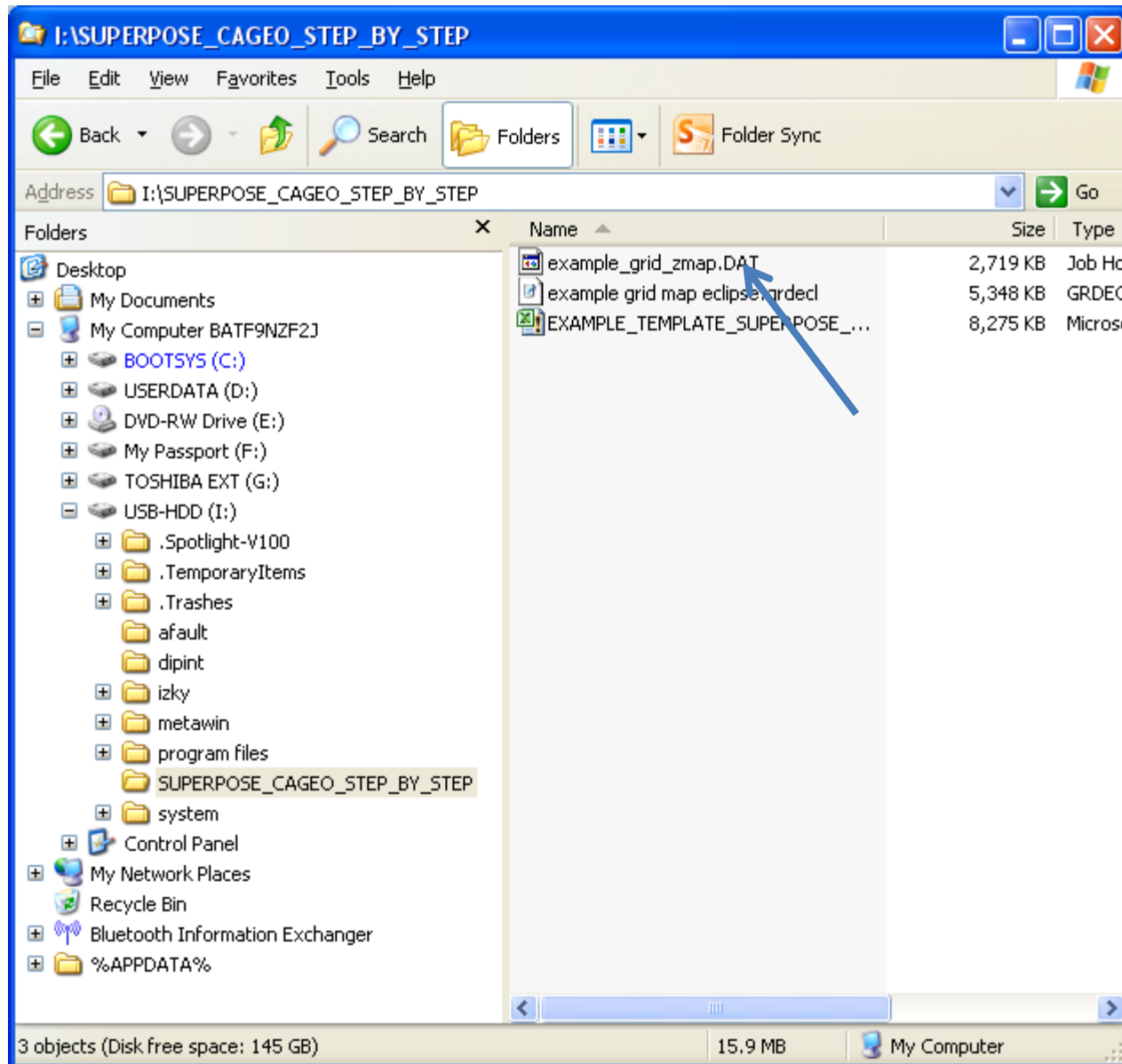


SUPERPOSE- An Excel Visual Basic Program for
Fracture Modeling Based on Stress
Superposition Method

Sait Ozkaya

STEP BY STEP QUICK RUN

IMPORTING GRID DATA IN Z MAP .DAT FORMAT



Place the grid data file in your work folder.

