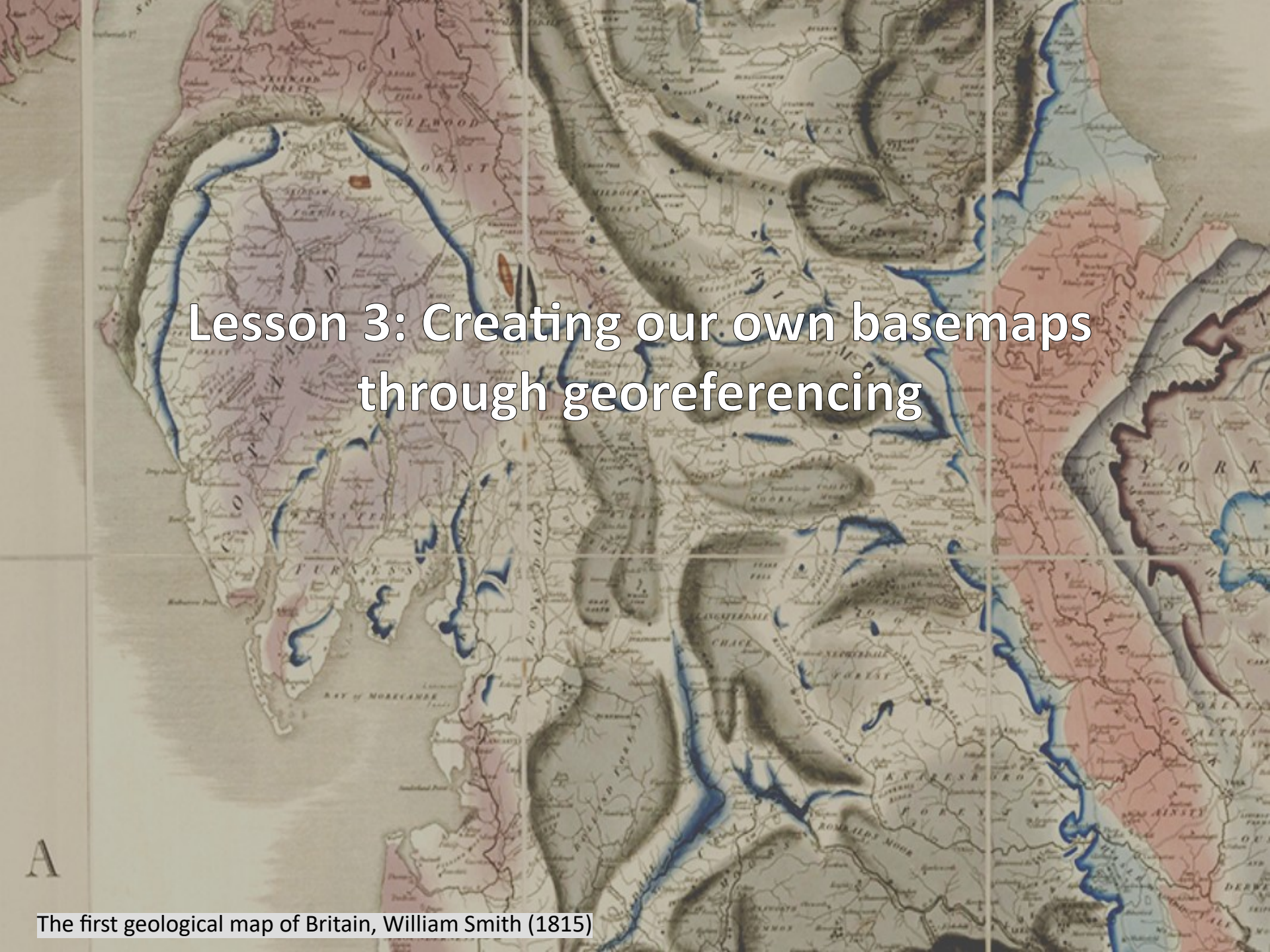
# Lesson 3: Creating our own basemaps through georeferencing



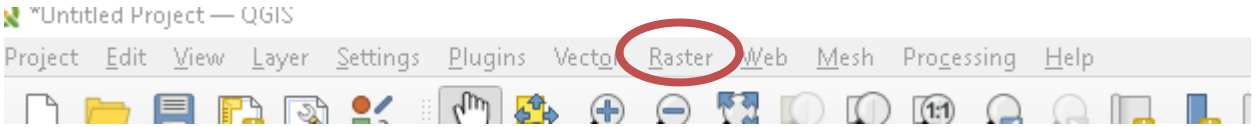
The first geological map of Britain, William Smith (1815)

# Georeferencing – turning a dumb image into a smart map

- Adds geographic  information to a map image (coordinates).
- Can use just about any scan / image of a feature.
- Find an appropriate image – here we are going to use this one from the internet. Any half-decent map will do.
- Save the image in a folder associated with your QGIS work.

