NAME

mbm_xyplot – Create an executable shellscript which will generate a GMT plot of xy data.

VERSION

Version 5.0

SYNOPSIS

mbm_xyplot –I*[filepars:]file* [**–I***[filepars:]file* **–G***fill* **–H –O***root* **–P***pagesize* **–S***symbol/size* **–U***orientation* **–V –W***pen*]

Additional Options:
[**–B***tickinfo* **–J***projection[/scale | width]* **–L***title[:xlabel:ylabel]* **–M***misc* **–Q –R***w/e/s/n* **–X –Z***]*

Miscellaneous Options:
*[***–MGD***gmtdef/value* **–MGL***[f][x]lon0/lat0/slat/length[units][+llabel]* **–MGT***x/y/size/angle/font/just/text* **–MGU[***/dx/dy/***][***label***]]**

DESCRIPTION

mbm_xyplot is a macro to generate a shellscript of GMT commands which, when executed, will generate a Postscript plot of xy data. Axes may be linear, log, or any of several geographic projections. Data may be plotted as symbols or lines. The plot will be scaled to fit on the specified page size or, if the scale is user defined, the page size will be chosen in accordance with the plot size. The primary purpose of this macro is to allow the simple, semi-automated production of nice looking plots with a few command line arguments.

By default **mbm_xyplot** expects the input data files to have values organized in columns separated by white space. However, users may optionally specify a non-white-space delimiter for each file. Input data files can have an arbitrary number of columns. When two or more columns exist the one may specify which two columns to plot (the first vs second is the default). In addition, users may optionally specify a single column to be plotted versus data-point-number.

The standard syntax with which one selects columns to plot may also be embedded into a larger Perl expression, which will be evaluated for each line of the data file. In this way, one may do on-the-fly mathematics or substring extractions as required. Indeed, one may specify most any Perl expression that when evaluated, will be a numeric result for plotting. For example, one can multiply the values in a column by a constant, add the values of two columns together or even extract latitude and longitude degrees and minutes in a file of NMEA strings and convert the results to decimal degrees for plotting. The macro uses the specified delimter to extract the values from each column, evaluate the expressions, and then leaves the result in temporary data in files to be read by the plotting shellscript. The temporary files are deleted on execution of the shell script by default, but can optionally be retained for debugging purposes.

For users seeking more control over the plot appearance, a number of additional optional arguments are provided. Truly ambitious users may edit the plot shellscript to take advantage of GMT capabilities not supported by this macro.

By default the output plot generation shellscript includes lines which execute a program to display the Postscript image on the screen. The program to be used to display the Postscript is set using **mbdefaults**; the default value can be overridden by setting the environment variable $MB_PS_VIEWER. Invoking the plot generation shellscript with a **-N** command line argument suppresses the screen display of the plot.

The plot scripts generated by this macro will work with GMT version 5.0 and later, and are not compatible with earlier versions of GMT.

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SIMPLE DESCRIPTION OF BASIC OPTIONS

–G *fill*
Select filling of symbols for xy plotting. Set the shade (0-255) or color (r/g/b) [Default is no fill]. To reset no fill, use *fill* = "N". For polygons, you may optionally specify **–Gp***icon_size/pattern*, where *pattern* gives the number of the image pattern (1-32) OR the name of a icon-format file. *icon_size* sets the unit size in inch. To invert black and white pixels, use **–GP** instead of **–Gp**. See **GMTs** Cookbook & Technical Reference Appendix E for information on individual patterns.

–H This "help" flag cause the program to print out a description of its operation and then exit immediately.

