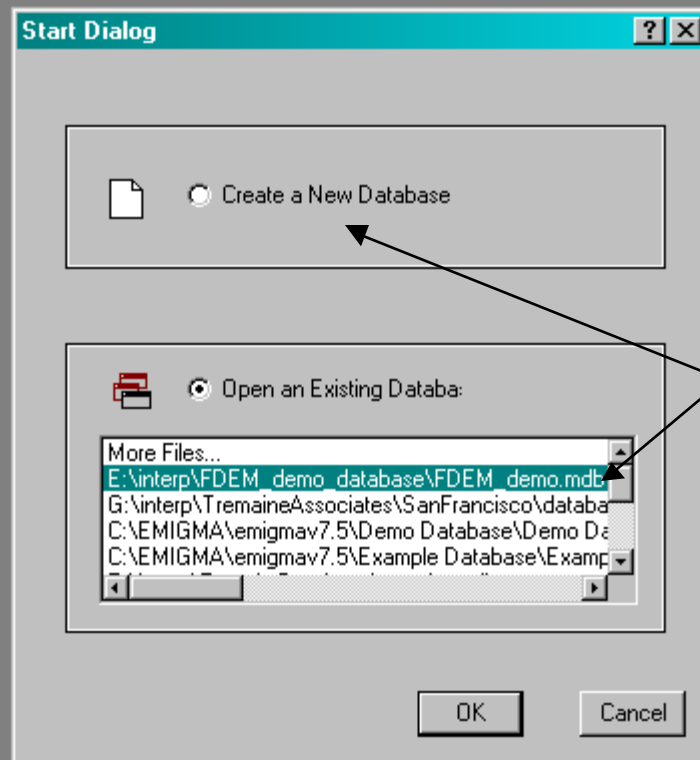


Opening a database



Select a Database

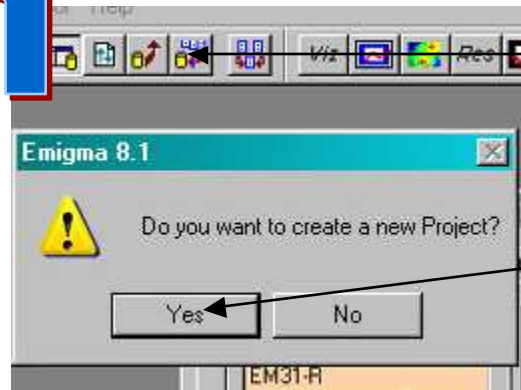
Or

Create a New Database

Note: If Creating a new database, it is recommended to put the new database in a new subdirectory

Importing Data - 1

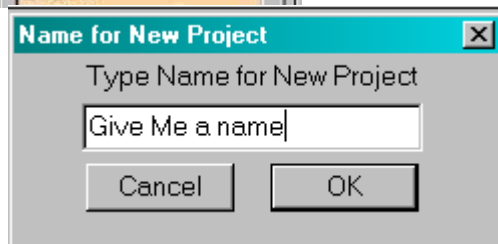
1



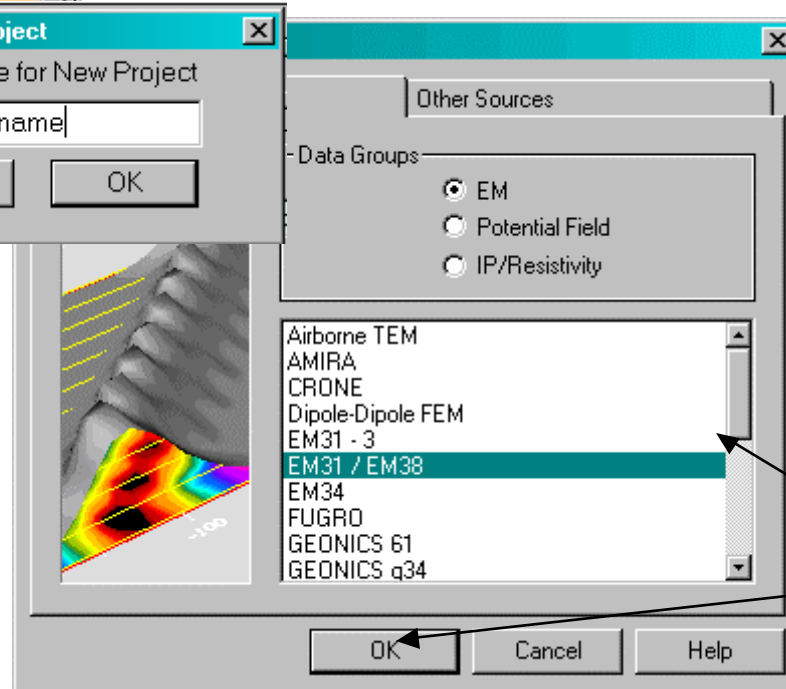
Import a dataset

Usually, Yes

2



3



Select EM31

Select

Importing Data - 2

1

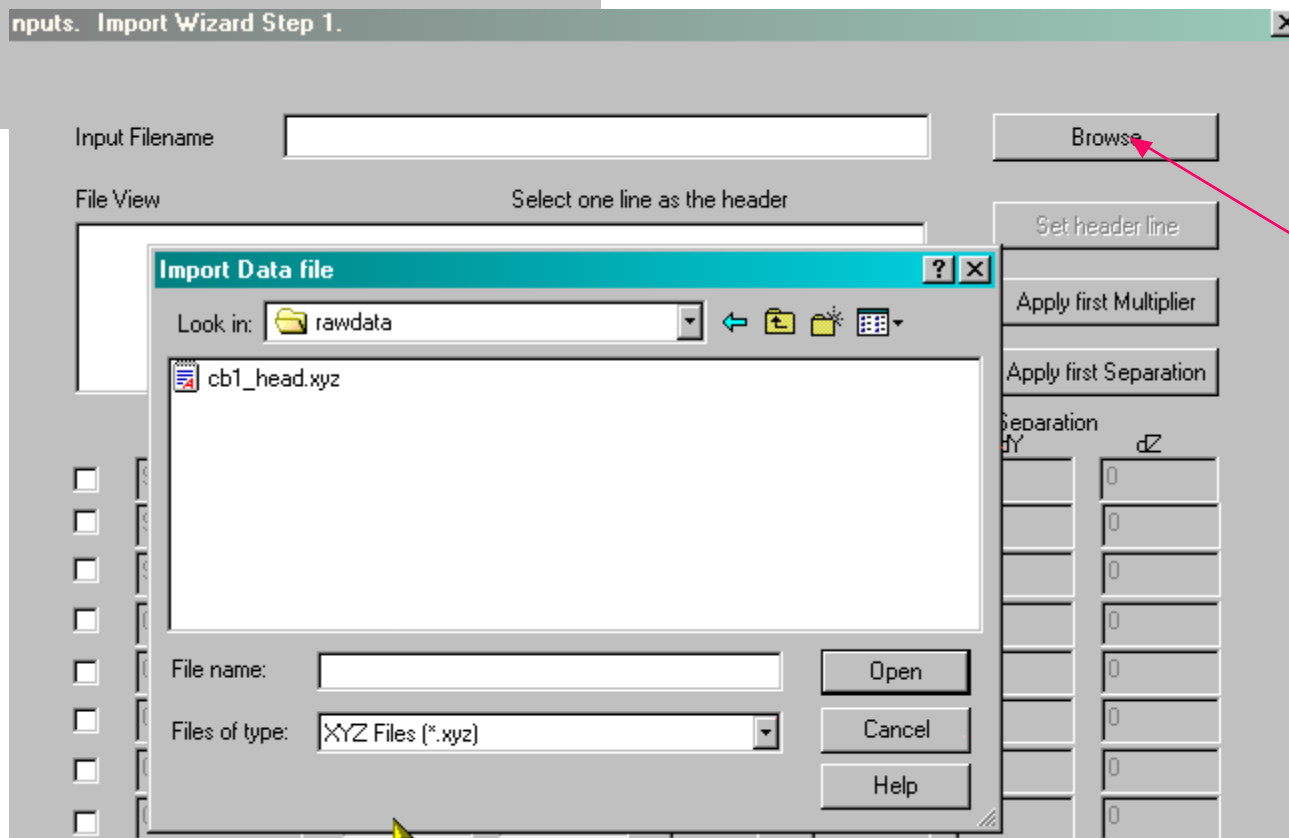
- Following systems and go to the next step.
- ☐ Em34
 - ☐ Em31/Em38
 - ☒ EM31-R
 - ☐ Max-Min
 - ☐ Fugro
 - ☐ AeroQuest
 - ☐ Unknown

