



Drag and drop the `.tif` file into Gimp. This pop-up window will show. Press "Import"



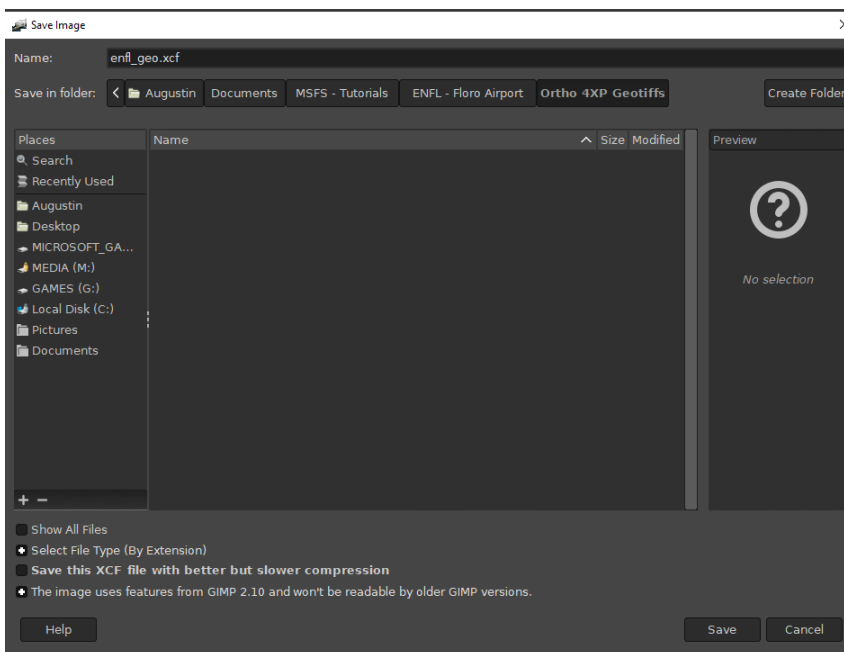
Make sure to align them correctly with the grid.



To remove unwanted aerial photo, just erase it with the eraser



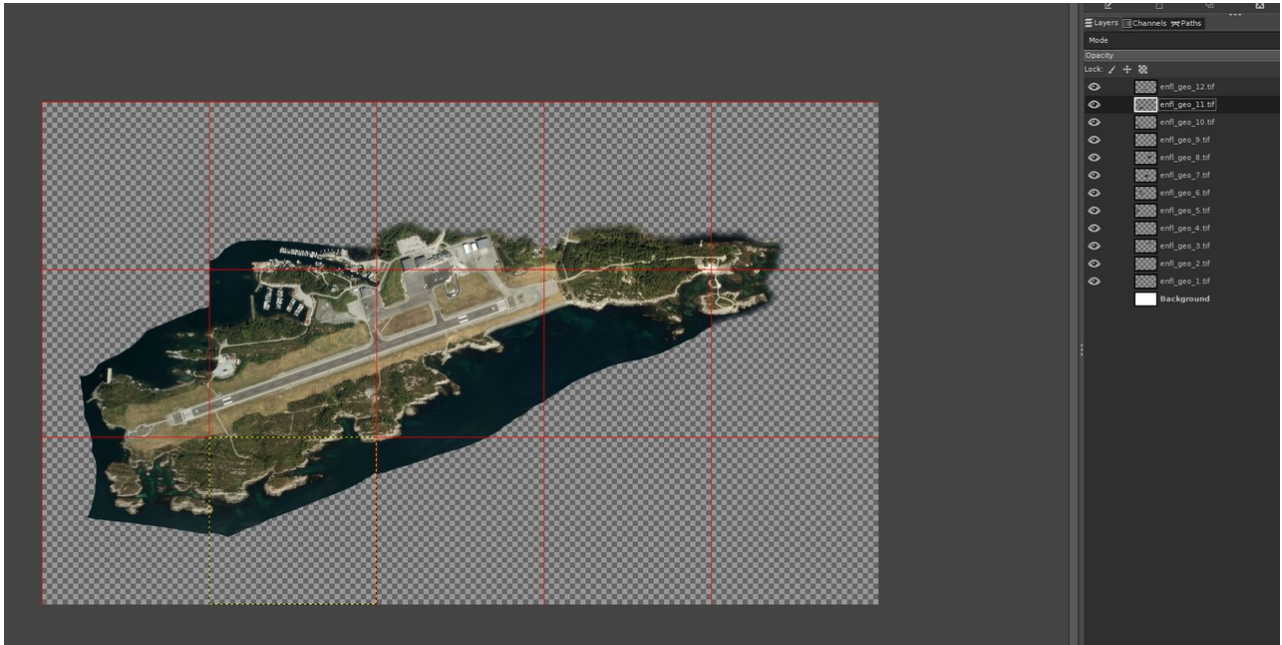
Remember to SAVE during your editing!



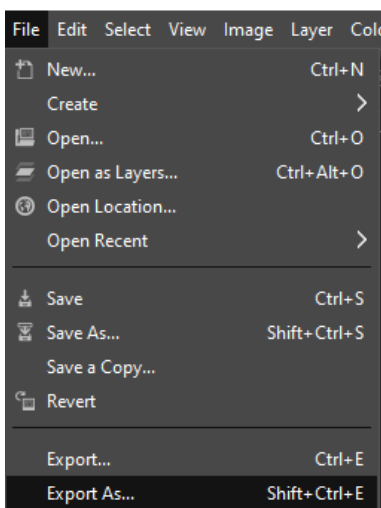
I will not cover color correcting since I do not have enough experience with that

Once you're happy with your edit, it's time to export it as a **.png**.

REMEMBER to disable the white background in GIMP. You want the background of the image to be checkerboard, meaning it is transparent.

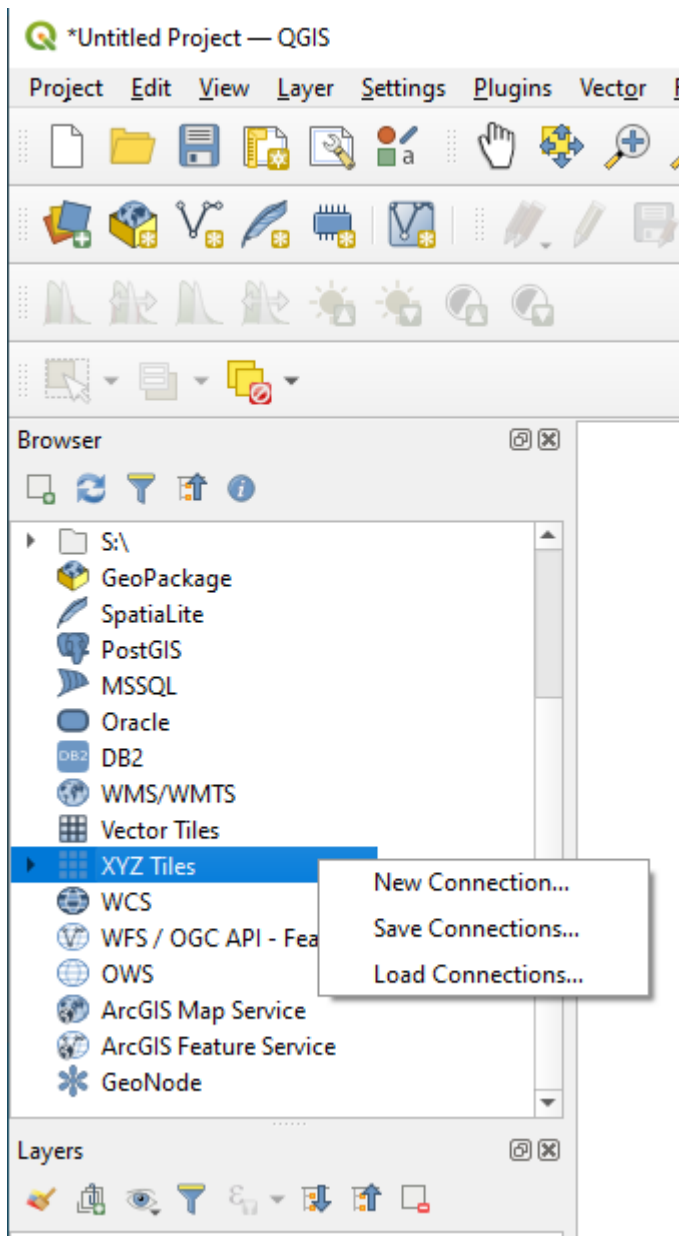


Go to **File > Export As**, and export it as **.png** (end the Name: with a ".png"). Click "Export", and when another window pops up, click "Export" again. Note, that it may take a few minutes, it's a lot of data. I'll save mine as **enfl_geo.png**



4 – Importing, georeferencing and exporting in QGIS

Open up QGIS, and right click on "XYZ Tiles", and click on "New Conection" (If you don't see the "Browser" panel. Go to *View > Panels > Browser* and check the box)



Select the reference map to use in QGIS (*This will be the map we use to know where in the world we are*)

I'll be using Bing, but you can use any of the ones listed below. Copy the link and paste it into the URL field in the XYZ Connection window, and give it a suitable name.

