

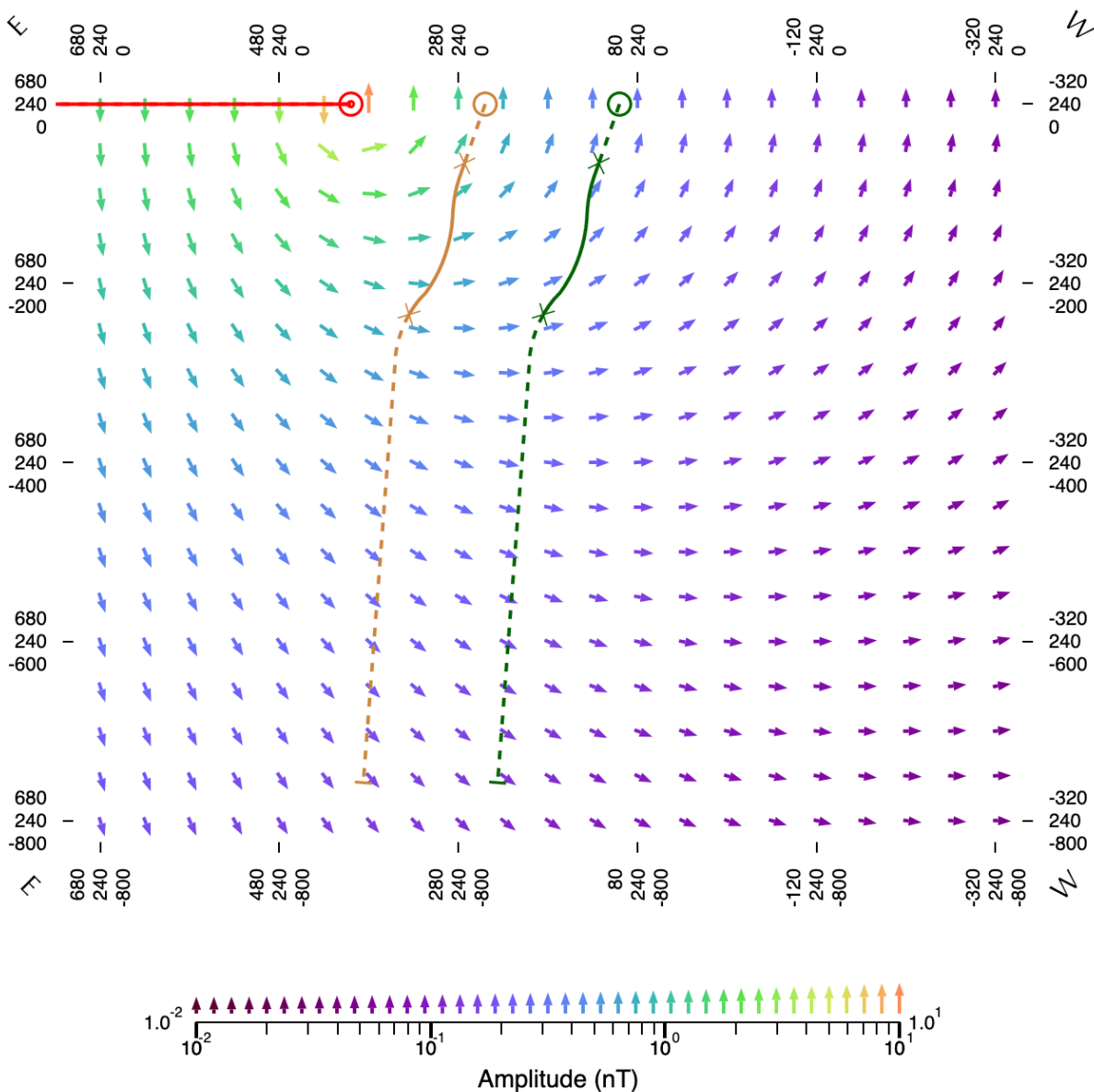
# Vector Plot

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*Lamontagne Geophysics Ltd.*

