NBP9507

Multibeam Data Processing

Benjamin Sloan

Institute for Geophysics
University of Texas at Austin

Corrections

The MB-System software allows one to reprocess multibeam data and make corrections for known roll and pitch bias. During NBP9507 experiments were conducted to assess both errors (see report by Chayes and others). Surprisingly, both tests showed close to zero bias. Thus, corrections for roll bias and pitch bias were not necessary for this dataset.

Navigation. The `mbmerge` program of MB-System allows one to merge multibeam data with cleaned navigation and is a recommended step in the processing sequence. We skip this step because the system on the *Palmer* uses gps data from the NGL system which is prefiltered and produces reasonably good navigation. However, we did experience a few brief gaps in the navigation due to problems with NGL and in these instances (*e.g.* day 334, files 21-23) was necessary to remerge multibeam data with new navigation or heading data. The heading is used in the MB-System software to determine the orientation of the ship and project the cross-track beam locations. The tool `mbnavedit` was used to clean up some heading problems (*e.g.* day 317, files 19-20).

Sound Velocity. Accurate determination of bathymetry from sonar travel times depends upon a good estimate of the velocity structure of the water column. During NBP9507, there were two main methods of estimating the velocity structure: XBT launches and CTD deployments. An expendible bathythermograph (XBT) is a device which is dropped into the water from the stern and sends back water temperature along a very thin copper wire as it descends through the water column. The data are recorded on an IBM PC computer in the dry lab. Software is used which converts the temperature and externally-provided salinity information to density into sound speed in water as a function of depth. XBT's were launched as needed to characterize the water column in which we were operating. During transits this meant about one XBT launch per day. In Bransfield Strait, only one or two XBTs were necessary during the two weeks operating in the same basin. Also, in Bransfield basin the OSU group lowered the water bottle rosette and their ZAPS sled, both of which have Seabird CTD instruments attached which measure temperature and salinity (actually conductivity). Seabird software includes a module to convert the CTD measurements to velocity. In some instances, such as the Scotia Sea where water depths exceed the XBT limits, archival data from the Levitus climatology was used (via the `mblevitus` program).

Once all the data within an area were collected and swath-plotted, it was possible to see the effects of velocity errors which produce curl-up or curl-down acorss the swath over flat bottom. In Bransfield basin the CTD data (Figure 3) yielded velocity structures which were more consistent and plausible than those calculated from the XBTs, which tended to be noisy, possibly from the

Data Editing

Because of artifacts inherent in the data and bathymetric noise introduced by ice or waves, it is necessary to edit each and every multibeam file by hand using the `mbedit` program included in MB-System (Figure 1). As noted previously, about 24 files are generated daily and each contains anywhere from 300 to 2000 pings, depending upon water depth. Editing takes anywhere from one to three hours depending on the severity of editing necessary, size of file, and experience of editor. During NBP9507, all available personnel were pressed into service as data editors. About twelve people completed the bulk of the work, each averaging about two files per day. Because only three IRIS machines were available for data editing, this meant round-the-clock edit work. Editing was possible on the Macintoshes using MacX, but never gained popularity, possibly because their mouses are only single-buttoned. The Sun workstation, *teranova*, was generally used for data processing and the Openwindows software (version 3.0) tended to crash when the editor was started.

The actual editing process and philosophy is difficult to describe without demonstrating it in front of the computer. Essentially, beams which do not "reasonably" match the trend of the ping in which they occur and the trend of beams in adjacent pings ought to be flagged. Most editors tend to flag far too little data, rather than too much (Figures 2a, 2b). In most cases, successive pings should be very nearly identical and any beams which deviate "significantly" from this should be flagged. Deviant beams are best seen at maximum vertical exaggeration, another common mistake among editors, who fail to see wild beams at too-small vertical scales. Time-permitting, a team-leader should review the work of each editor on his first several files, and periodically as the editor's understanding evolves.

Data Processing Methods

Once the data were edited, it was possible to start producing maps of survey areas. The first step in this process is to identify the bounds of a survey area, then to determine the data files which fall in the area and compile a list of those files. The real-time plots and daily plots are the chief source of information for this type of compilation as they allow one to examine location and quality of data. The list may then be used in an invocation of the `mbm_plot` command to generate a swath plot of the data. Typically, a map was generated of colored, shaded, contoured swath data with a labeled ship track. During the cruise, preliminary maps of an area may be used to identify gaps or unsurveyed surrounding regions to target on the next visit to the survey area. It is also useful, at times, to plot such maps at an appropriately large scale and tape them onto the real-time Calcomp plotter as an aid to navigating the next survey.