OpenStreetMap: <http://tile.openstreetmap.org/{z}/{x}/{y}.png>

Bing Aerial: <http://ecn.t3.tiles.virtualearth.net/tiles/a{q}.jpeg?g=1>

Google Hybrid: <https://mt1.google.com/vt/lyrs=y&x={x}&y={y}&z={z}>

Google Satellite: <https://mt1.google.com/vt/lyrs=s&x={x}&y={y}&z={z}>

Google Road: <https://mt1.google.com/vt/lyrs=m&x={x}&y={y}&z={z}>

XYZ Connection

Connection Details

Name: Bing

URL: <http://ecn.t3.tiles.virtualearth.net/tiles/a{q}.jpeg?g=1>

Authentication

Configurations Basic

Choose or create an authentication configuration

No Authentication

Configurations store encrypted credentials in the QGIS authentication database.

☒ Min. Zoom Level: 0

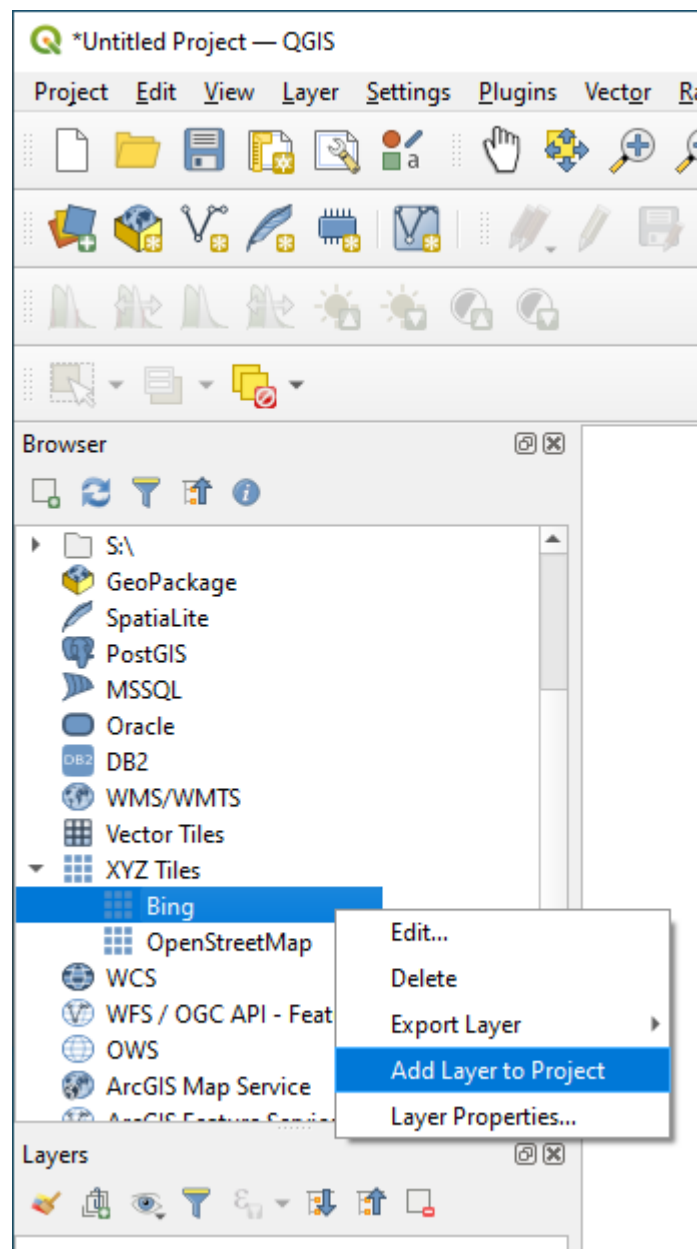
☒ Max. Zoom Level: 18

Referer:

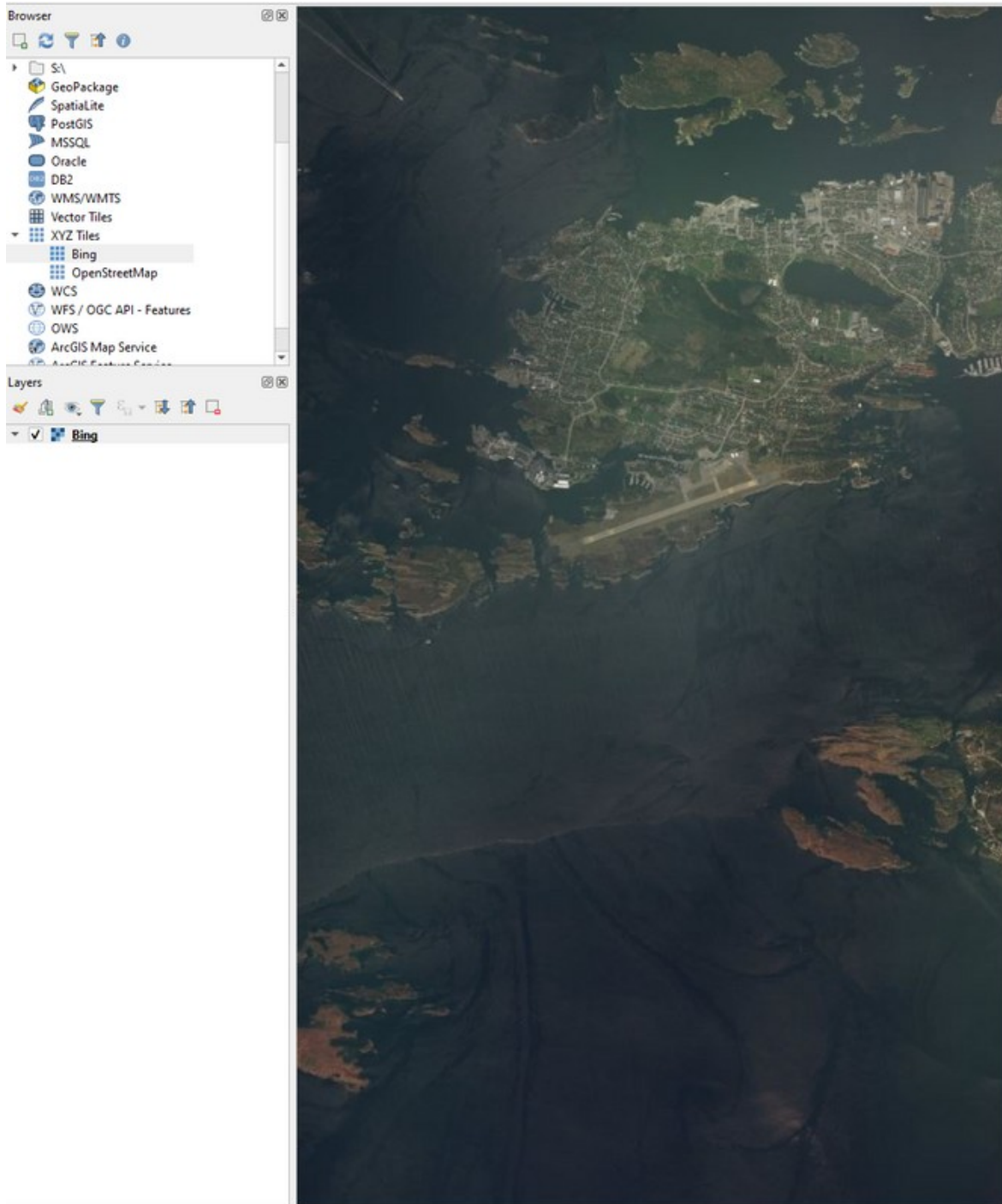
Tile Resolution: Unknown (not scaled)