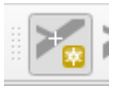
# Let’s get started – it is easy

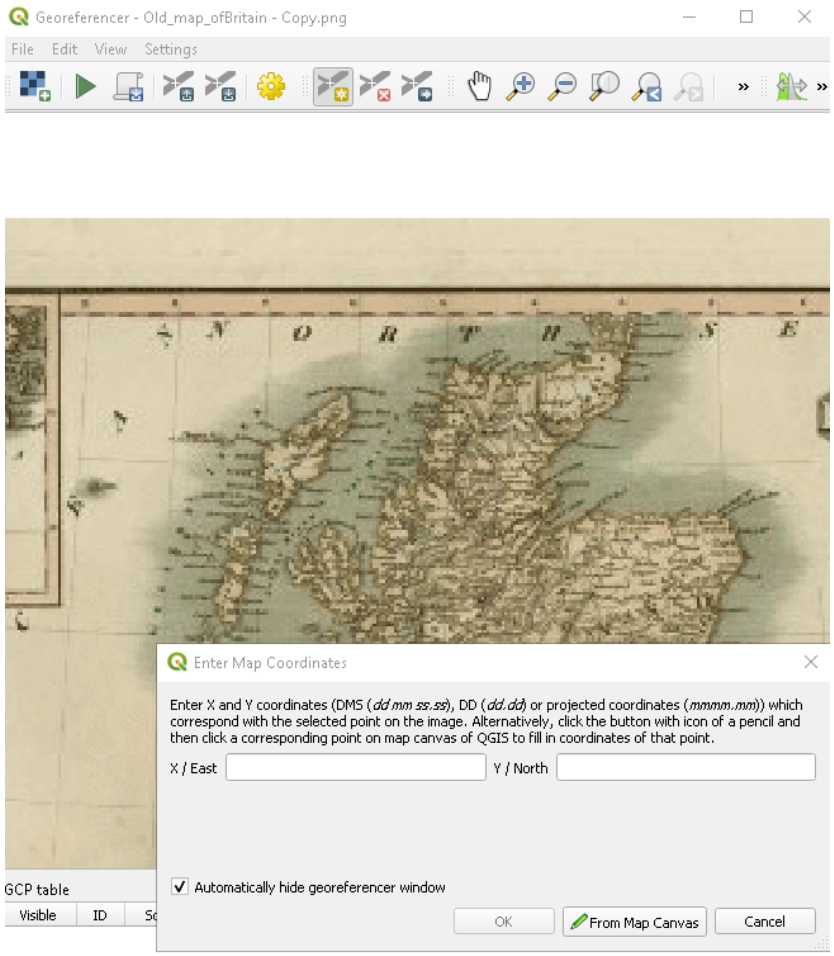
- Open QGIS and set Open Street (this one is clear which is necessary for georeferencing) map as your base map
- Zoom into the UK (or wherever your map to be georeferenced is of) using the mouse wheel
- From the top menu choose Raster then Georeferencer




- When the georeferencer window opens, use this button  to call up the map you want to georeference
- The Image will appear like this. Move the box a little so you can see both the image to be georeferenced and OpenStreetMap in the main QGIS window. You can move the map by holding down the mousewheel.

