

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

South Carolina Department of
Natural Resources Geological Survey

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Subsurface Data

Collection →

Using Survey 123

Display →

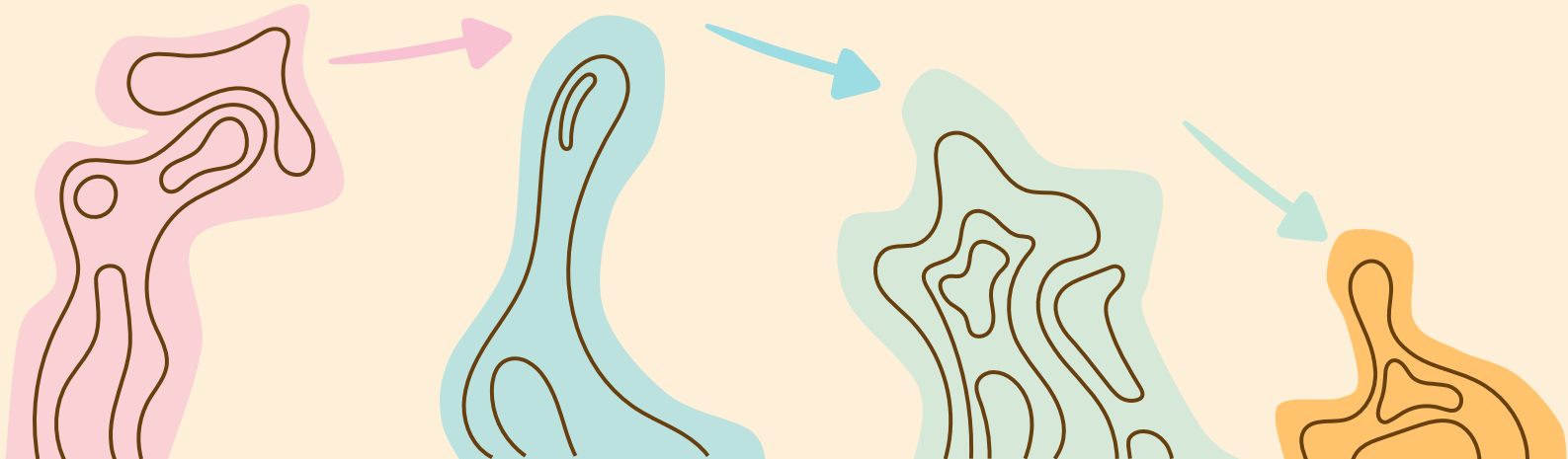
Exporting from
Survey 123 to
Strater

GeMS →

Exporting from
Survey 123 to a
Shapefile

3D

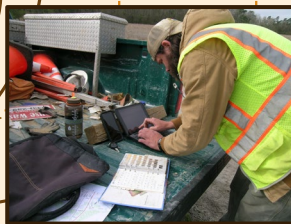
Using ArchHydro



The background of the slide is a topographic map with brown contour lines and a dashed orange grid. A pink map of North America is overlaid on the left side. A light blue wavy line is visible in the top right and bottom right corners.

Borehole Logging

Using Survey 123



DRILL HOLE LOG

Date: 2/2/2017 Total Depth: 10
 Field Number: 123 Agency: SCGM Geological Survey
 Logged by: David C. Chubbey
 Drilled by: Greg Smith
 UTM Coordinates: 69770 E 5742284 N

DESCRIPTION

0-10 cm: ...
 10-15 cm: ...
 15-20 cm: ...
 20-25 cm: ...
 25-30 cm: ...
 30-35 cm: ...
 35-40 cm: ...
 40-45 cm: ...
 45-50 cm: ...
 50-55 cm: ...
 55-60 cm: ...
 60-65 cm: ...
 65-70 cm: ...
 70-75 cm: ...
 75-80 cm: ...
 80-85 cm: ...
 85-90 cm: ...
 90-95 cm: ...
 95-100 cm: ...