About 800 hours of swath bathymetry data covering some 15,000 km^2 were acquired during cruise *NBP9507* of the *Nathaniel B. Palmer*. This document explains the steps taken in processing the bathymetric data once they were acquired and available on disk. Processing includes daily and hourly plots of the raw data, editing of the data (a group effort), corrections for roll bias, pitch bias, and velocity, and production of final gridded maps. This discussion does not include particulars of the acquisition process nor processing of amplitude nor sidescan data, which are partially covered elsewhere in this report.

Raw Data

The SEABEAM 2112 sonar installed on the *Palmer* collects data in a swath 120° wide. For each one-degree step, or beam, the depth in meters to the seafloor, travel time, cross-track distance, and amplitude are recorded. The 120 beams in a single swath are called a "ping" and are accompanied in the file by 2000 pixels of side-scan data. The sonar sends and receives pings at a rate inversely proportional to the water depth. All the pings for an hour are stored in a file under the name NBP9507.dXXX.YY where XXX is the day of the year and YY is the file number. This first file of the day is 00 and the last was typically about 23. Files are written at the end of each hour and whenever the system is restarted (either manually or because of a crash). Depending on water depth, the files collected on this cruise ranged in size from 2-30 megabytes. The raw data are stored on *challenger*, a Silicon Graphics Challenge-L dual processor server dedicated to data acquisition. At the end of each GMT day, the systems analyst (Dave Leger) transferred all the files for the day to a directory on *discovery*, an SGI machine dedicated to processing. Once they are on *discovery*, they are available for processing. All processing was completed using the MB-SYSTEM (version 4.3) and GMT (version 3.0) software developed at Columbia University's Lamont-Doherty Earth Observatory. The general steps involved in processing are outlined in the documentation for that software, but not all were necessary for this dataset.

Ideally, swath mapping of a given area would consist of a very regular and orderly series of parallel shiptracks and perpendicular cross lines. This "mowing the lawn" approach results in a dataset which is very easily divisible into start and end times for a given survey area. However, because of the nature of NBP9507, which combined multibeam surveying with a variety of station work, dredging, drifting, and seismic acquisition as well as operation in ice-infested waters, our course was often necessarily circuitous. Furthermore, the *Palmer* moved back and forth between

several survey areas and collected multiple sets of bathymetric data over some features. Thus, for a given area of interest, the corresponding files are a crazy patchwork quilt from many different days and of different vintages of unequal quality.

From the perspective of a survey team, there were three conditions which degraded the quality of the multibeam data: ice in the water, big waves, and a "characteristic" speed of 4-5 knots. Any ice accumulation substantial enough to make noise when striking the hull produced very erratic sonar records. The heavier the ice, the worse the data. Similarly, seas over about three meters progressively degrade the outermost beams either by waves slapping the hull or introducing air bubbles underneath (and probably other technical reasons best left to the Seabeam engineering report). Finally, steaming at speeds around 4-5 knots (seismic acquisition speed) seemed to produce fairly noisy data.

Within this data set, noisy data occur in the Bransfield basin whenever we encountered ice, which was almost every day. The Scotia Sea data were noisy partly because the seas were rough (the only seas over a few meters during the entire cruise) and partly due to our slow speed for seismic acquisition. Seismic data collected in the Bransfield basin were at relatively fast speeds (up to nine knots) and over calm seas. Transit data were collected at 10-14 knots over calm seas and are quite good in waters shallower than 4,000 meters

Hourly and Daily Swath Plots

The complexity of the mosaic of data collection days and vintages for each survey area made it necessary to carefully track the data within each area. To this end, plots were generated of the entire day of data at the end of each day and, where necessary, plots of individual hours of data. These plots were a very useful resource, referred to many times during the cruise, of where we were during a given day or hour and what nature of data were collected (depth, quality). The hour marks on the daily plots allow one to determine which times correspond to a particular survey area from which, with some trouble, one may determine the corresponding file numbers. The author notes that using ending times as file names would be more useful than the present scheme of sequential numbers which carry little information.

Hourly plots on 8.5x11" paper were generated in areas where our course was particularly circuitous and it was difficult to differentiate station data from survey data. Because the number of hours in this cruise was over 800 it was not feasible to generate a color plot for each hour of data collection although it would have been useful. Hourly plots before and after editing were a useful way to gauge the effectiveness of editing.

wire touching the hull. The candidate velocity structures were loaded into the `mbvelocitytool` program (Figure 4) along with a representative multibeam file over flat bottom. The program allows one to specify water velocity structures based on those collected by CTD, XBT, and from Levitus tables and modify them as necessary to produce a flat bottom in the data (Figures 5a, 5b). The resulting velocity model is then applied to the rest of the data, which are then swath-plotted to ensure sound speed-induced errors have been substantially reduced.