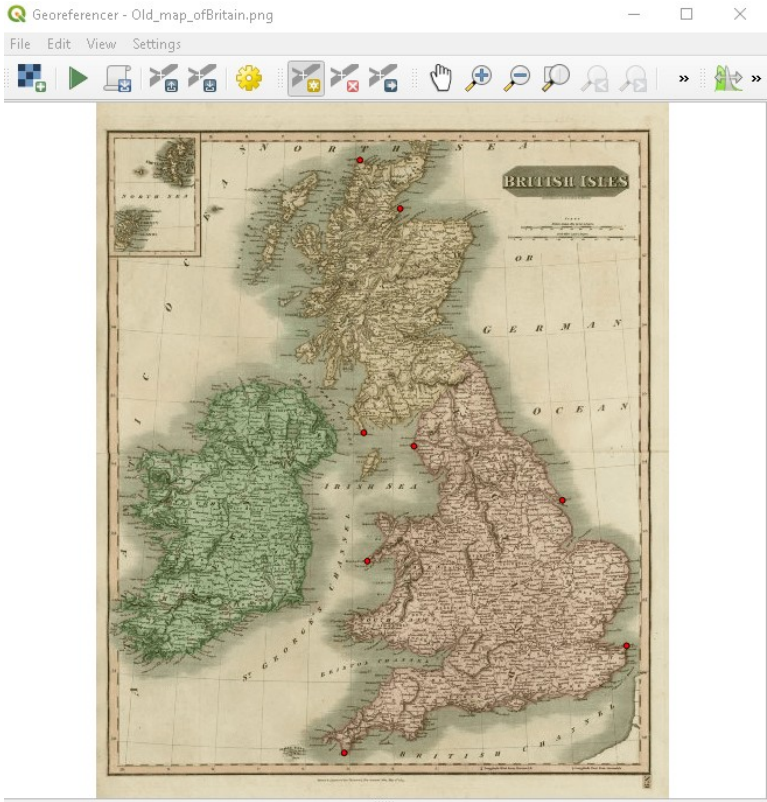
# Take points of the base map

- Click the Add points icon 
- Place the cross hairs on a prominent feature on the image and click.
- A new box will appear asking for the co-ordinates of that feature. These can be manually entered but it is easier to just get them from the base map.
- Click on the same feature on OpenStreetMap and its coordinated will appear below your map.
- Repeat for several points around the UK (at least 6), sequencially choosing a point from your map image and then taking the coordinates from OpenstreetMap.



# Now let’s georefence it

- You will have a map image with a series of coordinates under it
- Now press the  button to start the georeferencing process.
- QGIS will now ask you for the transformation setting you want to use to change your image into a georeferenced map.
- The setting are show on the next slide

