DIGITAL MAPPING TECHNIQUES 2023

The following was presented at DMT'23
May 21 - 24, 2023

The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2023)

http://ngmdb.usgs.gov/info/dmt/

Using custom scripts in ArcPro to create editing layout for cross sections at 1km spacing

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DMT 2023
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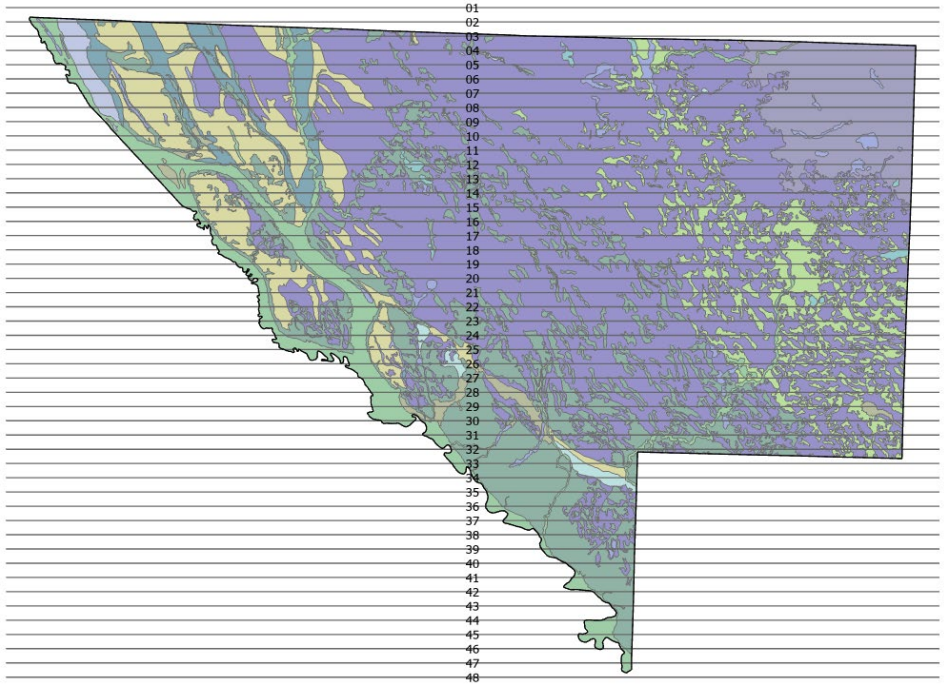
Quaternary Cross Sections at the MGS

County Geologic Atlas Program

Hennepin County Geologic Atlas



Chippewa County surficial geology and cross section lines (draft)

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How have we traditionally displayed cross sections?

Uses real-life elevation (z) for Ycoordinates (in feet)

Xcoordinate is calculated by:

- Distance from "start" of cross section at western side of the project area/county (meters)
- Vertical exaggeration factor "squishes" the x coordinate

