

Finding the Right Stuff!

Build a Helpful Utility for Locating Data

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Using ArcGIS, GIS users can create high quality digital maps by modeling data from many sources including datasets that are available on the Internet. Some datasets are available free of charge. Some data sources require only the payment of media or mailing costs. Other datasets can be purchased on a per-usage or subscription basis.

Data from the U.S. Geological Survey (USGS) has been available at no charge via FTP from the USGS Earth Resources Observation Systems (EROS) Web site for use by anyone patient enough to download and work with these files. *ArcUser* readers were introduced to the EROS site beginning in 1998, and many articles have described how to locate, download, and use these free data files.

However, during the summer of 2001, the EROS site was reorganized making obsolete the methods previously used to locate 1:24,000-scale digital elevation model (DEM) data in Spatial Data Transfer Standard (SDTS) format and 1:100,000-scale digital line graph (DLG) data in optional format. Although 1:24,000-scale data is now available from the GeoComm International Corporation (gisdatadepot.com/dem) and MapMart.com (www.mapmart.com) Web sites, the ability to graphically locate data for a specific quadrangle has been eliminated (as of publication of this article). The 1:100,000-scale DLG data is still available directly from the EROS site, but the naming convention for the files has been changed making it more difficult to identify the files needed for a particular area.

The sample data that comes with ArcGIS, *ESRI Maps & Data* (either the 2000 or 2002 version), includes *topoq24.shp*, a polygon shapefile that represents the geographic extent of the USGS 1:24,000-scale topographic maps organized in 7.5' quad tiles and *topoq100.shp*, a polygon shapefile of 30- by 60-minute quadrangles. With these files and a custom table in DBF format that can be downloaded from

the *ArcUser Online* Web site, this tutorial will show how to build an Index Map that will simplify the process of locating the correct data in these formats at these scales. Although this exercise uses only the 1:24,000- and 1:100,000-scale indexes, the ArcGIS sample data also includes an index for the 1:250,000-scale quadrangle maps that could be incorporated into the Index Map.

Dealing with the Modified SDTS DEM Format

In addition to changing the location of datasets, the DEM data now available differs from data previously offered directly from the EROS site. The data conversion tool in ArcToolbox, Import to Raster—SDTS Raster to Grid, properly imports this recently modified SDTS DEM data and converts individual quadrangles to GRID format. ArcView 3.x users can use a modified version of the SDTS2DEM utility that was originally developed by the late Sol Katz of the Bureau of Land Management. This version was updated by Gregg M. Townsend, a staff scientist at the University of Arizona, and is available from the University's Web site (www.cs.arizona.edu/topovista/sdts2dem.html) or from the GeoComm International Corporation site.

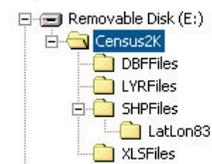
New Names for DLG Files

EROS modified the names of 1:100,000-scale DLG optional format files to match the file-naming structure from different map production centers. The old file-naming convention indicated the map quad, data type, resolution, and tile position. The new naming convention

What You Will Need

- ArcGIS (ArcInfo 8.1, ArcEditor 8.1, or ArcView 8.1)
- ESRI Maps & Data the sample data CD-ROM set (2000 or 2002 edition)
- An Internet connection
- Sample data from *ArcUser Online* Web site
- 50 MB of free hard drive space
- WinZip or a similar zipping utility

Figure 1: Directory structure



includes only a sequence number and the data type. Adding a cross-reference from the old naming convention to the new naming convention, saved as a DBF file related to the Index Map, will make locating desired data easier.

Acquiring and Organizing Files

This exercise requires Disk 1 from the *ESRI Maps & Data* CD-ROM set. Disk 1 contains data for the world and Europe. Before copying any data, create the directory structure shown in Figure 1. Start ArcCatalog and use it to examine Disk 2. Locate the shapefiles shown in Figure 2. Copy each shapefile to the Utility\IndexMap\SHPFiles\LatLon83 subdirectory.

Figure 2

File name	Type
cities_dtl	point
counties	polygon
states	polygon
topoq100	polygon
topoq24	polygon

From the sample data file downloaded from the *ArcUser Online* Web site, 100kdata.zip, extract 100Kdata.shp and place it and the unzipped file in the Utility\IndexMap\DBFFiles subdirectory. In ArcCatalog, navigate to the Utility\IndexMap\SHPFiles\LatLon83 subdirectory and explore the copied data. Each dataset in *ESRI Maps & Data* is fully documented with metadata that uses the content standard for digital geospatial metadata from the Federal Geographic Data Committee. Verify the datum and projection for all shapefiles.

Designing the Index Map

Including the two index shapefiles, topoq24 and topoq100, with shapefiles showing city, county, and state features in the same map document will provide familiar landmarks

for identifying desired files. Establishing a common coordinate system to display all layers and using only an outline color for the quad index files will make it possible to view all the layers in a meaningful way. Relating the DBF file to the 1:100,000-scale index will translate new file names to old file names. Using the Identify tool, it will be easy to locate the correct quad for a project at either scale.