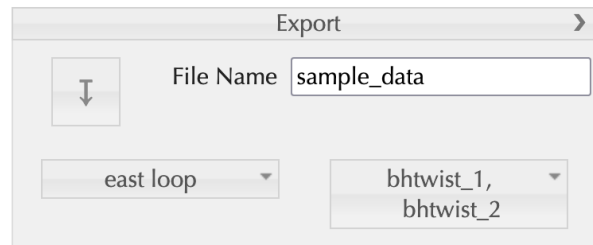
Vector plot displays the magnetic field of a loop projected onto a user-defined rectangular plane. The plotted 2-dimensional magnetic field vector's orientation and amplitude (length and/or colour) is calculated from the orientation and amplitude of the 3-dimensional magnetic vector projected onto the user defined plane.



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## 1.1 Loading and Saving Files



To import a file, select the “Choose or Drop Files” button or alternatively, drag the files into your web browser window. Vector plot currently accepts the following file formats:

1. Loop file (typically a .txt extension).
2. Line file (typically a .TEXT extension).
3. Borehole file (typically a .txt extension with “bh” in the file name).
4. 3cH5 file (position information read in)
5. “.JSON” (from Vector Plot or other Lamontagne Geophysics Ltd. software).

If a loop file is chosen, a default vector plot plane centred on the loop will be automatically generated for you. Alternatively, if a “.JSON” file is opened and it contains Vector Plot information, then the contained settings will be imported in. Multiple loop/traverse files can be imported in. The active loop can be selected from the Loop(s) dropdown menu (only one loop can be active at a time). The traverse(s) you wish to draw can be selected in the Traverse(s) dropdown menu.

To save a Vector Plot file, fill in your desired file name in the “file name” form beside the “Export” button and then select the “Export” button. A Vector Plot file has the extension .JSON and contains all of the information imported into Vector Plot (loops, lines, boreholes, vector plot options). Opening a Vector Plot “JSON” file will display the vector plot in the identical form as it was when the JSON file was made. If your browser does not support the downloading of files, the full text content of the file will be displayed in the menu control box (or in a new browser page/tab). You must then copy this text and paste into a blank text document and save the file with the extension “.JSON”. To hide the window simply select the “Export” button again.

This manual can be accessed by selecting the [?] button.

## 1.2 Plane Definition

Two options, 1 and 2, for the definition of the plane onto which the magnetic field vectors are projected are available.

### 1.2.1 Option 1

The 'Define Plane' dialog box is shown with the following settings:

- Strike Length: 1000
- Dip Length: 800
- Dip Dir (DDA): 0
- Dip: 90
- Reference Point:
  - X: 680
  - Y: 240
  - Z: 0
- U: 0 (with fast toggles at 0, 0.5, 1)
- V: 0 (with fast toggles at 0, 0.5, 1)
- Buttons: West, East, S+ → N-

In option 1 the plane is defined using:

Dip Direction Azimuth (DDA) (0° - 360°): the azimuth of the direction of the dip as projected to the horizontal. The dip direction is 90° off the strike angle.

Dip (0° - 180°): angle of decent between the plane and the dip direction.

Strike Length (m): length of the plane in the strike direction (U direction).

Dip Length (m): length of the plane in the dip direction (V direction).

U (0 - 1): relative location of the reference point along the strike length. V (0 - 1): relative location of the reference point along the dip length. Fast toggles for values [0, 0.5, 1] simplify selection. Fast toggles for direction at the bottom re-orient the view without changing the Dip and DDA.

Reference point (m): coordinate of the reference point at an internal location within the plane as defined using U and V. For instance, if  $[U, V] = [0.5, 0.5]$  then the reference point is the centre of the plane.

### 1.2.2 Option 2

Plane Vertices (U=0, V=0)			
$U_1, V_1 = 0,0$	x	680.0	y 240.0 z 0.0
$U_2, V_2 = 0,1$	x	680.0	y 1040.0 z 0.0
$U_3, V_3 = 1,0$	x	-320.0	y 240.0 z 0.0

In option 2 the plane is defined using 3 vertices of the plane. These vertices correspond to the following [U, V] internal coordinates:

$$U_1, V_1 = [0, 0], U_2, V_2 = [0, 1], U_3, V_3 = [1, 0].$$

For ease of use, the “Mark Vertices” checkbox will draw coloured circles on the vector plane corners and on the dialogue box (see **Drawing Options** for more details).

