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

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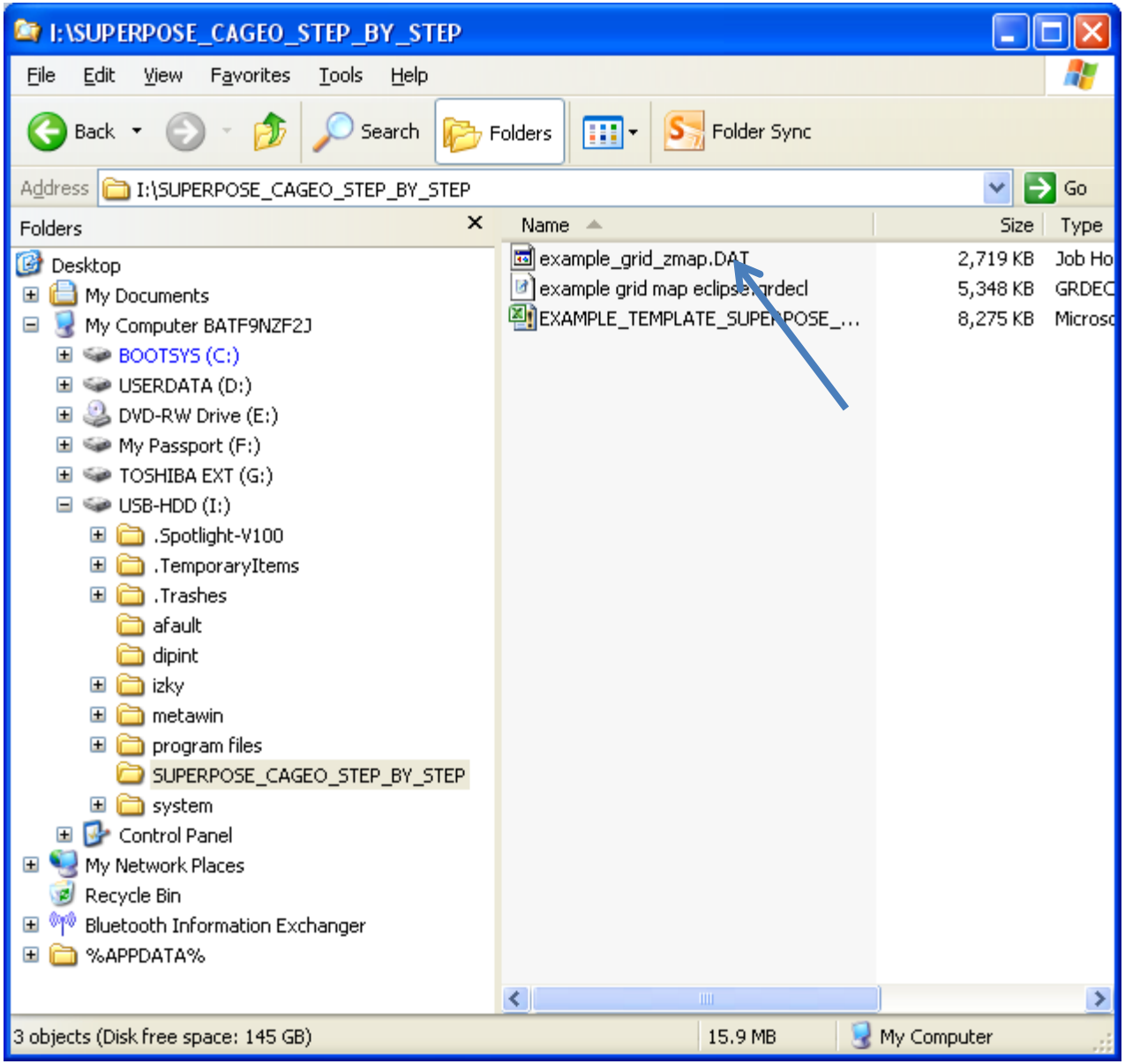
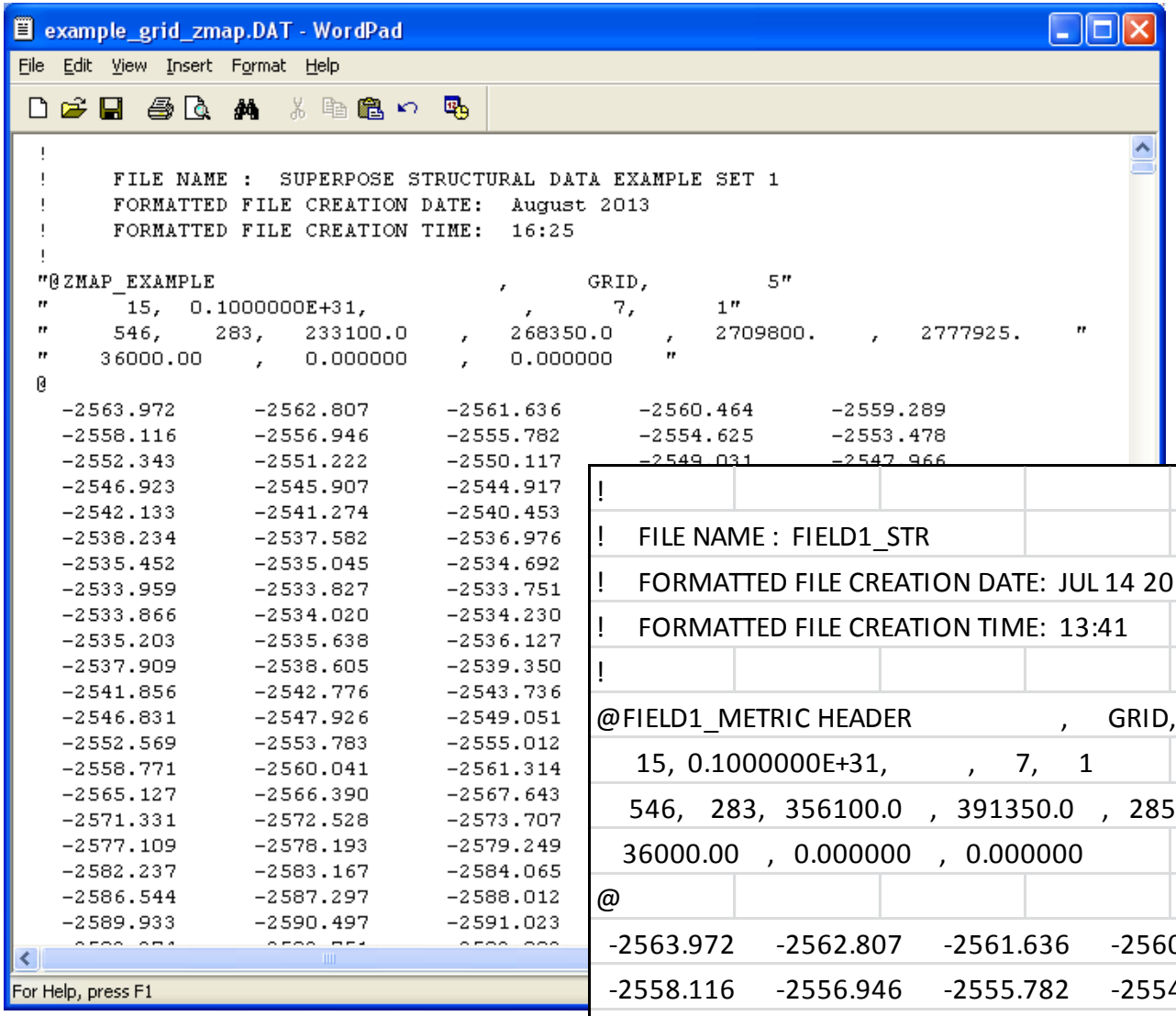
