

Interpolation using QGIS

The objective of this exercise is to interpolate Bathymetry and topography

Data inputs:

1. Bathymetry gridded raster or points data
2. Topography (Digital Elevation Model- DEM)

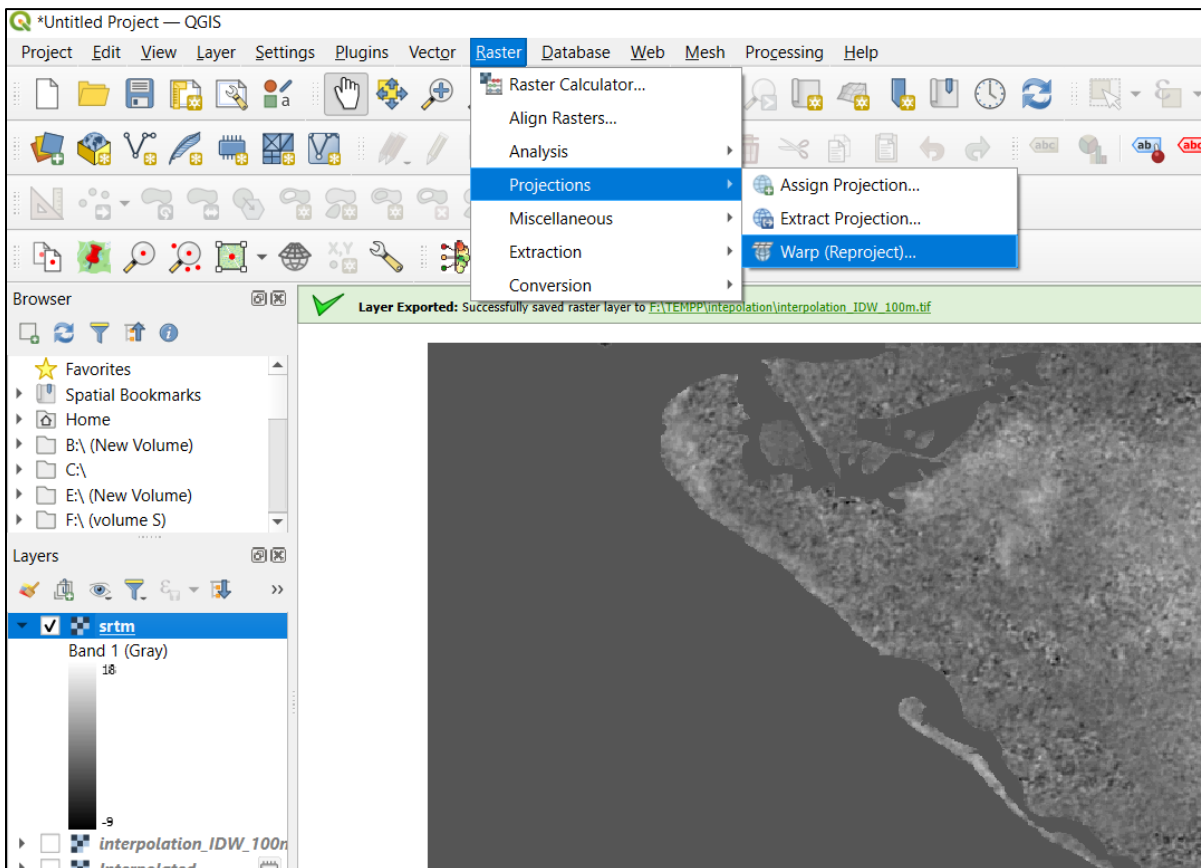
Here we are using GEBCO bathymetry and SRTM topography data

Important Note: Both data should be in same coordinate system → WGS 84: EPSG:4326


If data is not in WGS84: EPSG:4326 → then reprojection is required


Reprojection:

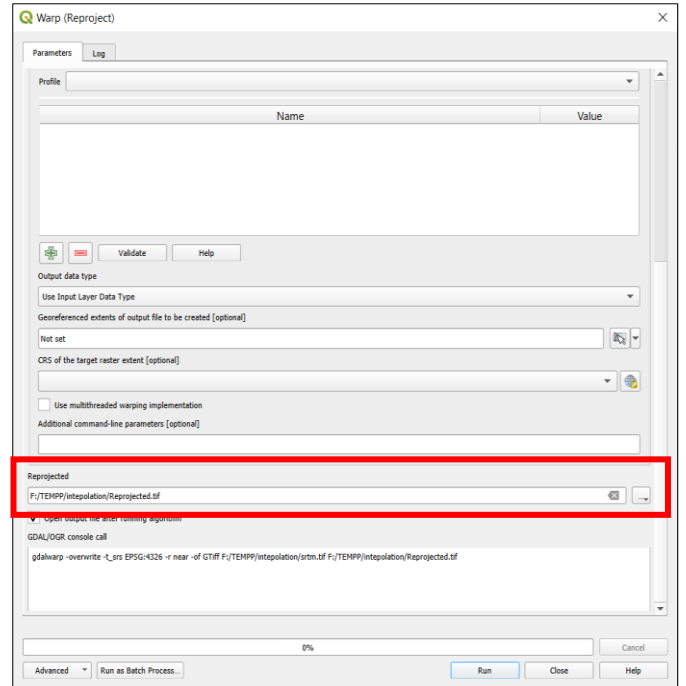
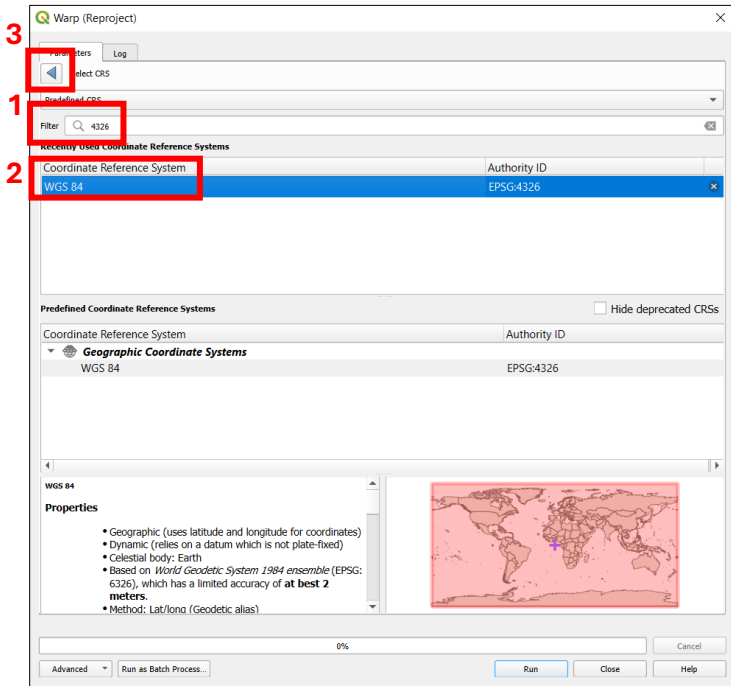
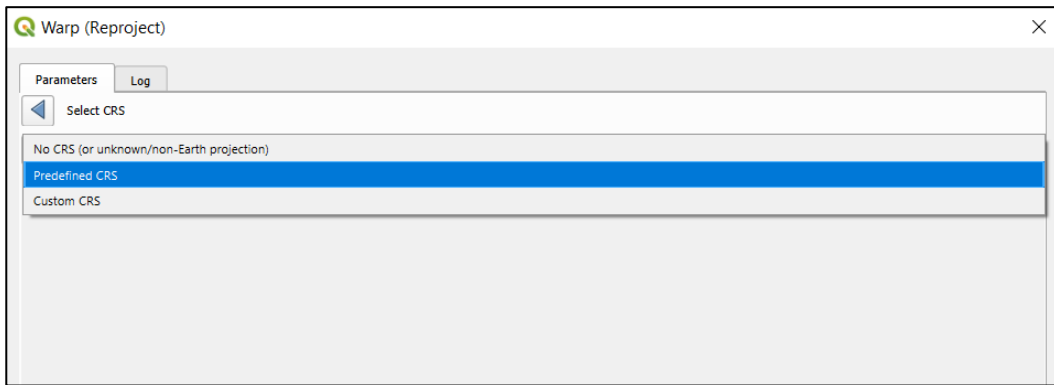
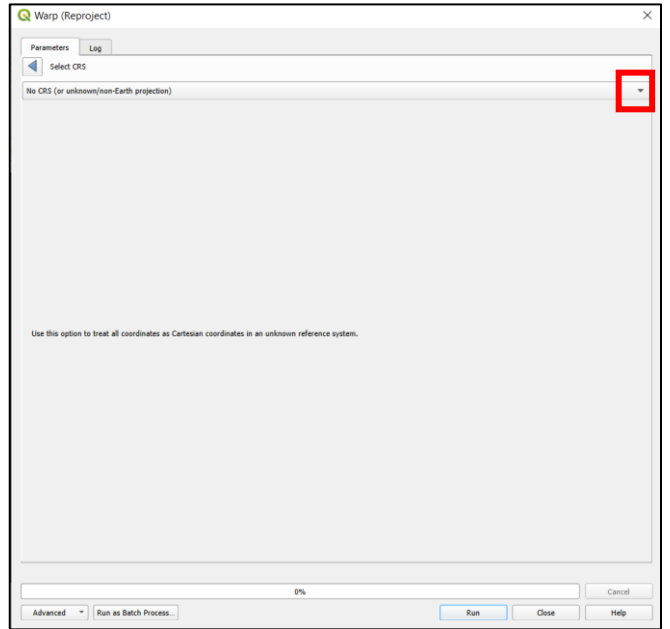
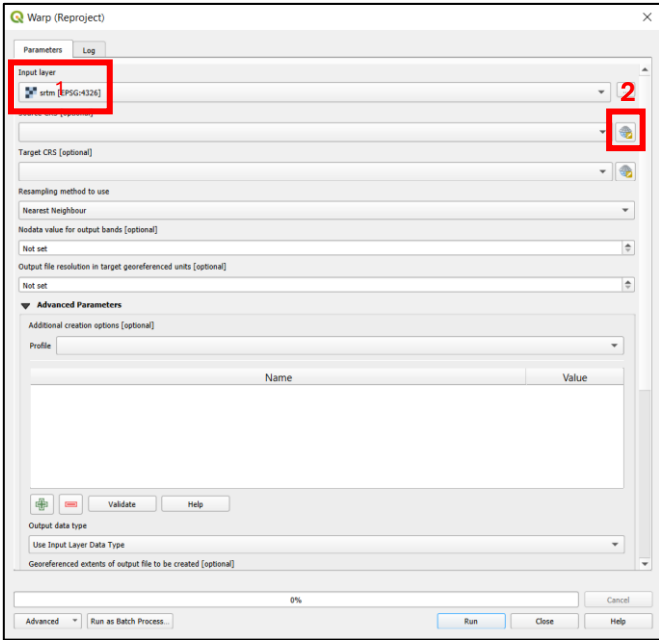
Go to 'Raster' tab → Projections → Warp (reprojection)



