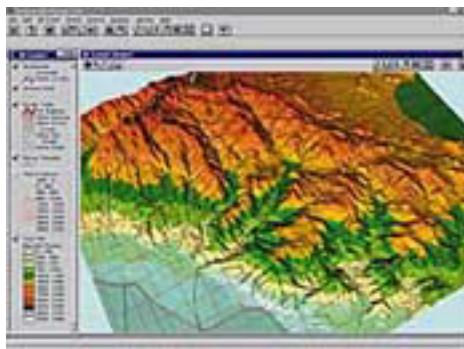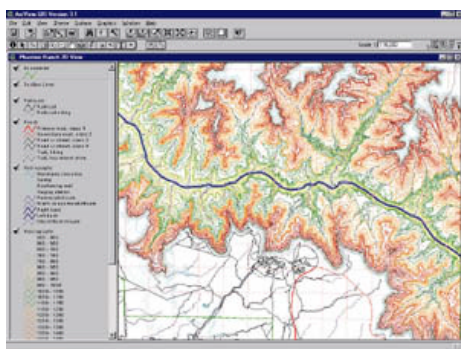# Lesson 1:
Finding Data for Modeling

Lesson Goal: Learn about the types of free downloadable data available from the U.S. Geological Survey (USGS) that can be modeled in ArcView GIS.

What You Will Need: Access to the Internet

Data and/or Utilities: None

DEM data can be used for detailed terrain modeling.

DLG files also provide an excellent source of data for ArcView 3D Analyst.

ArcView 3D Analyst provides desktop GIS users with the tools to create high-quality digital terrain models (DTMs). Modeling data are available in several forms at no charge on the Internet.

The USGS maintains Web sites that provide free downloadable modeling data via FTP protocol. The USGS Earth Resources Observation Systems (EROS) group site is an excellent source of data. Terrain data is available without charge in digital elevation models (DEMs) and digital line graphs (DLGs) format to anyone who is confident and patient enough to download these files.

DEM Data

DEMs in standard USGS format may be loaded directly into ArcView 3D Analyst or ArcView Spatial Analyst. DEMs provide gridded elevation data at various levels of resolution. They may be used as a base for detailed terrain modeling, hydrologic modeling, or other tasks. DLGs include sets of vector data mapped at several scales. Separate sets contain spatial information including hypsography (contour lines), hydrography (lakes, rivers, streams), and Public Lands Survey System (section lines). DLG data sets can also contain transportation data including roads, railroads, and land boundaries.
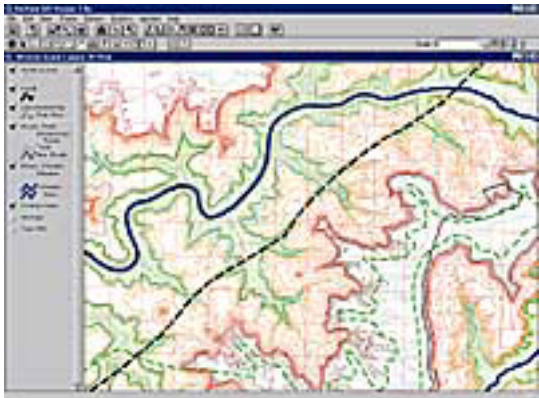
DLG Data

DLG files provide an excellent data set for three-dimensional terrain modeling with ArcView 3D Analyst. Hypsography is readily converted into triangulated irregular networks (TINs). Line and polygon DLG data, such as lakes, rivers, and roads, can be draped onto the TIN. User-generated data in UTM projection may be added to the model.

The modeling procedure is somewhat complicated, but it is also very structured and systematic. Several conversion methods are available to take data from DLG format to ArcView GIS.