$$X = D / 0.3048 / VE$$

Distance from "start" of cross section

Meters to feet

Compresses X coordinates to create vertical exaggeration

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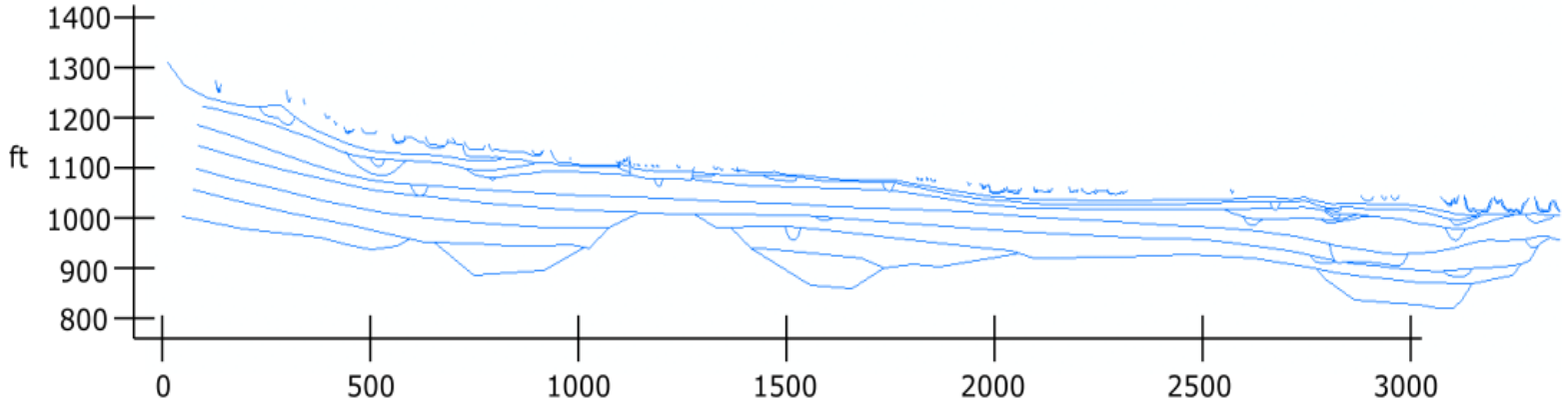
Traditional Display

True elevation (y)



D/ 0.3048 / V

(x)

Actual numbers here are meaningless for drawing lines

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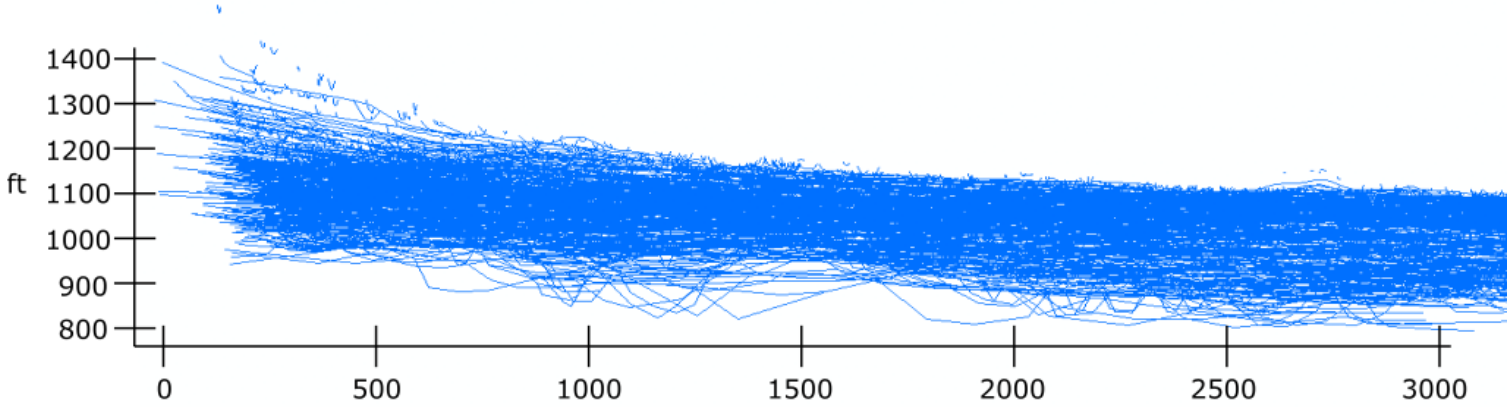
All cross sections have the same coordinates, regardless of cross section number or location