STEP BY STEP QUICK RUN

IMPORTING GRID DATA IN Z MAP .DAT FORMAT



Place the grid data file in your work folder.

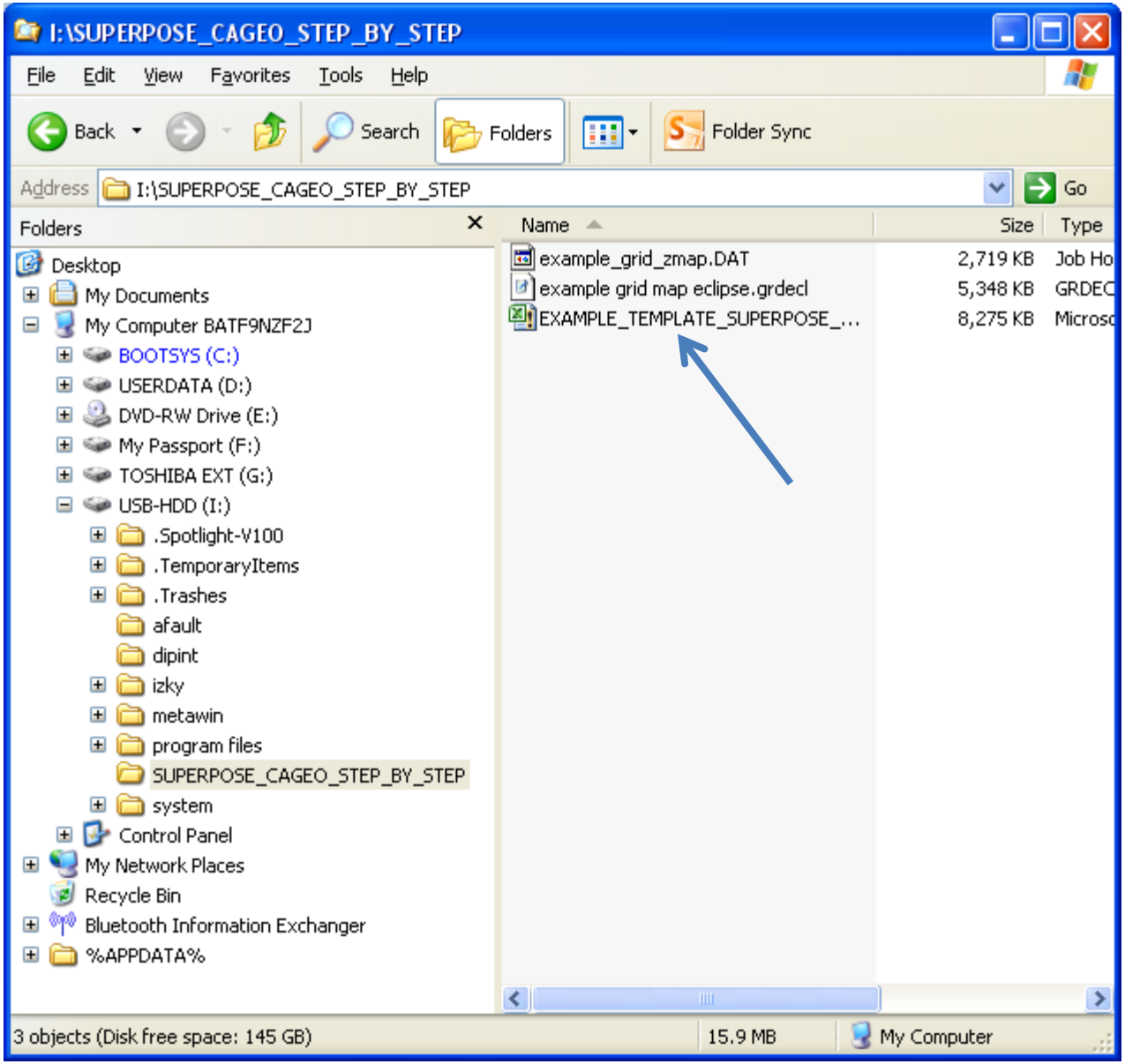
Make sure that the file is a text file. Otherwise