NAME

mbrolltimelag – Calculates cross correlation between the apparent bottom slope in swath bathymetry data and the roll time series used by the sonar in order to assess attitude time lag problems.

VERSION

Version 5.0

SYNOPSIS

mbrolltimelag –I*swathdata* [**–F***format* **–K***rollsource* **–N***nping* **–O***outroot* **–S***navchannel* **–T***nlag/lagmin/lagmax* **–V –H**]

DESCRIPTION

MBrolltimelag is an utility used to assess relative time errors, or time lag, between the ping timestamps of swath bathymetry data and the sonar attitude (roll and pitch) used in calculating the bathymetry. For any sonar ping, a roll error will cause the acrosstrack bathymetry profile to rotate vertically so that it is too shallow on one side of the swath and too deep on the other. Consequently, if no correction is made for the roll of the sonar, then the bathymetry data will appear to be ruffled in the outer swath. If the timestamps of the roll and ping data are consistent, then correcting for roll will produce bathymetry without these pronounced across-track artifacts. If, however, there is a lag between the two sets of time stamps, then the roll values used for correction will be incorrect, and the ruffles will still occur.

In order to determine the amount of time lag, if any, associated with a swath bathymetry dataset, this program calculates the cross correlation between the roll signal and the apparent bottom slope in the case of no roll correction (in practice this latter value is found by subtracting the applied roll value from the apparent acrosstrack bottom slope). If the seafloor is planar so that the apparent slope signal is dominated by roll error, then there will be a distinct peak in the cross correlation function at the actual time lag.

MBrolltimelag reads one or more swath sonar data files containing bathymetry data and calculates many cross correlation functions. The number of pings used for each calculation is specified with the **–N***nping* option. The range of time lags used and the number of lag values are all specified using the **–T***nlag/lagmin/lagmax* option. The cross correlation functions are output to a file named "swathdata_xcorr.txt", where *swathdata* is the input file or datalist specified with the **–I***swathdata* option. The macro **mbm_xyplot** is also called to generate a plot shellscript that, if run, will generate a postscript plot of the correlation functions.

AUTHORSHIP

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OPTIONS

–F *format*
Sets the **MBIO** integer format identifier for the input file specified with the **–I** option. By default, **mbrolltimelag** infers the format from the "*.mbXX" **MB-System** suffix convention.

–H This "help" flag cause the program to print out a description of its operation and then exit immediately.

–I *filename*
Sets the input filename. If *format* > 0 (set with the **–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 and process the data in each one of these files. Each input file will have an associated output file with either the ".sga" or ".aga" suffix. 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 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* = "datalist.mb-1".

–K *Krollsource*
This option sets the type of data record from which the roll values will be extracted. By default, the roll values are extracted from survey data records. If the **–S** option is used, the roll data will be extracted from primary or ancilliary navigation records. If this **–K** option is set, then the roll data will be extracted from data records of type *Krollsource*, where the possible values are listed here:

MB_DATA_DATA	1	/* general survey data */
MB_DATA_CALIBRATE	4	/* Hydrosweep DS */
MB_DATA_MEAN_VELOCITY	5	/* Hydrosweep DS */
MB_DATA_VELOCITY_PROFILE	6	/* general */
MB_DATA_NAV	12	/* Simrad, Reson 7k */
MB_DATA_HEADING	17	/* Simrad, Hypack */
MB_DATA_ATTITUDE	18	/* Simrad, Hypack, Reson 7k */
MB_DATA_SSV	19	/* Simrad */
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_MOTION	32	/* Reson 7k */
MB_DATA_SIDESCAN2	37	/* Reson 7k, XTF */
MB_DATA_SIDESCAN3	38	/* Reson 7k, XTF */
MB_DATA_ROLL	40	/* Reson 7k */
MB_DATA_PITCH	41	/* Reson 7k */
MB_DATA_NMEA_RMC	48	/* NMEA */
MB_DATA_NMEA_DBT	49	/* NMEA */
MB_DATA_NMEA_DPT	50	/* NMEA */
MB_DATA_NMEA_ZDA	51	/* NMEA */
MB_DATA_NMEA_GLL	52	/* NMEA */
MB_DATA_NMEA_GGA	53	/* NMEA */
MB_DATA_ATTITUDE1	55	/* ancillary attitude system 1 */
MB_DATA_ATTITUDE2	56	/* ancillary attitude system 2 */
MB_DATA_ATTITUDE3	57	/* ancillary attitude system 3 */

A typical value is *Krollsource*=18, which specifies extraction of roll from asynchronous attitude data records. This option supercedes the **–S** option.

–N *nping*
Sets the number of pings to be read for each cross correlation calculation. Default: *nping* = 50.

–O *outroot*
Sets the root of the output filenames. Default: output root is is the input filename minus any **MB-System** filename suffixe (e.g. the root derived from "datalistp.mb-1" will be "datalist").

–S *navchannel*
Sets **MBrolltimelag** to read the roll data from navigation records rather than the record type listed as the "navigation source" for a particular data format. Swath data formats may contain synchronous navigation (navigation is included in survey data records), asynchronous navigation (navigation comes in records separate from and at different times than the survey data records), or both (survey records contain merged navigation while the original asynchronous navigation is preserved in separate navigation records). Some data formats provide for multiple navigation sources, so that there are more than one channel of asynchronous data records. In this case one channel is always designated as the primary or active navigation channel. The **–S** option allows the user to specify that **MBrolltimelag** uses roll from the primary asynchronous navigation (**–N***0*) or from one of

three auxiliary navigation channels (**−N***1*, **−N***2*, or **−N***3*). If **−N** is used but the data file does not contain asynchronous navigation or the specified auxiliary navigation channels, then **mbnavlist** will output nothing. To determine if a datafile contains asynchronous navigation and/or auxiliary navigation, run **mbinfo** using its **−N** option to get counts of all data record types in the file. Default: *navchannel* = 1.

−T *nlag/lagmin/lagmax*
Sets the time lag values used for the cross correlation calculations. A total of *nlag* cross correlation values will be calculated evenly spaced from *lagmin* seconds to *lagmax* seconds. Default: *nlag* = 41, *lagmin* = −2.0 seconds, *lagmax* = 2.0 seconds.

−V The **−V** option causes the program to be verbose.

EXAMPLE

Suppose you want to evaluate the possible roll time lag in a collection of Reson 7125 files referenced by a datalist called datalistp.mb-1. The sonar was pinging at 2Hz (twice a second), and roll is available at 10 Hz in asynchronous navigation records that can be accessed with *navchannel* = 2. We choose to calculate the cross correlation with time lags separated by 0.1 seconds from −2.0 to 2.0 seconds. The following will suffice:

```
mbrolltimelag −Idatalistp.mb-1 −N41/-2.0/2.0 −S2 −V
```

SEE ALSO

mbsystem(1)

BUGS

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