

Geologic Maps of Afghanistan

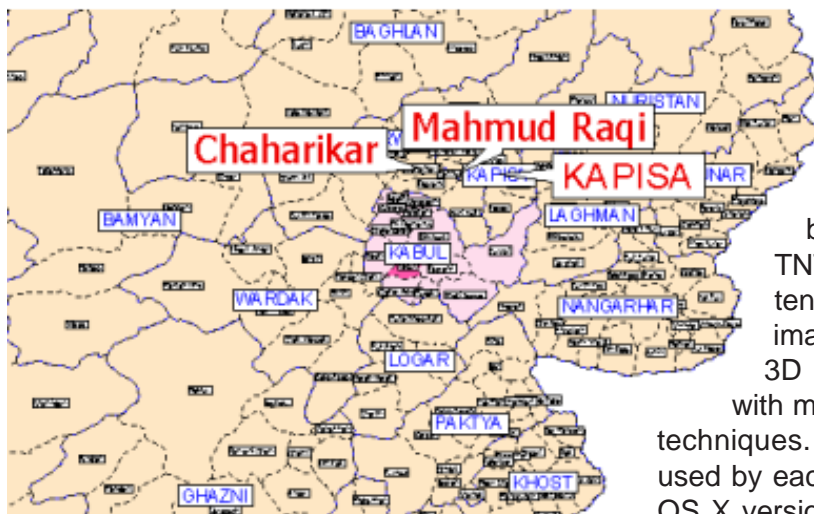
Another Large Project Completed Using TNTmips

1:100,000 series

USGS, under the sponsorship of USAID, is using TNTmips to prepare data for ~250 reconnaissance level, 1:100,000 digital geologic maps of Afghanistan. These will then be generalized into a 1:250,000 geologic map series for this nation.

The maps are being compiled using:

- ~1000 digital scans of Soviet 1:50,000 topographic maps,
- Soviet reconnaissance-level geologic maps,
- multispectral satellite images,
- SRTM digital elevation models, and
- other materials.