Input layer → Select your raster layer

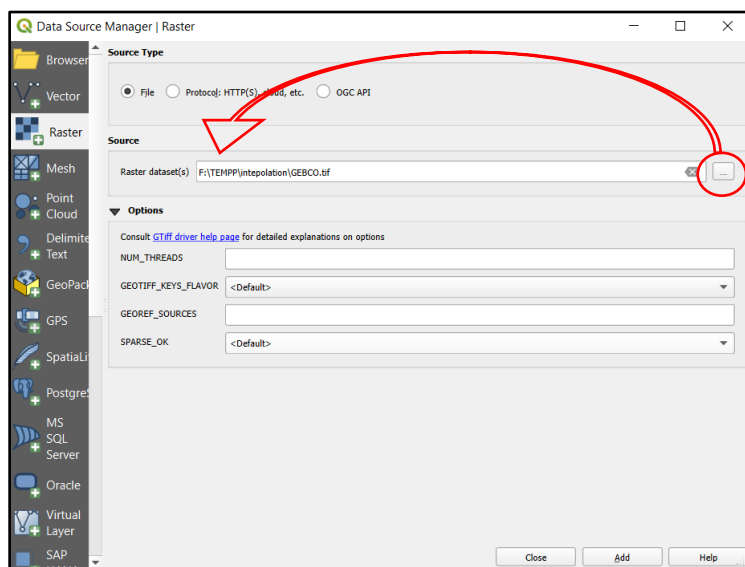
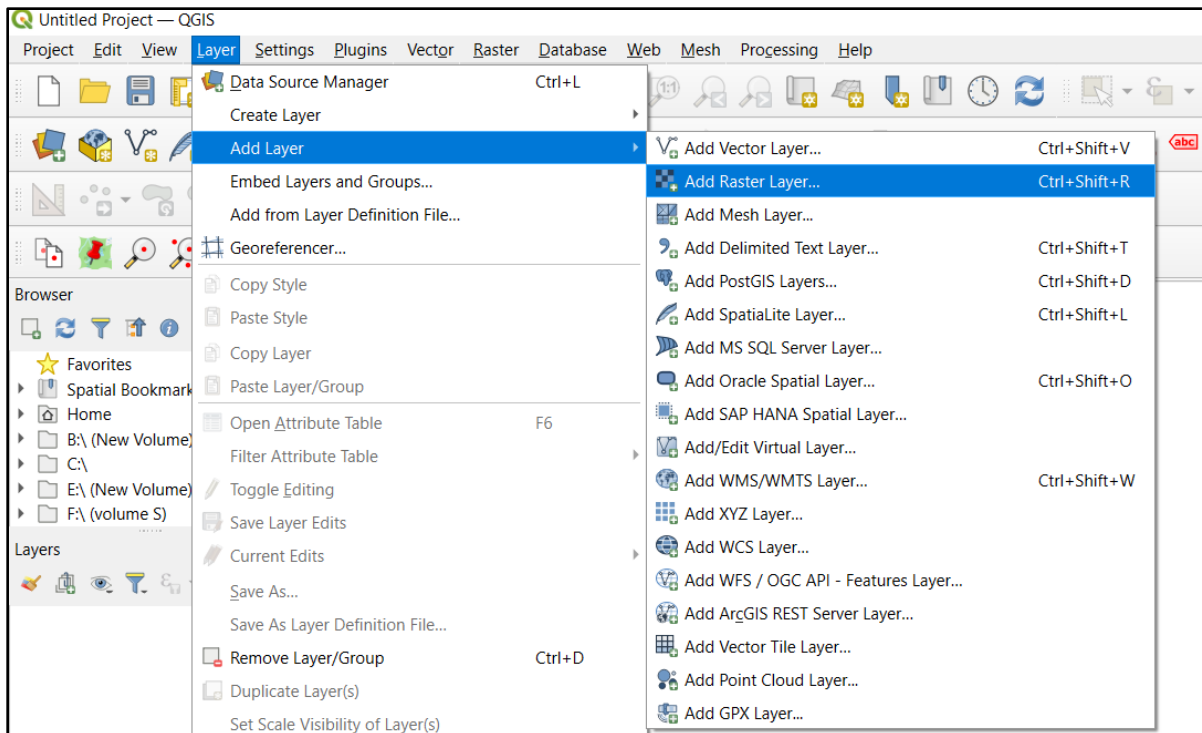
Target CRS → click on glob icon  → drop down 'No CRS (or unknown/ non-Earth projection)' → select 'Predefined CRS' → in filter search '4326' → Go to "Coordinate Reference System" tab and select 'WGS84' →

click back by clicking  this icon → scroll down and save the reprojected file by clicking 'save to file tab'. → Click "Run"