## 1.3 Vector Properties

The vector properties dialogue box controls the attributes of the drawn vectors.

Vector Properties			
dU (strike)	50	Min Value	8.3e-18
dV (dip)	50	Max Value	1.2e-13
Min Length	3	Stroke Width	2
Max Length	10	Arrow Tip Size	5

dU (strike) (m): interval between vector locations along the strike direction (U direction).

dV (dip) (m): interval between vector locations along the dip direction (V direction).

Min Length: drawing length of the smallest vector plotted.

Max Length: drawing length of the largest vector plotted.

Min Value: amplitude of the smallest projected magnetic field vector which corresponds to a drawing length of Min Length. This value is updated automatically unless locked, see **Drawing Options**.

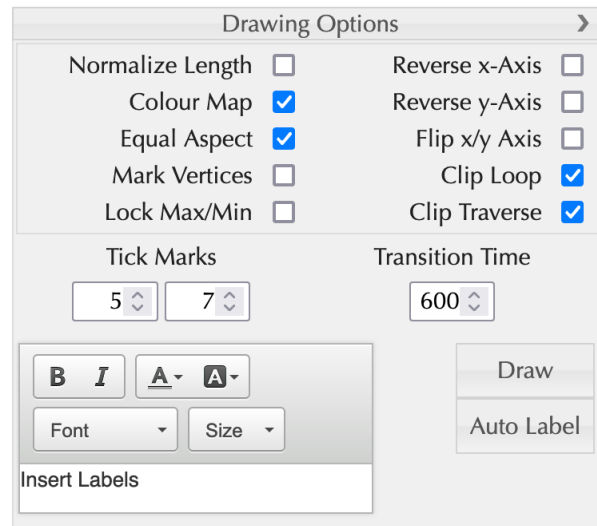
Max Value: amplitude of the largest projected magnetic field vector which corresponds to a drawing length of Max Length. This value is updated automatically unless locked, see **Drawing Options**.

Stroke Width: thickness (in pixels) of the vector arrow lines.

Arrow Tip Size: size of the vector arrow arrowheads.

## 1.4 Drawing Options

Drawing options controls various aspects of how the vector plane/arrows are drawn, the axis, and the drawing of the loops, lines, boreholes and labels.



Normalize Length: equalizes the length of each vector arrow.

Colour Map: adds a rainbow colour gradient to the amplitude of the projected vectors.

Equal Aspect: sets the aspect ratio to 1:1. If unchecked, the aspect ratio is changed so that the plot fits the entire plotting area.

Mark Vertices: draws coloured circles over the vertices of the vector plane on the vector plane plot, the dialogue box and on Grid Plot mini.

Lock Max/Min: locks the maximum and minimum values of the plane (which correspond to the vector drawing lengths Min Length and Max Length) to the values listed in Min Value and Max Value.

Reverse x-Axis: reverses the direction of the U-axis.

Reverse y-Axis: reverses the direction of the V-axis.

Flip x/y Axis: rotates the plot 90 degrees such that the U axis is on the left/right of the plot and the V axis is along the top/bottom.

Clip Loop: clips the drawing of the loop to the axis limits. If disabled, the axis limits will be resized to include the loop.

Clip Traverse: clips the drawing of the lines/boreholes to the axis limits. If disabled, the axis limits will be resized to include the lines/boreholes.

Tick Marks: sets the number of tick marks and labels on the axis.

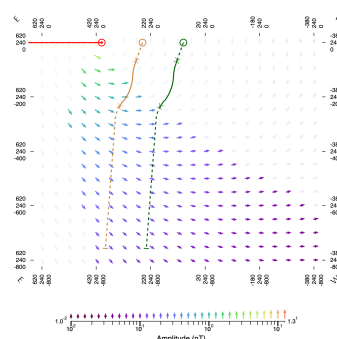
Transition Time: sets the transition time in ms (default = 600).

