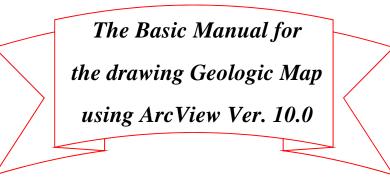
巻末資料 5 GIS データ作成のマニュアル

裹白

### **Table of Contents**

0. Set	the Environment for the drawing1
0-1.	Start 1
0-2.	Customize Tool bars ······ 1
-Men	no 1- useally no need 2
0-3.	Set Tool bars ······ 3
0-4.	Customize the Scale List
0-5.	Set the snapping ····· 8
0-6.	Set Small Windows of ArcView11
0-7.	Set Editor Options
0-8.	Work folders ····· 14
0-9.	Create empty layers (Shape Files)15
0-10.	Set layers
1. Star	t Editing20
1-1.	Start 20
1-2.	Start Editing window
-Men	no 2- useally no need
1-3.	Create Feature window
-Men	no 3- useally no need······23
2. Dra	
	w Polygons25
2-1.	w Polygons25 Start
2-1.	
2-1.	Start 25
2-1. -Men	Start
2-1. -Men 2-2.	Start25no 4- useally no need26Set the position and scale27
2-1. -Men 2-2. 2-3.	Start



Edition 0.2

# JICA-GIS Project 2012

At GSD Zomba



3. Dra	w Lines45
3-1.	Start 45
3-2.	Draw 46
4. Edi	t Polygons and Lines48
4-1.	Select
4-2.	Delete
4-3.	Copy and Paste51
4-4.	Edit Vertex
-Kno	wledge- this is not a manual
4-5.	Merge polygons in Editor Tool ····· 57
4-6.	Cut polygons ······ 60
4-7.	Clip Polygons in Editor Tool ······64
5. Dra	wing Techniques66
5-1.	Edge of the map ····· 66
5-2.	Fault
5-3.	Major geologic unit in the map71
5-4.	Out of Malawi ······72
6. Uni	fy to one Shape file73
7-1.	Clip the overlapped area73
7-2.	Open attribute table
7-3.	Add Field "Geo_ID" ····· 80
7-4.	Field Calculator82
7-5.	Merge in geoprocessing
7. Che	ck and setup polygon89
7-1.	Edge of map
7-2.	Gap of polygons94
7-3.	Check the Data of "Geo_ID" 103

### 0. Set the Environment for the drawing

### 0-1. Start

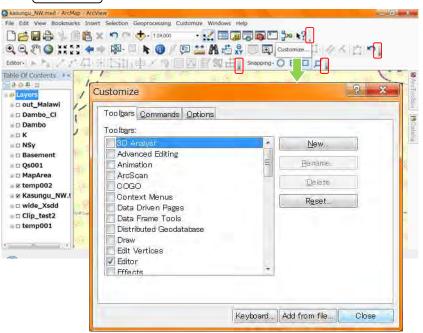
You can create the environment of ArcView freely as you like. This drawing manual recommends and uses the following environment for the drawing. You have a good environment that you feel comfortable, you use the environment.

### 0-2. Customize Tool bars

Each tool bar has small space at the edge of tool bar. The space has small mark  $\overline{\bullet}$  at

the bottom of the space. Click the space, Customize... will apeare.

Click Customize... | . "Customize window" will apeare.



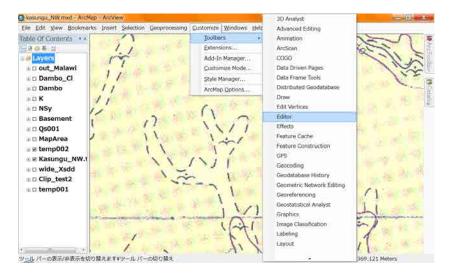
### -Memo 1- useally no need

If no toolbars in your ArcView window, you can show tool bar from main menu.

Customize  $\Box$  Toolbars  $\Box$  select one tool bar (any tool bar OK).

The tool bar apears. After the apearance of a tool bar, you can go to <2. Customize

#### Tool bars>.



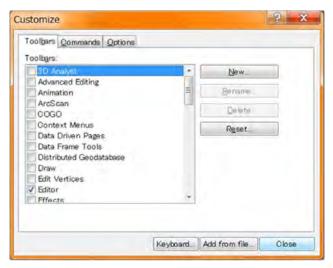
### 0-3. Set Tool bars

Sellect "Toolbars" Tab, Sellect (add check mark) followings,

- ✓ Edit Vertex
- ✓ Editor
- ✓ Main Menu (default selected)
- ✓ Snapping
- ✓ Standard
- ✓ Tools

This manual recommends that the other tool bars are not sellected (delete check mark).

Please do not close yet.



Sellect "Options" Tab, --- See a Figure at the top of next page ---

Add Check mark "Large icons", then "Close".

ustomize	? ×
Toolbars Commands Options	
Large icons	
Show <u>T</u> oolTips on toolbars	
Save all customizations to the document	
Create new toolbars and menus in the do	sument
Lock Customization	
@hange VBA Security	
Update ArcID module	
Update ArcID module	
Keymand 4	dd from file Close

After closing, these "Tool bars" will be shown. But the position is not comfortable yet.

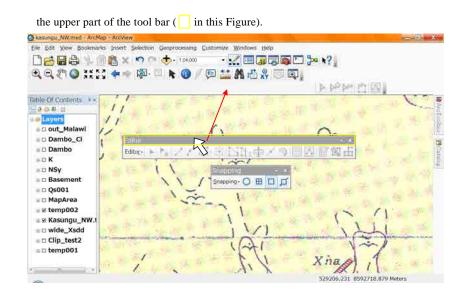
You can set all tool bars under main menu using "Drag". If the tool bar you want to

move is located under "Mein Menu", you can "Drag" the small space at Left edge of

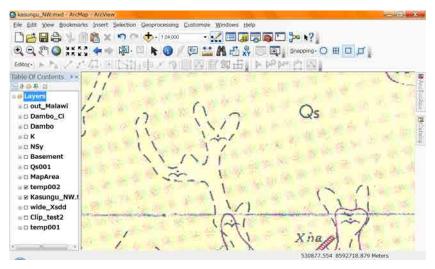
the tool bar ( in this Figure).



If the tool bar you want to move is not located under "Mein Menu", you can "Drag"



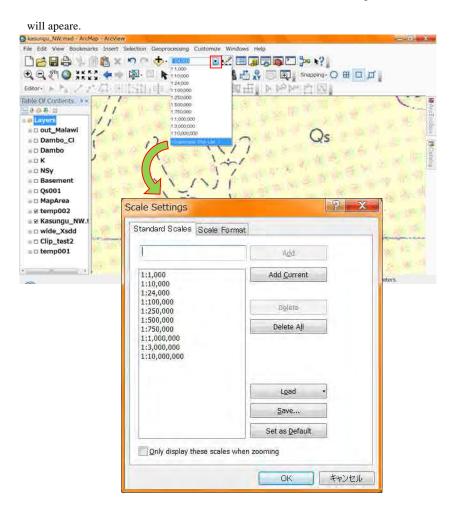
Set the tool bars similar as this figure.

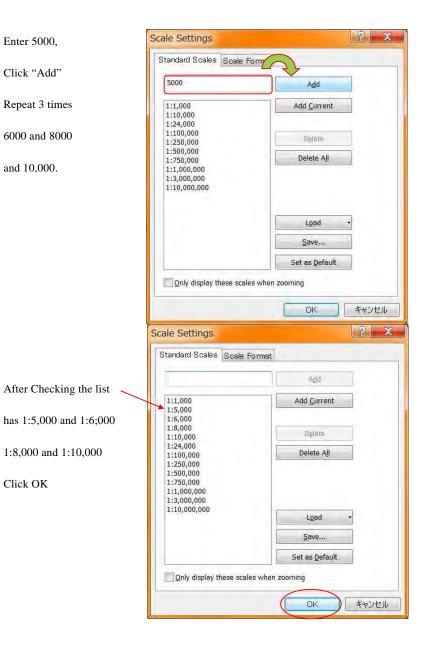


#### 0-4. Customize the Scale List

There is the "Scale Selector" in the "Standerd Tool Bar". Click the right edge of this

"Scale Slector". Then select "Customize This List", So the "Scale Settings window"





#### 0-5. Set the snapping

The snapping is convenient for the drawing. Use snapping from the "Snapping tool

bar".



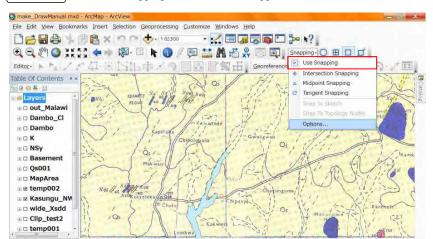
pping, if you can not see the check mark left side of "Use Snapping",

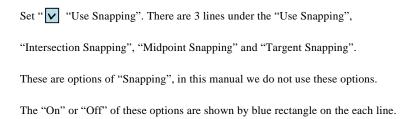
it means that Sunapping is Off. In this case, click

 $[Snapping \bullet] \implies$  "Use Snapping" fot the adding check mark. You can see the check

mark. It means that Sunapping is On. When there is check mark, you do same

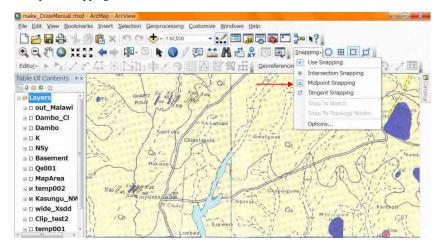
 $[Snapping \bullet] \implies$  "Use Snapping", the mark will disappear.





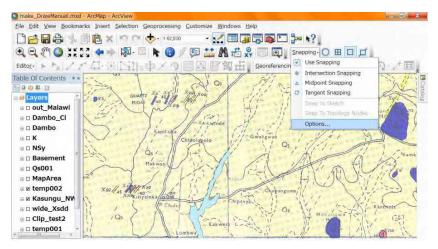
The following figure shows that "Midpoint Snapping" is "On". In this case click

"Midpoint Snapping" for "Off".



Set 3 options ["Intersection Snapping", "Midpoint Snapping" and "Targent Snapping"]

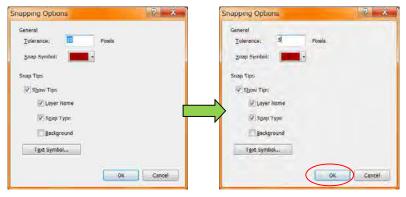
#### "Off" like as the folloing figure.



After the 3 options "Off", set the other options. Click

Snapping  $\checkmark$  "Options...". The "Snapping Options Window" will appear.

Set the "Tolerance" 5 pexels, and check "Snap Tips" as the right figure.



In the "Snapping Tool Bar" there are 4 more options. The blue rectangle 📃 means

the option is "On" now.

Q-make_DrawManual.mut - ArdMap - AreVaw	
Elle Edit View Bookmarks Insert Selection Generocesang Duttomize Windows Help	
Q Q 2 0 11 12 4 - 12 N 0 / 12 11 A 4 2 1 12 Interver 0 B 1 1	
Editor + 1 / / / E ISTL + / 1 IN POLE Georeterenong	一面
Table Of Conterns **	32 // ··································

These 4 options are often used. But for the bigenners 1 option "Vertex Snapping" is

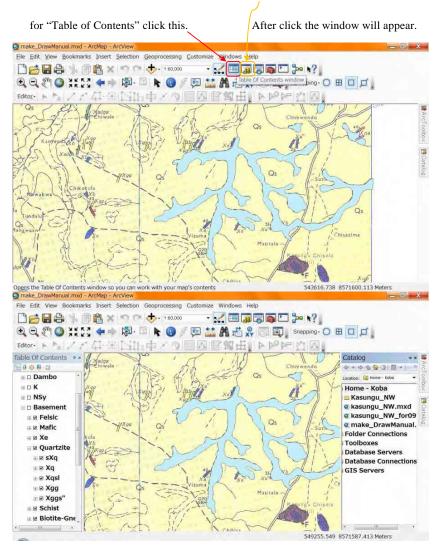
enough. Set off the other 3 options using click.