–I *[filepars:]xy_file*
Specifies a file containing (x,y) pairs to be plotted as lines or symbols. Optional parameters preceed the file name and consist of a list of flag-argument pairs, strung together with colons. These arguments may include the column delimiter, which columns to plot, line and symbol characteristics and a flag to specify when multiple data segments are embedded in a single file. The looks like the following.:

–ID*delimiter*:**C***columnsexpression*:**G***color*:**S***symbol*:**W***weight*:**M**:**xyfile**

Default parameters are whitespace [D(\s+)], column 1 vs column 2 [Cc[1]_c[2]], black lines without symbols [SN], [GN], [W1], and no multiple segments (omitted M flag).

Please see the "Complete Description of Options" below for details.

–O *root*
Sets the root used to construct the filename of the output shellscript (*root*.cmd) and names of files created when the shellscript is run. Normally the name of the input grid file or grid file list is used as the *root*.

–P *pagesize*
This option sets the size of the page the plot will be centered on. If the user does not set the plot scale, the plot will be sized as large as will fit on the designated page. If the user sets the plot scale such that the plot will not fit on the designated page, a larger page will be used. The supported page sizes include ANSI A, B, C, D, E, F, and E1, as well as most metric page sizes. See the COMPLETE DESCRIPTION OF OPTIONS section below for a complete list of the supported page sizes. The default page size is A.

–S *symbol/size*
Selects symbol to be used for plotting the next xy data file. Setting *symbol* = "N" causes line plotting. The list of available symbols is given in the COMPLETE DESCRIPTION OF OPTIONS section below.

–U *orientation*
Normally the orientation of the plot (portrait or landscape) is selected automatically so as to maximize the plot scale. The **–U** option allows the user to set the plot orientation. If *orientation* = 1, a portrait plot will be produced; if *orientation* = 2, a landscape plot will be produced.

–V Causes **mbm_grdplot** to operate in "verbose" mode so that it outputs more information than usual.

–W *pen*
Set pen attributes for xy plotting. See chapter 4.12 in the GMT Technical reference for a discussion of GMT pen values. [Defaults: width = 1, color = 0/0/0, texture = solid].

COMPLETE DESCRIPTION OF OPTIONS

–B *tickinfo*
Sets map boundary tickmark intervals. See the **psbasemap** manual page for details. By default the program chooses basemap annotations based on the map boundaries.

–G *fill*
Select filling of symbols for xy plotting. Set the shade (0-255) or color (r/g/b) [Default is no fill]. To reset no fill, use *fill* = "N". For polygons, you may optionally specify **–Gp***icon_size/pattern*, where *pattern* gives the number of the image pattern (1-32) OR the name of a icon-format file. *icon_size* sets the unit size in inch. To invert black and white pixels, use **–GP** instead of **–Gp**. See **GMTs** Cookbook & Technical Reference Appendix E for information on individual patterns.

–H This "help" flag cause the program to print out a description of its operation and then exit immediately.

–I *[filepars:]xy_file*

Specifies the files containing the data to be plotted, and for each file, a list of file parameters which are comprised of the rules used by **mbm_xyplot** to parse and manipulate the x and y values on the fly, as well as the line and symbol characters used for plotting the results.

The file parameters are an optional list of flags and their arguments concatinated and strung together with colons. A full specification has the following general syntax although individual flags and their arguments need not appear in any particular order as long as argument follows corresponding flag.:

–ID*delimiter*:**C***columnsexpression*:**G***color*:**S***symbol*:**W***weight*:**M**:**xyfile**

The delimiter may be any character string. The default delimiter is whitespace.

By default, **mbm_xyplot** uses the first column as the x value and the second column as the y value for the plot. However, the **C** flag and column expression allows the user to chose other columns to plot. The general syntax is

C *c[xcol]_c[ycol]*

where ’xcol’ and ’ycol’ designate the x and y columns respectively. Columns are numbered starting at ’1’ one the left most column in the file. In addition, either c[] expression may be replaced with a single ’#’ symbol to plot the other variable vs. line number. For example,

C *#_c[ycol]*

will plot the values in column ’ycol’ vs their line number in the file.

