b. GIS to graphic arts and back again
—traveling between the GIS and graphics workspace

attributes of the process:

- provides seamless flow of vector and raster information from GIS to Illustrator\MAPublisher and Photoshop and back to GIS

- concentrates specific tasks in applications that process those tasks most effectively, and does not depend upon GIS applications for output

- anticipates that products could be produced in variety of formats through a variety of media

- increases productivity and efficiency

components of the process:

1. GIS:
mechanism for collecting, quering, and sorting spatial and tabular data.

2. MAPPING in graphics applications:
mechanism for creating a geologic interpretation. Creating geologic units is a visual process; Illustrator and Photoshop provide the graphic tools necessary for visualizing information on-screen, as well as the drawing tools to create new vector or raster information.

a. Adobe Illustrator/Avenza MAPublisher filter:
mechanism used for desktop geologic mapping since 1998. It has proven to be essential for production of maps, reports, and proposals. Illustrator provides enhanced drawing capabilities not available in GIS, and the MAPublisher filter provides the connection between GIS and the graphic arts. In Illustrator, the Pencil Tool allows the geologist to make much better lines than can be drawn on a paper map or mylar, and bypasses the cumbersome digitizing process. Instant feedback allows polygon and line work to be transferred back to GIS for further analysis with digital data sets before the mapping process is completed. Editing line work is simple and easy. It provides both a means for ensuring high quality output and also facilitates geologic mapping, including traditional interpretative mapping and computer statistical mapping.

b. Adobe Photoshop:
mechanism for creating a single raster product from a diverse set of raster graphics. Computer made geologic maps based on statistical comparisons hold an important place in continuing geologic mapping efforts. They are reproducible, provide information about data variation and uncertainty, and illustrate what is known and what is knowable about geologic systems. Some components require splicing in programs such as Adobe Photoshop (for example, bedrock surface and unconsolidated thickness in Poster C.)
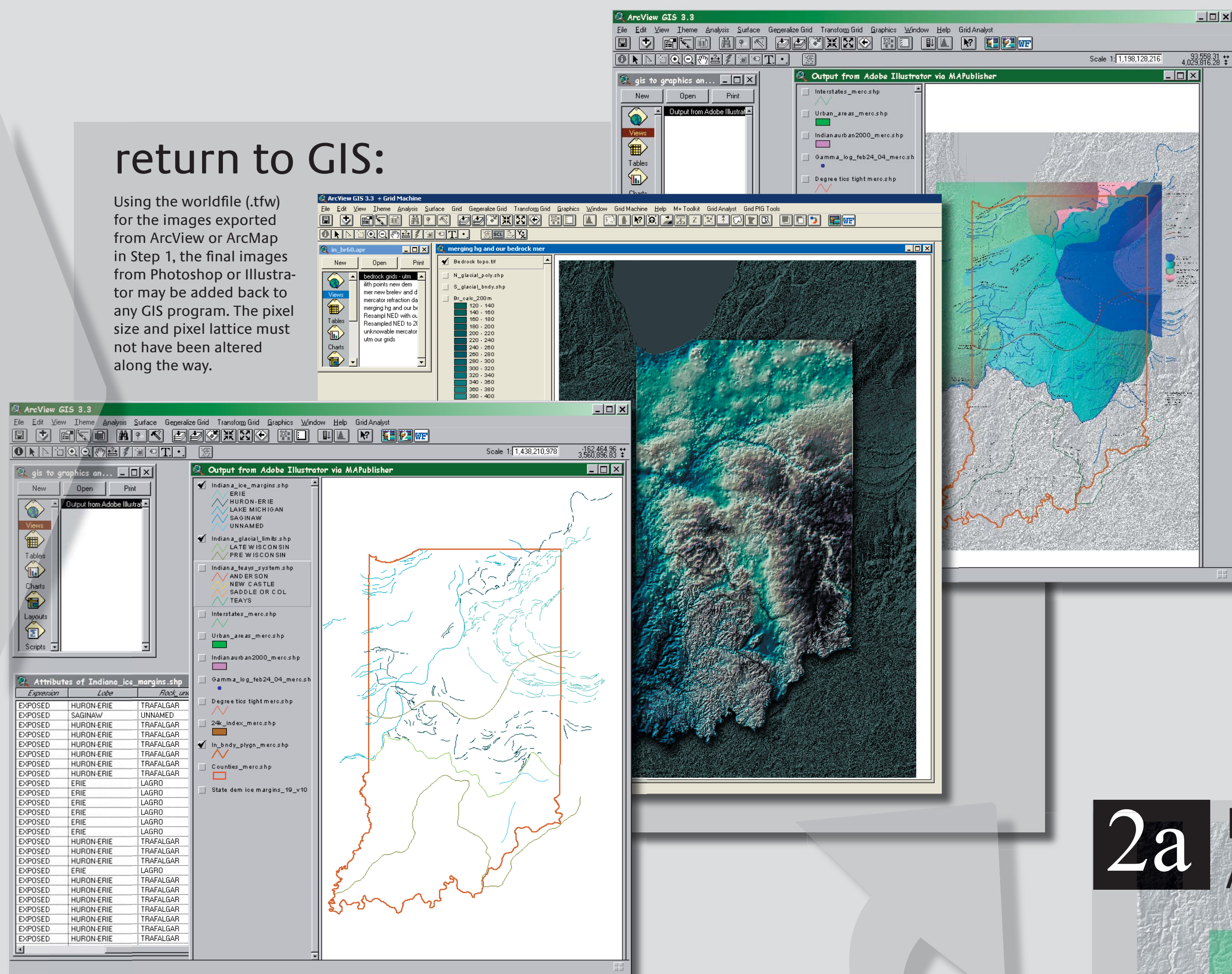
3. OUTPUT—Adobe InDesign:
mechanism for providing a more versatile suite of layout and art control tools than GIS applications. Linkages between working Adobe Illustrator and Photoshop files with georeferenced information to Adobe InDesign layouts have become vital elements of map, report, and proposal preparation.

