

**NAME**

**mbhysweeppreprocess** – performs preprocessing of multibeam data in the Hysweep HSX format (MBIO format 201).

**VERSION**

Version 5.0

**SYNOPSIS**

**mbhysweeppreprocess** [**-A***offsettype/x/y/z/t* **-B***rollbias/pitchbias/headingbias* **-D***sonardepthfile* **-I***datalist* **-J***projection* **-L** **-M***navformat* **-N***navfile* **-T***timelag* **-H** **-V**]

**DESCRIPTION**

**mbhysweeppreprocess** reads a Hysweep HSX (format 201) file, interpolates the asynchronous navigation and attitude onto the multibeam data, and writes a new HSX file with that information correctly embedded in the multibeam data. The user must specify a projection for the easting-northing navigation used in HSX files. This program can also fix various problems with multibeam data, and allows for lever arm correction of offsets between the sonar, the motion sensor, and the positioning sensor (provided the navigation and attitude data included in the HSX file are uncorrected for sensor offsets)..

**MB-SYSTEM AUTHORSHIP**

David W. Caress  
 Monterey Bay Aquarium Research Institute  
 Dale N. Chayes  
 Center for Coastal and Ocean Mapping  
 University of New Hampshire  
 Christian do Santos Ferreira  
 MARUM - Center for Marine Environmental Sciences  
 University of Bremen

**OPTIONS**

- A** *type/offsetx/offsety/offsetz/offsett*  
 This option sets the spatial and time offset for a sensor relative to a reference point on the survey platform (by convention usually close to the center of mass and rotation). If *type* = 1, the offsets pertain to the survey sonar. If *type* = 2, the offsets pertain to the source of the attitude data, usually an MRU or INS. If *type* = 3, the offsets pertain to the source of the position or navigation data. The time offsets are referenced against the sonar data, thus the sonar time offset will usually be zero. If any of these offsets are defined, then **mbhysweeppreprocess** will use lever arm calculations to determine the x, y, and z offsets associated with the platform attitude for each ping, and add those to the sonar navigation and depth values.
- B** *rollbias/pitchbias/headingbias*  
 This option sets roll, pitch, and heading bias values to be applied before merging the attitude and heading data with the sonar data while calculating bathymetry.
- D** *sonardepthfile*  
 This option causes **mbhysweeppreprocess** to read a sonar depth time series from the specified file and use that data in place of any sonar depth (DFT) records present in the HSX file. The sonar depth data must be in an ascii format of the form:  
 yyyy:mm:dd:hh:mm:ss.sss zzzz.zzz  
 where yyyy=year, mm=month, dd=day, hh=hour, mm=minute, ss.sss = seconds, and zzzz.zzz = sonar depth in meters.

- F** *format*  
Sets the format of the input file specified with the **-I** option. This is normally omitted unless the input filename does not conform to the **MB-System** file naming conventions. For this program, the only relevant options are *format* = 201 for an HSX format file, or *format*= -1 for a datalist referencing multiple format 201 files.
- H** This "help" flag cause the program to print out a description of its operation and then exit immediately.
- I** *infile*  
Sets the input file path. If *format* > 0 (set with the **-f** option or **mbdefaults**) 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 201  
 datafile2 201  
 This program only reads Hysweep HSX format data files (**MBIO** format 201).
- J** *projection*  
The Hypack and Hysweep software packages operate with navigation in a user-defined projected coordinate system. Resultantly, HSX format files contain positions in a projected coordinate system rather than longitude and latitude in geographic coordinates. Generally, the HSX files do not contain any description of the projection used to obtain the eastings and northings in those files. This option allows a user to specify the projection used to translate the eastings and northings back into longitude and latitude. If this option is not specified, **MB-System** will assume the data are associated with UTM zone 1 north. The projection identifier must conform to the same usage as with projections specified for **mbgrid**. For instance, to fully specify a particular northern UTM zone, set projection = UTMXXN where XX gives the UTM zone (defined from 01 to 60). As an example, a northern UTM zone 12 projection can be specified using -JUTM12N. Southern UTM zones are specified as UTMXXS. The European Petroleum Survey Group (EPSG) has defined a large number of PCS's used worldwide and assigned number id's to each; one can also specify the northern UTM zone 12 projection using its EPSG designation, or -Jepsg32612. The complete list of projected coordinate systems supported by **MB-System** is given in the **mbgrid** manual page.
- L**  
This option causes the program to list the timetags of bathymetry, navigation, attitude, and other data records.
- M** *navformat*  
Sets the input navigation file format used by the file specified with the **-N** option.  
 At present, the only option for the navigation file format is *navformat*=1:  
 yyyy:mm:dd:hh:mm:ss.sss sssss.sss eeeeeee.eee nnnnnnnn.nnn zzzz.zzz aaa.aaa hhh.hhh  
 where yyyy=year, mm=month, dd=day, hh=hour, mm=minute, ss.sss = seconds, sssss.sss = seconds from the start of the year, eeeeeee.eee = easting in meters, nnnnnnnn.nnn = northing in meters, zzzz.zzz = sonar depth in meters, and hhh.hhh = heading in degrees. Default: *navformat*=1.
- N** *navfile*  
The program will read navigation from the file *navfile* and merge those data with the multibeam data in the HSX file. If a timelag model is specified using **-Ttimelag**, the time lag will be applied to the navigation and attitude data before merging with the sonar data. The navigation and attitude data from *navfile* will also be embedded in asynchronous data records in the output format 201 data. Any pre-existing navigation data records will remain unchanged in the data stream. However, the HSX file header will be altered to show the newly merged data as "enabled" and the original, asynchronous data as not enabled.
- T** *timelag*  
This option specifies a *timelag* value in seconds to be applied to the navigation and attitude data prior to it being merged with the bathymetry. If *timelag* is a valid path to a file containing time

stamp and time lag pairs, then these data will be read and the time lag applied to particular records will be interpolated by time.