open the file with pspad or wordpad programs and save as text file.



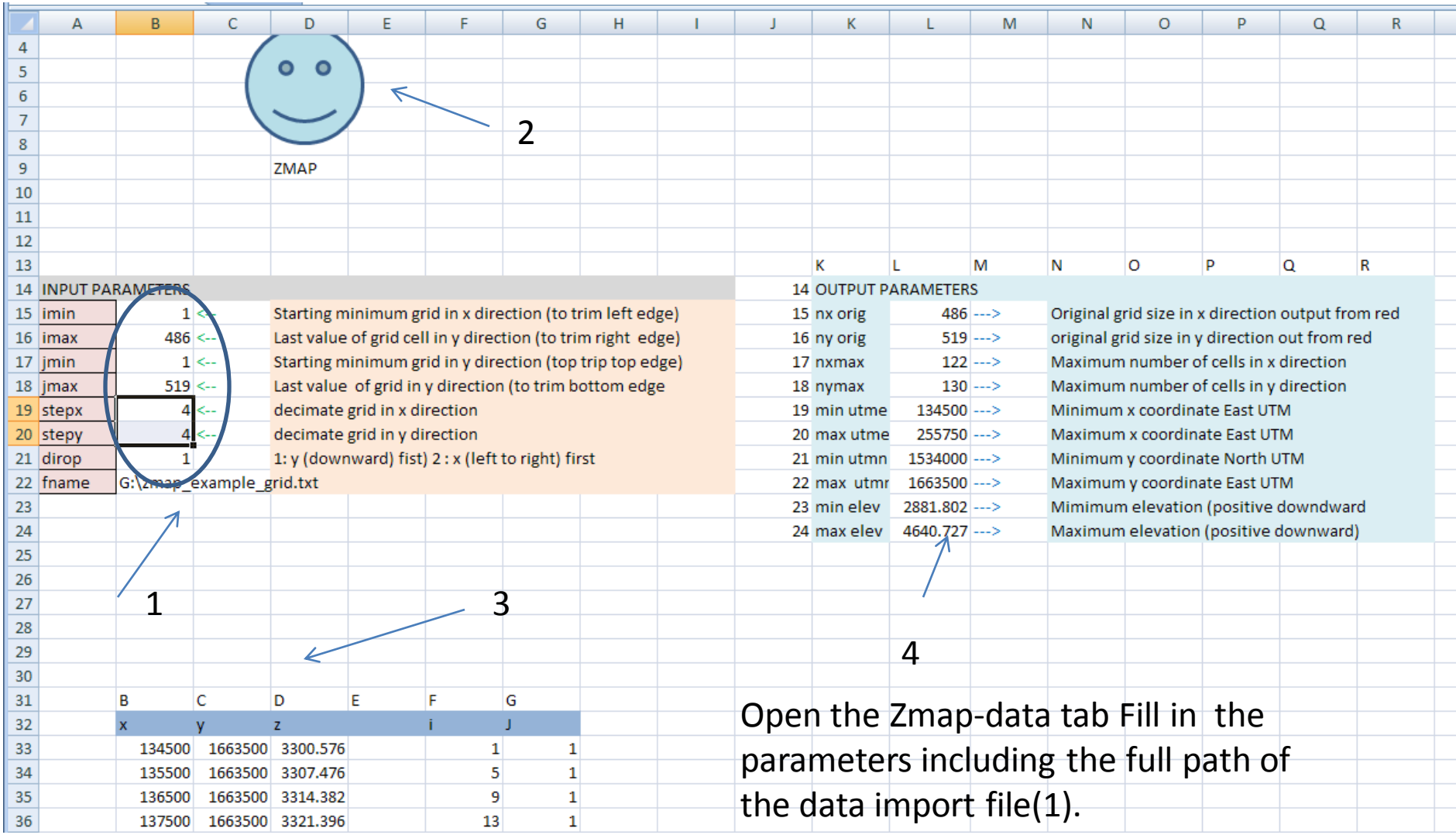
The Zmap file must have the content shown. See the User Guide for explanation.

