NAME

mbhistogram – Generate a histogram of bathymetry, amplitude, or sidescan values from swath sonar data files.

VERSION

Version 5.0

SYNOPSIS

mbhistogram [-Akind -Byr/mo/da/hr/mn/sc -C -Dmin/max -Eyr/mo/da/hr/mn/sc -Fformat -G -Ifile-name -Llonflip -Mnintervals -Nnbins -Pping -Rwest/east/south/north -Sspeed -V -H]

DESCRIPTION

mbhistogram reads a swath sonar data file and generates a histogram of the bathymetry, amplitude, or sidescan values. Alternatively, mbhistogram can output a list of values which break up the distribution into equal sized regions. These values can be used to construct a color table, producing an image which is histogram equalized. If desired, the histogram can be recast into a Gaussian distribution before output or the calculation of the histrogram equalization This feature is similar to the Gaussian option of **grdhisteq**. The linear histogram equalization is most appropriate for use with grayscale images, such as those produced from amplitude or sidescan data, and is used by the macro **mbm_plot** for that purpose. The Gaussian histogram equalization is well suited for shading of images, and is used by **mbm_plot** for shading of color bathymetry with amplitude data. The results are dumped to stdout.

MB-SYSTEM AUTHORSHIP

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OPTIONS

−**A** kind

Sets the kind of data to be processed, where

kind = 0: histogram of bathymetry data kind = 1: histogram of beam amplitude data

kind = 2: histogram of sidescan data Default: kind = 2.

-B *yr/mo/da/hr/mn/sc*

This option sets the starting time for data allowed in the input data. The $-\mathbf{E}$ option sets the ending time for data. If the starting time is before the ending time, then any data with a time stamp before the starting time or after the ending time is ignored. If instead the starting time is after the ending time, then any data between the ending and starting time will be ignored. This scheme allows time windowing both inside and outside a specified interval. Default: yr/mo/da/hr/mn/sc = 1962/2/21/10/30/0.

−D *min/max*

Specifies the minimum and maximum data values used for constructing the histogram. The width of the bins is determined by (max - min) divided by nbins (see the -N option). The min value is the center of the first histogram bin, and the max value is the center of the last histogram bin. Data values falling outside the range of the bins are ignored.

$-\mathbf{E}$ yr/mo/da/hr/mn/sc

This option sets the ending time for data allowed in the input data. The $-\mathbf{B}$ option sets the starting time for data. If the starting time is before the ending time, then any data with a time stamp before the starting time or after the ending time is ignored. If instead the starting time is after the ending time, then any data between the ending and starting time will be ignored. This scheme allows time windowing both inside and outside a specified interval. Default: yr/mo/da/hr/mn/sc = 2062/2/21/10/30/0.

-**F** format

Sets the data format used if the input is read from stdin or from a file. If format < 0, then the input file specified with the $-\mathbf{I}$ option will actually contain a list of input swath sonar data files. This program uses the **MBIO** library and will read or write any swath sonar format supported by **MBIO**. A list of the swath sonar data formats currently supported by **MBIO** and their identifier values is given in the **MBIO** manual page. Default: format = 11.

-G This option causes the data histogram to be recast into a Gaussian distribution.

-I filename

Sets the input filename. If format > 0 (set with the $-\mathbf{f}$ option) then the swath sonar data contained in infile is read and processed. If format < 0, then infile is assumed to be an ascii file containing a list of the input swath sonar data files to be processed and their formats. The program will read the data in each one of these files. In the infile file, each data file should be followed by a data format identifier, e.g.:

datafile1 11 datafile2 24

This program uses the **MBIO** library and will read or write any swath sonar format supported by **MBIO**. A list of the swath sonar data formats currently supported by **MBIO** and their identifier values is given in the **MBIO** manual page. Default: *infile* = "stdin".

-L lonflip

Sets the range of the longitude values returned. If lonflip=-1 then the longitude values will be in the range from -360 to 0 degrees. If lonflip=0 then the longitude values will be in the range from -180 to 180 degrees. If lonflip=1 then the longitude values will be in the range from 0 to 360 degrees. Default: lonflip=0.

-M nintervals

If *nintervals* > 0 then **mbhistogram** will calculate and output a list of values which break up the data distribution into equal sized regions. This can be useful for constructing color tables which accentuate features in amplitude and sidescan data (the macro **mbm_plot** makes use of this feature). If this option is enabled, then the raw histogram is not output.

−N nbins

Sets the number of bins used to calculate the histogram.

-P pings

Sets the ping averaging of the input data. If pings = 1, then no ping averaging is performed. If pings > 0, then that number of input pings will be averaged to produce one output ping. If pings = 0, then the ping averaging will automatically be done so that the along-track ping spacing is equal to the across-track beam spacing. Default: pings = 1 (no ping averaging).

-**R** west/east/south/north

Sets the longitude and latitude bounds within which swath sonar data will be read. Only the data which lies within these bounds will be read. Default: west=-360, east=360, south=-90, north=90.

−S speed

Sets the minimum speed in km/hr (5.5 kts $^{\sim}$ 10 km/hr) allowed in the input data; pings associated with a smaller ship speed will not be copied. Default: speed = 0.

- $-\mathbf{T}$ timegap
 - Sets the maximum time gap in minutes between adjacent pings allowed before the data is considered to have a gap. Default: timegap = 1.
- $-\mathbf{V}$ Normally, **mbhistogram** only prints out the statistics obtained by reading all of the data. If the -V flag is given, then MBCOPY works in a "verbose" mode and outputs the program version being used and all read error status messages.
- -H This "help" flag cause the program to print out a description of its operation and then exit immediately.

EXAMPLES

Suppose one wishes to obtain a histogram of the sidescan data in a file called mbexample.mb41 containing raw data from a SeaBeam 2112 sonar (format 41). The following will suffice:

mbhistogram -F41 -I sb199411211212.rec -D0.0/45000 -N25

```
to yield the following histogram:
```

```
0.000000 183814
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1875.000000 30845

3750.000000 5365

5625.000000 1918

7500.000000 951

9375.000000 591

11250.000000 403

13125.000000 232

15000.000000 189

16875.000000 127

18750.000000 108

20625.000000 75

22500.000000 85

24375.000000 48

26250.000000 30

28125.000000 31

30000.000000 28

31875.000000 21

33750.000000 10

35625.000000 9

37500.000000 4

39375.000000 2

41250.000000 2

43125.000000 2

45000.000000 1

In order to obtain 16 values breaking up the distribution into equal sized regions, use the $-\mathbf{M}$ option: mbhistogram -F41 -I sb199411211212.rec -D0.0/45000 -N45000 -M25

giving:

-0.500011

110.657221

137.446811

165.916284

199.635469

239.900007

287.726270

345.615610 418.142114

513.487776

639.986551

824.475879 1140.372280 1994.280032 44803.495633

SEE ALSO

 $mbsystem(1), mbm_plot(1), grdhisteq(1)$

BUGS

You find em, we fix 'em...