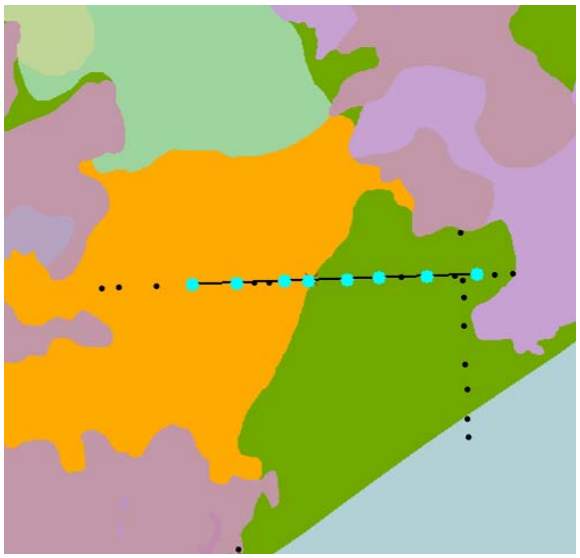
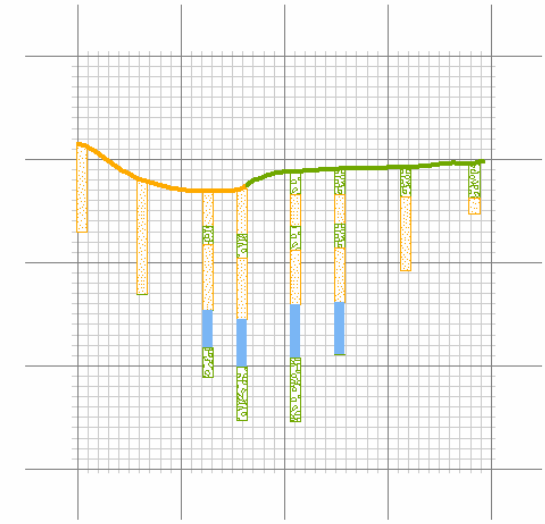
Profile Tool v1.2.1

Description:

This is a tool for three-dimensional modeling in ArcGIS. It draws a profile line based on a raster elevation source (such as a DEM or LiDAR). As an option, the profile can be delineated based on surface units (such as surface geology) using a polygon shapefile containing the surface units. The tool also has options to build a box around the profile, produce a reference grid behind the profile, and to produce a well or boring log overlay for the profile (as a line or polygon shapefile) showing subsurface geologic units or water table heights. This version of the tool was tested with ArcGIS 9.2 Service Pack 3, but should be compatible with ArcGIS 9.0 and 9.1. For best results, all data layers used by the tool should be in the same projection.





Defining the Profile:

The user defines the start and end points for the profile with mouse clicks within ArcMap, and can further refine the profile start and end points by editing the start and end click coordinates when they are displayed to the user. Precision of the profile (the number of times the elevation source is sampled) can be defined by either specifying the total number of points to create along the profile line, or by specifying the distance between sample points. A vertical exaggeration for the profile can also be specified, if desired. Only west-to-east profiles are allowed.

The profile is created as a polyline shapefile, and is geo-referenced at the origin of the coordinate system. In other words, if the start of the profile line has an elevation of zero feet, the output profile will begin at map coordinate (0,0). If the profile is 10 feet long, and the ending elevation is 10 feet, then the profile will end at map coordinate (10,10)--assuming a vertical exaggeration of 1. Creating the profile this way allows the profile to be viewed or printed at any scale (by changing the scale in ArcMap).

The Profile Box and Reference Grid:

The user has the option to build a box around the profile with attributed vertical and horizontal tick marks for elevation and distance. A grid can also be created inside of the box. The user has full control over the size of the box, vertical and horizontal tick spacing, and has the option to create a square grid based on the horizontal tick spacing. Producing a profile box and reference

grid is useful as a reference of measure, or if the user is going to draw a cross section below the profile based on the optional well or boring log overlay.

The Well or Boring Log Overlay:
This tool has the option to display subsurface data for wells and boring logs in the vicinity of the profile line. To use this functionality, the user must have a point shapefile or an X-Y-Event-Theme showing the well locations and a separate table with the subsurface data. The wells in the well layer should have a unique ID, and each well should have one or more records for subsurface unit layers in the subsurface data table (see example tables below).
This feature is extremely useful for creating geologic cross sections, water table maps, and visually exploring down-hole geologic data.

