



INT

Stereonet



A plug-in for Petrel



Copyright 2011 INT, Inc.

INT Stereonet 1.0 Technical Guide



Interactive Network Technologies, Inc
2901 Wilcrest, Suite 100
Houston, Texas 77042

Foreword

The INT Stereonet plug-in provides an essential tool for analyzing plane (faults, horizons, foliations, etc.) and line (stream lines, etc.) orientation. It projects each oriented element into a planar image of a sphere, which allows for easier grouping of elements by family.

Features include:

- Easy interaction with Petrel data tree (import data with optional sampling)
- Circular statistics generation, including circular and regular histograms;
- Families creation to help you sort and group your objects;
- Data edition;
- Data visualization;
- Images generation and easy interaction with clipboard;
- Clear customizable legend;
- Save / load of Stereonet data.

This document presents the plug-in interface as well as its main functionalities. Except when specified, all options are accessible using the menus, the toolbar, and by right clicking an object in the data browser.

The INT Support Team is eager to help you. Our goal is to respond to every request in a timely manner.

To report a new problem, ask for assistance or new features, send an email to support@int.com:

- Be specific in how we can help you
- Describe the steps you took to arrive at the problem
- What was it you were trying to achieve when you ran into trouble?

We will reply with a ticket ID number and login information if this is the first time you have reported a problem.

To check the status of an existing incident, you can access the [INT Support Database](#).

Be certain you have your login information and ticket number.

If you need assistance with login to the support database or have technical questions, send your requests to support@int.com. For general information about our products and services, email us at intinfo@int.com or call +1 713.975.7434

Plug-in main window

The main window of the INTStereonet plug-in is divided into 4 areas:

- (1): Menus and Toolbar. All the implemented options of INT Stereonet are accessible from here.
- (2): Data Browser. This tree displays all the loaded, imported or generated datasets. Most of INT Stereonet features are also accessible from right-clicking the tree.
- (3): The stereonet Canvas itself. Points and circular histograms are displayed. Some features are also accessible from right-clicking it.
- (4): Control area. Depending on the current action, this area contains specific functionalities.
- (5): Status bar. Gives information about current operations.

⚠ Except for crosses or stars, a point located in the South Hemisphere (dip angle between 90 and 180 degrees) will appear empty: only its boundary will be visible.