Make sure that the file is a text file. Otherwise open the file with pspad or wordpad programs and save as text file.

```

example_grid_zmap.DAT - WordPad
File Edit View Insert Format Help

!
! FILE NAME : SUPERPOSE STRUCTURAL DATA EXAMPLE SET 1
! FORMATTED FILE CREATION DATE: August 2013
! FORMATTED FILE CREATION TIME: 16:25
!
"@ZMAP_EXAMPLE          , GRID, 5"
" 15, 0.1000000E+31, , 7, 1"
" 546, 283, 233100.0 , 268350.0 , 2709800. , 2777925. "
" 36000.00 , 0.000000 , 0.000000 "
@
-2563.972 -2562.807 -2561.636 -2560.464 -2559.289
-2558.116 -2556.946 -2555.782 -2554.625 -2553.478
-2552.343 -2551.222 -2550.117 -2549.031 -2547.966
-2546.923 -2545.907 -2544.917
-2542.133 -2541.274 -2540.453
-2538.234 -2537.582 -2536.976
-2535.452 -2535.045 -2534.692
-2533.959 -2533.827 -2533.751
-2533.866 -2534.020 -2534.230
-2535.203 -2535.638 -2536.127
-2537.909 -2538.605 -2539.350
-2541.856 -2542.776 -2543.736
-2546.831 -2547.926 -2549.051
-2552.569 -2553.783 -2555.012
-2558.771 -2560.041 -2561.314
-2565.127 -2566.390 -2567.643
-2571.331 -2572.528 -2573.707
-2577.109 -2578.193 -2579.249
-2582.237 -2583.167 -2584.065
-2586.544 -2587.297 -2588.012
-2589.933 -2590.497 -2591.023
-2593.881 -2594.851 -2595.822

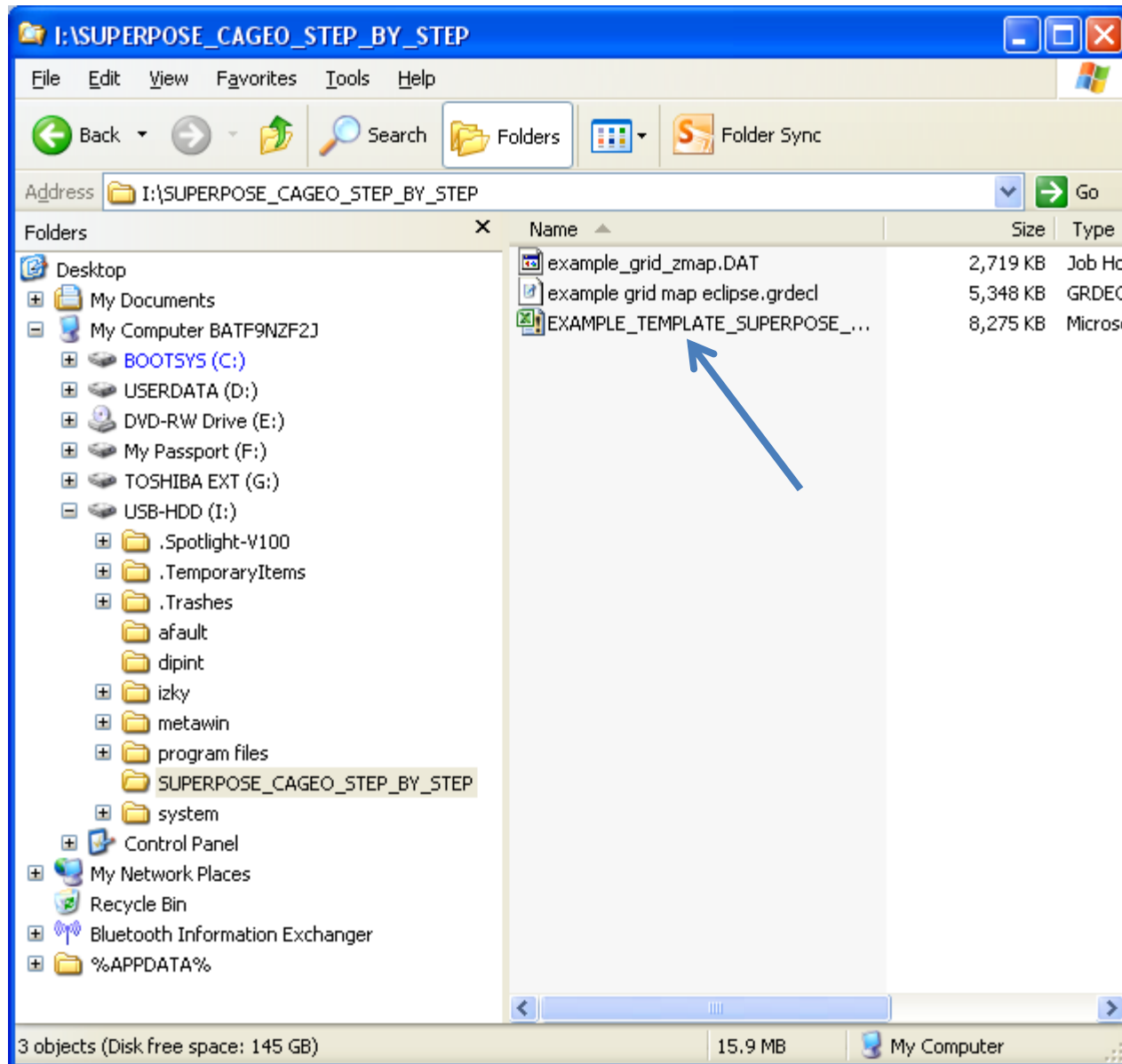
```