Other valid Perl expressions may be substituted for either column expression as well. For example, to plot in kilometers, a file whose columns contain x and y coordinates in meters, one would specify

C *c[0]/1000_c[1]/1000*

The line and symbol characteristics are set using the **G**, **S**, and **W** options. For example, the command **–IG***255/0/0:***S***a/0.1:xy.dat* will plot the (x,y) data pairs in the file xy.dat as 0.1 inch diameter red stars. [Default is a solid black line]. See the psxy man page for more details.

When multiple data files are specified (with multiple **–I** statements, the last **G**, **S**, and **W** options specified are for subsequent files. In order to plot different files using different line or symbol characteristics, new sets of commands can be specified for each file.

Finally, note that there are two ways in which one may plot multiple data sets on the same plot. One may specify multiple sets of file arguments [i.e. **–I***[filepars:]xy_file*], one for each file to be plotted. This allows the most flexibility, including different one-the-fly manipulations and colors for each xy series.

An alternative is to utilize the "multiple segments" feature of **psxy**. Specify the **M** flag in the file argument list to invoke this feature. A single file may then contain all the data, one series after the next, with lines containing a single ">" and nothing more to delineate breaks in data segments. This is the default break character for psxy, and currently the only break character supported by mbm_xyplot. For example **–IM**:xy.dat would plot multiple data series in the file xy.dat whose segements were separated as in the following snippet:

```
1.2   3
1.3   5
>
0     .1
0.1   .4
```

–J *projection*[*/scale* | */width*]
Selects the map projection. By default the map projection is Mercator and the plot scale is chosen to fit on the selected page size (see **–P** option). The user may specify a different projection to be used, in which case the plot scale is still automatically chosen to fit the page. The user may also specify both the projection and the plot scale. If the projection specifying character is upper case, a plot width rather than a plot scale is used. The scale values are specified in inch/degree or in 1:xxxxx ratios. Plot widths are specified in inches. If the user specifies a plot scale such that the plot will not fit on the default A size page, a appropriately larger page size will be chosen.

CYLINDRICAL PROJECTIONS:

–Jc*lon0/lat0/scale* (Cassini)
–Jm*scale* (Mercator)
–Joa*lon0/lat0/azimuth/scale* (Oblique Mercator – point and azimuth)
–Job*lon0/lat0/lon1/lat1/scale* (Oblique Mercator – two points)
–Joc*lon0/lat0/lonp/latp/scale* (Oblique Mercator – point and pole)
–Jq*lon0/scale* (Equidistant Cylindrical Projection (Plate Carree))
–Jt*lon0/scale* (TM – Transverse Mercator)
–Ju*zone/scale* (UTM – Universal Transverse Mercator)
–Jy*lon0/lats/scale* (Basic Cylindrical Projection)

AZIMUTHAL PROJECTIONS:

–Ja*lon0/lat0/scale* (Lambert).
–Je*lon0/lat0/scale* (Equidistant).
–Jg*lon0/lat0/scale* (Orthographic).
–Js*lon0/lat0/scale* (General Stereographic)

CONIC PROJECTIONS:

–Jb*lon0/lat0/lat1/lat2/scale* (Albers)
–Jl*lon0/lat0/lat1/lat2/scale* (Lambert)

MISCELLANEOUS PROJECTIONS:

–Jh*lon0/scale* (Hammer)
–Ji*lon0/scale* (Sinusoidal)
–Jk*lon0/scale* (Eckert VI)
–Jn*lon0/scale* (Robinson)
–Jr*lon0/scale* (Winkel Tripel)
–Jw*lon0/scale* (Mollweide)

NON-GEOGRAPHICAL PROJECTIONS:

–Jp*scale* (Linear projection for polar (theta,r) coordinates)
–Jx*x-scale*[**l**|**p***pow*][*/y-scale*[**l**|**p***pow*]] (Linear, log, and power scaling)
More details can be found in the **psbasemap** manpages.