OK Cancel

Now, open up the XYZ Tiles tab, and right click the map you added in the last step and click on "Add Layer to Project"

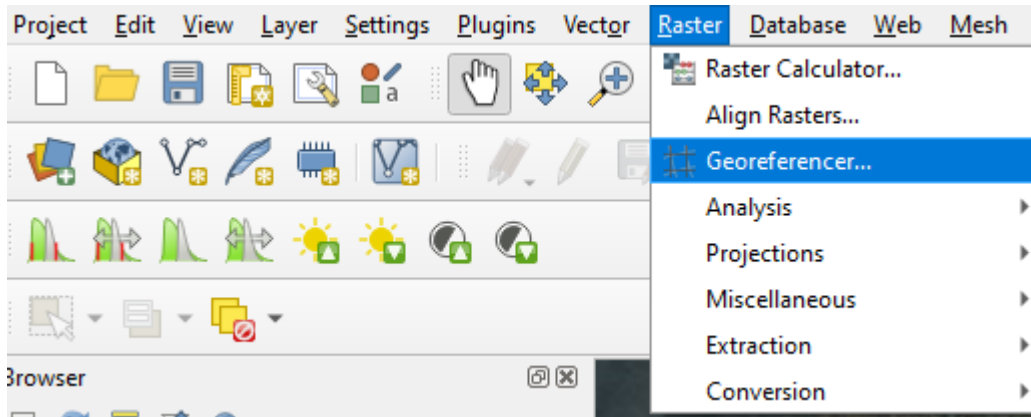


You should now see the map you chose in the preview window. Now you need to find the place you are creating an aerial scenery for

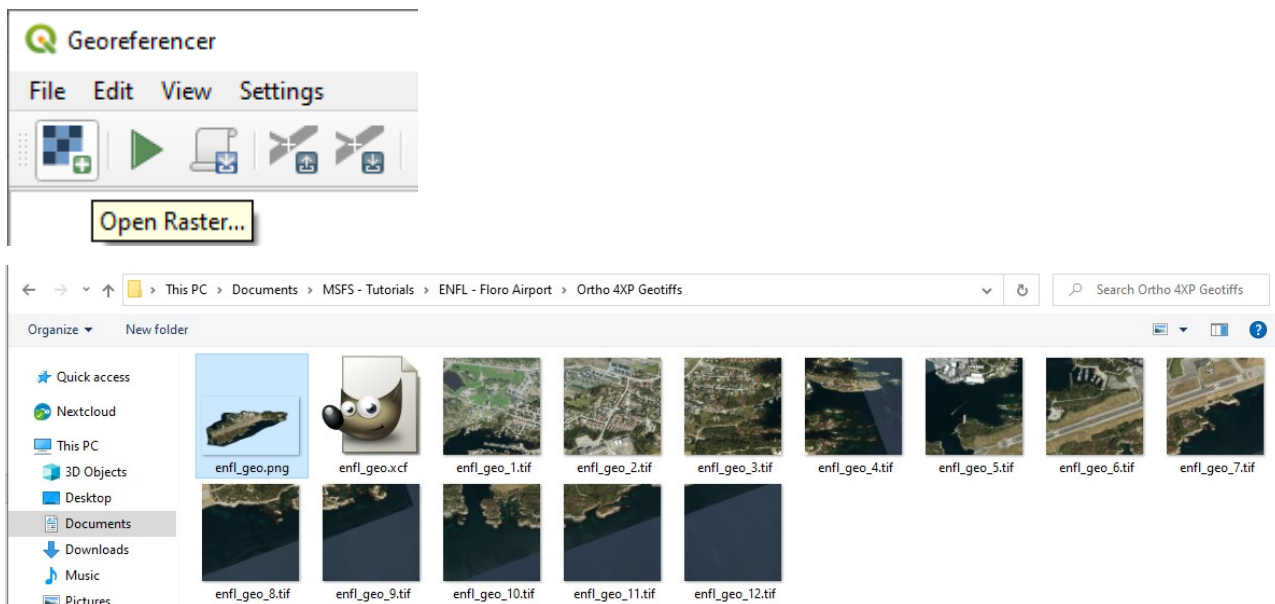


Now we need to georeference the aerial image. Basically meaning we need to give it information on where its coordinates in the world is.

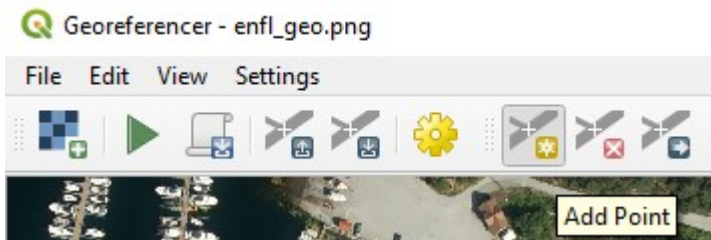
Go to **Raster > Georeferencer**



Click on **Open Raster** (Blue and black checker-boarded icon) and select your final exported .png. It may take a while for it to load

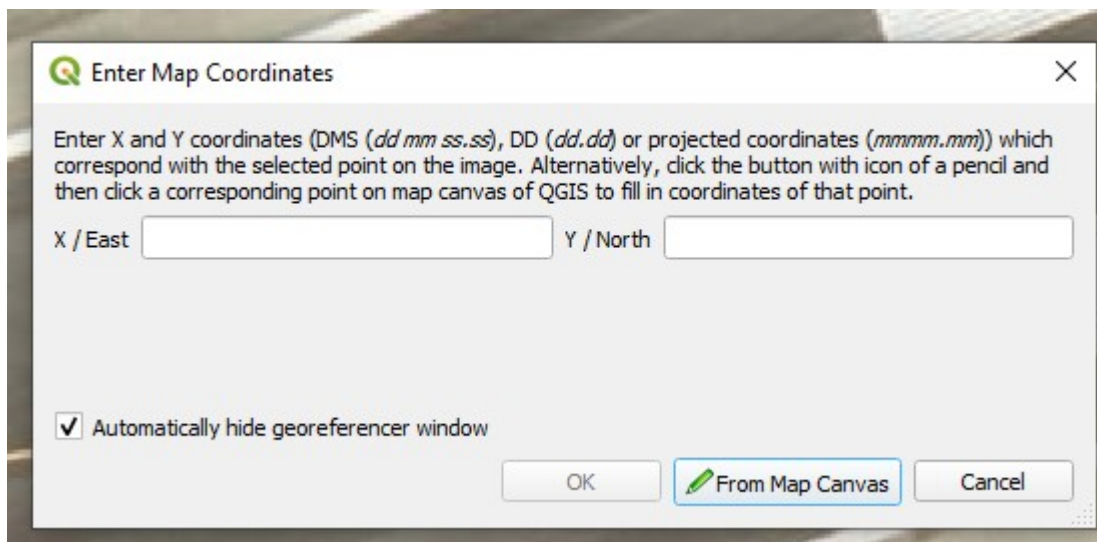


When it's loaded click on the "Add Point" button. You will now see that the cursor turns into a gray cross when you hover over the image.

