GEOSOFT

Oasis montaj Best Practice Guide

VOXI Earth Modelling - Preparing Data for Inversion

Support
For obtaining technical support, email support@geosoft.com

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Preparing Data for Inversion

Introduction

In order to predict the property of a sub-surface structure, a good place to start is with a map of the observed data.

- A close inspection of the data will help identify an *Area of Interest* (AOI) for further investigation.
- To properly handle the vertical positioning of the sub-surface structure, the vertical relief of the AOI should also be supplied.
  - The vertical relief is commonly referred to as *Digital Elevation Model* (DEM).

DEMs can be downloaded from a variety of free sources, such as SRTM, USGS, GSC, etc. The Oasis montaj tool, **Seeker**, downloads SRTM data that matches the coverage of an existing Geosoft data file.

Geophysical inversions are applied towards the latter part of an interpretation project. By that stage, all effects due to sources other than the actual geology should have been eliminated as much as possible.

- For VOXI, the profile data must be lag corrected and the temporal and instrument effects filtered.
- In the case of gravity data, the data reductions must be applied, while in the case of magnetic data, the IGRF/DGRF must be removed.

The inversion process resolves the variation of the sub-surface, thus it is the residual field that should be subjected to inversion.

⚠️ *Tie-line levelling alters the amplitude of the data without accordingly adjusting the elevation. As a result, although the gridded data will look better, the integrity of the observed data is altered. If you intend to use tie-line levelled data, you are cautioned to do so with due consideration.*

Data Preparation

Observed Data

- Import the observed data into a Geosoft database (GDB).
- If the temporal (lag/IGRF), instrument (drift, noise, aircraft systematic noise), and positioning offset (relative location of GPS and sensor) data corrections have not been applied, proceed to do so.

  ⚠️ *Data corrections intend to eliminate effects due to all sources other than geology.*

Figure 1: Geosoft Database containing x,y,z and sensor information

❯ The resulting database should contain the survey path positioning information along with the residual field (mag or gravity).

❯ The x and y data channels must be on a standard projection coordinate system. If the database does not have a projection assigned to, at this stage proceed to do so.

❯ The elevation must be on the same datum as the database coordinate system.
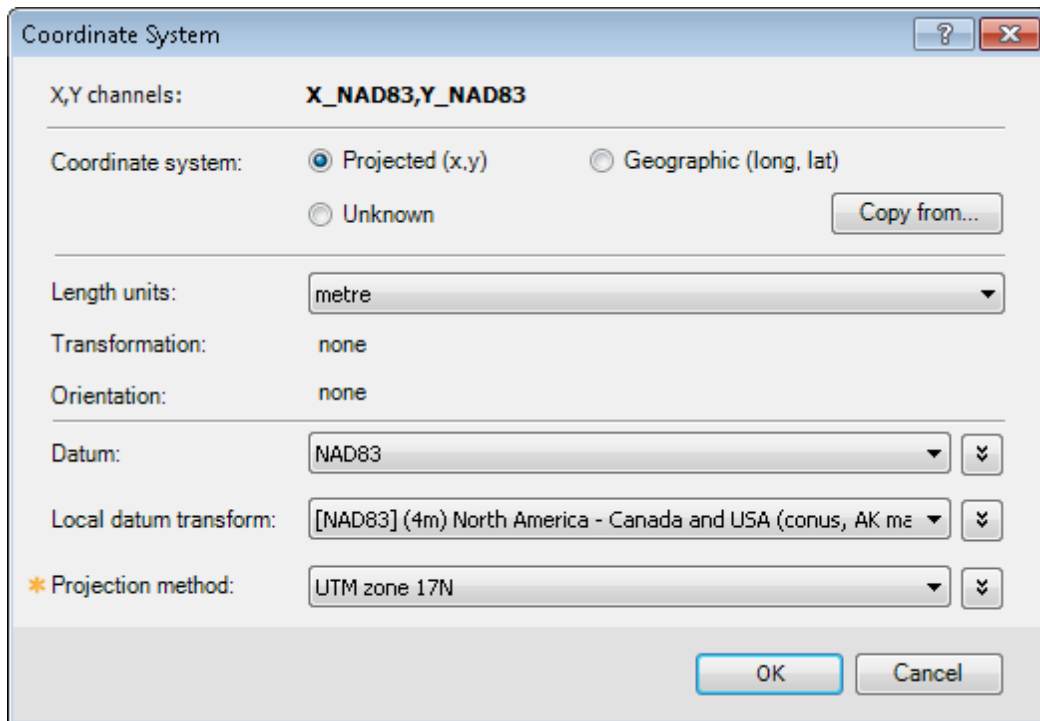
Figure 2: The Geosoft Database must have a projected coordinate system