–L *title[:xlabel[:ylabel]]*
Sets the title and the labels for the x and y axes of the plot. Note that a colon (:) rather than a slash (/) is used to separate the labels. Colons cannot be used in the labels themselves. If this option is not used, then a default title and colorscale label are provided. If the title is supplied alone, no x or y-axis labels will be provided.

–M A series of "miscellaneous" options are provided which are given as **–M** followed by a two character identifier, followed by any other parameters associated with that option. The **–M** options may be strung together separated by colons, e.g. "-MGQ100:GU:CA200/10", which is equivalent to "-MGQ –MGU –MCA200/10".

–MGD *gmtdef/value*
Allows the user to set the **GMT** default values used as the plot is constructed. This command may be given repeatedly to set as many **GMT** defaults as required. For example, to set the basemap annotation font to Courier, use "-MGDANOT_FONT/Courier".

–MGL [*f*][*x*]*lon0/lat0/slat/length*[*units*][*+llabel*]
Draws a simple map scale centered on *lon0/lat0*. Use **–Lf** to get a "fancy" scale [Default is plain]. Use **–Lx** to specify the position in inches instead of map units. The scale is calculated at latitude *slat*; if the string "center" is used instead of a numerical value for *slat*, then the macro will set the scaling according to the center of the plot bounds. The scale length value *length* is in km by default, but the units can be specified as one of e|f|k|M|n|u, where e = meters, f = feet, k = kilometers, M = statue miles, n = nautical miles, and u = US survey feet. Append *+l* to label the scale with the relevant units, or append *+l"label"* to set a different label string.

–MGT *x/y/size/angle/font/just/text*
Causes a text label to plotted on the map. *size* is text size in points, *angle* is measured in degrees counter-clockwise from horizontal, *fontno* sets the font type, *justify* sets the alignment. If *fontno* starts with a leading hyphen, then the remainder of *fontno* is taken to be a textstring with the desired fontname. See the **gmtdefaults** man page for names and numbers of available fonts (or run **pstext –L**). The alignment number refers to the part of the textstring that will be mapped onto the (*x,y*) point: 1 = Lower Left corner, 2 = Lower Center, 3 = Lower Right, 5 = Mid Left, 6 = Mid Center, 7 = Mid Right, 9 = Upper Left, 10 = Upper Center, 11 = Upper Right. This option may be given as many times as needed.

–MGU [*/dx/dy/*][*label*]
Draw Unix System time stamp on plot. User may specify where the lower left corner of the stamp should fall on the page relative to lower left corner of plot in inch [Default is (-0.75,-0.75)]. Optionally, append a label, or **c** (which will plot the command string.)

–O *root*
Sets the root used to construct the filename of the output shellscript (*root*.cmd) and names of files created when the shellscript is run. Normally the name of the input grid file or grid file list is used as the *root*.