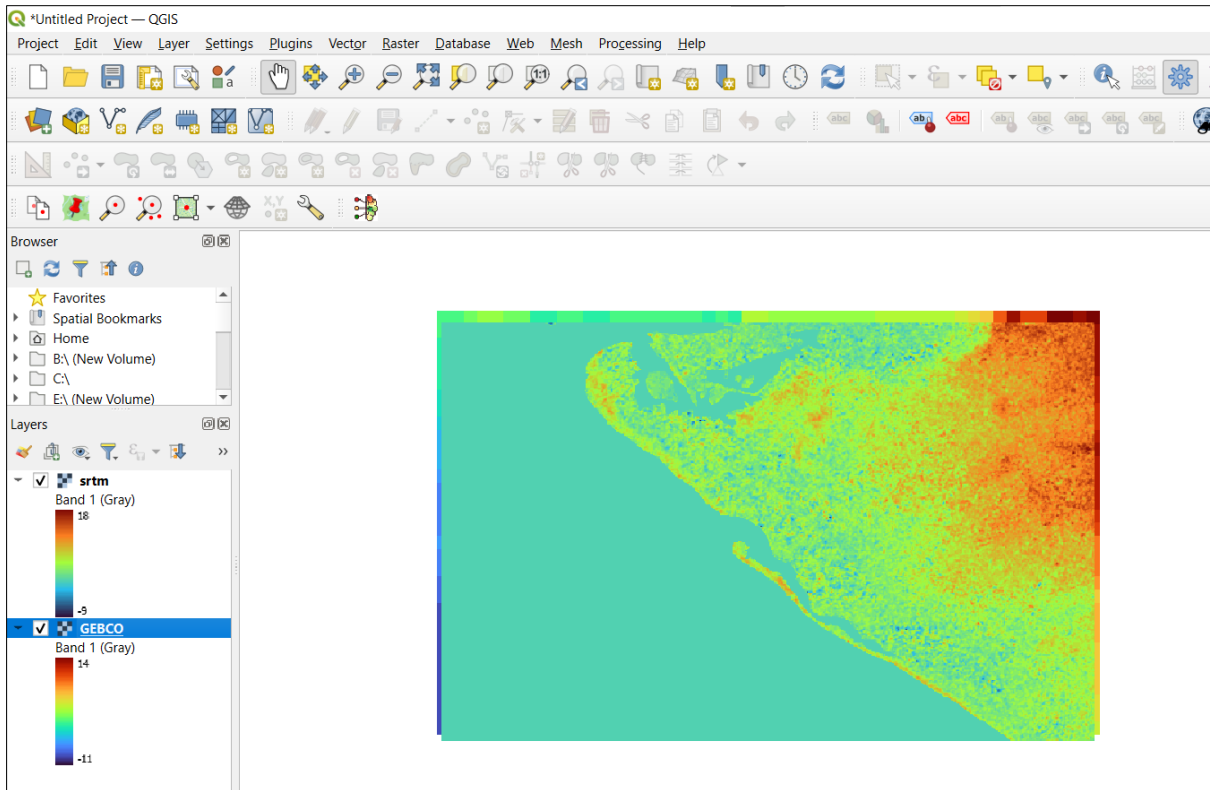


If you have your own Bathymetry and Topography DEM data in point shapefile format then skip step 1 and 2

Step 1: Add Both raster layers in QGIS:



