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2. Digitizing in ArcMap 9.3
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4. Change a projection to another
5. Clip, merge, split features
6. Add and display X,Y data
7. Attribute Queries
8. Georeferencing

ArcGIS 9.3 - How To...

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Czech Geological Survey

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CZECH REPUBLIC
DEVELOPMENT COOPERATION

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   - Create a new shapefile
   - Add shapefile to ArcMap
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7. 7. Attribute Queries
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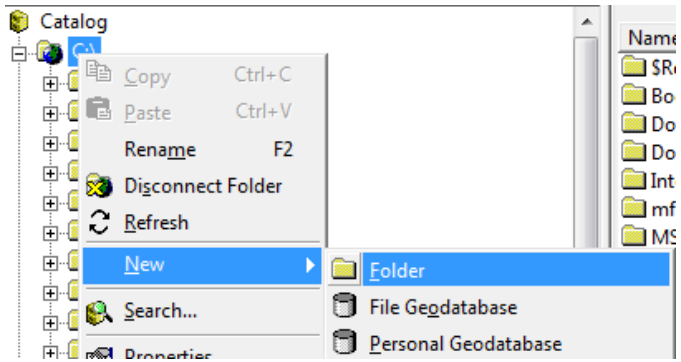
1. Managing data - Create shapefile

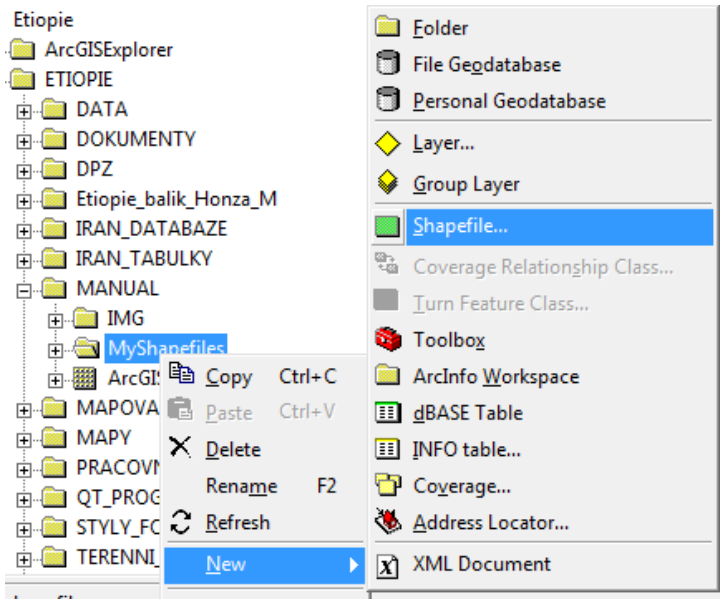
Step by step:

- Open ArcCatalog.
- Find or create target folder.
- Create a new shapefile in the folder.
- Type name, select feature type and coordinate system on the "Create Shapefile" dialog box.
- Open ArcMap and add the shapefile you have created.

Open ArcCatalog. Browse to the directory in which you'd like to create a folder. Right-click on that directory, select "New" and click on "Folder".



Right-click on the folder you have created. Choose "New" and click on "Shapefile".

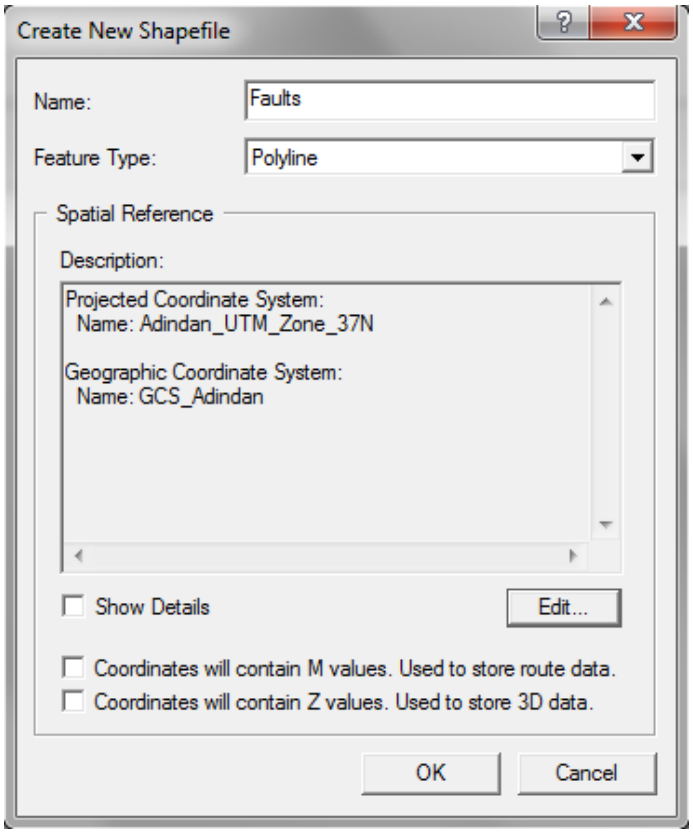


"Create New Shapefile" dialog box appears. Fill out the name of your new shapefile and select the feature type ("point", "Polyline" - for lines, "Polygon")

Add spatial reference: Click the "Edit" button. On a new dialog box click the "Select" and find out the projection.

Adindan projection example: *Projected Coordinate Systems/UTM/Other GCS/Adindan UTM Zone 37N.prj*

Click "OK".


Create New Shapefile
Name:
Faults
Feature Type:
Polyline
Spatial Reference
Description:
Projected Coordinate System:
Name: Adindan_UTM_Zone_37N
Geographic Coordinate System:
Name: GCS_Adindan
Show Details
Edit...
Coordinates will contain M values. Used to store route data.
Coordinates will contain Z values. Used to store 3D data.
OK
Cancel

Now open ArcMap and add your new shapefile to it.

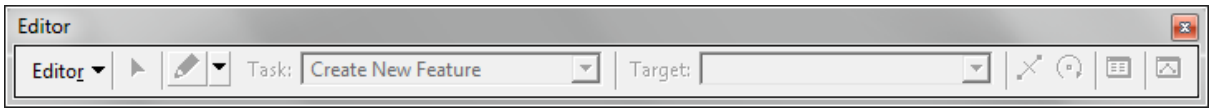
2. Digitizing in ArcMap 9.3

Step by step:

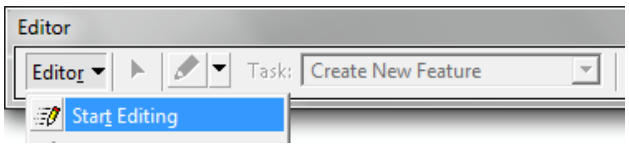
- Add shapefile you'd like to digitize to ArcMap.
- Open the "Editor" toolbar.
- Enable editing by the "Start Editing" tool.
- Select target layer (if your project has more then one layer).
- Select "Sketch Tool" (the pencil button) to start digitizing.
- Fill attributes in the attribute table.
- Save edits.
- Press "Stop Editing" to finish digitizing.

Open the "Editor" toolbar: Click the "Editor Toolbar" icon on the "Standard Toolbar":

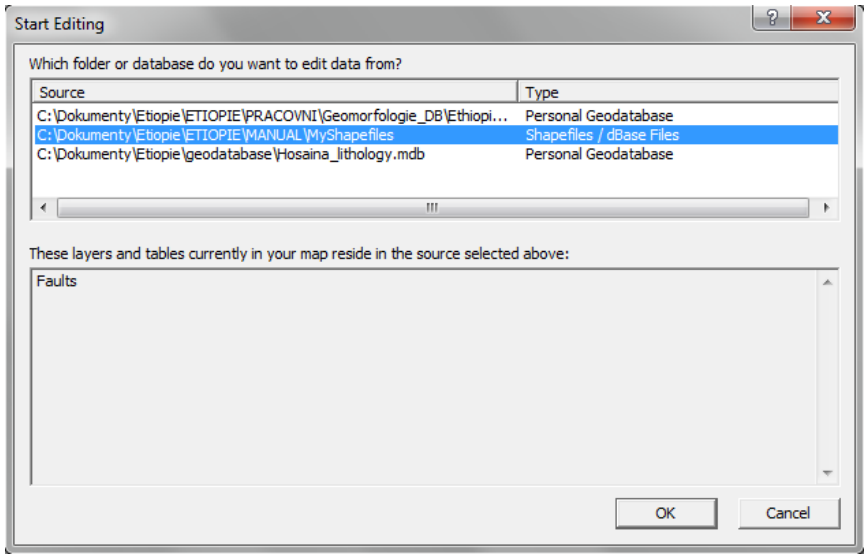
"Editor" toolbar appears:



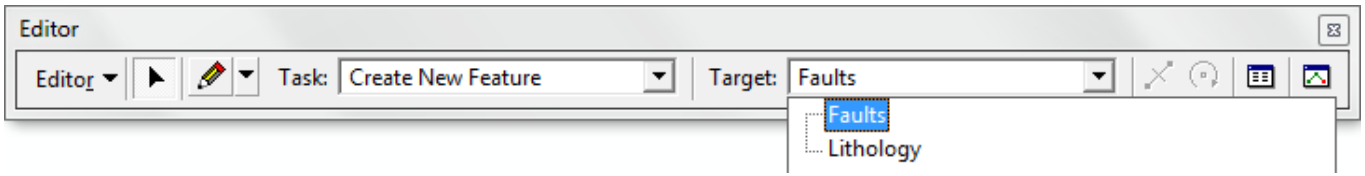
Click the "Editor" menu on the "Editor" toolbar and click "Start Editing":



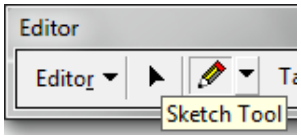
If you have more than one workspace in your ArcMap project, "Start Editing" dialog will appear. You will need to choose the folder you want to edit.



Select the target layer:



Start digitizing using "Sketch Tool"

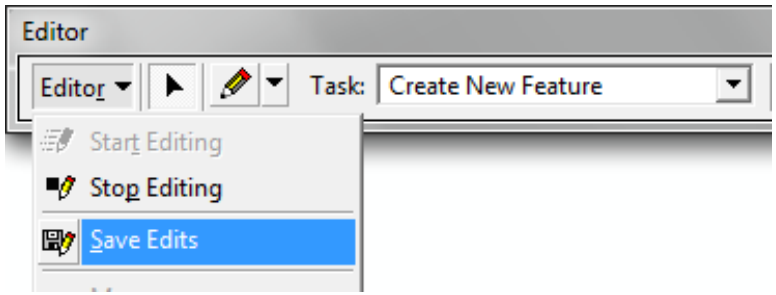


Select "Sketch Tool" and click somewhere in the map window. Now you are adding vertices ("points") of a new feature.

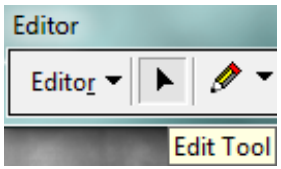
There are three possibilities to finish the sketch: double click, press "F2" key or right-click and select "Finish Sketch".

If you want, you can continue with creating another feature now.

Do not forget to save your edits:



To modify a feature: there is a useful tool called "Edit Tool":



Delete a feature

Select the "Edit Tool", click the feature you want to delete and press the "Delete" key.

Modify an edge

Select the "Edit Tool", double click the feature you want to modify and move the pointer over a vertex (point). Drag the vertex and drop it into a new position.

Delete a vertex

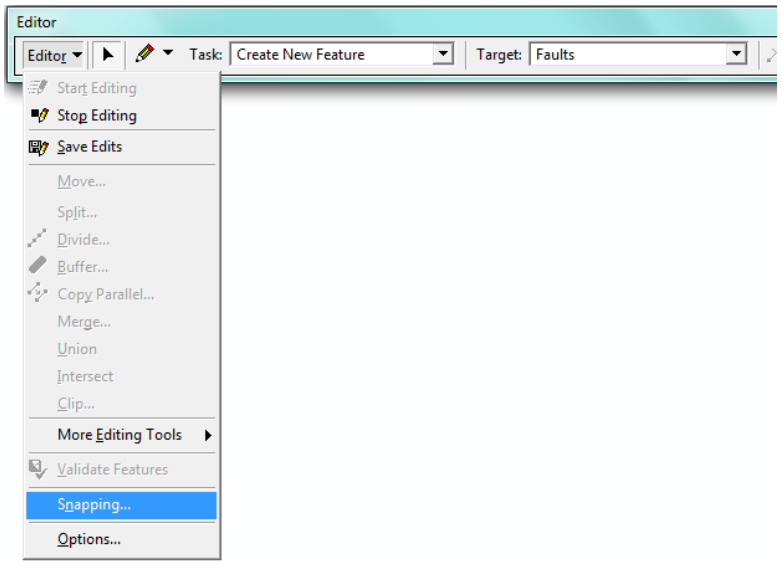
Select the "Edit Tool", double click the feature you want to modify and move the pointer over a vertex (point), right-click and select "Delete Vertex" from menu.

Insert a vertex

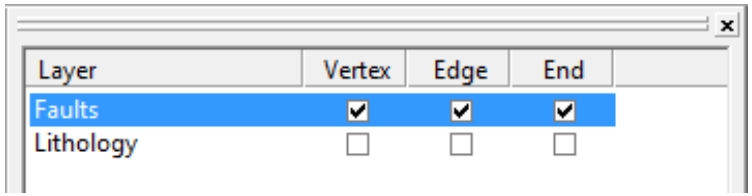
Select the "Edit Tool", double click the feature you want to modify and move the pointer over an edge. Right-click and select "Insert Vertex" from menu. It is possible to delete a vertex during digitizing. On the Main Menu, go to "Edit" and click "Undo Add vertex"

Snapping can establish exact locations in relation to other features. Mostly you want to ensure that the vertex connects precisely to other feature. Snapping helps you to avoid overlaps, dangles etc.

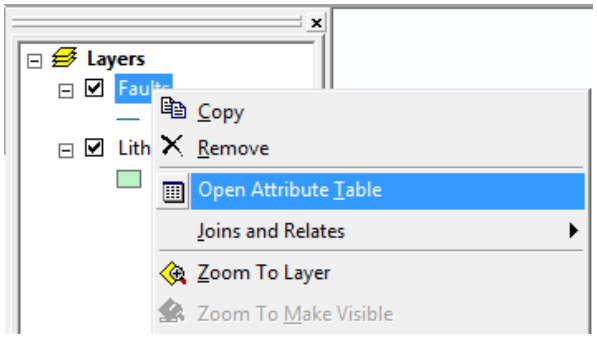
Go to the "Editor" menu on the "Editor" toolbar and click "Snapping":



Check all check boxes (Vertex, Edge, End) for your layer. Try to digitize a new feature. If the pointer is close to a feature, the vertex will automatically connect.

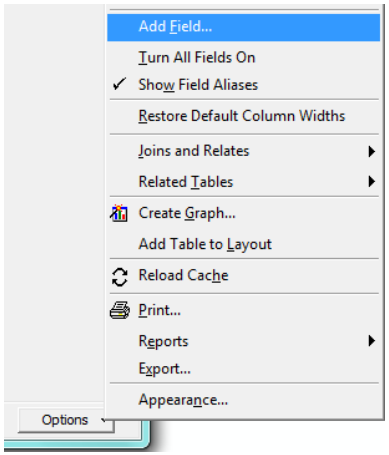


Once you begin an edit session, you'll be able to edit attributes through the "Attribute Table". Right-click the name of the layer (in the "Table Of Contents") and select "Open Attribute Table":

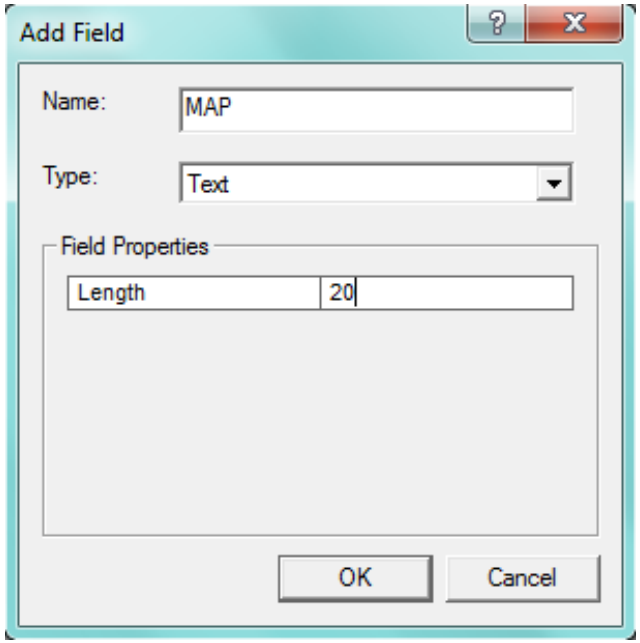


Edit attributes. Each feature is represented by one row. Each column corresponds to one attribute.

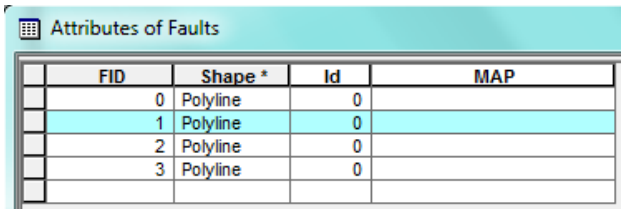
You may need to add a new field. It can be done directly in the attribute table but notice that it is only possible if you are out of edit session! If not: click the "Edit" menu on the "Editor" toolbar and select "Stop Editing". Then click the "Options" button in the attribute table and select "Add Field...":



Fill out the name of your new field, select the field type and properties:

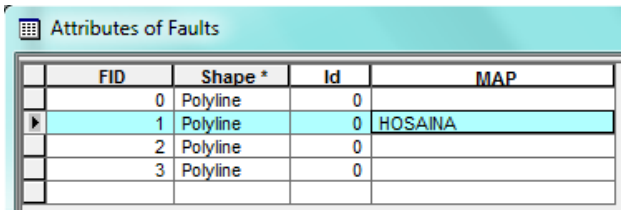


To know which row represents which feature click on the small box placed on the left side of each row. Corresponding feature will be highlighted in the map window.


Attributes of Faults

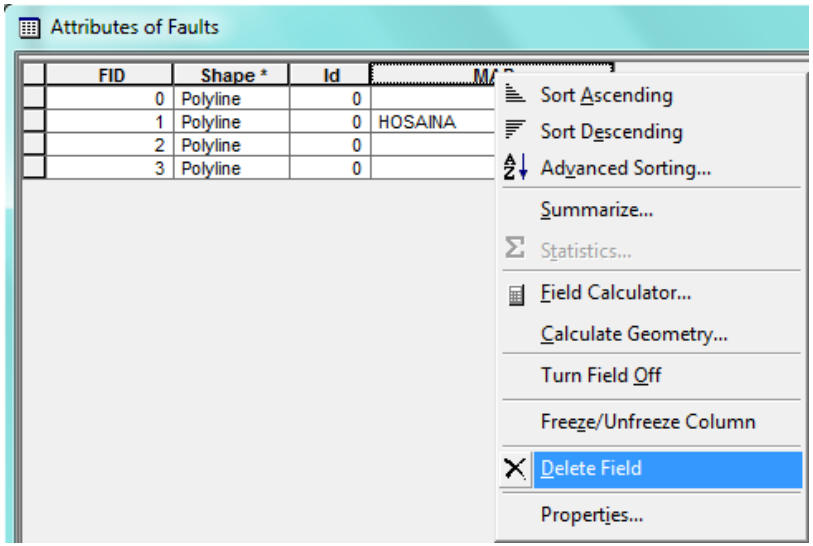
FID	Shape *	Id	MAP
0	Polyline	0	
1	Polyline	0	
2	Polyline	0	
3	Polyline	0	

Edit attributes (Remember, you must be in edit session). Do not forget to save your edits!