Indiana Geological Survey
Indiana University
611 N. Walnut Grove
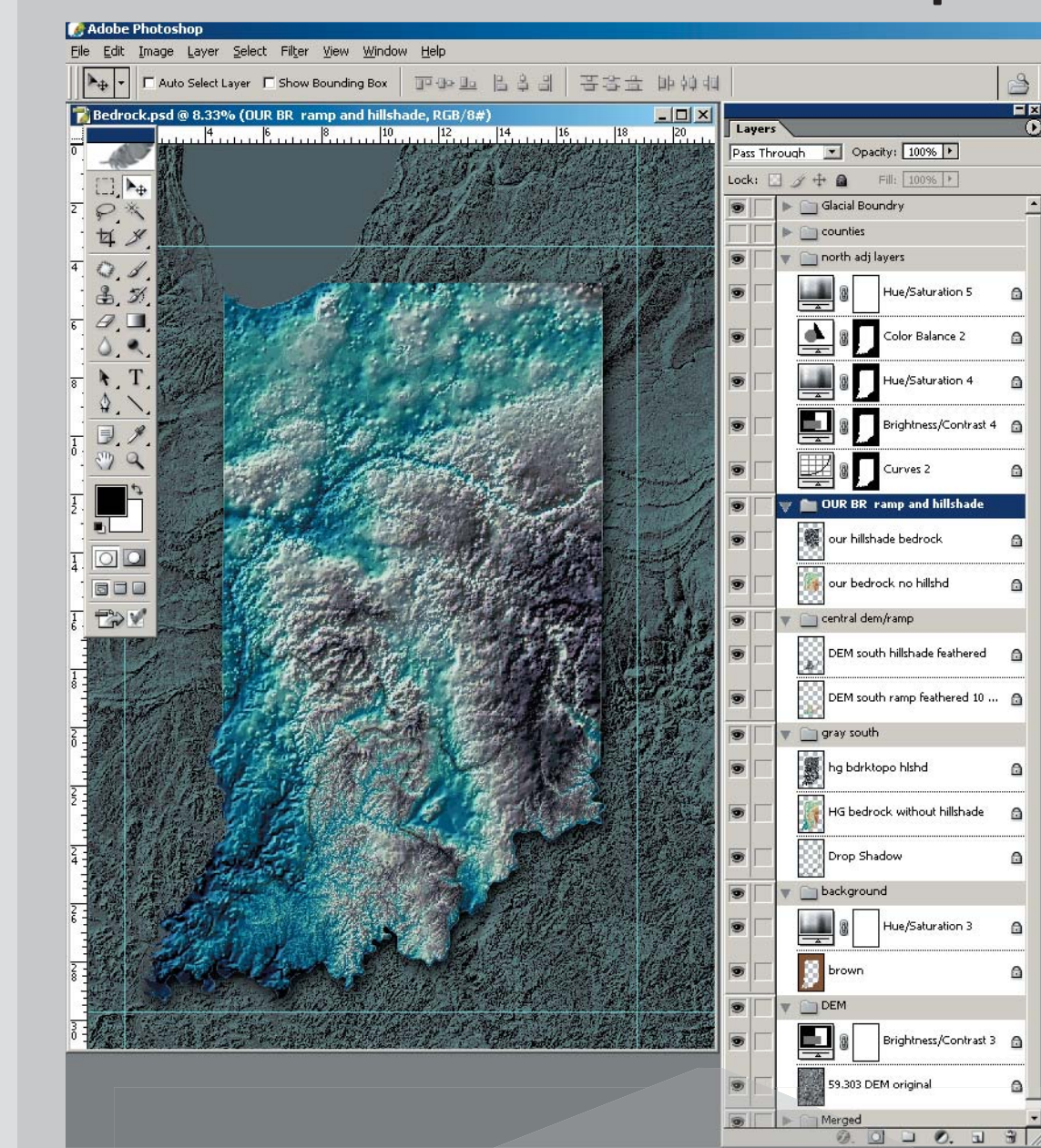Bloomington, IN 47405-2208

