QCTool

QCTool is a software package for data quality control, processing and mapping prior to interpretation. Having been conceived as a preprocessing stage of **EMIGMA**$^{©}$, our geophysical modeling and interpretation platform, it has turned into a universal tool that can be used practically in any field where data analyses and handling are involved.

The standard license of QCTool offers import and export capabilities, time and date channels, an extended spreadsheet, plotting and mapping functionalities. It also includes more advanced data processing tools, such as merging and appending files, data filtering, and interpolation as well as specific processing for different types of data. The evaluation version can be downloaded from our website www.qctool.ca and is valid for 7 days of use.

QCTool can be run on Windows Vista, Windows 7, 8, 10 and 11 and is entirely a Windows-style program.

The fundamental design of QCTool is a many leveled spreadsheet but all spreadsheets are linked in this application. In a given file, all spreadsheets have the same channels and formats. The purpose of the multiple spreadsheets is to separate data when convenient. For example, it is common to keep data from different profiles, transects or boreholes in a different spreadsheet within the same file.

The following is a brief outline of some of its capabilities.

Basic Functionalities

Data Import. QCTool permits import of data sets no matter what their size is. At this time we offer the following list of formats for data import. But, we are routinely adding formats and if you require a different format please let us know.

The import formats for data include:

ASCII and binary XYZ formats
Excel .csv
Scintrex CG3, CG5, Envi, Envi Pro, Envi Cs/Navmag, IPR12
Micro-g Lacoste Air-Sea
Geometrics 858/859 , 856 and 882
Stratagem impedance files
Zonge .avg both new and legacy and ZEN files
GEM ascii formats
SeaSPY
Geonics EM31, EM34, EM38 and PROTEM files (*.gx7)
GDD IP
Garmin .gdb
EDI formats for Impedance or Spectra
IRIS VLF
USF formats
SEGY format
SmarTEM .raw and .stk formats
.LAS logging formats
ArcGIS FLT format
Geosoft .grd , .gdb and .gbn files
Surpac STR files
GPX and GXF exchange files
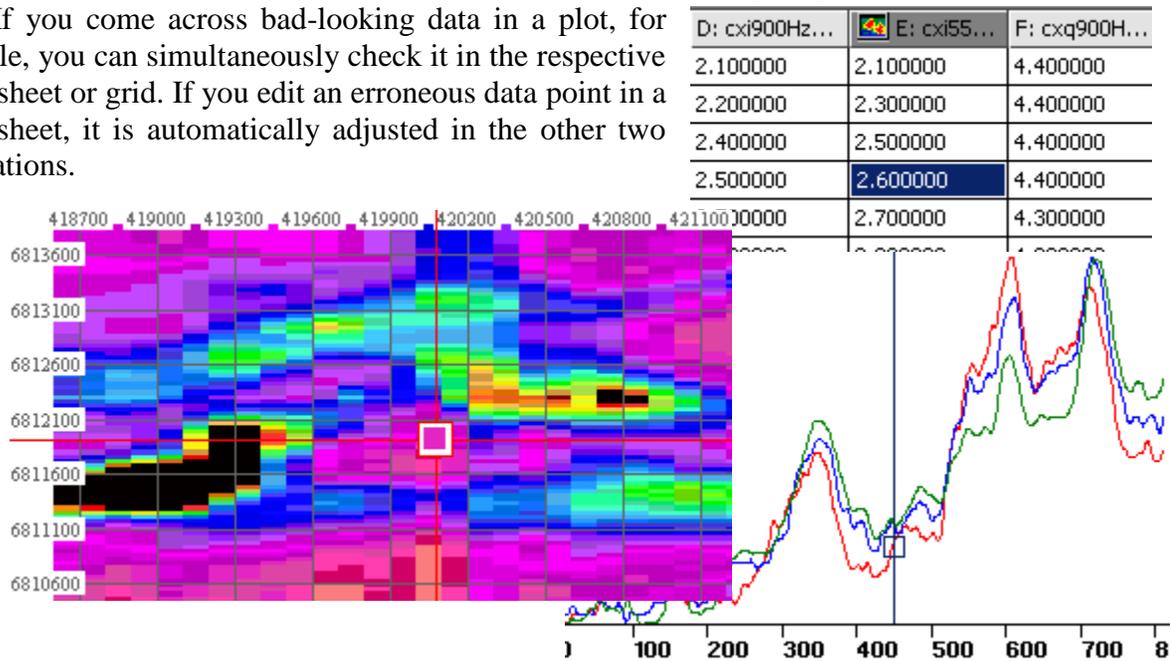**ARGIS FLT**
BIL files
GTOPO DEM files
CDED DEM files

The import procedure is fully automated and easy to manage.

Data is kept in the storage format of your choice whether it be double or single precision (float), short or long integer or date or degree formats.

Data Display. There are three means of data representation: spreadsheets, plots, and grids or maps. All three of them are interrelated and can easily be brought up for viewing at the same time. If you come across bad-looking data in a plot, for example, you can simultaneously check it in the respective spreadsheet or grid. If you edit an erroneous data point in a spreadsheet, it is automatically adjusted in the other two applications.

D: cxi900Hz...	E: cxi55...	F: cxq900H...
2.100000	2.100000	4.400000
2.200000	2.300000	4.400000
2.400000	2.500000	4.400000
2.500000	2.600000	4.400000
2.700000	4.300000

Spreadsheets. Depending on your choice during the import procedure, you can have your data represented as a single speadsheets or divide into many smaller tables within the .qct file. . The links between the tables differ from those used in similar applications, like Excel, due to the strict data structuring in QCTool. This feature makes it easier to work with large sets of data and saves much of your time. The spreadsheet format offers all standard functionalities usually available in comparable applications.