–P *pagesize*
This option sets the size of the page the plot will be centered on. If the user does not set the plot scale, the plot will be sized as large as will fit on the designated page. If the user sets the plot scale such that the plot will not fit on the designated page, a larger page will be used. The supported page sizes are:

```
American ANSI sizes:
A    8.5 x 11.0 in.   ( 215.9 x  279.4 mm)
B   11.0 x 17.0 in.   ( 279.4 x  431.8 mm)
C   17.0 x 22.0 in.   ( 431.8 x  558.8 mm)
D   22.0 x 34.0 in.   ( 558.8 x  863.6 mm)
E   34.0 x 44.0 in.   ( 863.6 x 1117.6 mm)
F   28.0 x 40.0 in.   ( 711.2 x 1016.0 mm)
E1  44.0 x 68.0 in.   (1117.6 x 1727.2 mm)

Metric ISO A sizes:
A0   841.0 x 1189.0 mm  (33.11 x 46.81 in.)
A1   594.0 x  841.0 mm  (23.39 x 33.11 in.)
A2   420.0 x  594.0 mm  (16.54 x 23.39 in.)
A3   297.0 x  420.0 mm  (11.69 x 16.54 in.)
A4   210.0 x  297.0 mm  ( 8.27 x 11.69 in.)
A5   148.0 x  210.0 mm  ( 5.83 x  8.27 in.)
A6   105.0 x  148.0 mm  ( 4.13 x  5.83 in.)
A7    74.0 x  105.0 mm  ( 2.91 x  4.13 in.)
A8    52.0 x   74.0 mm  ( 2.05 x  2.91 in.)
A9    37.0 x   52.0 mm  ( 1.46 x  2.05 in.)
A10   26.0 x   37.0 mm  ( 1.02 x  1.46 in.)

Metric ISO B sizes:
B0   1000.0x 1414.0 mm  (39.37 x 55.67 in.)
B1   707.0 x 1000.0 mm  (27.83 x 39.37 in.)
B2   500.0 x  707.0 mm  (19.68 x 27.83 in.)
B3   353.0 x  500.0 mm  (13.90 x 19.68 in.)
B4   250.0 x  353.0 mm  ( 9.84 x 13.90 in.)
B5   176.0 x  250.0 mm  ( 6.93 x  9.84 in.)
B6   125.0 x  176.0 mm  ( 4.92 x  6.93 in.)
B7    88.0 x  125.0 mm  ( 3.46 x  4.92 in.)
B8    62.0 x   88.0 mm  ( 2.44 x  3.46 in.)
B9    44.0 x   62.0 mm  ( 1.73 x  2.44 in.)
B10   31.0 x   44.0 mm  ( 1.22 x  1.73 in.)

Metric ISO C sizes:
C0   914.4 x 1300.5 mm  (36.00 x 51.20 in.)
C1   650.2 x  914.4 mm  (25.60 x 36.00 in.)
C2   457.2 x  650.2 mm  (18.00 x 25.60 in.)
C3   325.1 x  457.2 mm  (12.80 x 18.00 in.)
C4   228.6 x  325.1 mm  ( 9.00 x 12.80 in.)
C5   162.6 x  228.6 mm  ( 6.40 x  9.00 in.)
C6   114.3 x  162.6 mm  ( 4.50 x  6.40 in.)
C7    81.3 x  114.3 mm  ( 3.20 x  4.50 in.)
```

MB-System large format sizes:

m1	1371.6 x 1828.8 mm	(54.00 x 72.00 in.)
m2	1371.6 x 2133.6 mm	(54.00 x 84.00 in.)
m3	1371.6 x 2438.4 mm	(54.00 x 96.00 in.)
m4	1524.0 x 1828.8 mm	(60.00 x 72.00 in.)
m5	1524.0 x 2133.6 mm	(60.00 x 84.00 in.)
m6	1524.0 x 2438.4 mm	(60.00 x 96.00 in.)

The default page size is A.

–Q Normally, the output plot generation shellscript includes lines which execute a program to display the Postscript image on the screen. This option causes those lines to be commented out so that executing the shellscript produces a Postscript plot but does not attempt to display it on the screen. Alternatively, invoking the plot generation shellscript with a **-N** command line argument also suppresses the screen display of the plot. The program to be used to display the Postscript is set using **mbdefaults**; the default value can be overridden by setting the environment variable $MB_PS_VIEWER.

–R *west/east/south/north*
west, east, south, and *north* specify the Region of interest. To specify boundaries in degrees and minutes [and seconds], use the dd:mm[:ss] format. Append **r** if lower left and upper right map coordinates are given instead of wesn. You may ask for a larger *w/e/s/n* region to have more room between the image and the axes. A smaller region than specified in the grdfile will result in a subset of the grid [Default is region given by the grdfile].

–S *symbol/size*
Selects symbol to be used for plotting the next xy data file. Setting *symbol* = "N" causes line plotting. Choose between:

–Sa st**a**r. *size* is radius of circumscribing circle.