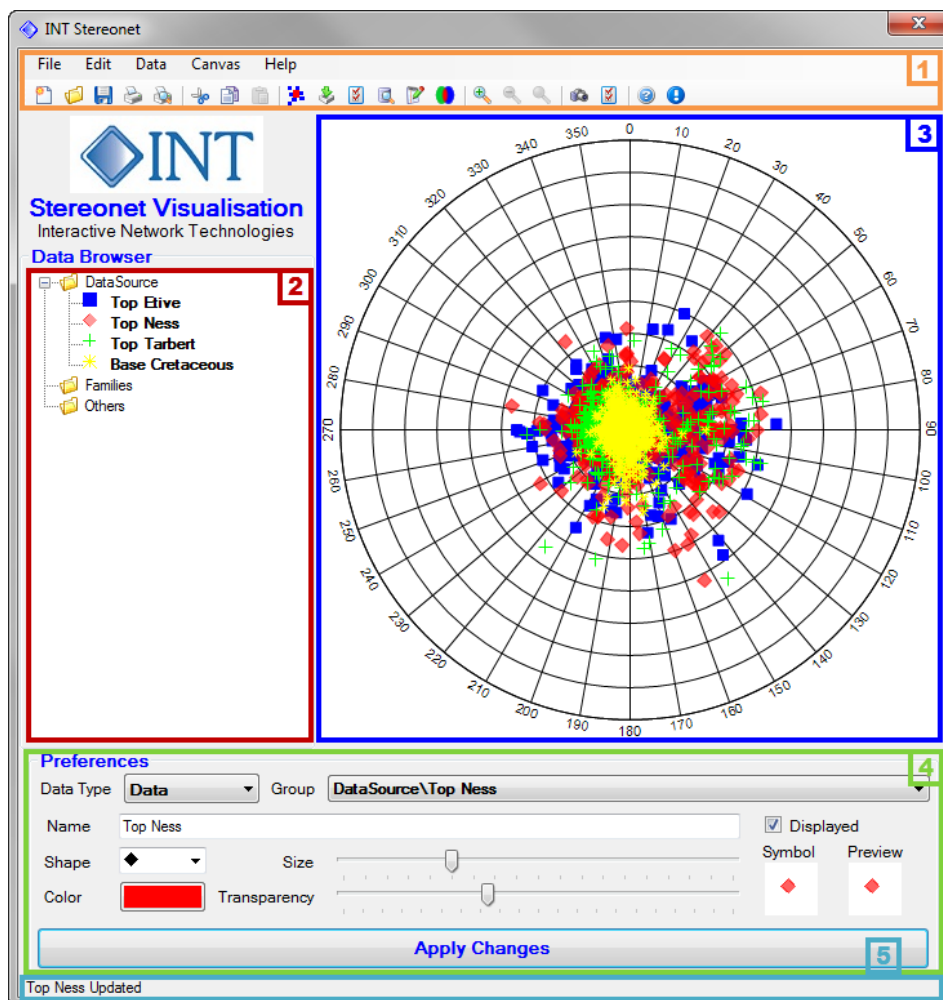


Figure 1: INT Stereonet main window

File Menu

The File menu offers common functionalities.



New

Ctrl+Shift+N

Close the current project and open a new empty one. The new document opens in the same window and replaces the closed project.



Open

Ctrl+Shift+O

Open an existing project (previously saved stereonet with a *.stn* file format).



Save

Ctrl+Shift+S

Save the project as a *.stn* file. If the project has not been saved yet, it will launch the *Save As* action.



Save As

Save the project in a new *.stn* file.



Save As Image

Export the chart as an image. The picture can be saved in several common formats.



Print

Ctrl+Shift+P

Select a printer, number of copies, and other printing options before printing the chart and its legend.



The chart will be printed with the default zoom, even if the chart has been zoomed in.



Print Preview

Preview the stereonet and sets printing parameters before the print.



The chart will be previewed with the default zoom, even if the chart has been zoomed in.

Edit Menu

The Edit menu allows for Data Browser Edition.



Expand Tree

Expand all the nodes of the Data Browser.



Collapse Tree

Collapse the Data Browser (only root directories are visible).



Create Directory

This feature is only available when a directory or a data set is selected in the Data Browser.

Create a new directory as a child of the selected object.



Cut

Ctrl+Shift+X

This feature is only available when an object is selected in the Data Browser.

Root directories are not removable.

Cut the selected object and copy it in the clipboard.



Copy

Ctrl+Shift+C

This feature is only available when an object is selected in the Data Browser.

Copy the selected object in the clipboard.



Paste

Ctrl+Shift+V

This feature is only available if a node has previously been copied or cut.

Paste the copied node under a directory. A node cannot be pasted directly under another point node, it needs a directory node as a parent node.



Delete Node

Shift+Del

This feature is only available when an object is selected in the Data Browser.

Root directories are not removable.

Delete the selected object and all its children. Points and histograms will be removed from the chart. Bar histograms remain open.



Delete Node Content

This feature is only available when an object is selected in the Data Browser.

Root directories are not removable.

Delete the content of the selected object, but not the object itself.

Data Menu

The Data menu allows for Data Edition or customization.



Set Visible Y/N

This feature is only available when a data set is selected in the Data Browser.

Show or hide the selected node on the chart.



Show

This feature is only available when a histogram is selected in the Data Browser.

Show the histogram. Circular histograms are displayed directly on the stereonet. Regular histograms open as new Petrel windows.



Show All

This feature is only available when the selected object in the Data Browser has non-displayed children.

Show all the children nodes of the selected node.



Hide All

This feature is only available when the selected object in the Data Browser has displayed children.

Hide all the children nodes of the selected node.



Import Data

Ctrl+Shift+I

Allow for data import from Petrel objects.

- (1): The Petrel *Blue Arrow* can be used for easy import.
- (2): Traditional combo-boxes can as well be used, at your convenience.
- (3): INT Stereonet 1.0 allows for data import from Surfaces, Reservoir Grids and Point Sets.
- (4): Several sampling algorithms allow for resampling data without altering its quality.



By convention, dip values range from 0 to 180 and azimuth values range from 0 to 360. If import data does not fit this convention, calculations convert values to fit those ranges.