EM31-R System Name

Select System

For other systems select Unknown and give it a name

2



Browse
for
XYZ
columnar
datafile

Importing Data - 3

Imports. Import Wizard Step 1.

Input Filename: E:\interp\FDEM_demo_database\rawdata\cb1_head.xyz [Browse]

File View: Select one line as the header

Line	UTM X	UTM Y	CPQ9800S1	CPQ9800S1	CPQ9800S2	CPQ9800S2	CPQ9800S2
LINE1							
553262.654311	4180924.072563	97.750000	15.900000	154.250000	20.4781		
553262.654004	4180924.072665	101.000000	15.880000	159.000000	20.4781		
553262.653462	4180924.072846	94.500000	15.860000	159.250000	20.4781		

[Set header line] [Apply first Multiplier] [Apply first Separation]

	Frequency	Tx - Rx Orientation Tx	Tx - Rx Orientation Rx	Correction Multiplier	dX	Tx - Rx Separation dY	dZ
<input checked="" type="checkbox"/>	9800	Z	Z	1	1	0	0
<input checked="" type="checkbox"/>	9800	Z	Z	1	2	0	0
<input checked="" type="checkbox"/>	9800	Z	Z	1	3.66	0	0
<input type="checkbox"/>				1	0	0	0
<input type="checkbox"/>	0			1	0	0	0

If your file does not contain a Header line with our specific annotation then use 'Set Header line' to set the header. Use the provided example file for assistance.

Importing Data - 3b

outs. Import Wizard Step 1.

Input Filename:

File View: Select one line as the header

Line	UTM X	UTM Y	CPQ9800S1	CPI9800S1	CPQ9800S2	CPI9800S2	CPQ9800S3
LINE1	553262.654311	4180924.072563	97.750000	15.900000	154.250000	20.4781	
	553262.654004	4180924.072665	101.000000	15.880000	159.000000	20.4781	
	553262.653462	4180924.072846	94.500000	15.860000	159.250000	20.4781	

	Frequency	Tx - Rx Orientation Tx	Rx	Correction Multiplier	dX	Tx - Rx Separation dY	dZ
<input checked="" type="checkbox"/>	9800	Z	Z	1	1	0	0
<input checked="" type="checkbox"/>	9800	Z	Z	1	2	0	0
<input checked="" type="checkbox"/>	9800	Z	Z	1	3.66	0	0
<input type="checkbox"/>				1	0	0	0
<input type="checkbox"/>	0			1	0	0	0

Note 1: Dipole orientations may be X,Y, or Z. These are in reference to the ‘Horizontal’ co-ordinate system (Manual). For example, Z-Z is horizontal co-planar and Y-Y or X-X or vertical coplanar. Y is perpendicular to line and X is tangential to the line.

Note 2: Separations may be dX, dY or dZ. dX is along line while dY is across line. For example, a dipole configuration with X-X and a separation of (0,dy,0) is vertical co-planar ‘broadside’.

Importing Data - 4

Format: Import Wizard Step 2

File Header View: Select the suitable line to define data format

LINE1	UTM X	UTM Y	CPQ9800S1	CPI9800S1	CPQ9800S2	CPI9800S2	CPQ9800S3
553262.654311	4180924.072563	97.750000	15.900000	154.250000	20.47800		
553262.654004	4180924.072665	101.000000	15.880000	159.000000	20.47800		
553262.653462	4180924.072846	94.500000	15.860000	159.250000	20.47800		

Profile identification string (case insensitive) is used to indicate the start of a new profile

LINE

Line Label

Location (column#, name)

☒ UTM ☐ Lat/Lon

☒ X 1 UTM_X

☒ Y 2 UTM_Y

Z & GPS Z

☐ Z

dZ: alt -- bird

.45 default

Unit ☒ meter ☐ feet

☐ GPS Z

dZ: instrument --

Fiducial

☒ FID 9 FIDS3

Units (Inphase)

☐ Percent ☒ PPT ☐ PPM

Units (Quadrature)

☐ Percent ☐ PPT ☐ PPM ☒ mS/m

< Back Next > Cancel Help

Check that the import has recognized the columns correctly.

Set the height of the instrument.

Check the data units.

Note:

mS/m is not an actual data unit. The data has been converted by the instrument manufacturer through an approximation to this unit. EMIGMA converts it back to the original data units. You may later display in these approximate units.

Importing Data - 5

Files: Import Wizard Step3:

Profiles and Locations

Profile	# Locations
LINE1	417
LINE2	557
LINE3	606
LINE4	604
LINE5	557
LINE6	531
LINE7	130
LINE8	420
LINE9	616
LINE10	628
LINE11	261
LINE12	202
LINE13	233
LINE14	218

Total Number of Profiles: 14

Total Number of Locations: 5980

Modify Profile

Profile:

Delete every: 2

Shift Values

	Sample Value	Shift Value
X Coordinate	553262.625	-550000
Y Coordinate	4180924	-4100000

Shift Coordinate Values (e.g. for resolution)

Shift X: 0

Shift Y: 0

Average Precision (m)

X: 1

Y: 10

You may choose not to import all profiles or decimate the data.

In addition, if you require sub-metre accuracy in your data positioning you may wish to strip off the leading numbers of the UTM positions

Importing Data - 6

n. Import Wizard Step 3.