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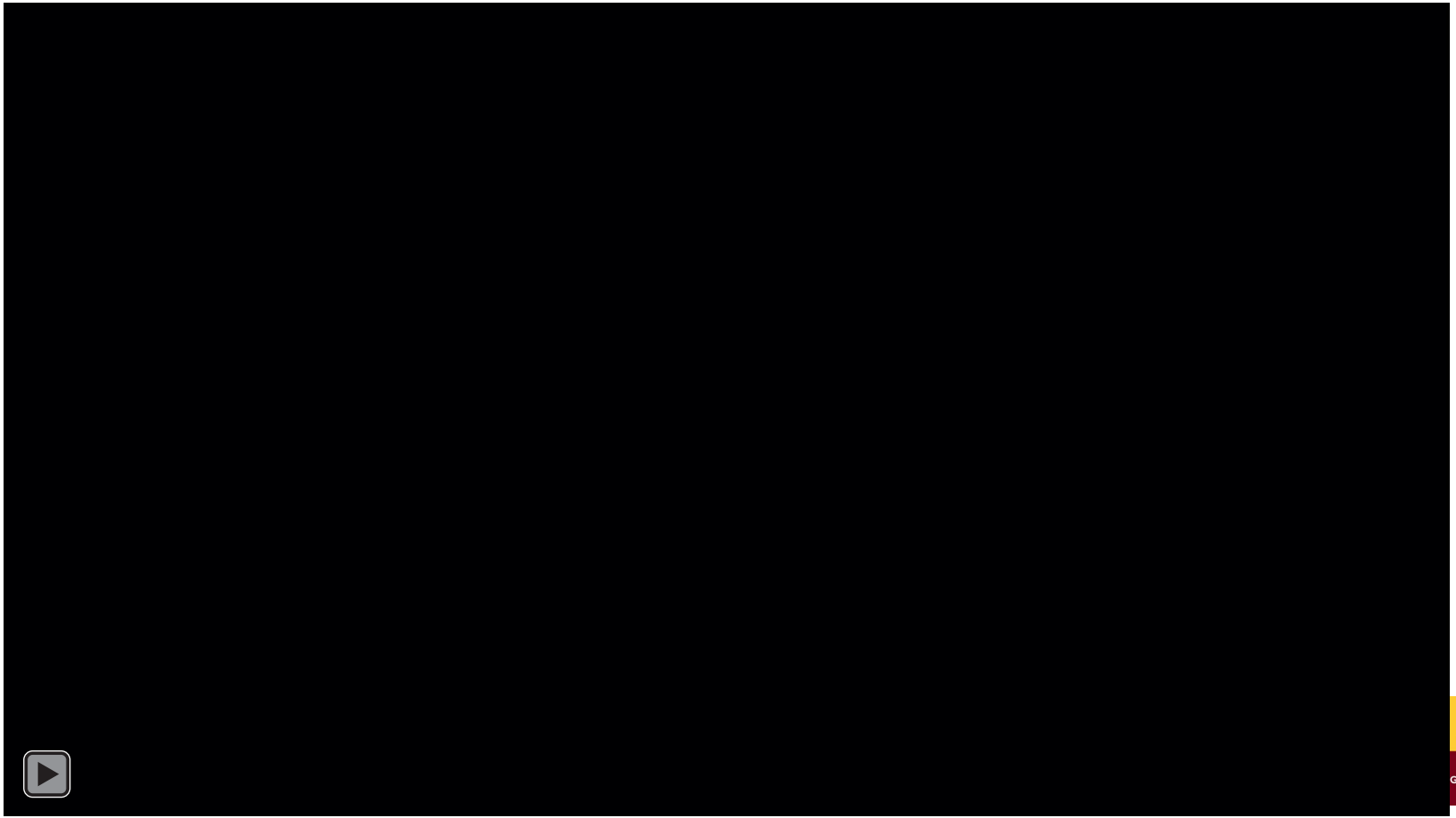
Use data-driven pages to filter by cross section



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Pros of the "traditional" cross section display

- Easy to see real-world **elevation** while drawing lines
- **Simple** calculation
- Runs **smoothly** with data driven pages
- Works with cross sections in **any orientation**

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Problems with the "traditional" cross section display

(i.e., why change things?)