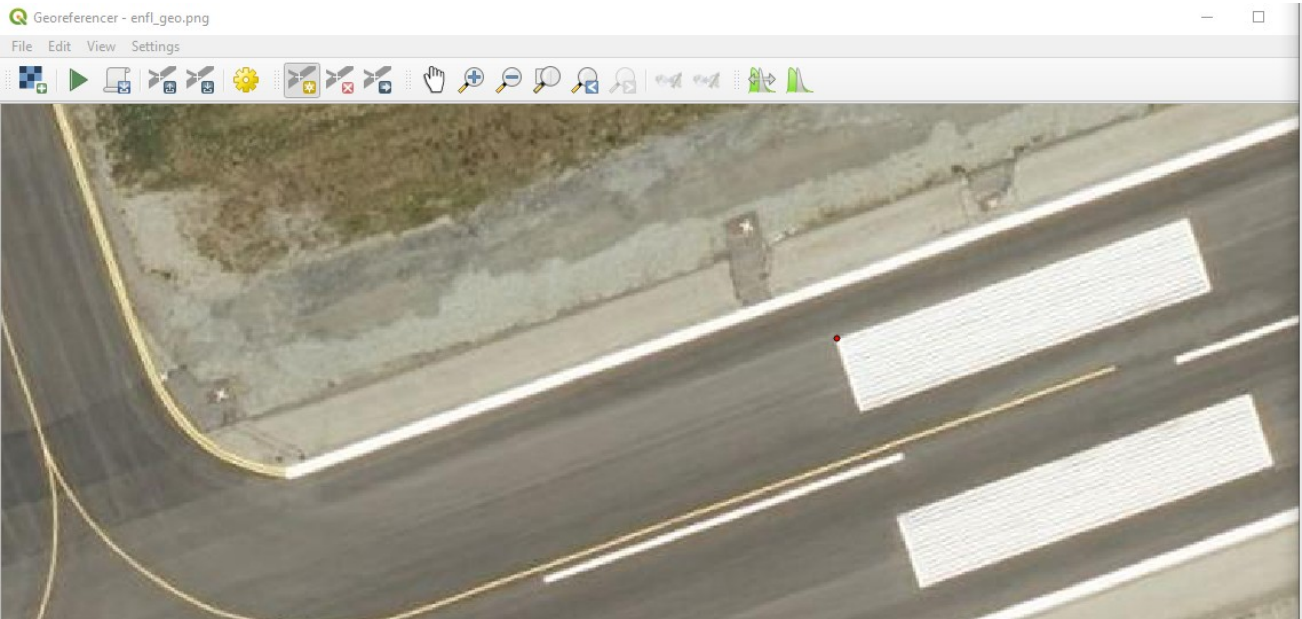


Now, you need to find a reference point. A point that is easy to see on both the reference map you added, and your aerial imagery, and that is easy to be precise with, I will choose one of the corners of the touchdown markings on the runway.

Left click on the point and a window will pop up. Click on "From Map Canvas" and basically left click on the same point on the map canvas, and click "OK".



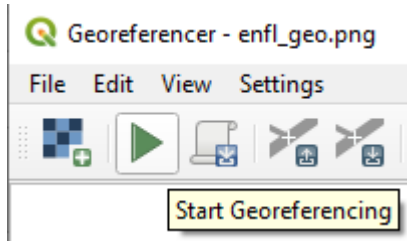
You have now created your first georeference point. I recommend that you create quite a few of these to increase the accuracy. I'll be creating 20. You can remove points by selecting the icon to the right to the Add Point icon

A screenshot of the Georeferencer application window showing a coastal aerial view with 20 red georeference points. Below the main view is a "GCP table" with the following data:

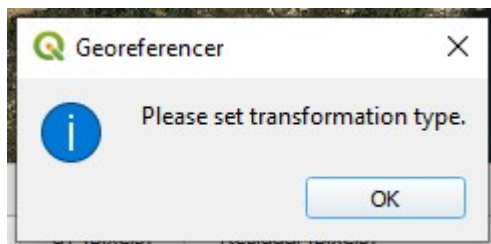
Visible	ID	Source X	Source Y	Dest. X	Dest. Y	dx (pixels)	dY (pixels)	Residual (pixels)
✓	0	10189.3	-5275.29	559500	8.76117e+06	0	0	0
✓	1	10236.8	-5416.93	559515	8.76112e+06	0	0	0
✓	2	8253.73	-4678.17	558920	8.76135e+06	0	0	0
✓	3	7489.62	-4941.97	558891	8.76127e+06	0	0	0
✓	4	7615.68	-5053.73	558730	8.76124e+06	0	0	0
✓	5	7720.93	-5016.04	558762	8.76125e+06	0	0	0
✓	6	8225.14	-5090.11	558911	8.76123e+06	0	0	0
✓	7	9355.05	-4537.18	559247	8.76139e+06	0	0	0
✓	8	9413.52	-4455.31	559265	8.76142e+06	0	0	0
✓	9	9645.46	-4328.91	559334	8.76145e+06	0	0	0
✓	10	10075.6	-4230.5	559463	8.76148e+06	0	0	0
✓	11	9956.06	-3871.84	559429	8.76159e+06	0	0	0
✓	12	10656.5	-3831.55	559637	8.7616e+06	0	0	0
✓	13	10664.3	-3999.19	559639	8.76155e+06	0	0	0
✓	14	10561.6	-3675.61	559609	8.76165e+06	0	0	0
✓	15	3177.91	-7645.56	557406	8.76046e+06	0	0	0
✓	16	3264.27	-7897.66	557433	8.76038e+06	0	0	0
✓	17	3370.33	-7576.69	557466	8.76048e+06	0	0	0
✓	18	3463.8	-7830.09	557492	8.7604e+06	0	0	0
✓	19	5481.26	-5073.87	558090	8.76123e+06	0	0	0
✓	20	5798.34	-5059.57	558184	8.76124e+06	0	0	0

Transform: Not set 10222,-4735 None

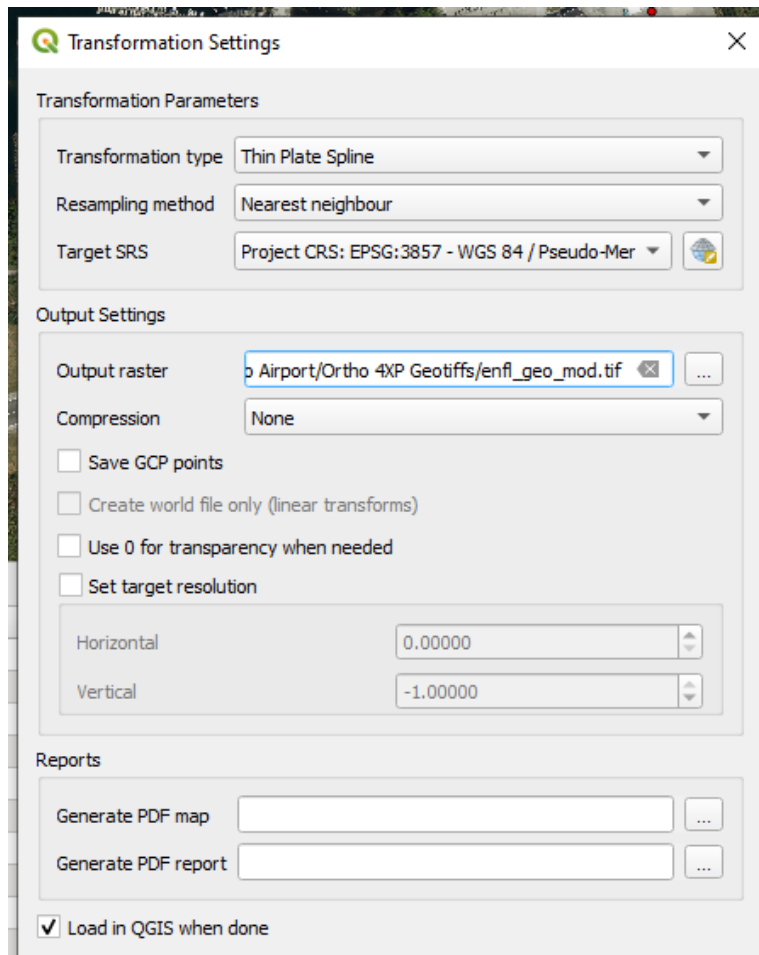
When you are done creating your points, click on "Start Georeferencing" (Green play button)



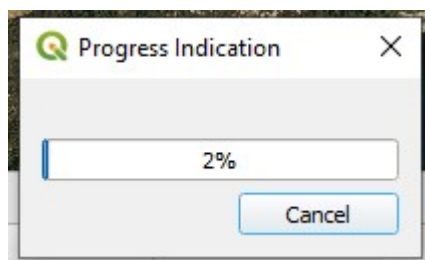
A little window will most likely pop up asking you to set the information type, click "OK"



Another window will pop up, check that the settings in the picture below match yours. If not, change the settings accordingly. The output raster file name is up to you however. I will save it in the same folder with all the other `.tif` files as `enfl_geo_mod.tif`



Click "Ok", and click on "Start Georeferencing" (Green play button) again. It will now start to georeference the image!



