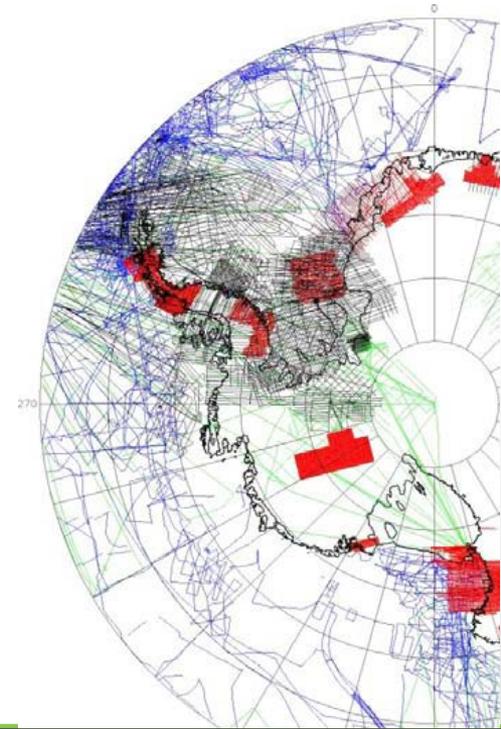


Processing & Interpretation of Marine UXO Surveys

Nigel Halsall – Geosoft Solutions Consultant



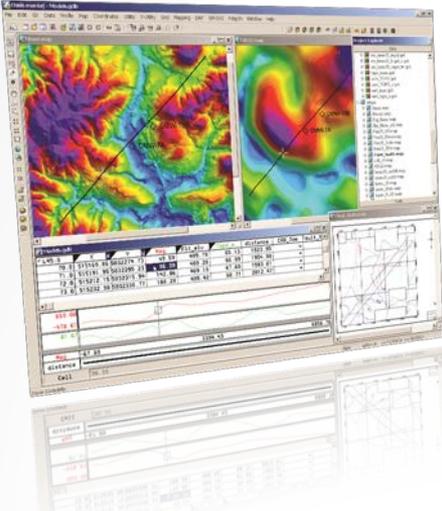
Geosoft Offices



Our customers:

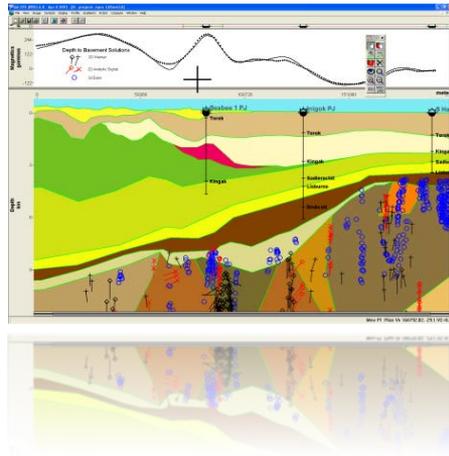
- Mineral exploration
- Oil and gas
- UXO
- Environmental, others
- 5000+ clients
- 250+ UXO clients

Wide range of gravity and magnetic mapping, modelling and interpretation solutions.