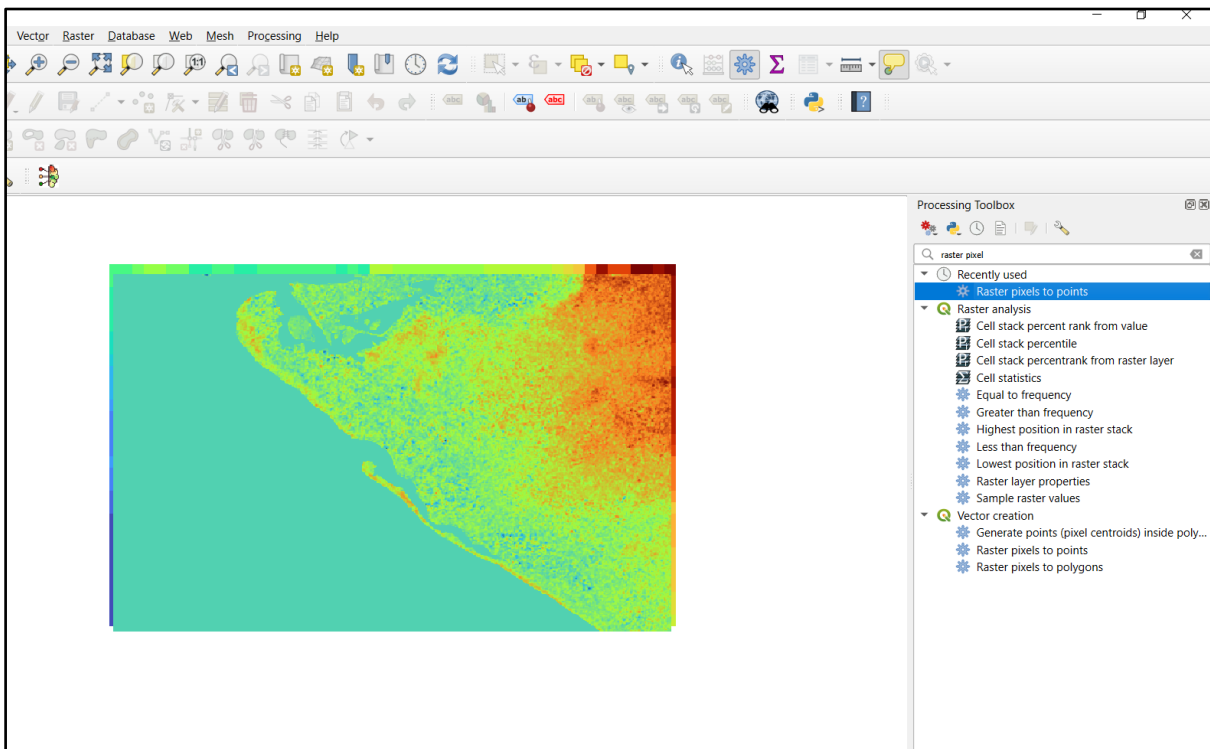
Similarly add SRTM data into QGIS

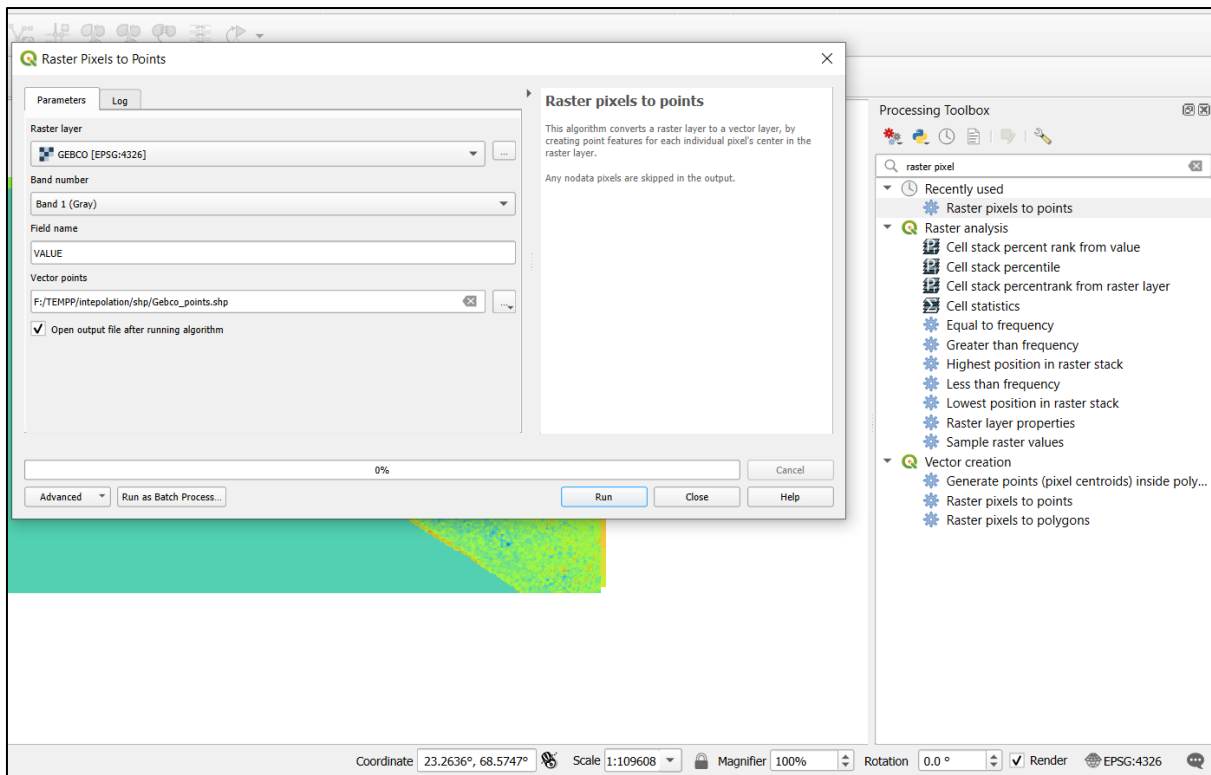


Step 2 : Raster to Vector conversion

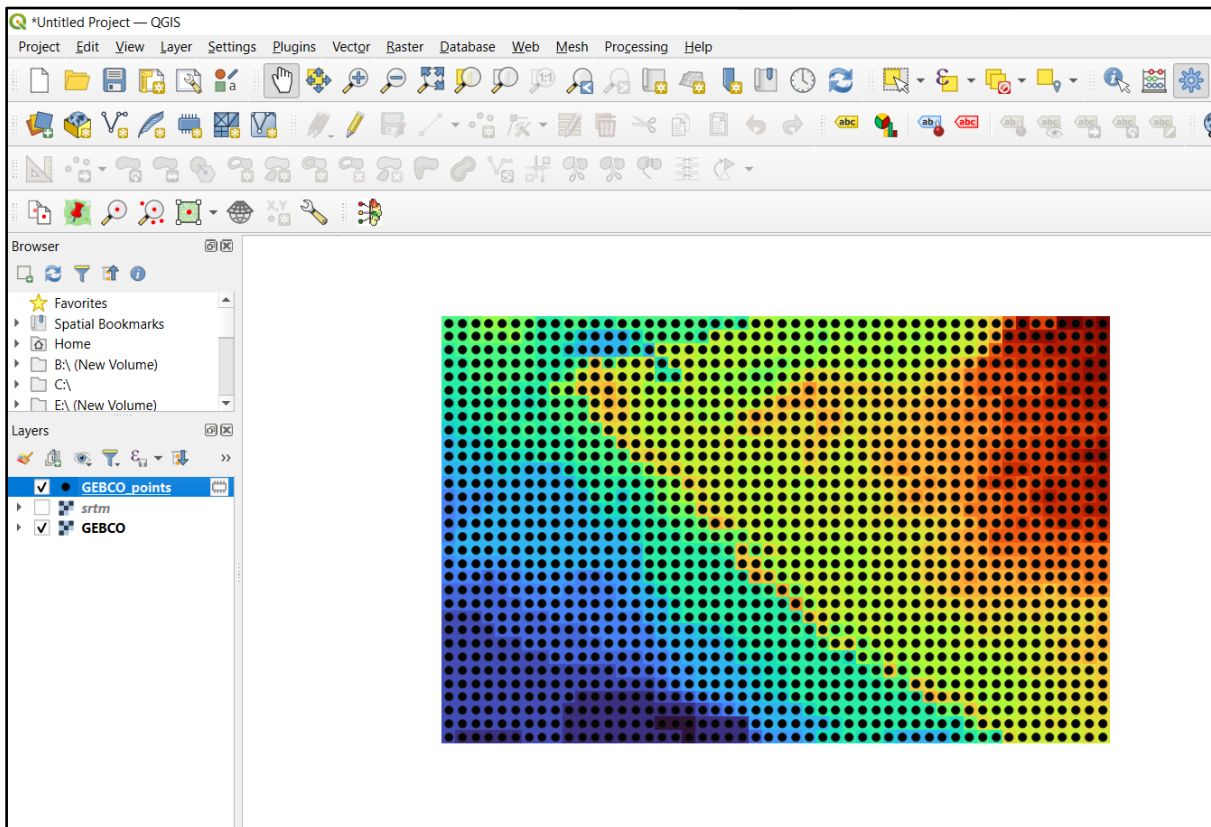
Convert raster pixels to points using "Raster pixels to points"

Search "Raster Pixels to Points" in Processing Toolbox






Save vector points in ".shp" format.

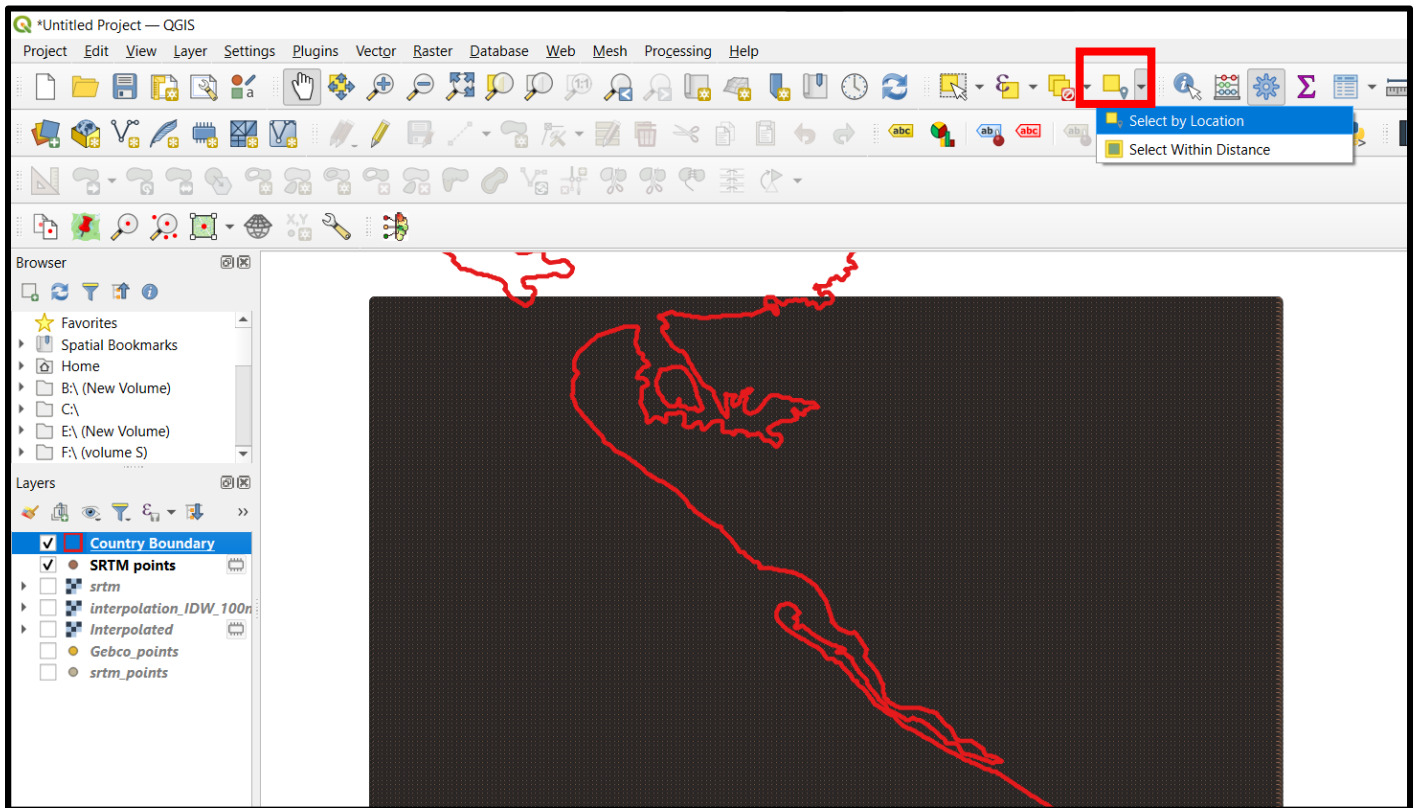


Similarly convert raster pixels to points for SRTM data also

Step 3: To remove land points from GEBCO points →

Import county admin boundary shapefile in QGIS → Layer → add Layer → add Vector Layer

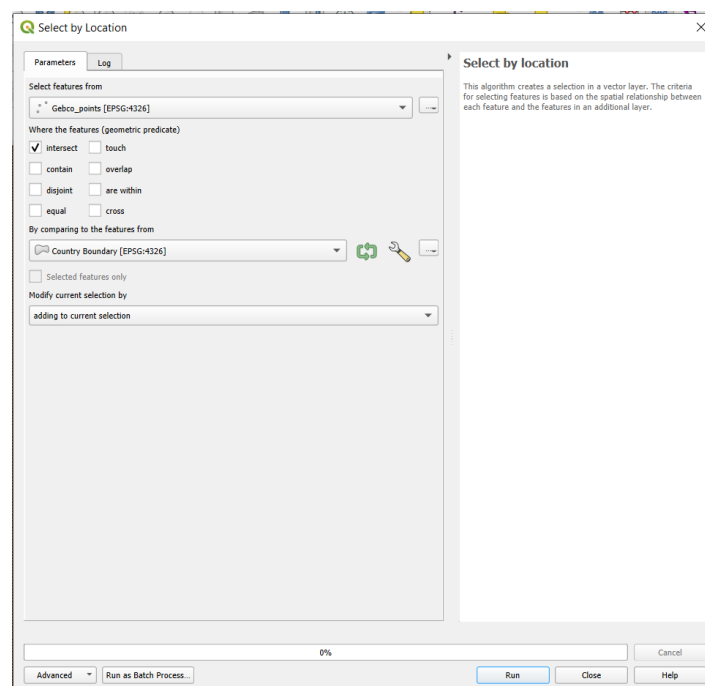
for selecting pixels falling inside country polygon → drop down 'Select by Location' by clicking  symbol