Attributes of Faults

FID	Shape *	Id	MAP
0	Polyline	0	
1	Polyline	0	HOSAINA
2	Polyline	0	
3	Polyline	0	

Deleting fields: Ensure you are out of edit session. Right-click the name of the field you want to delete and select "Delete Field":



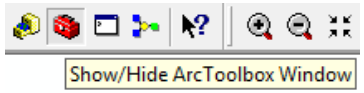
3. Contours from DEM

Step by step:

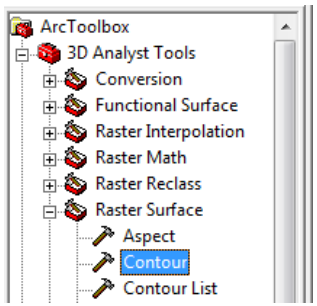
- Add DEM to ArcMap.
- Open arcToolbox.
- Run the "Contour" tool.
- Smooth contours.
- Remove short contours irrelevant to display in map.

Add DEM to ArcMap:

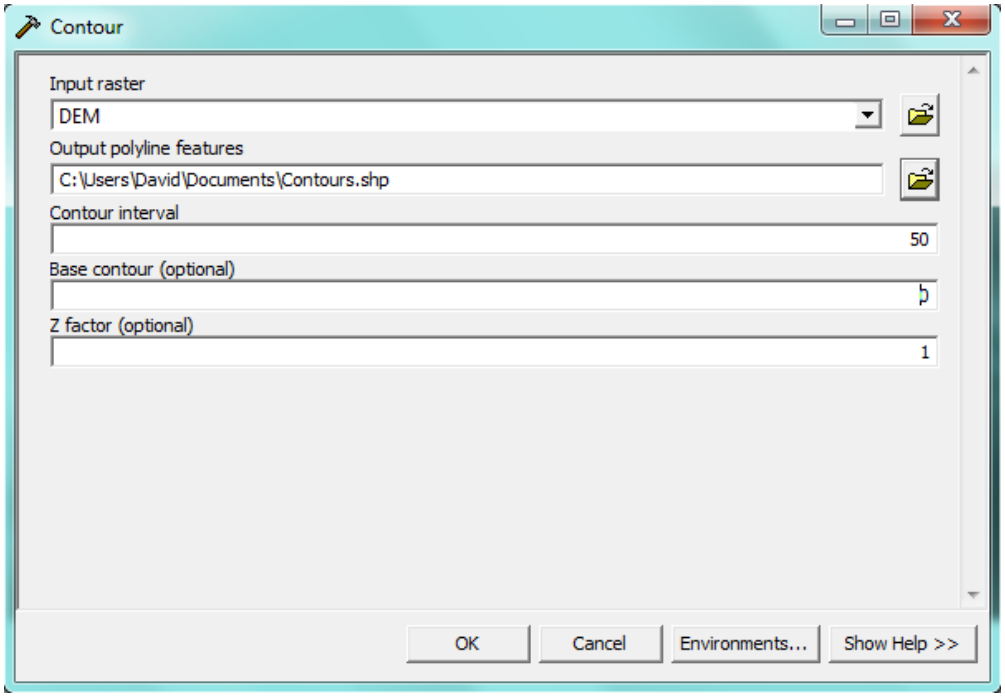
Open ArcToolbox (click the "Show/Hide ArcToolbox Window" icon on the "Standard" toolbar):



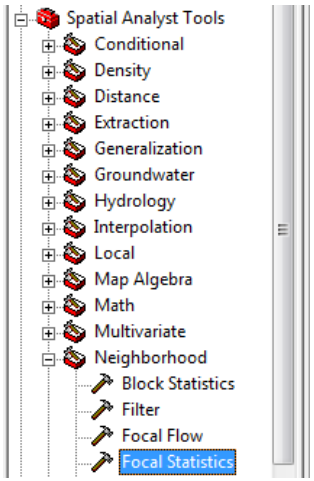
Open "Contour" tool ("3D Analyst Tools/Raster Surface/")



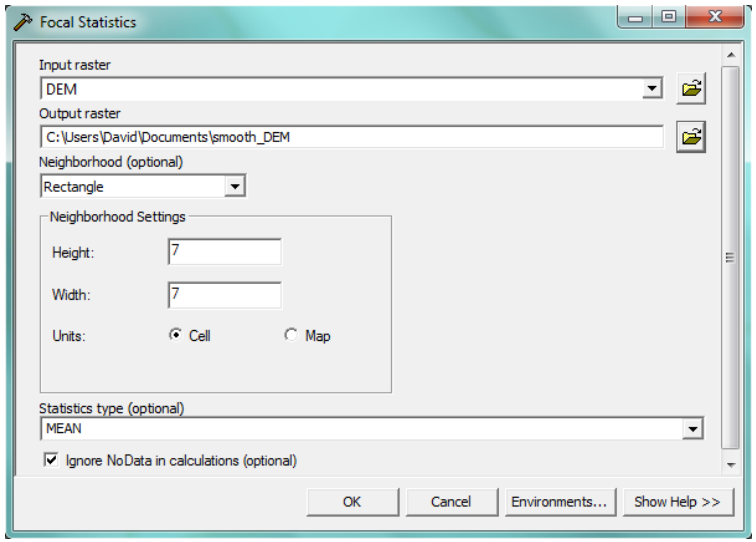
Fill in input parameters:



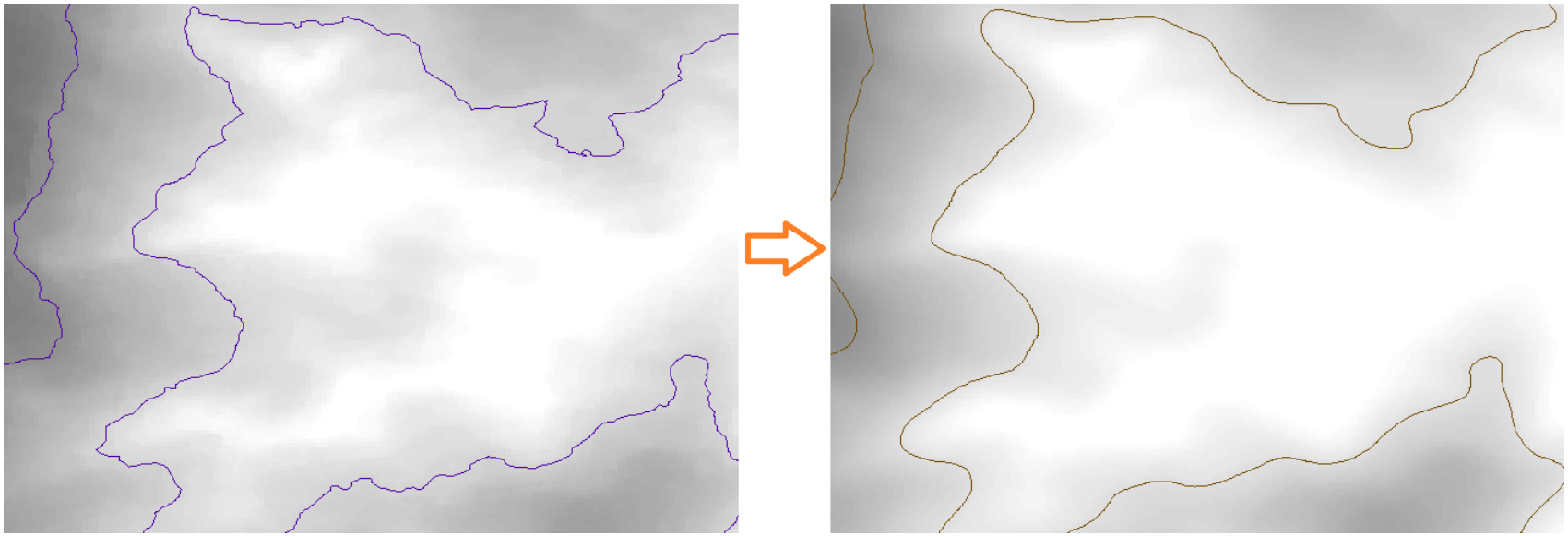
Look at the output layer. In some cases, contours may be jagged and it is necessary to smooth them. There are same possibilities to do it. First: Open ArcToolbox and use the "Focal Statistics" tool ("ArcToolbox/Spatial Analyst Tools/Neighborhood/Focal Statistics"):



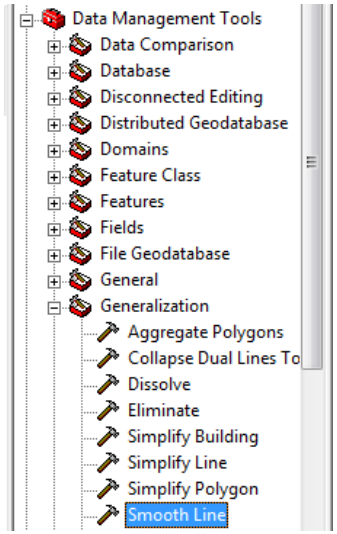
As the input layer choose your DEM. Leave "Rectangle" as "Neighborhood". You can change width and height of the rectangle according to the smoothness of output contours.



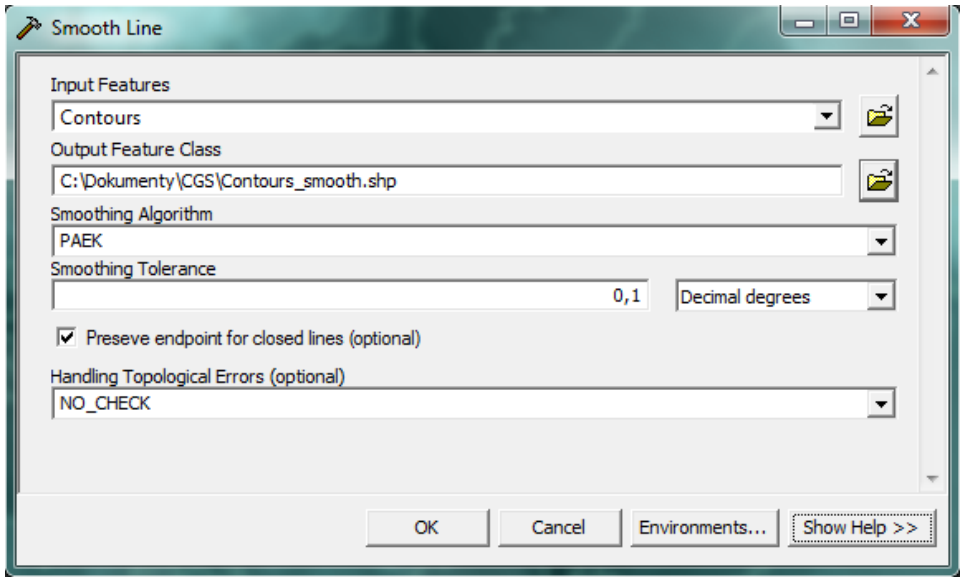
After you have created your smooth DEM, use the "Contour" tool again. You can see differences:



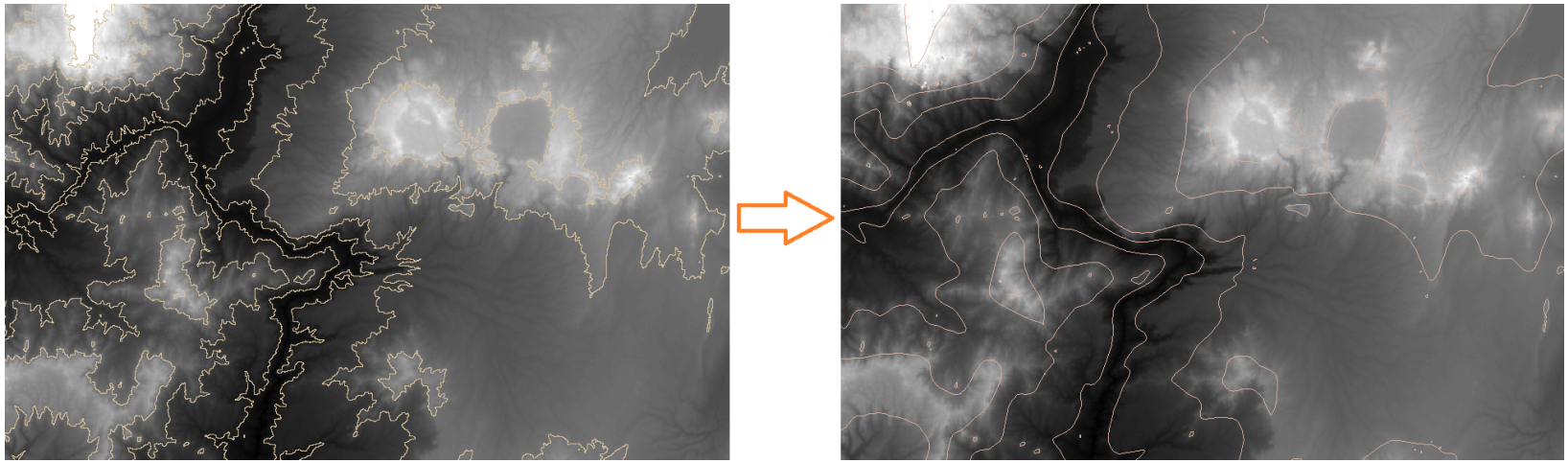
Another possibility is to smooth contour lines directly. Run the "Smooth Line" tool ("ArcToolbox/Data Management Tools/Generalization/Smooth Line"):



Leave "PEAK" smoothing algorithm on the "Smooth Line" dialog box and set up the tolerance. The value of tolerance may initially be experimental issue.

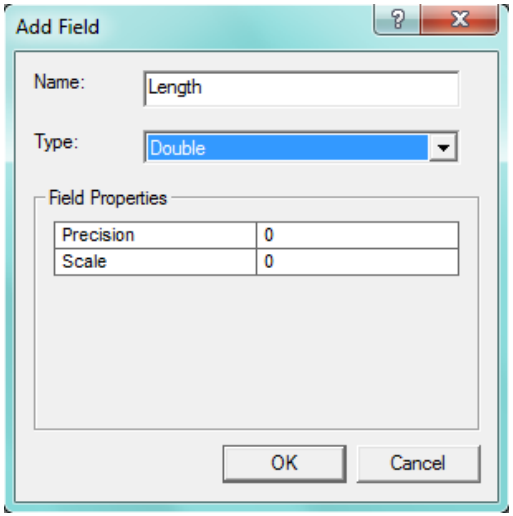


See differences:



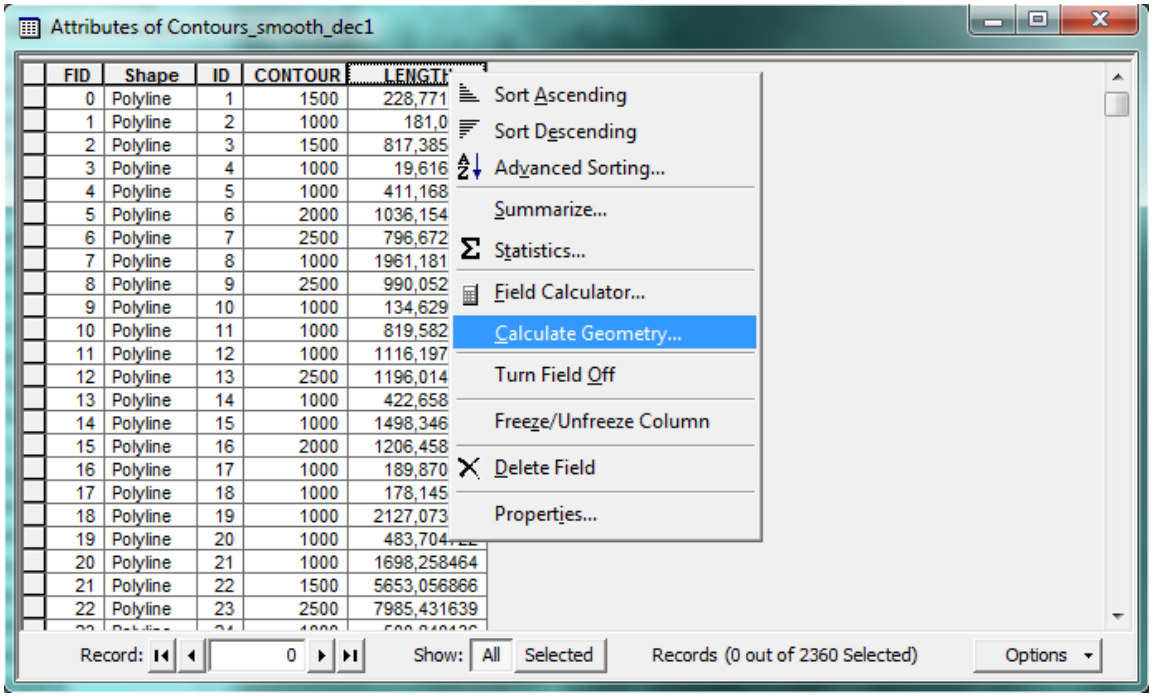
The last step is to remove contours that are too small to display. Add a new field to the attribute table called "Length" and calculate length of each contour:

Right-click the name of the "Contours" layer in the table of contents and select "Open Attribute Table". Then click on the "Options" button and click "Add Field..."

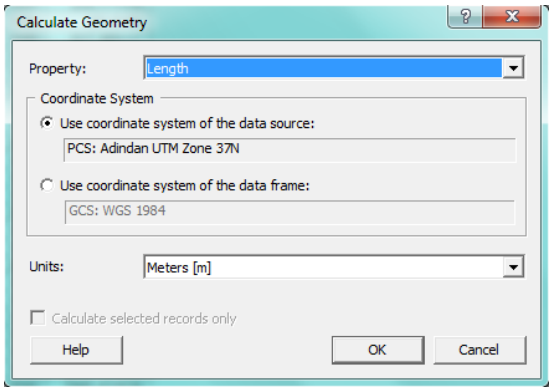


Type "Length" to the "Name" box and choose "Double" field type.

Right-click the name of the field and select "Calculate Geometry":

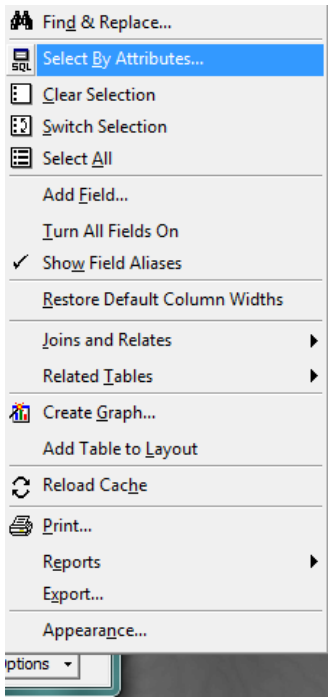


Ensure that the "Contours" layer has defined projected coordinate system.