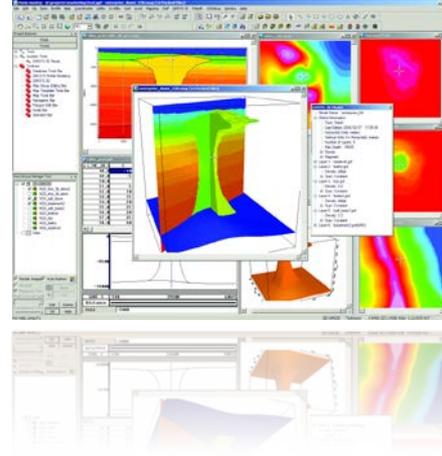
 **GEOSOFT**
Oasis montaj

Gravity and magnetic
mapping and processing



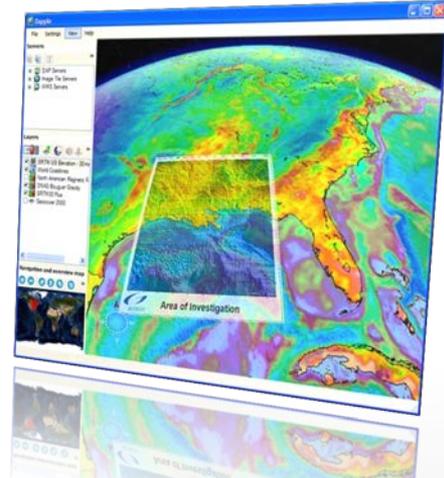
 **GEOSOFT**
GM-SYS Profile

Modelling and
interpretation



 **GEOSOFT**
GM-SYS 3D

3D modeling and
interpretation

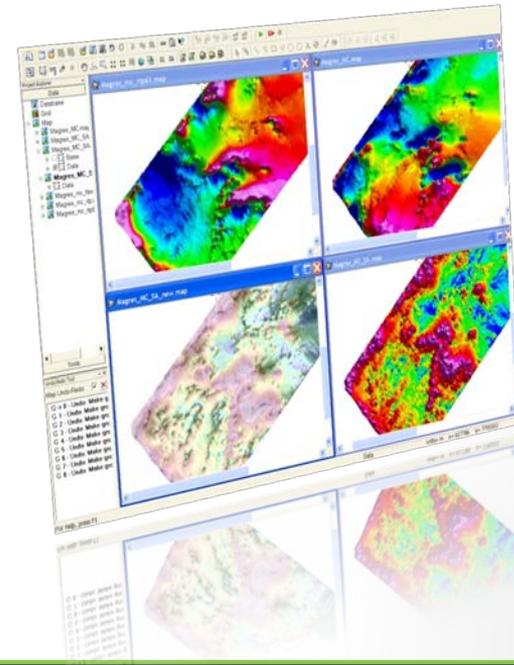


 **GEOSOFT**
DAP

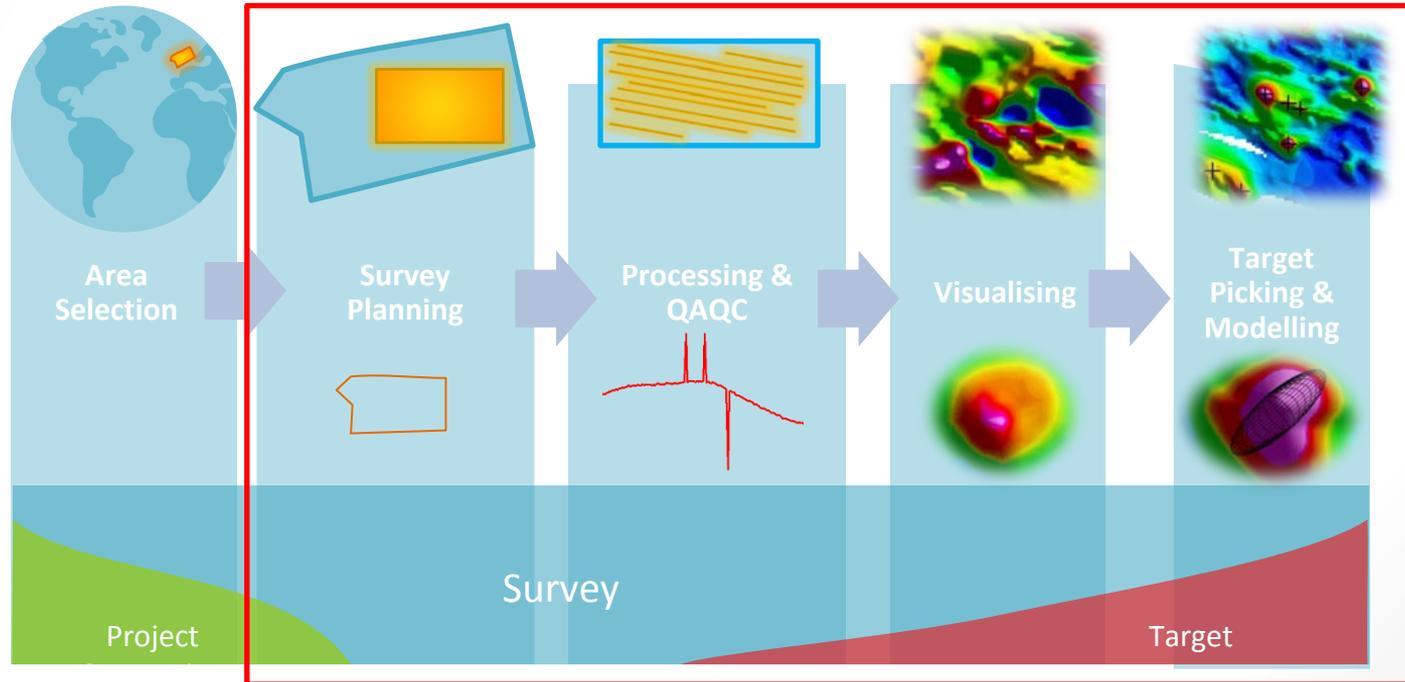
Data management

Agenda

