

Motivation and Capabilities

Our goal in developing GeoMapper was to create a practical, ready to use mapping program to increase the efficiency and quality of field mapping by using GPS support with digital base maps, and standardized archiving of various types of samples including digital photos. GeoMapper/PenMap is not a development package requiring users to create much of the actual program they will use, but a ready to go program.

Practitioners of field geology create and evaluate an enormous amount of visual data and through geo-spatial and temporal reasoning, reach interpretive conclusions of potentially great significance. The implications of geological mapping can be profound. Discovery of ore deposits during exploration, slope stability, sea cliff retreat, and a host of geological hazards are only a few of the many areas of significance of mapping to society. Change in technology of a field takes time and testing of potential options to find those that prove worthy under field conditions. A main goal of developing GeoMapper/PenMap has been to provide an integrated digital mapping system that supports this broad array of disciplines grounded in mapping, and to catalyze, and support a generational evolution from a paper-based technology to the use of modern digital field equipment supported by GIS and Information Technology. Barriers to access and adoption of this digital mapping technology are now very low as the software is free and PenMap Classic has minimal cost.

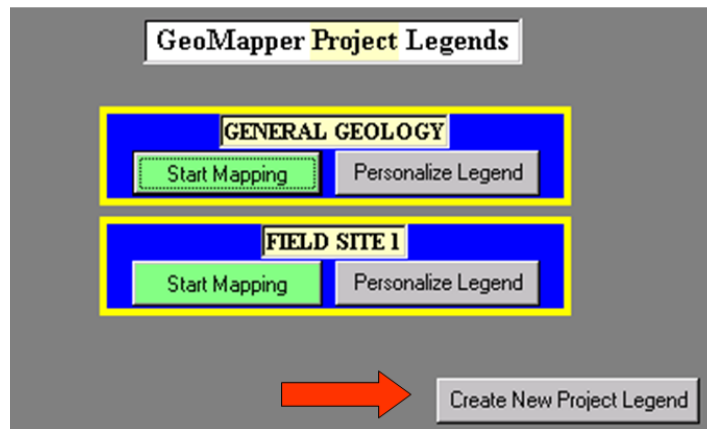
Application areas for GeoMapper include geological mapping, geomorphology, neo-tectonic mapping, applied geophysics, environmental geology, engineering and geotechnical geology, mining geology, and mineral and oil exploration. We developed GeoMapper as a digital mapping computer program to run under Windows XP on pen tablet PC portable field computers so that field mapping could be done by geologists and completed by geologists with a minimum of additional work necessary for map production by GIS specialists. Direct digital mapping has the potential then to (1) sustain a comprehensive GIS archive of data that can easily be augmented with continuing field work including digital photos, rock samples, thin sections, water samples, soil samples, etc. and (2) to also reduce the risk of losing information both in the short and long term. With GeoMapper, work-arounds to accomplish mapping tasks are unnecessary as a comprehensive array of mapping functions is pre-programmed.

GeoMapper/PenMap is designed specifically for direct one-step *paperless* geological mapping by trained practitioners of geology. Visual User Interfaces are a key part of GeoMapper and provide point and click access to action macro buttons organized in arrays that are intuitive for mappers familiar with standard professional field protocols for mapping outcrop lithology, structures, formations, mineralization, wall rock alteration, rock samples, field photos, and notes. By mapping directly into a GIS data base, the primary information on outcrop and sample location is recorded and can, if so desired, be printed out on final maps or simply maintained in GIS data base for use by other professionals. GeoMapper/PenMap has a multiplier effect by making users capable of sophisticated geo-spatial reasoning in the field where on-site interpretation can motivate the next step in mapping by evaluating a working hypothesis rather than doing all interpretation back in the office.

The goal of GeoMapper is to offer a powerful, flexible, and yet inexpensive program that supports the full range of geological mapping and reasoning activities with a minimum of user learning being necessary. While mapping on paper is a useful way to learn geological mapping, paperless digital mapping is now possible and much more in line with 21st Century information and digital electronic technology. GeoMapper/PenMap, if adopted widely, could motivate a transition from traditional paper-based mapping to digital mapping where *the field* is the place of work where a variety of base maps are integrated and used to interpret map patterns as they emerge. Digital field photos, notes, structural data, and geophysical measurements are easily captured in GeoMapper as you map rather than retrieved much later in the office. For example, earthquake epicenters can be overlain on faults to ascertain their neo-tectonic activity or fossil character. The resultant GeoMapper GIS files provide an integrated record of all field activities. Completed color maps can be plotted directly from GeoMapper or component files exported in an array of formats including Shape files, DXF, csv for use in other GIS systems.

GeoMapper is *not* a commercial development package requiring users to master and then have to forge a useable mapping system but rather an out of the box program that simply needs only point and click customization to each specific field site so the local stratigraphic columns can be implemented by buttons in an array by formation age. The necessary strike and dip functions, as well as a host of conventional symbols are already programmed including a variety of types of faults, structural symbols, lithological patterns, mineralization and wall rock alteration features. GeoMapper starts by enabling a user to define project areas that create specific directories for each region and customized stratigraphic legends for lithologies and formations.

GeoMapper Project Manager lets the user define the local stratigraphic column



Using only point and click technology, any user can then customize the generic legend so that the buttons show the time-stratigraphic symbol for each formation and the appropriate color. The buttons for lithology are also customized but instead of color, the standard lithological patterns are selected from a pull down menu and are shown in black.

GeoMapper Legend Maker

Takes < 1 hour using only point and click
 A hard copy of the legend can be printed
 Removes a **serious barrier** to *independent*
 digital mapping

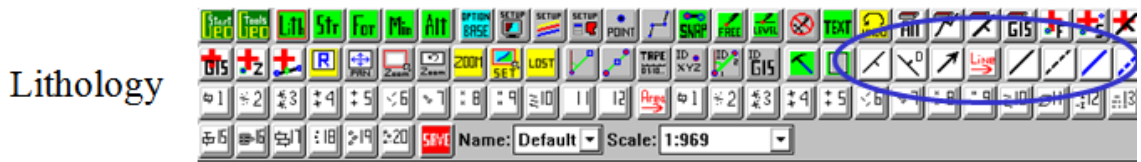
Click on the buttons below to edit their appearance.

Formation Buttons	Formation Names	Area Fills	Layer	Lithology Buttons	Lithology Names	Area Fills	Layer
	Tertiary Bald Peak		FA-F20		breccia		LA-L20
	Tertiary Claremont		FA-F19		conglomerate		LA-L19
	Formation 18		FA-F18		Lithology 18 = sandstone		LA-L18
	Formation 17		FA-F17		Lithology 17 = limestone		LA-L17
	Formation 16		FA-F16		Lithology 16 = chert		LA-L16

User-selected color infill patterns **Selectable pre-programmed lithology patterns (Compton, 1985)**

Button arrays shown below include: Lithology, Formations, Structures, Mineralization, and Alteration. Full editing capabilities make it possible to easily move nodes.

Button Tool bars bring up groups of buttons organized in a logical fashion but providing flexibility in sequence



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