

Processing and Georeferencing Old 15 Minute Topographic Maps

maps are from Dave Allen, Old Maps, West Chesterfield, NH (www.old-maps.com), or from UNH library (docs.unh.edu/nhtopos/nhtopos.htm)

Vt. 15 minute topo map index shapefile: email me (jnugent@sover.net) if you'd like a copy

map image file format: jpeg, 300dpi (UNH are 100 dpi), average 4-6 megabytes each, 3 band image (RGB color)

Photoshop editing/cropping process

Cropping is done to remove the map "collars," or margins of the sheet where no map information is present. This is necessary only if you intend to use adjacent map sheets together in a GIS.

In image processing software (I used Photoshop Elements), open the image

- use the crop tool to outline the edge of the map information on the map sheet
- check to see if the image looks square; if not, rotate image (generally less than 1 degree), image > rotate > custom (or just scroll up/down/across with map edge by side of window)
- crop the map (on the inside of the neatline), zooming in to get it as accurate as possible. Note that the mapped area of a topo map sheet is slightly trapazoidal (as meridians converge), but the older style topo maps have a rectangular neatline, inside of which is are 2 small triangular areas on either side of the map area. Newer maps won't have this rectangular neatline, so base your crop extent on the bottom corners of the map.
- save the image (I use an image quality of 9)

Even with this cropping, that little triangular area along either side of the map will overlap an adjacent map when one is brought into a GIS. If you wish to be able to eliminate this "overlap," one method is to convert to Indexed color (256 colors, not 3 band) and do some processing (below). You might also be able to set that portion to transparent but I'm not sure how.

- In Photoshop Elements: Image > Mode > Indexed color
- save the image as a Tiff, no compression for now (can compress later)
- will get some loss in image quality, detail of color
- use polygon lasso tool to select triangular overlap areas, then Cut (this will turn the triangle area to white (color 255))
- once georeferenced and the image is added to ArcMap, show the symbology in the table of contents, click in color 255, and in properties, set color to "null"

ArcMap georeferencing process

1. Open ArcMap and make sure a coordinate system is defined (define in the data frame manually or add a layer with a PRJ file)

2. Add layer(s) with reference points common to those in your map (i.e. 15 minute topographic map index)
3. Add the image(s) to be georeferenced (for 3-band images, don't double click on the image, but instead select and choose Add)
4. Turn on the magnify tool (Window>Magnifier) and set the zoom to ~800% by right-clicking on the magnify window border
5. Turn on the Geoprocessing toolbar (Tools>Customize or right-click any grey space in the menu bar)
6. In the Georeferencing toolbar, choose the image file you wish to georeference under the Layer pull-down.
7. Zoom to the image file you wish to work on (right-click on name in table of contents, and choose Zoom to Layer), OR, zoom to extent of quad in index, and choose "fit to display"
8. Use the Zoom tool and magnify window to zoom in to a corner of the map (or other feature that can be used as control points for the image) Click "add control points," then click once on the point on the image that's your first reference point, your "from" point. Zoom/Pan to the layer to which you're referencing (i.e. map index), use a bookmark to make it easier, and click on the corresponding "to" reference point (i.e. the corresponding map corner).
9. Repeat the process for the other reference points.
10. Open the "view link table" from the geoprocessing toolbar. Make sure that a low or consistent root mean square (RMS) value has been achieved. If not, then delete the points with high values and try again.
11. Once the image has been referenced, the RMS is acceptable, and the control points are saved (just in case something goes wrong), select either "Update Georeferencing" or "Rectify" to save the transformation to the image. "Update Georeferencing" saves an auxiliary and a world file with the same name as the image. "Rectify" will create a new image in either TIF, ERDAS IMG, or ESRI GRID format with the new transformation (the TIF is quite large size).

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