- Geosoft Software
- Processing Marine Magnetic Data in Geosoft
- Planning Challenges
- Data Processing Challenges
- Target Picking Challenges
- Depth Estimations & Modelling



Processing Marine Magnetic Data in Geosoft

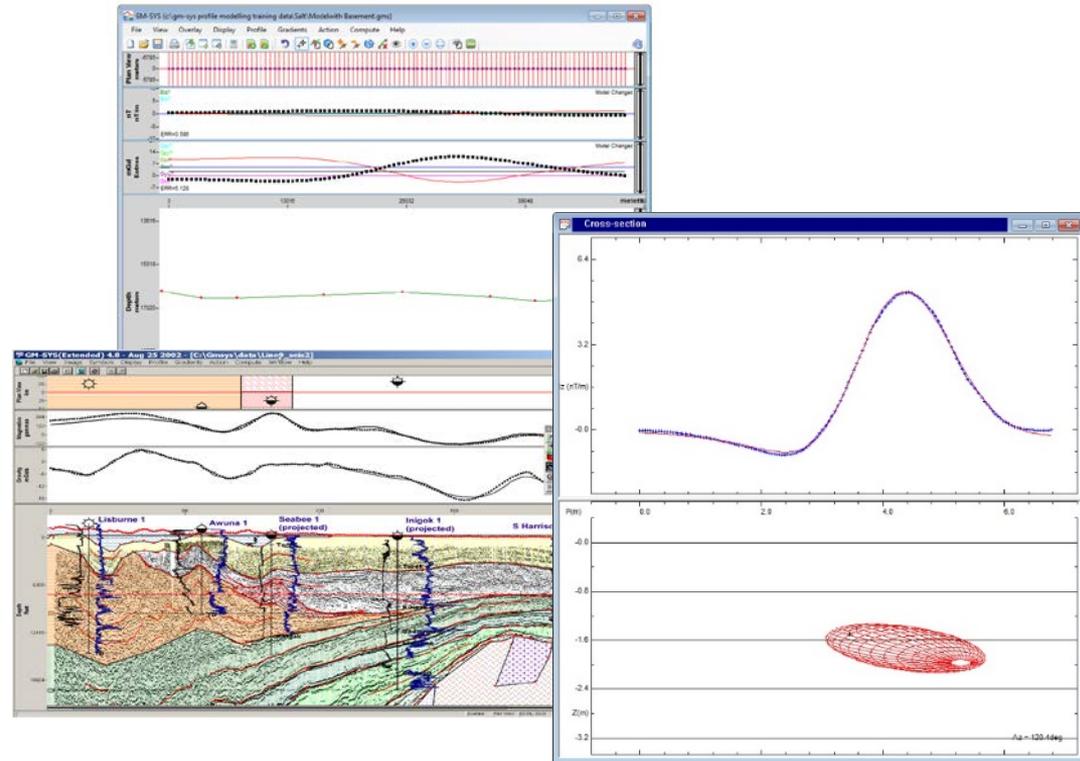


The exploration process starts with a large area and with each step we add new information, helping identify potential target locations.