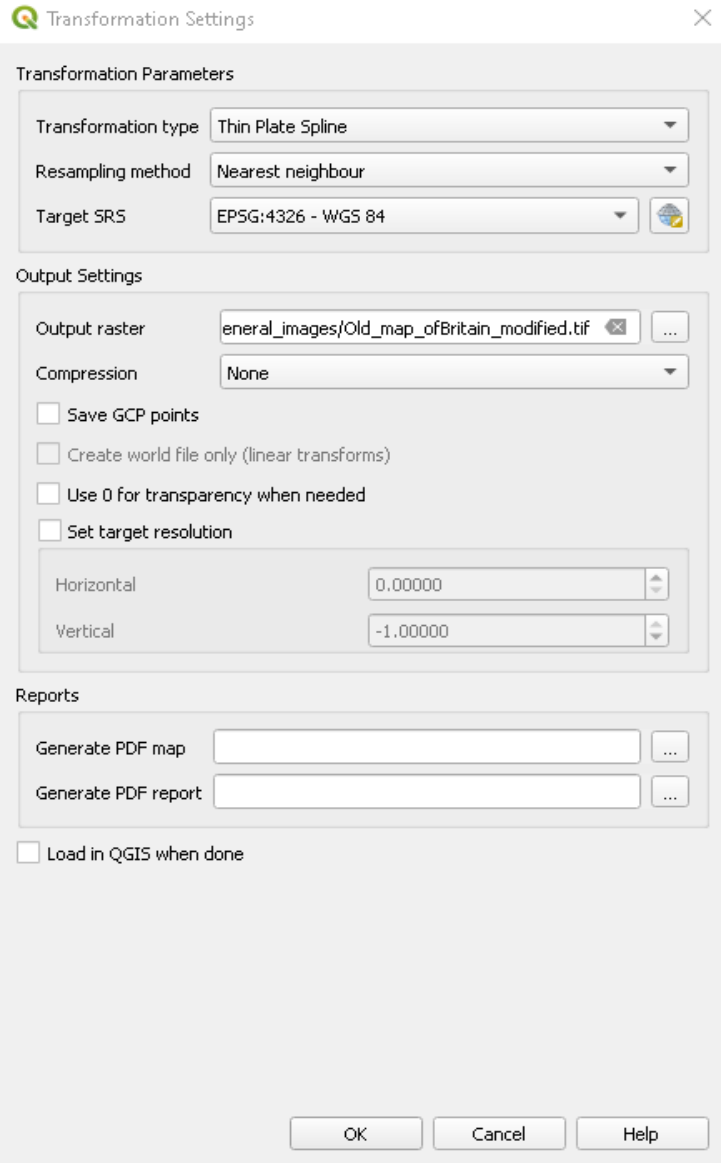



GCP table

| Visible | ID | Source X | Source Y | Dest. X | Dest. Y | dX (pixels) | dY (pixels) | Residual (pixels) |
|---|---|---|---|---|---|---|---|---|
| ✓ | 0 | 226.992 | -49.203 | -4.99599 | 58.6138 | 0 | 0 | 0 |
| ✓ | 1 | 261.723 | -90.9815 | -3.81127 | 57.8425 | 0 | 0 | 0 |
| ✓ | 2 | 401.719 | -342.596 | 0.111176 | 53.6282 | 0 | 0 | 0 |
| ✓ | 3 | 457.088 | -468.058 | 1.40708 | 51.363 | 0 | 0 | 0 |
| ✓ | 4 | 213.464 | -560.424 | -5.21487 | 49.9663 | 0 | 0 | 0 |
| ✓ | 5 | 233.346 | -395.071 | -4.7389 | 52.7909 | 0 | 0 | 0 |
| ✓ | 6 | 273.615 | -295.91 | -3.62018 | 54.4968 | 0 | 0 | 0 |
| ✓ | 7 | 230.326 | -284.333 | -4.88829 | 54.6496 | 0 | 0 | 0 |

# Transformation

- There are a number of different ways QGIS tranforms the data.
- Choose Thin Plate Spline (this seems to work well).
- Set the CRS to the same one as that of the base-map you have been taking the points from.
- Press the green arrow again and the georeferencing will be completed
- A new TIF image (GeoTIF) will appear in your folder with “modified” appended to the filename.
- Close the georeferencer now and when prompted save the GCP points (these are the control points we have created and can be used again if needs be).



# Take a look at the georeferenced map

- Open up your map in an image viewer
- It is now warped out of shape a little
- To check how good it is, simply drag it into QGIS as a new layer, overlaying the OpenStreetMap base-map
- We can now start to improve its appearance with a little cometic alteration.

# The georeferenced map should closely overlay the basemap

- Adjust opacity to see how closely the new map tracks the outline of the base map – doubler left click on the layer (opening the Layer properties dialogue) and play with the Transparency settings until you get it to your liking.
- Here it is quite good given that the starting image was so low resolution.

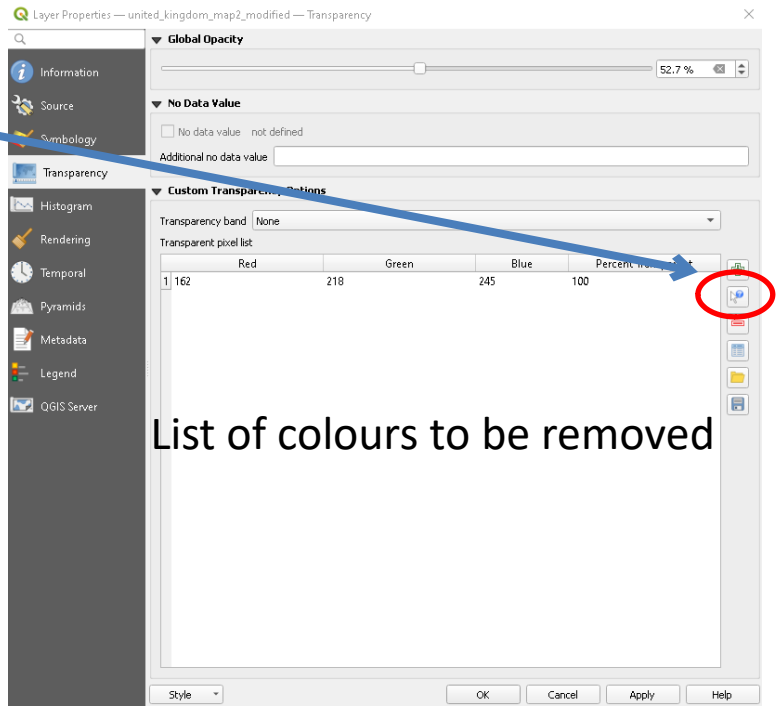
# The background of the georeferenced map can be removed if fairly uniform


Simple overlay
Basemap not visible


The blue of the sea has been removed
Opacity set to around 50%

# Adjusting the settings of your georeferenced layer

- Double click on the map layer then click on Transparency.
- Use the Colour select button to choose a colour you want to remove.
- Click on the background colour and this colour will then be listed in the box.
- Press Apply and that colour will be removed.
- This process can be used for several colours. Works best if there is good contrast between mapped feature and the background.
- Adjust Global opacity to achieve the best blend of the layers.
- Additional ways to enhance the belending of two layers can be found in Symbology: Blend Mode



# A completed georeferenced base-map

- With just three background colours removed we have a georeferenced map that sits near seemlessly over the basemap
- Job done – we have an accurate home-made basemap of our own…
- We can have fun with alternate maps – here are two examples

# A cartoon map of the UK

# The first comprehensive geological map of the UK by William Smith (1815)

Find out about this map at: https://www.nhm.ac.uk/discover/first-geological-map-of-britain.html
(Images of several versions available on web. This is from the hi-res PDF from the address above)