SC Geological Survey Borehole Log

Drill Hole ID: 123 Date: 2/2/2017 County: Horry
 Field Number: 123 Agency: SCGM Geological Survey
 Logged by: David C. Chubbey Drilled by: Greg Smith
 UTM Coordinates: 69770 E 5742284 N Collar Elevation: 32.5 Feet Total Depth: 10.0 Feet
 Method: Paper Log
 Location Description: 123000 Southeast of Five Creeks South on the Northwest side of Gustavia Island

DESCRIPTION

0-10 cm: ...
 10-15 cm: ...
 15-20 cm: ...
 20-25 cm: ...
 25-30 cm: ...
 30-35 cm: ...
 35-40 cm: ...
 40-45 cm: ...
 45-50 cm: ...
 50-55 cm: ...
 55-60 cm: ...
 60-65 cm: ...
 65-70 cm: ...
 70-75 cm: ...
 75-80 cm: ...
 80-85 cm: ...
 85-90 cm: ...
 90-95 cm: ...
 95-100 cm: ...

Purpose

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

Manual Entry or Dropdown Selection

My Survey

Information

Date: Tuesday, Mar 14, 2017 County: Horry
 Quadrangle: DUF-1 Field ID: DUF-1
 Collar Elevation (ft.): 99 Total Depth: 10 UTM Easting: UTM Northing:
 GPS Location: Position source closed error
 Crew: Logged by: Drilled by: Helpers: Borehole Method:
 Location Description:

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 (10B 8/1), stiff, dense, medium - coarse, moderately sorted, sub angular - sub rounded, sub prismatic - 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

very surf, fissile

Sand Size:

Sand Size 1:

- very fine (1/16-1/8mm)
- fine (1/8-1/4mm)
- medium (1/4-1/2mm)
- coarse (1/2-1.0mm)
- very coarse (1.0-2.0mm)

Sand Size 2:

- medium (1/4-1/2mm)
- coarse (1/2-1.0mm)
- very coarse (1.0-2.0mm)
- granule (2.0-4.0mm)
- pebble (4.0-64.0mm)

Roundness:

Roundness 1:

- very angular
- angular
- sub-angular

Roundness 2:

- sub-rounded
- rounded
- well-rounded

Sorting:

Minerals and Matrix:

Major Mineral (>25%):

- quartz
- phosphate
- calcic sand

Secondary Mineral (10-25%):

- carbonate
- shell hash
- gravel

Matrix:

- silt matrix
- silt matrix supported
- silt coated
- clay matrix
- clay matrix supported

Sed Texture

My Survey

Roundness 1: sub-angular

Roundness 2: sub-rounded

Sorting:

Sorting 1:

- very poorly sorted
- poorly sorted
- moderately sorted

Sorting 2:

- moderately sorted
- well sorted
- very well sorted

Minerals and Matrix:

Major Mineral (>25%):

- quartz
- phosphate
- calcic sand

Secondary Mineral (10-25%):

- calcic
- shell hash
- glauconitic
- gravelly
- fossiliferous
- phosphatic
- quartzose
- micaceous

Matrix:

- silt matrix
- silt matrix supported
- silt coated
- clay matrix
- clay matrix supported

Sed Texture



Borehole Logs

Using Strater

PythonScript

Quinn Nisbet & Tanner Arrington

Collars / Coordinates

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q |
|----|---------|---------|----------|------------|-----------|-------------|-----------|------------|--------|----------|------------|------------|-----------|-------|------------|---------------------|
| 1 | Hole ID | Easting | Northing | Starting D | Ending De | Location | Date | Logged by | County | Quadrang | Drilled by | Helpers | Sample ID | Photo | Drill Hole | Method |
| 2 | MUL-6 | 660612 | 3780143 | 0 | 50 | 3000ft We | 02March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger (measur |
| 3 | MUL-7 | 657796 | 3777440 | 0 | 50 | 4700ft Sou | 02March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | MUL-7-47 | no | | Power Auger (measur |
| 4 | MUL-8 | 660003 | 3783684 | 0 | 60 | 1000ft Noi | 04March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |
| 5 | MUL-9 | 656868 | 3779568 | 0 | 32 | 200ft East | 04March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |
| 6 | MUL-11 | 655037 | 3783050 | 0 | 7 | 200 feet si | 05March21 | C. Andrew | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |
| 7 | MUL-12 | 653230 | 3779779 | 0 | 27 | 1700ft Sou | 08March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | MUL-12-21 | no | | Power Auger |
| 8 | MUL-13 | 654842 | 3778863 | 0 | 9 | 2000ft Eas | 08March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |
| 9 | MUL-14 | 650560 | 3779390 | 0 | 7.5 | 150ft Sou | 08March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |
| 10 | MUL-15 | 652148 | 3783030 | 0 | 30 | 1500ft Sou | 10March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |
| 11 | MUL-16 | 650528 | 3782699 | 0 | 5 | 100ft Nort | 11March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |
| 12 | MUL-17 | 653557 | 3785888 | 0 | 40 | 300ft Nort | 11March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | MUL-17-11 | no | | Power Auger |
| 13 | MUL-18 | 653056 | 3787042 | 0 | 9 | 350ft Wes | 17March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |
| 14 | MUL-19 | 652661 | 3788110 | 0 | 50 | 200ft Wes | 17March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |
| 15 | MUL-20 | 660208 | 3790944 | 0 | 40 | 2000ft Eas | 19March21 | Kyle T. Ga | Marion | MULLINS | Jacky Stee | Eli_Covell | none | no | | Power Auger |