For Help, press F1

The Zmap file must have the content shown. See the User Guide for explanation.

Note : Quotation marks are ignored

!					
!	FILE NAME : FIELD1_STR				
!	FORMATTED FILE CREATION DATE: JUL 14 2013				
!	FORMATTED FILE CREATION TIME: 13:41				
!					
@	FIELD1_METRIC HEADER , GRID, 5				
	15, 0.1000000E+31, , 7, 1				
	546, 283, 356100.0 , 391350.0 , 2855000. , 2923125.				
	36000.00 , 0.000000 , 0.000000				
@					
	-2563.972	-2562.807	-2561.636	-2560.464	-2559.289
	-2558.116	-2556.946	-2555.782	-2554.625	-2553.478
	-2552.343	-2551.222	-2550.117	-2549.031	-2547.966
	-2546.923	-2545.907	-2544.917	-2543.957	-2543.028
	-2542.133	-2541.274	-2540.453	-2539.672	-2538.932



Open the SUPERPOSE
Excel template



ZMAP

2

INPUT PARAMETERS

imin	160	<--	Starting minimum grid in x direction (to trim left edge)
imax	400	<--	Last value of grid cell in y direction (to trim right edge)
jmin	200	<--	Starting minimum grid in y direction (top trip top edge)
jmax	519	<--	Last value of grid in y direction (to trim bottom edge)
stepx	4	<--	decimate grid in x direction
stepy	4	<--	decimate grid in y direction
dirop	1		1: y (downward) fist 2 : x (left to right) first
Z+down	1		1: changes sign of elevation
fname	C:\EXAMPLE.DAT		

486	Original grid size in x direction output from red
519	original grid size in y direction out from red
61	Maximum number of cells in x direction
80	Maximum number of cells in y direction
134500	Minimum x coordinate East UTM
255750	Maximum x coordinate East UTM
1534000	Minimum y coordinate North UTM
1663500	Maximum y coordinate East UTM
2857.277	Minimum elevation (positive downward)
4471.052	Maximum elevation (positive downward)