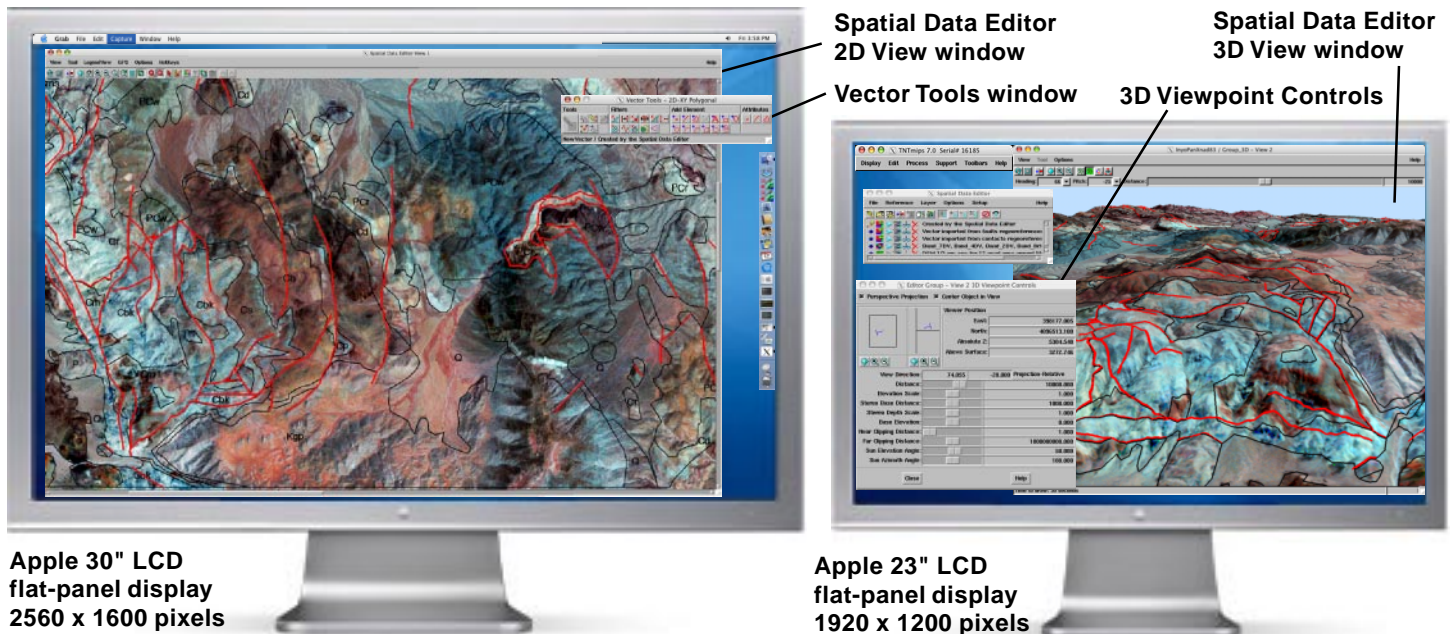


Extensive field work on this project is unrealistic due to mine fields, terrain, and human threats in this nation's remote mountainous areas. As a result this geologic mapping project is being conducted primarily with TNTmips. The USGS staff make extensive use of high resolution satellite imagery, image analysis, and 2D and 3D visualization techniques coupled with manual editing and map production techniques. The procedures and equipment used by each geologist working with the Mac OS X version of TNTmips are described and illustrated in the attached plate entitled Geologic Mapping Station. The team uses a floating license to TNTmips so that, according to individual preference, some staff can use similarly equipped Windows XP workstations that provide them with identical TNTmips functionality.



This activity is being done by a team of USGS geologists each working with a Mac OS X or Windows XP version of TNTmips using procedures and equipment described and illustrated in the attached plate entitled Geologic Mapping Station.

Geologic Mapping Station



TNTmips provides a broad suite of visualization and analysis tools that allow experts in many disciplines (forestry, soil science, geology, and so on) to carry out visual interpretation and mapping projects. For example, geologists can use a combination of 2D and 3D views in the Spatial Data Editor to create digital geologic maps from imagery and/or existing geologic map data. A large-format, high-resolution graphics workstation from Apple Computers provides the perfect environment for utilizing these TNTmips tools.

The geologic mapping station illustrated here consists of TNTmips running on a top-of-the-line Power Mac G5 with dual 2.5 GHz PowerPC processors, 2 to 8 GB of memory, and two Apple Cinema HD Displays. The larger Apple display is a 30" LCD flat-panel (2560 x 1600 pixels), while the smaller display is a 23" LCD flat-panel (1920 x 1200 pixels). The approximate cost of this workstation is US\$10,000.

A MicroImages client is currently using these Mac systems with the 64-bit TNTmips to compile geologic maps to aid in resource evaluation for a nation. New digital geologic maps are being created using older reconnaissance-level vector geologic maps, interpretation of orthorectified Landsat satellite imagery, SRTM 30-meter elevation data, and scanned topographic maps. The Landsat imagery has been pan-sharpened to 15-m resolution, processed with the SRTM elevation data to remove terrain-induced radiance variations, and used

to derive specialized products such as band ratio images to help distinguish different rock types.

The views above show geologic map data being created to scale in the TNTmips Spatial Data Editor by drawing geologic contacts and faults over pan-sharpened Landsat images processed through a TNT geospatial script to remove vegetation effects. The larger display is used for the editor's 2D View and Vector Tools windows. Editing is carried out in this View using the various vector drawing and editing tools. The 30" Apple Cinema Display is large enough and has sufficient resolution to show sizable areas at typical finished map scales of 1:24,000 to 1:100,000 or even when zoomed in to show added detail.

Geologic interpretation is greatly aided by the use of the editor's 3D view to show a perspective view of the reference and map data draped over the terrain surface provided by the SRTM elevation model. The perspective view is shown on the smaller display, along with the Layer Controls and 3D Viewpoint Controls windows.



Apple Power Mac G5
2.5 GHz Dual-processor
8 GB RAM