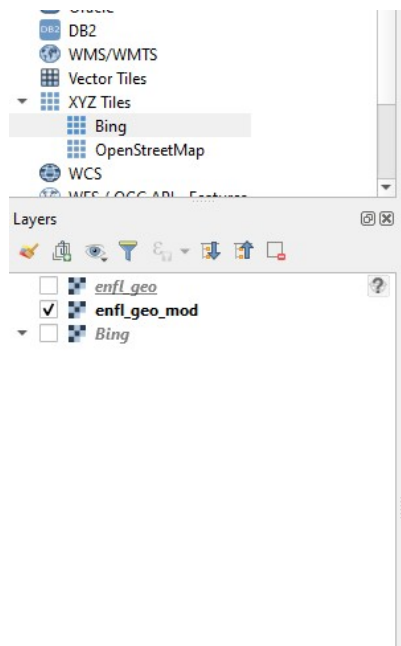
And tada! The image now has a geographical location!



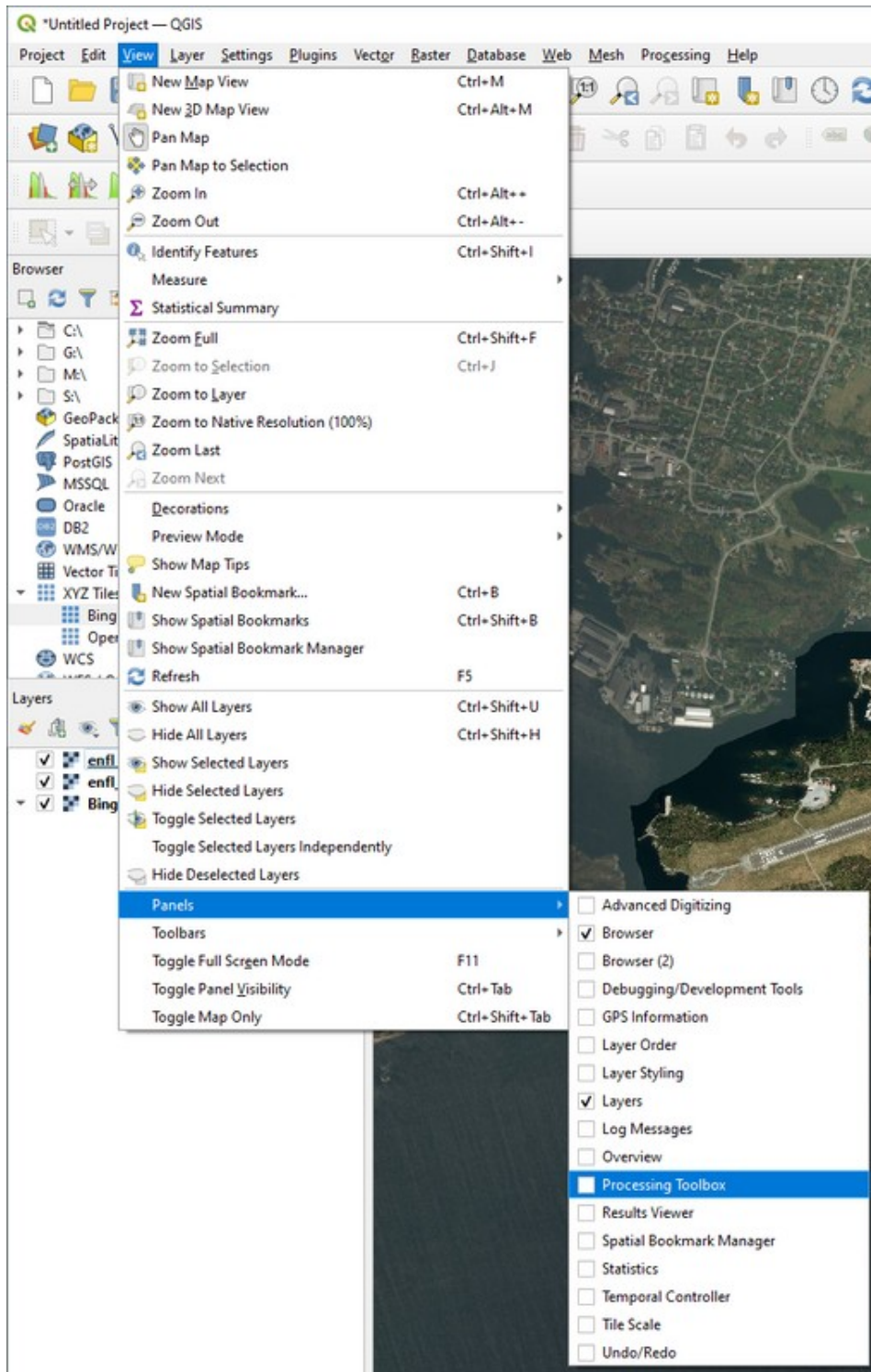
If the image is not placed correctly on the map, then you need to georeference again, and try to add reference points on other places

Now it's time to export it!

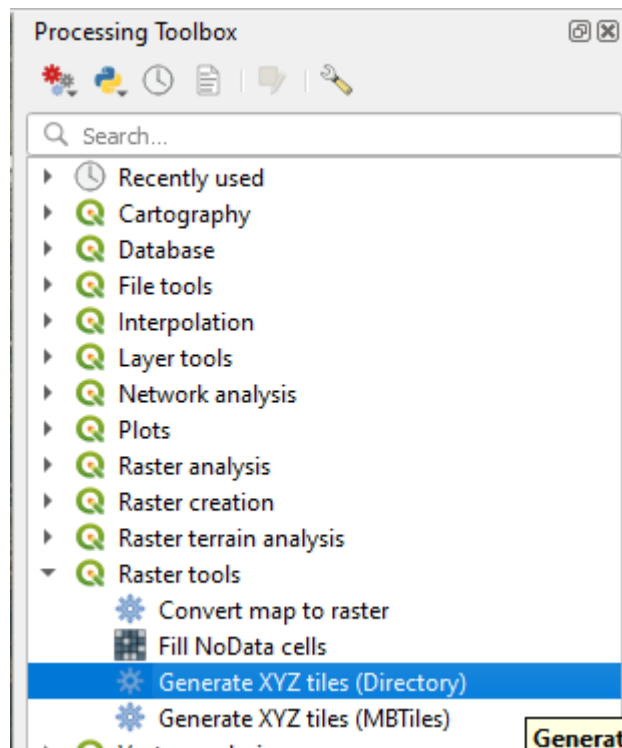
Hide the other layers first by un-checking them so that our newly georeferenced layer is the only one showing



Then we need to open up the Processing Tollbox. View > Panels > Processing Toolbox



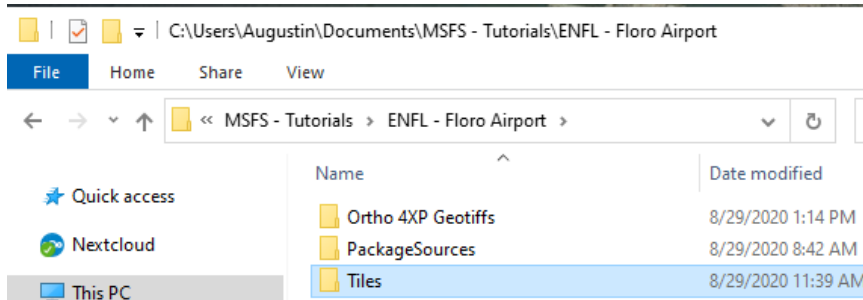
A new windows should appear. On it go to Raster tools > Generate XYZ tiles (Directory)