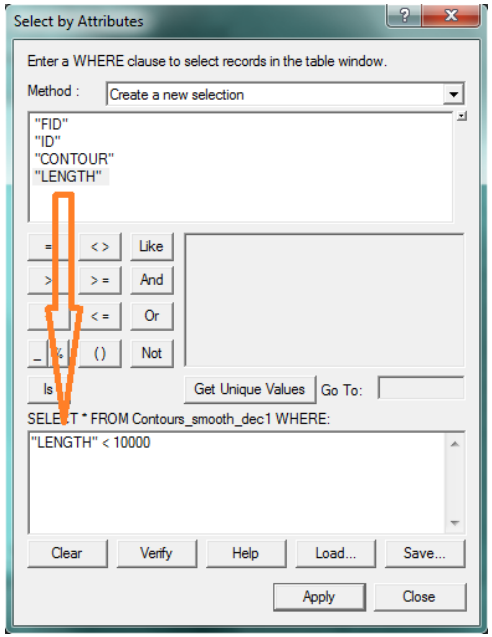


Select the "Length" property and click "OK". Lengths of each contour will be computed. Right-click the name of the field and select "Sort Ascending". You can see contours with minimum lengths.

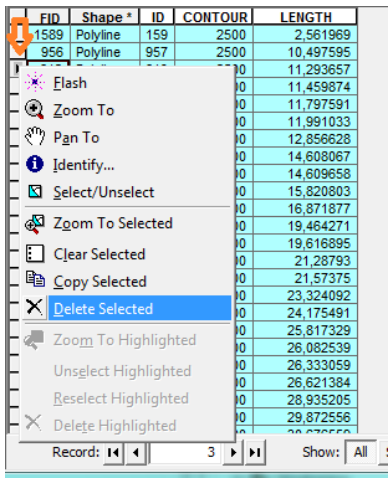
Select contours whose length is less then 10 000 meters: Click the "Options" button and select "Select By Attributes...":



Type the query as shown bellow and click the "Apply" button:

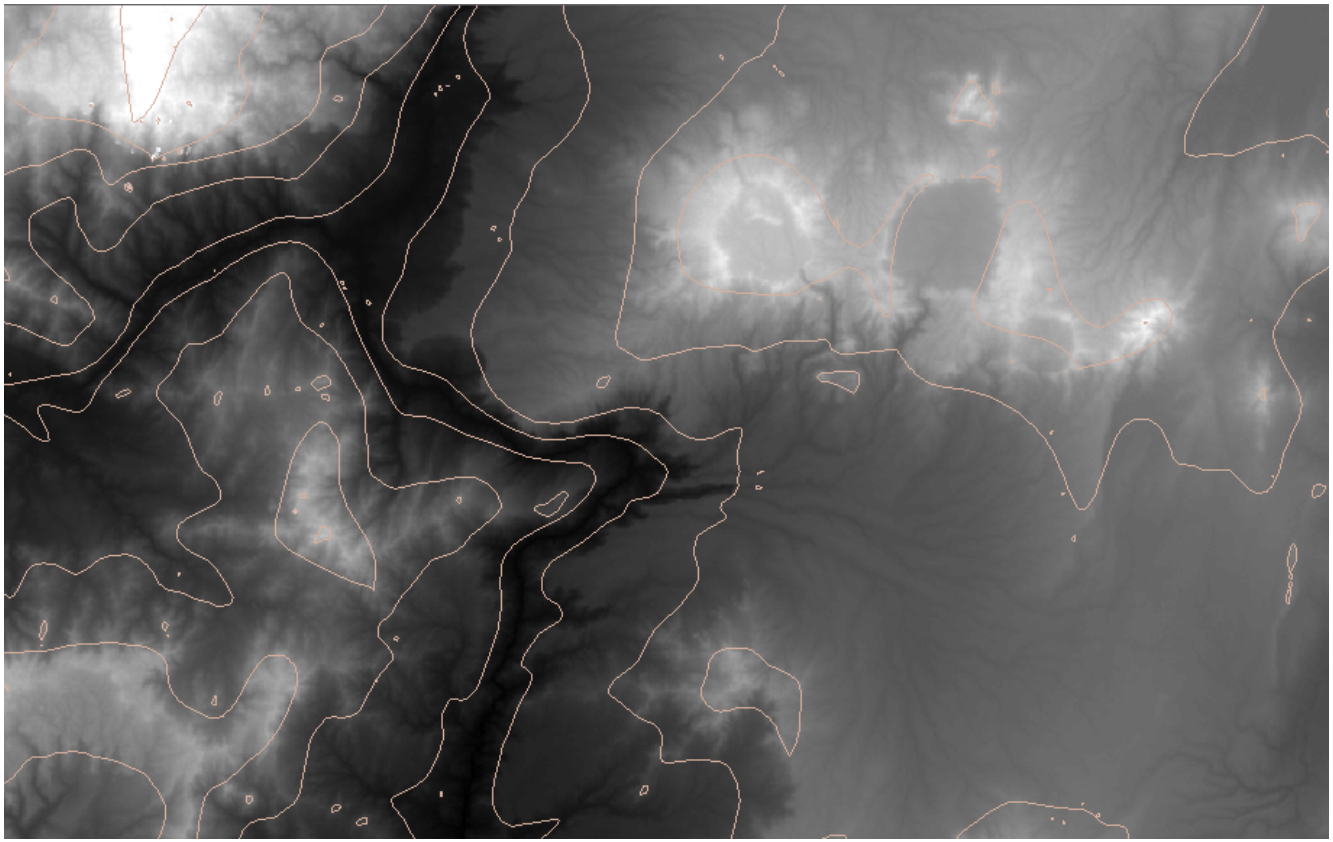


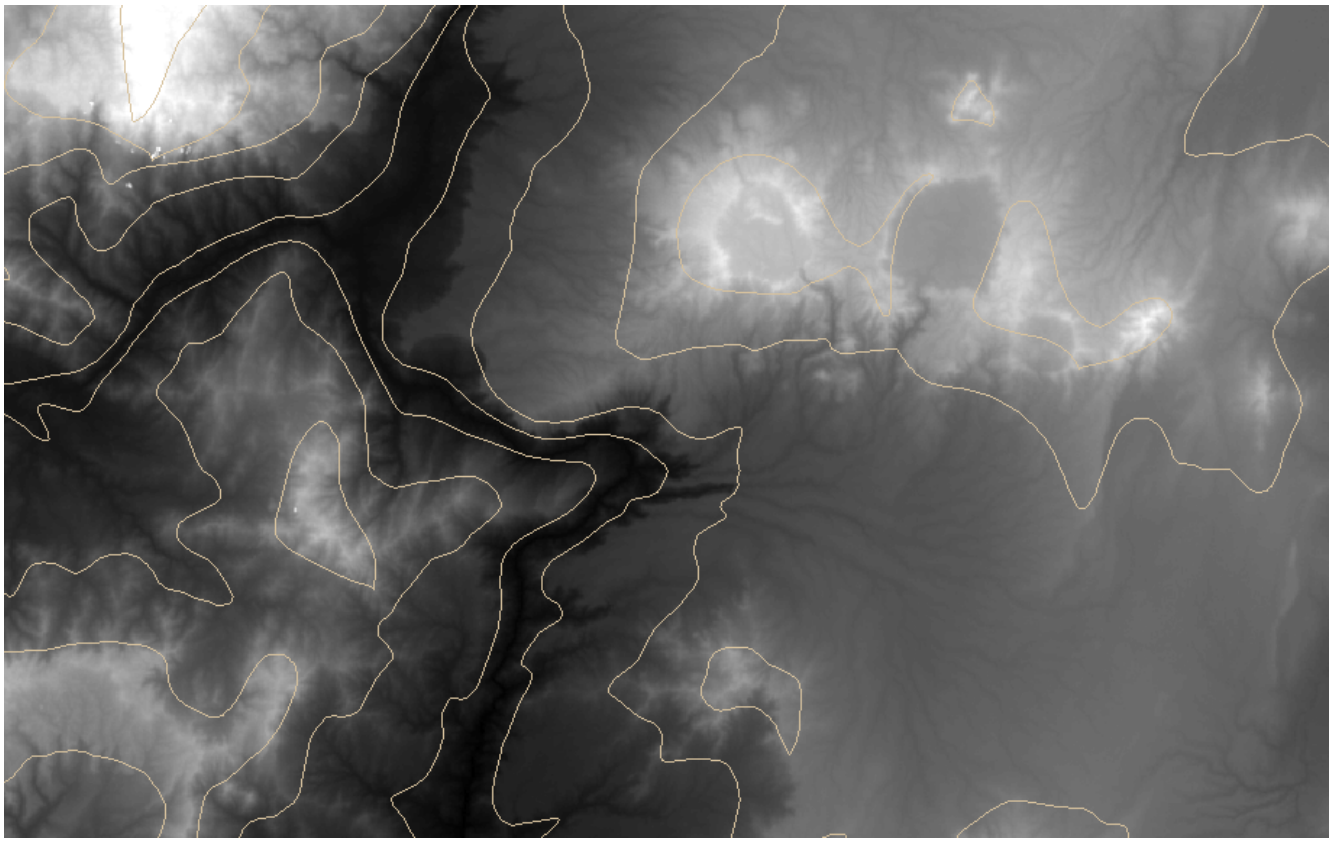
Open the "Editor" toolbar click the "Editor" menu and select "Start Editing". In attribute table of "Contours" layer right-click the small boxes on the left side of the table and select "Delete Selected":



Save your edits.

See differences:



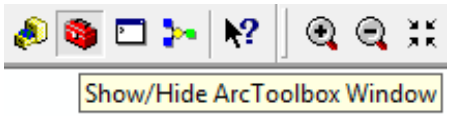


4. Change a projection to another

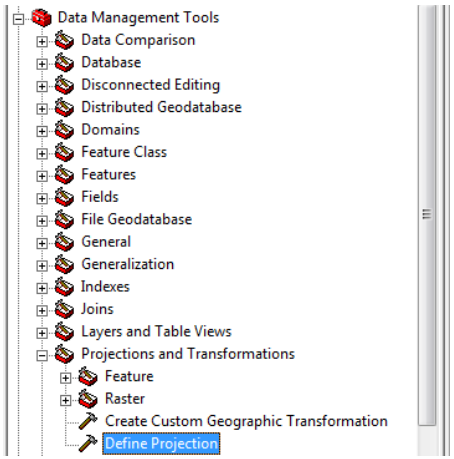
Step by step:

- Add a layer to ArcMap.
- Run the "Define Projection" tool.

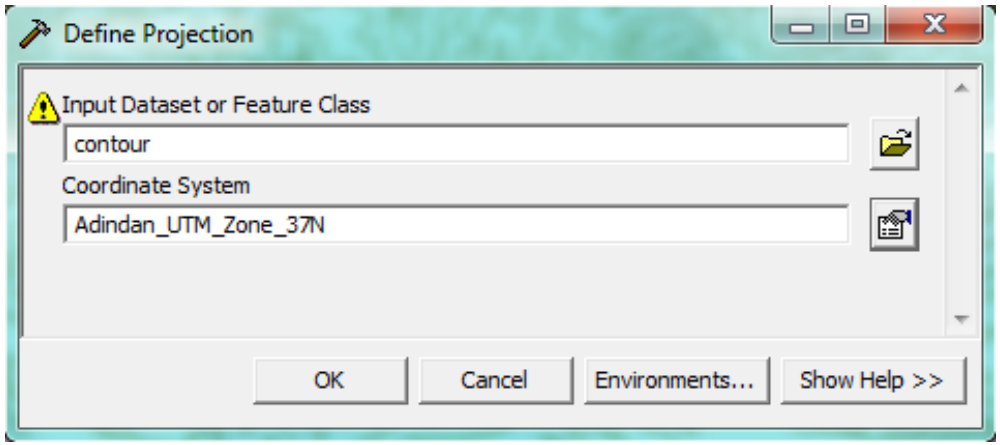
Add a shapefile to ArcMap and open "ArcToolbox":



Open the "Define Projection" tool ("ArcToolbox/Data Management Tools/ Projections and Transformations/Define Projection"). Doesn't matter if the projection of layer is defined or not.

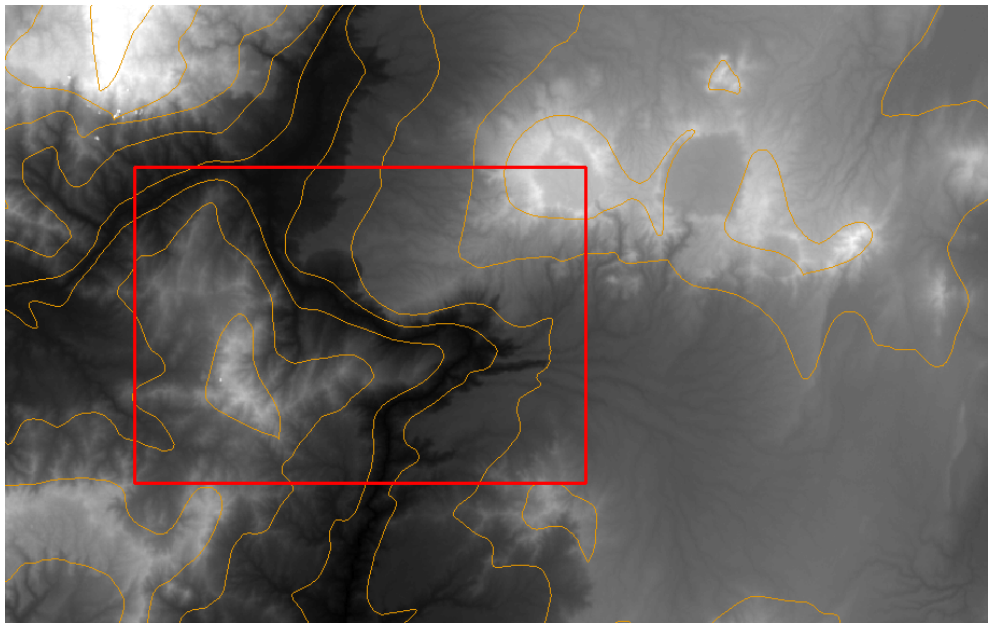


Select the input layer and choose new coordinate system.

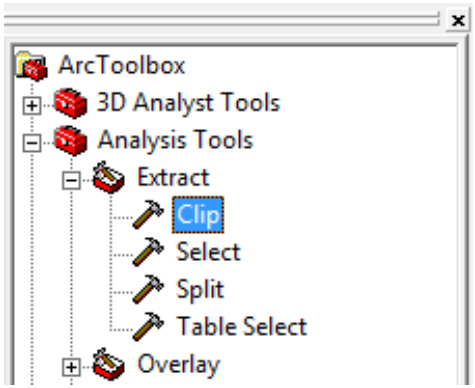


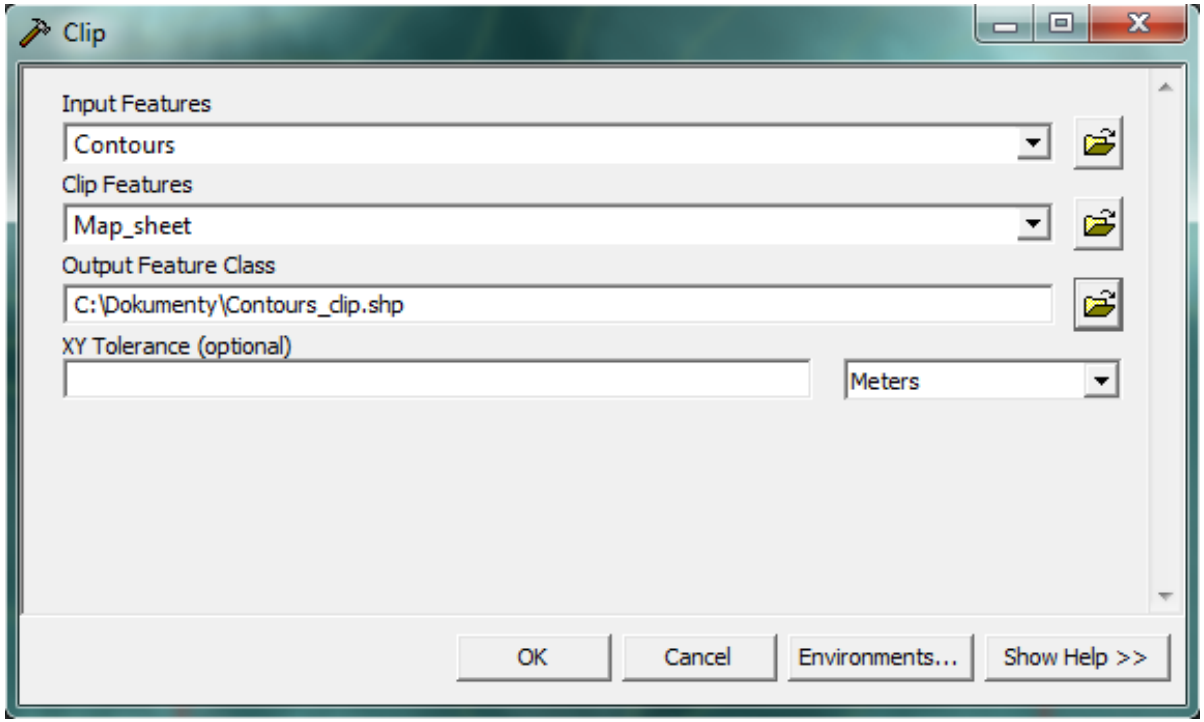
5. Clip, merge, split features

Clip features: Add to ArcMap the features to be clipped and the features used to clip the input features (must be polygons). In the example below we use "Contours" as the layer to be clipped and a map sheets as the clipping polygon layer.

