

Geoscience Data Management and GIS at the Yukon Geological Survey

Digital Mapping from the Field to the Internet

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Introduction

The collection, management and publication of geological data have rapidly become dominated by digital techniques. Large amounts of digital data are now being produced, demanding efficient methods of storage, analysis and final presentation.

The Yukon Geological Survey is addressing these increasing digital demands at all stages of the geological mapping process, including field data collection, map production, and distribution of the final products.

The tools for capturing digital geological data must be simple and flexible in order to accommodate the wide spectrum of field studies conducted by the Yukon Geological Survey and the varying needs and abilities of the field geologists. These tools must also ensure consistency in the data collected and conformance with corporate and national standards.



The Yukon Geological Survey has developed a series of tools that facilitate digital data capture in the field and efficient production of geological maps using standard drafting and GIS software (AutoCAD, ArcView 3.x and ArcGIS 8.x). These tools have made it possible to go from field data collection to the release of digital interactive maps within a six month period.

2 Field data collection

At the field station:

- GPS position is recorded and provides the foundation for subsequent digital mapping
- geological observations are entered directly into handheld computers and/or field notebooks.
- digital and regular cameras are used to document field stations in detail.



PLEASE ASK FOR A DEMO!

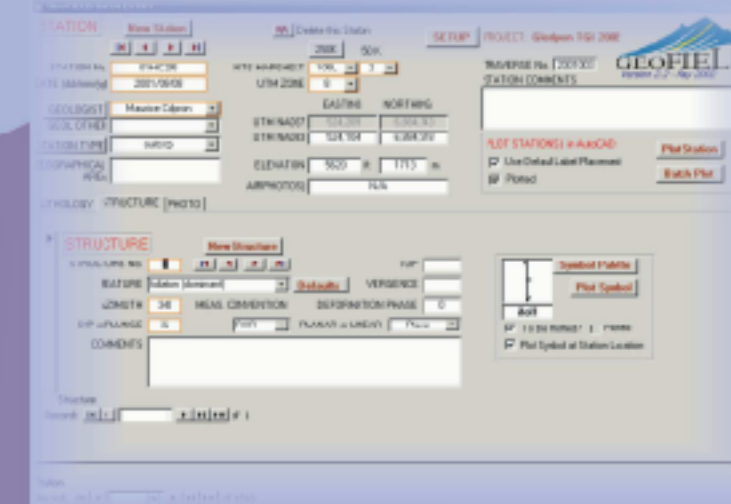
GeoFIELD v2.2 and its comprehensive manual are freely available for download from our website.

3 Field Data Management using GeoFIELD

GeoFIELD is a customized Microsoft Access database application which is used at the Yukon Geological Survey to manage, store, and plot geological field data such as station location, lithological descriptions, structural measurements, samples, and photos.

GeoFIELD features:

- user-friendly interface for data entry and browsing
- facilitates transfer of field data into the GIS environment
- easily customizable picklists ensure consistency and quality control
- can be used with handheld devices in the field
- easy customization of the database for users familiar with Microsoft Access
- complex database query and report capabilities
- quickly plots field station locations and structural symbols in AutoCAD Map or ArcGIS



1 Compilation of existing GIS data

Existing GIS spatial data is compiled in AutoCAD or ArcGIS to perform preliminary GIS analysis, support project planning, and to produce field base maps.

Data gathered includes:

- National Topographic Database (NRCan)
- geophysical and satellite imagery
- digital elevation models
- First Nations settlement lands
- quartz and placer claims
- parks and special management areas
- existing geological information such as MINFILE, assessment reports, and regional scale surficial and bedrock geology.



Preliminary digital manipulation of field data includes:

- downloading data from handheld or manually entering data into GeoFIELD
- plotting stations and structural measurements using GeoFIELD
- digitizing geological contacts and faults interpreted on field base maps
- plotting locations of samples taken for laboratory analysis
- hyperlinking digital photos and scanned slides

Handheld Data Capture:

GeoFIELD can be used very effectively with a Palm OS handheld device for collecting digital data directly in the field:

- simple interface for quick familiarization and minimal loss of valuable field time
- only fundamental information necessary for mapping must be entered (detailed information can be added to database from paper field notes at a later date)
- instant synchronization with GeoFIELD enables rapid daily map updates
- Palm OS devices are cheap, don't require expensive software to set up, and support disposable battery power.