Labeling: An editable input field where labels can be created. The “Draw” button will generate a draggable containing the formatted text within the input field. Clicking on the label will fix its position. Double-clicking will allow the label to be dragged again. Hold the shift key down while clicking on a label to remove that particular label. The “Auto Label” button will automatically generate labels of the drawn loops/lines/boreholes in the whitespace above the vector plot. These labels may need to be moved in order to avoid overlapping of labels. The “Auto Label” button can also be held down to remove all drawn labels.

## 1.5 Loop Options

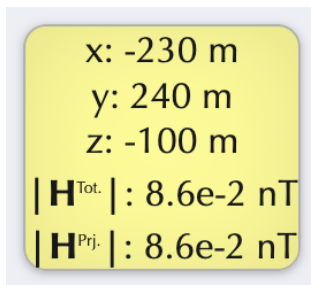
Loop: shift the loop in the [x,y,z] direction and/or set the current, I. This is often useful during survey planning to see the effect of moving the loop to a different location and/or to determine the amplitude of the magnetic field at a particular current. It may be useful to have the “Lock Max/Min” checkbox selected to ensure that the *vector arrow scale* remains unchanged when comparing different loop locations.

Coupling: the coupling dialogue box (enabled by selecting the adjacent checkbox) allows the user to only display the vectors which couple strongly with a target of known dip direction (“Dip Dir” field) and dip (“Dip” field). When the dot product of the vector and the normal vector to the target is below the coupling threshold (“c” field) that vector’s opacity is reduced.

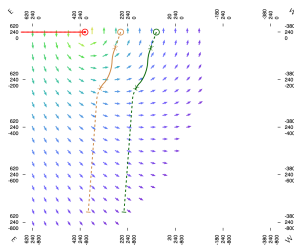


## 1.6 Mouse-over events

The following mouse-over events have been implemented within the vector plot figure:



By mousing over a vector in the vector plot figure the following information will be displayed: [x, y, z] coordinates of the vector,  $|H^{\text{Tot.}}|$  the amplitude of the total un-projected magnetic field,  $|H^{\text{Prj.}}|$  the amplitude of the total projected magnetic field.



By mousing over a vector in the scale bar all vectors with lengths less than the selected vector are hidden.

## 1.7 Symbols



Dashed/solid line represents a line that is behind or in front of the vector plane, respectively. The “X” symbol represents the pierce point where the line intersects the plane.




Loop symbols representing the current in the loop going into ( $\otimes$ ) and out of ( $\odot$ ) the vector plane.



Circle and line indicate the top and bottom of the borehole, respectively.



## 1.8 Footer information

Dir / Dip: 0°/90° Traverse: bhtwist_1 bhtwist_2	Loop: east loop I = 1    Shift = 0 0 0 Coupling: N/A File: sample_data	Survey Location: Multiloop X For: Synthetic Data
 GEOPHYSICS LTD GÉOPHYSIQUE LTÉE    Job 9999    Plot: 15/02/23		

Dir / Dip: dip direction and dip of the vector plane.

Traverse: names and the corresponding colour of the drawn traverse(s).

Loop: name of the active loop.

I / Shift: current and any shift that has been applied to the active loop.

Coupling: coupling information (threshold, dip direction, dip).

File: name of the file.

Survey Location: location of the survey as read in from the most recent loop file loaded.

For: client name as read in from the most recent loop file loaded.

Job: job number as read in from the most recent loop file loaded.