Planning Challenges

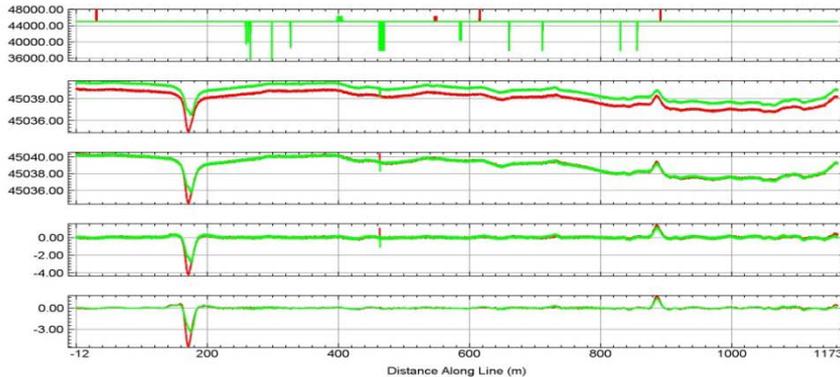
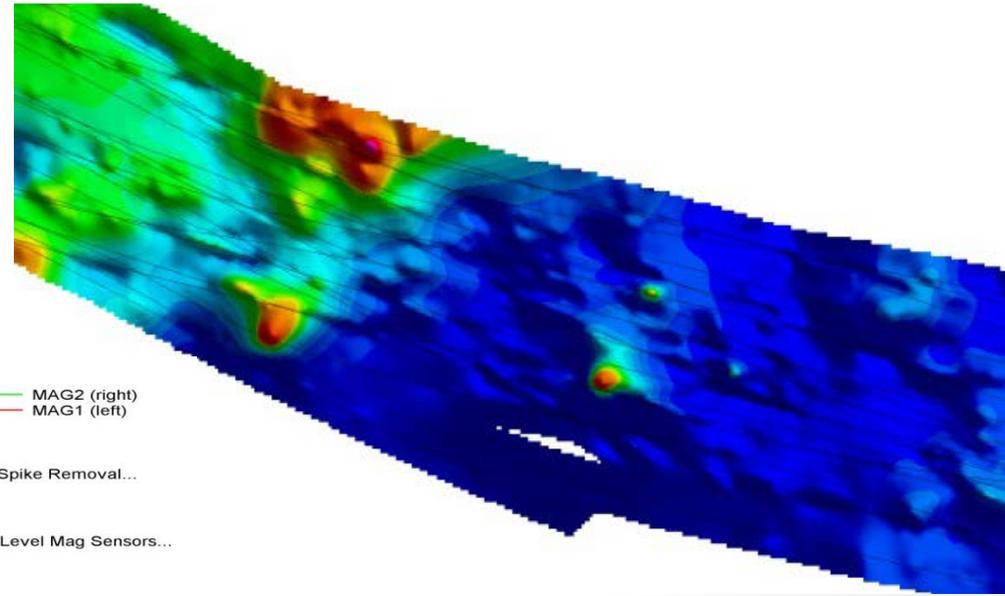
Q) Is my survey design optimal?
Q) What am I looking for?

- Forward Modelling
- PotentQ
 - Ellipsoid Target
- GM-SYS
 - Layered Model Building, 2D & 3D



Processing Challenges

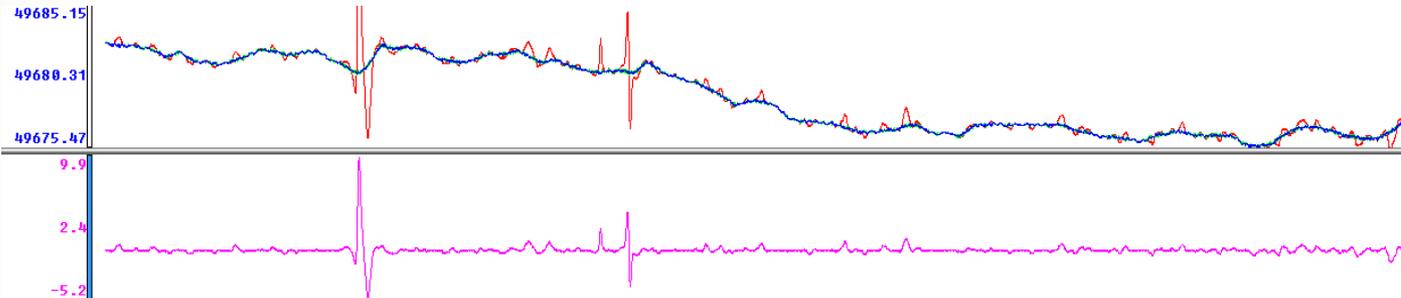
- How can I correct my navigation...
- I have unwanted noise spikes...
- How can I compare multiple sensors...
- My survey has a noisy Background...
 - Geology, Structures, Utilities
- Sensor altitudes influence my magnetics...