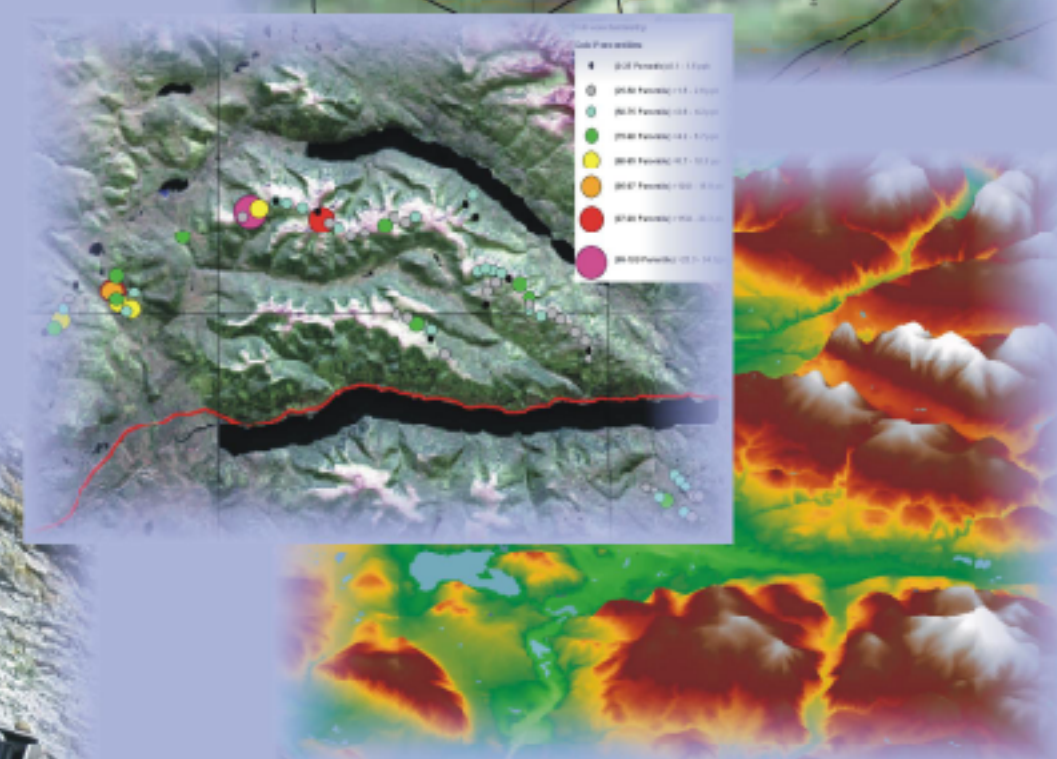


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4 GIS Analysis and Cartography

The real power of a GIS is its ability to portray geographic patterns and relationships by symbolically showing the characteristics, spatial extents and relative proportions of various map features. GIS analysis of digital geological maps include:

- Geological units, contacts and faults are classified using unique attribute values such as lithological unit, contact reliability or fault type.
- Point features such as age dates, till geochemistry and till clast lithologies are broken down into classes and displayed using a variety of symbol types, including charts and graduated sizes and colours.
- Raster images are manipulated in appearance to emphasize different features such as structure, relief, geophysical anomalies and vegetation
- Surface analysis is used to produce 3D visualizations of terrain



Cartographic features must also be added to the maps:

- Text labels are added for geological and topographic features (hydrology, elevation contours, physiography) either through automatic generation from attribute data, or manually.
- Legends, coordinate system graticules, and logos are added to the surrounds of the digital map.

The cartographic abilities of ArcGIS have greatly improved in the latest release of desktop GIS, although text editing and graphical design capabilities are still limited.

Adobe Illustrator has been used with great success to generate complex geological legends which are easily imported into the ArcGIS map layout. Complicated graticules can also be produced in external software such as AutoCAD, and then imported into ArcGIS.