- **Doesn't function** in ArcGIS Pro (changes in data-driven pages structure)
- **Difficult** to locate points along the cross section in map view
- **Challenging** to match cross sections with adjacent counties
- Entering id number for every stratline drawn is **confusing**
- Can be **difficult to visualize** north-south continuity

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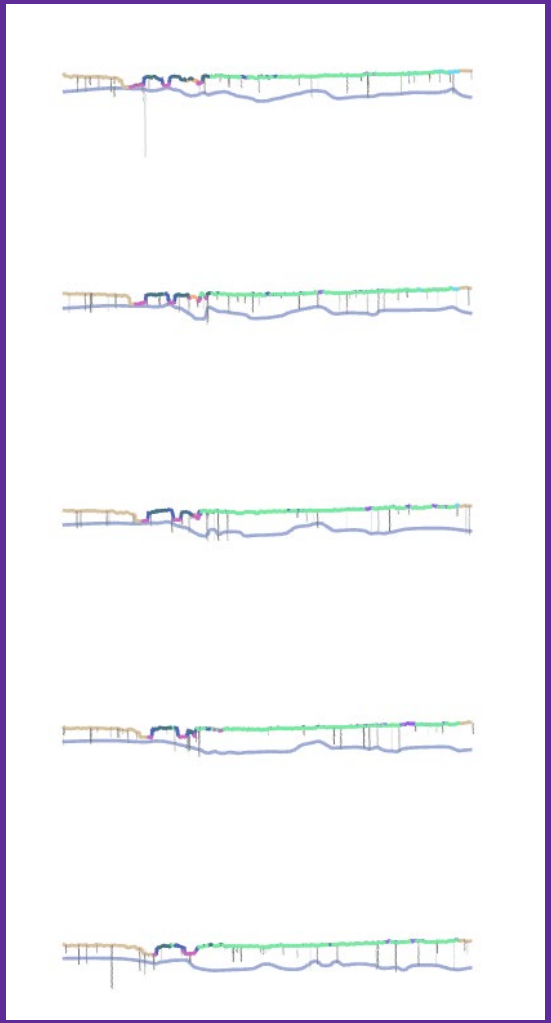
Solution

Plot cross sections in a “stacked” display using either ArcMap or ArcPro



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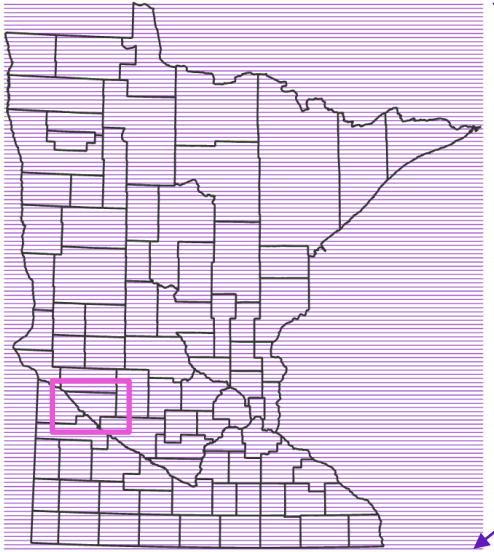
How does it work?

Uses real-life UTMXcoordinate

Ycoordinate is calculated using:

- True Z (elevation) coordinate
- mn_et_id (statewide cross section ID)
- Vertical exaggeration