- MAG2 (right)
- MAG1 (left)
- Spike Removal...
- Level Mag Sensors...
- Background Removal
- Altitude Corrections...

Background Removal

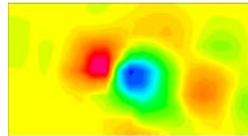
- Diurnal Drift, Geology & Heading
 - Removed as part of background
- Instrument Latency, Lag, Path and Sensor Corrections
 - optional steps if corrections have not applied during survey



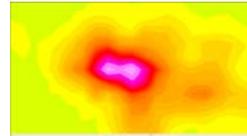
- ❖ High Pass
- ❖ Low Pass
- ❖ Band Pass
- ❖ Non-Linear
- ❖ Convolution
- ❖ Rolling Statistics
- ❖ Polynomial
- ❖ B-Spline

Analytical Signal

With anomaly complexities to consider, shape, orientation, magnetization.
We can simplify a complex signal using Analytical Signal



Total Field



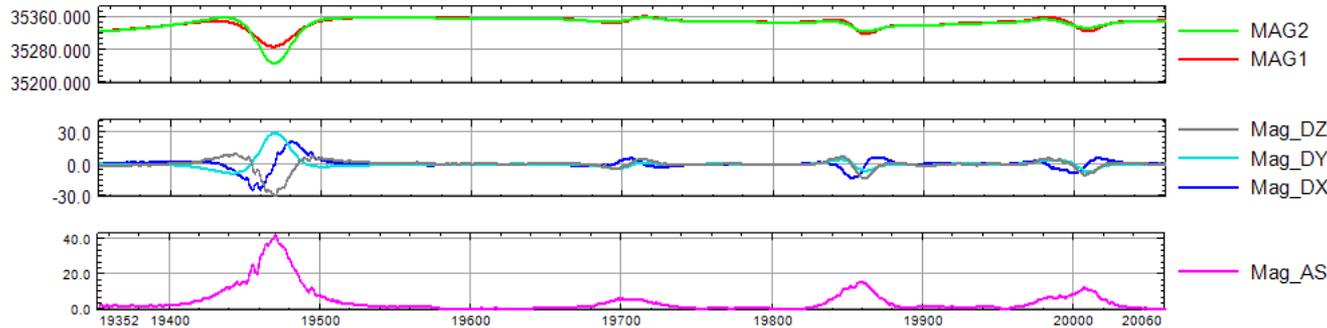
Analytical Signal

$$|\mathbf{A}(x, y)| = \sqrt{\left(\frac{dT}{dx}\right)^2 + \left(\frac{dT}{dy}\right)^2 + \left(\frac{dT}{dz}\right)^2}$$

where:

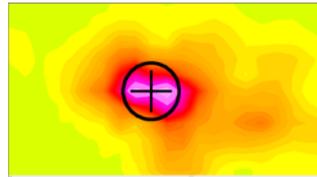
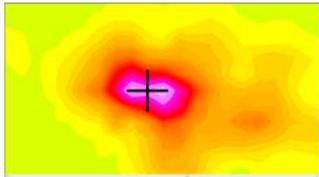
$\mathbf{A}(x, y)$ is the amplitude of the analytic signal at (x, y)

\mathbf{T} is the observed magnetic field at (x, y)

