PIM reference and manual
DRAFT

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1 Introduction

Who's PIM**?**

- PIM is the Perfect Image Mapper, a program by Remko Scharroo and Edwin Wisse of the Delft University of Technology's Section Space Research and Technology.

- PIM is build on the PMPLOT subroutine library by Remko Scharroo, which is an adjusted version of PGPLOT by Tim Pearson of CalTech.

- PIM is written to generate contour plots and colour plots of grids of geographical data, such as sea surface height.

- PIM supports all devices that are in the current PMPLOT library release: PostScript (colour and greyscale), XWindows, VT100, GIF, and PPM.

- PIM is fast and versatile.

- PIM uses a handy "input card format"

2 Command Reference

2.1 GRIDAREA lon0 lon1 lat0 lat1

The **GRIDAREA** command specifies the longitude and latitude boundaries of the grids that are to be plotted. If the card is omitted, an attempt is made to read the areas from the grids. If the area is not given in the grid header, or when this conflicts with the area given on the **GRIDAREA** card, an error message is given and the program will halt. The arguments **lon0 lon1 lat0 lat1** area manditory and specify the most western and eastern longitude and the most southern and northern longitude respectively. Negative numbers indicate west or south, positive numbers east or north.

2.2   SURFACE filename *min max*

To plot a grid in a scale of colours, use the **SURFACE** command. This card specifies the name of the grid file to be plotted (**filename**, manditory), and the range of values that are to be assigned colours, *min max*. If values in the grid are less than *min*, they will obtain the same colour as *min*, and similar for *max*. Illegal values will always be assigned the "bad data" colour (index 3).

   If the extreems are omitted, the minimum and maximum value in the grid are assumed. If the card is omitted, no grid is plotted.

   It is also possible to replace the **filename** by an arithmatic expression with file names, *e.g.*, `seaheight.grd + geoid.grd`. Adding (+) and subtracting (-) is allowed.

2.3   ILLUM *filename min max angle*

To illuminate the surface that you have plotted with the **SURFACE** command, you can use the **ILLUM** card. Specify the name of the grid to be illuminated with the optional argument *filename*. To make it easy, if you do not specify *filename*, or type a "=", PIM will assume the same file name as on the **SURFACE** card. The optional arguments *min max*, specify the slopes that acquire the minimum and maximum shading; *angle* indicates the direction of the simulated light source illuminating the surface, measured counter-clockwise starting from the right. The default is illumination from the top left corner, *i.e.*, *angle* = 135.

   To provide the illumination effect, PIM will automatically generate a new colour map from the original one specified on the **COLOUR** card. Depending on the device capabilities, each original colour will be represented by a number of "shades". (See also **QUANT** and **COLOUR**.)

2.4   CONTOUR *filename min max int*

A grid may also be presented as contours, using the **CONTOUR** card. If no arguments are given, the **FILENAME** is assumed equal to the one on the **SURFACE** card, and contours are plotted are printed in between the different colour levels. However, the minimum and maximum contour level, and the interval may also be specified by the *min max int* parameters.

2.5   DITHER *dither1 dither2*

To adjust the dithering of colours and shades, the **DITHER** command can be used. The default (if the card is omitted or used without arguments) is the no dithering is applied between different colours, but is applied between different shades of the same colour, *i.e.*, *dither1 dither2* = F T. Use, for instance **DITHER T** to switch on the dithering between th colours to have a smooth colour range.

2.6   DEVICE name

The card is manditory if you want to see something plotted. The **name** field on the **DEVICE** card should be one of the device names or types in the PGPLOT syntax. For instance, use `/xw` for Xwindows, `plot.gif/gif` to save the plot as a GIF file `plot.gif`. Other device types are: /ps, /vps, /cps, /cvps, /ppm, /tek.

2.7   COLOUR name

The **COLOUR** command specifies the colour map for plotting. The **name** refers to one of the colour maps in the directory `/home/edwin/coulourmaps` or one in your local directory. If the card is omitted, a default map is assumed.

  If illumination is performed, the colour range specified in the colour map is adjusted to be two-dimensional. One dimension (the colour dimension) will represent the original colours; the second dimension (the shade dimension) will simulate the illumination by setting a number of shades (dark to light) to each original colour. In total, the number of created indices should not exceed the device capabilities. For instance, if you use `twelve.col` and the Xwindow driver which supports 145 colours, then 16 are assigned colours, such as the foreground and background colour, and the remaining are devided into 12 colours with 10 shades each. The PPM and PS drivers support "true colour" capabilities. For these devices, the number of shades is set to 256.

  The **QUANT** card can be used to decrease the number of colours that is allowed, below the device capabilities.

2.8   QUANT *colours*

To quantisize the number of allowed colours below that of the device capabilities, use the **QUANT** card. If the card or the *colours* argument is omitted, the maximum number of colours allowed by the driver are assumed.

2.9   BACKGROUND *filename*

To adjust the background from being in one colour, use the **BACKGROUND** command. The *filename* should specify a PGM file. If the argument is omitted the TU Delft logo is plotted.

