NAME

mbkongsbergpreprocess – performs preprocessing of data from third generation Kongsberg multibeam sonars (e.g. EM122, EM302, EM710).

VERSION

Version 5.0

SYNOPSIS

mbkongsbergpreprocess [**–A** **–C** **–D***outputdirectory* **–F***format* **–I***file* **–O***outfile* **–SF***datatype/source* **–T***timelag* **–H** **–V**]

DESCRIPTION

mbkongsbergpreprocess reads data from a third generation Kongsberg multibeam sonar (e.g. EM122, EM302, EM710), interpolates the asynchronous navigation, heading, and attitude onto the multibeam data, and writes a new file with that information correctly embedded in the multibeam survey data. The input files may be in the vendor format MBF_EM710RAW (format id 58) or the **MB-System** extended format MBF_EM710MBA (format id 59); the output files will always be in the **MB-System** extended format MBF_EM710MBA (format id 59).

Like most modern swath survey data streams, Kongsberg multibeam data includes navigation, attitude, and heading data logged in separate data records as output by the respective sensors. Since each of these values is time stamped according to its origin rather than synced with multibeam pings, these values are asynchronous relative to the survey ping data. When multiple sources of navigation, heading, and/or attitude have been recorded in a data stream, **mbkongsbergpreprocess** allows the user to specify which asynchronous data are extracted and interpolated onto the survey data using the **–S** option.

This program allows the correction of a time latency (or time lag) error between the sonar data and the attitude and navigation data using the **–T** option.

The format 58 files This program also creates four ancilliary files containing the full asynchronous attitude, sonar depth, and heading data and the synchronous attitude data in parallel with each output format 59 file. These files are used, when present, by **mbeditviz** to facillitate interactive analysis of time lag issues. Each of these are text files with white-space delimited columns; the first column is always time in decimal unix seconds. These have the following suffixes:

asynchronous attitude (roll and pitch):	*.ata
asynchronous heading:	*.ath
asynchronous sonar depth:	*.ats
synchronous attitude (roll and pitch):	*.sta

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OPTIONS

–A

This option causes the program to attempt to calculate reliable beam angles through iterative raytracing to match the original bathymetry. This process is very time consuming. At present, the simple calculation of beam angles produces noisy values that in turn produce noisy bathymetry when the soundings are recalculated by raytracing. Thus, if one needs to recalculate bathymetry with a new model for the sound speed structure of the water column (often called a sound velocity profile or SVP), the data should first be preprocessed using the **−A** option.

−C

This option causes **mbkongsbergpreprocess** to print counts of the many different data record types compising a Kongsberg data stream. The data record counts are output for each file and as totals from all files processed.

−D *outputdirectory*

This option causes all format 59 output files to be placed in the specified directory *outputdirectory* rather than parallel to the original "raw" files.

−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 **−I** option will actually contain a list of input swath sonar data files. This program only reads third generation Kongsberg multibeam format data files (**MBIO** formats 58 and 59).

−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.:

```
datafile.all 58
datafile.all 58
```

This program only reads third generation Kongsberg multibeam format data files (**MBIO** formats 58 and 59).

−O *outfile*

This option causes **mbkongsbergpreprocess** to output all data to a single file specified as *outfile*. By default, the program creates output files for each input file. If the **−D***outputdirectory* option is also used, then the output file *outfile* will be in *outputdirectory*.

−S *datatype/source*

This option specifies which data records should be the source of the navigation (*datatype* = 1), heading (*datatype* = 2), and attitude (*datatype* = 3) data that are interpolated onto the survey ping times. In each case the *source* value specifies a data record type. The possibilities for Kongsberg data include:

```
MB_DATA_NAV            12   /* Simrad, Reson 7k */
MB_DATA_HEADING        17   /* Simrad, Hypack */
MB_DATA_ATTITUDE       18   /* Simrad, Hypack, Reson 7k */
MB_DATA_NAV1           28   /* ancillary nav system 1 */
MB_DATA_NAV2           29   /* ancillary nav system 2 */
MB_DATA_NAV3           30   /* ancillary nav system 3 */
MB_DATA_ATTITUDE1      55   /* ancillary attitude system 1 */
MB_DATA_ATTITUDE2      56   /* ancillary attitude system 2 */
MB_DATA_ATTITUDE3      57   /* ancillary attitude system 3 */
```

−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.

EXAMPLES

Suppose that one has collected a set of three Kongsberg EM122 data files named:

```
0000_20111219_154640_METEOR_EM122.all
0001_20111219_163703_METEOR_EM122.all
0002_20111219_175708_METEOR_EM122.all
```

First, we want to generate a "datalist" file referencing the raw survey files. The following will suffice:

```
/bin/ls −1 *all | awk '{print $1" 58"}' > datalist_raw.mb-1
```

We want to use **mbkongsbergpreprocess** to gracefully interpolate the asynchronous navigation, heading and attitude data onto the survey data and to generate data files in the extended format (MBF_EM710MBA = 59). To learn which potential sources of navigation, heading and attitude are available, use **mbinfo** with the **−N** option:

```
$ mbinfo −I 0000_20111219_154640_METEOR_EM122.all −N
```

