Preserving North Carolina Legacy Geologic and Topographic Maps

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ABSTRACT

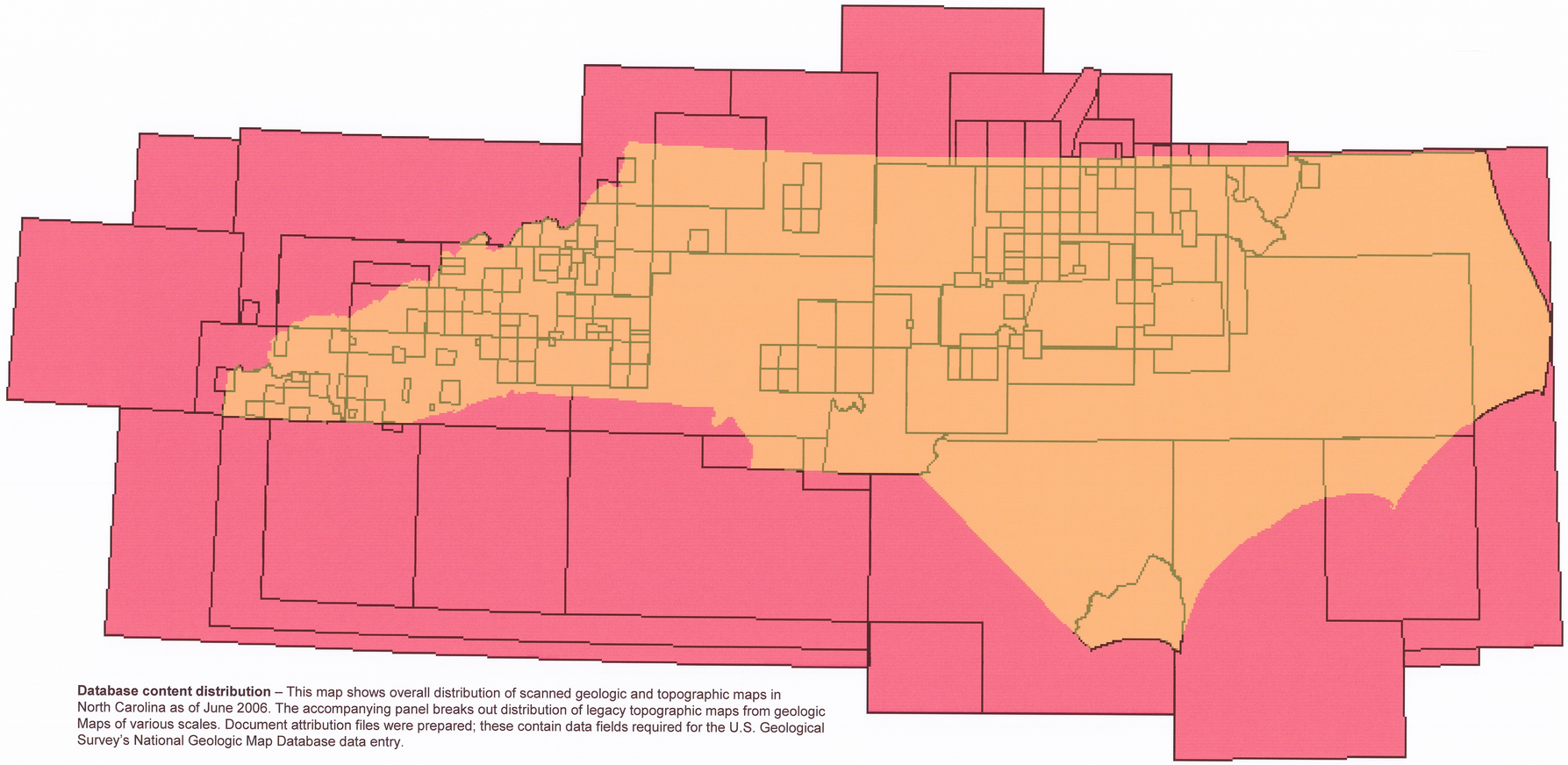
Geologic and topographic maps for North Carolina are being collected, scanned, georeferenced, and preserved in a collaboration between the NC Geological Survey (NCGS) and NCSU Libraries. The legacy geologic and topographic maps have no digital counterparts and paper copies are scarcely accessible.