1

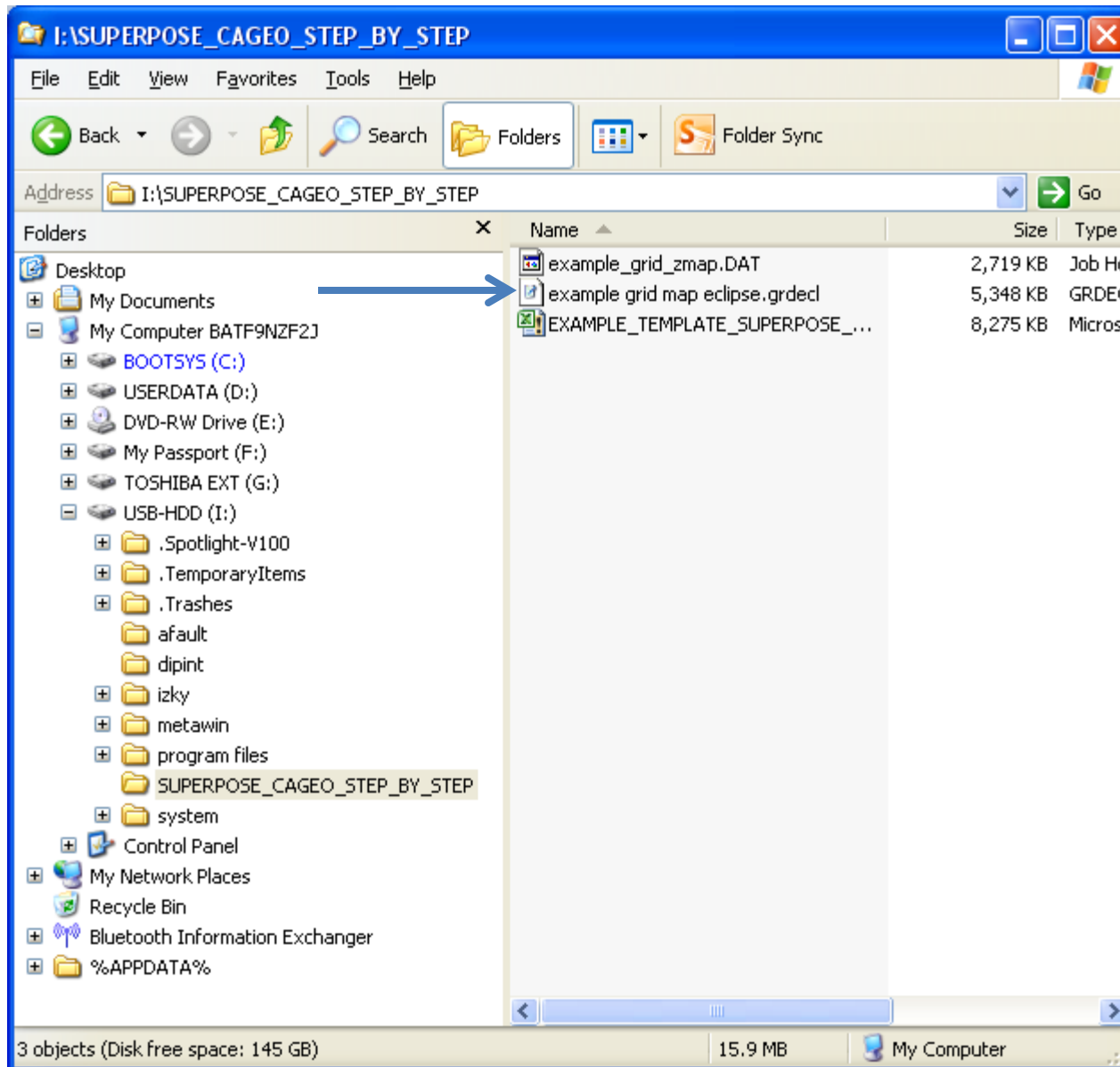
3

B	C	D	E	F	G
x	y	z		i	J
174250	1613750	3122.312		160	200
175250	1613750	3130.345		164	200
176250	1613750	3149.917		168	200
177250	1613750	3175.636		172	200

4

Open the Zmap-data tab Fill in the parameters including the full path of the data import file(1).
Click on the icon (2) to run the import program. Read the imported grid data (3) and parameters (4).

IMPORTING GRID DATA IN ECLIPSE .GRDECL FORMAT



Place the data file in your work directory. Make sure the file is a text file. If in doubt, open it with pspad or wordpad program and save as text file.

The format of the file must conform the example (1) with the specific key words and data (see User Guide for details).

----- Eclipse Data File Generated From GOCAD SGrid Export						
----- Name of Exported SGrid: FIELD X_Frac_SGRD						

SPECGRID						
200 304 1 1 F /						
GRIDUNIT						
'FEET' /						
MAPUNITS						
'FEET' /						
COORD						
1017060	9484908	8118.064	1017060	9484908	8123.78	
1017883	9484908	8078.894	1017883	9484908	8084.532	
1018705	9484908	8039.659	1018705	9484908	8045.215	
1019527	9484908	8000.383	1019527	9484908	8005.856	
1020349	9484908	7961.103	1020349	9484908	7966.495	
1021172	9484908	7921.799	1021172	9484908	7927.108	
1021994	9484908	7882.352	1021994	9484908	7887.58	
.....						

