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)..

AUTHORSHIP

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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 specifiy 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 eeeeeeee.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, eeeeeeee.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 **–T***timelag*, 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.