Geologic and historic maps are in high demand, and are critical for earth science instruction and research. Digital georeferencing provides new capabilities not possible with paper maps by allowing other data to overlay map images using GIS software.

Geologic maps, including collars, are scanned to a 300 dpi TIF file with a large format (42 inch) scanner. Using ArcMap 9.1's georeferencing extension, at least four geographic locations were interactively selected from the TIF based on coordinates and grids printed on the maps. ArcMap creates a table of these selected coordinate values, and with U.S. Army Corps of Engineers Corpscon software, each coordinate pair is converted to NC Stateplane NAD83 meters and then appended to the table. ArcMap then creates a TFW world file and transforms the TIF image so that it is represented in the data view in Stateplane Coordinates. Each image file is rectified with ArcInfo workstation and compressed with MrSID.

The TIF images and world files will become part of the North Carolina Geospatial Data Archiving Project, a partnership between NCSU Libraries and the US Library of Congress. As of June 2006, the inventory consists of 101 U.S. Geological Survey geologic maps, 130 North Carolina Geological Survey geologic maps, 47 maps from theses and dissertations, 8 NC Department of Transportation maps and 165 legacy 15-minute topographic maps – all 451 of which are backed up on multiple secure servers.

Data are planned for dissemination through the NC Department of Environment and Natural Resources and NCSU Libraries, and contributed to NCOneMap, the National Geologic Map Database and the National Geologic Map Image Library.

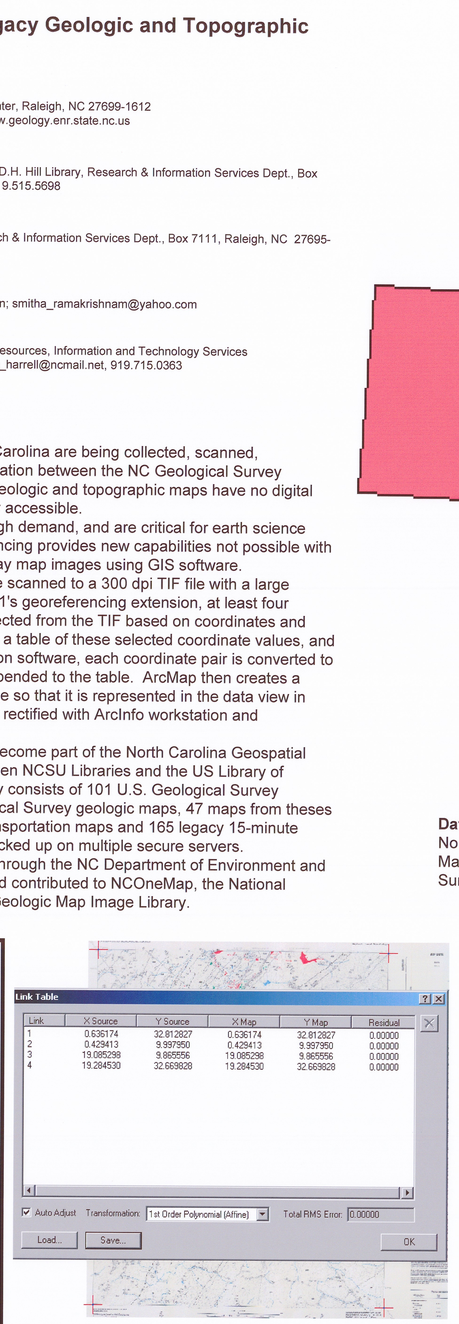


Database content distribution – This map shows overall distribution of scanned geologic and topographic maps in North Carolina as of June 2006. The accompanying panel breaks out distribution of legacy topographic maps from geologic Maps of various scales. Document attribution files were prepared; these contain data fields required for the U.S. Geological Survey's National Geologic Map Database data entry.