!				
! 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

Note : Quotation marks are ignored



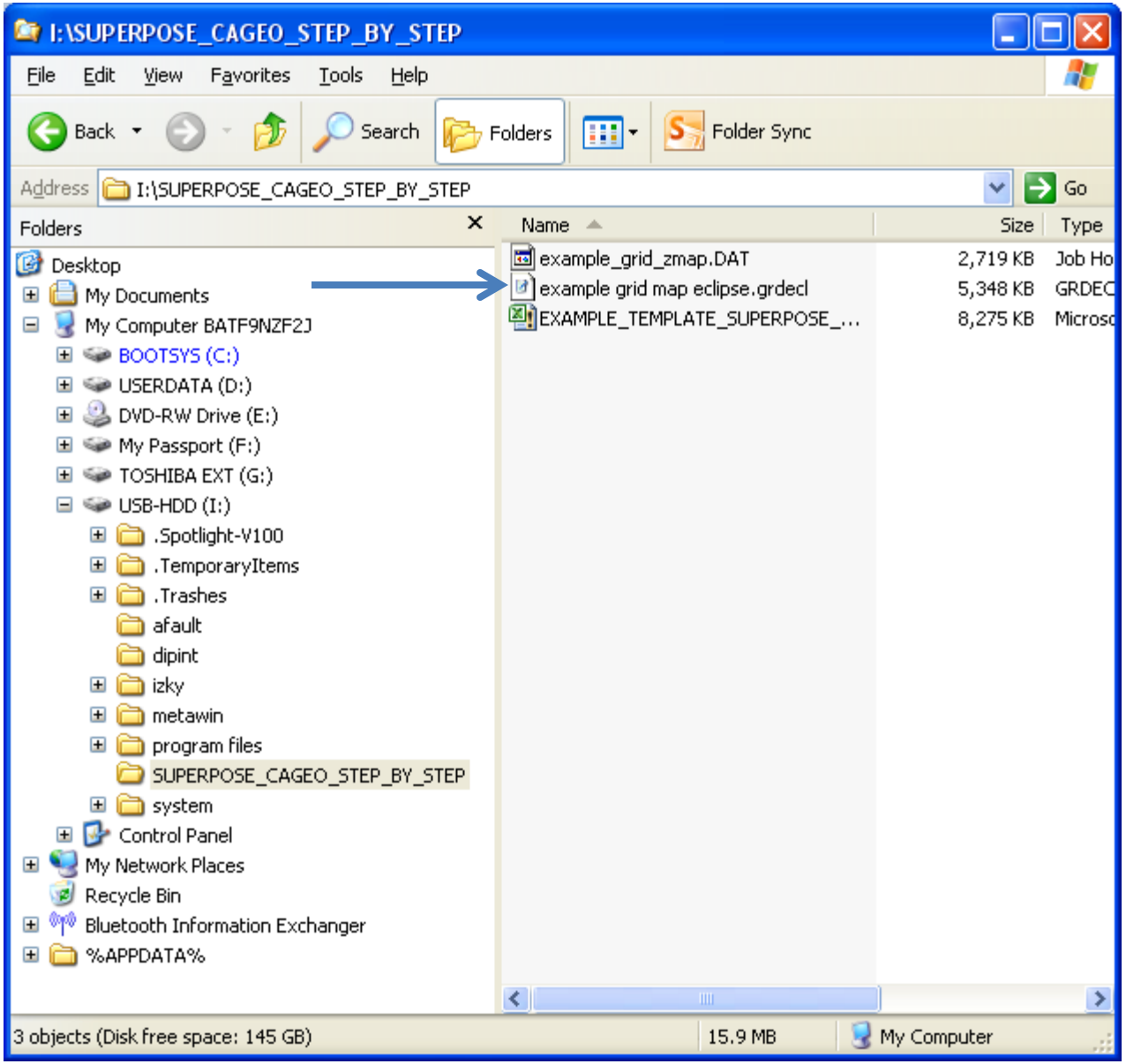
Open the SUPERPOSE Excel template



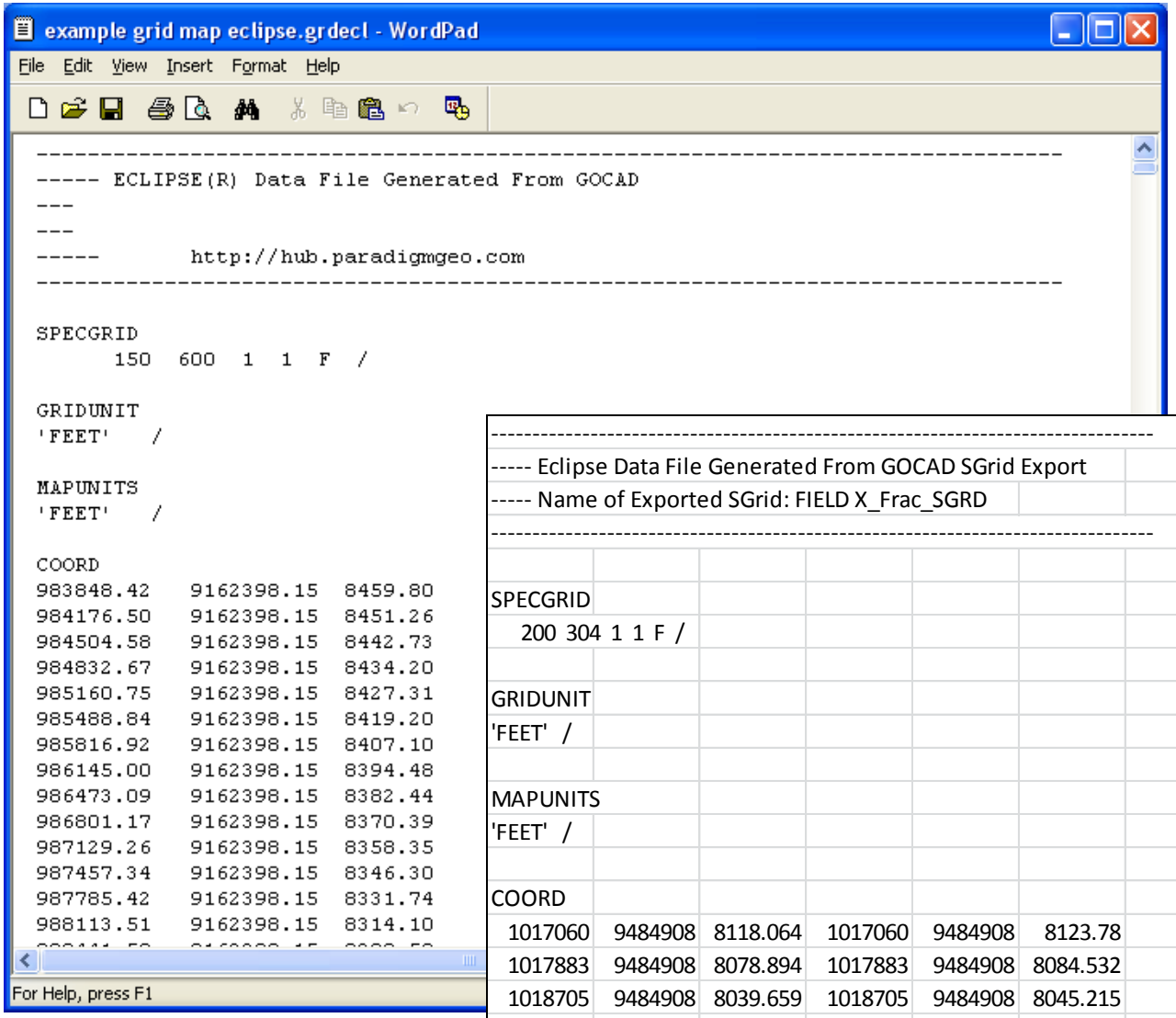