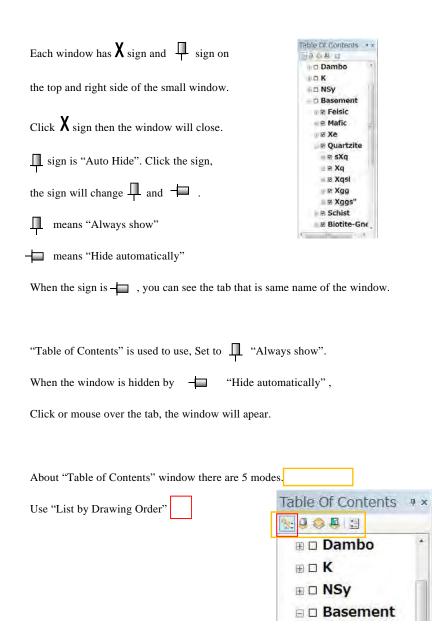
	Elle Edit Yew	Bookmarks Inte	t Selection Geop	ocessing <u><u>Gustom</u></u>	ize Windows B	jeip			
	Del	a . 0 1	x nn 🔶	908194	- 📈 🖽 🗔		3= N?		
Editors トレノアロ HETSIN 中ノウ 回線 IF (Sereferencing-wer) ・ウノ田	0,0,010	) XXXX 🔶	🔶 🕼 - 🗔 🖡	0 / 0	** M = *	, II II.	Snapping · O III	Dø.	
	Editor	1.19.11	#1516+	2 2 0 15	尼賀山	Georeferenc	ing · _aver	- (2)	と田

### 0-6. Set Small Windows of ArcView

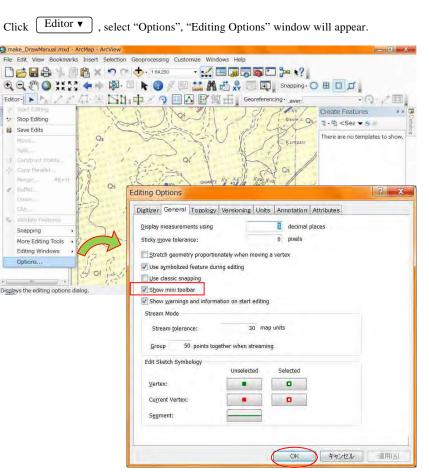
The small windows of "Table of Contents" and "Catalog" are necessary. If you can not

see these windows in your ArcView window, Cilck this for "Catalog" and





#### 0-7. Set Editor Options



This manual recommends the followings.

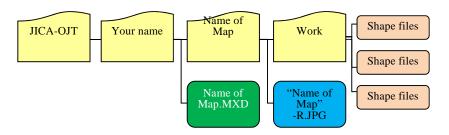
In the "General" tab remove the check mark at "Show mini toolbar".

Click "OK"

#### 0-8. Work folders

Finally all polygons and rectangles are joined to one layer (Shape File) with atteibute data. When you draw different geology and you are the beginner, you would better to draw in the different layer (shape file). In this manual we use temp001 and temp002 layers and "Make\_DrawManual.MXD" as an example.

On the actual job create and use layers named each index of geology. Before drawing you get one geologic map data (scaned and Georeferenced) and MXD file named the area of geologic map in your folder. In this manual we use "Koba" folder and "Kasung\_NW" folder. On the actual job you use a folder it might be your name. There is a MXD file and a folder named geologic map.



In the folder named geologic Map (Name og Map folder) there is a folder named work.

Create New shape files in the Work folder.

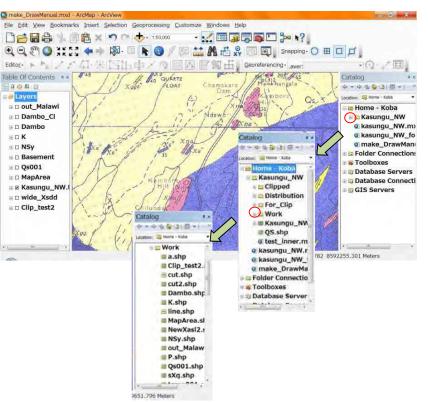
OK. Open the MXD file named area of geologic map. Check tool bars and windows

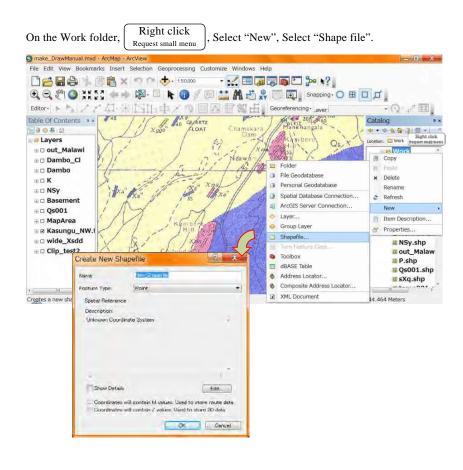
are settled. If they are not settled then start from 0-1, to 0-7, else continue (0-9).

#### 0-9. Create empty layers (Shape Files)

Check the "Catalog" small window. The upper part of the window there is a "Home-" and your name folder. Here in after we call this folder "Home folder". The left side of the home folder if the sign is \_ , you can see the child folder under the home folder. If not, there is a + on the left side of the home folder, Cleck the + sign. The sign will change from + to - and appear the child folder under the home folder. This action "Click + " means open this folder. Open the folder

named area of the geologic map. Open work folder.





Create New Shapefile" window will appear. Enter the name as the index of each geology (Example. "Xss" or "Xa"), Select Feature Type as Polygon (for the line drawing select "Polyline"). At the beginning of the drawing, you create all empty shape files for each geology. Refer the image of geologic map. On the creating each Empty shape file, do not forget the setting of "Spatial Reference". Click "Edit" then "Spatial Reference Properties" window will appear.

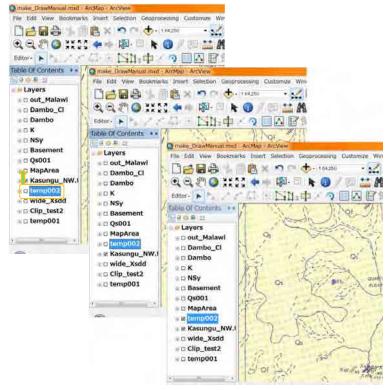
#### Set "WGS\_1984\_UTM\_Zone\_36S" Spatial Reference Properties 17 × XY Coordinate System Name Unknown Distalle Browse for Coordinate System \* Look In: 10 Coordinate Systems Geographic Coordinate Systems Projected Coordinate System Browse for Coordinate System Scilent Solvat a predir nok to: 🔄 Projected Gaordatete Systems 🔹 👟 🔛 🖽 🛥 📖 🖾 💁 💁 impert a coop domains from Import fecature datasa ARC (equal arc-second) State Systems New Greate a new Continental UTM County Systems World Edit the prope Made Show of type: coordinate sys World (Sphere-based) Gauss Kruger Class Sets the coo National Grids Polar UTM folder Save the coordinate system to a They have State Plane WGS1984 folder +++) OK. me UT Add how of types Coords Southern Hemisphere Eanon UTM zone 36S 8 × Create New Shapefile Temp001 Name After setting Click "OK" Feature Type Polyson \* Spatial Reference Description Projected Coordinate System: Name: WGS\_1984\_UTM\_Zone\_36S Geographic Coordinate System Name: GCS\_WGS\_1984 Catalog # × Do many times. キャウを登る 誰・! ? Location: ( wide\_Xsdd.shp For creating Xd.shp Xdi.shp Show Details Edit... Xe.shp All geology. Coordinates will contain M values. Used to store route data. Xgg.shp Coordinates will contain Z values. Used to store 3D data. Xggs00.shp Xh00.shp OK Cancel Xhga.shp Xk.shp For the shape file name you can not use ["] and space []. Xna.shp Xq.shp Xqsl.shp Use other characters. Xs001.shp Xs00ga.shp Xs00sl.shp Make "Polyline" shape file also. "fault" and "joint" Xsdga.shp · ·····

#### 0-10. Set layers

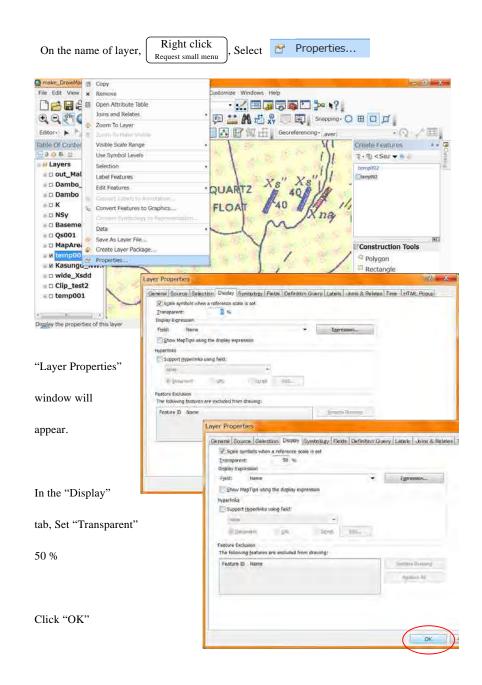
If there is the layer (shape file) which you would like to draw, under the image layer

(Geologic map scand and Georeferenced) in the "Table of Contents" window, drag the

layer to the upper than the image layer.



Add the check mark on the editing layer and image only in the "Table of Contents" window. About the other layers remove the check marks. In this manual we use the layer (shap file) "temp001" and " temp002" as a just example, you use the layer (shape file) named each index of geology.



## 1. Start Editing

### 1-1. Start

You can select 1 method from following 2 methods.

Method A: In the editor tool bar, Editor 
Start Editing
Method B: On the name of layer, Right click
Request small menu, Edit Features, Start Editing

"Start Editing window" will appear.

### 1-2. Start Editing window

You select the layer you will edit, click OK

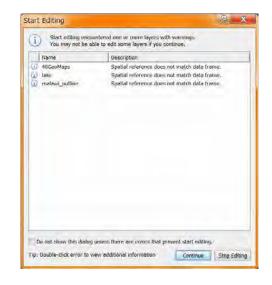
a 🔷 40GeoMaps	April 2 Aug
🕽 🗇 lake	
] 🧇 malawi_outline	
Source	Туре
	Type CA_DS01¥JICA_GIS Shapefiles / dBase Files
F:¥JICA_Malawi_2012¥JIC	CA_DS01¥JICA_GIS Shapefiles / dBase Files CA_DS01¥JICA_GIS Shapefiles / dBase Files
F:¥JICA_Malawi_2012¥JIC F:¥JICA_Malawi_2012¥JIC	CA_DS01¥JICA_GIS Shapefiles / dBase Files

### -Memo 2- useally no need

In some case, the dialog will appear. The Coordinate System may not match the Data

Flame (Data View) and each Layer (Shape File). Check those Coordinate Systems.

### <See Set Coordinate System>

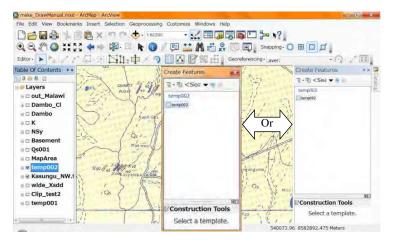


"Create Feature window" will appear.

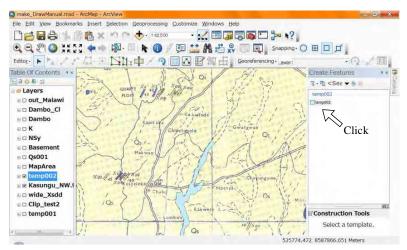
#### 1-3. Create Feature window

The name of layer (Shape File) will appear in the upper part of "Create Feature

#### window".



After selecting the name of layer (Shape File), some tools will appear in the lower part



#### of "Create Feature window". It is ready for Editing.

### -Memo 3- useally no need

IF you can not see the name of layer which you would like to edit in the upper part of

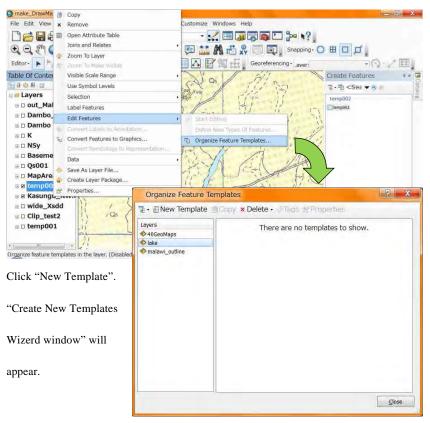
"Create Feature window", the tenplate is not ready. In this case organaze feature

template. On the name of layer (Shape File)

Right click Request small menu , select "Edit Features",

select "Organaze Feature Templates". "Organaze Feature Templates window" will

#### appear.



🗆 🧇 40 Geo Maps	Select <u>V</u> isible Layer
	Select All
	<u>C</u> lear All

Select (add check mark) the name of layer (Shape File).