System Parameters

Survey Type: Moving Tx -- Moving Rx

Coordinate Systems: Horizontal

Separation Reference Point: Tx

Normalization Type: Continuous

Normalization Divisor: Inphase

Normalization Convention: Percent

Project Name: Give Me a name

Import to the Database

Run Import

Messages:

- ...frequencies...creating...
- ...system.....creating...
- ...components.....creating...
- ...locations.....creating...
- ...data.file.....creating...
- Processing Completed

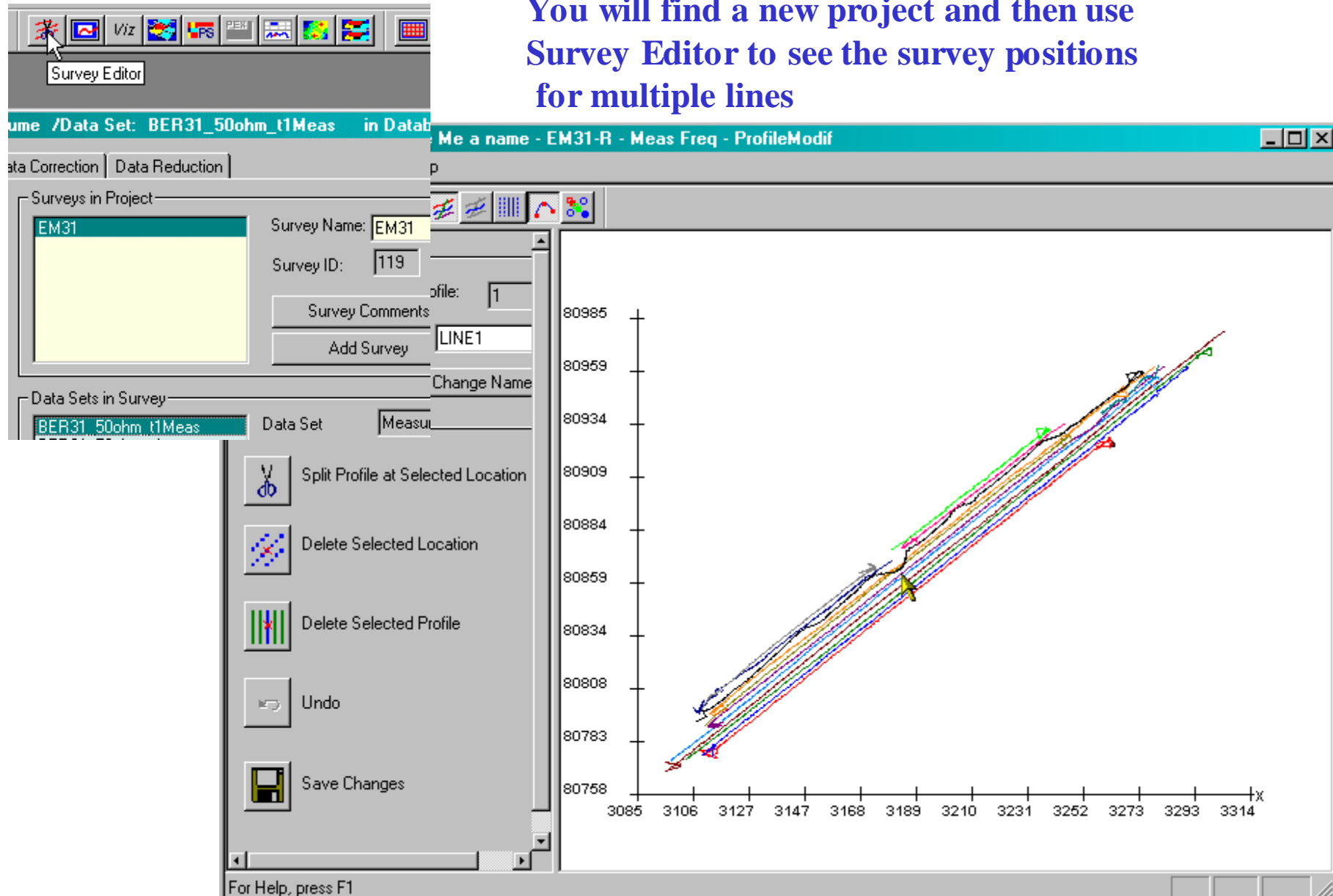
If using an EM31-R, then your data is probably positioned at a common Tx reference point. This is because the data is collected from a common Tx antennae

Note: The centre point of the 3 Rx-Tx data are not the same.

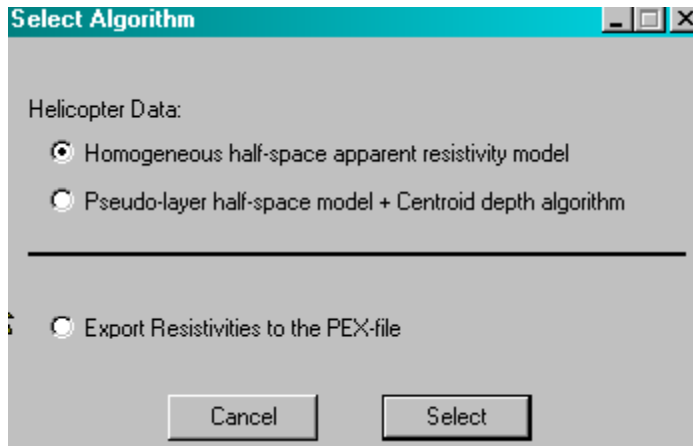
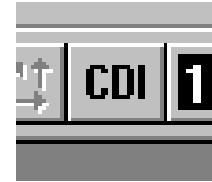
Run Import:

Importing Data - Final

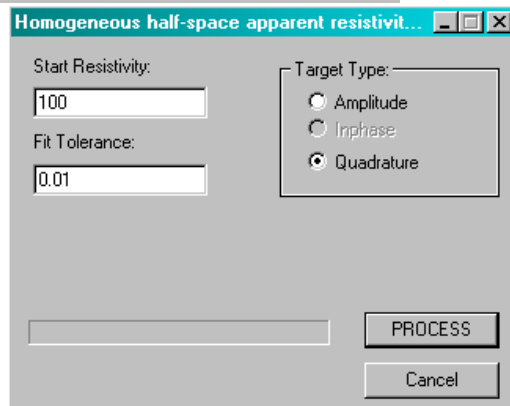
You will find a new project and then use Survey Editor to see the survey positions for multiple lines



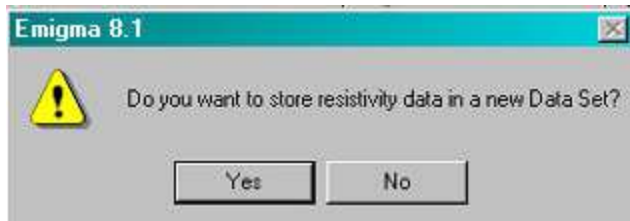
Calculating Apparent Resistivity



Calculate the best fitting half-space app rho for any dipole-dipole frequency EM data airborne or ground