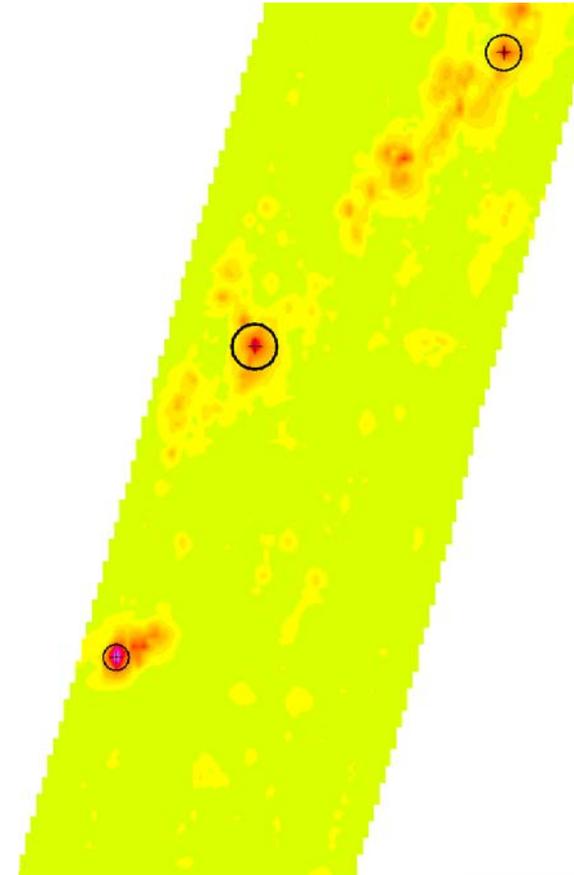


Automated Target Picking

- Blakely
- Magnetic Sizes
 - Inflection Points

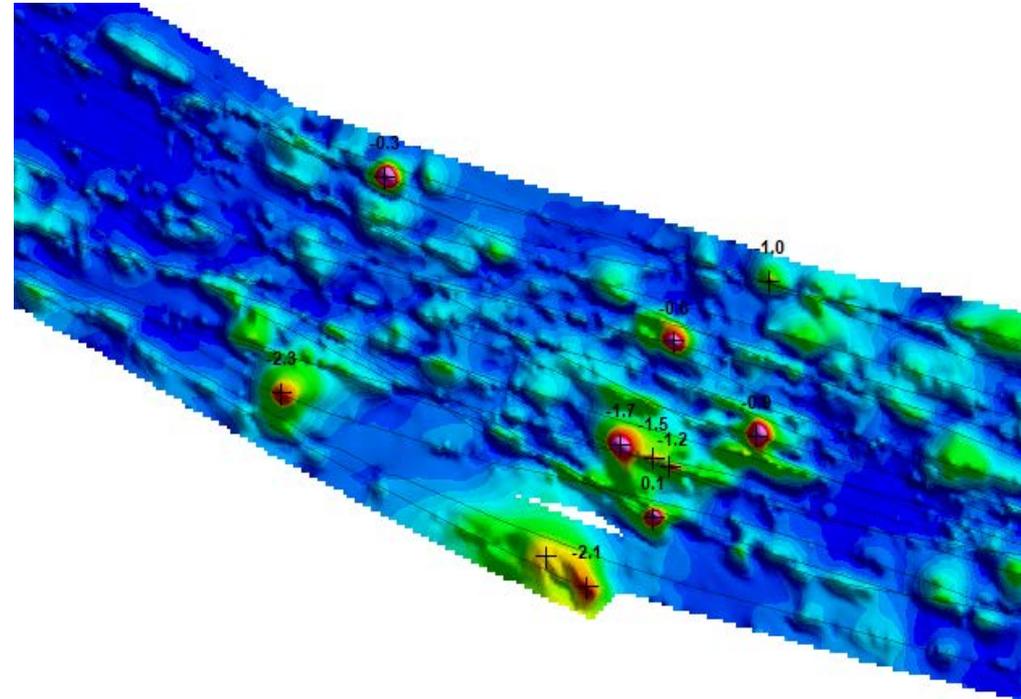
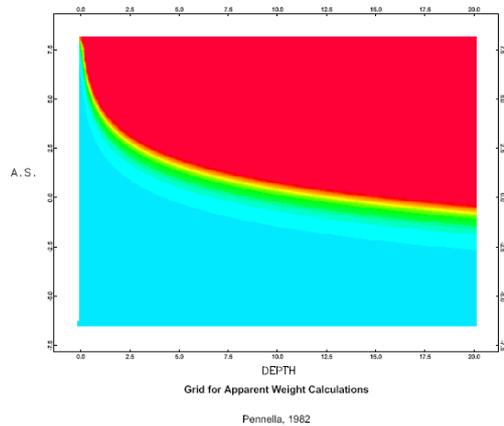