Then click "Finish".

🗹 🧇 40Geo Maps	Select Visible Layers
	Select All
	<u>Q</u> lear All

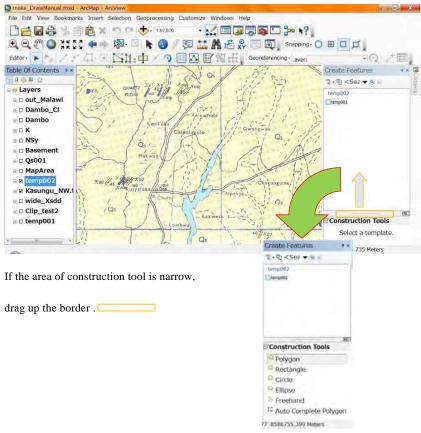
### 2. Draw Polygons

### 2-1. Start

After "Start Editing", you can see the "Construction Tools" in the lower part of

"Create Feature window". If not, < see 1. Start Editing> or see Memo 4 in next

#### page.



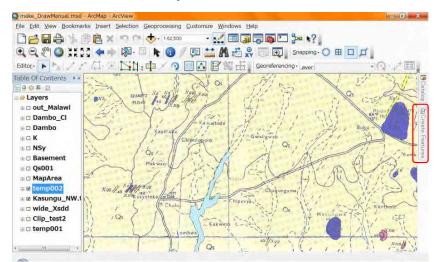
#### -Memo 4- useally no need

IF you have aready done "Start Editing" and you can not see the "Create Feature

window", the window may hide. Check the right edge of ArcView window, there may

a small tab. In this case, click or mouse over the "Create Features" tab.

#### the "Create Feature window" will apear.



You want to be shown this window, click  $-\Box$  . the sign will change to  $\square$ .

means "Always show".

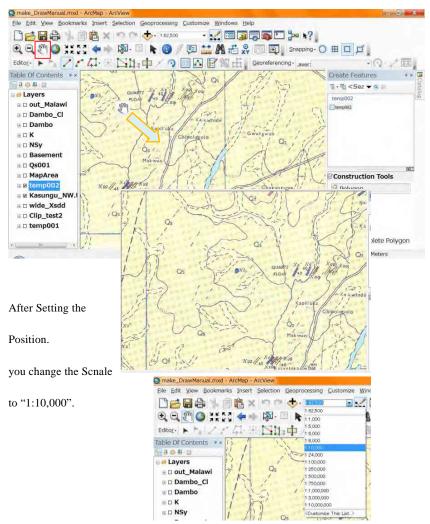
About the detail see "0-6. Set Small Windows of ArcView"

### 2-2. Set the position and scale

The scale of the origenal geologic map is 1:100,000. "1:5,000 – 1:10,000" is good for

the drawing polygons. Set the position where you draw to the center of data view using

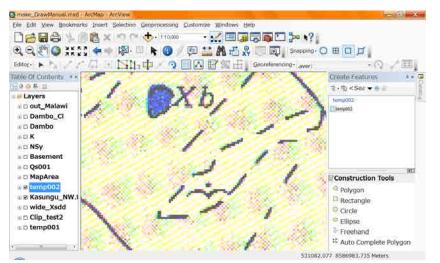




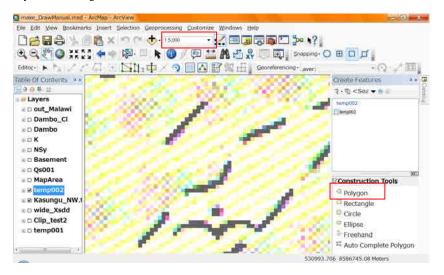
Can you see the Geologic unit which you will draw polygons? If not,

Move to good position using at tool. If you lost the present positon, back to smaller

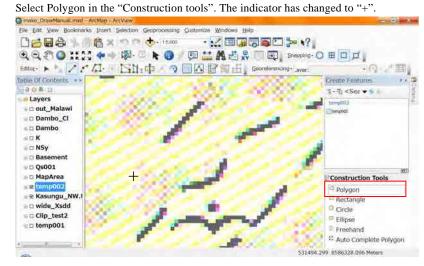
#### scale and reset the position to the center of view.



If you are the beginner, set the scale "1:5,000".



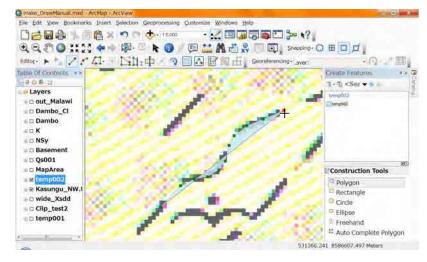
#### 2-3. Draw polygon



Click on the boundary of geology 1 point by 1point like as the figure.

The inerval of each point is important. The interval is too long the boundary will be

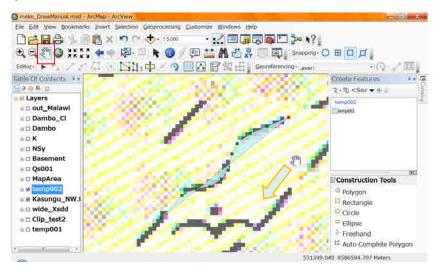
Zigzag. The inteval is too short it spends long time for the drawing.



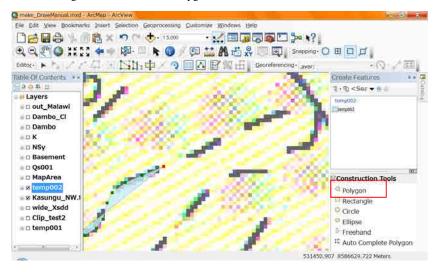
If you came to the edge of the view, Click 🦉

Move the view. (instead of this method you may use the drag using center wheel of

#### your mouse)



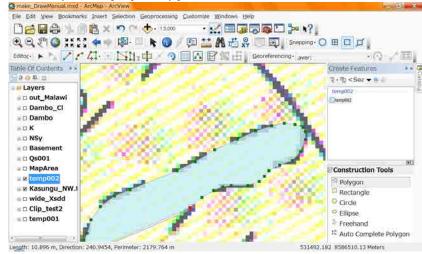
After moving the view, reselect "Polygon" tool in the "Contruction tools".



The indicator has changed to "+".

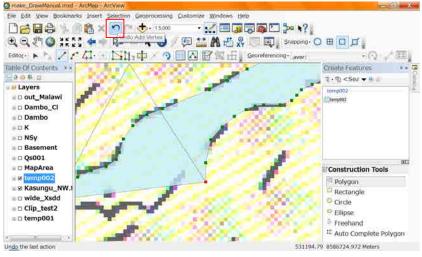
Continue the drawing.

The boudary curves tight, put many points.

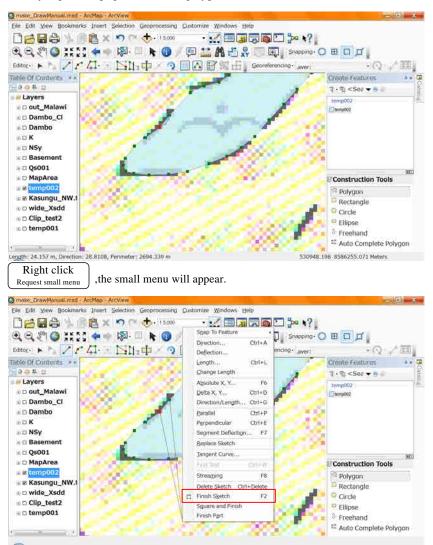


Continue the drawing. If you need mooving the view, do same as before.

When you put wrong point, you can delete the point using "Undo".



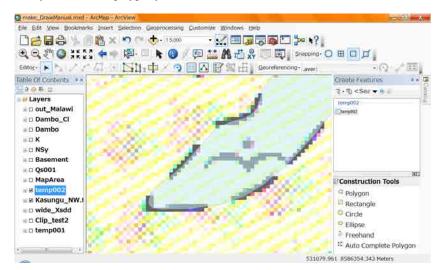
When you put enough point to draw a polygon,



Select "Finish Sketch". You can finish the drawing.

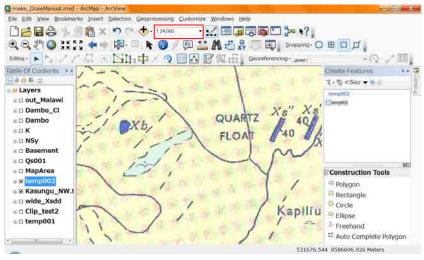
(instead of this method you may use "F2" key on your keyboard.)

Now you can see the polygon you drawn.



Change the View scale to "1:24,000".

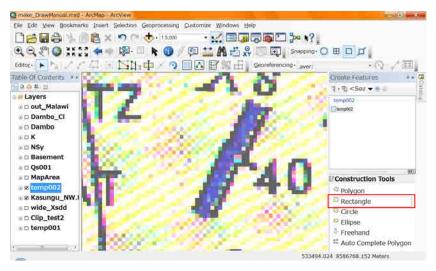
In the Smaller Scale. Check the smoothness of the polygon.



If it had enough smoothness, it is OK.

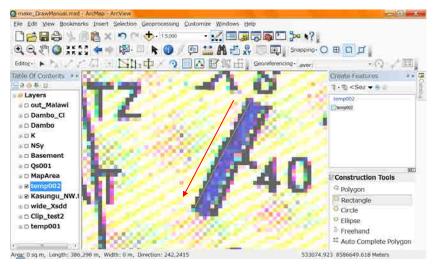
#### 2-4. Draw Rectangle

Select "Rectangle" in the "Construction Tools". The indicator has changed to "+".

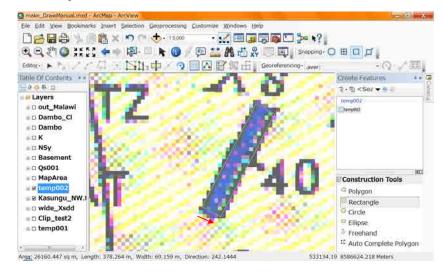


Click a corner of the rectangle you want to draw. Move along the longer side to next

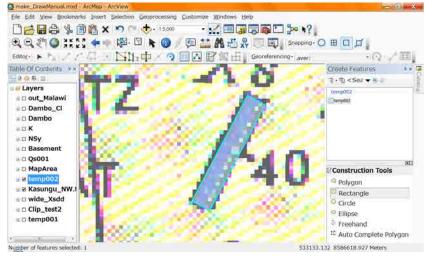
corner, then click the corner.



Move along the shorter side, At the coener click.

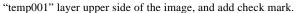


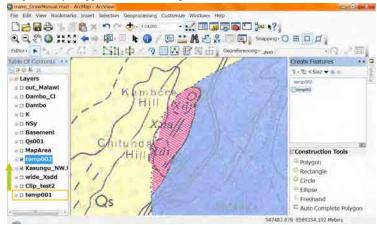
A rectangle draw.



#### 2-5. Draw adjoined Polygon

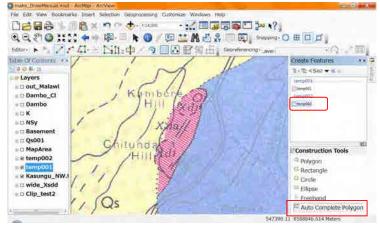
When you draw different geology and you are the beginner, you would better to draw in the different layer (shape file). Finally all polygons and rectangles are joined to one layer (Shape File) with atteibute data. In this case we use tenp001 layer. Darg





Select "temp002" in the "Create Features" window not "temp001", and "Auto

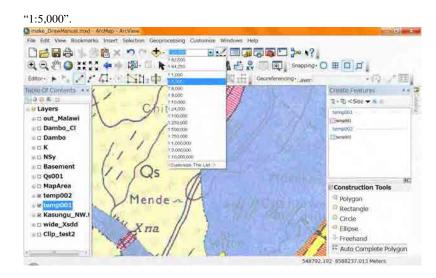
Complete Polygon" in the "Construction Tools".