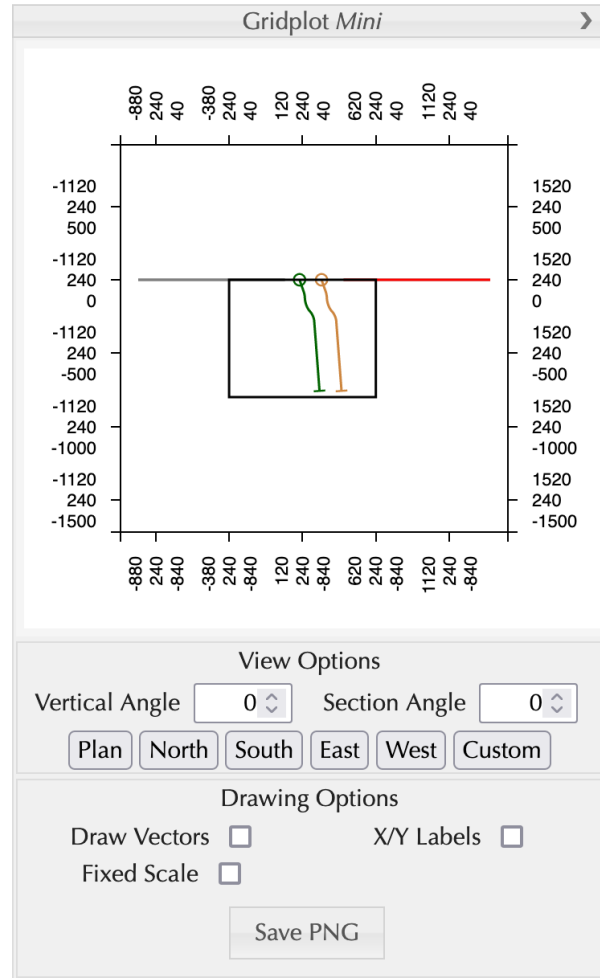
Surv: date of the survey as read in from a 3CH5 file (if available).

Red: date of the file reduction as read in from a 3CH5 file (if available).

Plot: current date.

## 1.9 Grid Plot *Mini*

Grid Plot mini will plot the imported loops, lines, boreholes and the outline of the vector plot plane in a 2-dimensional view. It is useful tool to use when positioning the vector plot plane to be in the optimal location in regard to the loop and line/borehole locations. The active loop is drawn in red while the others (if any) in grey. The vectors can also be drawn within Grid Plot mini by selecting the “Draw Vectors” checkbox. It should however be noted that the vectors drawn in this view are projections of the 3-dimensional magnetic field vectors in the selected view and are not restricted to only be the 2- dimensional components within the vector plane. This is useful when there is a significant component of the 3-dimensional magnetic field vector normal to the vector plane. Note that many of the drawing options in vector plot also control the behaviour of the drawing in Grid Plot mini.



### 1.9.1 View Options

The View Options menu controls the camera view / projection direction. Several quick buttons exist to select the most common viewing angles such as: Plan view, looking North, looking South, looking East and looking West. A custom view is also possible by manual inputting a desired vertical and section angle. The up/down arrows within the vertical and section angle can be scrolled through to simulate 3D camera rotation and perspective.

### 1.9.2 Drawing Options

Draw Vectors: draws the projected magnetic field vectors within the vector plane.

X/Y Labels: reverts the X/Y/Z label to X and Y labels on the respective axis. This option is de-selected if the view is changed from the standard plan view.

Fixed Scale: setting this will prevent the display from adjusting the grid size to the objects' projection at vertical and section angles.

Save PNG: downloads a png file of the current section view in the display.

## **1.10 Known bugs and work-arounds**

This web application was developed in Google Chrome (version 5.0.2454.85 (64-bit)), and tested with Firefox (version 110.0 (64-bit)). Vector Plot currently does not function in many versions of Internet Explorer.

The following bugs have been noted on other browsers. Please report any bugs to: [info@lgl.kos.net](mailto:info@lgl.kos.net)

### ***1.10.1 Exporting Files***

Downloading files is not supported in all browsers. If your browser does not support the downloading of files, the full text content of the file will be displayed in the menu control box (or in a new browser page/tab). You must then copy this text and paste into a blank text document and save the file with the extension “.JSON”. To hide the window simply select the “Export” button again.

### ***1.10.2 Imported Labels***

Imported labels may be positioned incorrectly. This can especially occur when the browser zoom is set to values other than 100% when the file was created and/or when the file was loaded in. 11