The **−N** option causes **mbinfo** to generate a list of the data record types read in the file at the end of the file statistics:

```
Swath Data File:      0000_20111219_154640_METEOR_EM122.all
MBIO Data Format ID:  58
Format name:          MBF_EM710RAW
Informal Description: Kongsberg current multibeam vendor format
Attributes:           Kongsberg EM122, EM302, EM710,
                      bathymetry, amplitude, and sidescan,
                      up to 400 beams, variable pixels, binary, Kongsberg.

Data Totals:
Number of Records:                         334
Bathymetry Data (432 beams):
  Number of Beams:           144288
  Number of Good Beams:      129951     90.06%
  Number of Zero Beams:           0      0.00%
  Number of Flagged Beams:    14337      9.94%
Amplitude Data (432 beams):
  Number of Beams:           144288
  Number of Good Beams:      129951     90.06%
  Number of Zero Beams:           0      0.00%
  Number of Flagged Beams:    14337      9.94%
Sidescan Data (1024 pixels):
  Number of Pixels:          342016
  Number of Good Pixels:     289910     84.77%
  Number of Zero Pixels:          0      0.00%
  Number of Flagged Pixels:   52106     15.23%

Navigation Totals:
Total Time:             0.8327 hours
Total Track Length:    13.6418 km
Average Speed:         16.3823 km/hr ( 8.8553 knots)

Start of Data:
Time:  12 19 2011 15:46:27.537000  JD353 (2011-12-19T15:46:27.537000)
Lon:   −11.562232000     Lat:    36.848179850     Depth:  4931.4829 meters
Speed: 17.6040 km/hr ( 9.5157 knots)  Heading: 129.1900 degrees
Sonar Depth:    5.6975 m  Sonar Altitude: 5025.2964 m

End of Data:
Time:  12 19 2011 16:36:25.308000  JD353 (2011-12-19T16:36:25.308000)
```

Lon: −11.489473500 Lat: 36.771997400 Depth: 3242.5244 meters
Speed: 12.7800 km/hr (6.9081 knots) Heading: 274.9200 degrees
Sonar Depth: 6.4334 m Sonar Altitude: 3236.0911 m

Limits:
Minimum Longitude: −11.635798757 Maximum Longitude: −11.391532562
Minimum Latitude: 36.723994163 Maximum Latitude: 36.919907119
Minimum Sonar Depth: 5.0135 Maximum Sonar Depth: 6.9798
Minimum Altitude: 3175.1121 Maximum Altitude: 5027.8770
Minimum Depth: 2391.9229 Maximum Depth: 5121.0713
Minimum Amplitude: −59.2000 Maximum Amplitude: −9.1000
Minimum Sidescan: −90.1300 Maximum Sidescan: −0.4700

Data Record Type Notices:
DN: 334 MB_DATA_DATA (ID=1): survey data
DN: 1 MB_DATA_VELOCITY_PROFILE (ID=6): SVP
DN: 1 MB_DATA_START (ID=10): Simrad start datagram
DN: 1 MB_DATA_STOP (ID=11): Simrad stop datagram
DN: 3023 MB_DATA_NAV (ID=12): Navigation record
DN: 287 MB_DATA_RUN_PARAMETER (ID=13): Simrad runtime parameter datagram
DN: 3022 MB_DATA_CLOCK (ID=14): Simrad clock datagram
DN: 2964 MB_DATA_ATTITUDE (ID=18): Attitude record
DN: 731 MB_DATA_SSV (ID=19): Surface sound speed record
DN: 3022 MB_DATA_NAV3 (ID=30): Auxiliary nav system 3
DN: 3023 MB_DATA_STATUS (ID=46): Status record
DN: 2964 MB_DATA_ATTITUDE1 (55): ancillary attitude system 1
DN: 1512 MB_DATA_ATTITUDE2 (56): ancillary attitude system 2

Nonfatal Error Notices:
EN: 20551 MB_ERROR_NO_DATA_REQUESTED (ID=−11): No data requested for buffer load

Problem Notices:

This listing shows that the format 58 file includes MB_DATA_NAV (*source* = 12) and MB_DATA_NAV3 (*source* = 30) records, both of which include both position and heading data. Also included are three sources of attitude data: MB_DATA_ATTITUDE (*source* = 18), MB_DATA_ATTITUDE1 (*source* = 55), and MB_DATA_ATTITUDE2 (*source* = 56).

To extract and use the default navigation, heading, and attitude data, the following will suffice:
mbkongsbergpreprocess −I datalist_raw.mb-1 −V

An equivalent command that explicitly specifies the default asynchronous data sources using **−S***1/source* for navigation, **−S***2/source* for heading, and **−S***3/source* for attitude is:
mbkongsbergpreprocess −I datalist_raw.mb-1 −V **−S***1/12* **−S***2/12* **−S***3/18*

To interpolate navigation and heading from the secondary navigation source, use
−S*1/30* **−S***2/30*

To interpolate attitude from ancillary attitude system 2, use:
−S*3/56*

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

BUGS

Not true bugs. More like arachnids.