- Export					
-- Grid: example					
-- Done by Sait on Mon Oct 17 10:23:59 AST 2011					
MAPUNITS					
METRES /					
MAPAXES					
323485.37 3026777.9 323485.37 3027777.9 324485.37 3027777.9 /					
GRIDUNIT					
METRES /					
SPECGRID					
139 198 1 1 F /					
COORD					
0.0000000 0.0000000 2627.3430 0.0000000 0.0000000 2628.3430					
105.97949 66.225585 2627.1299 105.97949 66.225585 2628.1299					
211.96289 132.45117 2626.8831 211.96289 132.45117 2627.8831					
317.94531 198.67480 2626.4150 317.94531 198.67480 2627.4150					
423.92773 264.90039 2625.7671 423.92773 264.90039 2626.767					

This alternative format uses mapaxes option. The coordinates are specified following the mapaxes keyword.

Coordinates are given as increments. User must decide the axis orientation and specify xdir and ydir keywords accordingly.

The screenshot shows a software window with a grid-based interface. The top section contains two panels: 'INPUT PARAMETERS' and 'OUTPUT PARAMETERS'. The 'INPUT PARAMETERS' panel is highlighted with a blue circle and labeled '1'. It contains the following data:

Parameter	Value	Description
imin	1	Starting minimum grid in x direction (to trim left edge)
imax	151	Last value of grid cell in x direction (to trim right edge)
jmin	1	Starting minimum grid in y direction (top trip top edge)
jmax	601	Last value of grid in y direction (to trim bottom edge)
xdir	1	1 right -1 left (relevant only if mapaxes is specified)
ydir	1	1 down -1 up (relevant only if mapaxes is specified)
stepx	4	decimate grid in x direction
stepy	4	decimate grid in y direction
fname	g:\EXAMPLE_GRID.GRDECL	

Below the input parameters is a red smiley face icon labeled 'GRDECL', with an arrow pointing to it labeled '2'. To the right of the input parameters is the 'OUTPUT PARAMETERS' panel, which contains the following data:

Parameter	Value	Description
rx orig	151	Original grid size in x direction output from red
ny orig	601	original grid size in y direction out from red
nxmax	38	Maximum number of cells in x direction
nymax	151	Maximum number of cells in y direction
min utme	299877	Minimum x coordinate East UTM
max utme	314677	Maximum x coordinate East UTM
min utmn	2732699	Minimum y coordinate North UTM
max utmn	2792699	Maximum y coordinate East UTM
min elev	2128.000732	Minimum elevation (positive downward)
max elev	2651.427734	Maximum elevation (positive downward)

Below the output parameters is a table of data, labeled '4' with an arrow pointing to it. The table has columns x, y, z, i, and j.