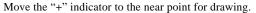


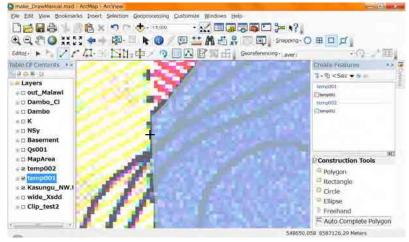
In this case you draw red colored unit as "temp 001" shape file, after drawing blue

colored unit as "temp002" shape file. It is no need that you draw the boundary twice.

Set the starting position to the center of the view for the drawing and set the scale to



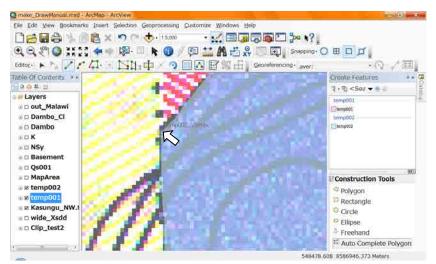




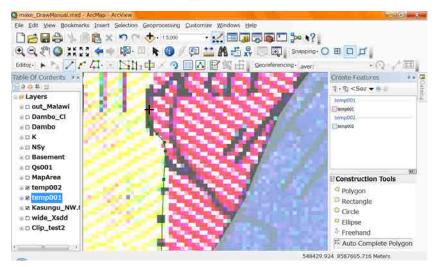
Brown rectangle appears on the point you put before (Vertex). And the arrow

indicator  $\overline{K}$  ,and the text which are Layer name and "Vertex" appears. Click the

point, the starting point will be same point as the point you put before (Vertex).

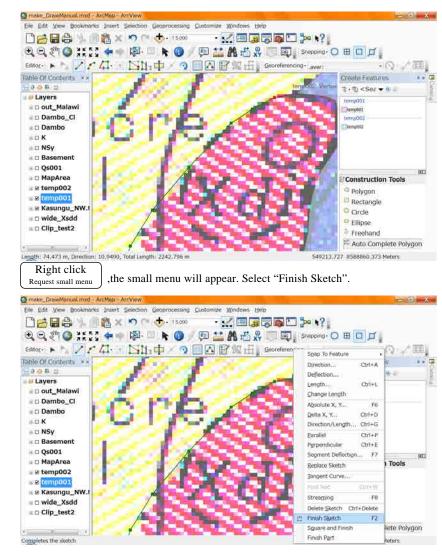


Draw like a polygon. Sometimes use 🖑 for the moving your view.

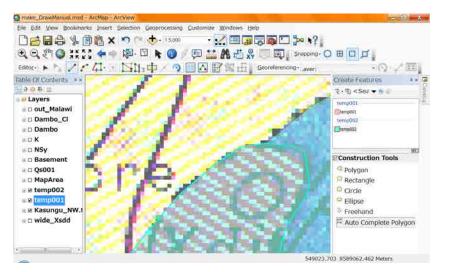


After the drawing new boudary, the indicator comes to the near ending point. The

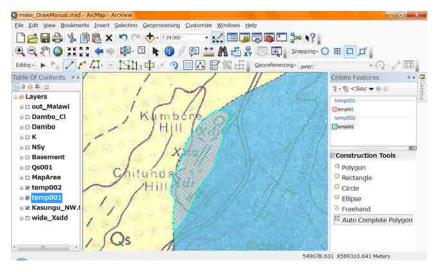
indicator will change, and brown rectangle and texts will appear like a starting point.



The polygon will appear. Check in the smaller scale (1:24,000).



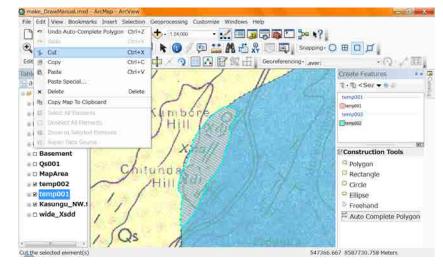
The New polygon is created beside the polygon you drawn before.



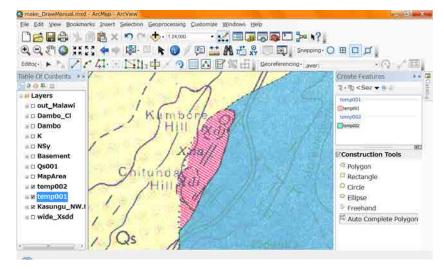
Now you have to move this created polygon form "temp002" to temp001" layer (shape

file). New porygon is selected now, shown by light blue border.

From main menu bar, select "Edit", select "Cut". The new polygon will disapear.

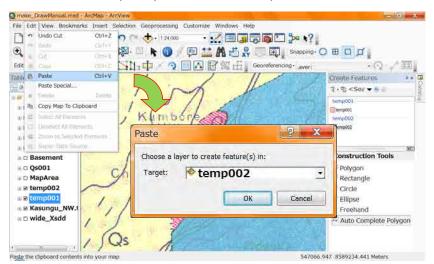


No need afraid.



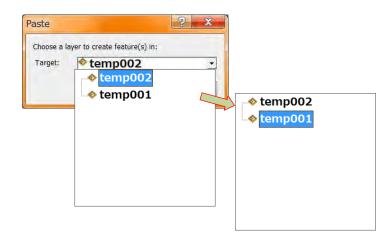
From main menu bar, select "Edit", select "paste".

Do not do the other action between "Cut" and "Paste".

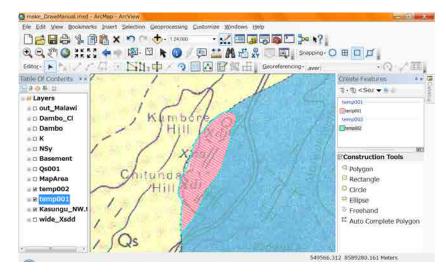


(instead of these action you may use the combination key "Ctrl+X" then "Ctrl+V".)

The small window "Paste" will apear. Select target to "temp001".

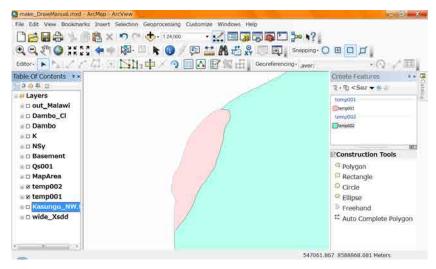


The new polygon will apear as the "temp001" layer.



For the checking the result once hide the image layer, remove check mark of the image

layer.



You can see the adjoined Polygon as the "temp001" layer.

#### 2-6. Save edit

In the editor tool bar,

The polygons you drawn in the view is still temporal. Save to the shape file.

Editor **v** 

and a standard standard of the second standard of the second standard sta	
Edit View Bookmarks Insert Selection Geoprocessing	
) 😂 🖬 🖨 🖐 🗿 🖺 🗙 🤊 (*) 🚸 1 24,000	
LQ 🖑 🕲 XXX 💠 🕸 🔍 k 🚷 .	/ 💷 🔛 👫 🖧 💭 ன 🛊 Srapping- 🔾 🖽 🗖 💋
Nor- NAZA SA	
Shirt Editing	Create Features
Stop Editing	7 · D < Sez • 0
2 Save Edits	temp001
Mam.	Energion Element
Sale	temp002
Countratt Bantar	Etemp302
<ul> <li>Costy Parallel</li> </ul>	
Tircan Albert	/ / / / / / / / / / / / / / / / / / /
Dellary,	Construction Tools
Among Street	Polygon
95	C Rectangle
e patrimo featuras	
Snapping +	♀ Ellipse
More Editing Tools •	Freehand
Editing Windows •	Auto Complete Polygon
Dotions	

Save Edits

Before the happening (Example black-out) save the data for your data's safty.

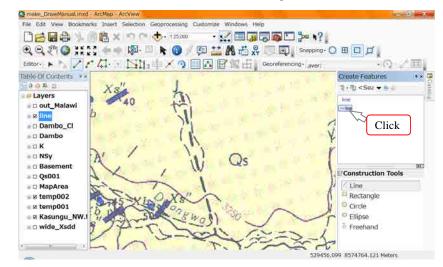
This save action is easy. Do often.

### 3. Draw Lines

### 3-1. Start

After "Start Editing", you can see the "Construction Tools" in the lower part of

"Create Feature window". If not, < see 1. Start Editing or see Memo 4>.



The kind of Construction tools is similar to Polygon's Tools. For the drawing line

(Fault or Joint) the "Line" tool is useful. Select "Line" tool in the "Construction

tools". The indicator has changed to "+"

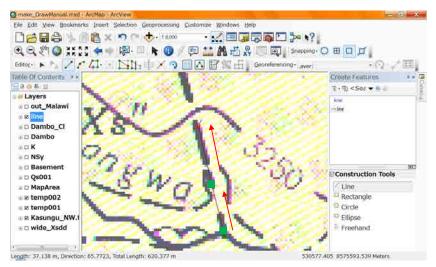
The scale of the origenal geologic map is 1:100,000. "1:8,000 – 1:10,000" is good for

the drawing Lines. Set the position where you draw to the center of data view using 🖑

Eile Edit y	view Bookmarks	Insert Selection	on Geoprocessing	Customize	Windows H	elp	
Dete		島×1つ	°≥ 🛧 • 18,000	+		<b>□ □ &gt; \</b> ?	
292	n 🕥 XX 50	🍬 🌧 🔯	🗉 k 🕦 /	1 💷 🔛	M to S	Snapping-	
						Georeferencingaver:	

#### 3-2. Draw

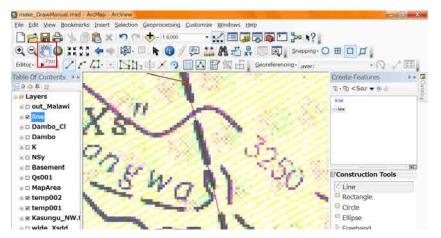
Put the point on the Fault or Joint line in the geologic map image using clicking.



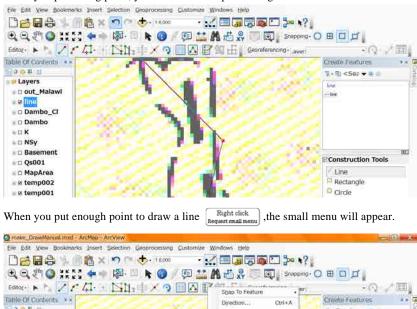
If you came to the edge of the view, Click 🔊

Move the view. (instead of this method you may use the drag using center wheel of

#### your mouse)



#### When you put wrong point, you can delete the point using "Undo".





Select "Finish Sketch". You can finish the drawing.

(instead of this method you may use "F2" key on your keyboard.)

In the Smaller Scale. Check the smoothness of the ine.

If it had enough smoothness, it is OK

### 4. Edit Polygons and Lines

### 4-1. Select

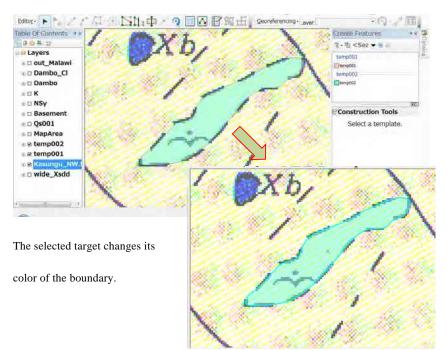
After "Start Editing" (see 1.Start Editing), Click **s** in the "Editor toolbar".