Also, a very handy 'Formula Calculator' can be displayed at the click of a mouse to furnish you with the most commonly used mathematical function from which to make your own equation if necessary.

There is a wide range of spreadsheet functions available, including

Outlier Removal
Sorting
A large variety of digital filters
FFT and DFT filtering and spectral analysis
Interpolation
Summation and Difference (first and second order)
Matrix and Vector rotation

Plots. Plots are generated automatically. With them, editing data takes no time since errors are visible to the naked eye. Deleting any point on the plot will produce the same changes in the respective table or grid. You can plot as many channels as necessary to view them all at the same time; you can cut your plots into segments; switch between lines, channels, and curves; zoom in and out; change plot appearance, remove trends – all within a split second.

Grids (2D Displays) The gridding tool provides numerous convenient functionalities.

You can view and adjust profiles, apply different methods of interpolation, change draw modes, draw and customize contours. You can also superimpose your grid on a calibrated map (with calibration provided within QCTool), change from vector to raster formats, move grid elements, measure the distance between different points, customize grid appearance and much more.
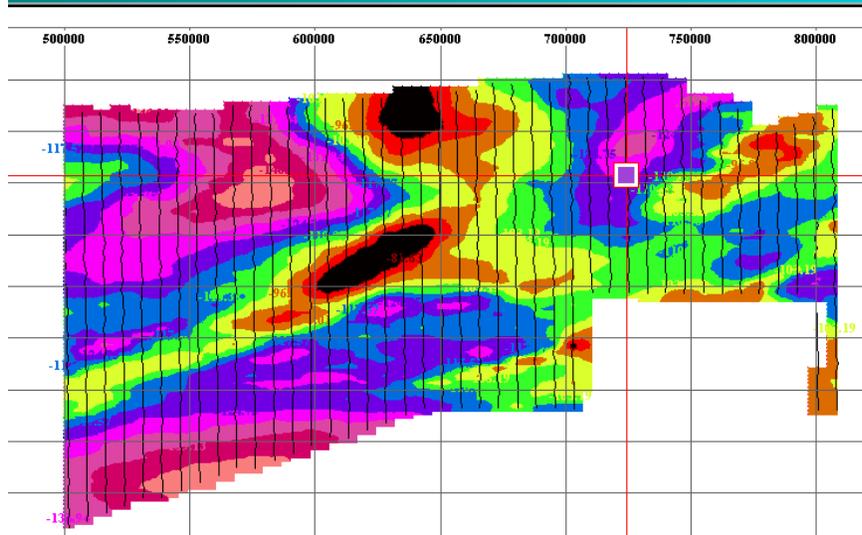
2D data displays may be made of any column (parameter) versus any other 2 parameters quickly and easily. You may show simply the parameter at the data points (x,y), interpolate the data onto regular grids using either square or rectangular grid cells. A very accurate local interpolation technique called Natural Neighbour is allowed or the more conventional global Minimum Curvature technique. Interpolated grids may be shown as equal range (traditional) or equal area (weight). Contours may be made and filled plus many other mapping capabilities which are integrated with 2D plot presentations.

Mapping: QCTool is now also designed as a mapping software product, providing a range of mapping capabilities with export to other mapping products as well as ArcMap, MapInfo, AutoCAD and Google Earth.

Coordinate and Datum Transformations. QCTool offers a wide range of GIS processing and transformation capabilities offering many source and destination datums and a variety of projection tools.

Additional Standard Functionalities

Merging Files. With QCTool, you can merge as many data sets as necessary and have the missing values interpolated to get the full and consistent picture of your survey. This can be done with data of different types or from different instruments but have a common data channel for linking such as time or date or temperature.

Append Files. QCTool also lets you append new data to old data. This is useful when you collect data on different days or at different times and you need to bring them together.

Data Interpolation. This is an excellent tool to fill up the gaps in your data. Data interpolation is especially useful when you merge two or more files and there are a lot of missing data as a result. The only thing you have to do is to select the necessary data points to interpolate and all the rest will be done for you.

Data Sorting. Allows sorting of your data at various levels

Data Filtering. Data Filtering uses 7 kinds of filters: low pass, high pass, band pass, band removal, mean, median and Gaussian. For advanced processing of Potential field data, FFT filtering options are available. You can plot unprocessed versus filtered data, transform time-domain data into frequency-domain, and adjust filter settings to optimize the result.

Trend Removal. Many instruments have drift in the measurements, so an easy-to-use drift correction is provided. Data shifting is also provided as sometimes instruments need to be shifted in sequence when compared to other parameters.

Gravity Corrections. QCTool offers a full range of modern gravity correction functions including very advanced topographic and isostatic corrections

Magnetic Corrections. Base station correction capabilities, IGRF calculation, drift and regional gradient removal plus other functions can be performed in QCTool.

Magnetotelluric Processing QCTool also offers the capability to compute impedances and tipper data from spectral data and derive standard MT parameters

VLF Processing

Induced Polarization Processing – calculate 3 Cole-Cole parameters for your data

Additional Extended Functionalities – special licenses

Marine magnetics and gravity tools

Time Series Stacking and Windowing

Magnetic compensation – Suitable for compensation of either total field or vector sensors, for fixed wing, towed platforms or stingers. Suitable for fixed wing or helicopter airborne, marine or ground applications