$$Y = (((z * 0.3048) - (700 * mn\_et\_id)) * VE) + 23{,}100{,}000$$

Feet to meters

Order cross sections the same way as map view

Arbitrary constant to vertically space cross sections with no overlap

Arbitrary constant to keep all coordinates above zero

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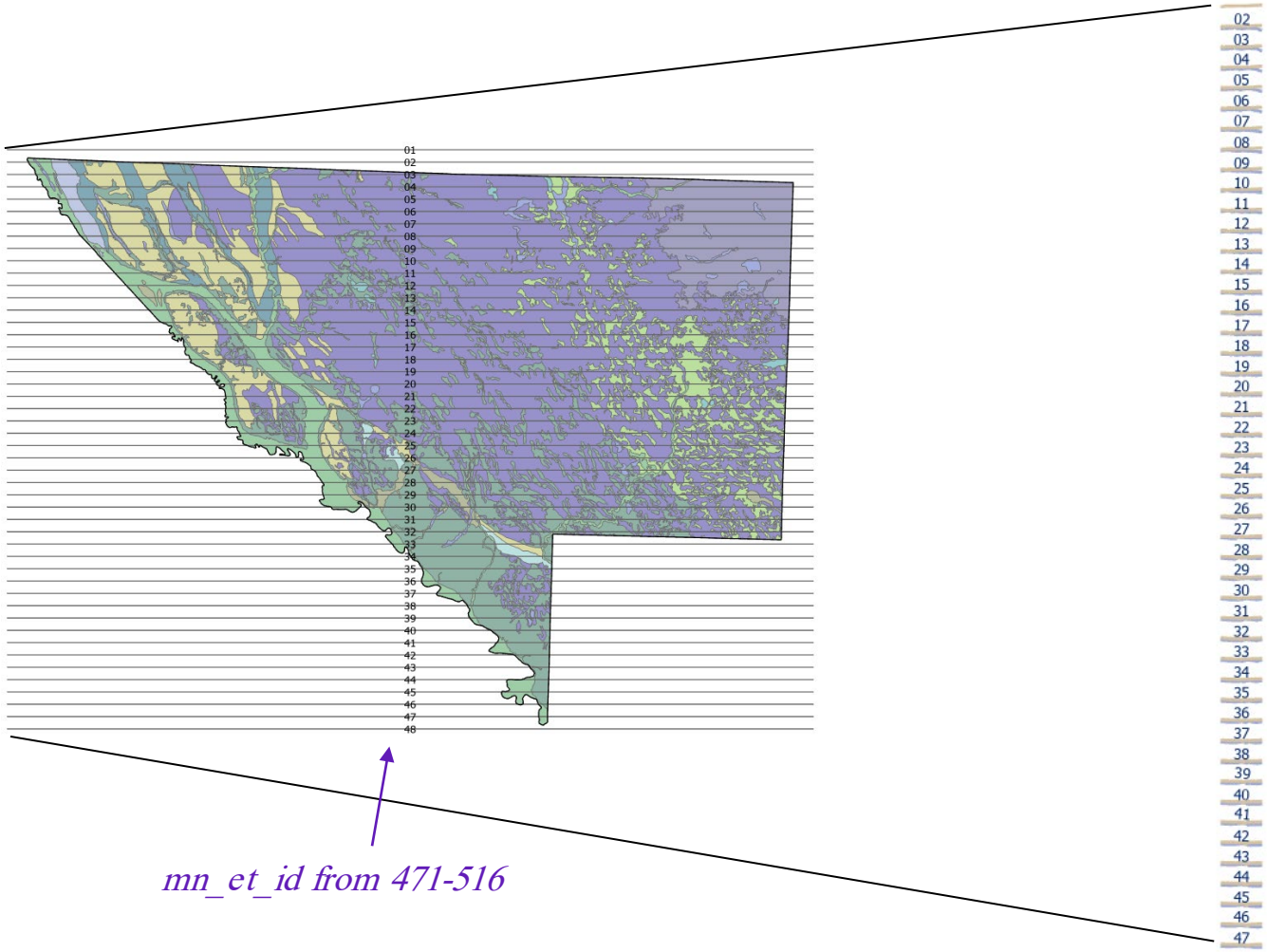