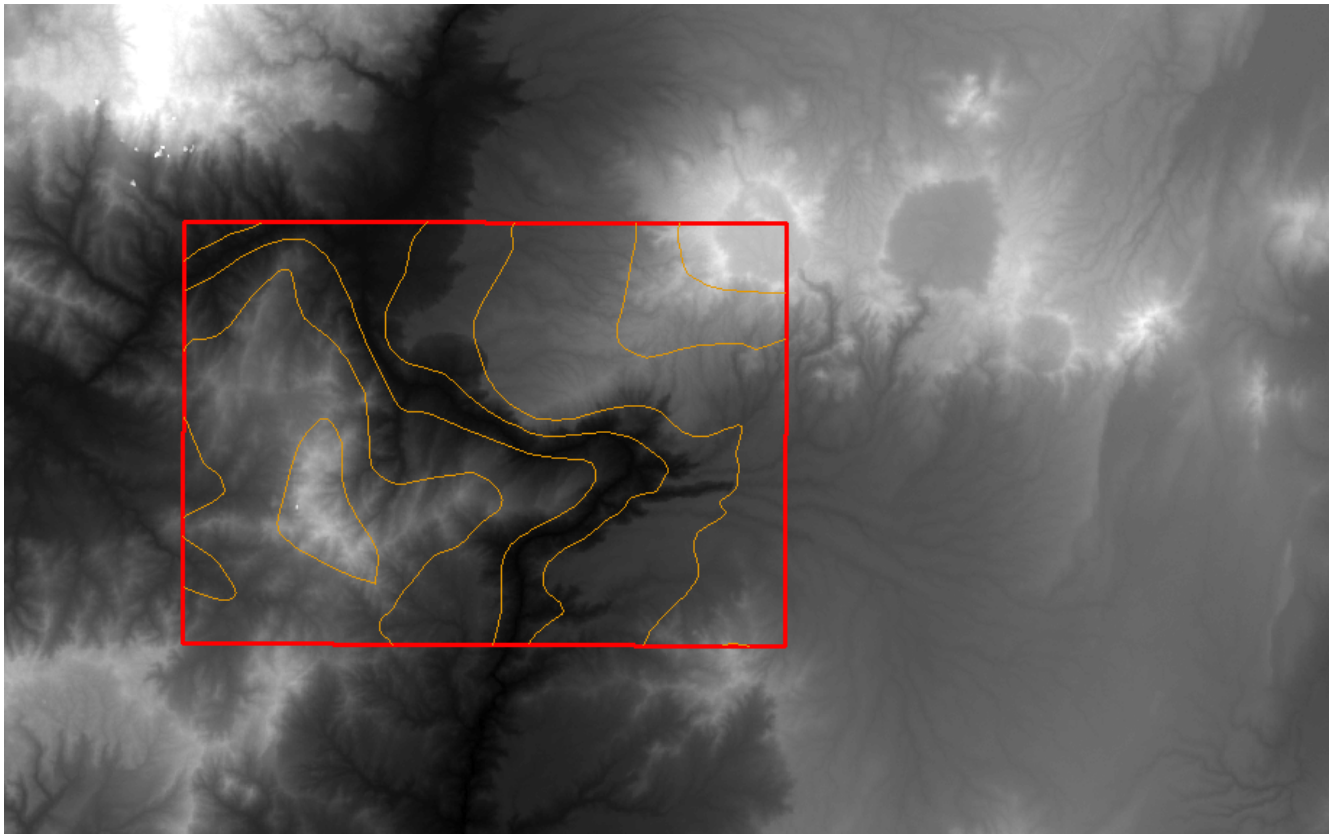


In the "ArcToolbox" window search the "Clip" tool ("ArcToolbox/Analysis Tools/Extract/Clip").

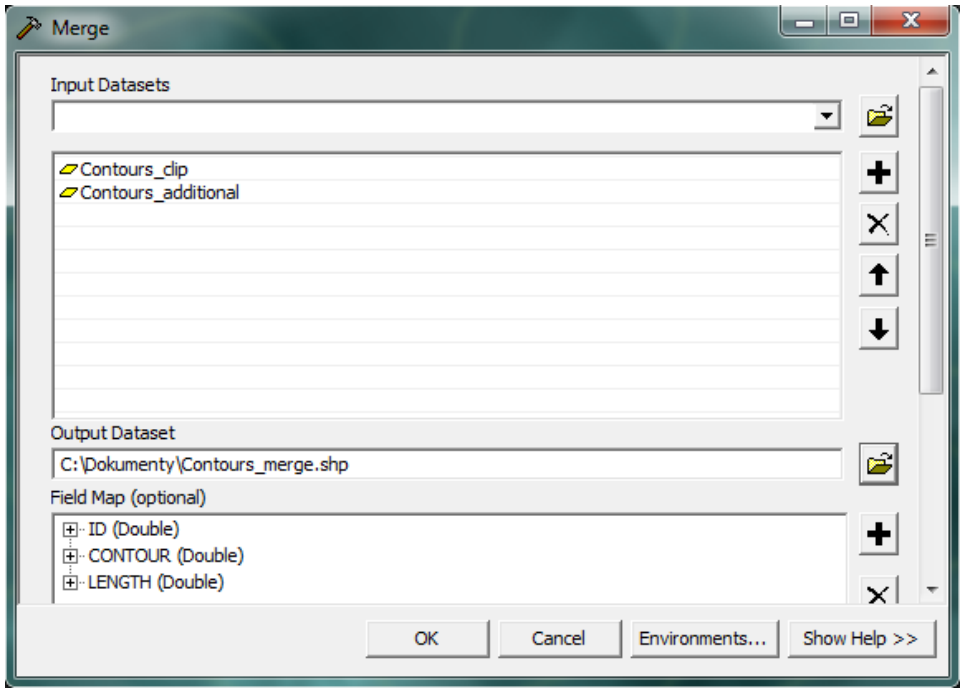



Clip
Input Features
Contours
Clip Features
Map_sheet
Output Feature Class
C:\Dokumenty\Contours_clip.shp
XY Tolerance (optional)
Meters
OK
Cancel
Environments...
Show Help >>

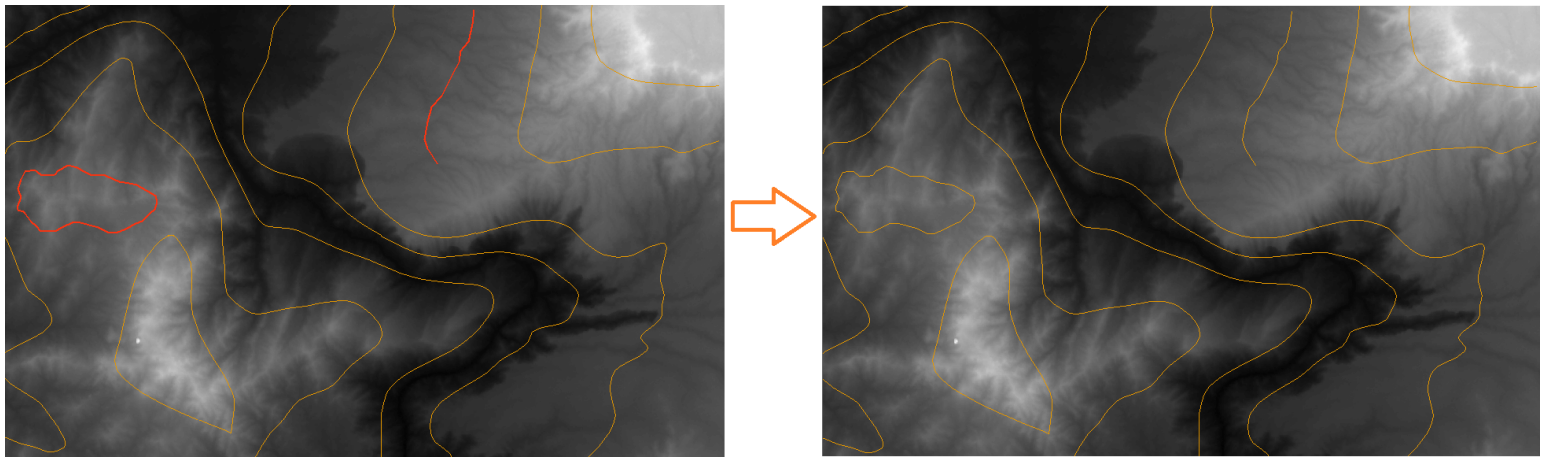
Output layer:



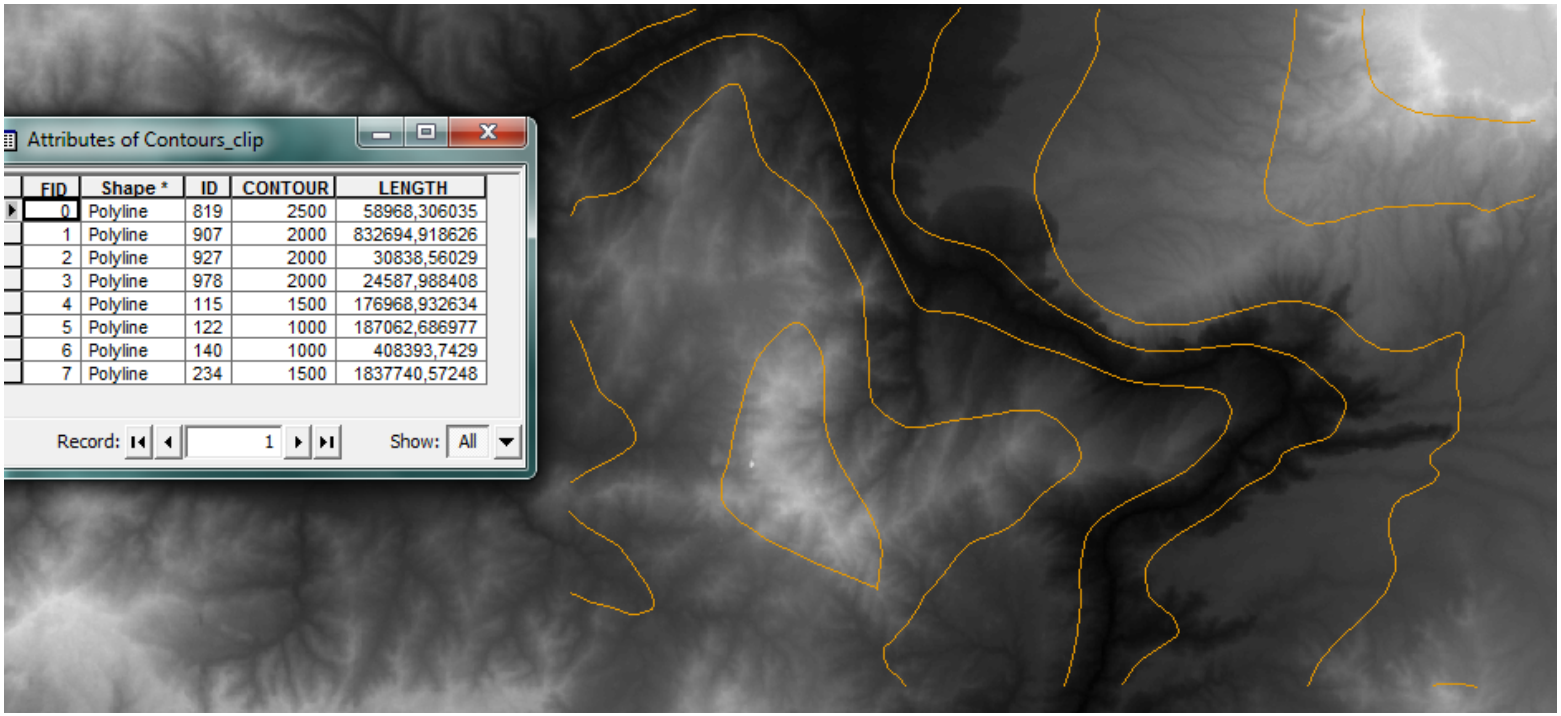
Merge: You can merge both layers and features. To merge layers use the "Merge" tool ("ArcToolbox/Data Management Tools/General/Merge"):



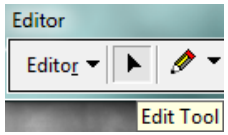
On the "Merge" dialog: Add layers you'd like to merge. Define output layer and run the function.



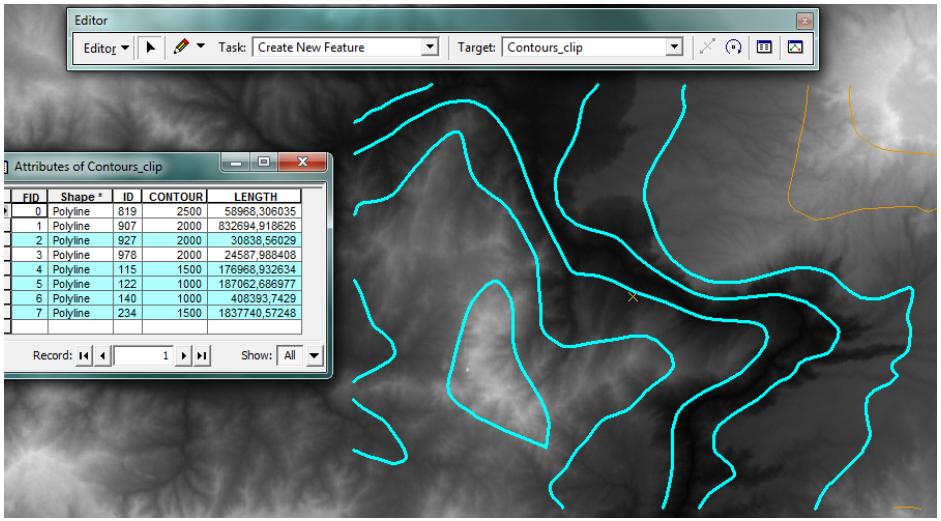
To merge features run the "Merge" tool from "Editor" menu on the "Editor" toolbar. See the attribute table before merge.



On the "Editor" toolbar click the "Editor" menu and "Start editing". Then select the "Edit Tool":

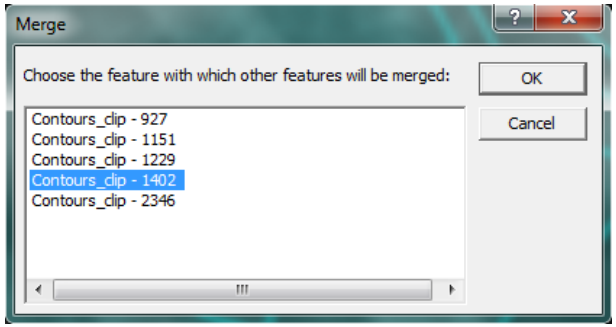


Hold the "Shift" key and click features you want to merge:

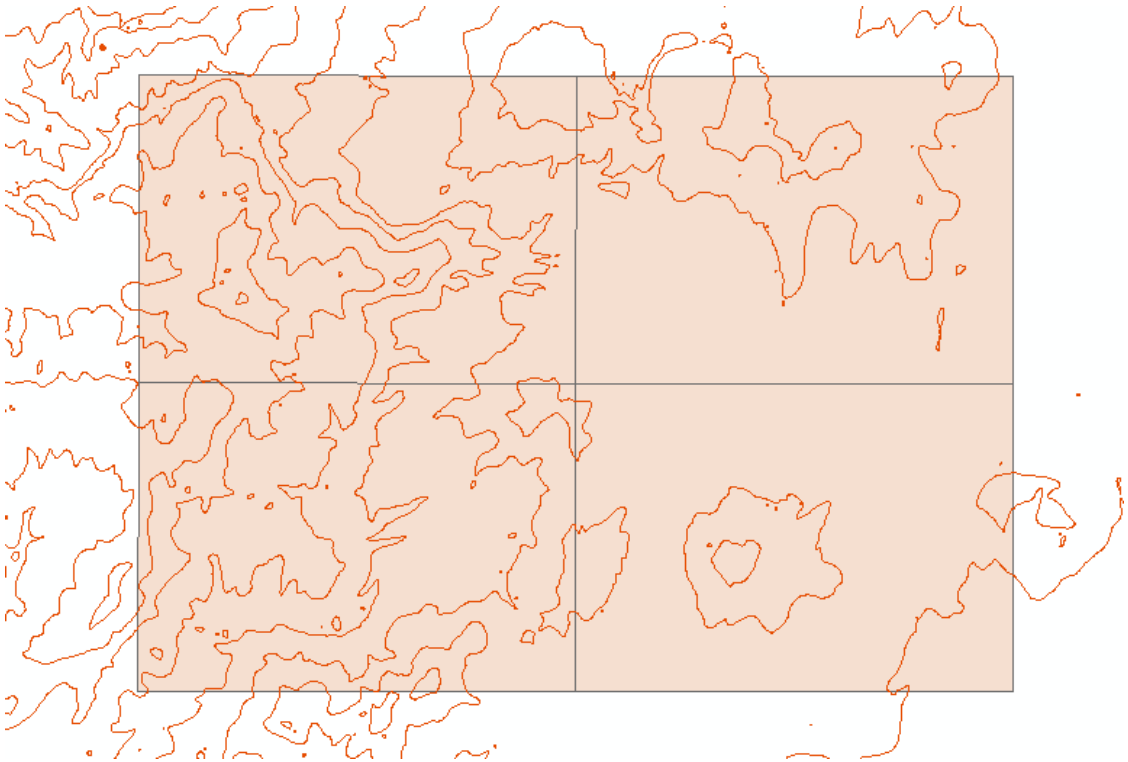


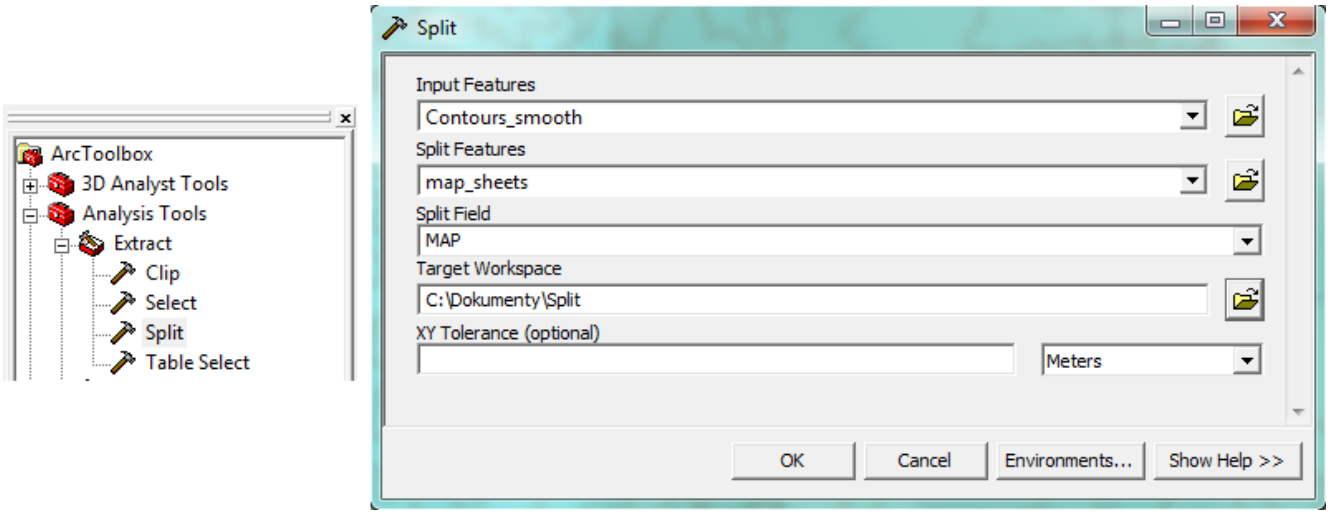
Click on the "Editor" menu and select "Merge...":

As the dialog below sais: "Choose the feature with which other features will be merged" and press "OK":