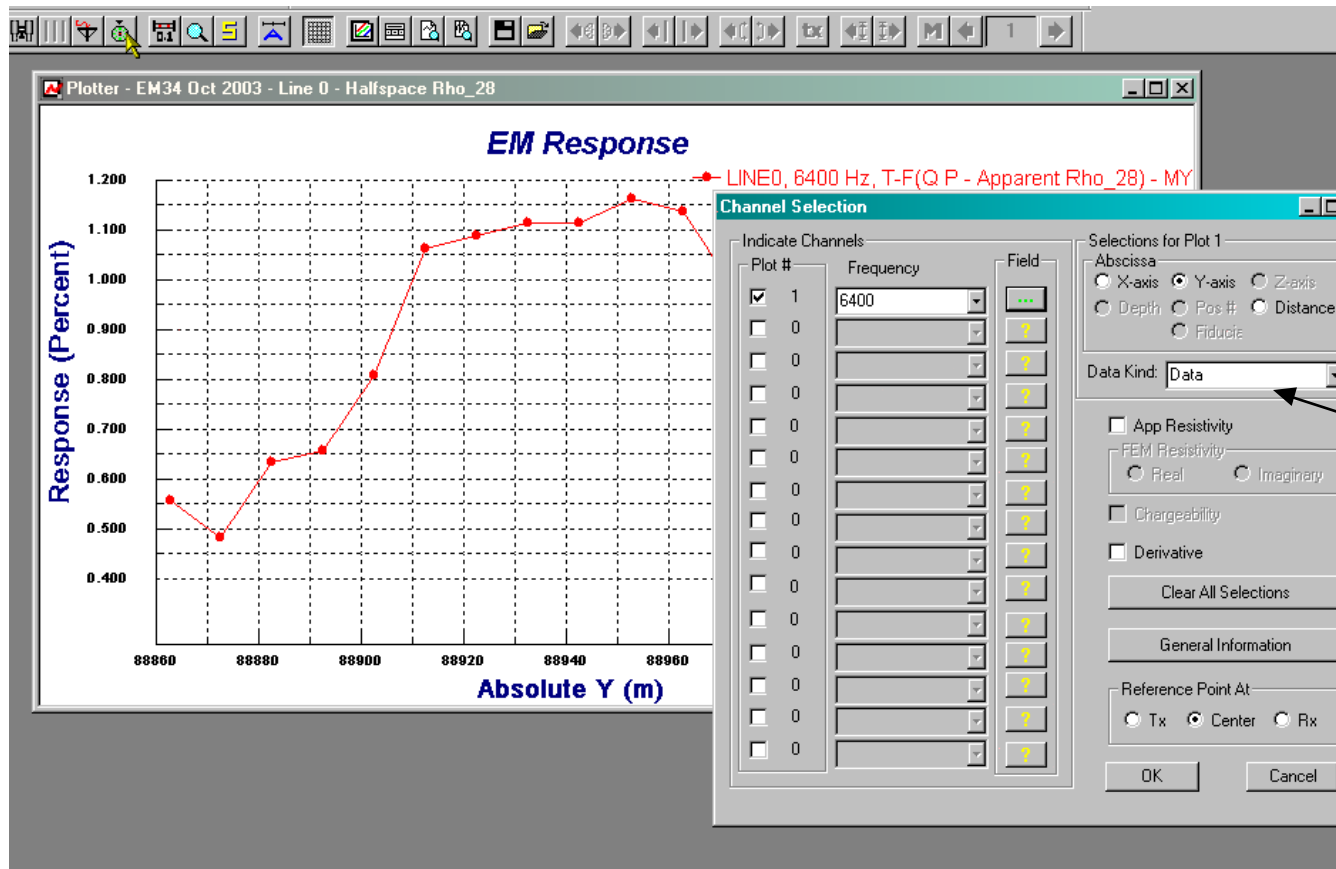


Calculate the best fitting half-space app rho choose which data elements to use e.g. for EM34 then Quadrature is default



Store to new dataset or attach to original data

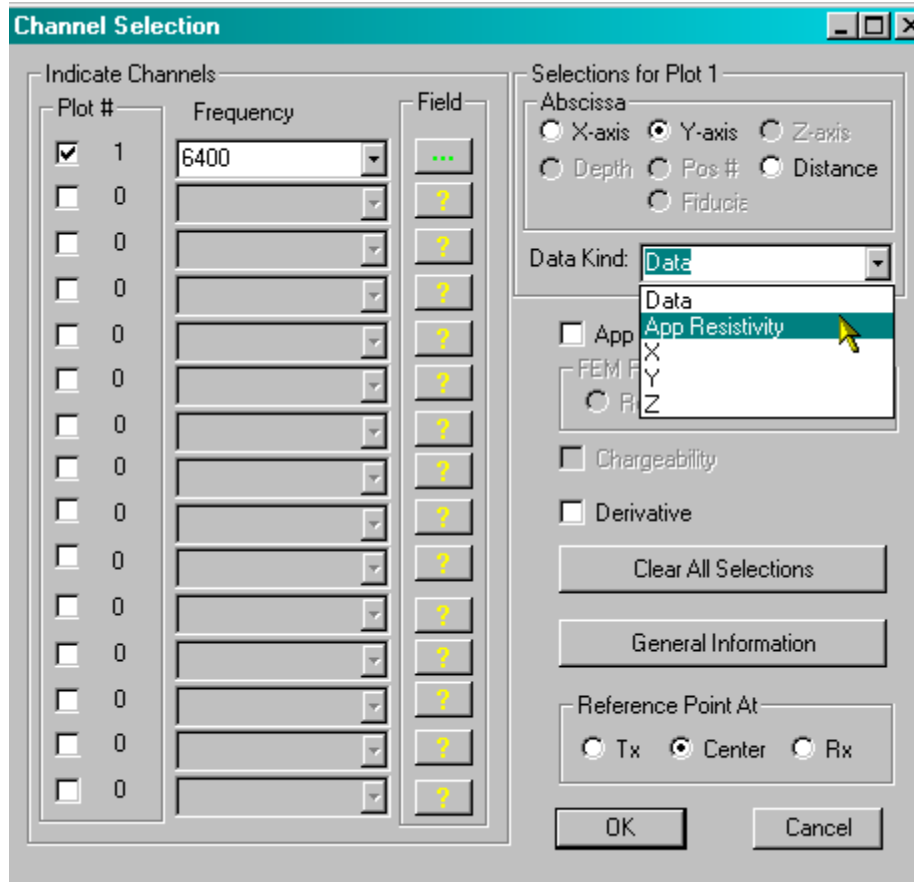
Plotting Data - 1 (V81_tutorial .pdf for more details)



app rho display
converts normalized
data to app rho
through short separation
algebraic formula

For apparent conductivity:
Settings -> Custom -> App Cond

Plotting Data - 2



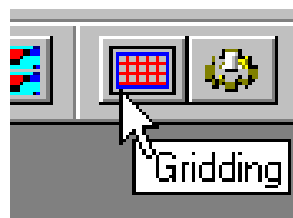
app rho display
use calculated best fit
apparent resistivity

for apparent conductivity
Settings -> Custom -> App Cond

Gridding data - 1

Interpolate to Grid

interpolate to regular grid



3D interpolation ? ?