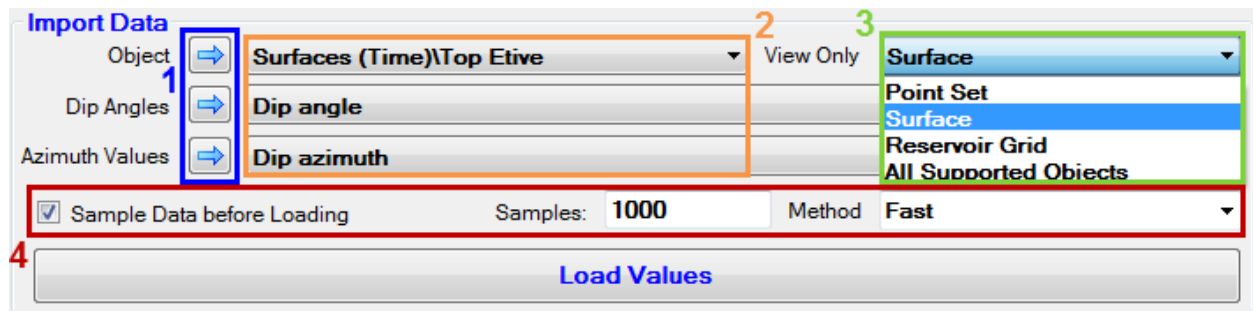


Figure 2: The Import Data control allows for import and resample circular data from Petrel objects

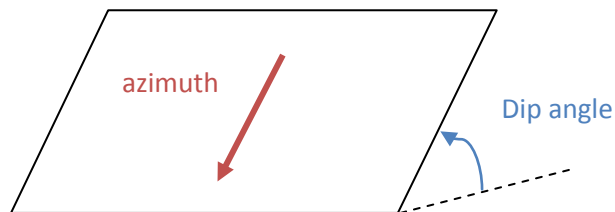
INT Stereonet 1.0 allows for four types of sampling:

- Fast: Resampling with equi-probability of selection through the source dataset.
- Density-faithful: Sampled data set honors source dataset density.
- Dip Angle Repartition: Sampled data set honors source dataset dip angle distribution.
- Azimuth Repartition: Sampled data set honors source dataset azimuth distribution.



INT Stereonet recognizes the following dip angle / azimuth convention:

- dip angle: the angle (in degrees) between the plane and the horizontal;
- azimuth: the North-referred direction (in degrees) of the slope.





View data

Ctrl+Shift+W

This feature is not available if the selected object of the Data Browser is a directory.

Allow for data visualization as numerical values. The table is automatically updated when a new object is selected in the Data Browser. Both point sets and histograms can be displayed.

1 **View Data**

	Azimuth range	Number of values
▶	[0 - 20]	224
	[20 - 40]	128
	[40 - 60]	169
	[60 - 80]	355
	[80 - 100]	568

Data Type: DataSource
Group: DataSource\Surfaces (Time)\Top
Page: Page 1

2 **View Data**

	Dip Angle	Azimuth
▶	26.1816844940186	79.0814819335938
	22.8433723449707	90.4341735839844
	18.2169742584229	60.5064544677735
	17.8166408538818	115.190696716309
	2.50449585914612	72.9683990478516

Data Type: DataSource
Group: DataSource\Surfaces (Time)\Top
Page: Page 1

Figure 3 : Data Visualization for Point Sets (1) and Histograms (2).



Edit data

Ctrl+Shift+E

This feature is only available if the selected object of the Data Browser is a data set.

The *Edit Data* control allows for direct data edition:

- Add new point: Add a point to the data set at a given dip and azimuth value.
- Only keep in range: Remove all points which are not in the selected dip/azimuth range.
- Remove in range: Remove all points in the selected dip/azimuth range.

Edit Group

Data Type: DataSource
Group: DataSource\Surfaces (Time)\Top Etive

Keep only from

Dip 0 to 180 all dips
Azimuth 0 to 360 all azimuths

Only keep in range...
Add new point
Only keep in range...
Remove in range...

Edit

Figure 4: Data Edition using simple menus



Preferences

This feature is not available if the selected object of the Data Browser is a directory.

Preferences allows for display customization. Depending on the selected object in the Data Browser, the control may have different aspect:

Sets of Points

Series of points can easily be customized:

- Name can be changed
- 7 types of symbol are available
- RGB color with transparency
- Symbol size can be set

The user can show or hide points directly with the *Displayed* checkbox.

Areas on the right are dedicated to preview the new symbol customization compare to the current one, before applying all changes.