- Database Profile Picking
 - Amplitudes & Anomaly Half-Widths



Depths – Euler Deconvolution

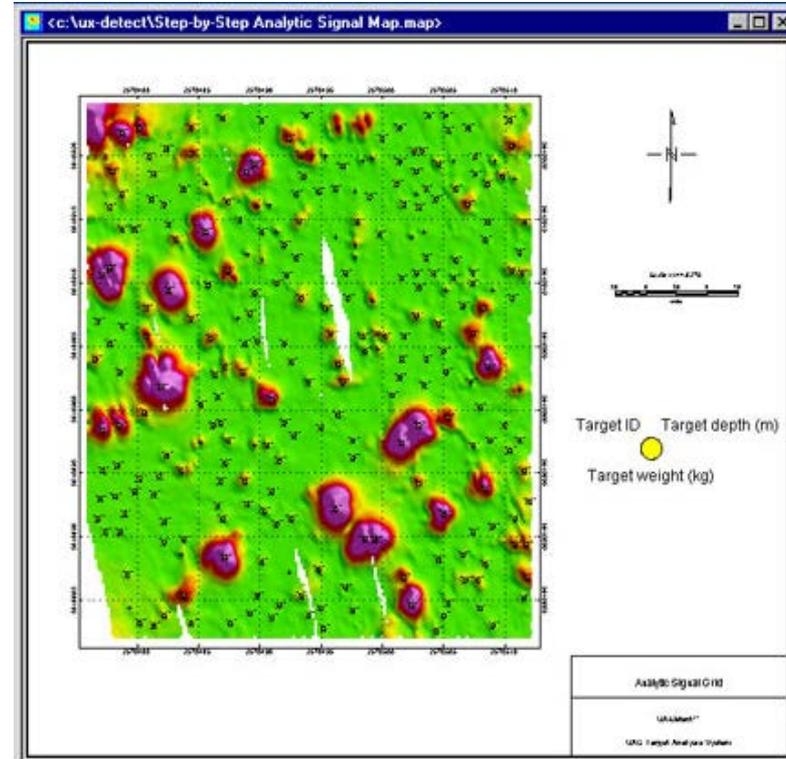
- Use Euler Deconvolution to Calculate Target Depths
- Calculating Weights using Depths
- Panella, 1982 Converted to UXOKG.grd