— Data —

Survey Bounds:

Data Number: Min X: Min Y: Min Z:

Profile Number: Max X: Max Y: Max Z:

Interpolation:

Select Data for Interpolation: ☒ Data ☐ App Resistivity

Select Components for Interpolation: ☒ All Component

Method:

Max Iteration: Resolution factor:

Derivative Information:

☒ Set to zero ☐ Estimate ☐ Use Input

☐ dX ☐ dY ☐ dZ

Grid:

Current Profile:

Y

89187

89039

Select Components

Current Profile: Current Position: X: 8808.983398, Y: 88787.171875

Y axis: Y

Input Bounds

X Min: 8451.98 Y Min: 88722
X Max: 8971.35 Y Max: 89209.9
Angle: 5 Set Angle Reset Grid

Output Grid Information

U Min: -240 V Min: -223.813
U Max: 240 V Max: 223.813
dU: 10 dV: 5.32887
nU: 49 nV: 85

☐ For FFT ☐ Show Grid ☐ Show Proportionally To Input Bounds

Angle: 5 Set Angle
Center X: 8711.67 Set Center
Center Y: 88965.9 Reset Grid

Average distance between locations: 10.6576 Average distance between lines: 48.2187 OK

Set Grid Settings

Gridding data - 2

Interpolate to Grid

View Grids

3D interpolation

Survey Bounds:

Data Number: 279 Min X: 8468.72 Min Y: 88741.6 Min Z: 0.2

Profile Number: 11 Max X: 8954.61 Max Y: 89190.3 Max Z: 0.2

Select Data for Interpolation: Select Components for Interpolation: ☒ All Component

Method: Natural Neighbour

Max Iteration: 0

Resolution factor: 1000

Derivative Information:

☒ Set to zero

☐ Estimate

☐ Use Input

☐ dX ☐ dY ☐ dZ

Grid:

Grid Setting

Load Grid

Z - level: 0.2

☐ Remove Extrapolated Points

Spatial Radius: 36.164

☐ Slow ☒ Fast

☐ Use Split Technique

Cancel INTERPOLATE

Model Name:

☐ Model

☒ Has Related Grid(s)

Grid Information

Grid Data Set(s):

NatNeighbour_29
NatNeighbour_29_30
NatNeighbour_29_31
NatNeighbour_29_32

Data Created: 10/7/2003 11:35:10

Grid Data Set: NatNeighbour_29_32 Change Name

ID: 32 Delete Grid

Related to:

Project: EM34 Oct 2003

Survey: EM34

Data Set: Meas Freq_22

Data Set: Measured

Domain Type: Frequency

Grid Data Set Information:

Orthogonal local dimensions:

	Min	Max	N ptn	delta
U	-240.0000...	240.0000000	97	5.0000000
V	-222.5000...	222.5000000	90	5.0000000
Z	0.2000000	0.2000000	1	0.0000000

Data Type: Data App Resistivity

Statistics

Centroid of Grid:

X: 8711.67

Y: 88965.9

Z: 0.2

Counterclockwise orientation of local U-axis w.r.t. to global X-vector (degree): 0

Components:

1. Tx - Dipole My
Rx - Dipole Hy
Sep - 10.00 0.00 0.00
2. Tx - Dipole Mz
Rx - Dipole Hz
Sep - 10.00 0.00 0.00
3. Tx - Dipole My
Rx - Dipole Hy
Sep - 20.00 0.00 0.00
4. Tx - Dipole Mz
Rx - Dipole Hz
Sep - 20.00 0.00 0.00

#	Frequencies
1	6400.000
2	1600.000

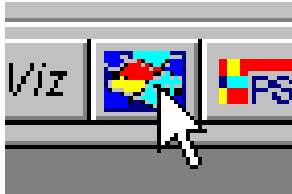
Export to Profile Data Set Export to Geosoft (.grid) Export to xyz-file