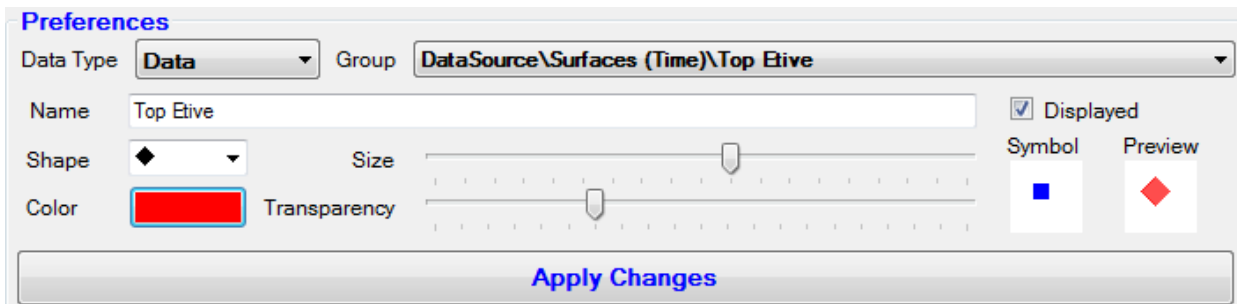


Figure 5: Preferences edition for points



Circular histograms

Circular histograms can also be customized. However, the user cannot change the name of the histogram unless it has been copied under another directory. The histogram can be displayed or not using the *Displayed* checkbox.

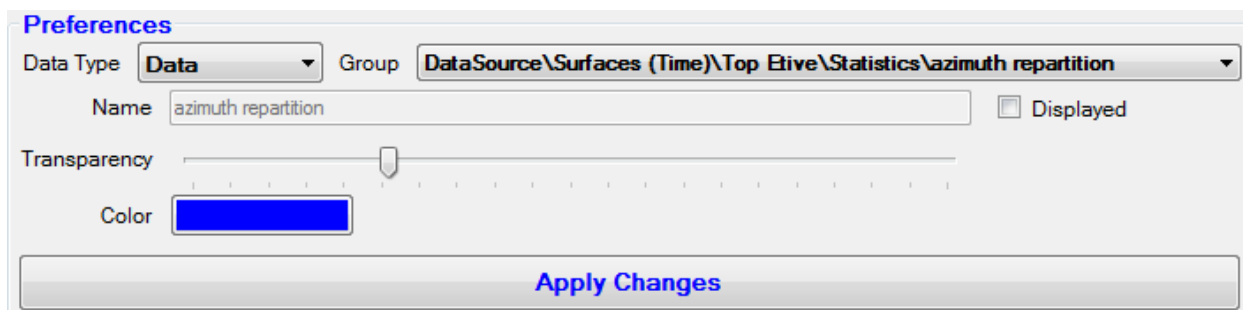


Figure 6: Preferences edition for circular histograms



If displaying several circular histograms on the chart, the bins size should be the same for all. To define the bin size of a circular histogram, please refer to Canvas Properties.



Regular histograms

Regular histograms can also be customized. The user cannot change the name of the histogram unless it has been copied under another directory.

Preferences

Data Type: **Data** Group: **DataSource\Surfaces (Time)\Top Etive\Statistics\dip angle repartition**

Name:

Scale: **0 - 180** Bins Size:

Color:

Apply Changes

In 1.0, three scales can be used for visualization: 0-90 degrees, 90-180 degrees, and 0-180 degrees. The bins size is defined for each histogram. By default, the histogram is displayed with the most logical scale, calculated from the series of points.



Generate Statistics / Refresh Statistics

Ctrl+Shift+M

This feature is only accessible if a set of points is selected in the Data Browser.

Statistics generation produces a *Statistics* directory below the source object. Variance, Standard deviation, Minimum, Maximum, Median, Dips and Azimuths Distributions are computed, and stored under this directory. Generated statistics honors specificities of circular series¹.

Statistics can be affected by data edition. Then, available statistics can be refreshed at the user request using the *Refresh Statistics* feature.



Refresh statistics does not recover deleted objects. To recover statistics, use *Re-Generate Statistics*.



Recover Statistics

This feature is only accessible if a set of statistics is missing.

Refresh Statistics with full data recovery.





¹ : J. Borradaile. *Statistics of Earth Science Data : their distribution in space, time and orientation*. Springer, 1st edition, 2003.