Select feature from → GEBCO points


By comparing features from → Country Boundary

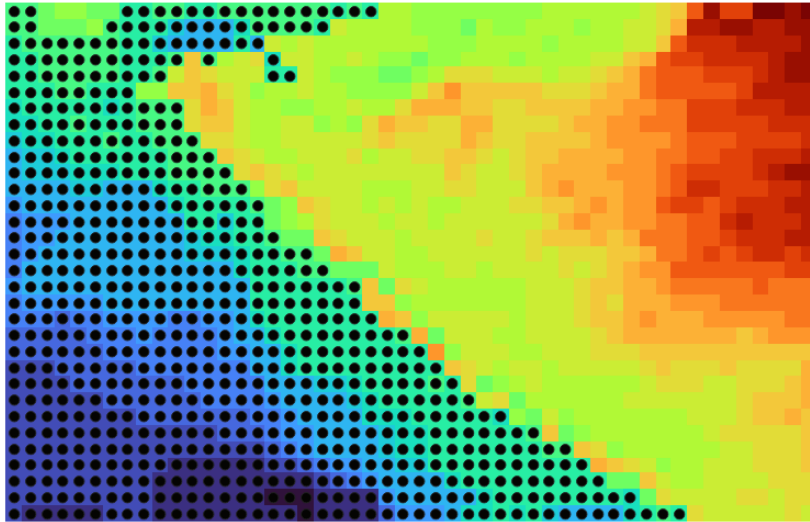
Modify current selection by → adding to current selection → Run → Close



Open Attribute table of GEBCO points → Selected points are Land points which we want to remove.

start editing using () this symbol. Delete selected features by clicking delete symbol ()

Save the edits and stop editing by clicking  symbol
GEBCO points will be look like this:





For SRTM we want to keep land points. Again click selection by location tab →


Select feature from → SRTM points

By comparing features from → Country Boundary

Modify current selection by → adding to current selection → Run → Close

Right click on SRTM points → Open Attribute Table → start editing using () this symbol.

Now to keep land points we will do invert selection by clicking  symbol.

→ Delete selected features by clicking delete symbol ()

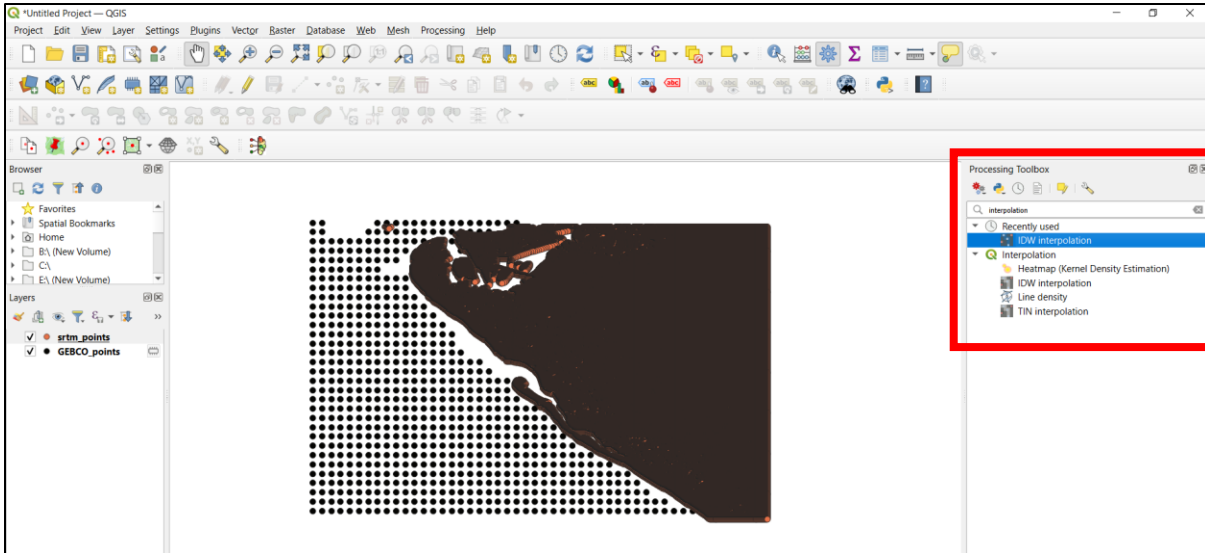
Save the edits and stop editing by clicking  symbol

SRTM points will look like this:





Step 4: Interpolation

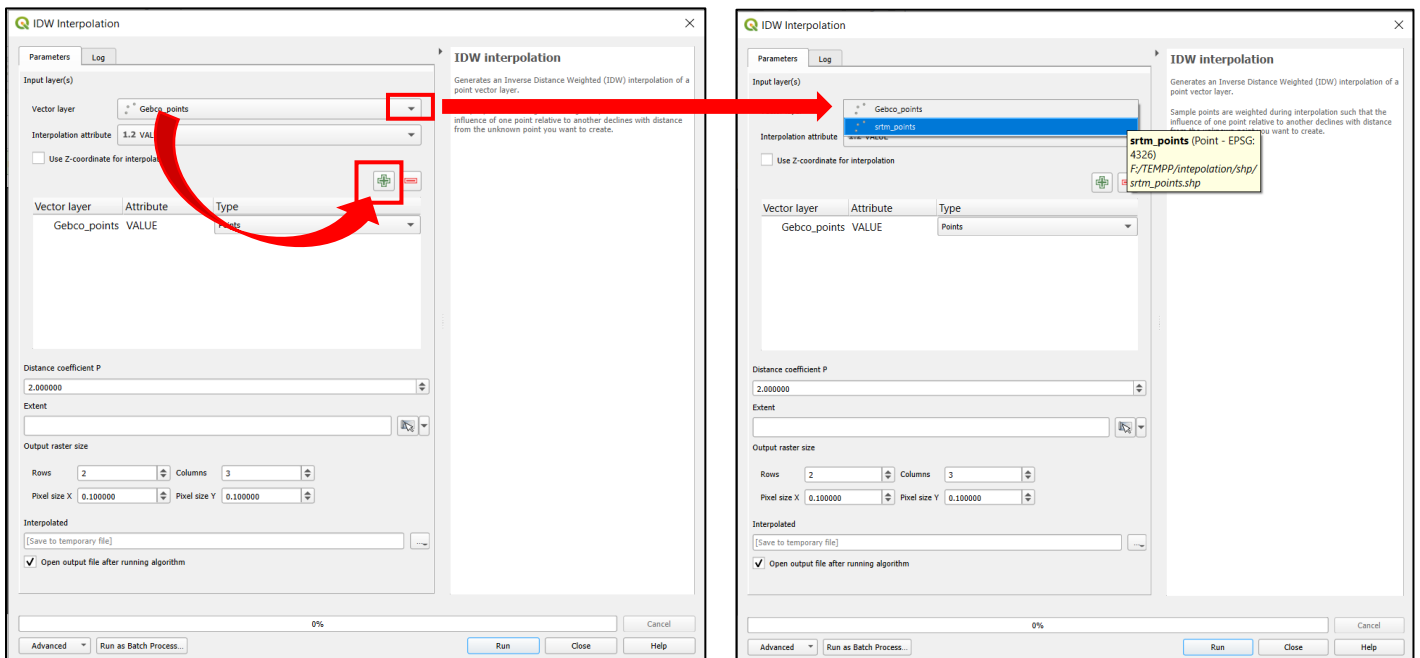
Search 'interpolation' in the processing toolbox:



Double Click on “IDW interpolation” →

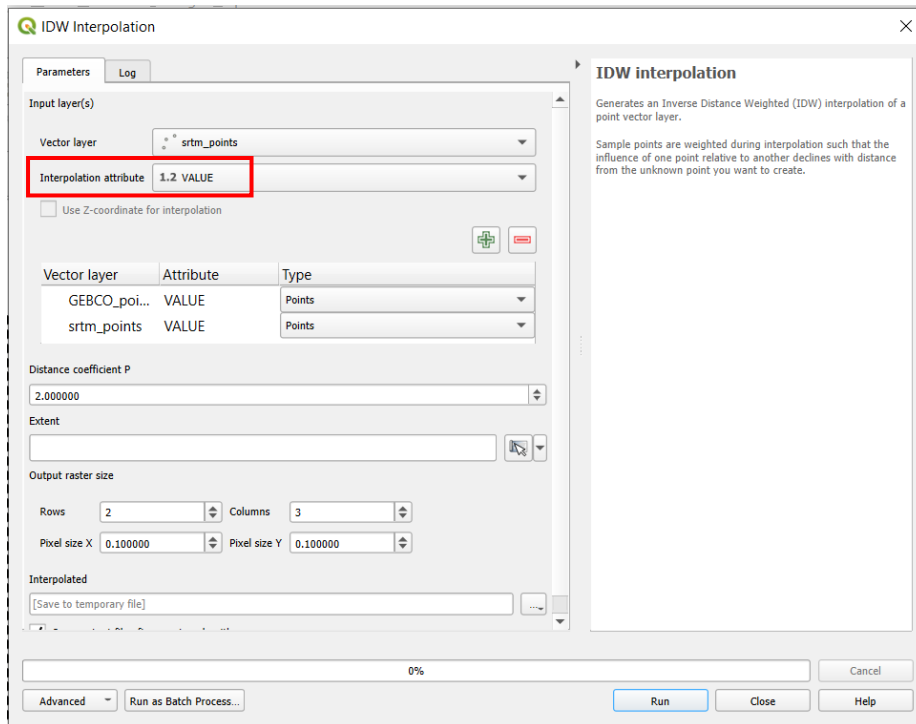
Select Vector Layer as “GEBCO_points” then click  to add in table →

After adding GEBCO point select SRTM_points by drop down in ‘vector layer’ by clicking and then click  to add in table

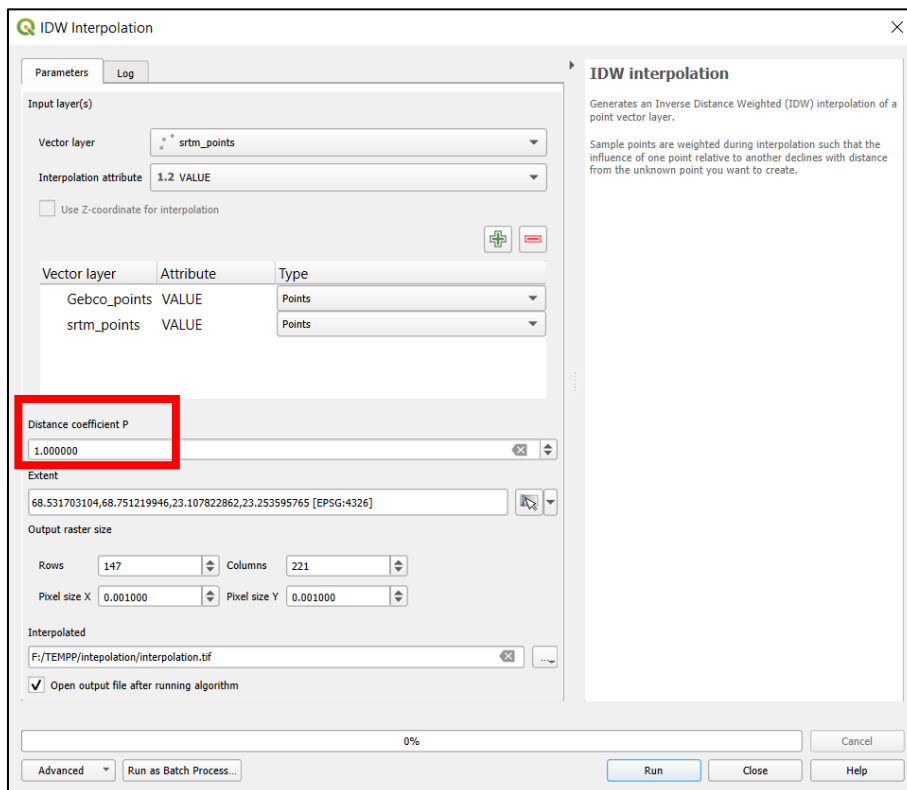


Important Note:

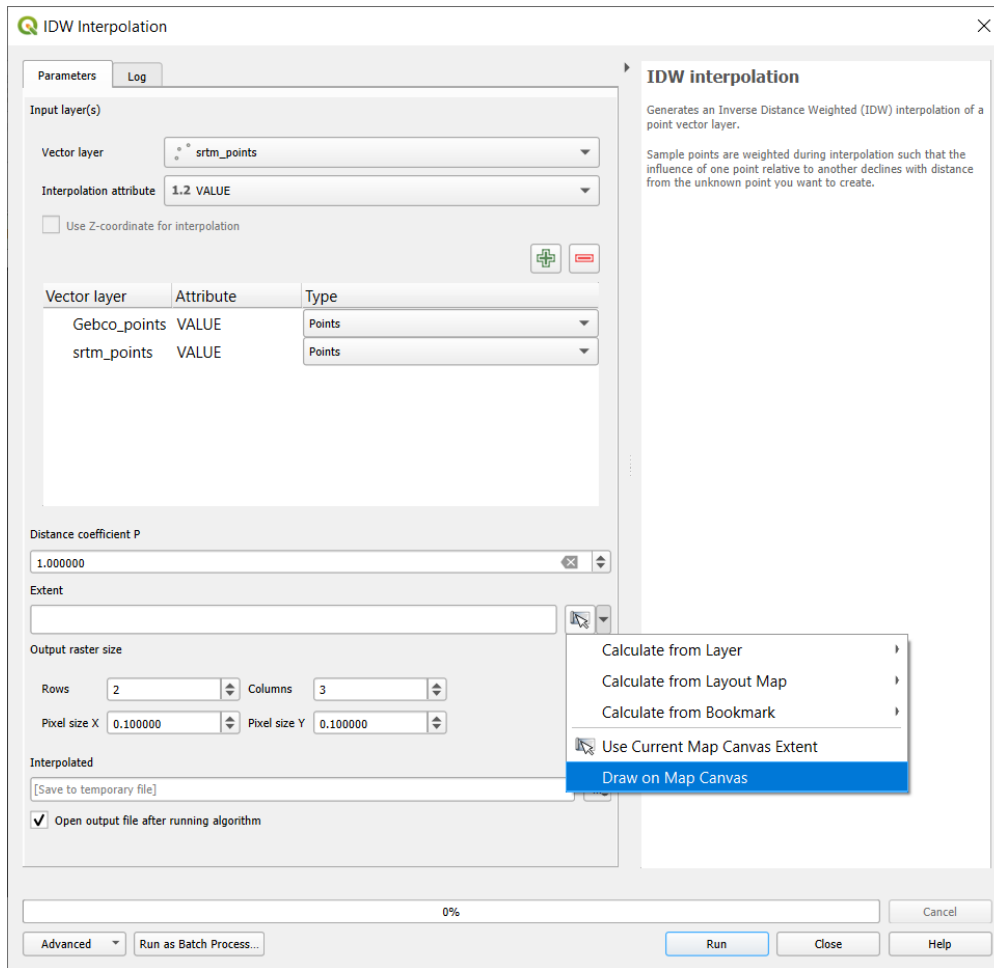
If you have your own DEM or Bathymetry data in shapefile then Check column name where elevation values are present. Here column name for both data is “VALUE”. If your column name is different then change dropdown into “Interpolation attribute” tab.



Distance to coefficient $P = 1$



Extent → Click on dropdown icon in extent → select Draw on Map Canvas



Draw the extent you want of output interpolated file → start from Upper left and end at Bottom Right.