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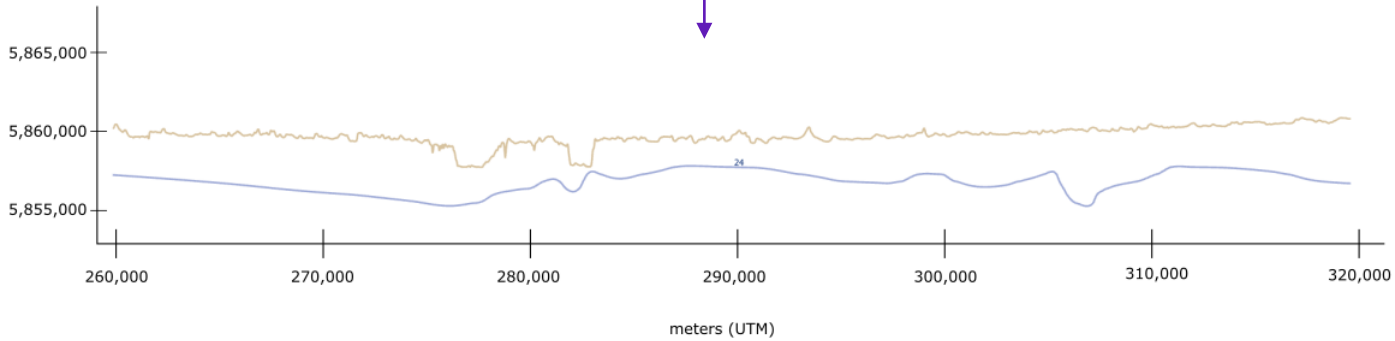
More cross sections above and below this one



Meaningless coordinate, based on calculate in slide 8

Exactly match x coordinates in map view

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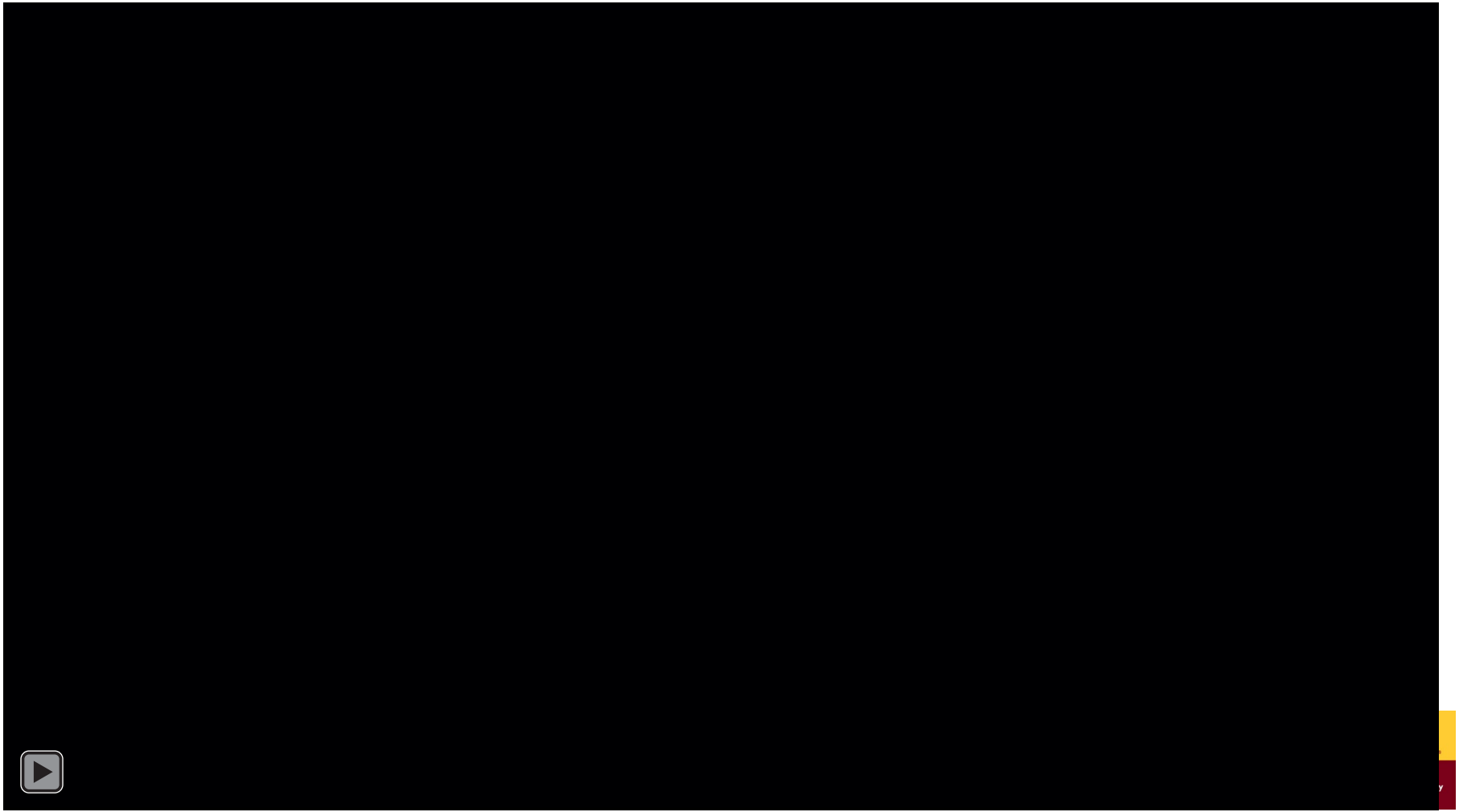

