# Facet Manual

## *The data input file*

Format of data infile:

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Facet Data [A number = 5, optional]
Rotation angle (t)
Latitude(theta) longitude(phi) x y
latitude longitude x y
.....
.....
END

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If a number 5 appears in the first line it instructs the program to read data in 5 columns.
There should be no empty lines, the data numbers in a line separated by one or more blank spaces. Text appearing after the final END will be ignored and can be used for comments. The latitude and longitudes must be integers, multiples of 10. The allowed interval for the latitude is [-90,90] and for the longitude in [-40,120]. x and y may be real numbers with decimals. The rotation angle (t) is a real number.

Keep the name of the data file SHORT! If the name is too long the postscript file will not save.

## *Using the program*

Start the program by double clicking the icon. You will be asked to open a data file that must be in the format shown above. You will see two windows, the **Angular Space** window and the **Facet Space** window. The **Angular Space** window shows the data (theta, phi) with an overlay of lines connecting points with the same x (red lines), y (blue lines), and z (green lines) values respectively (in steps of 5). The *t* rotation is not applied here in order to avoid the distortion induced by this mapping. The **Facet Space** window shows the facet space (x, y), each data point being represented by a small black square. The facet points are connected with a grid of black lines. In some cases I have found that the y-axis is reversed, if this is the case the data can be corrected by using the menu item **Actions / ReverseY**. The **Facet Space** window is scrollable.

Now click in the **Facet Space** window to select it. You can also use the menu item **Actions/Go To Facet Space**. You can now change the x, y data by dragging the small black squares. The black grid will adapt to the change but a green grid behind will show the original arrangement of the facets.

You can undo the last operation in the Facet Space window using **Edit/Undo** or Control-Z. If you want to see the effect of the change of the facet data, you choose the menu item **Actions/Update Angular Space**. By clicking in the **Facet Space** window you can continue to modify the facet data.

The option **Actions/Preview Data** opens a new window and effectively plots the data, a triangular net, in the **Angular Space** window on a two-dimensional orthographic representation of a sphere. The *t* rotation is now applied to the data points. By using the arrow keys on the keyboard you can tip and rotate the sphere to investigate layout of the facets. Hidden parts of the layout are marked red. A blue blob marks the point on the sphere where a line from the eye of the observer to the centre of the sphere cuts the sphere. Around this point the perspective distortion is minimal.

The picture in the window is written to a Postscript File using **Actions/Make Postscript File**.

By first choosing in the **Plot Options** menu, you can select either of Average, X, Y, Z or Eye parameter plot. The default option is always the Average. When you choose **Make Postscript File** there will be a letter added (X, Y, Z, p) to that menu item indicating the chosen option. When the **Make Postscript File** action has been completed, the plot option is reset to the default option (Average). If any changes have been made in the data, you will be asked if you want to save the changed data in a new data file. The Postscript file can be sent to a Postscript printer or can be opened and handled by applications like Illustrator or Photoshop.

You can also save the modified data at any time by choosing **File/Save**.

Values displayed on X, Y and Z plots reveal the angular spacing between individual x, y, and z facet rows, respectively. Unfortunately, in the current program, the z (green) rows are incorrectly plotted in the Angular Space – they should be roughly perpendicular to the direction they are currently shown. This means that the Z values shown on the plots are incorrect. It turns out, however, that a value of half the current Z value (at any given position on the Z-globe) is the correct value for (correct) z-rows running in the roughly perpendicular direction. Thus the correct x, y and z spacings are X, Y and 0.5Z.

**Inserting new data points**

1. Choose **Insert Point** at the bottom of the **Action** menu. The Facet window will go to the front (unless it isn't already there) and the cursor will change to a hand.

2. Suppose you want to extend a chain of existing points with an extra point to the right. You click the next to last point in the chain (it will be marked by a circle) then the last point in the chain (it will also be marked) and then finally click where you want the new facet point to be. All the windows will now be updated taking the new point into account. The procedure is analogous if you want to extend a chain to the left or up- or downwards. The points introduced in this way can be moved as regular points but will be marked by an unfilled square. It will copy the D (diameter) value (if any) from the previous last point in the chain.

If you try to extend the chain on top of an already existing point there will be a beep and the **Insert Point** operation will be cancelled. The same thing will happen if you try to insert points outside the present angular limits (-40 to 120 degrees in phi and -90 tp 90 degrees in theta).

Inserted points will not be saved in the original data file.

## *The Menus*

### File
Here you can **Open**, **Save** (if opened) a Facet Data file and **Quit** the application. If any changes have been made in the original data you will be asked to save the changed data in a new file.

### Edit
The item **Undo** is implemented. It undoes the last change made in the Facet Space window.

### Actions
**Update Angular Space** redraws this window using the (modified) data from Facet Space.
**Go To Facet Spac**e is equivalent to clicking and selecting the Facet Space window.
**ReverseY** inverts the sign of all y co-ordinates.
**Preview Data** can be used to check that the output Postscript file data looks nice.
**Make Postscript File** composes a Postscript file of the output data in the form decided by the setting in the **Plot Options** menu. **The postscript file is always saved in the Facet application folder.**

## Plot Options

**Average plot**
**X Plot**
**Y Plot**
**Z Plot**
**Eye Parameter**