  This command is only allowed for pixel devices.

  (This command is not yet fully supported.)

2.10   LOGO *filename x0 y0*

To plot the TU Delft logo at the bottom left corner of the background, use the **LOGO** command without arguments. The arguments *filename x0 y0* may

be used to specify a different PGM file or a different location (in normalised viewport coordinates).

This command is only allowed for pixel devices.

(This command is not yet fully supported.)

2.11 PROJECT type *scale*

The projection type is defined with the **PROJECT** command. Valid projection types are given in the PMPLOT manual. The default projection is equirectangular (type 1).

The scale of the plot can be given as well. By default the plot will be scaled to fit the largest possible space in the viewport.

2.12 VIEWPORT x0 x1 y0 y1

To adjust the amount of space used by the plot, the viewport can be adjusted with the **VIEWPORT** command. The default values of the viewport boundaries **x0 x1 y0 y1** are 0.05 0.95 0.05 0.95. Other possibilities are **VIEWPORT big** (default) or **VIEWPORT fullscreen** or **VIEWPORT small**.

2.13 TITLE string

The title of the plot can be specified with the **TITLE** command. If this command is used, extra space is reserved at the bottom of the viewport to fit the text.

2.14 PLOTAREA lon0 lon1 lat0 lat1

The **PLOTAREA** command specifies the longitude and latitude boundaries of the region that has to be plotted, which does not have to be the same as the region defined by the grid boundaries.

If the card is omitted, the area that is plotted is the same as the gridarea defined by the **GRIDAREA** command or the grid file header. The arguments **lon0 lon1 lat0 lat1** are manditory and specify the most western and eastern longitude and the most southern and northern longitude of the plot respectively. Negative numbers indicate west or south, positive numbers east or north.

2.15 LEGEND *units hmin hmax hint nsubs*

With the **LEGEND** command the plotting of a legend bar is invoked. Automatically space is reserved on the right side or bottom of the viewport to fit the bar. Whether the bar appears on the right or bottom depends on the shape of the plot.

By default, the string "meters" is printed to indicate the units. However, this mat be overruled by specifying the *units* parameter. In addition, the range of the bar, specified on the **SURFACE** card can be overruled by the parameters *hmin hmax*. If you do not like the PGPLOT standard interval generation, redefine this with *hint nsubs*.

For example, if you have a grid containing heights in meters, and specified *min max* as 0.0 0.20 on the **SURFACE** card, you may like to use **LEGEND cm 0 20** to get the bar in centimeters.

2.16 INTER *xcells ycells*

Normally, PIM does not interpolate your grid, but this is very much recommended, especially for pixel devices, such as /xw and /gif. Interpolating can be invoked with the **INTER** command. If this command is used, PIM will interpolate the grid to pixel level. Otherwise, your grid will be plotted as rectangular cells of the original size of the grid cells.

If you use a PostScript device, **INTER** can be used to reduce the resolution of the grid to reduce the plot size. Resolutions between 200 200 and 400 400 are optimal for these devices.

2.17 INFO

To get some information on the grids and some options, use the **INFO** command.

2.18 NOTATION **filename**

Use or generate a notation file.

(This command is not properly supported yet).

2.19 BOX *linewidth 'xopt' xint nxsub 'yopt' yint nysub*

To change the default parameters for plotting of the box around the plot surface (1 'bcnsti' 0 0 'bcnstiv' 0 0), the **BOX** command can be used. If the linewidth is set to 0, no box will be plotted. Also, parts of the box may be removed by omitting some of the 'xopt' or 'yopt' parameters (have to be within quotes). The parameters *xint nxsub yint nysub* handle the printing of major and subticks.

2.20 BATHYM *filename linewidth levels*

To plot bathymetric contours, use the **BATHYM** command. The argument *filename* specifies the WDB data set (default 2.nat.bth), *linewidth* the line width (default 1), and *levels* up to 5 levels to be plotted (default -3500 -2000).

This card may be repeated to use more levels or different WDB data sets.

2.21   LAND *filename*

To draw a land mask the **LAND** command is invoked. By default, the land mask is read from the 1.lnd WDB data set, but you can specify others with the optional *filename* parameter.

This card may be repeated to use different WDB data sets.

2.22   COAST *filename linewidth*

The **COAST** command controls plotting of a coast line. By default, the 1.cil WDB data set is used, but you can specify others with the optional *filename* parameter. In addition, the linewidth (default 1) can be redefined by the *linewidth* parameter.

This card may be repeated to use different WDB data sets.

2.23   XGF **filename** *colour marker linewidth size*

If you want to plot markers, store the locations in XGF format and use the **XGF** command in PIM. The parameter **filename** is manditory and specifies the XGF filename. Additional parameters *colour marker linewidth size* control the colour index, marker type, line width, and size (in character heights).

If a color index of -999 is specified, the colour index will change according to the height field in the XGF file and the colour range. If a marker type of -1 is specified you will get point markers, and -999 means: get the marker type from the sigma field in the XGF. Defaults for the optional arguments are -999 -1 2 1.