Open the Zmap-data tab Fill in the parameters including the full path of the data import file(1).

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' /

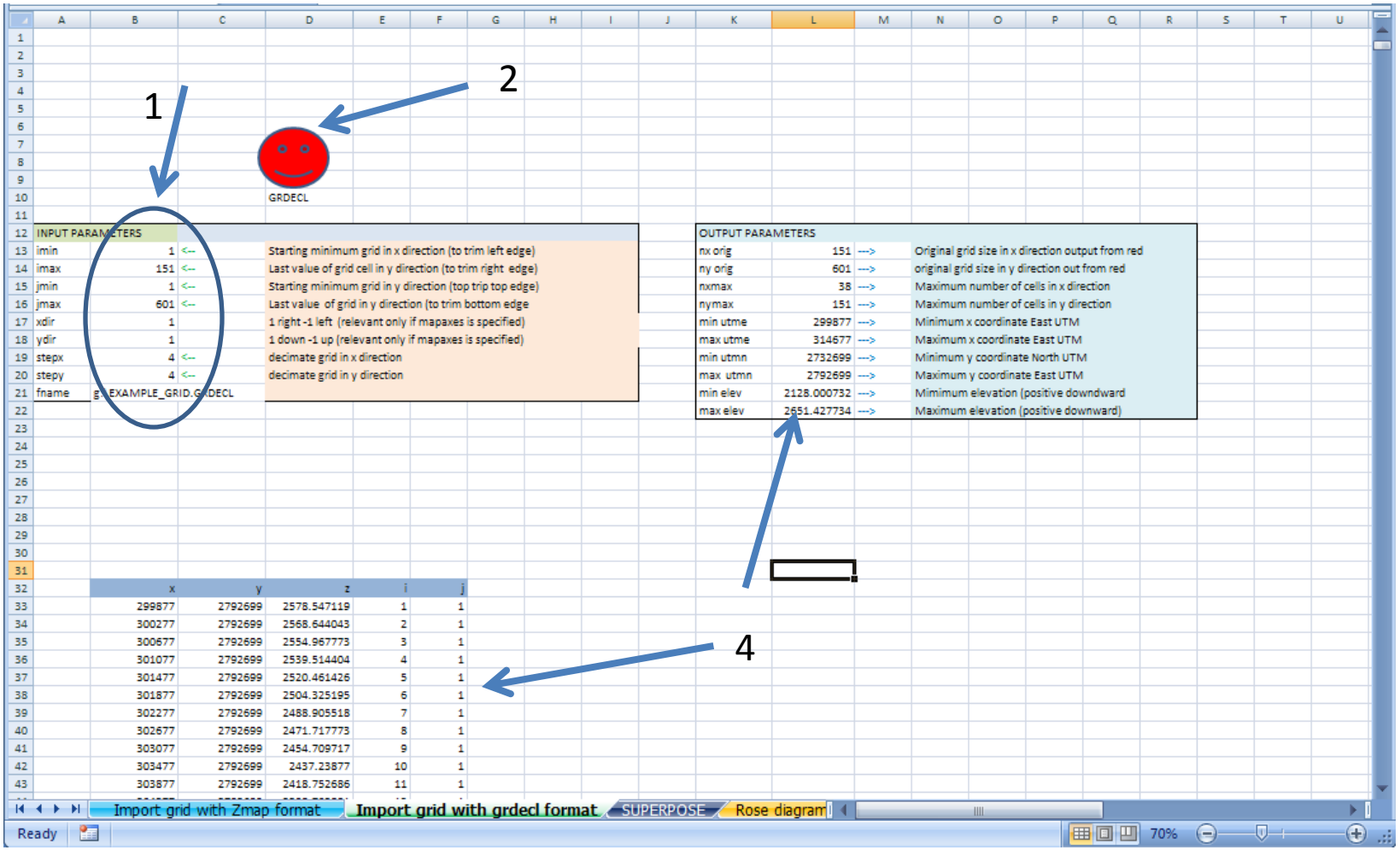
COORD

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
```