Lithology

| A | B | C | D | E | F | G | H | I | J | K | |
|----|---------|------|------|--------------------|--|--|--|----------------------|--------------|--------------------|------------------|
| 1 | Hole ID | From | To | Lithology Keyword | Lithology Description | Notes 1 | Notes 2 | Notes 3 | Notes 4 | Notes 5 | Note: |
| 2 | MUL-6 | 0 | 1 | Road fill | Road fill | | | | | | |
| 3 | MUL-6 | 1 | 24 | Marsh | clayey-sand (50-15-35), strong brown (7.5YR 5/8), crumbly | f | By 5.0ft: a | From 7.0-1 | At 8.5ft: c | At 10.0ft: i | By 13.0ft: By 16 |
| 4 | MUL-6 | 24 | 31 | Fluvial | sand (85-15-00), brownish yellow (10YR 6/8), loose, wet medium -very coarse, moderately sorted, very angular -roun | | | | | | |
| 5 | MUL-6 | 31 | 32 | Weathering horizon | clayey-sand (50-15-35), strong brown (7.5YR 5/6), soft, sticky, goeey fine -medium, well sorted, angular -sub rounded | | | | | | |
| 6 | MUL-6 | 32 | 44 | Re-worked Pee Dee | clayey-sand (45-15-40), black (5Y 2.5/1), strong brown (7.5Y From 32.0-34.0ft: strong brown (6.5YR 4.0/6) color is mottl | | | | | | |
| 7 | MUL-6 | 44 | 49 | Pee Dee | sandy-clay (10-10-80), greenish black (10Y 2.5/1), light gray | By 47.0ft: i | By 48.0ft: addition of scattered very fine visible | | | | |
| 8 | MUL-7 | 0 | 4 | Floodplain deposit | clayey-sand (65-10-25), olive yellow (2.5Y 6/6), wet, playable, medium plasticity, soft fine -coarse, moderately sorted, | | | | | | |
| 9 | MUL-7 | 4 | 30 | Fluvial system | sandy-clay (25-10-65), white (5Y 8/1), dark red (2.5YR 3/6), r | By 7.5ft: a | By 11.0ft: By 15.0ft: By 22.0ft: i | At 27.0ft: i | At 28 | | |
| 10 | MUL-7 | 30 | 41 | Marsh | sandy-clay (20-10-70), pale brown (10YR 6/3), sticky, slightl | Rip up cla | At 36.0ft: color changes to light yellowish brow | | | | |
| 11 | MUL-7 | 41 | 49 | Pee Dee | sandy-clay (20-15-65), light gray (2.5Y 7/1), slightly stiff, mo | From 41.0 | By 42.0ft: i | At 44.0ft: i | By 45.0ft: i | At 46.0ft: i | At 47 |
| 12 | MUL-8 | 0 | 12 | Marsh | clayey-sand (50-15-35), yellowish brown (10YR 5/8), soft, pl | By 3.0ft: c | By 5.0ft: i | By 7.0ft: c | By 10.0ft: i | At 12.0ft: color c | |
| 13 | MUL-8 | 12 | 20 | Fluvial | silty-sand (65-35-00), pale brown (2.5Y 8/3), loose, wet fine | From 13.0 | From 14.0 | From 15.5- From 16.5 | At 17.0ft: i | By 19 | |
| 14 | MUL-8 | 20 | 26 | Marsh | sandy-clay (30-10-60), reddish yellow (5YR 6/8), sticky, goo | From 24.0-26.0ft: addition of dark bluish gray color (8.0B 2 | | | | | |
| 15 | MUL-8 | 26 | 33 | Salt marsh | clayey-sand (40-20-40), dark bluish gray (10B 4/1), wet, soft | From 31.0-33.0ft: color changes to pinkish gray (5.5YR 4.0/ | | | | | |
| 16 | MUL-8 | 33 | 34 | Lag deposit | sand (85-15-00), pale brown (10YR 6/3), loose fine -medium pebble, very poorly sorted, angular -sub rounded, prismic | | | | | | |
| 17 | MUL-8 | 34 | 36.5 | Fluvial | sand (80-20-00), white (10YR 8/1), loose medium -coarse, w | From 36.0-36.5ft: color changes to light yellowish brown (| | | | | |
| 18 | MUL-8 | 36.5 | 49 | Oyster bed | clayey-sand (65-10-25), light bluish gray (10B 7/1), firm, der | Through | At 37.5ft: rare sub-rounded, sub-disoidal coars | | | | |