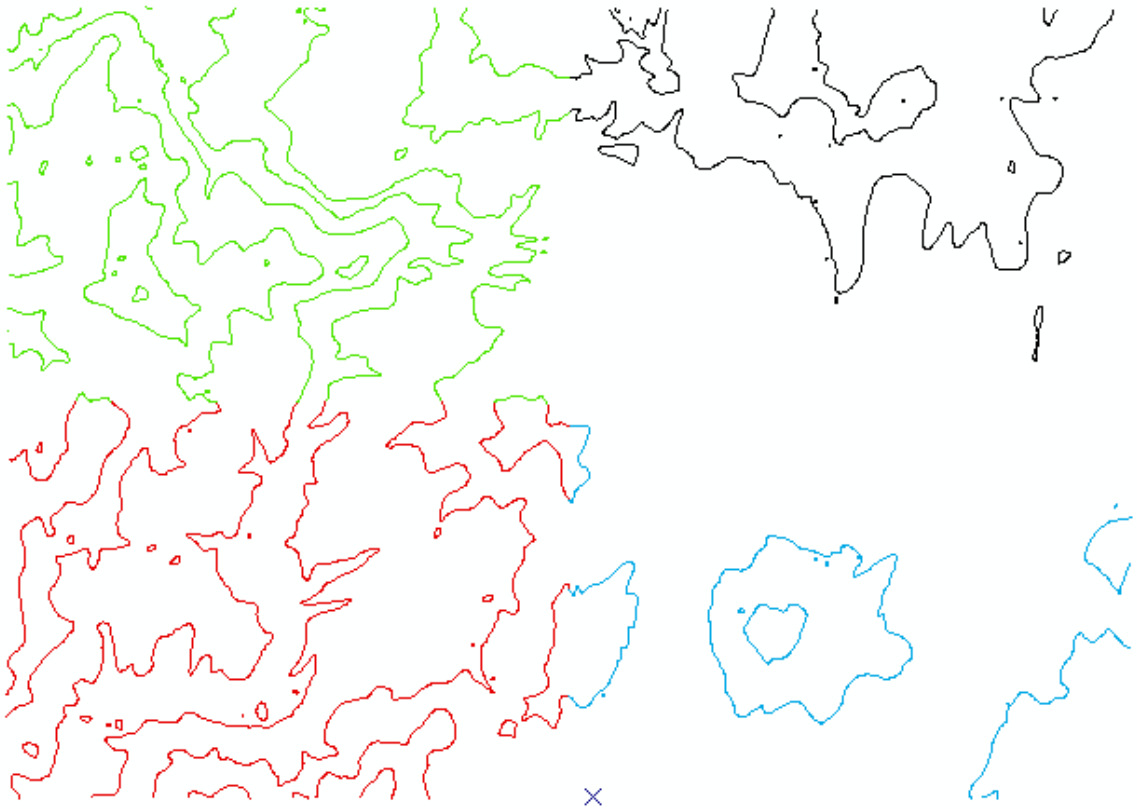


Split layers: Run the "Split" tool in the ArcToolbox ("ArcToolbox/Analysis Tools/Extract/Split"). Input layers example: contours and Map sheets:

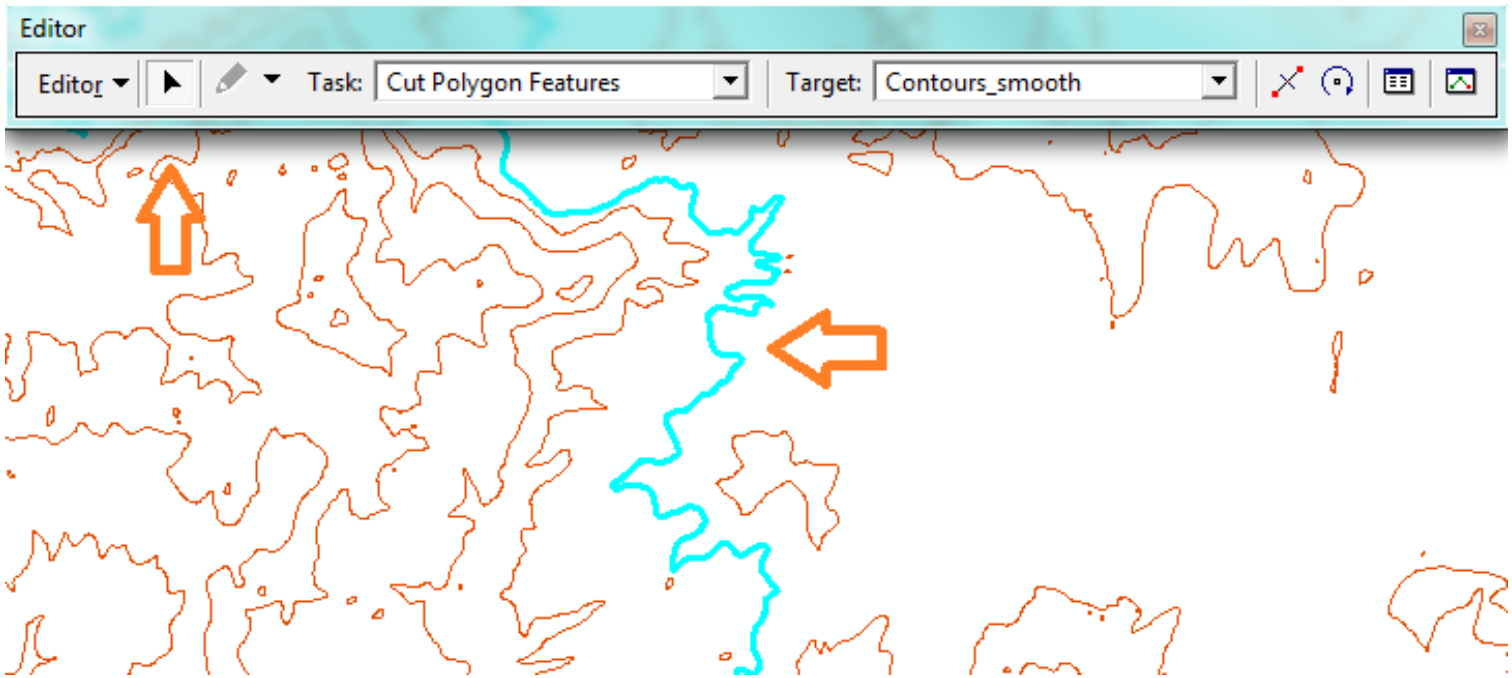



ArcToolbox
3D Analyst Tools
Analysis Tools
Extract
Clip
Select
Split
Table Select
Split
Input Features
Contours_smooth
Split Features
map_sheets
Split Field
MAP
Target Workspace
C:\Dokumenty\Split
XY Tolerance (optional)
Meters
OK
Cancel
Environments...
Show Help >>

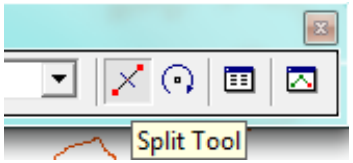
The result: four separated layers.



Split features: Use "Editor" toolbar. Start editing. If you'd like to split lines: select the "Edit Tool" and click the line you want to split:

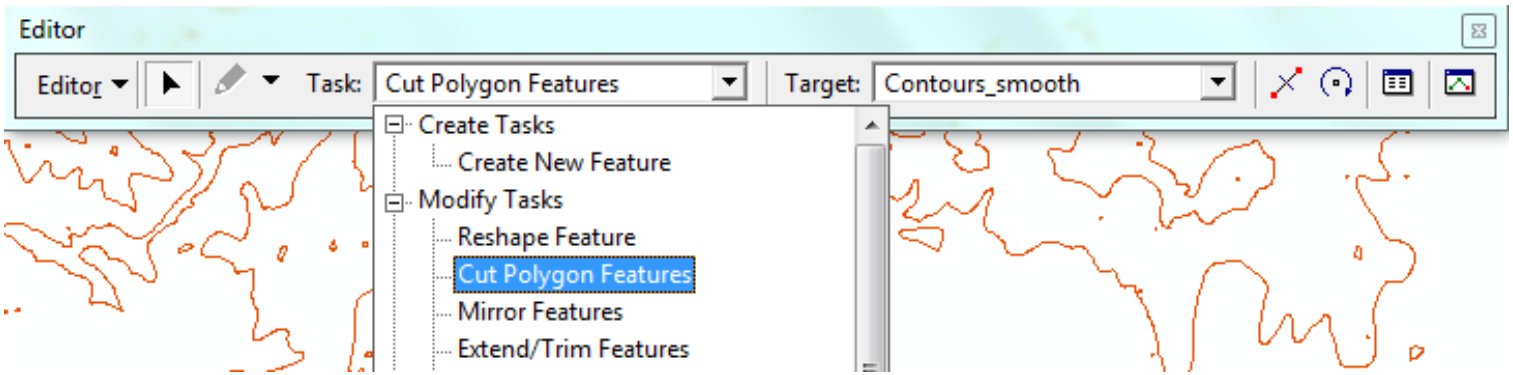


Ensure that snapping is checked (Editor/Snapping). Select the "Split Tool" on the "Editor" toolbar:

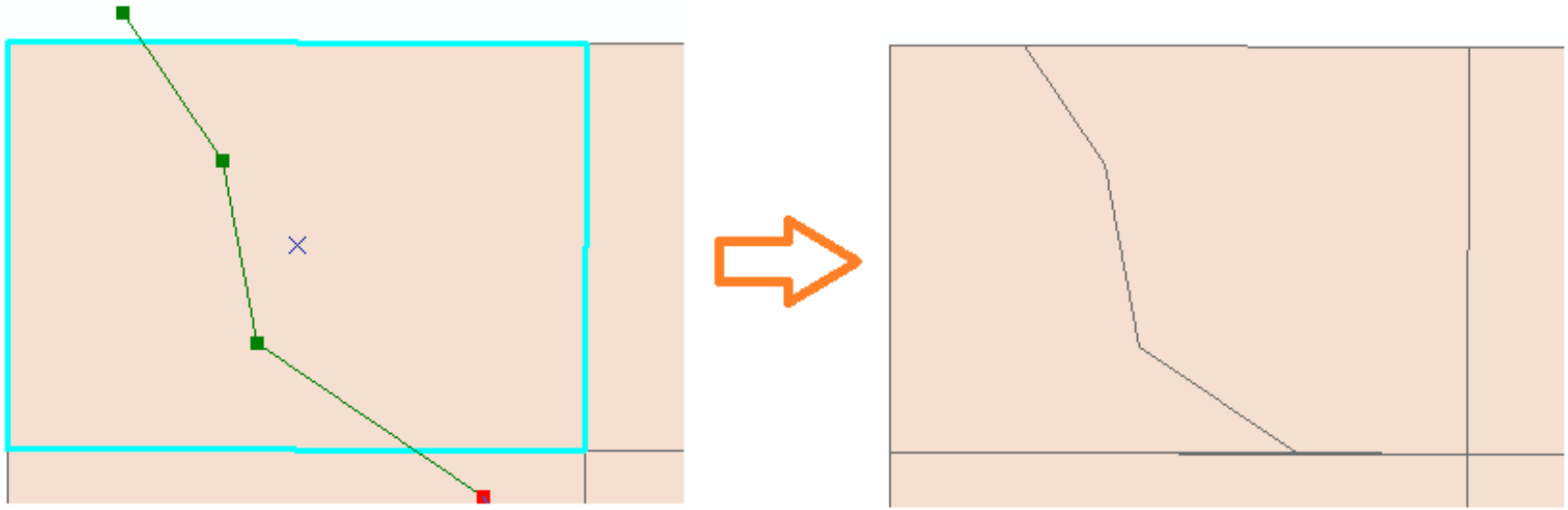


click the selected line.

If you'd like to Split polygons select polygon you want to split by "Edit Tool". In the "Task" pop-up menu select "Cut Polygon Features":



Using the "Sketch Tool" create a line that will cross over the polygon boundaries. Polygon is separated after you finish the sketch.

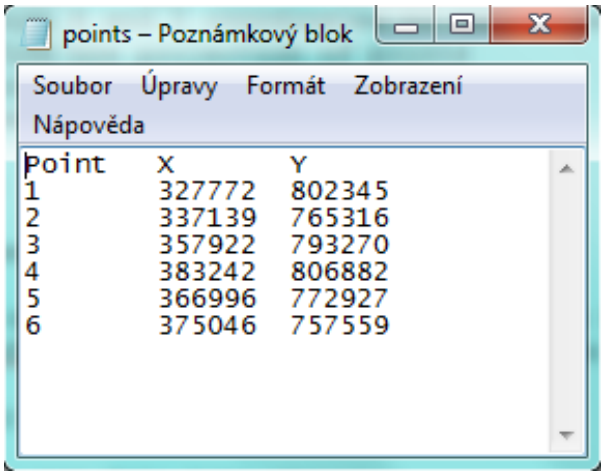


6. Add and display X,Y data

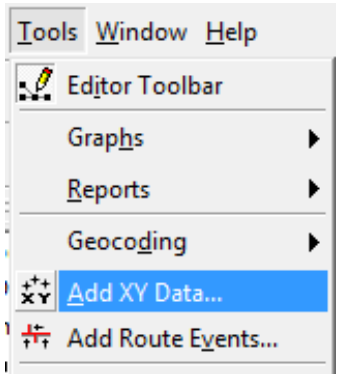
Step by step:

- Add txt or xls file to ArcMap.
- Assign X and Y coordinates to appropriate fields.
- Define projection of points.
- Export your X, Y data to a shapefile.

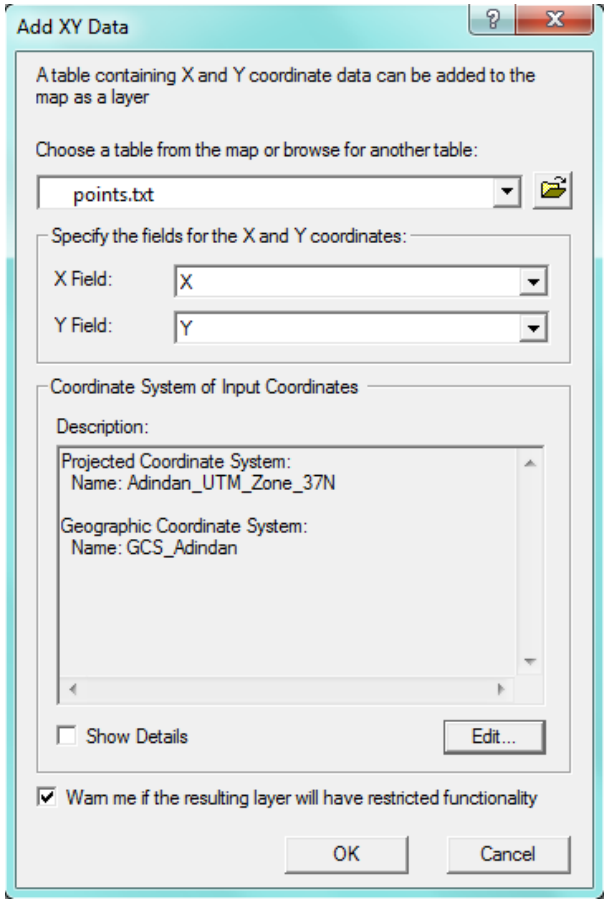
This chapter shows how to import tabular data to ArcMap. You need a table or a text file that must contain two fields: x-coordinate and y-coordinate. As example create a txt file similar to this one:



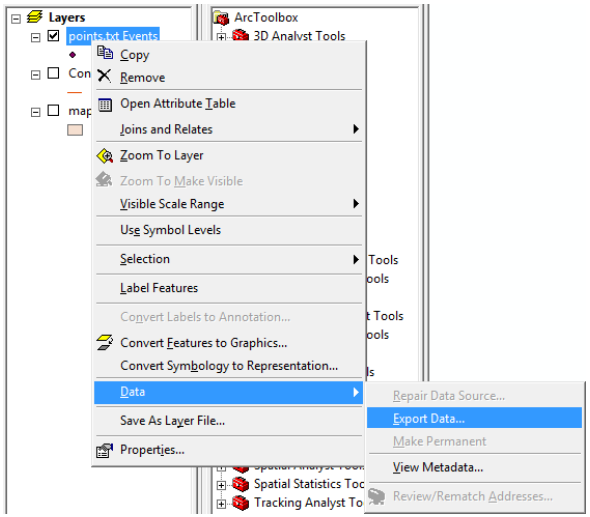
In ArcMap click the "Tools" menu and click "Add XY Data...":



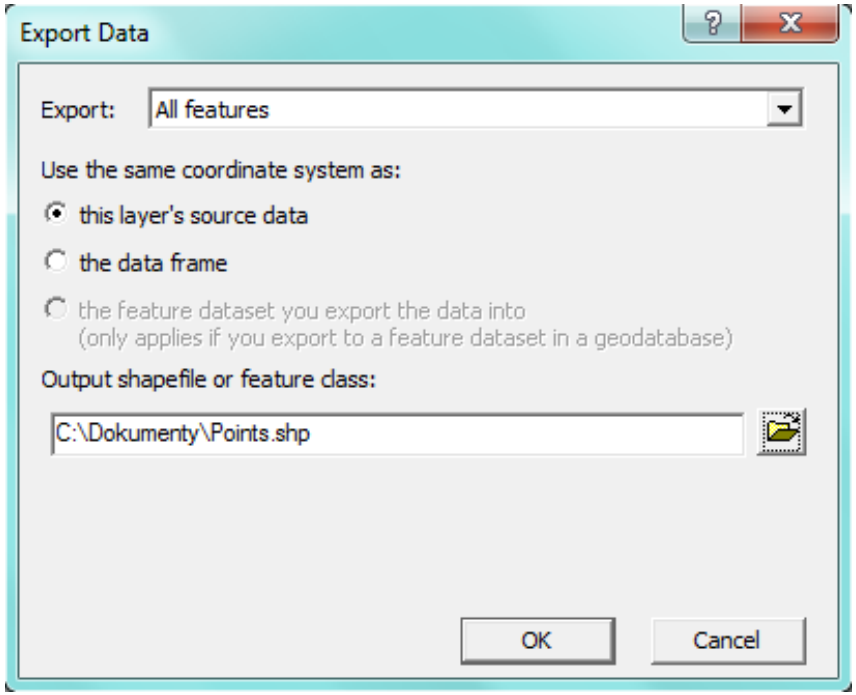
Browse the txt file you have created. Click the X Field drop-down arrow and click the field containing x-coordinate values. Do the same with y-coordinate. Define the coordinate system and units represented in the x and y fields!


Add XY Data
A table containing X and Y coordinate data can be added to the map as a layer
Choose a table from the map or browse for another table:
points.txt
Specify the fields for the X and Y coordinates:
X Field:
X
Y Field:
Y
Coordinate System of Input Coordinates
Description:
Projected Coordinate System:
Name: Adindan_UTM_Zone_37N
Geographic Coordinate System:
Name: GCS_Adindan
Show Details
Edit...
Warn me if the resulting layer will have restricted functionality
OK
Cancel

Click "OK" button. Check the warn me box that says that you will not be able to make selections, perform relates and edit your points because the "ObjedtID" field is missing. Click "OK". You can create a new feature class from this data and be able to perform those tasks. Right-click the layer in the table of contents, point to "Data", then click "Export Data...":



Leave "Export: All features". Click the Browse button and navigate to a location to save the exported data. Type the name for the output data source and click "OK".