Remove Extrapolated Points Difference of grids

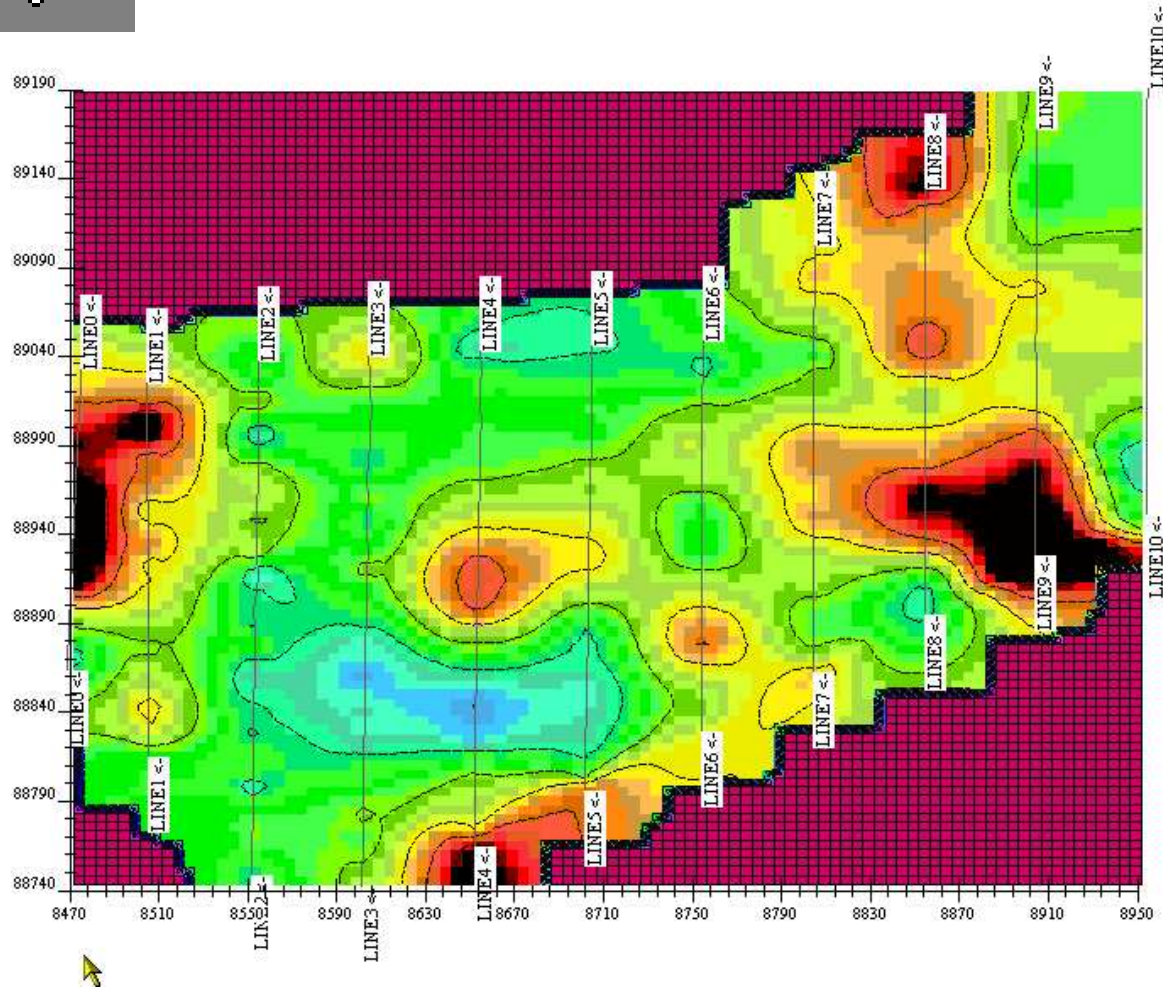
Exit Help

View Grid Characteristics

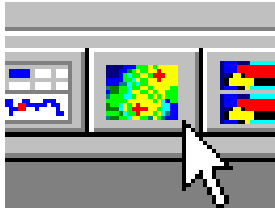
Viewing Gridded Data - 1



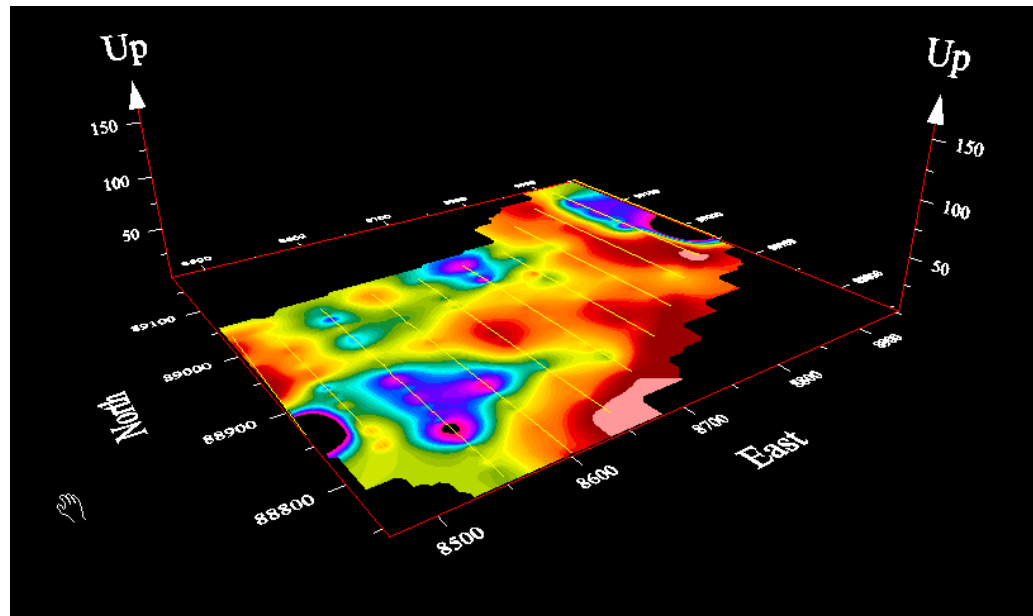
Grid Presentation



Viewing Gridded Data - 2



Contour



1D FEM Inversion - 1

INVERSION. Style and Data Selection

Inversion Technique

☐ L1 - Linear Regression ☐ Standard Least Square Occam

☐ Marquardt - Least Square ☒ Enhanced Conjugate Gradient Occam with Susceptibility Extension

☐ Use old method

Forward Method

☐ Old ☒ New ☐ Emigma

Frequencies

1	9800.000
---	----------

Components & Separations

1	Rx-Hz	Tx-Mz	3.66	0.00	0.00
---	-------	-------	------	------	------

Profiles and Locations

☒ Batch Mode Checked --> Run the 1-D inversion for a series of profiles and locations.
Unchecked --> Only the data at a single location will be inverted.

Profiles

4	LINE115
5	LINE120
6	LINE125
7	LINE130
8	LINE135
9	LINE140
10	LINE145
11	LINE150
12	LINE155

Locations

Profile 9: LINE140

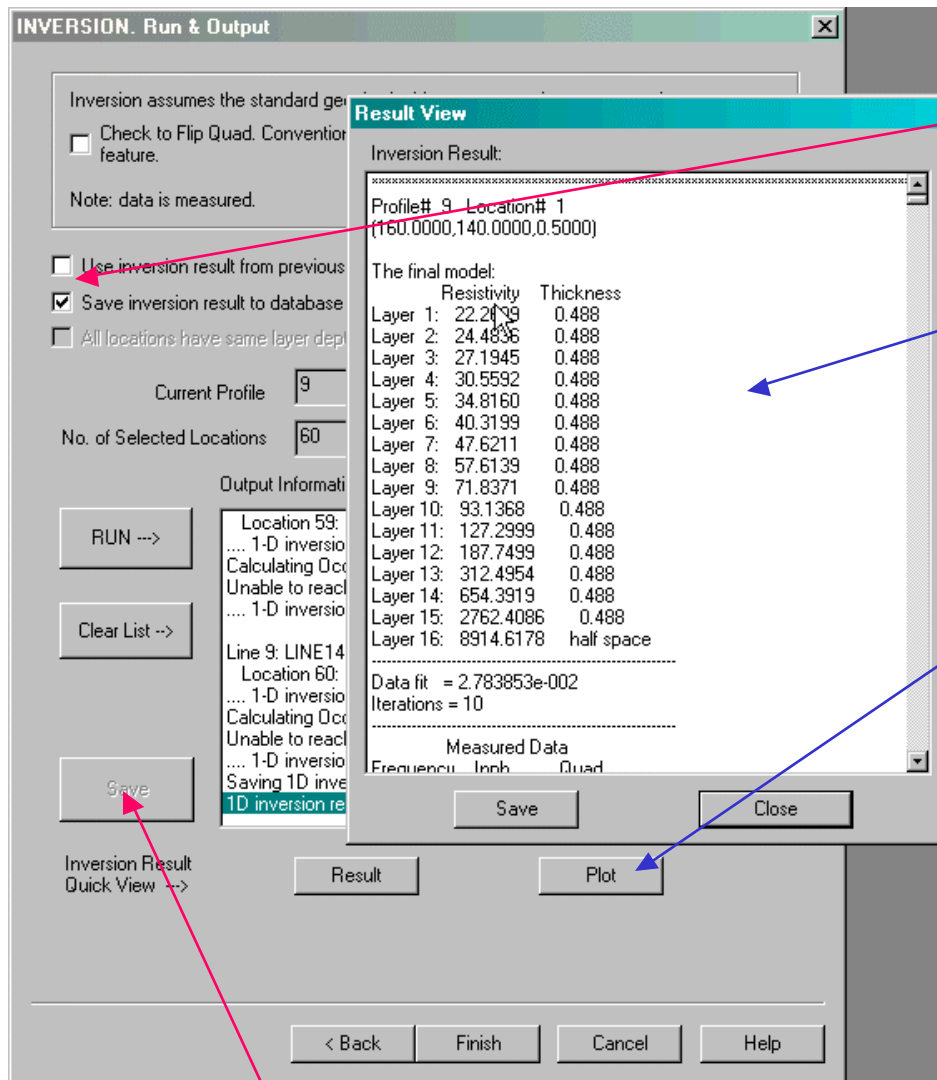
1	160.0	140.0	0.5
2	159.0	140.0	0.5
3	158.0	140.0	0.5
4	157.0	140.0	0.5
5	156.0	140.0	0.5
6	155.0	140.0	0.5
7	154.0	140.0	0.5
8	153.0	140.0	0.5

