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/
The following slides were presented by Kyle Gawinski at DMT '21. They explain the current method the South Carolina Geological Survey is using to collect, display, and store subsurface data. Standardization and consistency are two of the major themes of this presentation. A method for inputting subsurface data into GeMS databases is also described.
Updates on Using Survey123 to Log Borehole Cuttings and Produce Geologic Maps
Subsurface Data

Collection
Using Survey 123

Display
Exporting from Survey 123 to Strater

GeMS
Exporting from Survey 123 to a Shapefile

3D
Using ArcHydro
Borehole Logging

Using Survey 123
Manual Entry or Dropdown Selection

Purpose

- Paper → Digital Logs
- Standardized Data Collection
- Survey 123 → tailored to fit needs, exportable, GeMS compliant

Tradition Description

Dark yellowish orange, silt matrix supported, well sorted, subangular to subrounded, very fine to fine quartz sand.

Survey 123 Generated Description

clayey-sand (55-15-30), very dark gray (10YR 3/1), light brownish gray (10YR 6/2), yellowish brown (10YR 5/8), light bluish gray (1B 8/1), stiff, dense, medium - coarse, moderately sorted, sub angular - sub rounded, sub prismoidal - sub discoidal, clay matrix quartz with scattered, very fine - fine, sub rounded, spherical opaques with rare, medium-coarse, sub angular, smoky quartz, rutile, and very coarse - granule iron-stained quartz and quartz
Picture References

- **My Survey**
  - **Sand Size:**
    - Sand Size 1:
      - very fine (1/16–1/8 mm)
      - fine (1/8–1/4 mm)
      - medium (1/4–1/2 mm)
      - coarse (1/2–1.0 mm)
      - very coarse (1.0–2.0 mm)
      - gravel (2.0–4.0 mm)
      - pebble (4.0–64.0 mm)
    - Sand Size 2:
  - **Roundness 1:**
    - very angular
    - angular
    - sub-angular
  - **Roundness 2:**
    - sub-rounded
  - **Sorting 1:**
    - very poorly sorted
    - poorly sorted
    - moderately sorted
  - **Sorting 2:**
    - moderately sorted
    - well sorted
    - very well sorted
  - **Minerals and Matrix:**
    - Major Mineral (>25%): calcite, carbonate
    - Secondary Mineral (10-25%): fossiliferous, phosphatic
    - Matrix: silt matrix, silt matrix supported
Interactive Ternary Diagram

Sand - Silt - Clay %
65-25-10

Sed Composition
silty-sand
Borehole Logs

Using Strater
Collars / Coordinates

Lithology

<table>
<thead>
<tr>
<th>Hole ID</th>
<th>From</th>
<th>To</th>
<th>Lithology Keyword</th>
<th>Lithology Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUL-6</td>
<td>0</td>
<td>1</td>
<td>Road fill</td>
<td>Road fill</td>
</tr>
<tr>
<td>MUL-6</td>
<td>24</td>
<td>23</td>
<td>Clayey sand</td>
<td>Strong brown (75YR 5/8), crumbly, friable by 50% a From 7.0 ft At 5:38 ft c At 10:08 h By 13:08 i By 16:08 j By 19:08 k By 22:08 l By 25:08 m By 28:08 n By 31:08 o By 34:08 p By 37:08 q By 40:08 r By 43:08 s By 46:08 t By 49:08 u By 52:08 v By 55:08 w By 58:08 x By 61:08 y By 64:08 z By 67:08</td>
</tr>
</tbody>
</table>
Boreholes in GeMS
Methods

- Export shapefile from Survey 123
- Script → fill in “Stations” feature class and “StationsBoreholeLogs” table
Stations (GeMS Feature Class)

- FieldID
- LocationConfidenceMeters
- ObservedMapUnit
- MapUnit
- Symbol
- Label
- PlotAtScale
- DataSourceID
- Notes
- Stations_ID
- TimeDate
- Observer
- SignificantDimensionsMeters
- LocationMethod
- GPSX
- GPSY
- PDOP
- MapX*
- MapY*
- ElevationMeters*
- LocationDescription*
- LoggedBy*
- County*
- Drilled By*
- Helpers*
- SampleID*
- Photo*
- Method*

GeMS Feature Classes and Tables

StationsBoreholeLogs*

- FieldID
- TopContactDepth_ft
- TopContactDepth_m
- BottomContactDepth_ft
- BottomContactDepth_m
- TopContactElevation_ft
- TopContactElevation_m
- BottomContactElevation_ft
- BottomContactElevation_m
- BoreholeUnitThickness_ft
- BoreholeUnitThickness_m
- BoreholeUnit
- Description
- IdentityConfidence
- DataSourceID
- StationsBoreholeLogs_ID

*Added
“While it is important to recognize the importance of geologic features for groundwater analysis, we did not attempt to create a comprehensive geologic map database in the groundwater data model design” (Strassberg et al., 2011).
Cross Sections

Borehole Viewer

Fence Diagrams
Thanks!

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https://www.dnr.sc.gov/geology/

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