1. With ArcCatalog open, begin an ArcMap session. Size the application windows so both ArcCatalog and ArcMap are accessible.
2. Select all the shapefiles in the LatLon83 directory and drag them to the empty map document in ArcMap. Zoom in on the continental United States.
3. In ArcMap, right-click on the data frame and choose Layers Properties. Click on the Coordinate System tab and select Predefined > Projected > Continental North America > USA Contiguous Albers Equal Area Conic. Note that this does not change the coordinate system of the source data. It merely causes all the layers in the data frame to display in a common coordinate system.
4. If necessary, drag the layers in the Table of Contents so that the index layers are on top followed by the cities, counties, and states shapefiles. Double-click on the legend patch for topoq24.shp to open the Symbol Selector dialog box and choose no fill color and a bright color for the outline. Repeat this process for topoq100.shp. Double-click on the legend patch for the states layer to invoke the Symbol Selector dialog box and create a color ramp for this layer so state boundaries will be easy to see. Follow the same procedure to choose colors for the counties and cities layers that will have enough contrast to be easily discerned.
5. When finished, save the map document as IndexMap.

Zoom in to a familiar portion of the country. Choose Selection > Set Selectable Layers from the menu. In the Set Selectable Layers dialog box, click on the Select All button. Select the Identify tool and click on a familiar feature. By default, the Identify tool acts on the top-most layer. In the Identify Results dialog box, click on the drop-down box next to Layers, select <Selectable layers>, and click on the map again with the Identify tool. Now the Identify Results dialog box includes information for all the layers. In the Table of Contents, turn off the topoq24 layer.

Creating the Relate

In the left pane of the Identify Results dialog box, click on the quad listed under the topoq100 layer. The attribute files for this layer are listed. Note the field called USGS_QD_ID. This field, a concatenation of longitude, latitude, and map tile number, is a shorthand reference for each map. Each USGS_QD_ID in the attribute table for topoq100.shp is asso-

Figure 3

Name	Data in Field
OID	Object ID
USGS_QD_ID	Key field
N_QUADNAME	New quad name
N_TILENO	Location of data in the map
N_DATATYPE	New data type
O_FILENAME	Old file name
N_FILENAME	New file name, used to download data

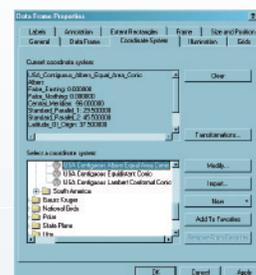
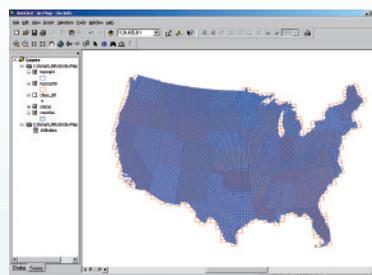
ciated with several files in the 100kdata.dbf, which lists the different types of data for each quad (e.g., TRANSPORT-ROAD, HYDROLOGY, BOUNDARIES). Because this is a one-

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Making the Map Index

Create Map Document

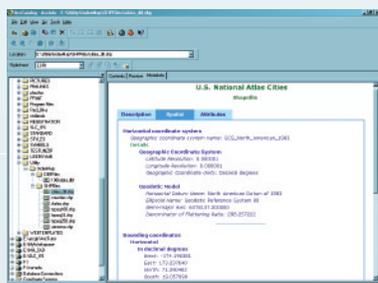
2



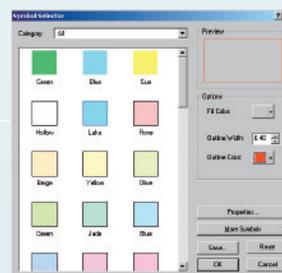
Change the coordinate system used by the data frame so that all layers will display in USA Contiguous Albers Equal Area Conic.

Organize Data

1



After creating the directory structure and adding the data, use ArcCatalog to inspect the metadata for these files.



Use the Symbol Selector to adjust the color symbology for all the layers.

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to-many relationship, the tables for topoq100 and 100Kdata should be related rather than joined. Creating a relate using USGS_QD_ID will supply the file name needed for downloading the file from the USGS site.

In the Table of Contents, right-click on 100kdata.dbf. The Table of Contents display switches from the Display to the Source tab. In the context menu, choose Open Table. Inspect the table. It should contain the seven fields shown in Figure 3.

Get ready to make the relate between the 100kdata.dbf file and the 1:100,000-scale

shapefile attribute table by sizing the map and attribute table windows so the map occupies at least the upper half of the display and the table is immediately below the map. If possible, set the display resolution for the monitor to at least 1,024 x 768 pixels.