- V This option increases the verbosity of **mbhysweeppreprocess** with respect to informational output to the shell.

## EXAMPLES

Suppose that one has logged a set of five HSX files incorporating multibeam sonar data, navigation, attitude, heading, and altitude data, but not sonar depth data, all from an ROV platform. Further suppose that a datalist file named `datalist_hsx.mb-1` references those files, and that a separate text file named `ROVnav.txt` includes an improved vehicle navigation, including the sonar depth. Finally, suppose that the existing sensor offsets are known, but have not been applied to any of the existing data

In order to merge the better navigation and sonar depth before starting MB-System processing, do something like:

```
mbhysweeppreprocess      -I      datalist_hsx.mb-1      -A1/0.42/2.005/-1.34/0.0
-A2/0.46/0.22/0.55/0.0   -A3/0.46/0.22/0.55/0.0      -JUTM01N -NROVnav.txt
```

The program will output something like the following:

Data available for merging:

Navigation (northing easting sonardepth altitude heading): 120959

Sonar depth (sonardepth): 0

Time lag: 0

Offsets to be applied:

	X (m)	Y (m)	Z (m)	T (sec)
Roll bias:	0.000			
Pitch bias:	0.000			
Heading bias:	0.000			
Sonar:	0.420	2.005	-1.340	0.000
MRU:	0.420	2.005	-1.340	0.000
Nav:	0.420	2.005	-1.340	0.000

Data records read from: 000\_2004.HSX

Positions (POS): 2651

Positions ignored (POS): 0

Heading (GYR): 19486

Attitude (HCP): 15752

Echosounder (altitude) (EC1): 2651

Dynamic draft (DFT): 0

Raw multibeam (RMB): 24438

Other: 64978

Data records read from: 000\_2048.HSX

Positions (POS): 2967

Positions ignored (POS): 0

Heading (GYR): 21942

Attitude (HCP): 17771

Echosounder (altitude) (EC1): 2967

Dynamic draft (DFT): 0

Raw multibeam (RMB): 25363

Other: 71010

Data records read from: 000\_2138.HSX

Positions (POS): 2573

Positions ignored (POS): 0

Heading (GYR): 18936

Attitude (HCP): 15307  
Echosounder (altitude) (EC1): 2573  
Dynamic draft (DFT): 0  
Raw multibeam (RMB): 23398  
Other: 62787

Data records read from: 000\_2221.HSX

Positions (POS): 2824  
Positions ignored (POS): 0  
Heading (GYR): 20863  
Attitude (HCP): 16907  
Echosounder (altitude) (EC1): 2824  
Dynamic draft (DFT): 0  
Raw multibeam (RMB): 23993  
Other: 67411

Data records read from: 000\_2308.HSX

Positions (POS): 2657  
Positions ignored (POS): 0  
Heading (GYR): 19571  
Attitude (HCP): 15818  
Echosounder (altitude) (EC1): 2657  
Dynamic draft (DFT): 0  
Raw multibeam (RMB): 24009  
Other: 64712

Total data records read from: datalist\_hsx.mb-1

Positions (POS): 13672  
Positions ignored (POS): 0  
Heading (GYR): 100798  
Attitude (HCP): 81555  
Echosounder (altitude) (EC1): 13672  
Dynamic draft (DFT): 0  
Raw multibeam (RMB): 121201  
Other: 330898

Data records written to: 000\_2004.mb201

Positions (POS): 2651  
Positions ignored (POS): 0  
Heading (GYR): 19486  
Attitude (HCP): 15752  
Echosounder (altitude) (EC1): 2651  
Dynamic draft (DFT): 0  
Raw multibeam (RMB): 24438  
Other: 0

Data records written to: 000\_2048.mb201

Positions (POS): 2967  
Positions ignored (POS): 0  
Heading (GYR): 21942  
Attitude (HCP): 17771  
Echosounder (altitude) (EC1): 2967  
Dynamic draft (DFT): 0  
Raw multibeam (RMB): 25363

Other: 0

Data records written to: 000\_2138.mb201

Positions (POS): 2573  
 Positions ignored (POS): 0  
 Heading (GYR): 18936  
 Attitude (HCP): 15307  
 Echosounder (altitude) (EC1): 2573  
 Dynamic draft (DFT): 0  
 Raw multibeam (RMB): 23398  
 Other: 0

Data records written to: 000\_2221.mb201

Positions (POS): 2824  
 Positions ignored (POS): 0  
 Heading (GYR): 20863  
 Attitude (HCP): 16907  
 Echosounder (altitude) (EC1): 2824  
 Dynamic draft (DFT): 0  
 Raw multibeam (RMB): 23993  
 Other: 0

Data records written to: 000\_2308.mb201

Positions (POS): 2657  
 Positions ignored (POS): 0  
 Heading (GYR): 19571  
 Attitude (HCP): 15818  
 Echosounder (altitude) (EC1): 2657  
 Dynamic draft (DFT): 0  
 Raw multibeam (RMB): 24009  
 Other: 0

Total data records written from: datalist\_hsx.mb-1

Positions (POS): 13672  
 Positions ignored (POS): 0  
 Heading (GYR): 100798  
 Attitude (HCP): 81555  
 Echosounder (altitude) (EC1): 13672  
 Dynamic draft (DFT): 0  
 Raw multibeam (RMB): 121201  
 Other: 0

## SEE ALSO

**mbsystem(1)**, **mbformat(1)**, **mbinfo(1)**

## BUGS

At this point, the HSX i/o module and preprocessor are only tested with a single survey of R2Sonic data.