Gridded Maps

Once the data have been edited, navigation problems addressed, corrections made for roll and pitch bias and bathymetries recalculated from appropriate velocity models, final maps may be produced. The final map is generally made from a gridded file created using the `mbgrid` command, which makes a GMT format grid file from a list of multibeam files. Gridding is useful because it allows one to interpolate gaps in the data. Also, once the grid file for an area exists, it may be subsampled to produce larger-scale maps of areas of particular interest. Final gridded maps may also include overlays of other data, such as cruise tracks, coastlines, station locations, and so forth.

As of this writing, semi-final maps have been produced for the central and eastern Bransfield basins and for the Scotia Sea work area (Figures 6, 7), although further editing of the data is going to be necessary, particularly for the last area. Most of the remaining data from NBP9507 was taken during transit or covers such a small area that separate processing and velocity modeling may not be reasonable.

Conclusions and Recommendations

Multibeam processing on cruise NBP9507 has been moderately successful. The MB-System software and hardware on the *Palmer* were adequate to the task, although anticipated improvements in both will be welcome. CPU speed on *discovery*, the machine dedicated for processing, was generally sufficient although faster disk access would be desirable. Ghostview (Postscript on-screen previewer) on the SGI machines is intolerably slow and ought to be upgraded to the much faster Pageview software which runs under NEWS on the Sun workstations or Adobe Xpsview. Color 8x11" printing on the HP Deskjet printer is fairly slow and often fails during large jobs (> 4 mb) or when there are more than three jobs in the queue, translating into average print speeds not much faster than multibeam data are acquired. This situation could probably be rectified by a change in the Novell print server configuation, as proven by the Oregon State group who had a similar setup which seemed to work quite well.

The pace of multibeam data acquisition requires at least part-time attention by the data processor for raw data quality control and editing quality control, as well as a dedicated stable of about one dozen editors. Several weeks of post-processing is required (much of which was performed on the long NBP9507 transit). Future cruises should plan for a full-time processor or two. Ideally, these persons should be fluent in UNIX, GMT, and have at least been introduced to MB-System. Finally, on-board technical support, of the sort essential to acquire the data (Seabeam engineer, UNIX systems analyst), are indispensible to the data processor.

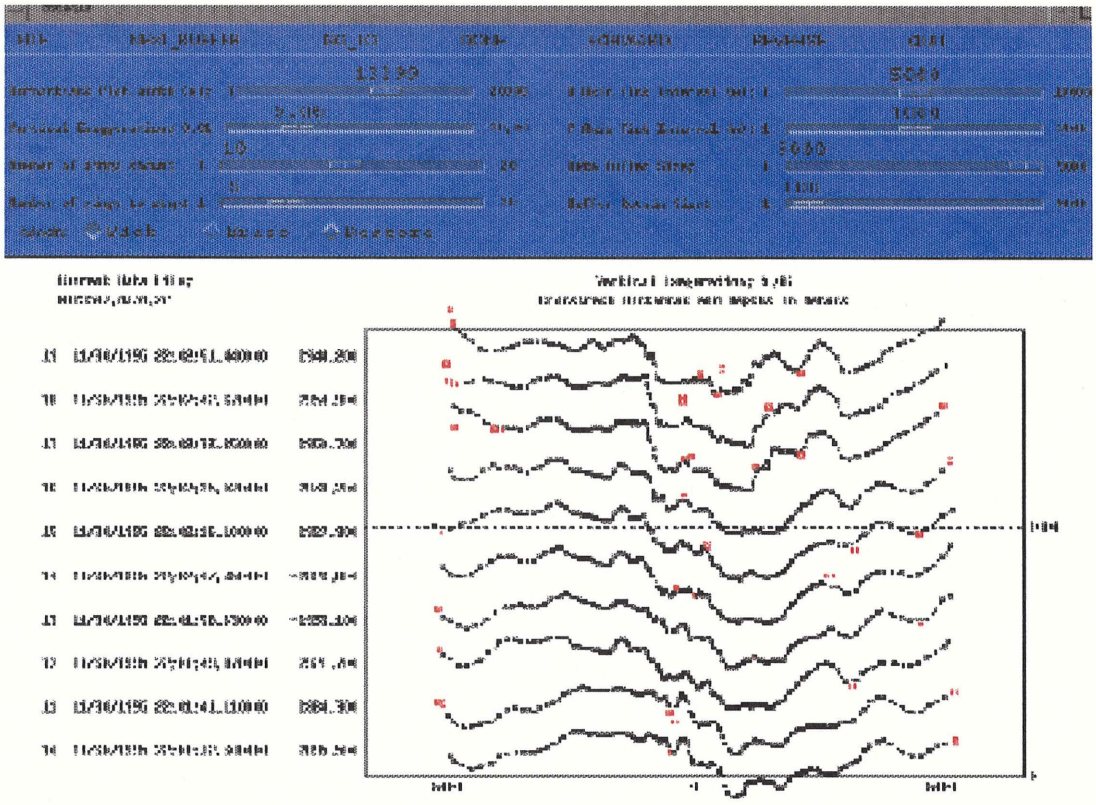


Figure 1. Multibeam editor, `mbedit`, window as it appears on the screen. Lines are pings which are each formed by 120 beams, shown as black or red dots. Red dots are beams which have been flagged.