Clicking the > you will enter selection mode. This is basic for the "edit polygons

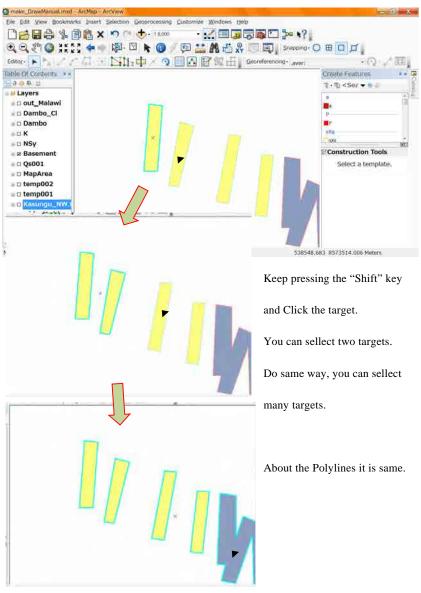
and Lines". In the selection mode you can select polygons and lines using click on the

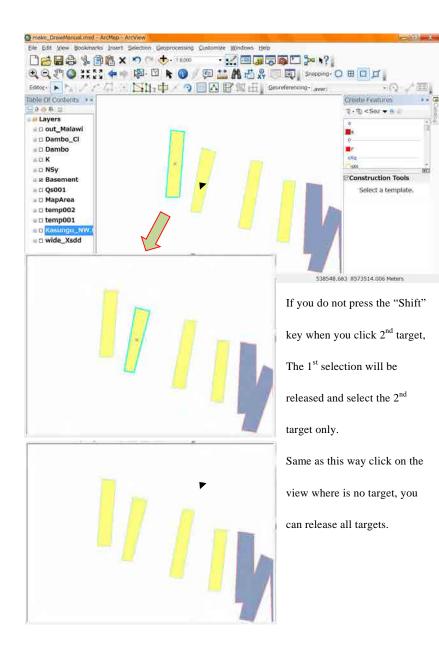
#### target.



The plual targets are able to select using "Shift" key + Click on the target. For seenig

clearly we hide the image layer. After selection one target, move on the second target.





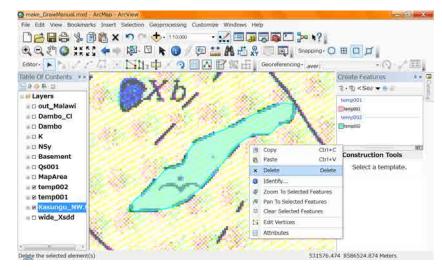
#### 4-2. Delete

After the selection Ri Requi

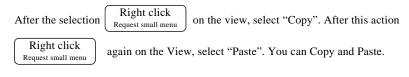
Right click Request small menu on the view, select "Delete". You can delete the

selected target. (instead of this method you can use the "Del" key on your keyboard or

from "Main menu", select "Edit", select "Delete".)

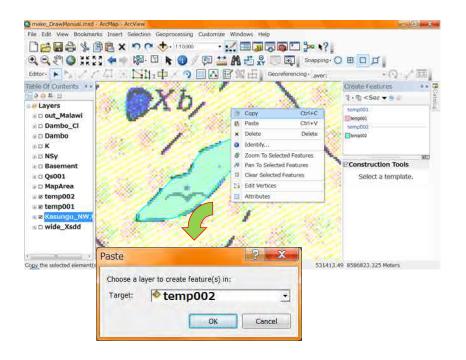


### 4-3. Copy and Paste

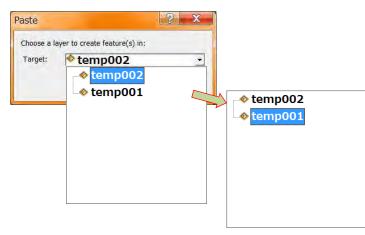


(instead of this method you can use from "Main menu", select "Edit", select "Copy" or

"Paste".)

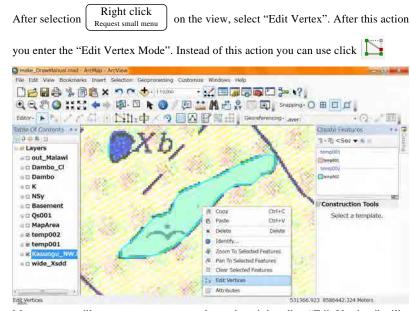


After the paste action "Paste" window will will apear. Select target to "temp001".



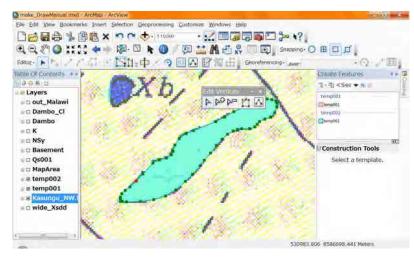
The new polygon copied one will apear as the "temp001" layer.

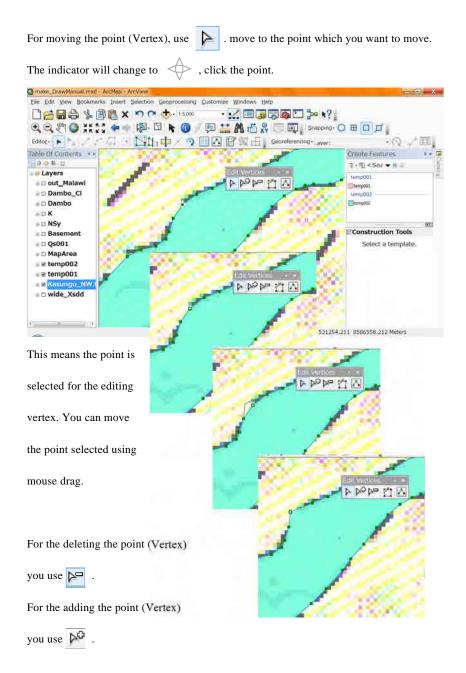
### 4-4. Edit Vertex

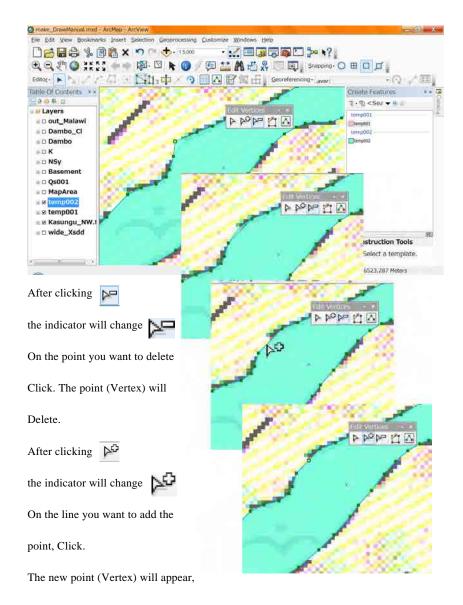


Many vertex will appear as green rectangles and a mini toolbar "Edit Vertices" will

#### appear.







and selected. If you want to move the point added new, drag the point to the place you would like to move.

### -Knowledge- this is not a manual

You can understand polygons and polylines are compsed by Vertices (points) from the above. And each 2 Vertices connected 1 straght line. They seem smooth curve that boundaries of polygons and polylines, but they composed the combination of many 2 verteices and 1 straght line.

Each Vertex has X and Y value (coordinates).

Therefore we can look on the "Shape file" as a aggregate of many X, Y values.

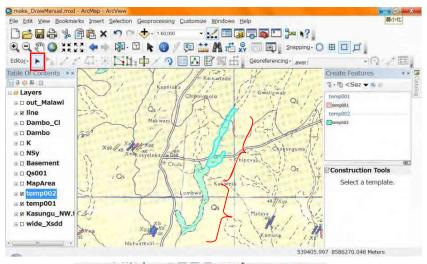
### 4-5. Merge polygons in Editor Tool

The "Merge" is one of the major techinich for the drawing geologic map.

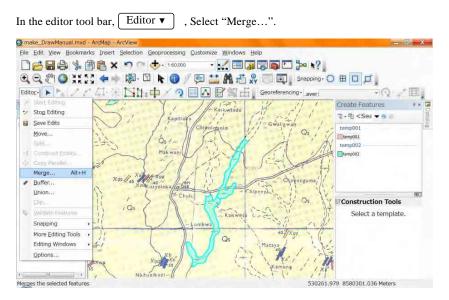
It is tough that you draw the long or wide area one time. In this case, You can draw

little by little. After drawing, you can merge these small polygons. Select more than 2

polygons (see 4-1. Select).







The small window "Merge" will appear.

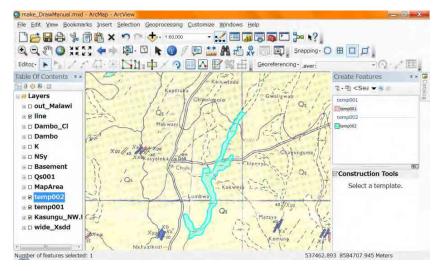
Merge		? ×
Choose the feature w	ith which other features will be merged:	ОК
temp002 -		Cancel
*	III	

<Caution>

The "Merge" is good for the same layer. It can not merge from different layers.

In this window we can check "How many polygons and which layer you selected".

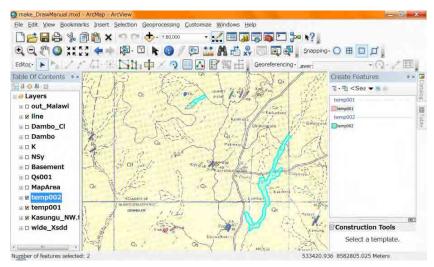
Click "OK", 2 polygons are merged to 1 polygon.



<Information>

Take care. The "Merge" can merge Isolated more than 2 polygons.

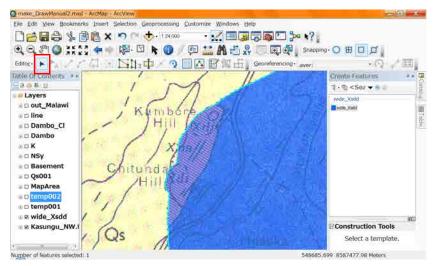
#### In the useal drawing do not merge isolated polygons.



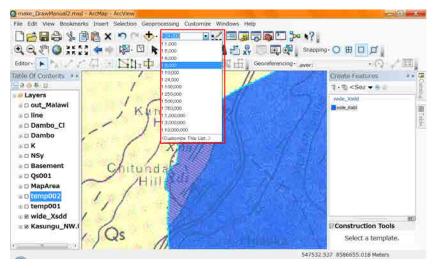
#### 4-6. Cut polygons

You can cut polygins in reverse using "Cut Polygons Tool".

#### At first you select polygons that you would like to cut.

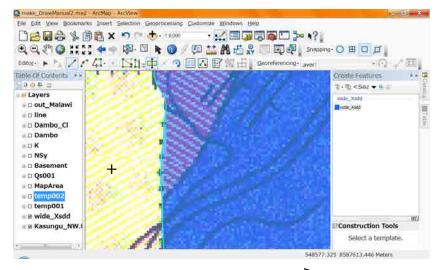


#### Set the scale bigger (1:8,000).



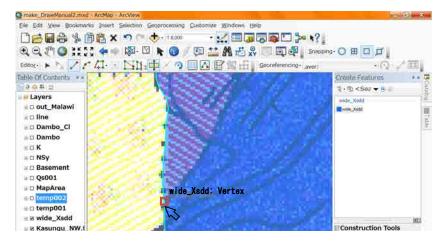
Set the positon using 🔊 , and then select "Cut Polygons Tool" 📫 the indicater

#### will change to +.



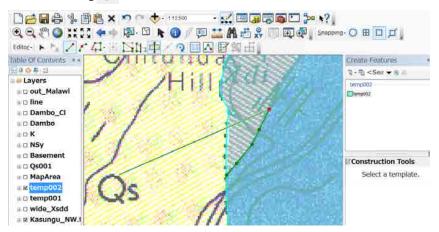
Mouse over to the start point for cut. The indicator changes to  $\sqrt{2}$  and the 1 vertex is

#### shown by $\square$ . and the texts layer name and ":Vertex" are shown near the point.

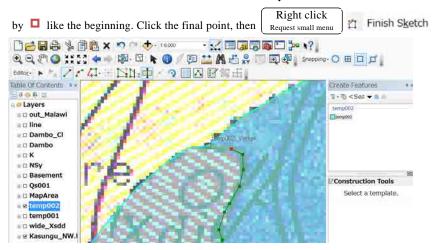


This is the effect of the snapping. Put pints on the line you would like to cut

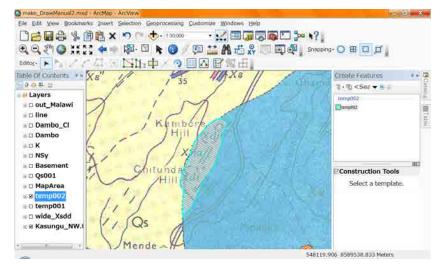
Sometimes using 🖑



If you came to the end point, The indicator changes to  $\sqrt{3}$  and the 1 vertex is shown



The polygon has devided 2 plygons.