To create the well or boring log overlay, the user must select the well points to overlay on the profile using the Select Features tool in ArcMap prior to selecting the start and end points for the profile. The features in the output shapefile are attributed with the point ID, point's distance from the profile line, the start and end depths of the subsurface layers, and the subsurface unit for the layer (if known).

Example wells table (an X-Y-Event-Theme can be produced from the well coordinates):

PointID	Northing	Easting
1	500121	125339
2	500200	125350
3	500300	125400

Example subsurface data table:

PointID	Layer Top Depth	Layer Bottom Depth	Subsurface Unit
1	0	10	Fill
1	10	20	Sand
1	20	30	Gravel
1	30	100	Bedrock
2	1	5	Fill
2	5	15	Sand
2	15	20	Gravel
2	20	100	Bedrock
3	0	100	Bedrock

Profile Tool Output Files:
-Polyline shapefile containing the profile, with (optionally) the profile delineated into a series of connected line segments labeled with respect to the surface units along the profile.
-Polyline shapefile containing the profile line (the reference line on the map).
-Point shapefile containing the intersection points between the profile line and the surface units.
-Polyline shapefile(s) containing the profile box and reference grid (optional).
-Polyline or polygon shapefile containing the down-hole well or boring log data (optional).
-Text file recording profile parameters.
-Comma delineated text file with profile points.
-Graphic drawn on the display in ArcMap corresponding to the profile line (optional).

Setup:
1. Open the included map document that already has the tool loaded.
2. Add your own data
3. Run the tool from the custom toolbar ‘ProfileTool’

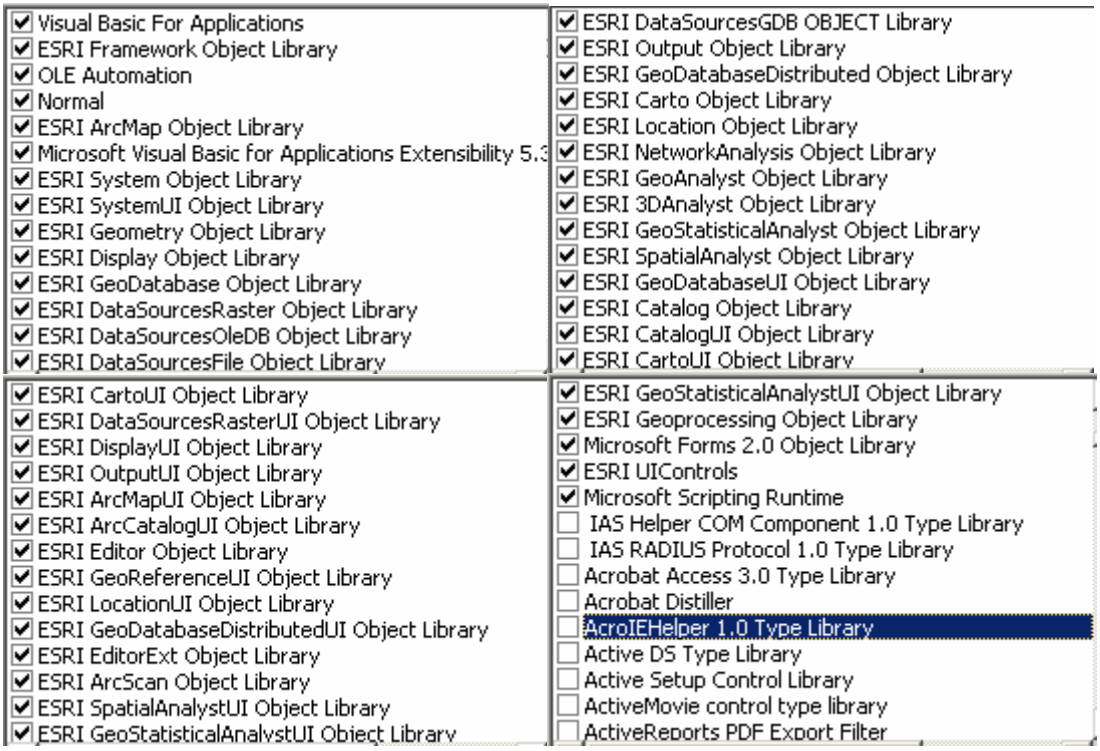
Alternate Setup:
In the ArcMap document,
1. Right-click on any toolbar and choose customize
2. Click on the 'Commands' tab
3. Under 'Categories:', scroll down and click on 'UIControls'
4. Next to 'Save in:', choose 'Untitled' (note: If the map has already been saved, instead of choosing Untitled, choose the name of the map.)
5. Click on the 'New UIControl...' button
6. Select 'UIToolControl' and click on the 'Create' button
7. Under 'Commands:', rename the new button to 'Project.NewProfile'
8. Drag the new button to some toolbar in ArcMap
9. Right click on the button you have just placed in the toolbar and choose 'View Source'
10. In the Visual Basic window that opens up, delete anything that is already in there, and then paste all of the following code into the window.

```
'--------------Begin Profile Tool------------------

Private Function NewProfile_CursorID() As Variant
   NewProfile_CursorID = 3 'Crosshair Cursor
End Function

Private Sub NewProfile_MouseUp(ByVal button As Long, _
ByVal shift As Long, ByVal x As Long, ByVal y As Long)
   Call StartGeoProfile(x, y)
End Sub

Private Function NewProfile_ToolTip() As String
   NewProfile_ToolTip = "Create a profile, " _
   & "profile box, and wells overlay."
End Function

Private Function NewProfile_Message() As String
   NewProfile_Message = "Click on the map to " _
   & "indicate the startpoint and endpoint for the " _
   & "profile (West-to-East profiles only)."
End Function

'--------------End Profile Tool--------------------
```