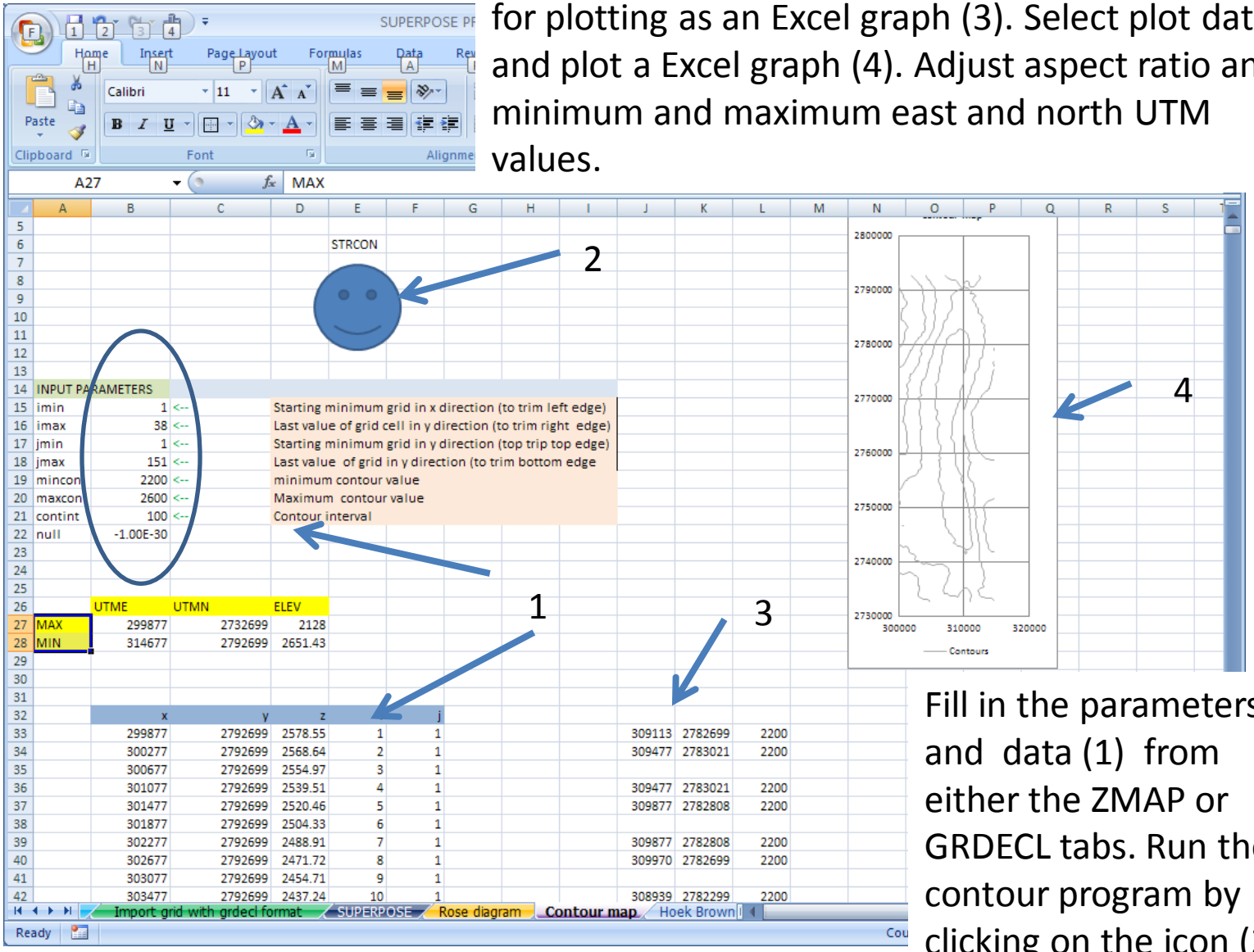
This alternative format uses mapaxes option. The coordinates are specified following the mapaxes keyword. Coordinates are given as increments. User must decide the axis orientation and specify xdir and ydir keywords accordingly.



