DIGITAL MAPPING TECHNIQUES 2021

The following was presented at DMT’21
(June 7 - 10, 2021 - A Virtual Event)

The contents of this document are provisional

See Presentations and Proceedings from the DMT Meetings (1997-2021)

http://ngmdb.usgs.gov/info/dmt/
GeMS-in-Excel

as Editing Mechanism

Jordan T. Hastings
UC Santa Barbara

USGS Grant G20AC00014
Undoubtedly, Excel is everyone’s go-to software for tabular data entry, manipulation, analysis and visualization. Excel is also a developer’s dream: it is fast, portable, stable, and extensible, with APIs attuned to the user interface that the world already knows.

For over a decade, I have been programming scientific data management in Excel. Through the NCGMP-funded coop at UC Santa Barbara, I am now exploring how to leverage Excel for geologic maps, GeMS specifically. In my DMT21 talks, I show how Excel can be utilized to:
1) deliver our geologic maps to end-users, many of whom lack or eschew GIS software; and
2) facilitate end-users' own work with our geologic maps, in field engineering, resource studies, survey, etc.
BACKGROUND

Currently

GISc Researcher, UCSB

Formerly

Chief Cartographer, NBMG

Long ago / first training

Database Professor, UNR

→ Advanced love / hate relationship with geologic maps in GIS databases
FOREGROUND

Try something new  Same old

Excel  GIS

Database
FOREGROUND

Try something *really* new  

Same old

Do it ALL in Excel!
FOREGROUND

really new workflow

Paper MAP → Excel → Digital MAP

Database

Database & File ESRI-compatible
FOREGROUND

Different focus – the map-user

Simplify, simplify
OUTLINE

GIS-in-Excel Processing

• Image Feature Extraction (raster-to-vector) - optional
• Feature Digitizing (points, lines, and polygons)
• Topology Construction (lines+points → polygons)

Excel GIS Data File

• Raster and Vector data types
• Editable (vector) data in-situ
• Esri compatible → fluidity
• Standards support → longevity
GEOLOGIC MAP

GIS IN EXCEL

Map Portion

Raster in Excel
GIS IN EXCEL

Generated KML

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              -116.99,39.79,3
              -116.99,39.78,4
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          </LinearRing>
        </outerBoundaryIs>
      </Polygon>
    </Placemark>
  </Document>
</kml>
```

Image in Google Map
EXCEL GIS DATA FILE

Develop an ODBC driver for the esri File Geodatabase

1 Comment

by JoshuaBixby MVP 02-20-2021 08:05 AM

I gave up on this hope/wish/dream many years ago. Fortunately with Esri’s move to improve functionality and support for its mobile geodatabase format, which is based on SQLite, I am more interested in moving away from file geodatabases as much as possible.

GeoPackage = SQLite + Esri ST
EXCEL GIS DATA FILE

<table>
<thead>
<tr>
<th></th>
<th>Ent/File GDB</th>
<th>Personal GDB</th>
<th>Shapefile</th>
<th>GeoPackage</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

KML is a (wonderful) transport format, but not a data storage format.
EXCEL GIS DATA FILE

GeoPackage

Non-Esri / Non-MS Personal Geodatabase

An Open Format for Geospatial Data

GeoPackage is an open, standards-based, platform-independent, portable, self-describing, compact format for storing and transporting geospatial data.

https://www.geopackage.org/implementations.html
Relatively simple geology

- Surficial and Igneous units
- Fault structure “in your face” still active and well studied -- even in the lake
- Intra-unit contacts (from lava flows)
- Fine cartography
TAHOE-DONNER MAP  Kings Beach Quad

Simplify, simplify

Table Of Contents

- Personal GDB
- C: \work\GeMSiE~Tahoe\MS_060_Tahoe-
- GeologicMap_Mercator
  - ContactsAndFaults_2
    - <all other values>
    - Type
      - contact
      - fault, with ball on downdropped
      - map boundary
      - shoreline
  - MapUnitPolys_2

- GeoPackage
- C: \work\GeMSiE~Tahoe\MS_060_Tahoe-
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    - <all other values>
    - Type
      - contact
      - fault, with ball on downdropped blc
      - map boundary
      - shoreline
  - main.MapUnitPolys_2

DMT21 Meeting (Zoom)
GeMS EDITING

Immediate Next Steps (target Fall 2021)

1. Extend GeMSiE to support GeoPackage (ODBC)
2. Write GeoPackage conversion Script for ArcMap
3. Adapt simple feature sketch tool to GeMSiE/GeoPackage
4. Write Point+Line → Polygon processor in Excel

Future Ambitions

1. Integrate Image → Vector feature extraction in GeMSiE
2. Adapt Excel’s 3D MapViewer to “see” GeoPackage
THANKS!

[end]