"Export Data" function is also useful when you'd like to store only a layer selection. You may do same analysis for example. Its result is a selection. You can use this selection and export it to a new shapefile as your result data. Select few features from a shapefile. Right-click the layer in the table of contents, click "Data" and select "Export Data...". Click the "Export:" drop-down arrow and click "Selected features".

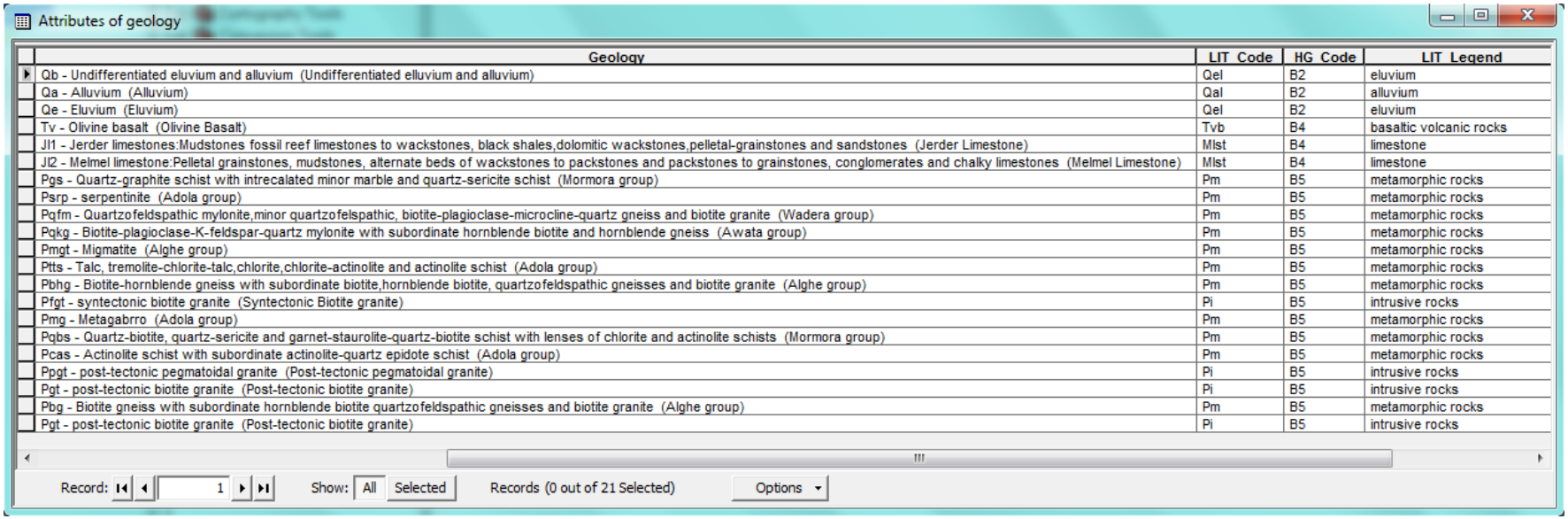
7. Attribute Queries

This chapter will provide an overview of basic attribute queries. Effective way to select features is a sql expression. You build expressions on the "Select by Attributes" dialog box.

Open the "Select by Attributes" dialog box. You can open it from attribute table: Click the "Options" button and click the "Select By Attributes..." or from main menu: "Selection/Select By Attributes".

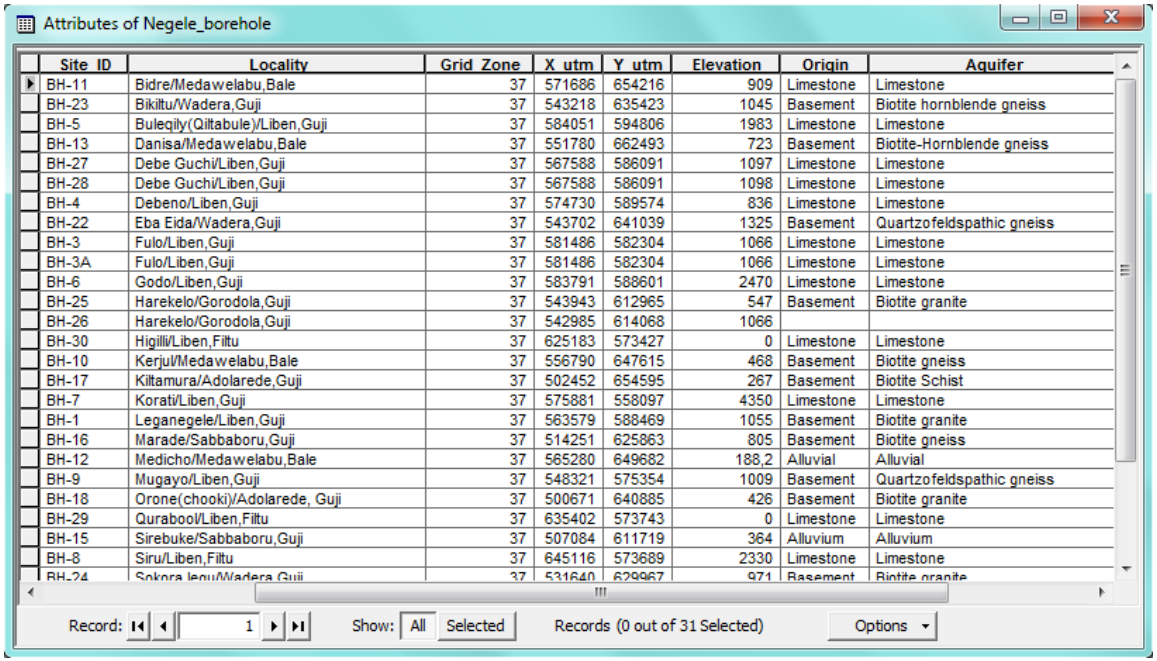
For the presentation we will use two layers: geology and borehole. Look at their attribute tables:

geology:



Geology	LIT_Code	HG_Code	LIT_Legend
Qb - Undifferentiated eluvium and alluvium (Undifferentiated elluvium and alluvium)	Qel	B2	eluvium
Qa - Alluvium (Alluvium)	Qal	B2	alluvium
Qe - Eluvium (Eluvium)	Qel	B2	eluvium
Tv - Olivine basalt (Olivine Basalt)	Tvb	B4	basaltic volcanic rocks
Jl1 - Jerder limestones:Mudstones fossil reef limestones to wackstones, black shales,dolomitic wackstones,pelletal-grainstones and sandstones (Jerder Limestone)	Mlst	B4	limestone
Jl2 - Melmel limestone:Pelletal grainstones, mudstones, alternate beds of wackstones to packstones and packstones to grainstones, conglomerates and chalky limestones (Melmel Limestone)	Mlst	B4	limestone
Pgs - Quartz-graphite schist with intrecalated minor marble and quartz-sericite schist (Mormora group)	Pm	B5	metamorphic rocks
Psrp - serpentinite (Adola group)	Pm	B5	metamorphic rocks
Pqfm - Quartzofeldspathic mylonite,minor quartzofelspathic, biotite-plagioclase-microcline-quartz gneiss and biotite granite (Wadera group)	Pm	B5	metamorphic rocks
Pqkg - Biotite-plagioclase-K-feldspar-quartz mylonite with subordinate hornblende biotite and hornblende gneiss (Awata group)	Pm	B5	metamorphic rocks
Pmgt - Migmatite (Alghe group)	Pm	B5	metamorphic rocks
Ptts - Talc, tremolite-chlorite-talc,chlorite,chlorite-actinolite and actinolite schist (Adola group)	Pm	B5	metamorphic rocks
Pbhg - Biotite-hornblende gneiss with subordinate biotite,hornblende biotite, quartzofeldspathic gneisses and biotite granite (Alghe group)	Pm	B5	metamorphic rocks
Pfgt - syntectonic biotite granite (Syntectonic Biotite granite)	Pi	B5	intrusive rocks
Pmg - Metagabrro (Adola group)	Pm	B5	metamorphic rocks
Pqbs - Quartz-biotite, quartz-sericite and garnet-staurolite-quartz-biotite schist with lenses of chlorite and actinolite schists (Mormora group)	Pm	B5	metamorphic rocks
Pcas - Actinolite schist with subordinate actinolite-quartz epidote schist (Adola group)	Pm	B5	metamorphic rocks
Ppgt - post-tectonic pegmatoidal granite (Post-tectonic pegmatoidal granite)	Pi	B5	intrusive rocks
Pgt - post-tectonic biotite granite (Post-tectonic biotite granite)	Pi	B5	intrusive rocks
Pbg - Biotite gneiss with subordinate hornblende biotite quartzofeldspathic gneisses and biotite granite (Alghe group)	Pm	B5	metamorphic rocks
Pgt - post-tectonic biotite granite (Post-tectonic biotite granite)	Pi	B5	intrusive rocks

borehole:

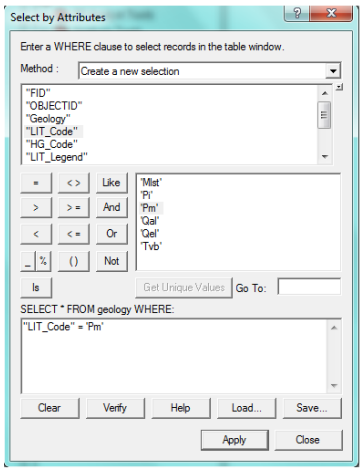


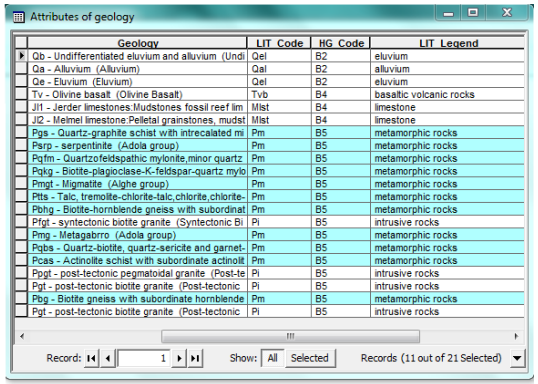
Attributes of Negele_borehole

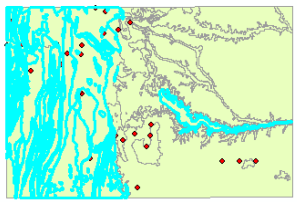
Site_ID	Locality	Grid_Zone	X_utm	Y_utm	Elevation	Origin	Aquifer
BH-11	Bidre/Medawelabu,Bale	37	571686	654216	909	Limestone	Limestone
BH-23	Bikiltu/Wadera,Guji	37	543218	635423	1045	Basement	Biotite hornblende gneiss
BH-5	Buleqily(Qiltabule)/Liben,Guji	37	584051	594806	1983	Limestone	Limestone
BH-13	Danisa/Medawelabu,Bale	37	551780	662493	723	Basement	Biotite-Hornblende gneiss
BH-27	Debe Guchi/Liben,Guji	37	567588	586091	1097	Limestone	Limestone
BH-28	Debe Guchi/Liben,Guji	37	567588	586091	1098	Limestone	Limestone
BH-4	Debeno/Liben,Guji	37	574730	589574	836	Limestone	Limestone
BH-22	Eba Eida/Wadera,Guji	37	543702	641039	1325	Basement	Quartzofeldspathic gneiss
BH-3	Fulo/Liben,Guji	37	581486	582304	1066	Limestone	Limestone
BH-3A	Fulo/Liben,Guji	37	581486	582304	1066	Limestone	Limestone
BH-6	Godo/Liben,Guji	37	583791	588601	2470	Limestone	Limestone
BH-25	Harekelo/Gorodola,Guji	37	543943	612965	547	Basement	Biotite granite
BH-26	Harekelo/Gorodola,Guji	37	542985	614068	1066		
BH-30	Higilli/Liben,Filtu	37	625183	573427	0	Limestone	Limestone
BH-10	Kerju/Medawelabu,Bale	37	556790	647615	468	Basement	Biotite gneiss
BH-17	Kiltamura/Adolarede,Guji	37	502452	654595	267	Basement	Biotite Schist
BH-7	Korati/Liben,Guji	37	575881	558097	4350	Limestone	Limestone
BH-1	Leganegele/Liben,Guji	37	563579	588469	1055	Basement	Biotite granite
BH-16	Marade/Sabbaboru,Guji	37	514251	625863	805	Basement	Biotite gneiss
BH-12	Medicho/Medawelabu,Bale	37	565280	649682	188,2	Alluvial	Alluvial
BH-9	Mugayo/Liben,Guji	37	548321	575354	1009	Basement	Quartzofeldspathic gneiss
BH-18	Orone(chooki)/Adolarede, Guji	37	500671	640885	426	Basement	Biotite granite
BH-29	Quraboo/Liben,Filtu	37	635402	573743	0	Limestone	Limestone
BH-15	Sirebuke/Sabbaboru,Guji	37	507084	611719	364	Alluvium	Alluvium
BH-8	Siru/Liben,Filtu	37	645116	573689	2330	Limestone	Limestone
BH-24	Sokora Ieau/Wadera Guji	37	531640	629967	971	Basement	Biotite granite

Record: 1 Show: All Selected Records (0 out of 31 Selected) Options

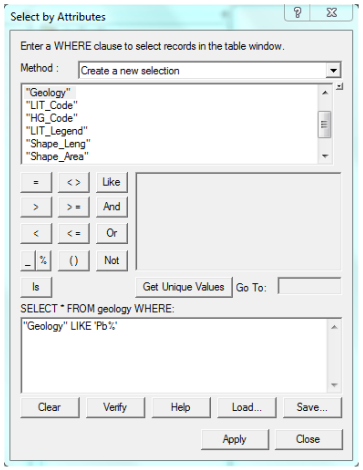
The easiest example describes a selection where an attribute is equal to a specified value: Double-click a field to add the field name to the expression box. Click the equals operator to add it to the expression. Click "Get Unique Values" to see the values for the selected field. Double-click a value to add it to the expression. Click the "Apply" button:

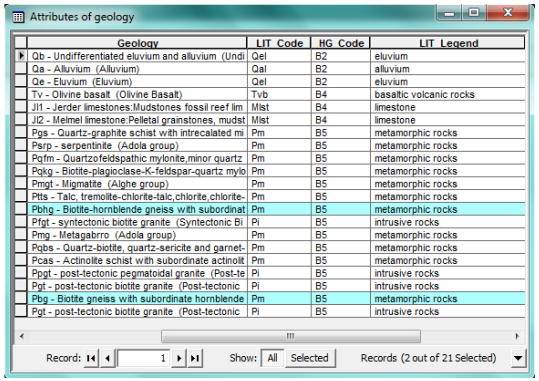


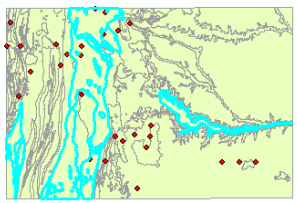




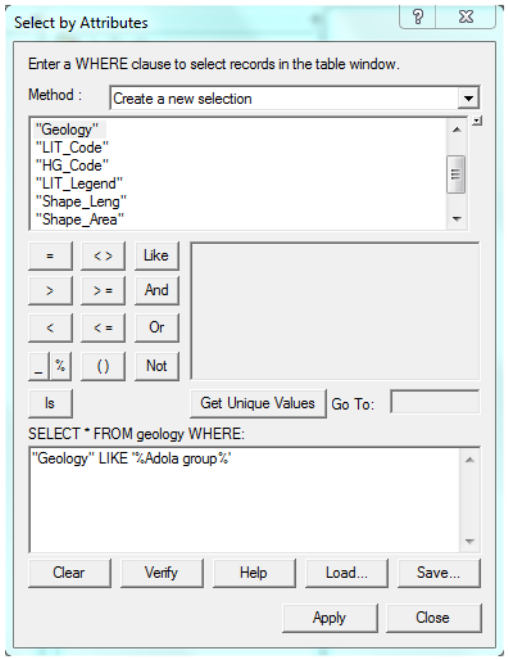
Sometimes it is better to use "LIKE" operator instead of "equals". It allows you to use only a part of an attribute value in your expression. In this case the percent sign substitute each character or each group of characters in a value:

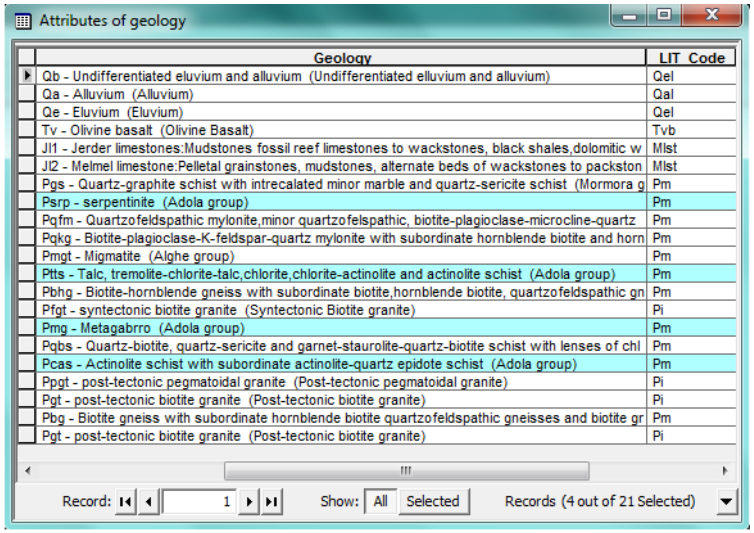


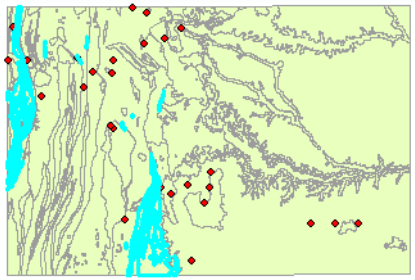




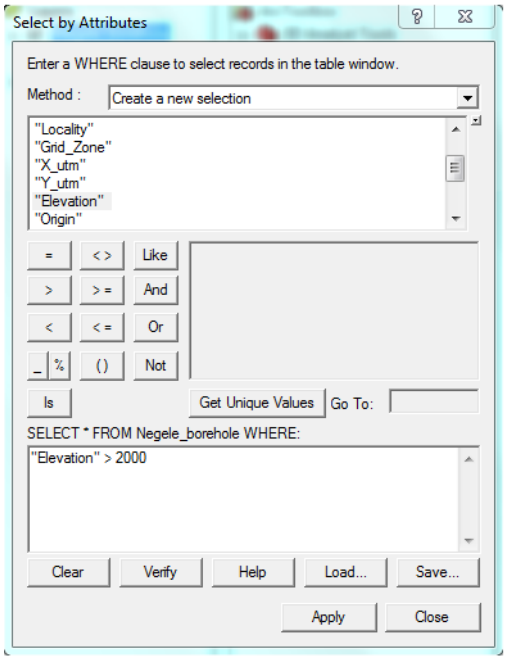
Or:

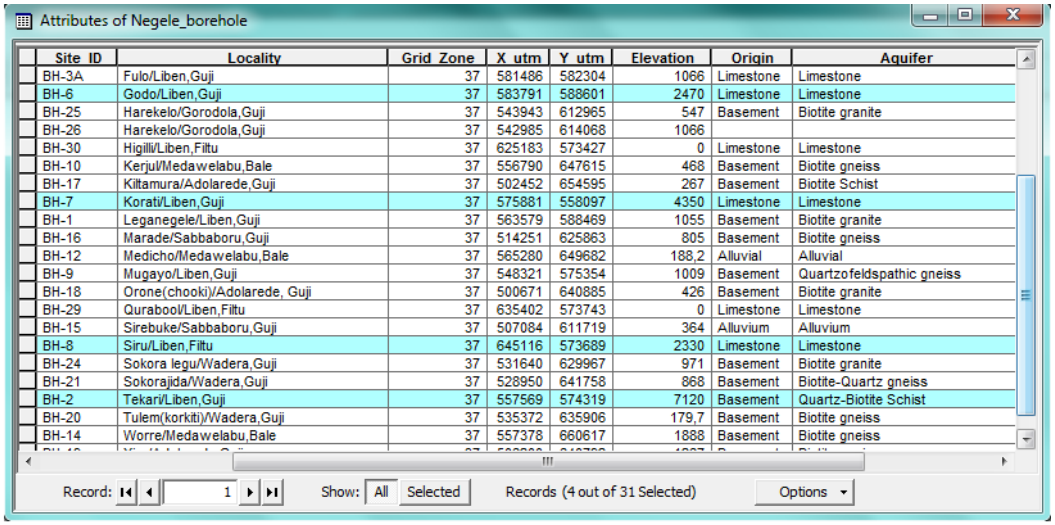

Select by Attributes
Enter a WHERE clause to select records in the table window.
Method :
Create a new selection
"Geology"
"LIT_Code"
"HG_Code"
"LIT_Legend"
"Shape_Leng"
"Shape_Area"
=
< >
Like
>
> =
And
<
< =
Or
_
%
( )
Not
Is
Get Unique Values
Go To:
SELECT * FROM geology WHERE:
"Geology" LIKE '%Adola group%'
Clear
Verify
Help
Load...
Save...
Apply
Close

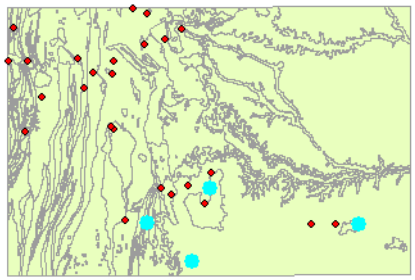

Attributes of geology
Geology
LIT_Code
Qb - Undifferentiated eluvium and alluvium (Undifferentiated elluvium and alluvium) Qel
Qa - Alluvium (Alluvium) Qal
Qe - Eluvium (Eluvium) Qel
Tv - Olivine basalt (Olivine Basalt) Tvb
Jl1 - Jerder limestones:Mudstones fossil reef limestones to wackstones, black shales,dolomitic w Mlst
Jl2 - Melmel limestone:Pelletal grainstones, mudstones, alternate beds of wackstones to packston Mlst
Pgs - Quartz-graphite schist with intrecalated minor marble and quartz-sericite schist (Mormora g Pm
Psrp - serpentinite (Adola group) Pm
Pqfm - Quartzofeldspathic mylonite,minor quartzofelspathic, biotite-plagioclase-microcline-quartz Pm
Pqkg - Biotite-plagioclase-K-feldspar-quartz mylonite with subordinate hornblende biotite and horn Pm
Pmgt - Migmatite (Alghe group) Pm
Ptts - Talc, tremolite-chlorite-talc,chlorite,chlorite-actinolite and actinolite schist (Adola group) Pm
Pbhg - Biotite-hornblende gneiss with subordinate biotite,hornblende biotite, quartzofeldspathic gn Pm
Pfgt - syntectonic biotite granite (Syntectonic Biotite granite) Pi
Pmg - Metagabrro (Adola group) Pm
Pqbs - Quartz-biotite, quartz-sericite and garnet-staurolite-quartz-biotite schist with lenses of chl Pm
Pcas - Actinolite schist with subordinate actinolite-quartz epidote schist (Adola group) Pm
Ppgt - post-tectonic pegmatoidal granite (Post-tectonic pegmatoidal granite) Pi
Pgt - post-tectonic biotite granite (Post-tectonic biotite granite) Pi
Pbg - Biotite gneiss with subordinate hornblende biotite quartzofeldspathic gneisses and biotite gr Pm
Pgt - post-tectonic biotite granite (Post-tectonic biotite granite) Pi
Record: 1
Show: All Selected
Records (4 out of 21 Selected)



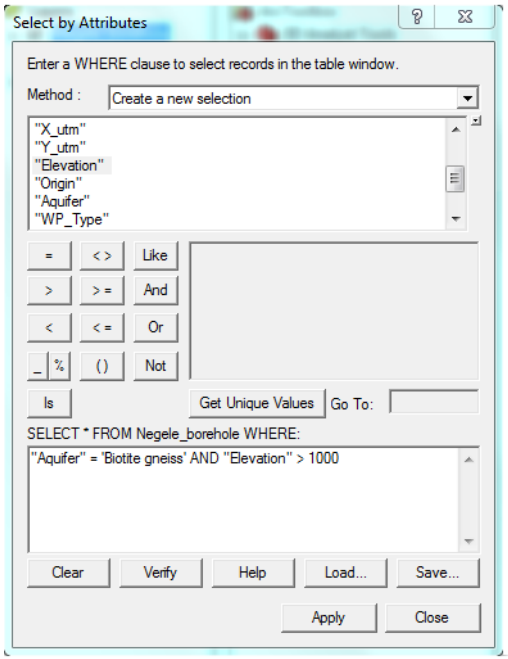
You can also make expressions using operators "greater than" or "less then" (in case of numeric attributes):

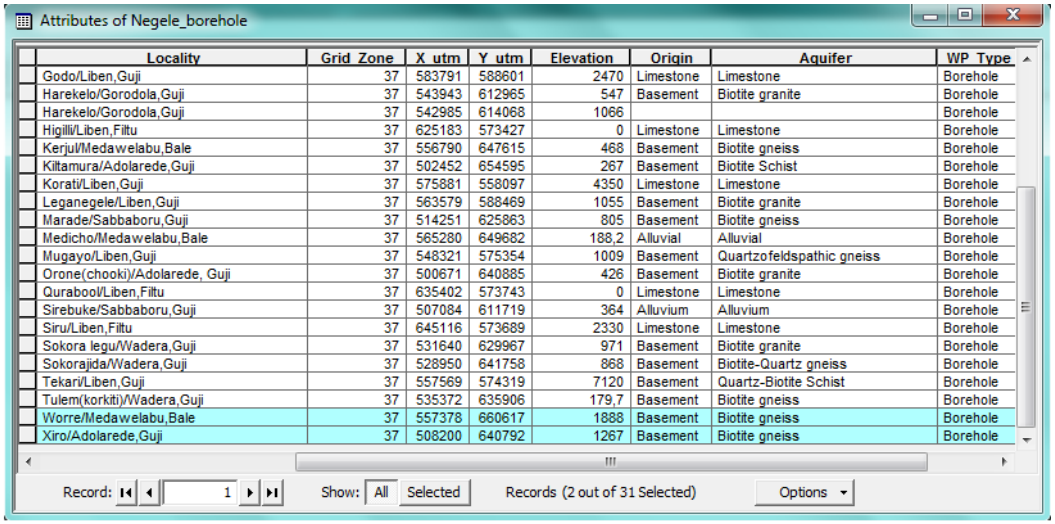


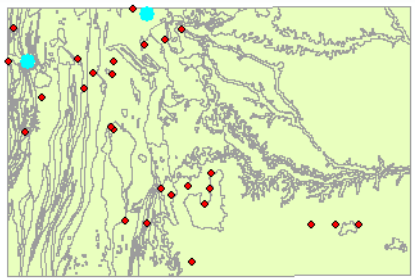




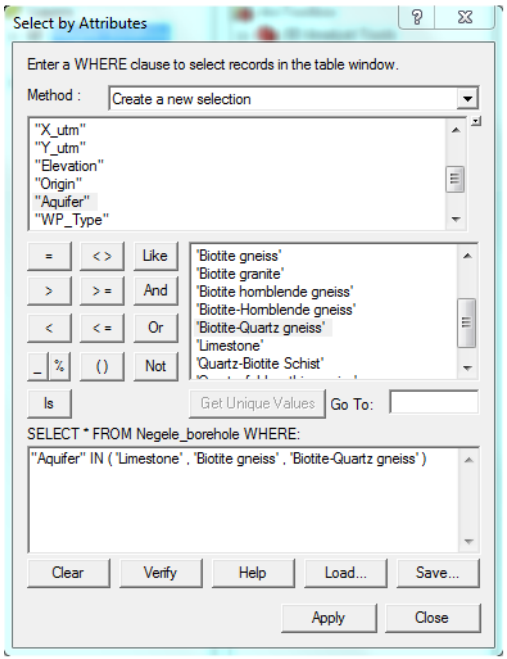
It is possible to combine queries using operator "AND":

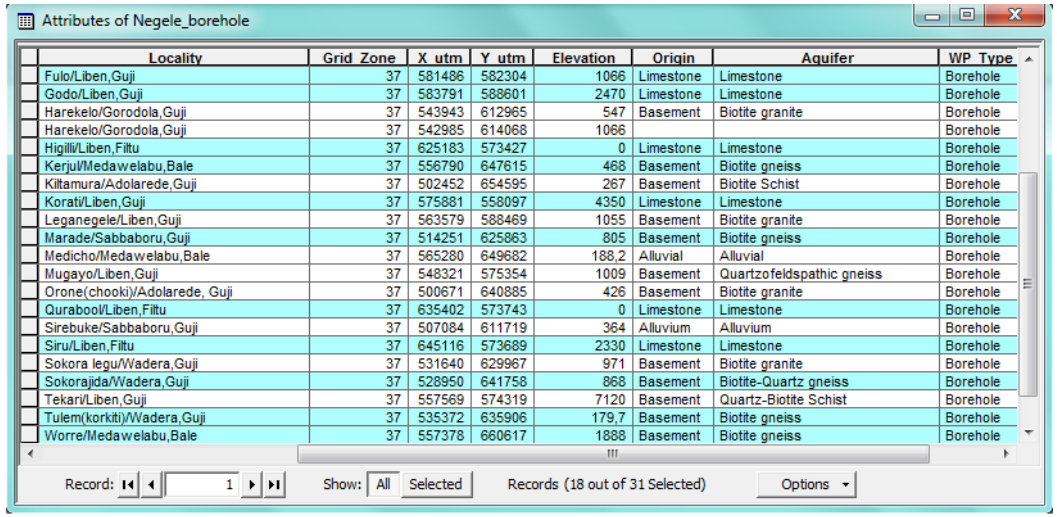


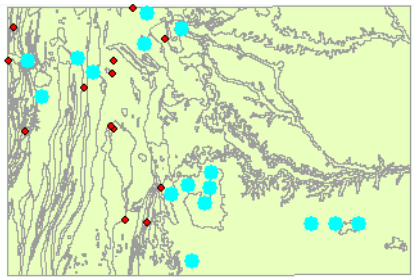




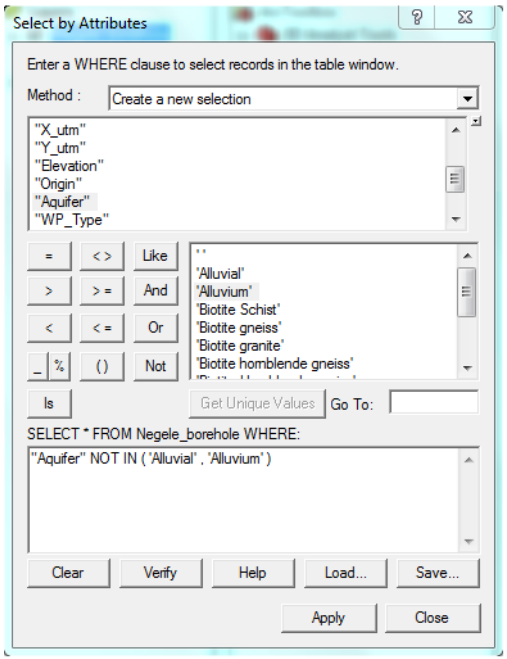
In some cases it is preferable to create a listing of values: It can be done by "IN" operator. To parenthesis type your values separated by comma:

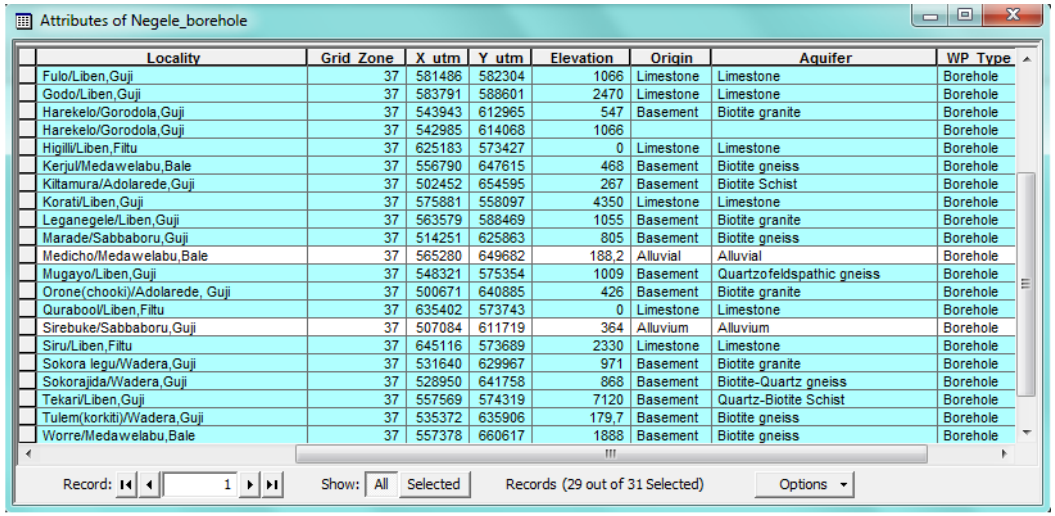


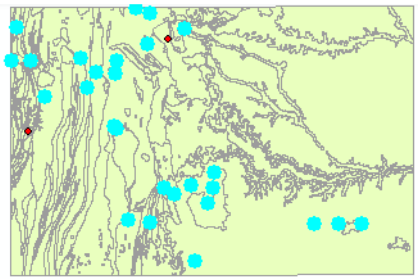




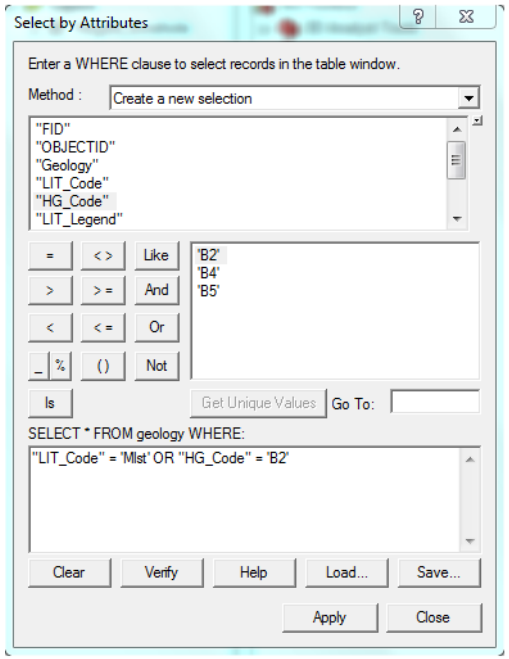
Or select all values except those in the listing:

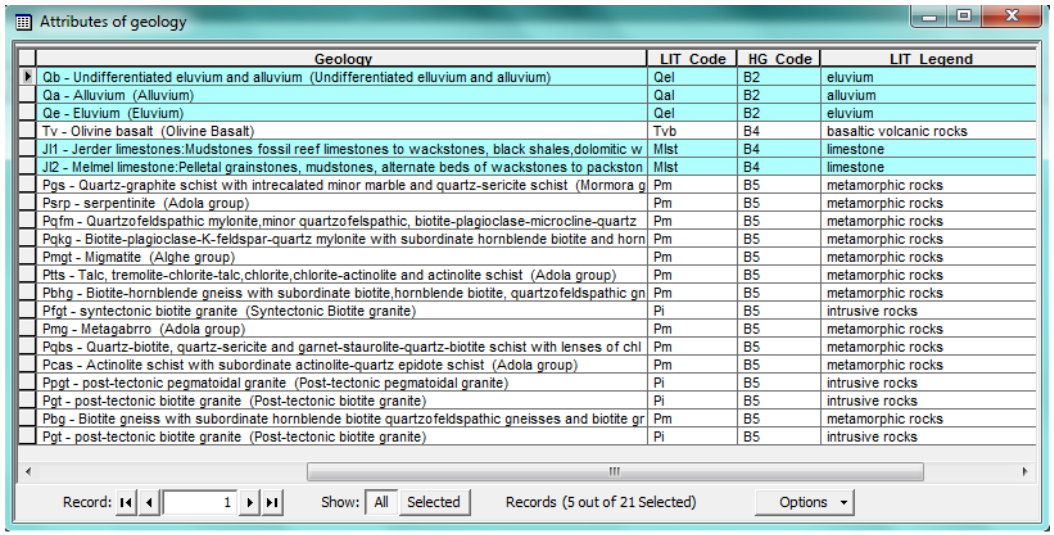


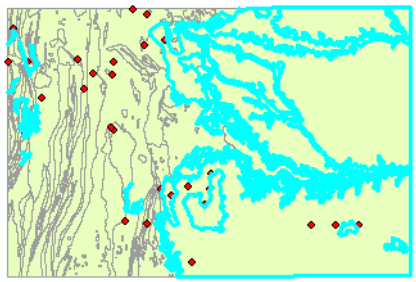




As you can combine queries with the "AND" operator you can also use "OR":





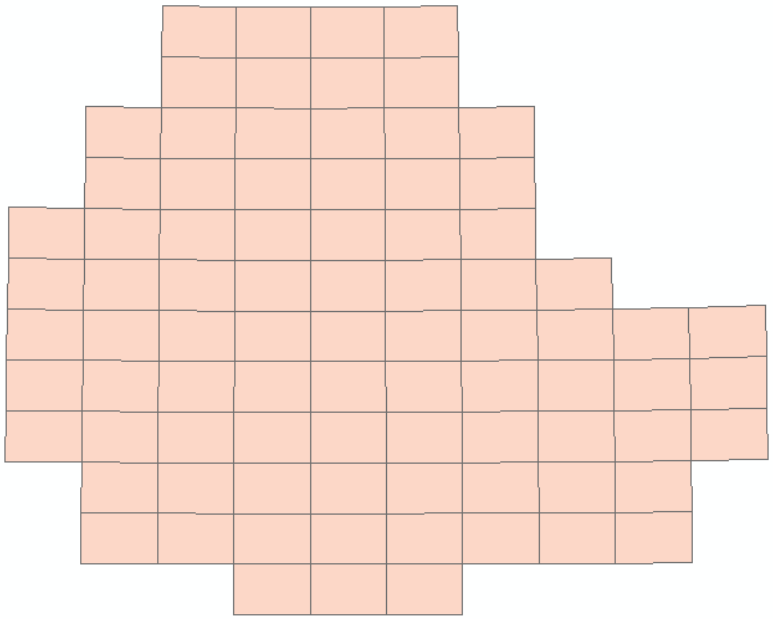


8. Georeferencing

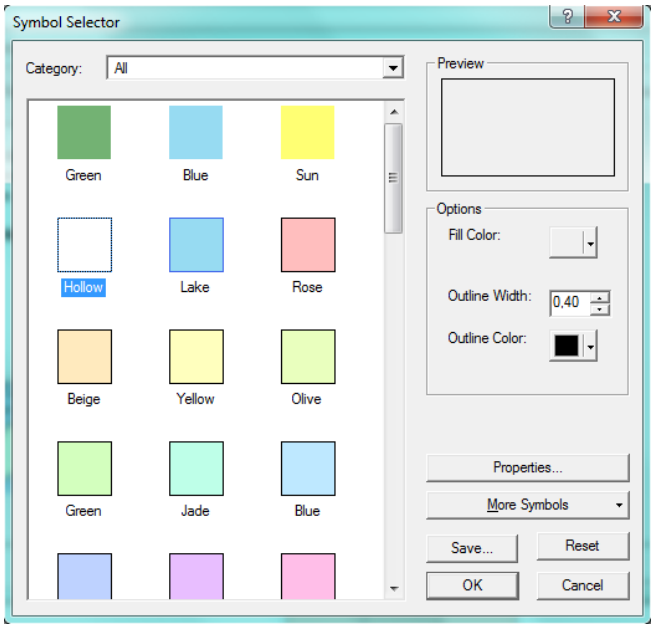
Step by step:

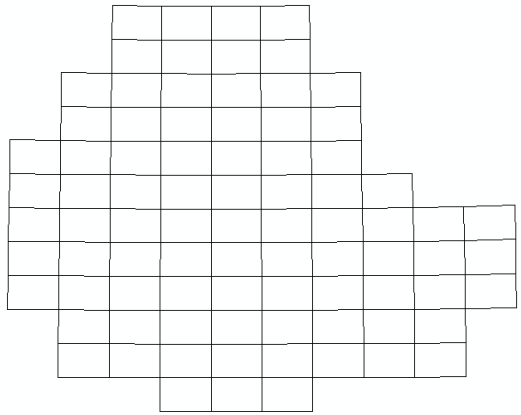
- Add the raster dataset that you want to align with your projected data in ArcMap.
- Zoom to area where you will align the raster.
- Display the raster in current view.
- Align the raster with control points.
- Save georeferencing.