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).

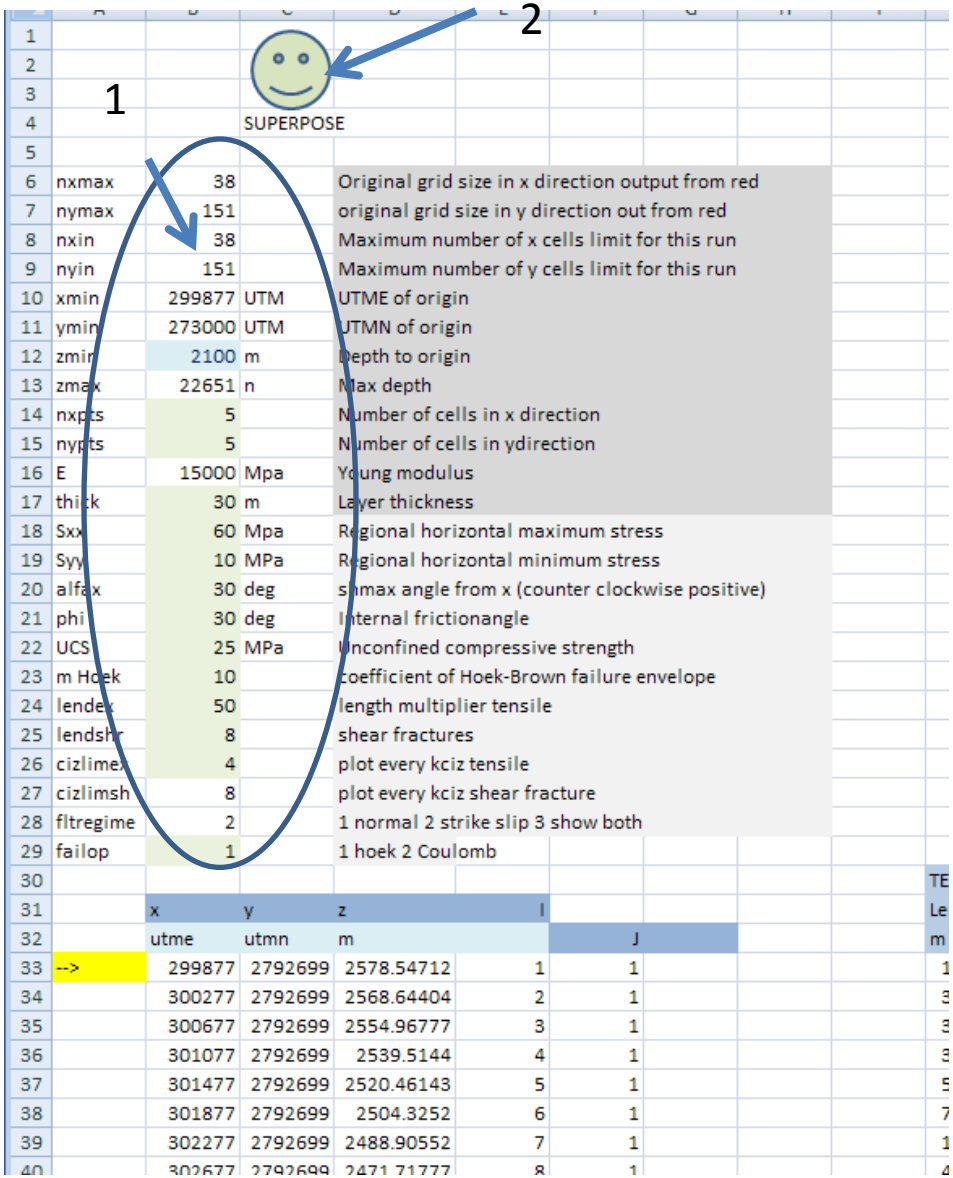
DRAWING STRUCTURE CONTOUR MAP

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

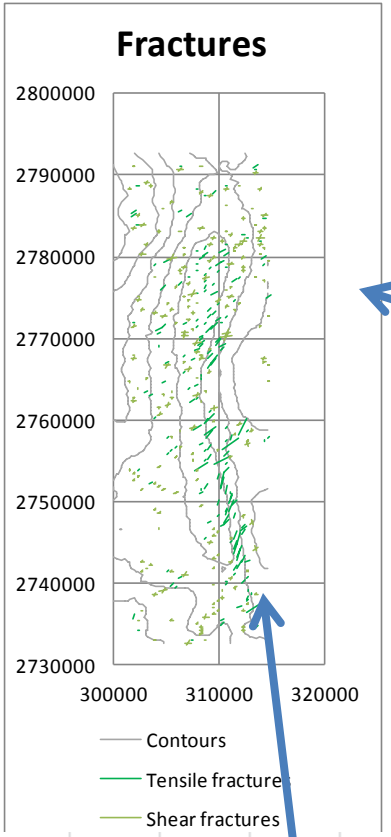


6	nxmax	38		Original grid size in x direction output from red
7	nymax	151		original grid size in y direction out from red
8	nxin	38		Maximum number of x cells limit for this run
9	nyin	151		Maximum number of y cells limit for this run
10	xmin	299877	UTM	UTME of origin
11	ymin	273000	UTM	UTMN of origin
12	zmin	2100	m	Depth to origin
13	zmax	22651	n	Max depth
14	nxpts	5		Number of cells in x direction
15	nypts	5		Number of cells in ydirection
16	E	15000	Mpa	Young modulus
17	thick	30	m	Layer thickness
18	Sxx	60	Mpa	Regional horizontal maximum stress
19	Syy	10	MPa	Regional horizontal minimum stress
20	alfax	30	deg	shmax angle from x (counter clockwise positive)
21	phi	30	deg	Internal frictionangle
22	UCS	25	MPa	Unconfined compressive strength
23	m Hoek	10		coefficient of Hoek-Brown failure envelope
24	lendex	50		length multiplier tensile
25	lendshr	8		shear fractures
26	cizlimex	4		plot every kciz tensile
27	cizlimsh	8		plot every kciz shear fracture
28	fltregime	2		1 normal 2 strike slip 3 show both
29	failop	1		1 hoek 2 Coulomb

		x	y	z	I	J	TE
31		x	y	z	I		Le
32		utme	utmn	m		J	m
33	-->	299877	2792699	2578.54712	1	1	1
34		300277	2792699	2568.64404	2	1	3
35		300677	2792699	2554.96777	3	1	3