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1 GIS—the cornerstone ESRI ArcMAP/ArcView

GIS is the cornerstone of digital mapping and digital geology. The ESRI products are commonly used for visualizing and analyzing spatial and tabular data. From the desktop, one can add layers of data and draw cross sections in 2D, or assemble views with a variety of surfaces and produce 3D cores in a 3D Scene. Images from these views can be exported as .tif, .wmf, .bmp, .eps, .ai, .cgm, or .jpg format.

The process described in this poster is still dependent on ArcView 3.x because of the many key customized extensions available. *See footnotes below.
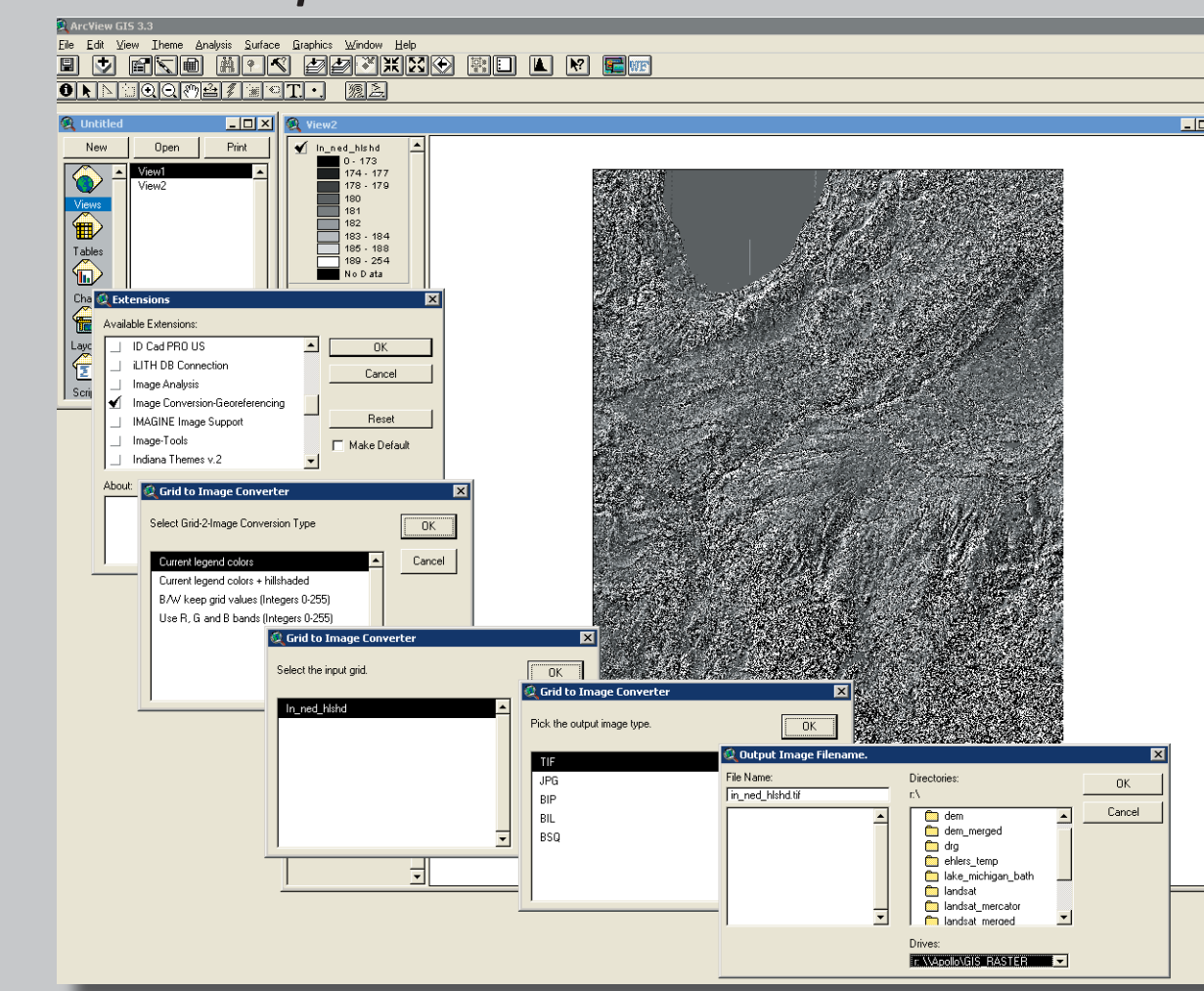
raster images from GIS:

ArcGIS and ArcView have extensions that create world files for raster images that are exported. It is important to chose an extension that preserves the same pixel size and lattice as the original grid. One extension that does just that is the *image_convert_georef.avx* by Joep Luijten (based on the original script by Kenneth McVay).

Using a rectangular projection when working with rasters alleviates many problems caused by nonrectangular projections. *See footnotes below.

return to GIS:

Using the worldfile (.tfw) for the images exported from ArcView or ArcMap in Step 1, the final images from Photoshop or Illustrator may be added back to any GIS program. The pixel size and pixel lattice must not have been altered along the way.

2a MAPPING— vector based units Adobe Illustrator/Avenza MAPublisher

Use Adobe Illustrator and Avenza MAPublisher for on-screen visual data analysis and to create new GIS information. Geologists can increase productivity by creating new geologic information directly on their own desktops utilizing graphics arts tools. No more mylar tracing, map sheet scanning, and time consuming digitizing or vectorizing!
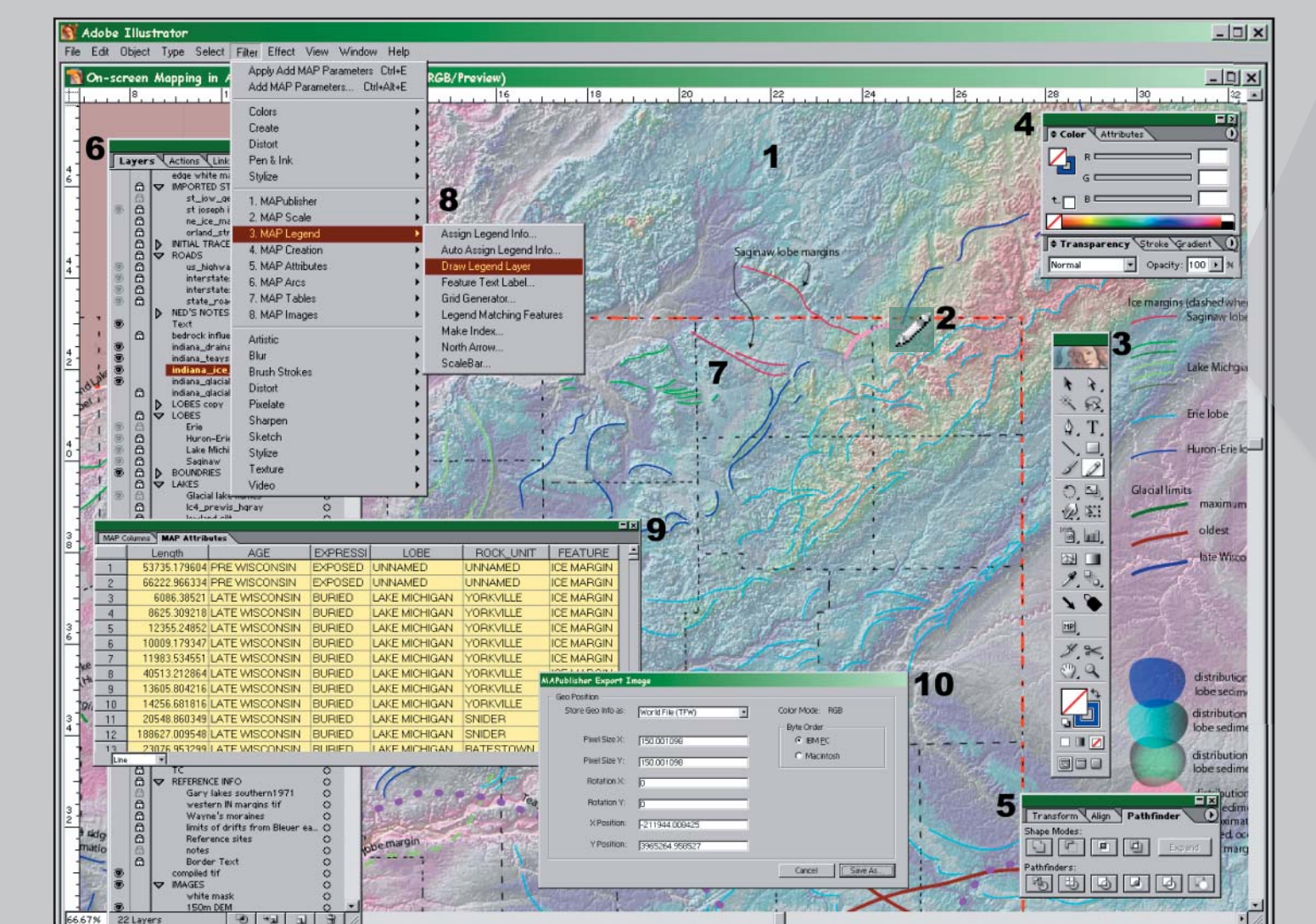
1. Place and register GeoReferenced images such as a DEM or satellite imagery with the MAPublisher filter. Use Transparency Palette to blend and enhance image layers for visual analysis. In this example, a hillshaded image of a DEM is displayed with an opacity of 30 percent and a color-ramped image of a DEM is displayed with an opacity of 35 percent.