Optimized conjugate-gradient or Occam, Linear Regression and Marquardt

data points for selected profile

Invert single profile or All profiles

1D FEM Inversion - 2



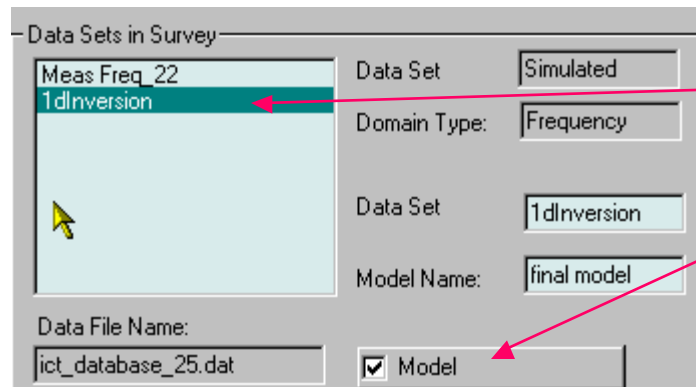
automatic save to database

contents of *.mod file
point by point information

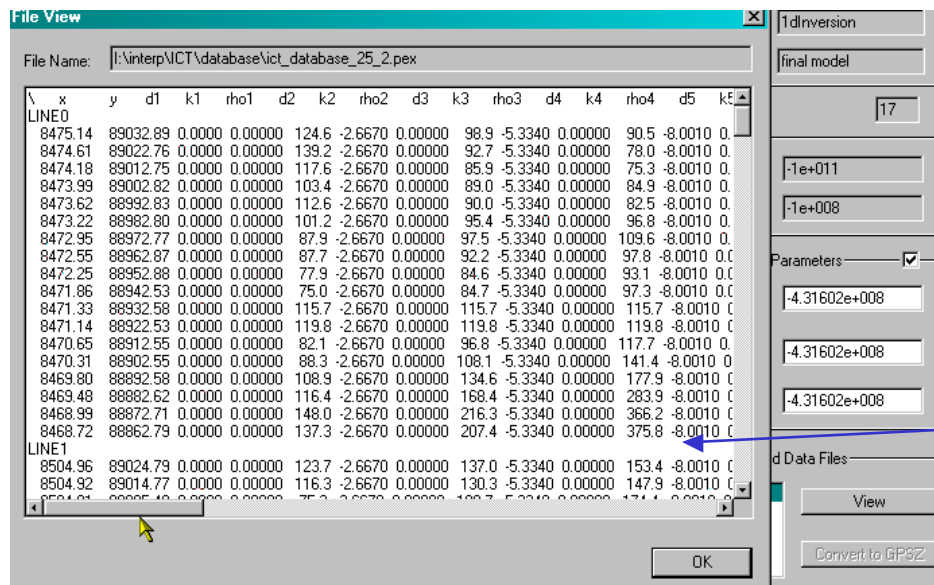
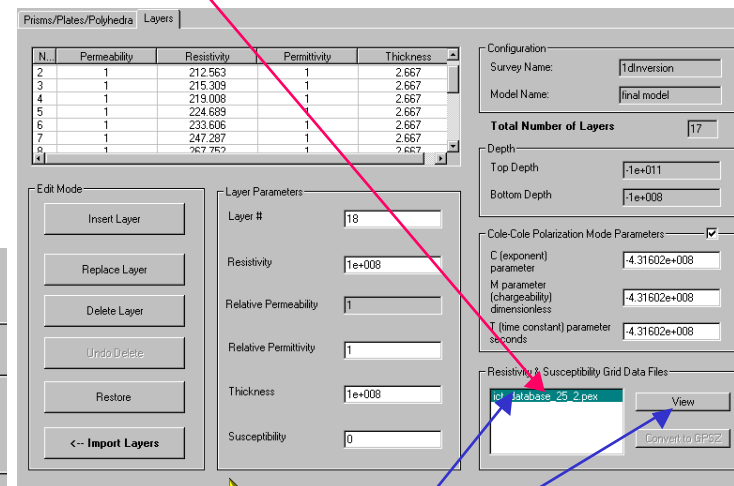
Single line depth contour
available only for single line
inversions

Save to database
after completion

1D FEM Inversion - 3

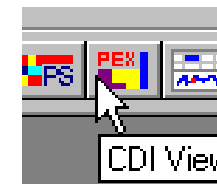


inversion results saved to database
contains synthetic data under the model
with the model attached – (*.pex)