36		301077	2792699	2539.5144	4	1	3
37		301477	2792699	2520.46143	5	1	5
38		301877	2792699	2504.3252	6	1	7
39		302277	2792699	2488.90552	7	1	1
40		302677	2792699	2471.71777	8	1	4

Open the superpose tab in the Excel template. Fill in the input parameters and copy and paste grid data from ZMAP or GRDECL tabs (1). Click on the icon to run the SUPERPOSE program (2).

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.



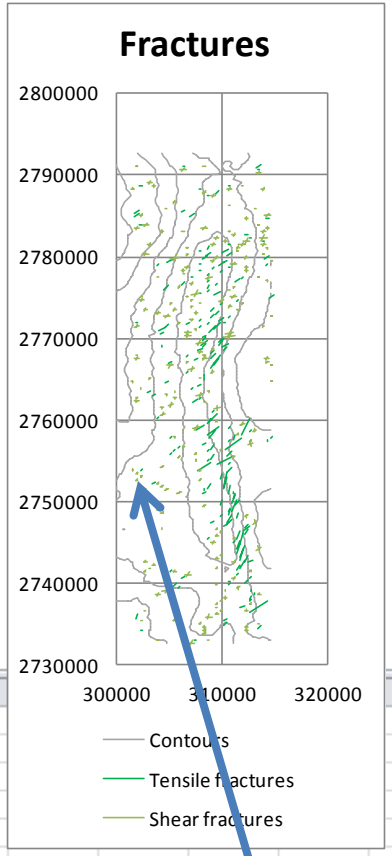
1

Columns J to U: Tensile fracture sticks

2

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	umtn	utme	utmn	Tip2 x	tip2 y
862.7418	56.27857	248725	2733300	248366.2	2733061	249083.8	2733539		
1274.483	56.36598	249225	2731300	248694.4	2730947	249755.6	2731653	248366.2	2733061
749.7146	55.89773	249225	2730800	248914.6	2730590	249535.4	2731010	249083.8	2733539
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	CH
22											
23											
24											
25											
26											
27											
28											
29											
30	SHEAR FRACTURES					SHEAR FRACTURE STICKS STICKS					
31	Length	Strike	X	Y		tip 1		tip 2			
32	m	deg	utme	utmn		utme	umtn	utme	utmn		
33	33.83671	89.5081	242225	2766300		242208.1	2766300	242241.9	2766300		
34	33.83671	29.50818	242225	2766300		242216.7	2766285	242233.3	2766315		
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		

EXCEL PLOT AID	
Tip 1 x	Tip1 y
Tip2 x	Tip2 y
242208.1	2766300
242241.9	2766300
242216.7	2766285
242233.3	2766315