Area of Interest (AOI)

❯ The polygon delimiting the area of interest should be supplied in the Geosoft polygon format (PLY).

❯ If you do not have a polygon, create a map of your survey data in Oasis montaj; then draw a polygon around the area of interest.

⚠ *By producing the polygon from a map that has acquired the projection of the data, you make sure that the polygon has an associated projection. This point, although not required, is preferred.*

⚠ *You also have the option to create the polygon in the VOXI interface, however it may be more convenient to generate the AOI polygon while preparing the data.*
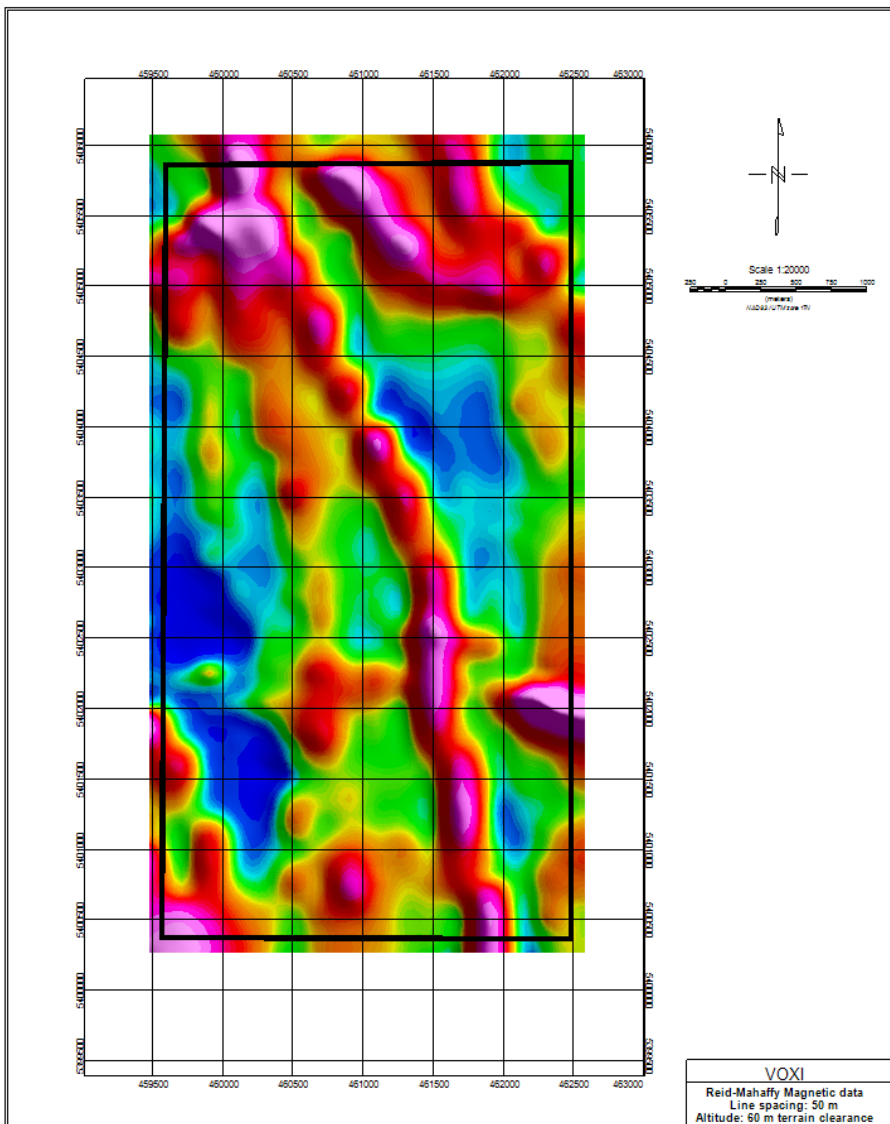
Figure 3: Using a map of the area, draw and save the AOI in the Geosoft polygon format.