2. The Illustrator Pencil Tool is used to freehand draw smooth Bezier lines over the reference data on a new layer.

3. Illustrator provides a complete suite of drawing and art tools to create, design, and manipulate new and existing GIS information.

4. Easy-to-use Illustrator Palettes enable quick and easy professional layouts.

5. The Pathfinder Tools provide for productive and efficient creation of sliver-free polygons.

6. The Layers and Sublayers keep information organized.

7. Use fill and line color or line thickness to graphically sort new information for later attribution.

8. MAPublisher provides a suite of tools to use and create GIS information in Adobe Illustrator.

9. Attribute new data in Adobe Illustrator.

10. Export layouts or artwork as GeoReferenced images. MAPublisher provides a variety of GeoReferenced image formats such as GeoTiff or TIF with a World File.
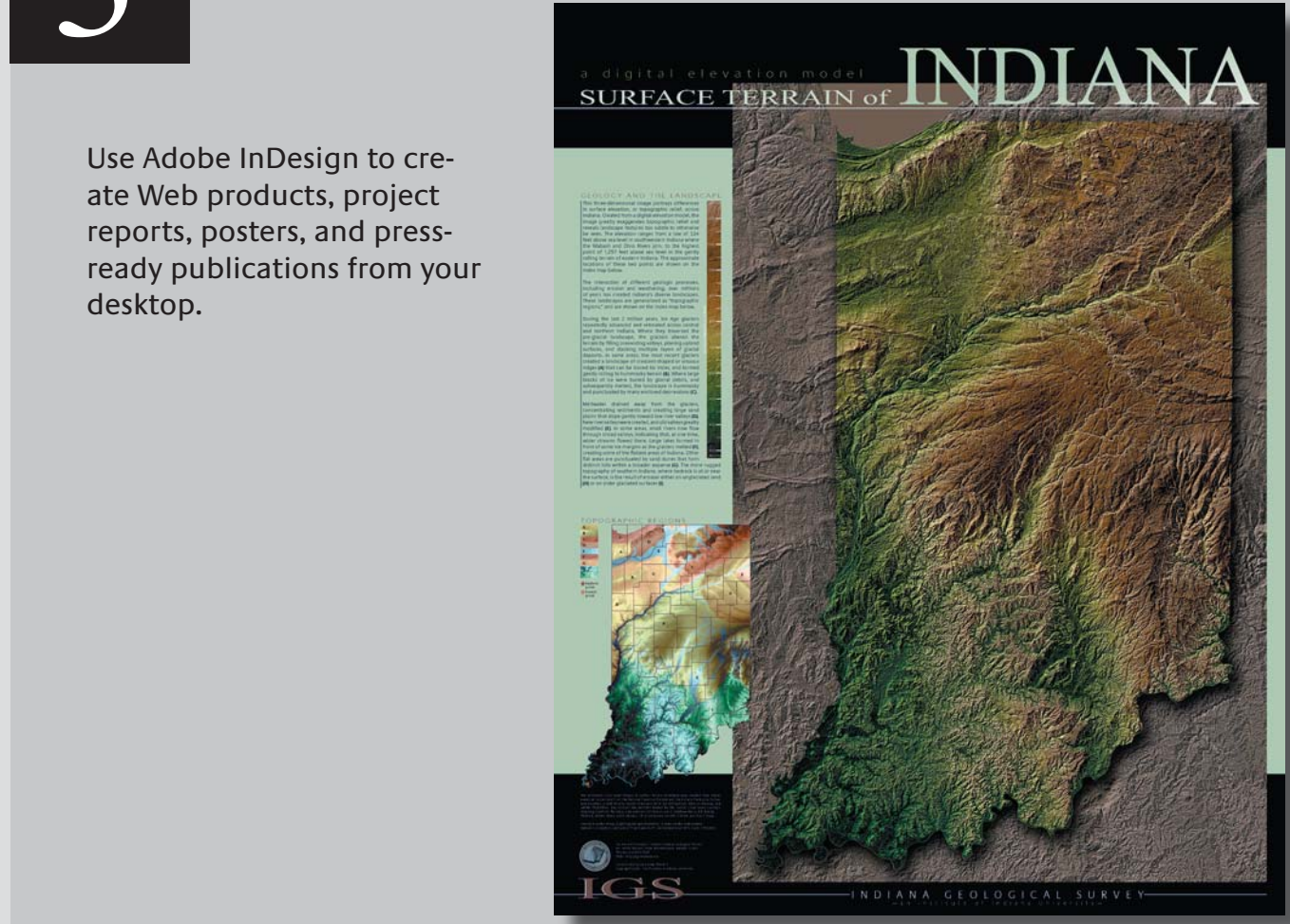

2b MAPPING— raster based units Adobe Photoshop

Adobe Photoshop is the "world-standard" in imaging. An infinite variety of enhancements can be done in Photoshop after the registration of the layers is completed in MAPublisher. Some enhancements can illuminate textures and patterns not usually visible.

Illustration of the "natural continum" can only be accomplished in continuous-tone raster imagery that can be created here. It is important to maintain the same number and size of pixels so that the file can be exported with the worldfile and return to the GIS environment.

Layers added to the bedrock surface map are:

- subtle blending of north and south Indiana imagery from disparate souces

- transparent layer of the hillshaded DEM in the south-central region

- color balance

- brightness/contrast
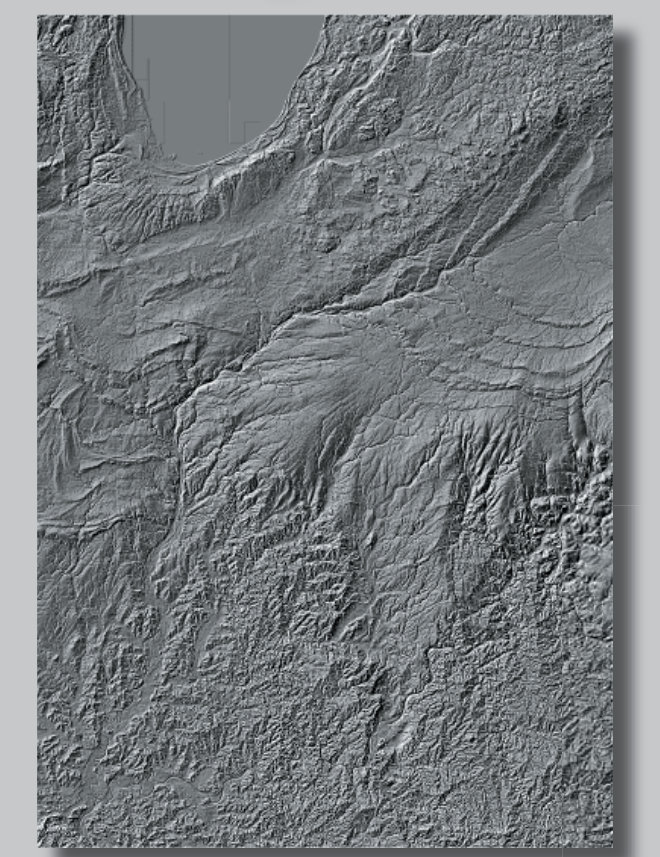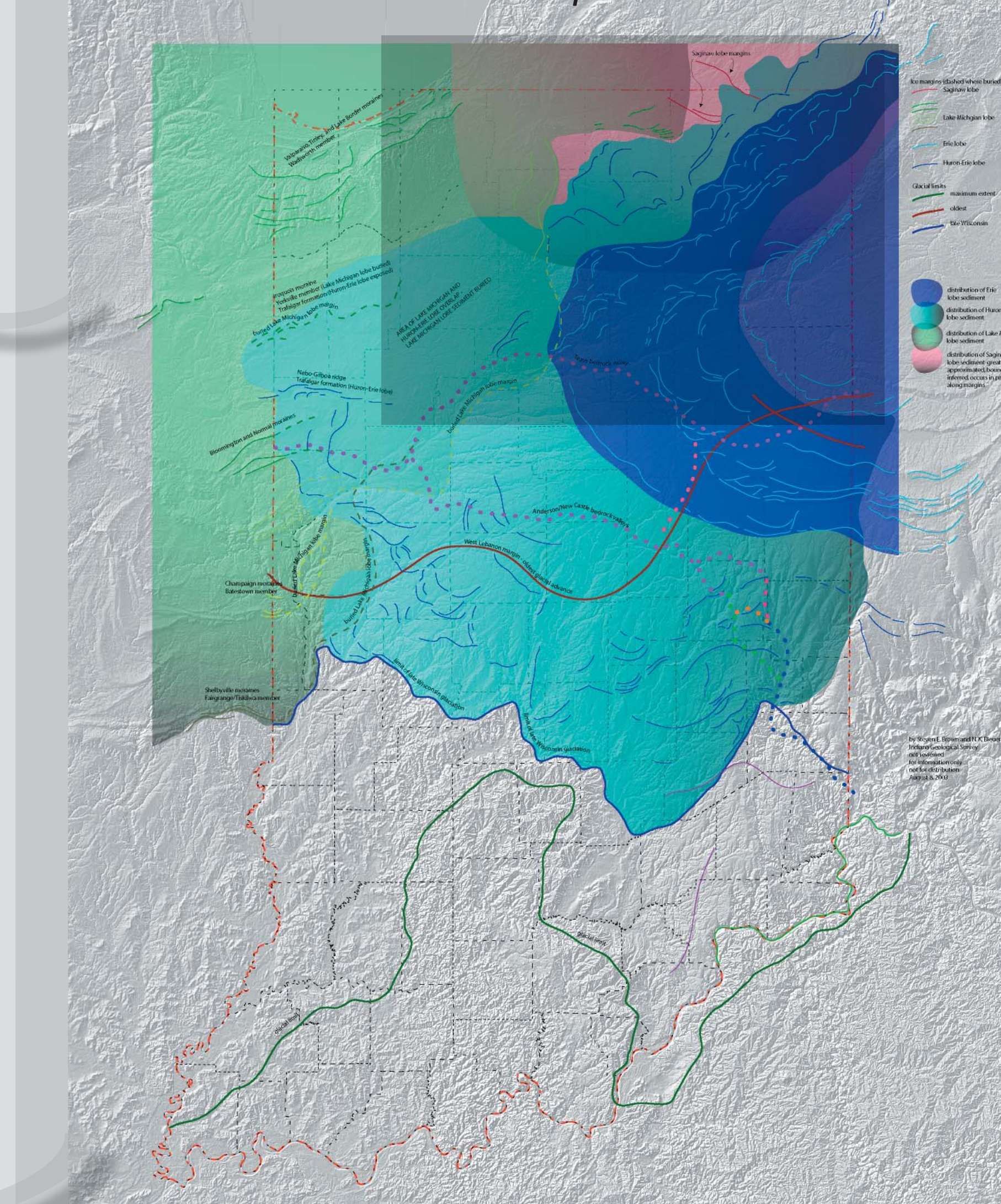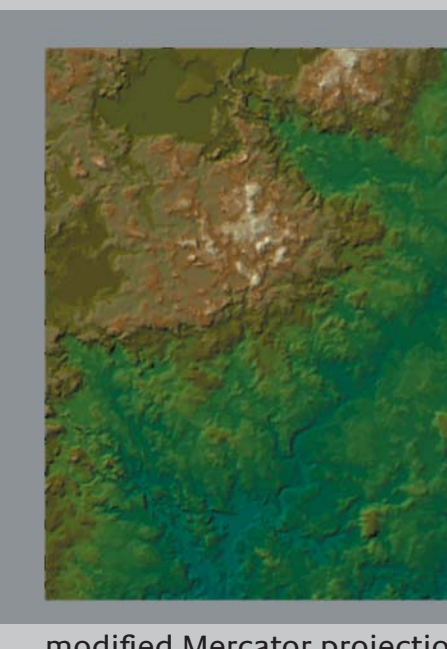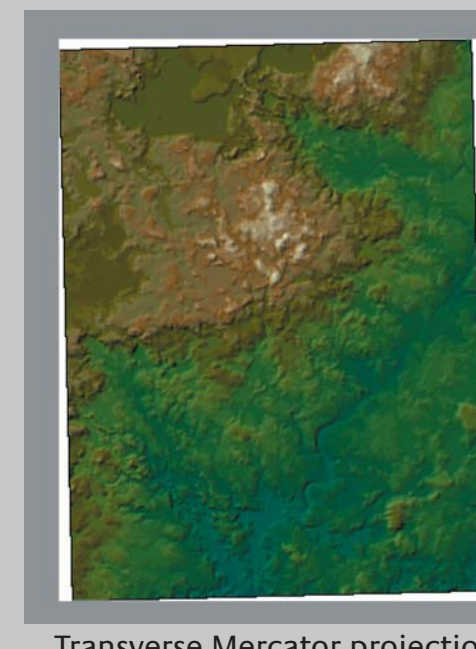
- hue/saturation