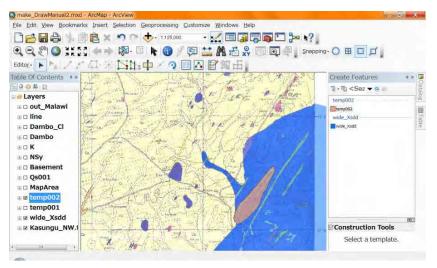


After selecting one plygon you cut off, you can delete or copy + pasete (See 4-3. Copy

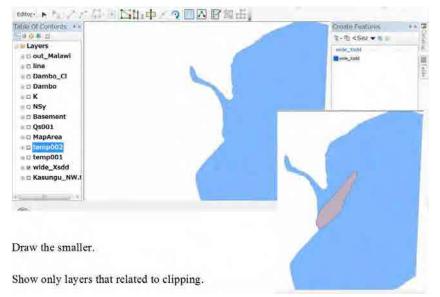
and Paste).

### 4-7. Clip Polygons in Editor Tool

There is a smaller geology in the bigger geology. In this case, Draw the bigger.

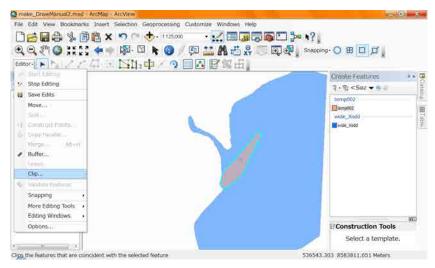


#### After drawing large or wide area.



Hide the other layers. The layers shown will be cliped.

## Select the small geplogy using **b**. From the Editor, select "Clip...".



"Clip" window will appear. You useally select Buffer Distance = 0, then "OK".



The area of the smaller geolody is

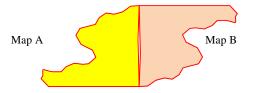
Deleted from the bigger geology.



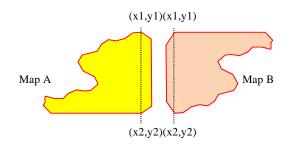
# 5. Drawing Techniques

## 5-1. Edge of the map

Usually a geologic map and the other map adjoin. When you draw a geologic unit which distributes the edge of map, you trace just the edge of map, it may bring a problem. It will be a small gap between 2 maps adjusted.



For the aboidance this small gap, Once you draw these Geologic unit wider than the map area, after the drawing you will cut off the outsid of the map area using true longitude and latitude (Numeric data).

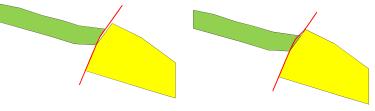




## 5-2. Fault

The faults approximate usually are drawn as the dashed lines in the paper Map. But the faults laid contiguous line. In the ArcView you can change the line symbol easy. Draw the fault line as a contiguous Polyline.

Usually the faults cut some strata (geologic unit). In these case the cut geology is bounded on the different geology and the bouder have to be the fault. The same reason of the edge of map there may be a gap between 2 different geology and fault line. You have to take care of these small gaps.



Gap of 2 geology

Gap of fault line and boundary

For the aboidance these small gaps, you have two method. About both methods it is

important that the techinique of the "Snapping".

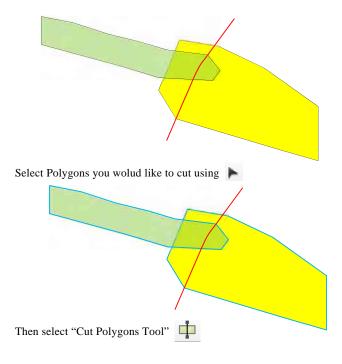
Before drawing check the setting of "Snapping" (see 0-5. Set the Snapping)

<u>S</u> na	Snapping• 🔿 🖽 🗖 🞵				
~	Use Snapping				
⊗	Intersection Snapping				
Δ.	Midpoint Snapping				
σ	Tangent Snapping				

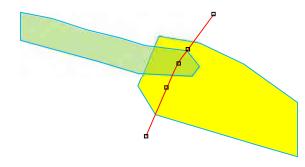
## <Method A> Cut Polugon using the Vertices of fault line shape

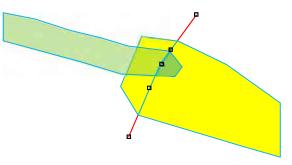
Draw geologic unit over the fault line. Draw the fault line as polyline. When you cut

thegeology, remember the point (Vetex) you put for the drawing fault.

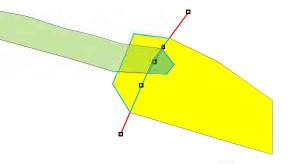


The indicater will change to +. Follow the fault line using "Snapping"



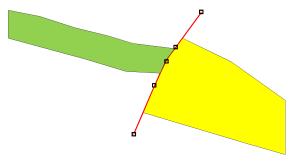


After following the fault line, Right Click, "Finish Sketch". The polygons are cut.



Select Polygons you wolud like to cut off using 🕨 . After selection

Right Click, "Delete" or "Delete" key on your keyboard.



These geology cut by the fault line.

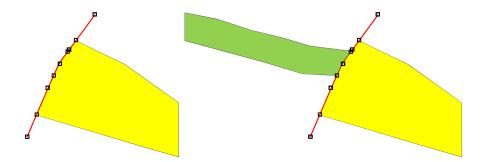
### <Method B> Draw on the same Vertices of the Fault.

Draw the fault line as a polyline. When you draw the fault, put the points (Vertices) on

each crossing point of the geologic boundary and the fault.

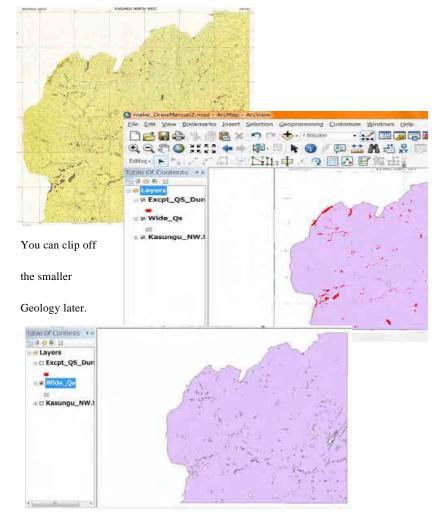


After the drawing fault line, Draw geologic unit. When you draw the boundary among the fault, put all same points on the fault using the "Snapping". By the putting all same points, it will be completelly same that the baoundary and fault line. Do same way for the other side too. You can understand the impotance of the putting points on the crossing point



## 5-3. Major geologic unit in the map

Some Geologic map has the major geologic unit. In this case draw the major one at onece. For example this is the area of Kasungu North west. In this map Qs (Qauternary sand) distriutes widely.



### 5-4. Out of Malawi

The national bouder laid in some of geologic maps and gelogy is not drawn out side of Malawi. So the distributions of each geologic unit cut by the national bouder. For the smooth drawing of national bouder, this manual recommends to draw a polygon of the out side of Malawi, and draw each geology bigger same as the edge of Maps. After the drawing of each geology, you can cut off the outside of Malawi using the polygon and the "Clip" techique.

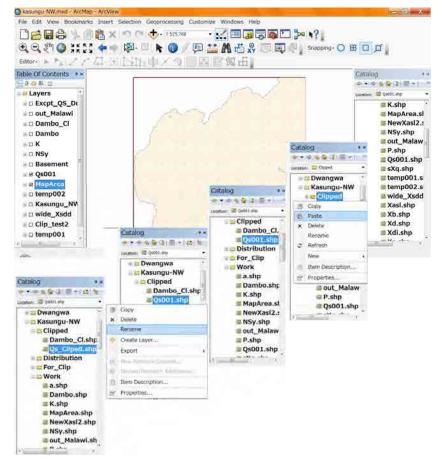
# 6. Unify to one Shape file

### 6-1. Clip the overlapped area

The major geology was drawn as a area included other smaller geology. Copy the

major shape file to the other folder (Example. Cliped). In the Catalog window Right click Request small menu on the layer (Shape File), select "Copy". On the folder "Cliped" Right click Request small menu ,

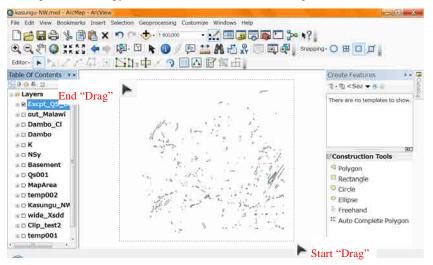
Select "Paste". Copied Shape File is appeared. Then rename the copied Shape file.

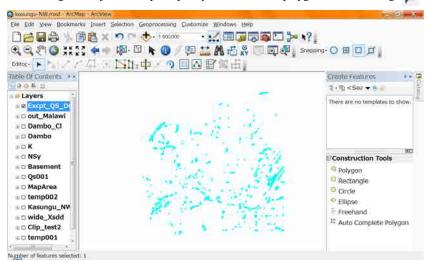


The smaller geologic unit is drawn one or some layers. Make a temporally shape file

which is joind all smaller geologic unit for "Clipping" using "Copy and Paste"

techinique (see 4-3. Copy and Paste) in the same folder (Ex. Cliped).





Start Editing for the joined temporally shape file. Select all polygons at onece using

After Selecting all polygons for "Clipping", merge to one polygon using "Merge" (See

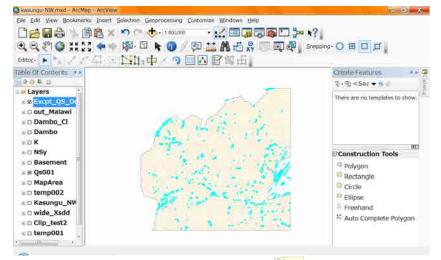
4-5. Merge polygons in Editor Tool). The merged polygon is isolated, but this is one

polygon. You can clip the area of smaller geology from the major geology at once.

Show only 2 layers which the copied major geology and merged smaller geology.

Select smaller geology which is merged to one polygon. Then Clip. After clipping this

manual recommends that to dalete the temporally file.

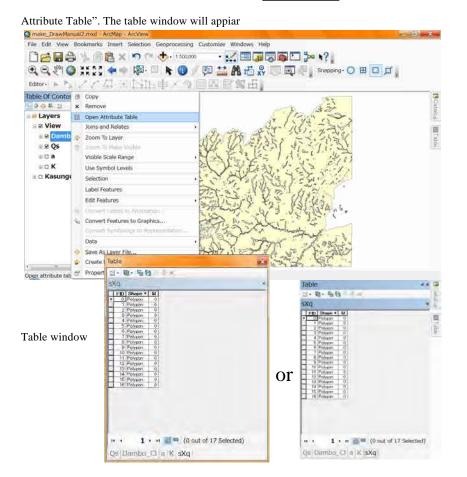




Cliped Geology

### 6-2. Open attribute table

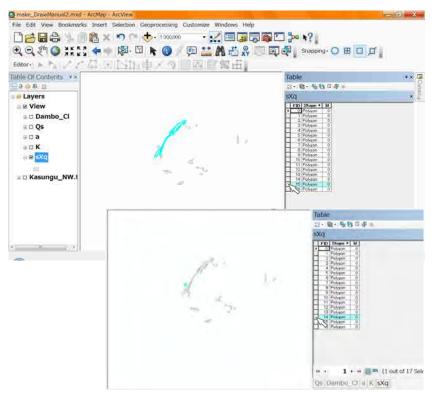
Each shape file of All geology have to unify to one Shape File. After the unifying each geology have to identify by the atteibute data. The attribute data is stored in the attribute table of each Shape File. Before unifying you add the data to the attribute Table. To see and edit these data you open the attribute table of each Shape File. To open attribute table, on the lyaer name (shape file) Right click Request small menu , select "Open



Each line of the attribute table means each polygon or polyline. The row ( we call it

"Field") is the attribute data. When you select 1 line in the table, you click left side of

### each line.



If you select one line, the line color is changed to light blue and one shape (Polygon or

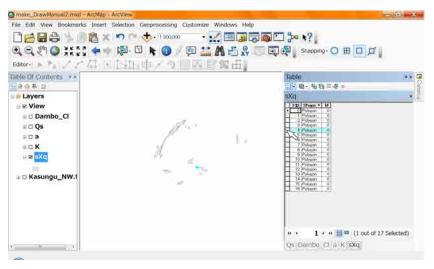
Polyline) is selected and its color is changed.