1. Choose Selection > Set Selectable Layers from the menu. In the Set Selectable Layers dialog box, click on the Clear All button. Check the box next to topoq100 to make it the only selectable layer and close the dialog box.
2. Right-click on topoq100 in the Table of Contents and select Joins > Relates > Relate from the context menu.
3. In the Relate dialog box, choose USGS_QD_ID for the field the relate will

be based on, choose 100kdata as the table or layer to relate, and choose USGS_QD_ID as the field in the related table to base the relate on. Name the relate 100KRelate so it can be accessed by this name. To learn more about relating data, click on the About Relating Data button.

4. Click OK to establish the relate.

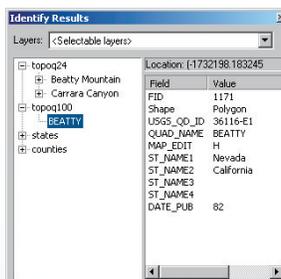
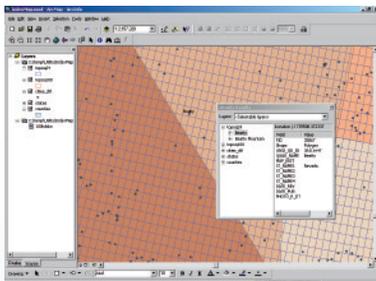
Using the Relate

Relates are used in the table window to find data that is related to a selected record or records. Because relates are bidirectional, both tables involved can use the relate regardless of which table owns the relate.

1. Use the Select Feature tool to click on a single tile in the topoq100 layer.

3

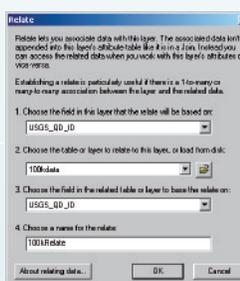
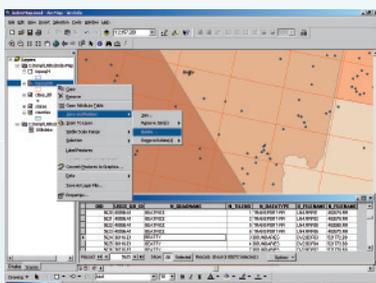
Locate 1:24,000 DEM Data



After changing the layers selection to Selectable Layers, the Identify tool will return information about all layers.

4

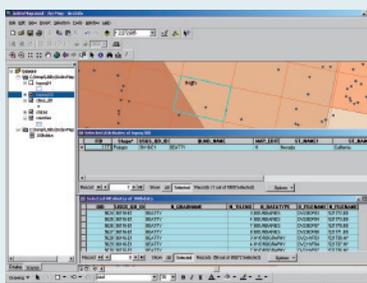
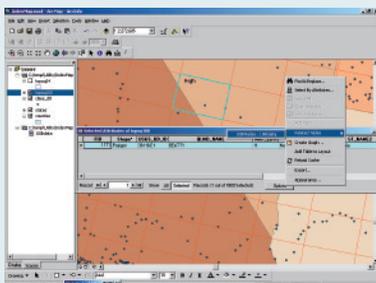
Create a Relate



Create a relate on the topoq100 layer with the 100Kdata.dbf file.

5

Use the Relate



Use the relate by selecting a feature, invoking the attribute table, and choosing Relate > 100Kdata from the Options menu in the table window. The related table is opened with the selected records highlighted.

- In the Table of Contents, right-click on topoq100 and choose Open Attribute Table from the context menu.
- In the table window, click on the Show: Selected button at the bottom to display the selected feature.
- Click on the Options button at the bottom of the table window and choose Related Tables > 100KRelate. The related table (i.e., 100Kdata.dbf) is displayed with the record selected.

To access information for other quads, make a new selection from the topoq100 layer and choose the 100KRelate again as described in Step 4. Examine the old and new file names in the table resulting from the relate. Note the new file name and use it to download

1:100,000-scale data from the EROS site. Use the N_TILENO field for querying the position of locations in the map. A set of queries can be built that show only certain data types. Also, adjacent quads can be graphically selected to list data in areas that span several quadrangles.

Summary

With Index Map, it will be much easier to identify and locate specific desired spatial data in both 1:24,000-scale SDTS DEM and 1:100,000-scale DLG data. When visiting the EROS, Geo Comm International Corporation, or MapMart.com sites, have the Index Map open in ArcMap and use the Windows Task Bar or <Alt><Tab> to switch between the Index Map and the Web browser. A similar

project can also be created in ArcView 3.x by linking, rather than relating, the DBF to the topoq100 shapefile. [\[10\]](#)

Disclaimer

The user assumes all responsibility for use of the sample routines as well as implementation of them to achieve the intended results. The user is responsible for fully testing each portion of the routine prior to relying on it. This information is offered as a sample only, and ESRI assumes no obligation for its operation, use, or any resultant effect in spite of this offer. This information and these sample routines are provided on an "as is" basis, without warranty of any kind.

Please remember to back up your data prior to using this information.