Geoprocessing ▼ ▾ ✕

← Pull Drill Logs from Survey123 +

Parameters Environments ?

AGOL Username

AGOL PW

Output Folder
 📁

Quad Prefix

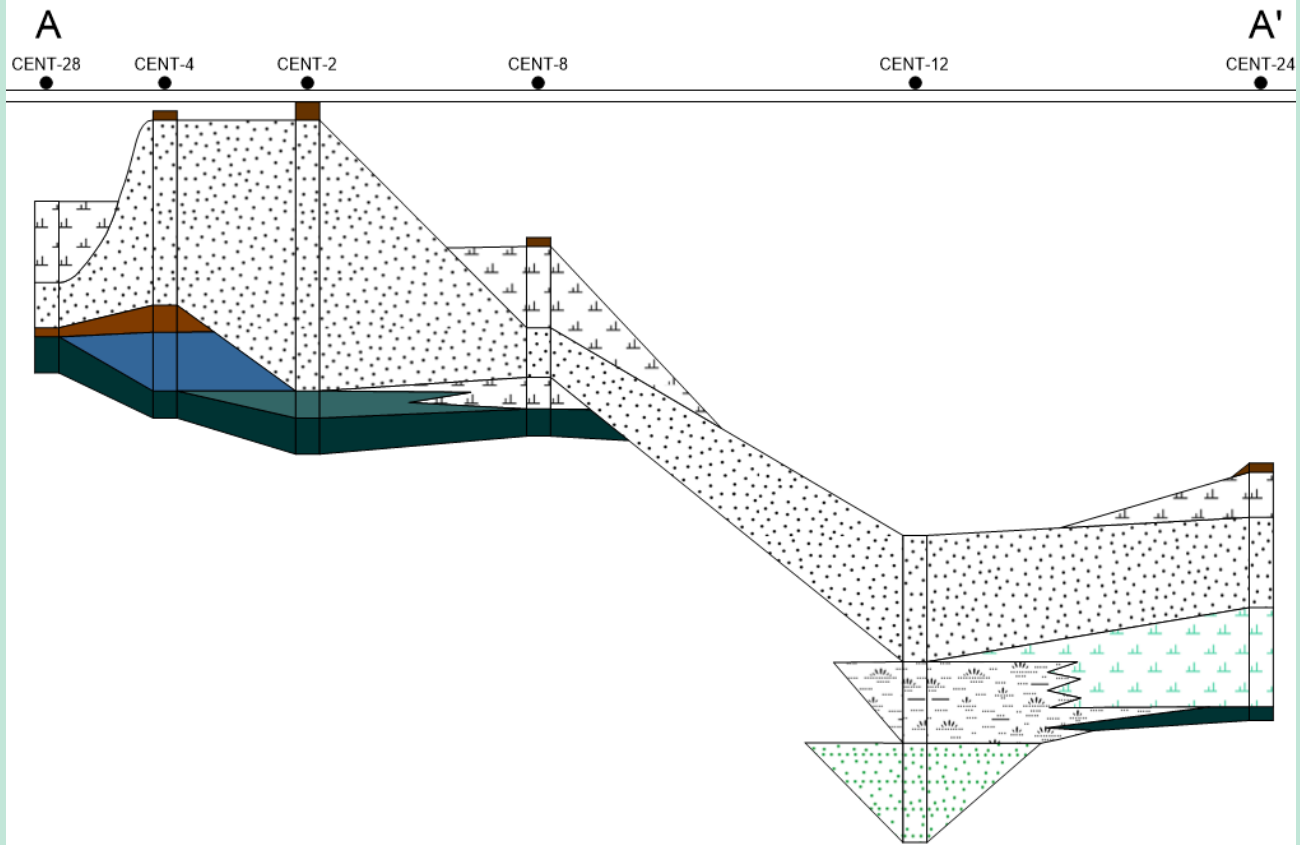
Lower Drill Hole #

Upper Drill Hole #

Item ID

▶ Run ▼

Cross Section

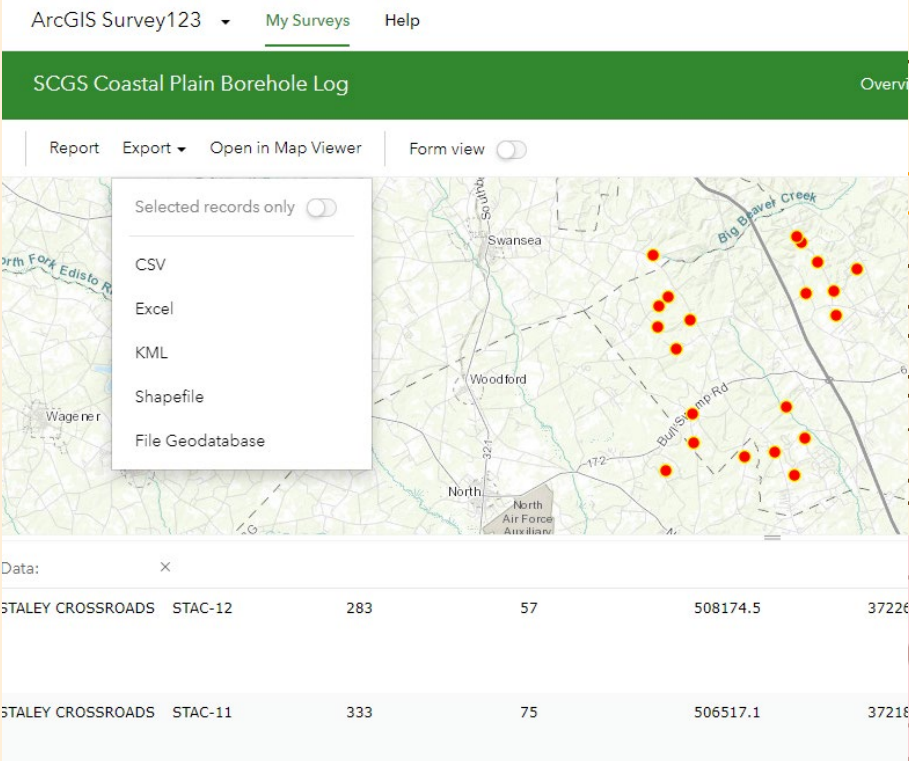


The background is a topographic map with brown contour lines and a dashed orange grid. A teal-colored map of North America is overlaid on the left side. A white rounded rectangle with a brown border is positioned on the right, containing the title text. Two blue wavy lines are located at the top and bottom right of the page.

Boreholes in GeMS

Methods

- Export shapefile from Survey 123
- Script → fill in “Stations” feature class and “StationsBoreholeLogs” table



The screenshot displays the ArcGIS Survey123 interface for a survey titled "SCGS Coastal Plain Borehole Log". The interface includes a navigation bar with "ArcGIS Survey123", "My Surveys", and "Help". Below the title bar, there are options for "Report", "Export", "Open in Map Viewer", and "Form view". A map shows the survey area with red dots representing borehole locations. A dropdown menu is open, showing options for "Selected records only", "CSV", "Excel", "KML", "Shapefile", and "File Geodatabase". Below the map, a data table is visible, showing two rows of data.

| Data: | | X | | | |
|-------------------|---------|-----|----|----------|-------|
| STALEY CROSSROADS | STAC-12 | 283 | 57 | 508174.5 | 37226 |
| STALEY CROSSROADS | STAC-11 | 333 | 75 | 506517.1 | 37218 |