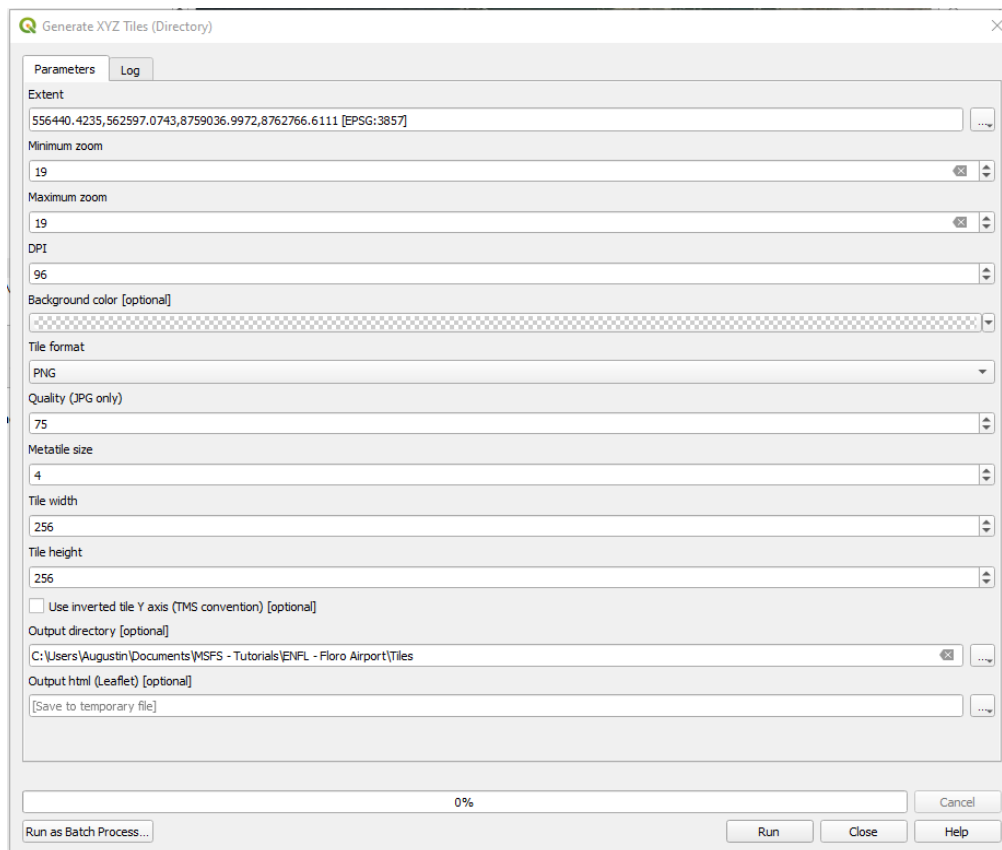
Choose the newly georeferenced layer as Extent



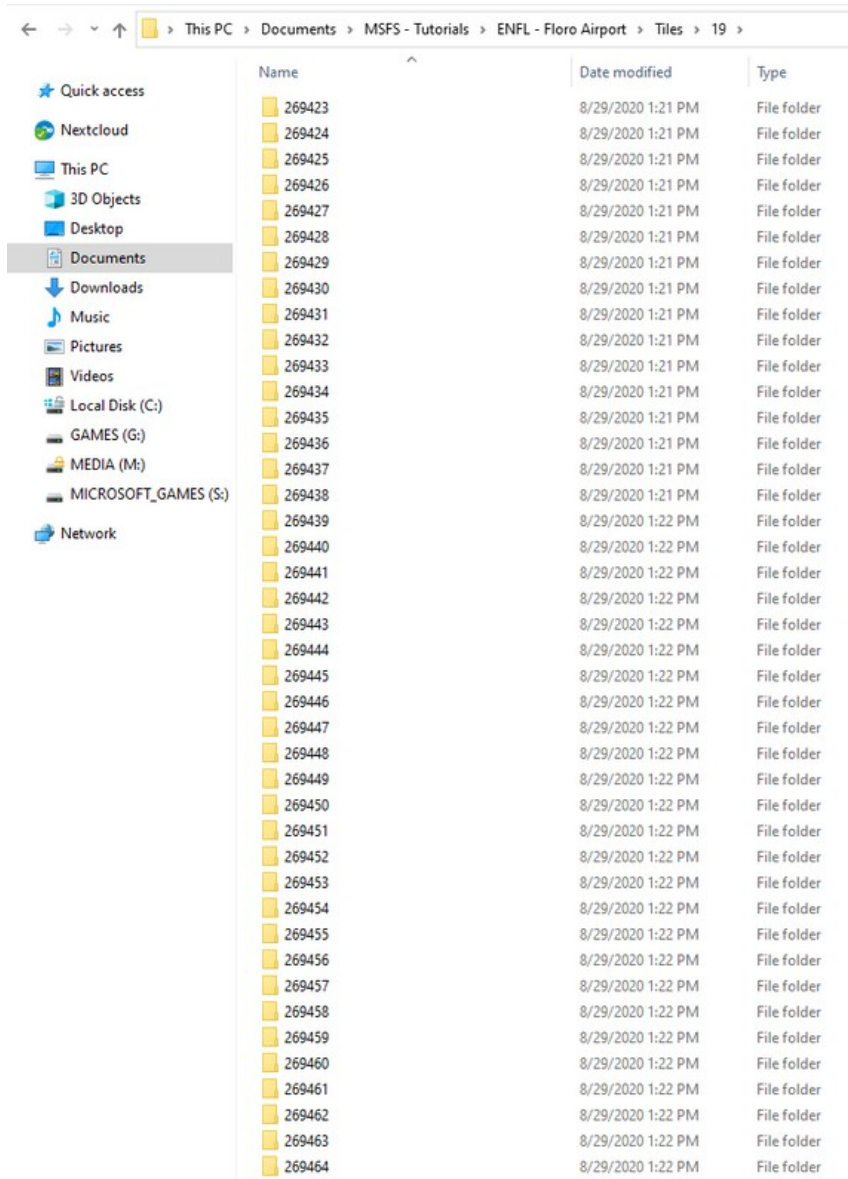
Set the Minimum and Maximum zoom to 19. And the output folder can be a folder in your Project folder called Tiles. So create that



Make sure your settings are correct and click “Run” to start the export. This will basically chop up the picture in to tiny squares which will we later convert to a structure that MSFS will understand

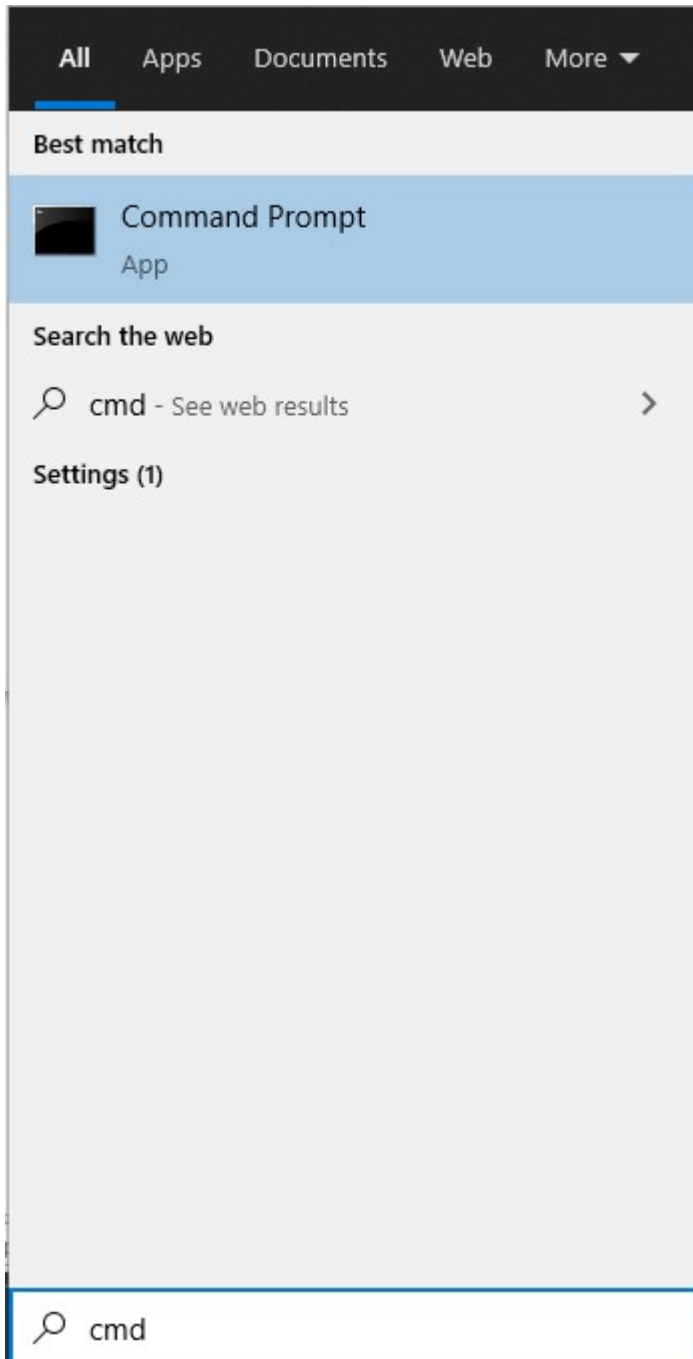


When it's done, you'll find a folder in you **Tiles** folder named after you zoom level, and inside that folder is many other sub-folders, and inside them, are the pictures of your aerial imagery