Georeferencing allows you to align a raster dataset to a known coordinate system. Known positions in map coordinates can be identified by a reference layer. For example map sheet layer:

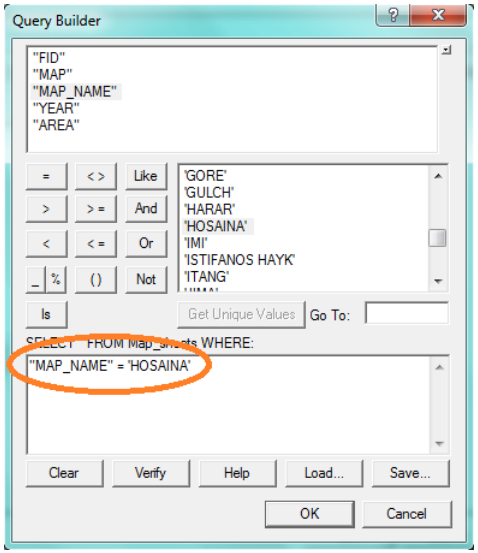


For this case it is better to change the symbology of the reference layer. Click the layer symbol in the table of contents. The Symbol Selector dialog box is displayed. Select the "Hollow" symbol:



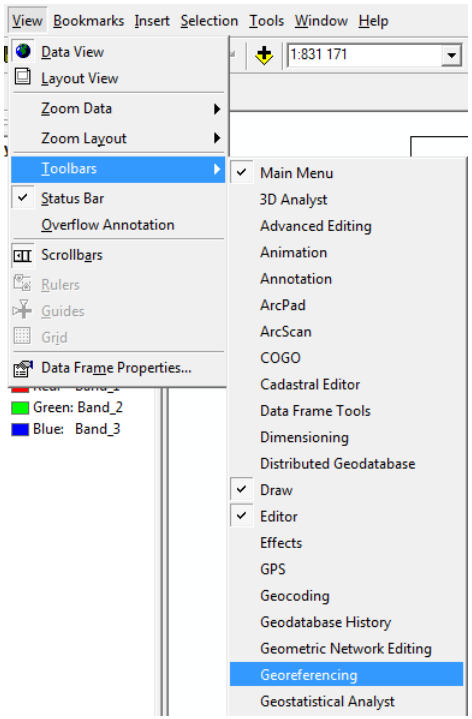


Display only the Hosaina map sheet: Go to layer properties, open the "Definition Query" tab, click "Query Builder..." button. Double-click "MAP_ NAME", then add "=" symbol. Click the "Get Unique Values" button, find out "HOSAINA" and double-click the value to add it to the expression. Your query must looks like this:



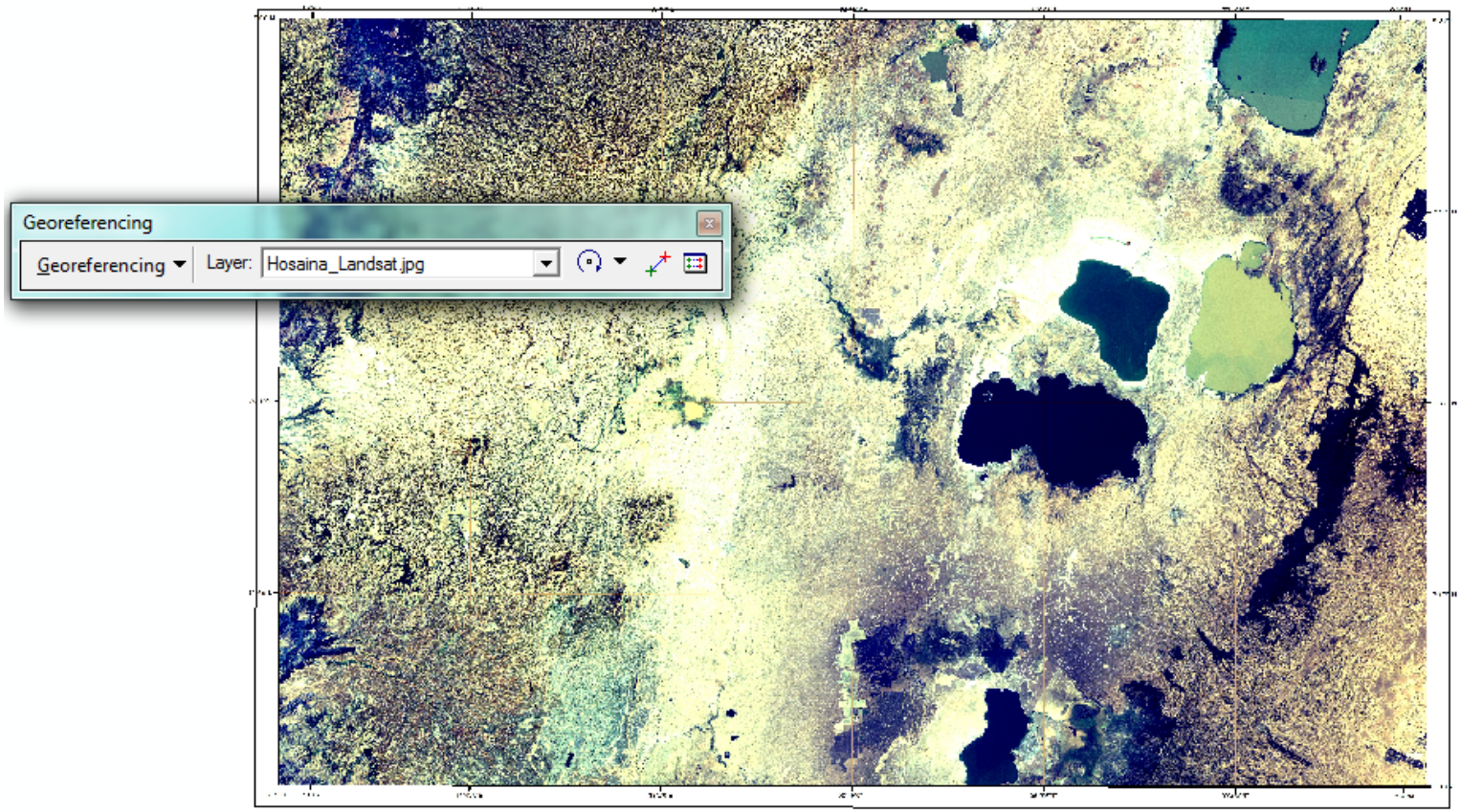
Confirm dialog boxes. Now only the Hosaina map sheet is displayed. Zoom to it.

Add the raster dataset to ArcMap. Click the "View" menu, point to "Toolbars" and click "Georeferencing":



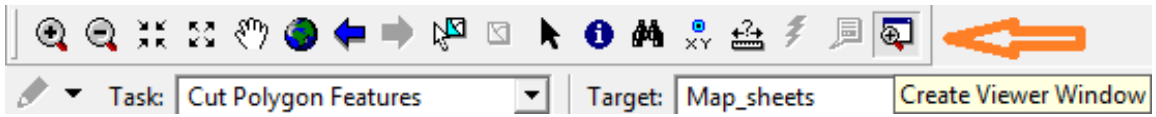
On the "Georeferencing" toolbar select your raster dataset:

Click the "Georeferencing" pop-up menu and select "Fit To Display". Raster will appear in the current map view.

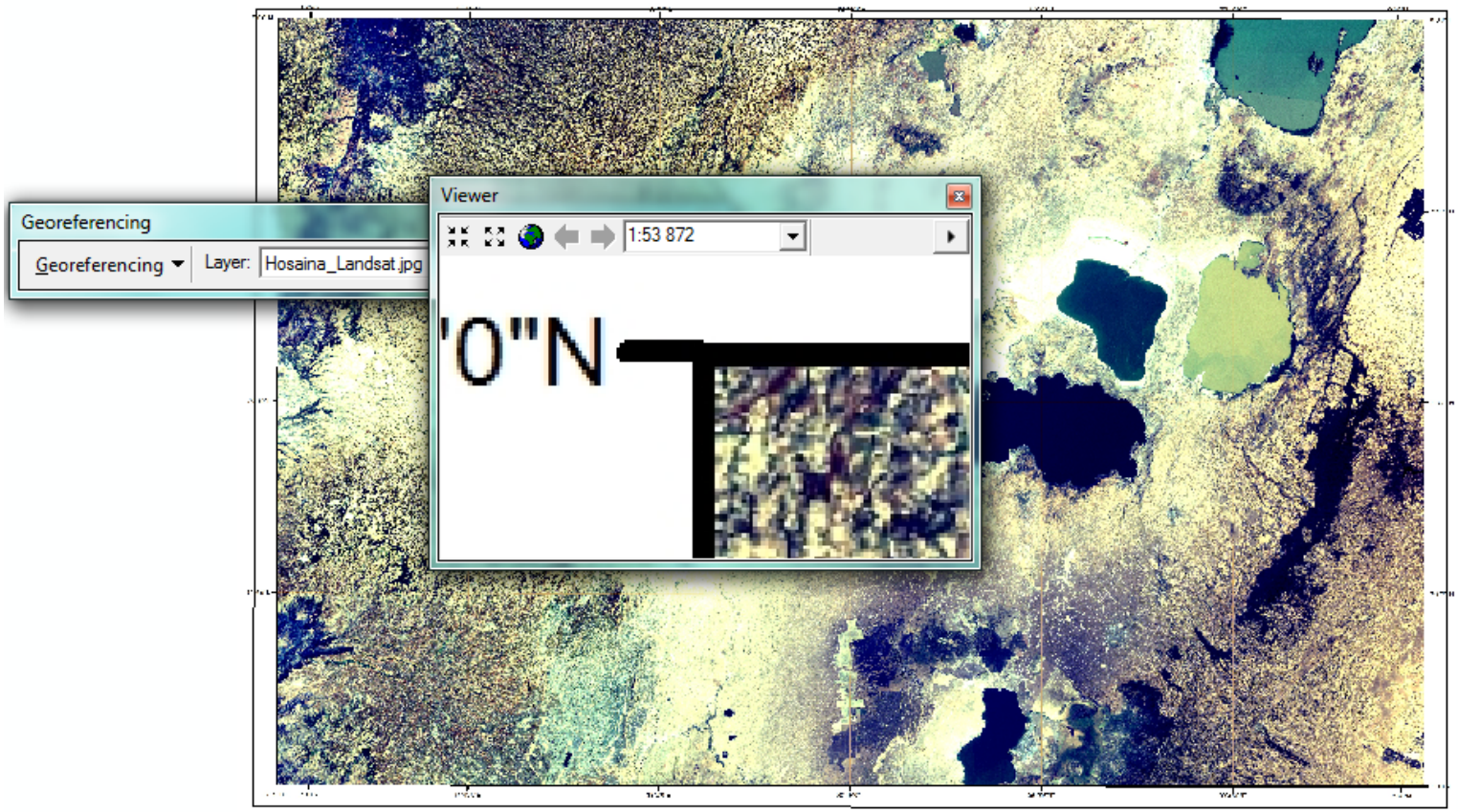

Georeferencing
Georeferencing
Layer:
Hosaina_Landsat.jpg

Before marking control points it is necessary to enable snapping: Start editing, go to "Editor" menu, click "Snapping" and check the "Vertex" check box for the map sheets layer.

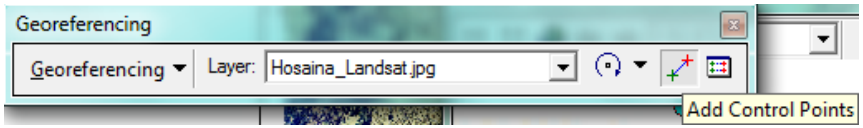
Open the "Viewer" window: Click the "Create Viewer Window" icon on the "Tools" toolbar:



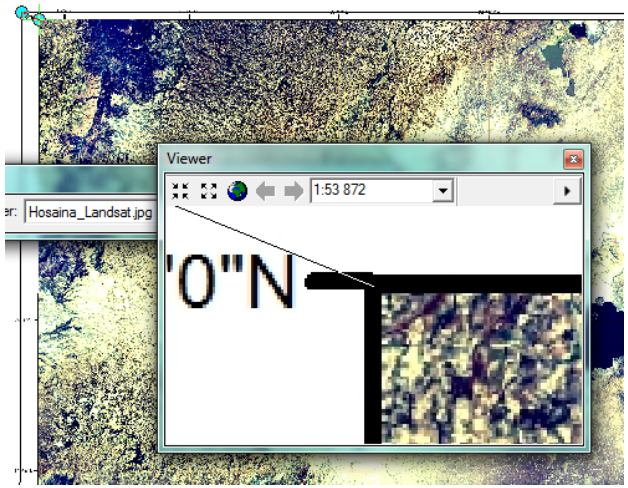
In data view use the tool's crosshairs to draw a viewer at upper left corner of raster map:


Georeferencing
Georeferencing
Layer:
Hosaina_Landsat.jpg
Viewer
1:53 872
'0"N

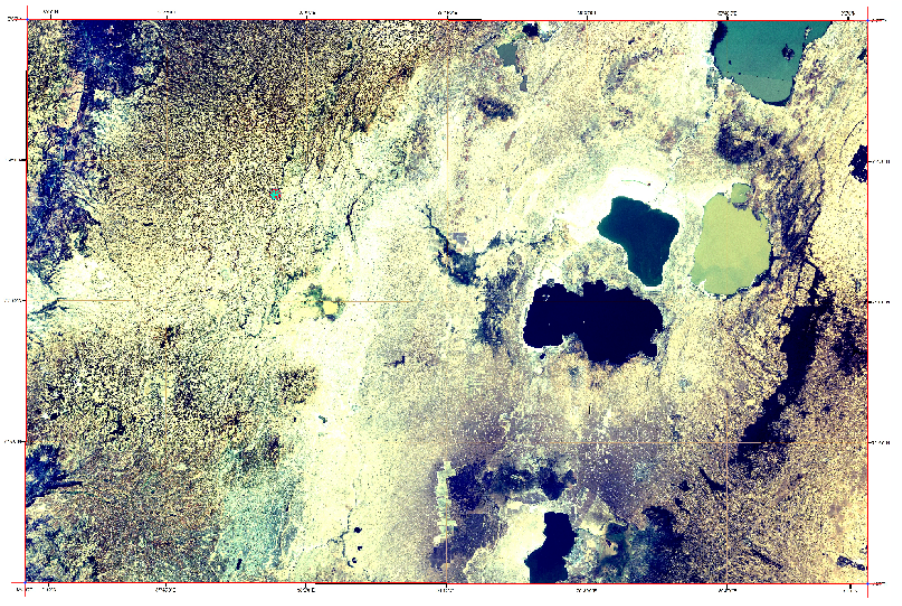
Start to add control points: On the "Georeferencing" toolbar click "Add Control Points":



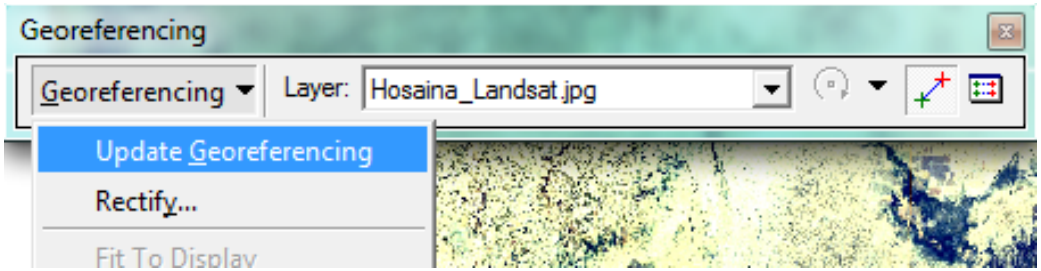
Click at position of map sheet corner in raster (in the "Viewer" window), then click (snap) the corner in vector (in data view).



Close the "Viewer" window and create a new at the upper right map sheet corner in raster (again use "Create Viewer Window" icon). Click the "Add Control Points" and mark second point (first raster then vector). In the same way, add the remaining two points.



On the "Georeferencing" toolbar click the "Georeferencing" pop-up menu and select "Update Georeferencing". This will create additional files to the raster (in the same folder) and your georeferencing is saved.



If a control point was wrongly marked there is a possibility to repair it. On the "Georeferencing" toolbar click the last icon ("View Link Table"). In this table you can delete wrong points and they can be exchanged for new by "Add Control Points" tool.