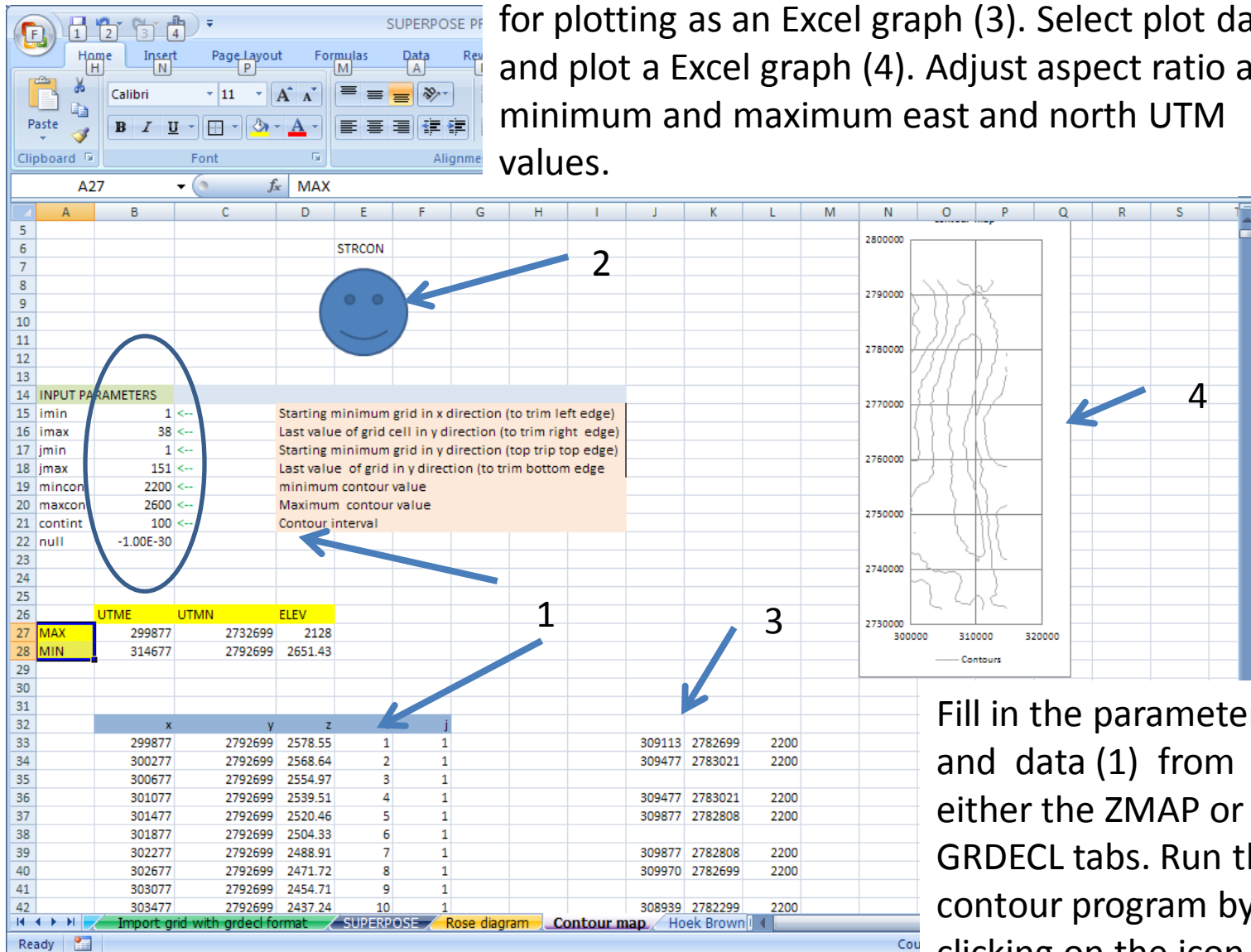
x	y	z	i	j
299877	2792699	2578.547119	1	1
300277	2792699	2568.644043	2	1
300677	2792699	2554.967773	3	1
301077	2792699	2539.514404	4	1
301477	2792699	2520.461426	5	1
301877	2792699	2504.325195	6	1
302277	2792699	2488.905518	7	1
302677	2792699	2471.717773	8	1
303077	2792699	2454.709717	9	1
303477	2792699	2437.23877	10	1
303877	2792699	2418.752686	11	1

The bottom of the window shows a status bar with the text 'Import grid with Zmap format', 'Import grid with grdecl format', 'SUPERPOSE', and 'Rose diagram'.

Open the grdecl tab. Place import parameters (1) and click on the icon to run the GRDECL import program (2). The results (data and parameters) are placed as shown (4).

DRAWING STRUCTURE CONTOUR MAP

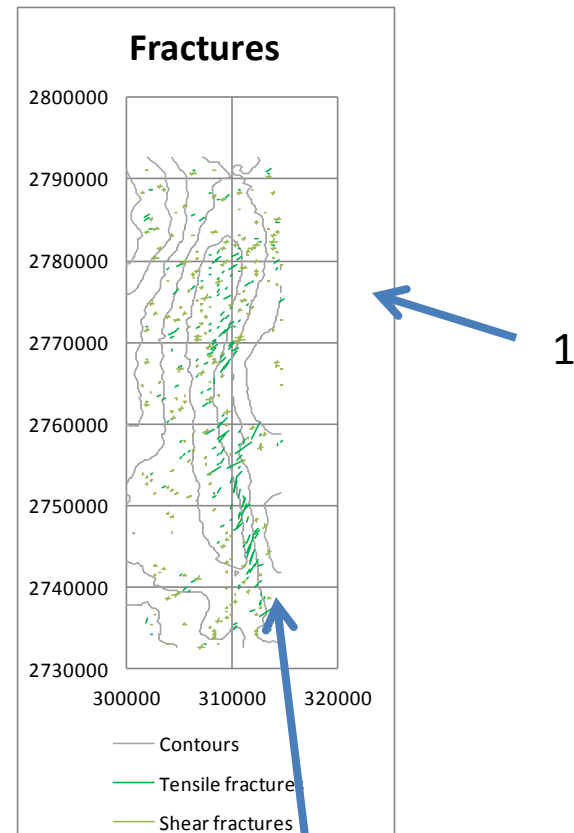
The contour program outputs the contours suitable for plotting as an Excel graph (3). Select plot data and plot a Excel graph (4). Adjust aspect ratio and minimum and maximum east and north UTM values.