5 – tiles2bing

In your windows search bar type `cmd` and click on Command Prompt

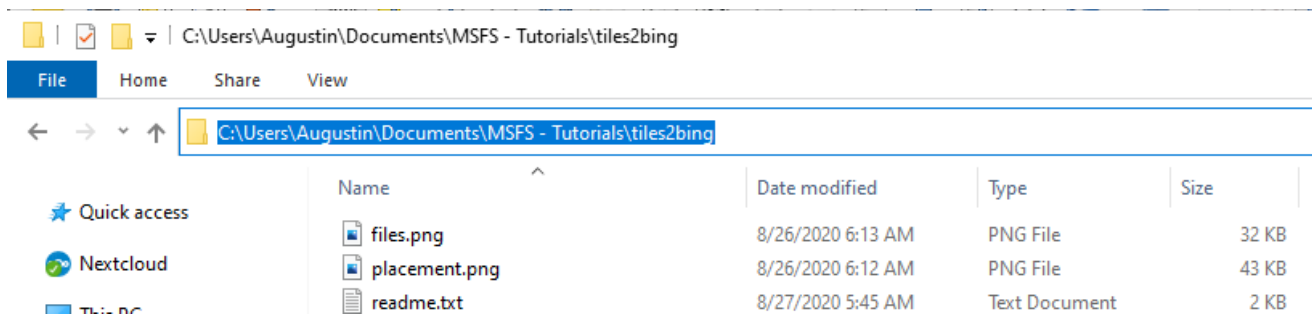


Now you need to type in `cd` followed by the path to where you have extracted tiles2bing, I have mine in `C:\Users\Augustin\Documents\MSFS - Tutorials\tiles2bing`

```
Command Prompt
Microsoft Windows [Version 10.0.19041.450]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\Augustin>cd C:\Users\Augustin\Documents\MSFS - Tutorials\tiles2bing
C:\Users\Augustin\Documents\MSFS - Tutorials\tiles2bing>
```

(If you are wondering how to find the path to certain folders, open the folder up in File explorer, and click in the bar where it's says where you are)



Now that we are in the tiles2bing, we can start to convert the images we have in our "Tiles" folder.

Type the command `tiles2bing "C:\Path\To\Tiles" /o "C:\Path\to\PackageSources\CGL\airial_images" /y google`

Of course replace the `\path\to\` with your respective path, for me it's this:

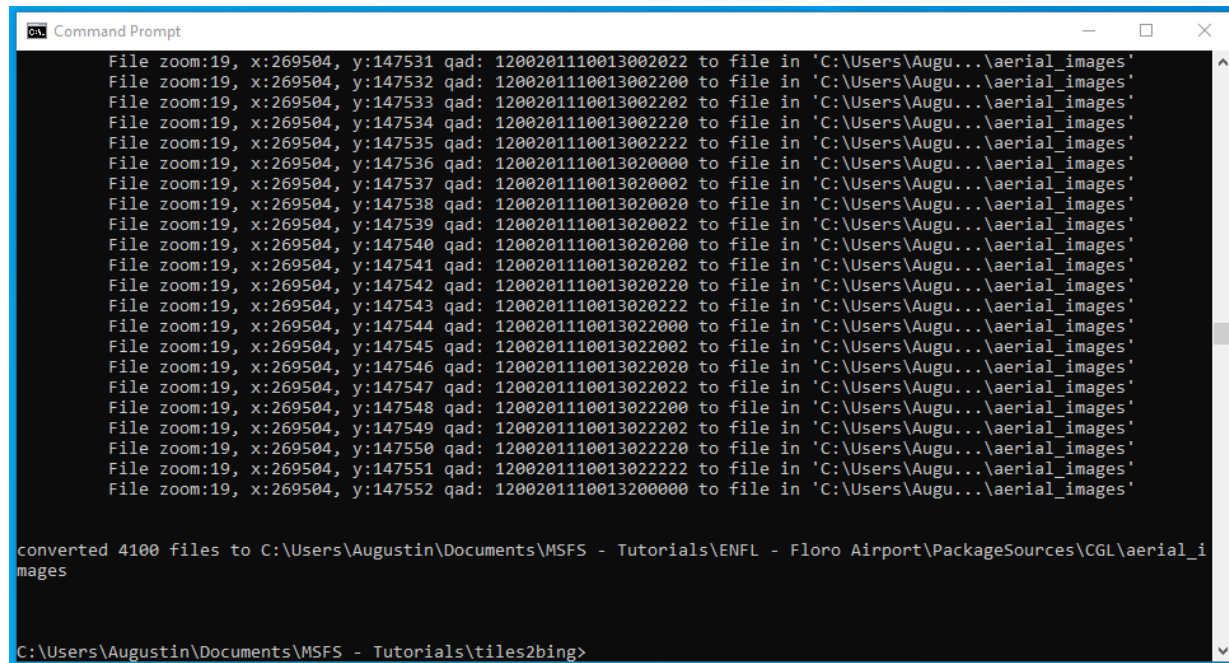
```
tiles2bing
"C:\Users\Augustin\Documents\MSFS - Tutorials\ENFL - Floro Airport\Tiles"
/o "C:\Users\Augustin\Documents\MSFS - Tutorials\ENFL - Floro Airport\PackageSources\CGL\airial_images"
/y google
```

Remember to use the Quotes (") at each end of the folder paths.

If you get an error saying a `.dll` file is missing, install this:

<https://dotnet.microsoft.com/download/dotnet-core/thank-you/sdk-3.1.401-windows-x64-installer>

When everything works smooth, the output should look like this

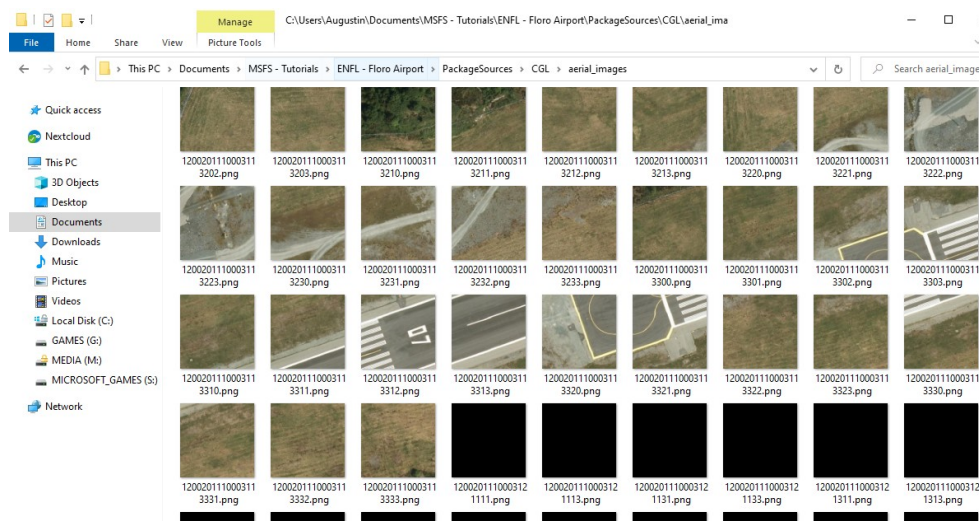


```
File zoom:19, x:269504, y:147531 qad: 1200201110013002022 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147532 qad: 1200201110013002200 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147533 qad: 1200201110013002202 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147534 qad: 1200201110013002220 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147535 qad: 1200201110013002222 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147536 qad: 1200201110013020000 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147537 qad: 1200201110013020002 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147538 qad: 1200201110013020020 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147539 qad: 1200201110013020022 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147540 qad: 1200201110013020200 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147541 qad: 1200201110013020202 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147542 qad: 1200201110013020220 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147543 qad: 1200201110013020222 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147544 qad: 1200201110013022000 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147545 qad: 1200201110013022002 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147546 qad: 1200201110013022020 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147547 qad: 1200201110013022022 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147548 qad: 1200201110013022200 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147549 qad: 1200201110013022202 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147550 qad: 1200201110013022220 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147551 qad: 1200201110013022222 to file in 'C:\Users\Augu...\airial_images'
File zoom:19, x:269504, y:147552 qad: 1200201110013200000 to file in 'C:\Users\Augu...\airial_images'

converted 4100 files to C:\Users\Augustin\Documents\MSFS - Tutorials\ENFL - Floro Airport\PackageSources\CGL\airial_images

C:\Users\Augustin\Documents\MSFS - Tutorials\tiles2bing>
```