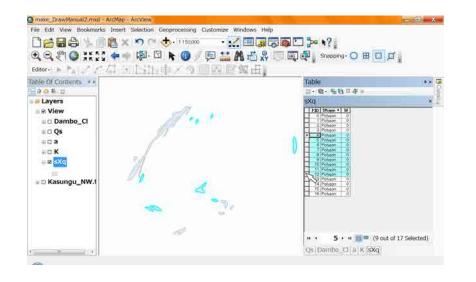
You can select lines and shapes (Polygon or Polyline), not only one.

After selecting one line in the table, if you keep pressing "Shift" key in your keyboard,

and click the other line, from the first clicked line to this time clicked line will be

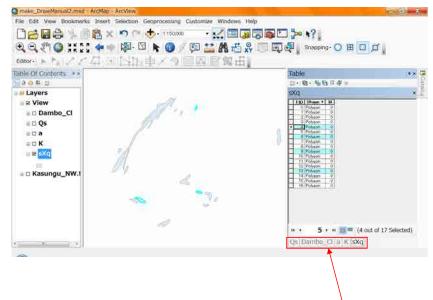
#### selected.





The selection of the plural lines is not only continuous. If you want to select

discontinuously, you use pressing "Ctrl" key in your keyboard and click the other line.



The openning of the attribute table is nor only one.

You can see one or some tabs at the bottom of table window. This example is

openning 6 tables.

## 6-3. Add Field "Geo\_ID"

For adding the data to each shape (polygon or polyline), first of all you have to add the field (row) as a container. For adding the field to the attribute table click this icon This is a menu for the table window. Smake\_BrawManual2.mxd - ArcMap - ArcView File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help 🗋 😹 🖨 💺 🖷 🖺 🗙 🗠 🔿 🔿 🧄 i 150000 · 📈 🗐 🗊 🗊 🖕 🖓 🔍 🔍 🖑 🔕 👯 🗧 🛶 🖓 🔍 🖡 🚷 🥖 🗐 🔛 🦀 📸 🥋 🗔 🖾 🖉 🖉 Snapping O 🖽 🗖 д . Editor·FA//口田下計車/今回回回盤出 Table Of Contents \*\* × 10 2011 8-48----Layers sXq Table Option FID Shape + M ■ E View a Dambo\_Cl E C Qs aca atK ∈ 8 sXq E Kasungu\_NW.t 0.34 1 + + = = (0 out of 17 Selected) Qs sXq 10 114

Select "Add Field", "Add Field" window will appear.

Select All Select By Attributes... Add Field... E. Class Selech Turn All Fields On Switch Selection Show Field Aliases If you can not select Select All Arrange Tables Restore Default Column Widths Turn All Fields On Restore Default Field Order Show Field Aliases "Add Field" Joins and Relates Arrange Tables Related Tables Restore Default Column Widths E Create Graph ... Restore Default Field Order you might start editing. Add Table to Layout Joins and Relates Reload Cache Related Tables Print .. 8 i Create Graph... For the adding field stop editing. Reports Add Table to Layout Export... 2 Reload Cache Appearance. & Print... Reports Export ... Appearance.

The menu will appear

Find & Replace...
 Select By Attributes...

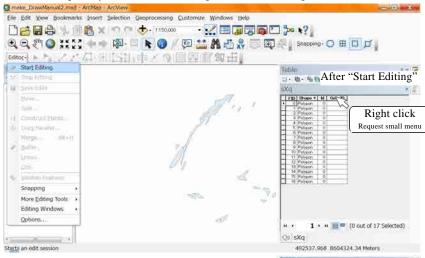
Switch Selection



## 6-4. Field Calculator

It is convinient for adding data to use "Field Calculator" in this case.

Before adding data you have to start editing (see 1. Start Editing).



Right Click on the name of field "Geo\_ID" for

requesting small menu. Select "Field Calculator"



Table	
11· 相· 标用:	2.8
skq	
TEU Libreger         40 Libreger           10 Jahongan         0.           10 Jahongan         0.           2 Polyapo         0.           3 Polyapo         0.           4 Polyapo         0.           4 Polyapo         0.           5 Polyapo         0.           4 Polyapo         0.           5 Polyapo         0.           6 Polyapo         0.           7 Polyapo         0.           6 Polyapo         0.           9 Polyapo         0.	Sort Ascending     Sort Descending     Sort Descending     Advanced Sorting     Summentee      Field Calculator
1) Property 1) Pro	Calculate Geometry Turn Field Off Friesze/Untresse Colum
	# Properties

"Field Calculator" window will appear.

You do not use the upper half this time.

ields: FID	Type:	Functions:
Shape Id Geo_ID	© Number	Atn ( ) Cos ( ) Exp ( ) Fix ( ) Int ( ) Log ( ) Sin ( ) Sqr ( ) Tan ( )
Show Codeblock eo_ID = "sXq"		· / & + · =

Input the index of geology same as the paper Geologic map that is srrounded by "". This example is "sXq". After entering Click "OK". "sXq" is enterd to all lines. You could enter the data successfully. Do for all shape files.



If the table has only one line,

you can enter the data directly to the cell

after clicking the cell.



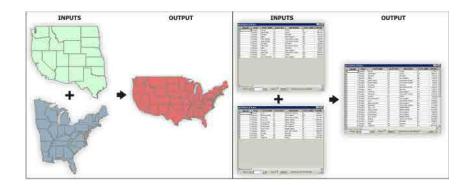
## 6-5. Merge in geoprocessing

This is almostly the final stage of the unifying to one shape file.

"Merge in geoprocessing" and "Merge in Editor Tool", these use same word "Merge". But the functions (works) of these are not same at all. The function(work) of "Merge in Editor Tool" is making one polygon from plural polygons in the same layer (Shape File). On the other hand the function(work) of "Merge in geoprocessing" is making a new layer (Shape File) from plural layers (Shape Files) with keeping data of original layers (Shape Files).

### <Merge in Geoprocessing from Help of ArcView>

Combines multiple input datasets of the same data type into a single, new output dataset. This tool can combine point, line, or polygon feature classes or tables. Use the Append tool to combine input datasets with an existing dataset.



Now start "Merge in geoprocessing". Select "Geoprocessing" in the main manu. Then

🔵 kasungu NW.mxd - ArcMa	- Acview
Contents **	A MINISTRAL
U Layers I I Dambo I I I Dambo I I I I I I I I I I I I I I I I I I I	Merge
Basement Basement Basement Basement	Combres multiple input datasets of the same data type into a single, new output dataset. This tool can containe point, ane, or polygon feeture classes or tables.
e 2 P e 2 Xdi e 2 Xna e 2 Mafic	Use the Append tool to combine input dialasets with an existing dataset.
iii ⊗ Xup iii ⊗ Xd iii ⊗ Xd	Global Divere  Pint Max (accore)
4erge Features Classes or Tat	
	On, Canton Environments, << Hale Help, Tool Help

select "Merge". The "Merge" window will appear.

Select all layers (shape files) for the unifying in the blank under "Input Datasets",

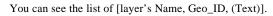
using **[▼**].

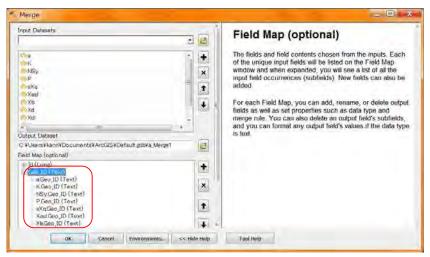


During Selecting the layers, check the "Field Map" which laid in the bottom half of

this window. There is + left side of "Geo\_ID", Click +.

Input Datasets	38	Input Datasets
Cha K K NSy F Axaa Xaa Xaa Xaa Xaa Cuba	+ × • • •	The input datasets that will be merged together into a new output dataset. Input datasets can be point, line, or polygo feature classes or tables. The data type of all input datase must match
Field Map (optional)		
II) lø (Long) ⊯-Geo ID (Text)	+ × +	





This means these data will join to one field in the new Shape File.

If there is other field name which is similar to "Geo\_ID", you made wrong field name

for the layer. In case, check the attribute table of original layer (shape file).

nout Datasets			
Input Detasets		3	Output Dataset
Cha NSy Sa Xaal Xaa Xa Output Dataset C VUsersVAnnYDocumentsV	IT:	× +	The output dataset that will contain all combined input datasets
Field Map (optional) III Id (Long) Geo ID (Text)		+	5 }
-KGeo,ID (Text) -NSyGeo,ID (Text) PGeo,ED (Text) -sKqGeo,ID (Text) -KqGeo,ID (Text) -KGeo,ID (Text) -KGeo,ID (Text)	Output Data	Distribution shp )1.shp	
	Name:	Result02.shp	Save

After checking the "Field Map", input the "Output Dataset".

Then click "Save", "OK".

You can get the merged (unified) shape file.

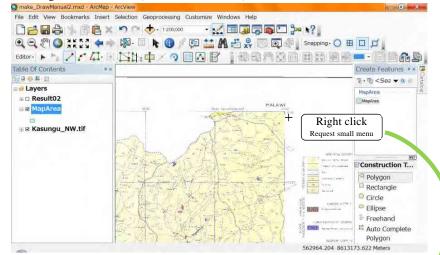
# 7. Check and setup polygon

## 7-1. Edge of map

For the cutting off the outside of map, this manual recommends to make a new shape

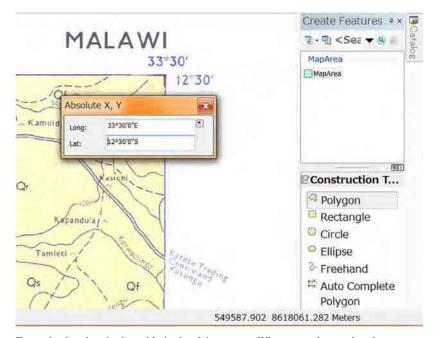
file of map area. Create a new empty polygon shape file named "MapArea" using the

"Catalog" tab and window (see from 0-9. To 2-3.).



Select "polygon" in the "Construction Tools", then right click near a conner of map.

Select "Absolute X,Y".	Absolute X, Y			Spap to reature	STOCK.
,	A	4455.187		2	-
"Absolute X,Y" window	Y: 86	18338.299		Abscrute X, Y	96 500+0
will appear. Click 🛡 .		Meters     Decimal Degrees     Degrees Minutes Seconds     Degrees Decimal Minutes		Profes Again (11)	Sills Sills
Select "Degrees Minutes Se	MGRS U.S. National Grid UTM		Replace Sketch	China MA	
The numbers will change.	Absolute X,	Y		Streeging	¥8
	cong.	30'4.206"E	1	Providente Separate de l'esta Inservat	Here .



Enter absolute longitude and latitude of the conner. When enter the number do not break format of number espesially "E" and "S". After entering the numbers, press "Enter" key in your keyboard. The point will appear in your view. Repeat 3 times more on the other 3 conners of map area, make a rectangle of map area. After drawing the polygon of map area, stop editing with save edits. And add data for the shapefile which you unifyed. Remove the image of geologicmap. "Clip in geoprocessing" and "Clip in Editor Tool", these use same word "Clip". But the functions (works) of these are not same at all. In the using "Clip in geoprocessing" the target area is deleted and outside of the area remains. But in the using "Clip in geoprocessing" the target area remains and outside of the area is deleted.

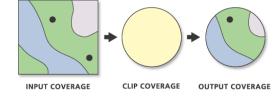
### <Clip in Geoprocessing from Help of ArcView>

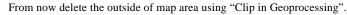
Use this tool to cut out a piece of one feature class using one or more of the features in

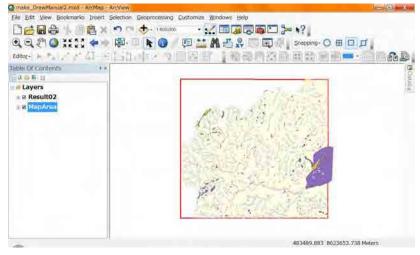
another feature class as a "cookie cutter". This is particularly useful for creating a new

feature class-also referred to as study area or area of interest (AOI)-that contains a

geographic subset of the features in another, larger feature class.