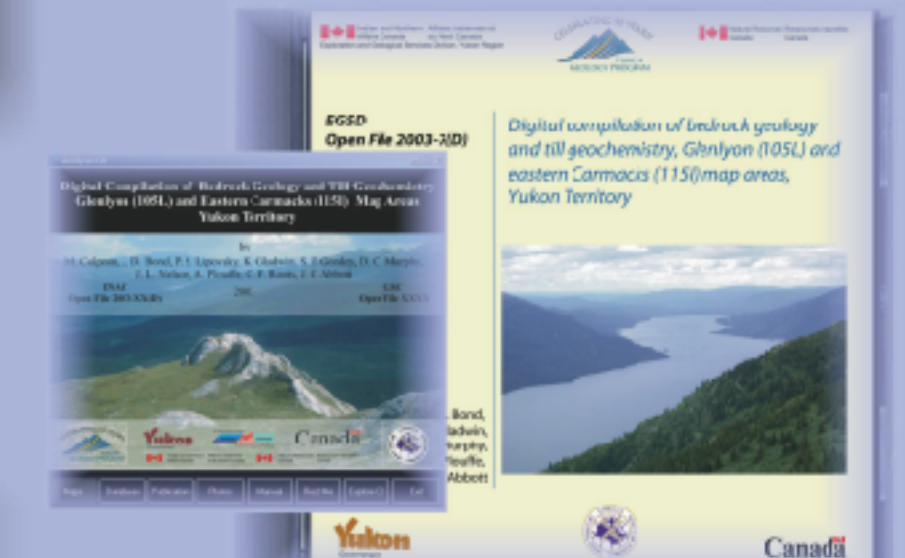
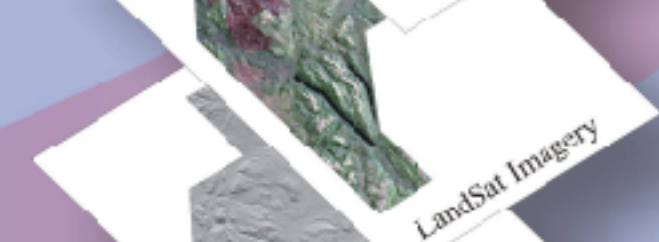
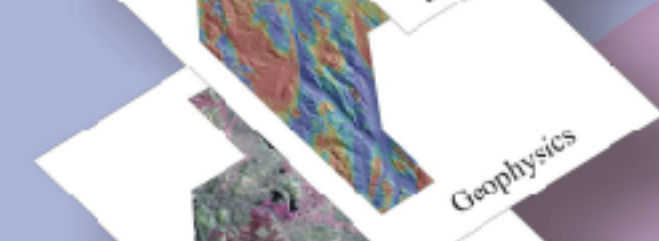
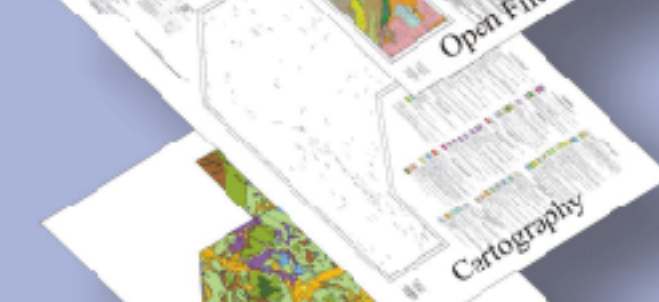
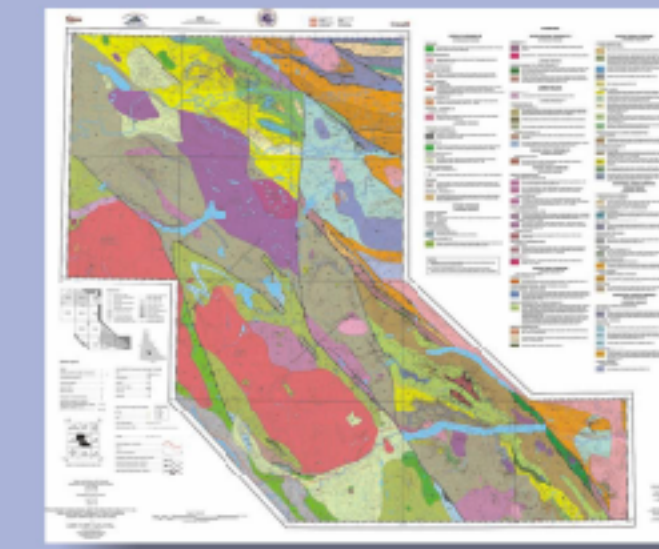
5 Digital mapping products

Geological maps and reports:

Open File Maps, Geoscience Maps and Bulletins are the hardcopy outcomes of digital geological mapping programs.

They are available for purchase as hardcopies from our sales office or as free PDF downloads from our website:

www.geology.gov.yk.ca



CD-ROMs:

Digital compilations on CD-ROMs are rapidly becoming a favoured medium for release of large volumes of geoscientific information by the Yukon Geological Survey.

They provide interactive interfaces to browse spatial data in various GIS formats, YGS publications, field databases and colour photographs.

A variety of YGS spatial data is available on CD-ROM, including MINFILE, regional mapping programs, geophysics, regional stream geochemistry, regional mineral assessments, terrain hazards and much more.

Yukon Digital Geology compilation CD and internet maps:

Ultimately, the results of geological mapping are incorporated into a Yukon-wide regional compilation. The geological spatial data can be interactively browsed in CD format or through our internet Map Gallery at:

www.geology.gov.yk.ca/gallery/index.html