Fill in the parameters and data (1) from either the ZMAP or GRDECL tabs. Run the contour program by clicking on the icon (2)

RUNNING SUPERPOSE PROGRAM

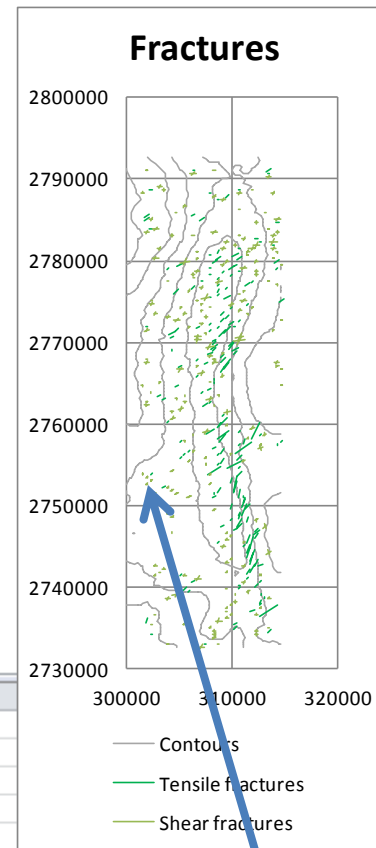
The fracture stick data for tensile fractures is placed at column J and U. Copy the contour map to the SUPERPOSE tab(1). Copy and paste the data onto the contour map (2) and change color chosen for tensile fractures.



Columns J to U: Tensile fracture sticks

TENSILE FRACTURES					FRACTURE STICKS				EXCEL PLOT AID	
Length	Strike	X	Y		tip 1		tip 2		Tip 1 x	tip1 y
m	deg	utme	utmn		utme	utmn	utme	utmn	Tip2 x	tip2 y
862.7418	56.27857	248725	2733300		248366.2	2733061	249083.8	2733539	248366.2	2733061
1274.483	56.36598	249225	2731300		248694.4	2730947	249755.6	2731653	249083.8	2733539
749.7146	55.89773	249225	2730800		248914.6	2730590	249535.4	2731010		
875.9929	29.45001	253725	2730300		253509.7	2729919	253940.3	2730681		
880.7181	29.61821	254225	2730300		254007.4	2729917	254442.6	2730683	253985.4	2728863

The fracture stick data for shear fractures is placed at columns Y and AU Copy and paste the data onto the contour map and change color chosen for shear fractures.



Columns Y to AU: Shear fracture sticks

	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	
22											
23											
24											
25											
26											
27											
28											
29											
30	SHEAR FRACTURES				SHEAR FRACTURE STICKS				EXCEL PLOT AID		
31	Length	Strike	X	Y	tip 1		tip 2		Tip 1 x	tip1 y	
32	m	deg	utme	utmn	utme	utmn	utme	utmn	Tip2 x	tip2 y	
33	33.83671	89.5081	242225	2766300	242208.1	2766300	242241.9	2766300	242208.1	2766300	
34	33.83671	29.50818	242225	2766300	242216.7	2766285	242233.3	2766315	242241.9	2766300	
35	61.85426	89.13495	242225	2765800	242194.1	2765800	242255.9	2765800			
36	61.85426	29.13503	242225	2765800	242209.9	2765773	242240.1	2765827			
37	26.90363	89.19306	244225	2765800	244211.5	2765800	244238.5	2765800			
38	26.90363	29.19314	244225	2765800	244218.4	2765788	244231.6	2765812			
39	105.2603	88.88298	242225	2765300	242172.4	2765299	242277.6	2765301			