It will appear as:

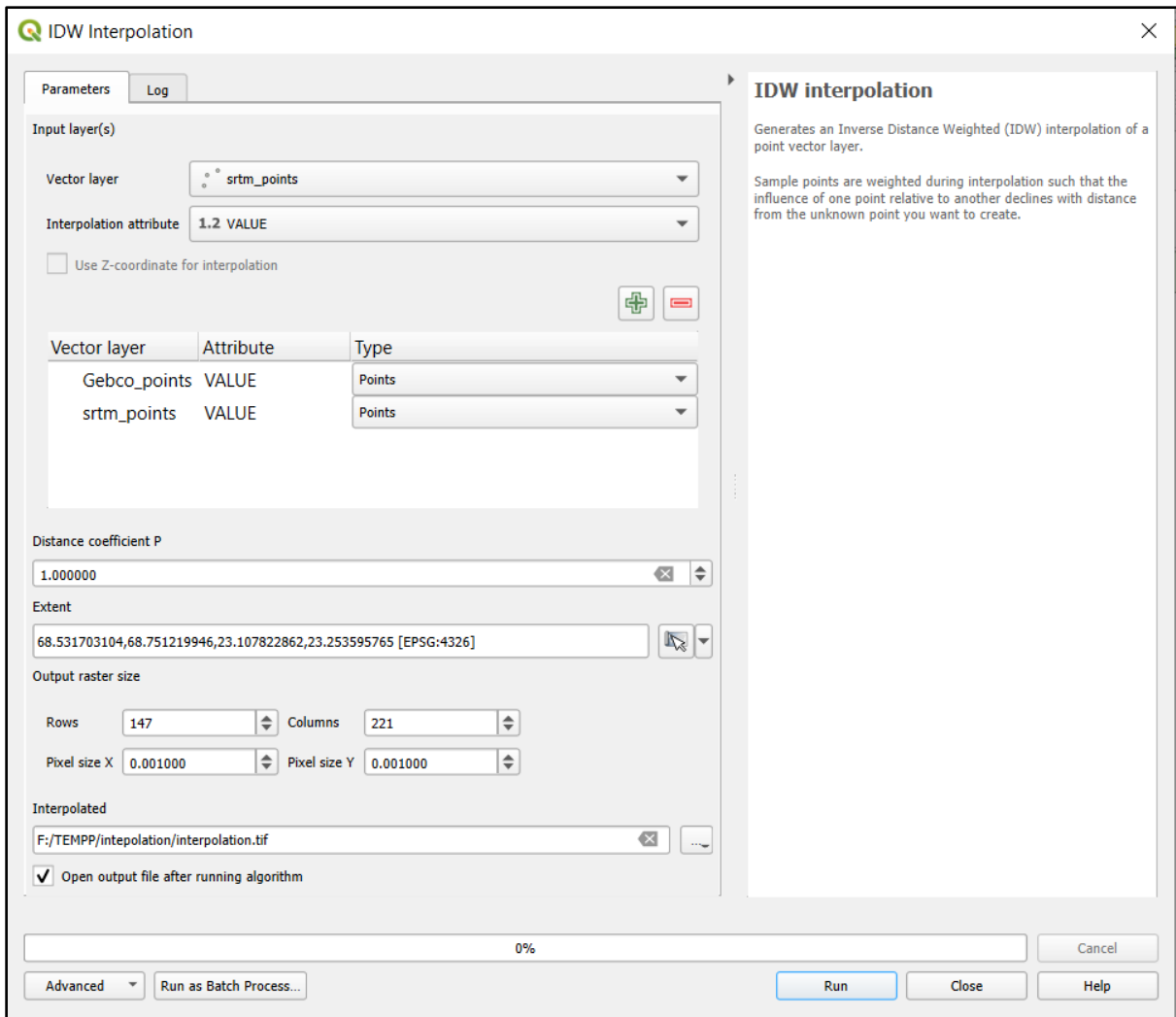
Top Left Longitude, Bottom Right Longitude, Bottom Right Latitude, Top Left Latitude [EPSG:4326]

Give Pixel size in decimal degrees: for 10m spatial resolution, give pixel size for X and Y as

$[10 / (108 * 1000) = 0.000093]$

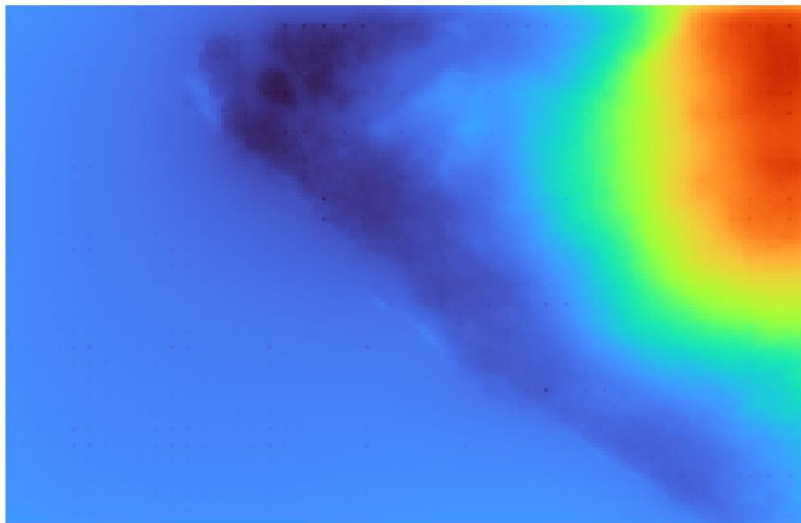
Spatial Resolution (meters)	Decimal Degree
10m	0.000093
30m	0.000278
90m	0.000833
120m	0.00111

Save file to your directory:



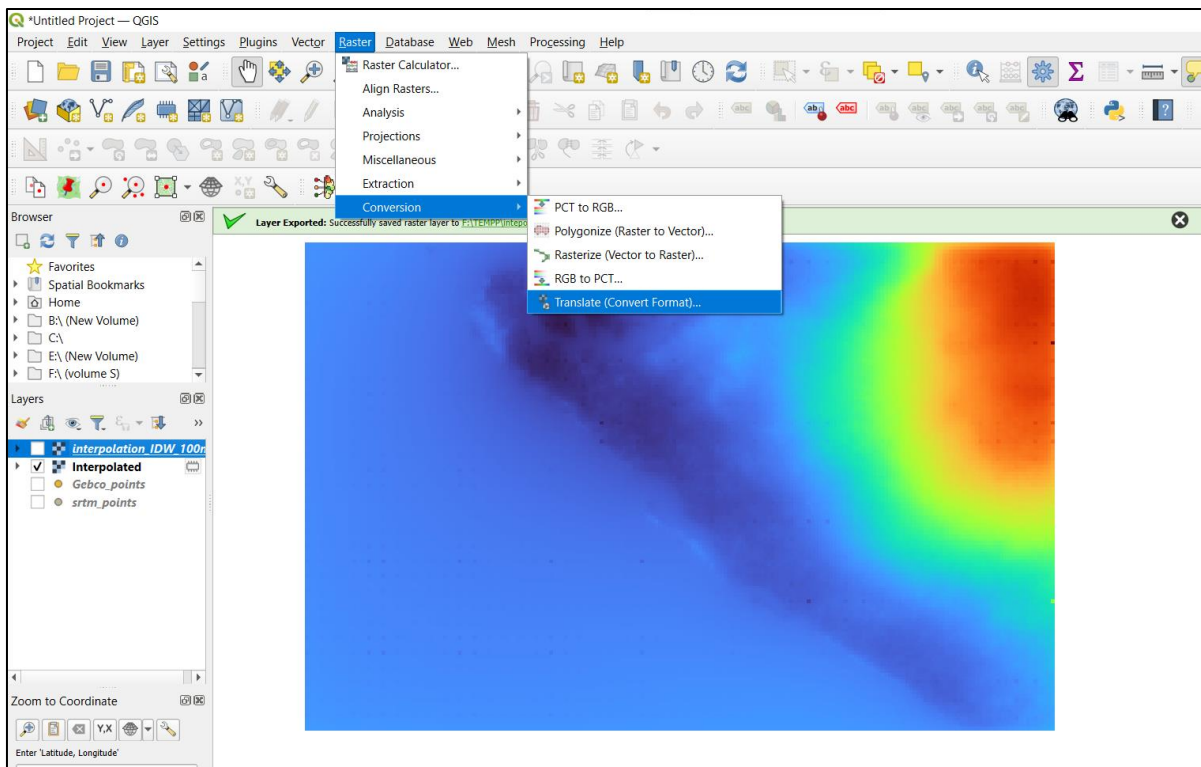
Run the IDW interpolation.