Tools to convert back to real coordinates

- Convert Stratlines to Mapview
- Convert stratline vertices to mapview points with unit and elevation attributes

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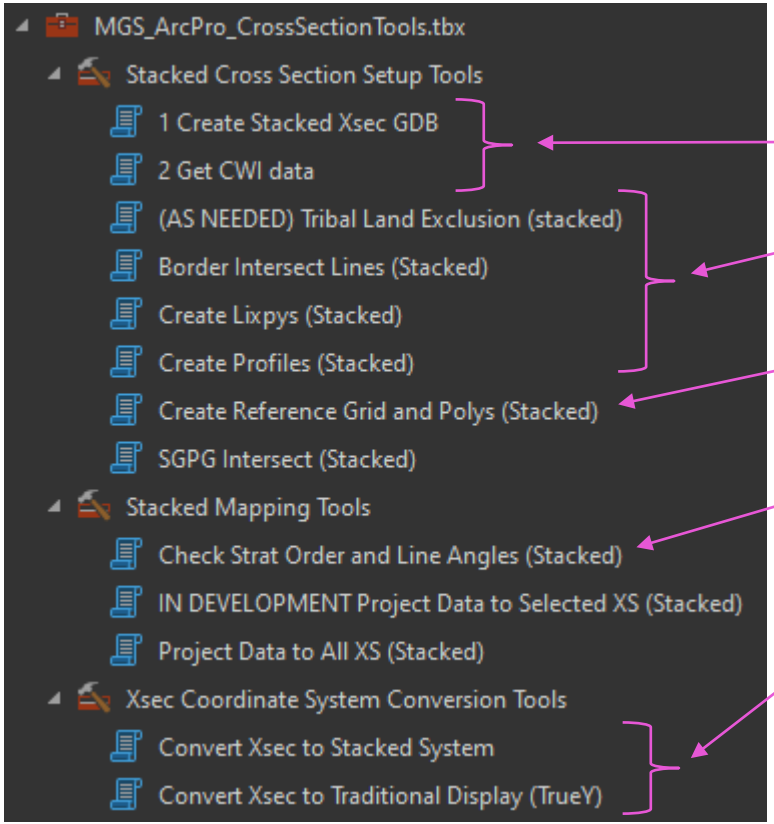
Suite of script tools



- Gather input data
- Create data in XS view using input data with mapview coordinates
- Create reference grid to show elevation and UTME coordinates
- Quality control to check unit order and line angles
- Conversion tools to switch between “traditional” display and “stacked” display

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Challenges

- Only works with straight east/west cross sections
  - Vertical exaggeration factor will be skewed if cross section is diagonal or zig zag
- Easy to get “lost” between cross sections
  - Solution: bookmarks
  - Hope to automate bookmark creation in the future
- Compatibility between old/new data
  - Solution: conversion tools that switch between systems

Questions?

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