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3 OUTPUT—Adobe InDesign

Use Adobe InDesign to create Web products, project reports, posters, and press-ready publications from your desktop.

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* footnotes

a-raster friendly projection:

- assumes that USGS quadrangles are the basic mapping areas
- pixels are square or rectangular—useable image must be also
- easy edge placement of georeferenced images—no slivers to battle
- all map areas oriented in same direction
- no Transverse Mercator edge effects

Transverse Mercator projection   modified Mercator projection

ESRI ArcView 3.x extensions frequently used in this process		
Extension	**Usage**	**Author**
ColorRamp 1.0	For creating continuous color ramps based on values in legends based on RGB, LAB, or HSV color spaces	William Huber, Quantitative Decisions
Image Conversion-Georeferencing	For the creation of TIFF and other image format files with a world file from GRID data, preserves number of pixels in GRID	Joep Luijten
3D Point of View	For the consistent orientation of views of 3D Scenes	Klaus Neudecker
DRG Tools	For manipulation of Digital Raster Graphics	Will Patterson, California Dept. of Fish & Game
Grid Analyst Extension 1.1	For converting images to grids and grids to images and other functions. once converted to a GRID format, raster information can be reprojected and transformed in a variety of ways and then transformed back to an image format, useful for reprojecting Digital Raster Graphics such as topographic quadrangles	Dr. Arun K. Saraf, Indian Institue of Technology
ClipGrid	For producing aligned grid clipping	Tim Schaub
Points to lines or polylines	For conversion of GPS "bread crumb" trails to lines, ArcPad and GPS technology provide for the field documentation of field trip routes, paths to outcrops, and general field documentation of places visited, this utility (and others) converts the continuous stream of GPS points to a continuous line	Dan Patterson
View.AddXYCoordToFTab	For adding coordinate text to the attribute table of a shapefile, used when point data are projected to different coordinate systems and the value of the coordinate information is required for other applications	ESRI
ILITH Database Connection	Opens queries made in ILITH in ArcView, choose SQL or make table	Mike O'Neal, Indiana Geological Survey
3D Core Builder	Use to build 3D cores in 3D views (3DCB.avx)	Mike O'Neal, Indiana Geological Survey
Stratigraphic column Layout 4.0	Use to draw cross sections using selected lithologic logs (SCL.avx)	Mike O'Neal, Indiana Geological Survey
E-Log Plotter	Use to draw cross sections using selected gamma logs	Mike O'Neal, Indiana Geological Survey