–Sb **b**ar extending from *base* to y. *size* is bar width. By default, *base* = 0. Append */base* to change this value. Append **u** if *size* is in x-units [Default is inch].

–Sc **c**ircle. *size* is diameter of circle.

–Sd **d**iamond. *size* is side of diamond.

–Se **e**llipse. Direction (in degrees counterclockwise from horizontal), major_axis (in inch), and minor_axis (in inch) must be found in columns 3, 4, and 5.

–Sf **f**ault. Give distance gap between ticks and ticklength in inch. If gap is negative, it is interpreted to mean number of ticks instead. Append **l** or **r** to draw tick on the left or right side of line [Default is centered]. Upper case **L** or **R** draws a triangle instead of line segment.

–Sh **h**exagon. Give side in inch.

–Si **i**nverted triangle. Give side in inch.

–Sl **l**etter or text string. Give size in inch, and append */string* after the size. Note that the size is only approximate; no individual scaling is done for different characters. Remember to escape special characters like *.

–Sp **p**oint. No size needs to be specified (1 pixel is used).

–Ss **s**quare. Give side in inch.

–St **t**riangle. Give side in inch.

–Sv **v**ector. Direction (in degrees counterclockwise from horizontal) and length (in inch) must be found in columns 3 and 4. *size*, if present, will be interpreted as arrowwidth/headlength/headwidth (in inch) [Default is 0.03/0.12/0.1 inch]. By default arrow attributes remains invariant to the length of the arrow. To have the size of the vector scale down with decreasing size, append n*norm*, where vectors shorter than *norm* will have their attributes scaled by length/*norm*.

–SV Same as **–Sv**, except azimuth (in degrees east of north) should be given instead of direction. The azimuth will be mapped into an angle based on the chosen map projection (**–Sv** leaves the directions unchanged.)

–Sx cross. Give length in inch.

–U *orientation*
Normally the orientation of the plot (portrait or landscape) is selected automatically so as to maximize the plot scale. The **–U** option allows the user to set the plot orientation. If *orientation* = 1, a portrait plot will be produced; if *orientation* = 2, a landscape plot will be produced.

–V Causes **mbm_xyplot** to operate in "verbose" mode so that it outputs more information than usual.

–W *pen*
Set pen attributes for xy plotting. See chapter 4.12 in the GMT Technical reference for a discussion of GMT pen values. [Defaults: width = 1, color = 0/0/0, texture = solid].

–X Normally, **mbm_xyplot** creates an executable shellscript and then exits. This option will cause the shellscript to be executed in the background before **mbm_xyplot** exits.

–Z **mbm_xyplot** extracts the desired columns of the input data and creates secondary files with the xy values to be plotted. Normally these files are left in place by the plot shellscript to be used multiple times. The **–Z** option causes the shellscript to delete those secondary files.

EXAMPLES

Suppose we have obtained a swath sonar data file called sb2112_example.mb41 collected using a SeaBeam 2112 sonar. In order to obtain an xy plot of the center beam depth versus time, we first extract the time-depth xy doubles from the swath sonar file using **mblist**:

```
mblist –F41 –Isb2112_example.mb41 –OmZ > mz.dat
```

Here time is in seconds from the start of the file and the depths are in meters, positive upward (topography rather than bathymetry). Now, we use **mbm_xyplot** to generate shellscripts which in turn generate plots when executed. First, we generate a simple black line plot:

```
mbm_xyplot –Imz.dat –Omz
```

The above command generates an executable shellscript mz_line.cmd; executing this shellscript will generate a Postscript plot and display it on the screen.