Overview of DLG Data Use

Here is a brief description of DLG data acquisition, conversion, and modeling. DLG files are created in a UTM projection using the NAD 27 datum and the Clarke 1866 ellipsoid. Horizontal and vertical units of measure are metric. Data are available at several scales and formats. Consistent, reasonably current data are available throughout the United States at a 1:100,000 scale in an optional format. A newer Spatial
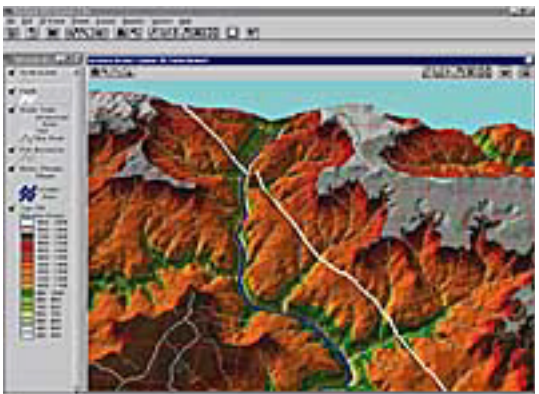
Overview of the Modeling Process

Step 1: Downloaded and converted DLG data, showing contours, hydrology, trails, boundaries, and geographic structures, is displayed in ArcView GIS. This data set depicts Grand Canyon National Park
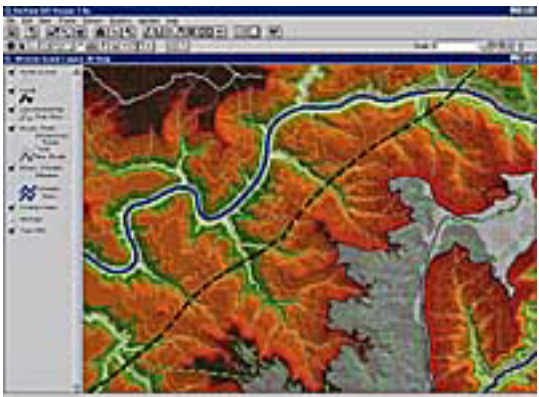
Step 2: A two-dimensional shaded TIN was created from 50-meter contour lines.

Step 3: A three-dimensional perspective view, showing the west end of Grand Canyon National Park, can be displayed in an ArcView 3D Analyst.

Data Transfer Standard (SDTS) format is also available at some scales.

The United States is mapped at 1:100,000 scale as a series of 1-degree by 30-minute map sheets. For download, each sheet is divided into eight 15-minute by 15-minute tiles. Each tile includes five to seven related files containing the vector data listed above. DLG data are downloaded in a zipped GZ format and must be extracted by the user. Individual file names are long and confusing. Data files are best renamed as they are downloaded and unzipped.

File management is very important while downloading data. The most difficult part of the entire 3D modeling process is downloading the DLG data from the Web, which requires time, patience, and organization.

Converting data from DLG for use with ArcView GIS presents other issues. Translating data to an intermediate AutoCAD DXF format appears to be the most stable, intuitive procedure. A third party DOS utility performs the DLG/DXF conversion. Tests are currently underway to determine which switches work best with ArcView GIS. The conversion can be performed interactively or in DOS batch mode. The CAD Reader for ArcView GIS will read the intermediate DXF directly including available elevation.

Using Converted the Files

Once loaded into ArcView GIS, contour lines are readily converted to an ArcView GIS shapefile, which can then be edited and built into a TIN with ArcView 3D Analyst. Other data may now be draped onto the TIN surface to enhance the 3D model. It is not necessary to convert draped DXF data into shapefiles except to edit or enhance the data. ArcView GIS legends built around the layer value field provide many thematic display options. Within each DLG/DXF data set, the CAD layer is coded to provide additional information about data types.

Visit the EROS site and explore the available data, and download some data from your part of the world. Finally, convert and load the data into ArcView GIS and ArcView 3D Analyst and begin to explore in 3D modeling using data from your own backyard.

This lesson is based on an article written by Mike Price of ESRI for the April–June 1998 issue of ArcUser *magazine.*