Create a Family by Operations

Ctrl+Shift+F

A new family of points can be generated using mathematical operations from existing data sets:

-  **Copy:** create a new family which is the copy of the input family. Eventual children associated to the source data set are not copied.
-  **Copy (with Exclusion):** copy a data set while removing all points belonging to another one.
-  **Intersection:** create a new family using only points belonging to the selected datasets.
-  **Union:** create a new family using all points belonging to at least one of the two selected datasets. Points belonging to the datasets intersection are only copied once.

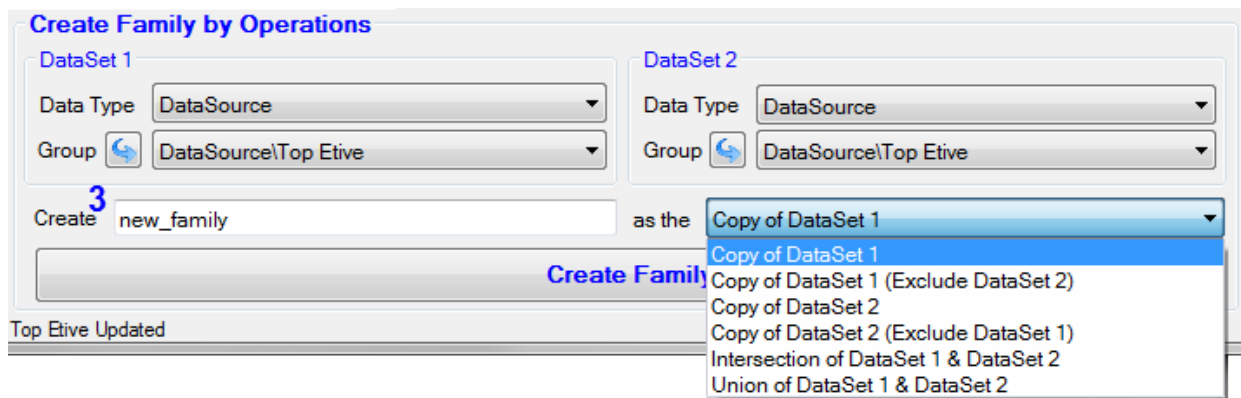


Figure 7: Family by Operation edition

Canvas Menu

The Canvas menu allows for Canvas (graphic area) edition or customization.



Zoom in

Increase the zoom of the chart. The center of the graphic will focus on the same point, before and after the zoom.



Zoom out

This feature is only accessible if the zoom is higher than the default one.

Decrease the zoom of the chart. The center of the graphic will focus on the same point, before and after the zoom.



Reset zoom

This feature is only accessible if the zoom is higher than the default one.

Reset the zoom of the chart to the default zoom (1:1). The center of the graphic is reset as well.



Preferences

Ctrl+Shift+G

This feature is also accessible from right-clicking on the canvas.

This control allows changing:

- Azimuth Increment: Spacing (in degrees) between two azimuth radiuses, starting from 0.
- Dip Increment: Spacing (in degrees) between two dip circles, starting from 0.
- Global Rotation: Rotation of the North (0-value), using direct convention.
- Petal Bins Size: Width (in degrees) of circular histogram bins.



The maximum Petal Bins Size allowed is 360 degrees (only 1 bin displayed on the chart).
The minimum Petal Bins Size minimum is 0.001 degree.

Preferences

Data Type **Diagram**

Azimuth Increment Global Rotation Petal Bins Size

Dip Values Increment

Apply Changes

Figure 8: Diagram Preferences control



Export Chart as an Image

This feature is also accessible by right-clicking the canvas.

Export the chart as an image. The picture can be saved in several common formats. The picture size is 485*485 pixels.



The chart will be exported with the default zoom, even if the chart has been zoomed in.



Copy Chart to Clipboard

This feature is also accessible by right-clicking the canvas.

Copy the chart to the clipboard, so it can be pasted into another application.



The chart will be copied with the default zoom, even if the chart has been zoomed in.



Copy Legend to Clipboard

Figure 9: Diagram Preferences control

This feature is also accessible by right-clicking the object tree.

Copy the object tree to the clipboard, so it can be pasted into another application.

Help Menu

The Help menu allows for recovering information and support.



Help

Shift+F1

Open the Help Box with INT contacts for support.

Preferences

Data Type **Diagram**

Azimuth Increment Global Rotation Petal Bins Size

Dip Values Increment

Apply Changes



About

Shift+F2

Open the About Box with details about the plug-in version.