Suppose we also have a sparse set of depth estimates in a file called sr.dat obtained by picking the seafloor on a seismic reflection record, and we wish to compare the two sets of depths. We can plot the swath sonar derived depths as a black line and the seismic derived depths as red stars as follows:

```
mbm_xyplot –Omz_sr –Imz.dat \
        -IG255/0/0:Sa/0.1:sr.dat
```

As an example, the contents of the plotting shellscript "mz.cmd" are:

```
#
# Shellscript to create Postscript plot of data in grd file
# Created by macro mbm_xyplot
#
# This shellscript created by following command line:
# mbm_xyplot –Imz.dat –Omz
#
# Save existing GMT defaults
echo Saving GMT defaults...
```

```
gmtdefaults –L > gmtdefaults$$
#
# Set new GMT defaults
echo Setting new GMT defaults...
gmtset ANOT_FONT Helvetica
gmtset LABEL_FONT Helvetica
gmtset HEADER_FONT Helvetica
gmtset ANOT_FONT_SIZE 8
gmtset LABEL_FONT_SIZE 8
gmtset HEADER_FONT_SIZE 10
gmtset FRAME_WIDTH 0.074999999999999997
gmtset TICK_LENGTH 0.074999999999999997
gmtset PAGE_ORIENTATION LANDSCAPE
gmtset COLOR_BACKGROUND 0/0/0
gmtset COLOR_FOREGROUND 255/255/255
gmtset COLOR_NAN 255/255/255
#
# Make xy data plot
echo Running psxy...
psxy mz.dat \
        -Jx0.0011071486125582637/0.0062732342007434947 \
        -R0/8128.99/-4382/-3306 \
        -X1 –Y0.5 –K –V > mz.ps
# # Make basemap
echo Running psbasemap...
psbasemap –Jx0.0011071486125582637/0.0062732342007434947 \
        -R0/8128.99/-4382/-3306 \
        -B500/100:."Data File mz.dat": \
        -O –V >> mz.ps
#
# Delete surplus files
echo Deleting surplus files...
rm –f
#
# Reset GMT default fonts
echo Resetting GMT fonts...
mv gmtdefaults$$ .gmtdefaults
#
# Run xpsview
echo Running xpsview in background...
xpsview –ps a –or landscape –maxp 4m mz.ps &
#
# All done!
echo All done!
```

ADVANCED EXAMPLES

Suppose we have a file of NMEA GGA strings logged from a GPS receiver whose data looks like the following:

filename: gps.raw:

```
$GPGGA,23.0,5427.89080,N,14600.29458,W,1,10,0.9,19.01,M,6.40,M,,*70
$GPGGA,24.0,5427.89248,N,14600.30088,W,1,10,0.9,19.39,M,6.40,M,,*7B
$GPGGA,25.0,5427.89424,N,14600.30713,W,1,10,0.9,19.72,M,6.40,M,,*7C
```

We can specify a comma delimited file and convert the latitude and longitude fields to decimal degrees on the fly with the following:

mbm_xyplot −ID,:C'substr(c[5],0,3)+substr(c[5],3,length(c[5])) /60_substr(c[3],0,2)+substr(c[3],2,length(c[3]))/60':gps.raw

This is about as ugly as it gets. However, it is quite straightforward and very handy, so let us pick this apart. The −I flag specifies the file to plot and its parameters. The D subfield followed by ',' indicates the file is comma delimited. The C subfield followed by the Perl expression extracts fields to plot. There are two expressions here, the x values, (longitude) and the x values (latitude) separated by an "_". In the longitude expression, the degree portion of the longitude, which is the 5th field (c[5]) is extracted and added to the minute portion of the longitude divided by 60. The same is done with the latitude field, (c[3]).

Note the single quotes surrounding the C expression. These are required to ensure complex expressions such as these are not inadvertently interpreted by the shell.

SEE ALSO

mbsystem(1), **mbcontour**(1), **mbswath**(1), **mbdefaults**(1), **mbm_grdplot**(1), **mbm_grd3dplot**(1), **mbm_plot**(1)

BUGS

Please let us know.