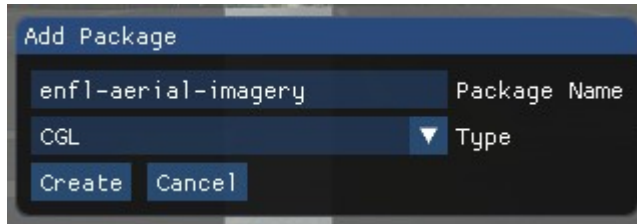
And the `airial_images` folder should be full up on your aerial imagery



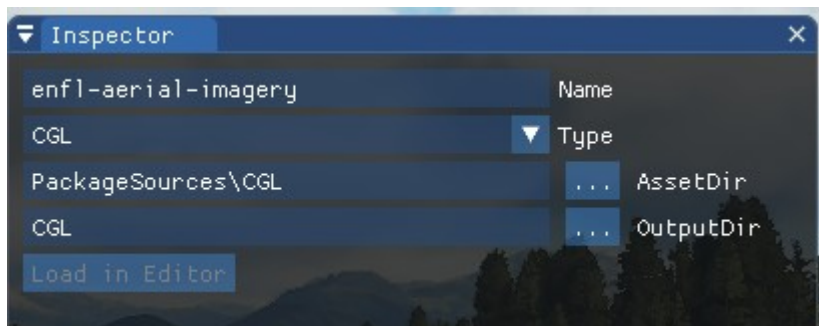
6 – Compiling

Start up MSFS and go to the place where you are to have your aerial imagery. Open up an existing project or create a new one.

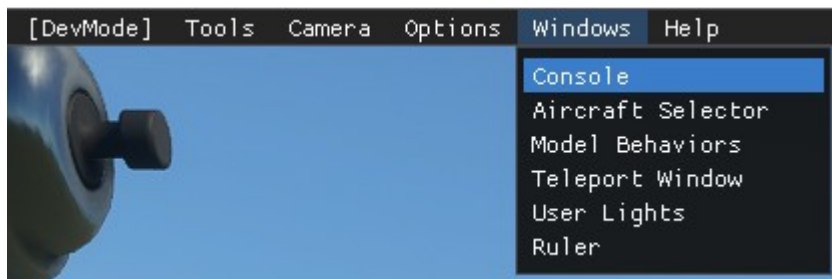
Create a new CGL ssset



Set the AssetDir to the PackageSource\CGL folder, and the OutputDir to CGL\



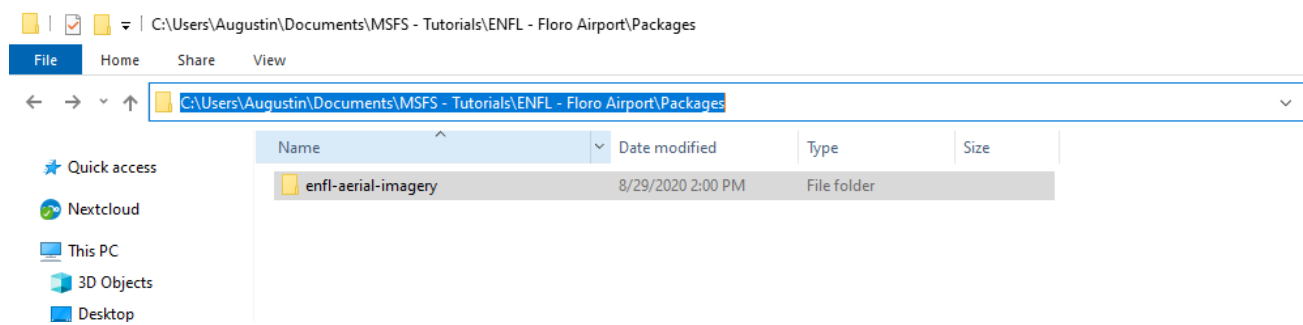
Save the project, and open up the console window and clear it so that we can see all the info that comes up when we build the imagery



This should be the output after you built your package if you're only building a CGL asset
(Only error is that we don't have any ContentInfo folder, but that's not a problem in our case)

```
PackageBuilder | Reading C:\Users\Augustin\Documents\MSFS - Tutorials\ENFL - Floro Airport\enfl-aerial.xml...
PackageBuilder | Preparing asset groups...
PackageBuilder | Done, 3 asset groups registered.
PackageBuilder | Generating commands for package enfl-aerial-imagery...
PackageBuilder | Preparing commands for asset group ContentInfo...
ContentInfoLister | Source directory C:\Users\Augustin\Documents\MSFS - Tutorials\ENFL - Floro Airport\PackageDefinitions\enfl-aerial-imagery\ContentInfo\ does not exist
PackageBuilder | Failed to spawn lister for asset group ContentInfo (type ContentInfo)
PackageBuilder | Preparing commands for asset group enfl-aerial-imagery...
PackageBuilder | Ready, 1 commands added.
PackageBuilder | Starting the build...
Compiling CGL file(s)
PackageBuilder | Skip mirroring due to command failures.
Compiling CGL file(s)
PackageBuilder | Finished, 0 skipped, 1 done and 1 failed, took 53s728ms.
? false returned by Command=BuildPackages Comment=Rebuild the packages whose name correspond to the given filter, and for the given project (default fs-project.xml) NbPar:
```

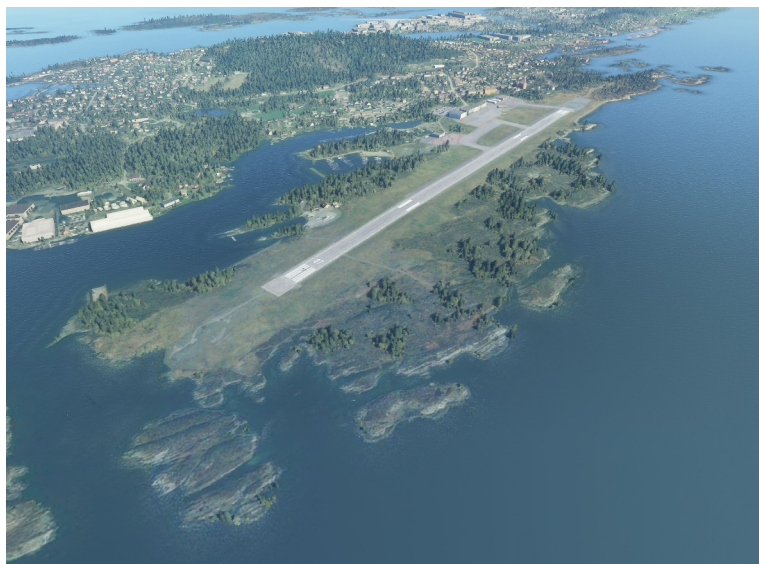
You should now have a **Packages** folder in your project folder, and inside that folder is our newly built package!



Place this package in your MSFS **Community** folder and restart the sim, and go back to the location of the aerial imagery

7 – THE FINAL RESULT

Before



After



Hope this guide/tutorial helped you!

I would like to thank both the developers of QGIS, Oscar Pilote and Christine Winther for making the tools necessary for doing this! You are legends!