Targets Analysis

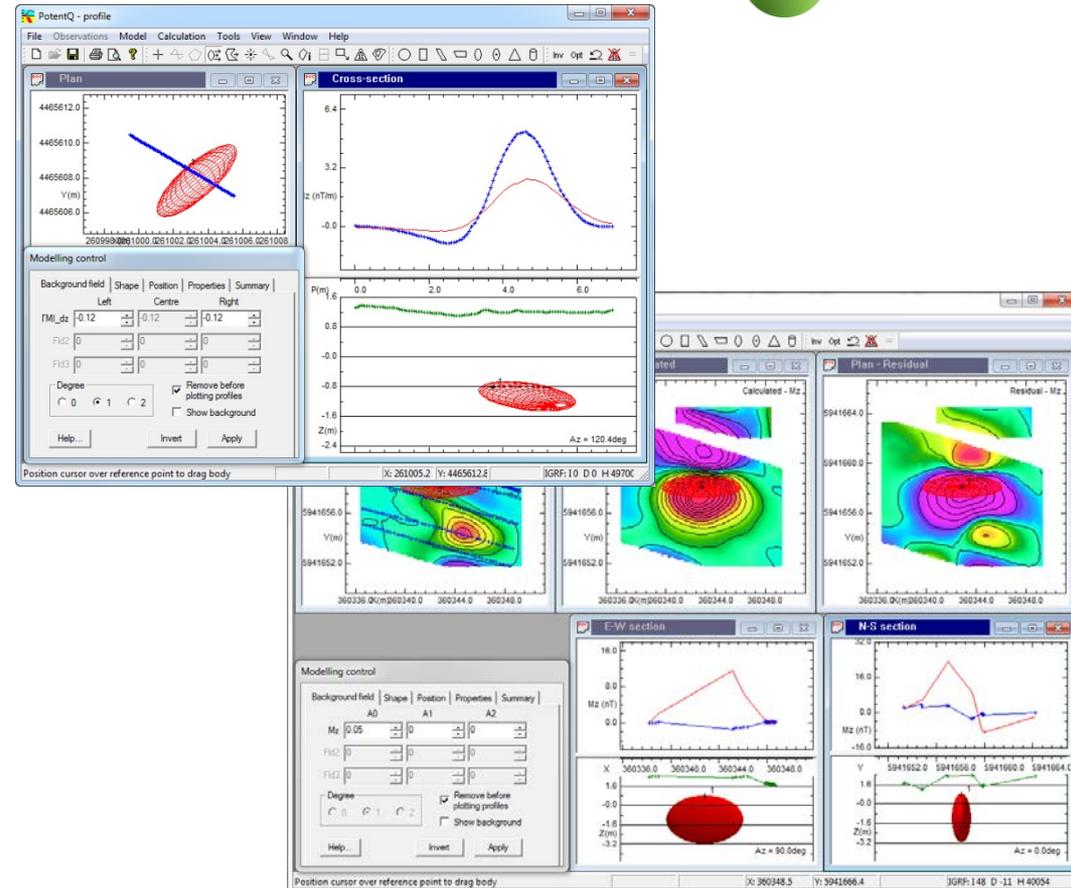
How do I manage my picked targets?

- Refine Lists
- Add Additional Data
 - Utilities (import dxfs)
 - Sidescan (geotiffs/grids)
- Additional Modelling
- Depth Error from Euler



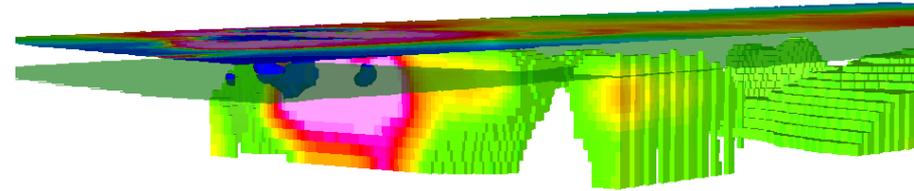
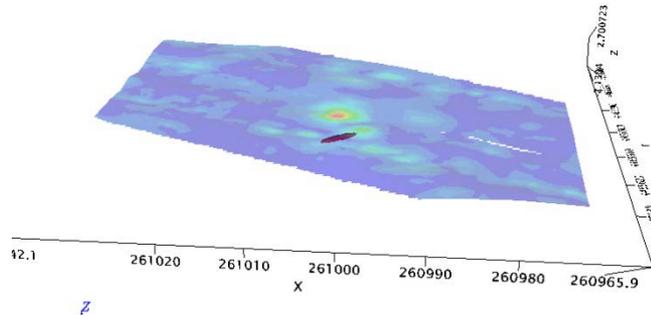
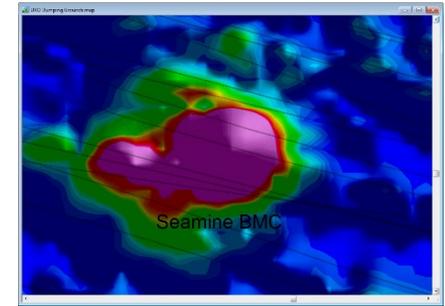
Modelling Tools

- PotentQ
 - Rapid semi-automatic modelling
 - Forward and Inverse
 - Multiple Datasets
 - Interactive Control



VOXI Inversion Modelling

- 3D Inversion
- Magnetics, Gravity, & EM
- Outputs 3D Voxels of Susceptibility
- Introduce Constraints
- Shipwrecks?



Thank you

We love to hear from our customers, so if you have any questions, e-mail us at explore@geosoft.com or visit www.geosoft.com.