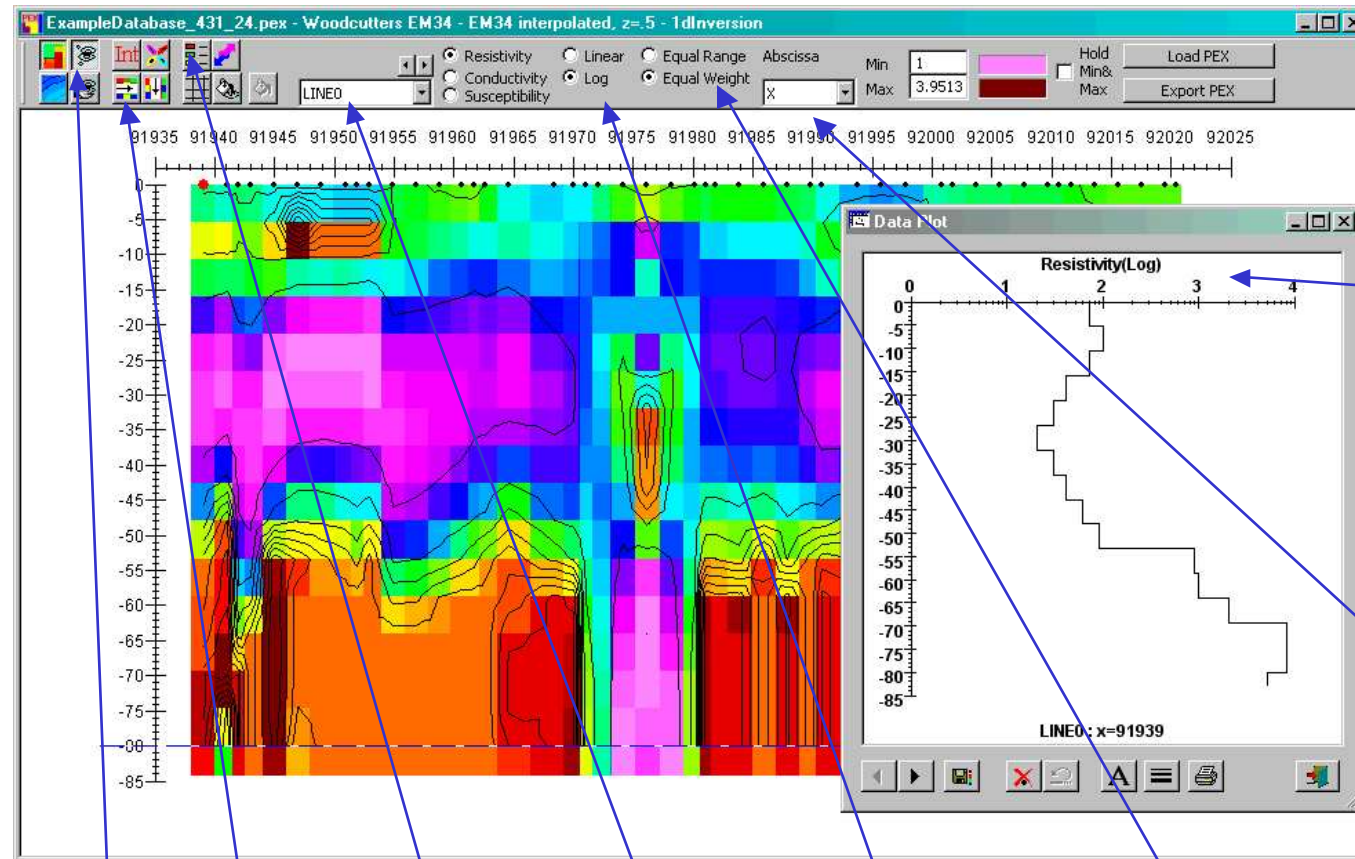
The *.pex file is a columnar ASCII file
inside your database directory

Use CDI Viewer for viewing models



1D FEM Inversion - 4

CDI Viewer



Plot of
Resistivity vs.
Depth for
single point

Horizontal Axis
selection

Apply
Contour

Legend

2D Interpolation

Select Line

Model
Units

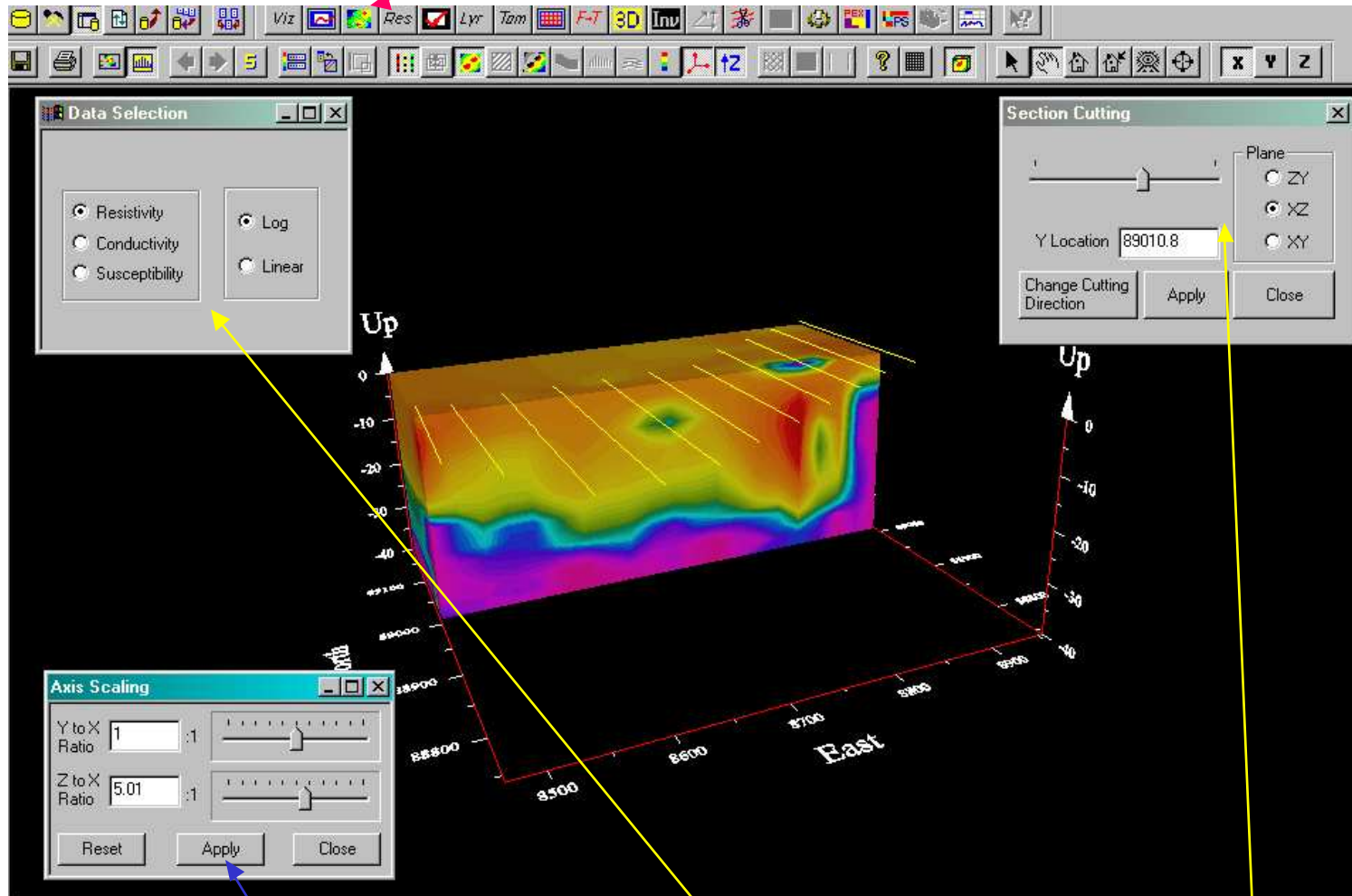
Colour Distribution

Equal Range – intervals equal

Equal Weight – distribution equal

1D FEM Inversion - 5

3D Volume Contour
(with Inversion model
dataset selected)



Axis Scaling

Model Units

Section Cutting