11. In the Visual Basic window, choose [File] and [Import file…], then select ‘frmProfileTool.frm’ from the ‘source’ folder and click on the [Open] button.

12. Repeat the previous step to import ‘modProfileTool_Main.bas’
13. Repeat the previous step to import ‘modProfileBox.bas’
14. Repeat the previous step to import ‘modProfileWells.bas’
15. Under the ‘Tools’ menu, click on ‘References...’ and add a reference to “Microsoft Scripting Runtime” and click on the ‘OK’ button.
16. Close the Visual Basic window.

If you have problems running this script, try checking the reference libraries you have selected for your project. The references I have selected are shown below; although I’m not sure all of them are actually used for this project…



Contact Info:

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(I’m always interested in work in the Missoula, MT area)

Acknowledgments:

This tool is based on a similar profile tool developed by Michael Moex Maxelon. Thank you Michael for allowing this version of your work to be shared with others via ESRI.

Michael Moex Maxelon
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http://e-collection.ethbib.ethz.ch/show?type=bericht&nr=377

This tool also uses a modification of Chris Rae’s (19-May-99) array bubble sort method used to sort data in an array. Chris Rae's VBA Code Archive - http://chrisrae.com/vba

Major Changes From Version 1.0:

- The tool is now only available for ArcGIS 9
- Added profile box functionality
- Added down-hole geologic data display functionality
- Changed the name of output files, and made customization of output names easier
- Changed the lnXstart and lnYstart variables from long data type to double
- Tool now works with group layers and invalid layers in the map's TOC
- Tool can now remember settings during an ArcMap session for user convenience

Major Changes From Version 1.1:

- New user interface form with better checking of user inputs.
- The wells in the well overlay can now be created as polygons or polylines.
- A surface unit layer is no longer required (i.e. only an elevation grid is needed).
- Tool can now accept a surface layer that has gaps between polygons, or a surface layer that does not cover the entire area of the profile line
- User can now specify elevation grid units as meters or feet.
- User can now specify subsurface data table units as meters or feet.
- Tool automatically detects map base units.
- Tool automatically adjusts between standard (ft) and metric (m) user inputs based on the map display units (which users can change in the map document).
- The profile length (for defining the grid box) is automatically calculated and displayed to the user.
- Updated output readme files.
- General cleanup of all code.
- Improved speed for creating the profile box and well lines.
- Spatial reference is now pulled from the map document, not a layer in the map.
- Fixed bug in the ListDataSources sub that caused an error with complex group layer files.
- Fixed bug that resulted in an incorrect number of tick marks for the grid box.
- Fixed bug that resulted in incorrect source data paths in the output readme files.
- Better method for selecting an output file location.
- User options are not saved in the registry to they persist after the map is closed and reopened.

Changes From Version 1.2:

- Added version number to the header of the user form.
- Fixed a bug that prevented perfect west-to-east profiles from being created
- Fixed a bug that occasionally caused the tool to fail by displaying the "Could not verify..." error, followed by the "Not enough information..." error.
- Rewrote the user input verification procedure to display exactly which user defined options need to be changed in the event that the user's input was invalid.