Result:

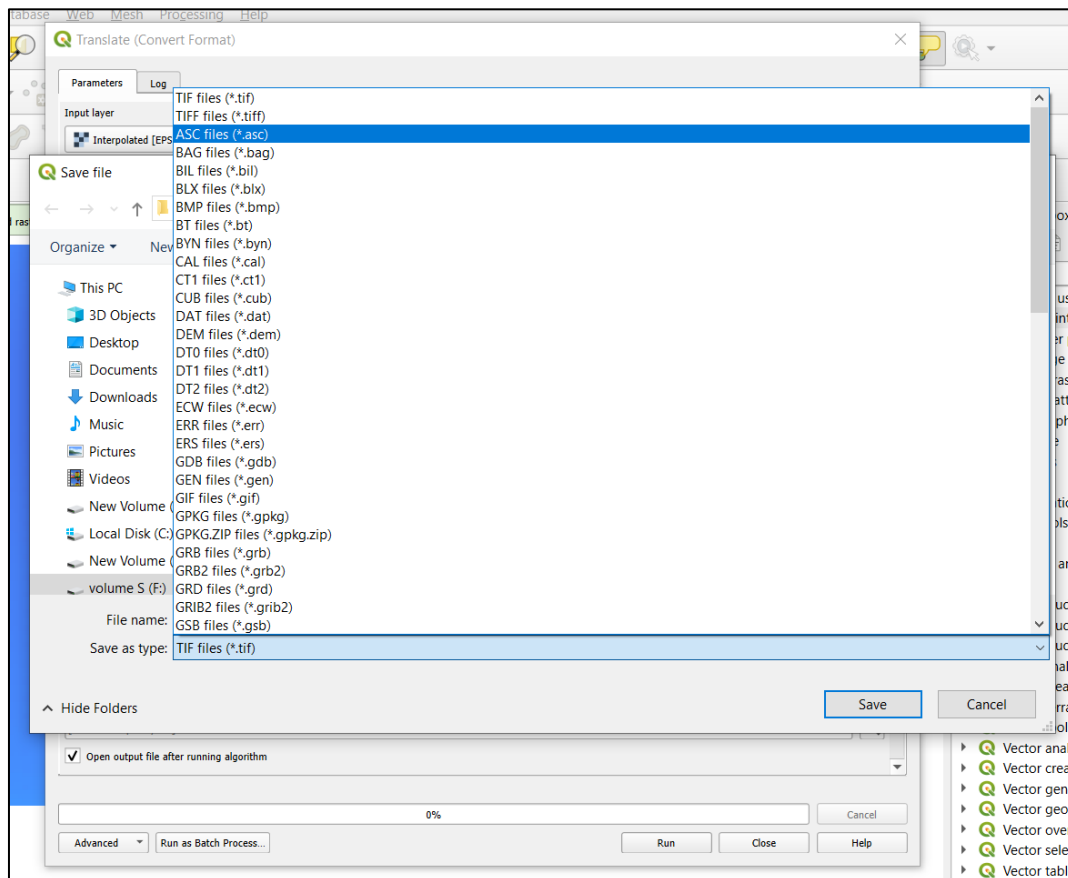


Step 5: Raster to ASCII conversion:

Make sure output raster projection is in WGS84- EPSG:4326



Give input layer as Interpolated file. Save file into drive in ".asc" format. And click run.




Step6: Edit ASCII data

Open that ascii file in notepad.

```
F:\TEMP\interpolation\interpolation.asc - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
interpolation.asc [3]
1 ncols 206
2 nrows 134
3 xllcorner 68.538849000000
4 yllcorner 23.114026000000
5 dx 0.000999131860
6 dy 0.000997684880
7 NODATA_value -9999
8 4.8136644363403320312 4.8115782737731933594 4.8094768524169921875 4.80546045303344472656 4.7992773056030273438 4.7964115142822265625 4.7950005531
9 4.8138818740844726562 4.8100757598876953125 4.8066196441650390625 4.8027391433715820312 4.7985897064208984375 4.7950425148010253906 4.7919292445
10 4.8106374740600585938 4.8068385124206542969 4.803432464599609375 4.799457550048828125 4.7950868606567382812 4.7915091514587402344 4.788473129272
11 4.8021993637084960938 4.8017482757568359375 4.7999930381774902344 4.7957096099853515625 4.7878232002258300781 4.7854313850402832031 4.7847166061
12 4.8001513481140136719 4.799053192138671875 4.7970981597900390625 4.7927737236022949219 4.7852497100830078125 4.7825956344604492188 4.78157997131
13 4.80231475830078125 4.7982954978942871094 4.7946858406066894531 4.7905564308166503906 4.7860622406005859375 4.7822861671447753906 4.778997421264
14 4.799659149536132812 4.795599374389648438 4.7919344902038574219 4.7878007888793945312 4.7833499908447265625 4.7794971466064453125 4.7760539054
15 4.7928385734558105469 4.790898799962402344 4.7887940406799316406 4.7844529151916503906 4.7776584161987304688 4.7744603157043457031 4.7727031707
16 4.785213470458984375 4.78349700927734375 4.780694186901855469 4.7816367149353027344 4.7724237442016601562 4.770336151123046875 4.7697939872741
17 4.7917275428771972656 4.7876458168029785156 4.7840719223022460938 4.7797589302062988281 4.774899005898925781 4.7709536552429199219 4.7675909996
18 4.790134490696766875 4.7857518196105957031 4.7817969322204589844 4.7774357795715332031 4.7728114128112792969 4.7687582969665527344 4.7651076316
19 4.7850337028503417969 4.7818789482116699219 4.7790389060974121094 4.7744040489196777344 4.7679300308227539062 4.76432037353515625 4.762117385864
20 4.7704515457153320312 4.7776670455932617188 4.77654266357421875 4.7716727256774902344 4.7593698501586914062 4.7587027549743652344 4.759413242340
21 4.7825155258178710938 4.7784256935119628906 4.7748370170593261719 4.7702136039733886719 4.764749526975390625 4.7607464790344238281 4.7576336860
22 4.7817678451538085938 4.7772073745727539062 4.773026466369289062 4.7684755325317382812 4.7637090682983398438 4.7595057487487792969 4.7557110786
23 4.7779302597045898438 4.77407073974609375 4.7706842422485351562 4.7659454345703125 4.7599921226501464844 4.756038665771484375 4.7532052993774414
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26 4.7744379043579101562 4.7697582244873046875 4.7654571533203125 4.7607889175415039062 4.7559041976928710938 4.7515749931335449219 4.7476429939270
27 4.771541595458984375 4.7672572135925292969 4.7634706497192382812 4.7586736679077148438 4.7530574798583984375 4.748858823547363281 4.74551343917
28 4.7562303543098020312 4.762763748168945312 4.7613506317138671875 4.756253719329839844 4.7439146041870117188 4.74289703369140625 4.743227005004
29 4.7665772438049316406 4.7631182670593261719 4.7599682807922363281 4.7550415992736816406 4.7482852935791015625 4.7443785667419433594 4.7418432235
30 4.7678279876708984375 4.7630963325500489281 4.7587890625 4.7540721893310546875 4.7490906715393066406 4.7446956634521484375 4.7407069206237792969
31 4.7654848098754882812 4.7609972953796386719 4.7570667266845703125 4.7523226737976074219 4.7465792366027832031 4.742609992980957031 4.7389602085
32 4.7543048958642578125 4.7564940452575683594 4.7550578117370605469 4.7500729560852050781 4.7397871017456054688 4.7374830245971679688 4.7369503974
33 4.758396148681640625 4.7561922073364257812 4.7537770271301269531 4.7488532066345214844 4.7411360740661621094 4.737569809599609375 4.73565959930
34 4.7618889806654785156 4.757160186767578125 4.7529344558715820312 4.7481832504272460938 4.7430830001831054688 4.7386965751647949219 4.7348022293
```

Delete “dy” row, and replace dx as “cellsize” dx → cellsize

ncols	206
nrows	134
xllcorner	68.538849000000
yllcorner	23.114026000000
dx	0.000999131860
dy	0.000997684880
NODATA_value	-9999
4.8136644363403320312	4.8115782737731933594
4.8138818740844726562	4.8100757598876953125
4.8106374740600585938	4.8068385124206542969
4.8021993637084960938	4.8017482757568359375



ncols	206
nrows	134
xllcorner	68.538849000000
yllcorner	23.114026000000
cellsize	0.000999131860
NODATA_value	-9999
4.8136644363403320312	4.8115782737731933594
4.8138818740844726562	4.8100757598876953125
4.8106374740600585938	4.8068385124206542969
4.8021993637084960938	4.8017482757568359375

Save this ascii file and this will be use as C Grid in ComMIT model