Digital Elevation Model (DEM)

The survey database can sometimes contain the terrain information. If so, grid the terrain elevation at an appropriate resolution, such as 1/4th of the survey line spacing. Otherwise, download the elevation information from one of the sources available to you.

❯   The digital elevation grid (DEM) must be in a projected coordinate system. You can verify if it has a projection by looking at the grid properties. If the DEM is not projected, proceed to assign the proper projection.

⚠   *If the DEM projection is different from that of the observed database, it will be re-projected within VOXI.*
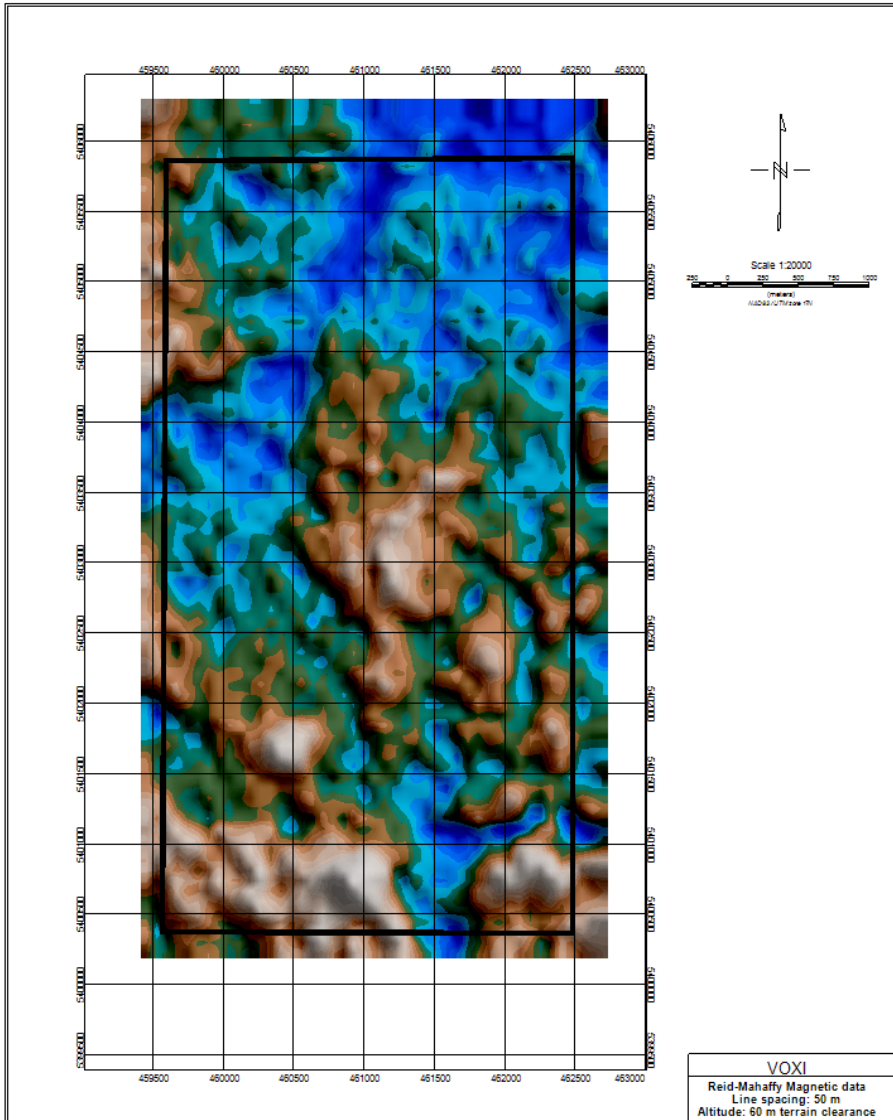
Figure 4: SRTM grid of the AOI downloaded using the Geosoft Seeker tool.

Your input data for VOXI is now ready to perform an inversion.