GeMSeature Classes and Tables

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*

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



3-D Geology

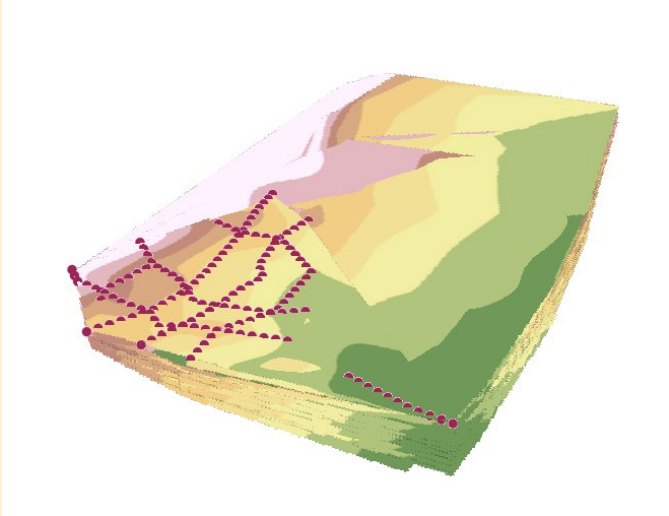
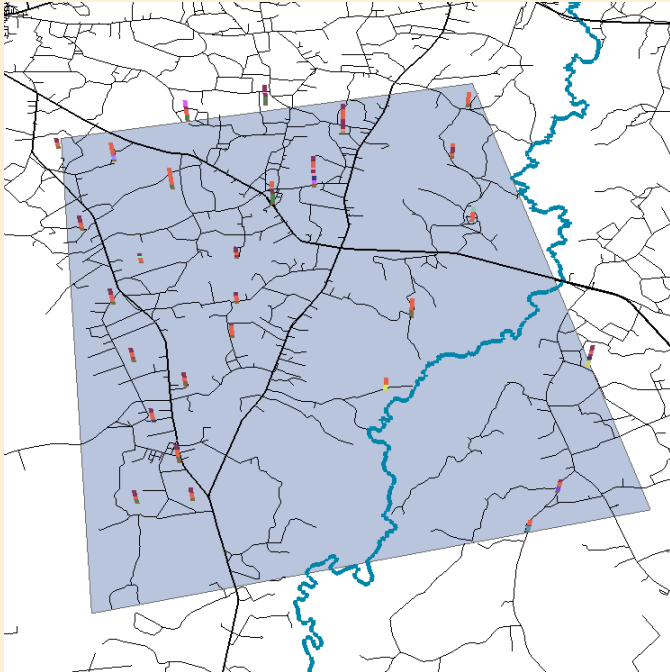
Using Archydro by Aquaveo

DISCLAIMER

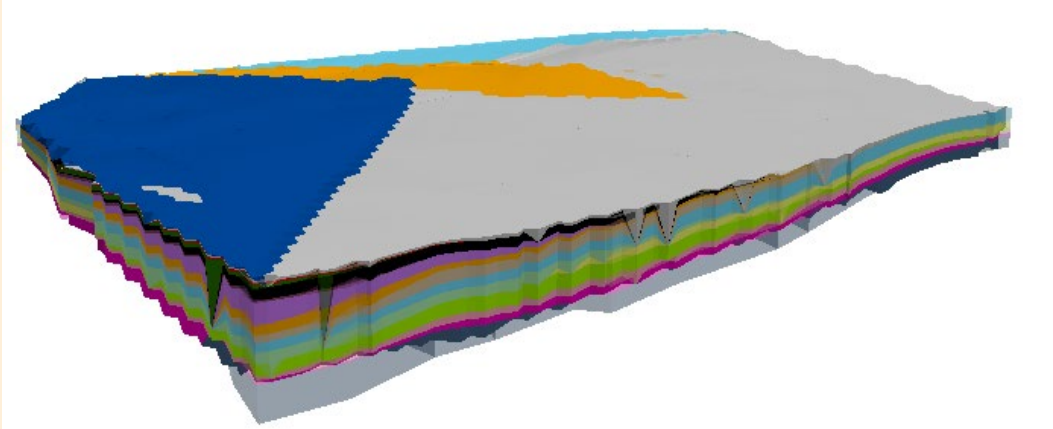
“While it is important to recognize the importance of geologic features for groundwater analysis, we did not attempt to create a comprehensive geologic map database in the groundwater data model design” (Strassberg et al., 2011).

Raster Creation

Borehole Visualization



Solids





Thanks!

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

CREDITS: This presentation template was created by Slidesgo, including icons by Flaticon, and infographics & images by Freepik