Select "Geoprocessing" in the main menu, then select "Clip".

File Edit View Bookmarks Insert Select	tion Geoprocessing Customize Window	s Help
Contents	5 Cin	
w Layers ≝ ⊭ Result02 ⊯ 8 <mark>MapArea</mark>	교 Search For Tools ArcTroolbox 한 Environments 정 Besuits Searchs Potential Extension 고 Eython	

"Clip" window will appear.

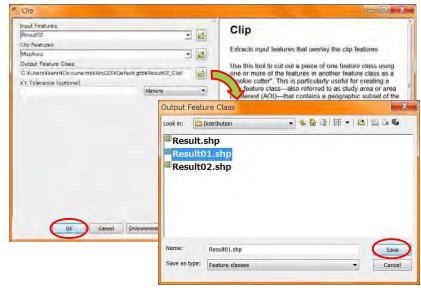
Select unifyed layer (shape file) as "Input Features" using **v**.



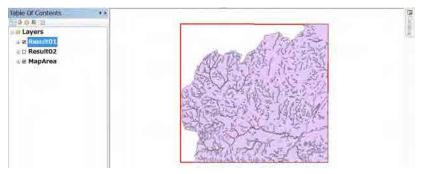
## Select "MapArea" layer (shape file) as "Clip Features" using ▼.

Inouf Features PresultO2 ResultO2 ResultO2 ResultO2 ResultO2	Clip Features The features used to clip the	input features
OK Cancel Enveroimments «« Lind	Tool Hele	

Set the file location and the name of shape file.



### Then click "Save" and "OK".



The Cliped layer (shape file) will appear.

### <for a change>

By the way if you have enough free time, consider the method for deleting the outside

of map area using "Cut polygon" tool and numeric coordinates.

### 7-2. Gap of polygons

For checking the gap of polygons you use the polygon of the map area and the outside

of Malawi. This is the reason which this manual recommends to make these polygons.

The basic flow of checking the gaps of polugons is

1. Copy polygons from unifyed, cliped layer to the map area layer.

2. Merge polygons which copied to the map area layer.

3. Clip (Editor tool bar) map area polygon by merged polygon.

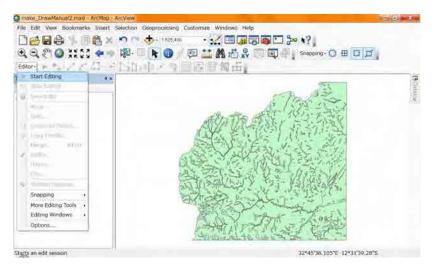
<optional there is a area of outside malawi>

4. Clip (Editor tool bar) map area polygon by outside Malawi polygon.

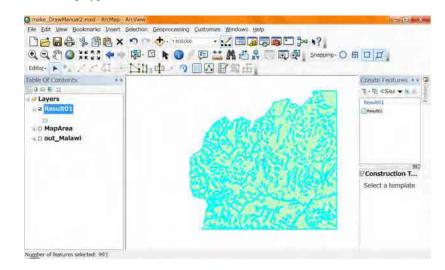
If you draw with no gap, there is no polygon. The remainning polygon means the gap.

See the procedure. Prepare 3 layers (unifyed cliped distribution, Map area, Outside of

Malawi). Show and Strat editing about unifyed cliped distribution layer.



#### Select all polygons.

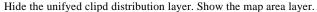


#### Copy all polygons.



#### Stop editing.



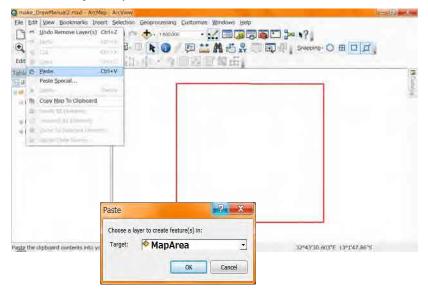


make_DrawMenuel2.mod ArcMay - ArcViev	
	an Geoprocessing Customize Windows Help
Deed and the sources	* 🚸 - 190000 - 🔣 🖾 🕼 🖓 👰 🖸 🎾 א?
④, ④, १ <sup>९</sup> १ 🎱 XX 2 2 💠 → 🖓 Editor-	💷 📐 🕐 / 🖅 🔛 👬 🖓 🥽 💽 🗐 snepping- 🔿 🖽 🖬 💋
able Of Contents	1.3 1.3 1.4 1.
0.0.8/12	
PD Result01	
n R MapAren	
A REAL AND DECK	

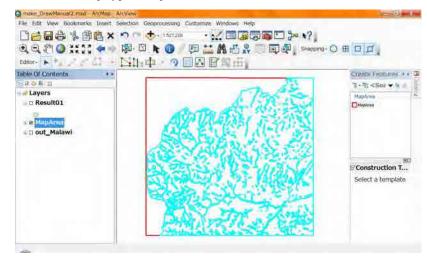
#### Start editing about the map area layer.

make_BrawMenuel2.ma	and the second se	 istomize <u>Windows</u> Help		
dtor-			Shepping- O	ш ц д
Start Editing	4.8			1
- China				4
Sec.				
And Reality				

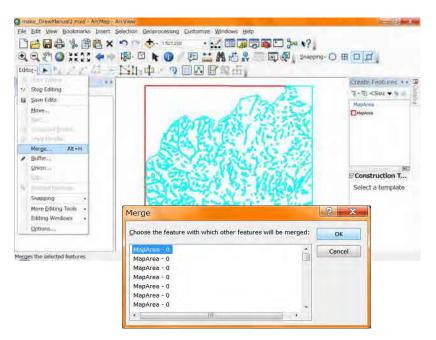
#### Paste to the map area layer.



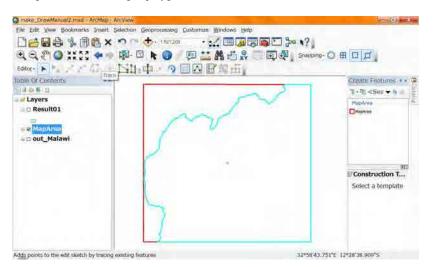
The distribution polygons are paseted and selected.



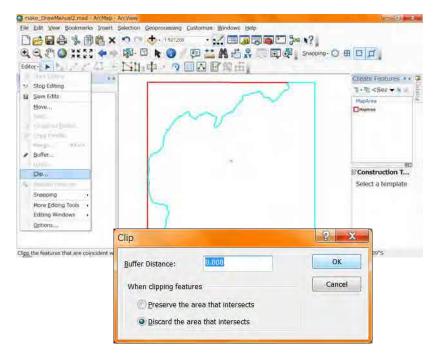
Merge (in the editor tool) to make one area you drawn for the distribution.



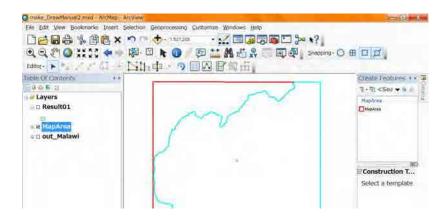
Merged. Selected a merged polygon.



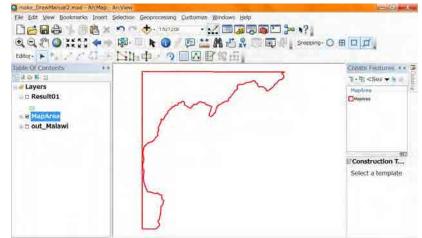
### Clip (in the editor tool)



The area you drawn for the distribution is deleted from the map area.



Delete the area you drawn for the distribution

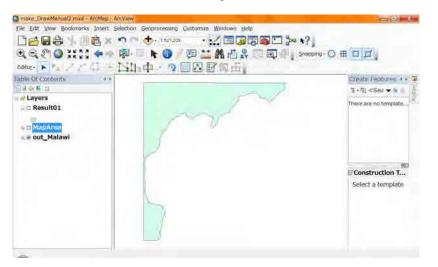


If the map area dose not include the outside of Malawi, you check the polygons remain

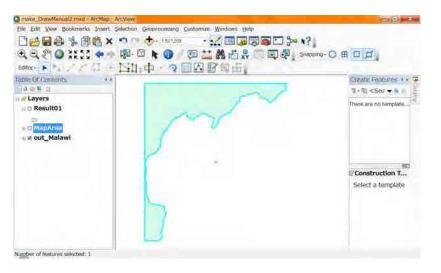
or not. No polygon remain it is OK. The polygon remained means the gap.

If there is the area of outside of Malawi continue the option.

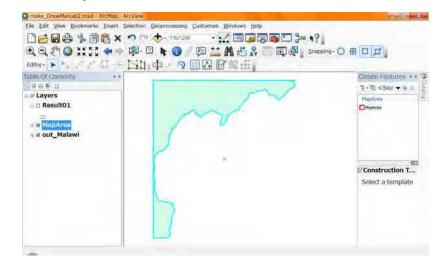
Show the outside of Malawi and hide the map area.



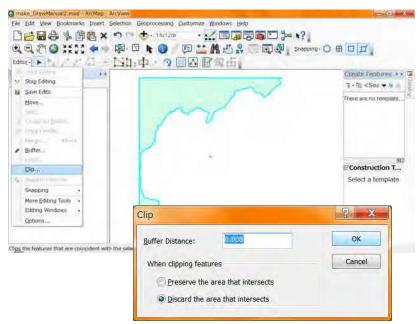
Select the outside of Malawi.



Show the map area.



#### Clip (in the editor tool)



🛃 make_DrawManual2.mud = ArcMasi = ArcVaew	
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Bel	p.
· 김승명은 사 // 혼 × ? ? 수· 1968 · · · · · · · · · · · · · · · · · · ·	3 <b>5</b> 2 3 <b>8</b> ? .
QQ (?) Q XXX ↔ + (?) = ► (0) / (2) 🔛 M // S	
Editor- F M / / C - Kh中 ? 回区图如击;	
Table Of Contents + +	Create Features * * 📿
0 8 9 M 2	1 • H <sos n="" td="" ≠<="" ▼=""></sos>
a arr Layers a □ Result01	Maphree 2 K
al la Milip Arsue	
⇒ □ out_Malawi	
	Construction T
	Select a template
-	32°54'2.015°E 13°1'20.552°S

Check the polygons remain or not. No polygon remain it is OK. The polygon remained

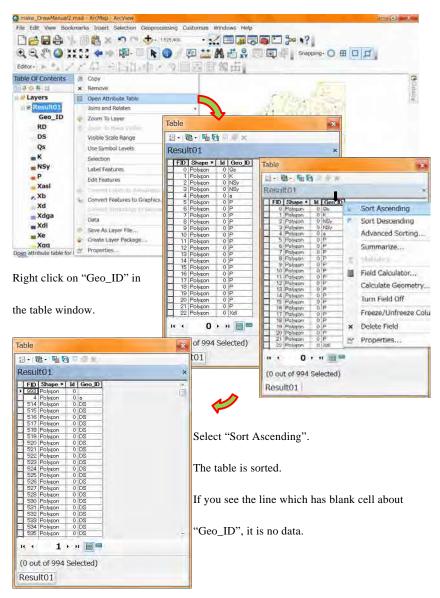
means the gap.

For repairing the gap, copy the polygons to the distribution layer you drawn. And add

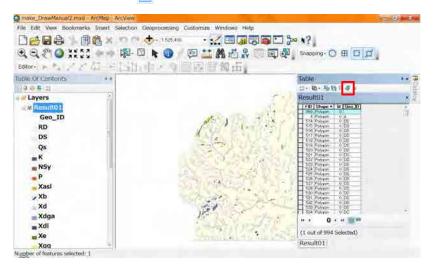
the data of "Geo\_ID" to the atttribute table.

# 7-3. Check the Data of "Geo\_ID"

For checking the data of "Geo\_ID", open the "Attribute Table".



Select one line, then click 🛃 .



The view is zoomed to the polygon. You can easy to understand the geology (Geo\_ID)

of the area. Enter correct "Geo\_ID" after start editing.