1

Georeferencing Steps

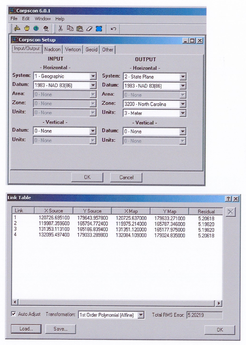
- Geologic maps were scanned in their entirety including margin notes and explanation (300 or 600 dpi) using large format scanner
- Scanned TIF images delivered to DH Hill Library via NCGS external hard drive and DVDs.
- Images were copied to NCSU external hard drive. Using ArcMap 9.1 and its Georeferencing Extension, Geographic locations were interactively selected at no less than four points from the TIF, using coordinates and grids printed on the maps.
- ArcMap creates a table of these selected coordinate values



2

Georeferencing Steps (cont'd)

- Each coordinate pair was then entered into the USACE CorpsCon to convert them to NC Stateplane NAD83 meters.
- The Stateplane coordinates were next appended to the corresponding pair in the ArcMap table.



3

Georeferencing Steps (cont'd)

ArcMap auto-creates a .TFW world file and transforms the TIF image so that it is represented in the data view in NC Stateplane Coordinates.

Approximate time to georeference one map was 15-20 minutes.

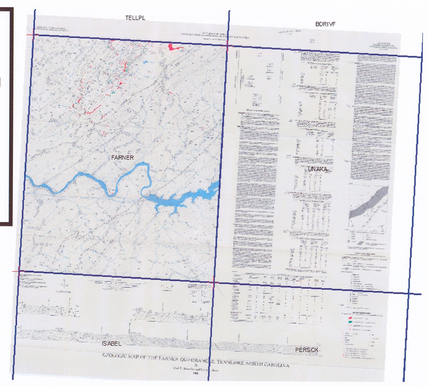
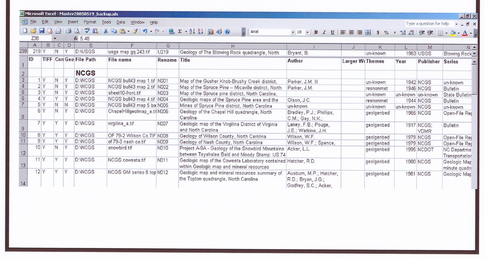


Image Compression

- TIF image compression involved first using ArcInfo workstation to rectify each TIF image to create a new rotated, scaled, and transformed image based upon the parameters in the world file
- MrSID image compression was then used to compress the TIFs at a 20:1 ratio for web downloading and easier distribution and use
- Data backed up on multiple secure servers

Documentation

- MS Excel spreadsheet was used to document map information, status, generate batch scripts, metadata, etc.

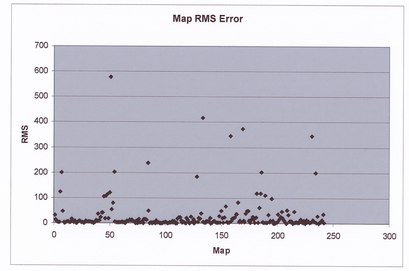


Results

- **An index shapefile was created using the ArcView 3 ply_generate extension, which generates polygons based on bounding coordinates entered in the spreadsheet**
- **101 USGS maps complete**
- **130 NCGS maps complete**
- **47 theses and dissertations**
- **8 NC Department of Transportation (geotechnical) maps**
- **165 15-minute topo maps**
- **451 Total georeferenced maps**
- **All maps georegistered (Stateplane meters NAD83) and accompanied by world files comprise 40.0 GB storage (uncompressed .TIF files)**
- **165 legacy 15-minute topographic maps comprising 16.4 GB storage (uncompressed .TIF files) also georegistered**
- **All TIF files have been rectified and compressed to MrSID format, 1 GB storage**

Registration error assessment

- **Avg. RMS: 28.2**
- **Range: 0.14 – 577**
- **High Average RMS due to some maps having no coordinates, insufficient coordinate labels, age and past storage of maps**



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