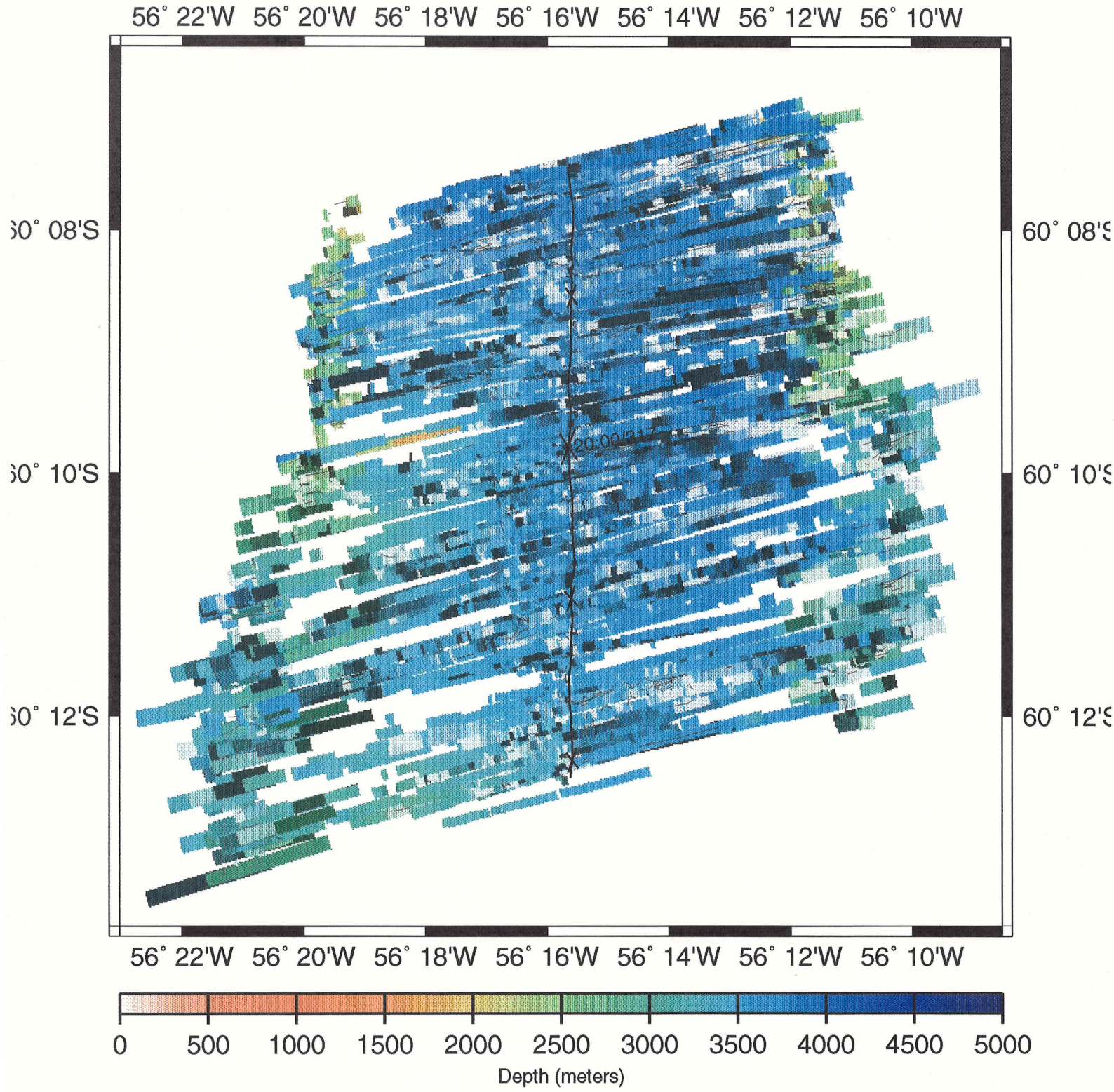


Figure 2a. Example of one hour of fairly noisy raw data from the Scotia Sea.

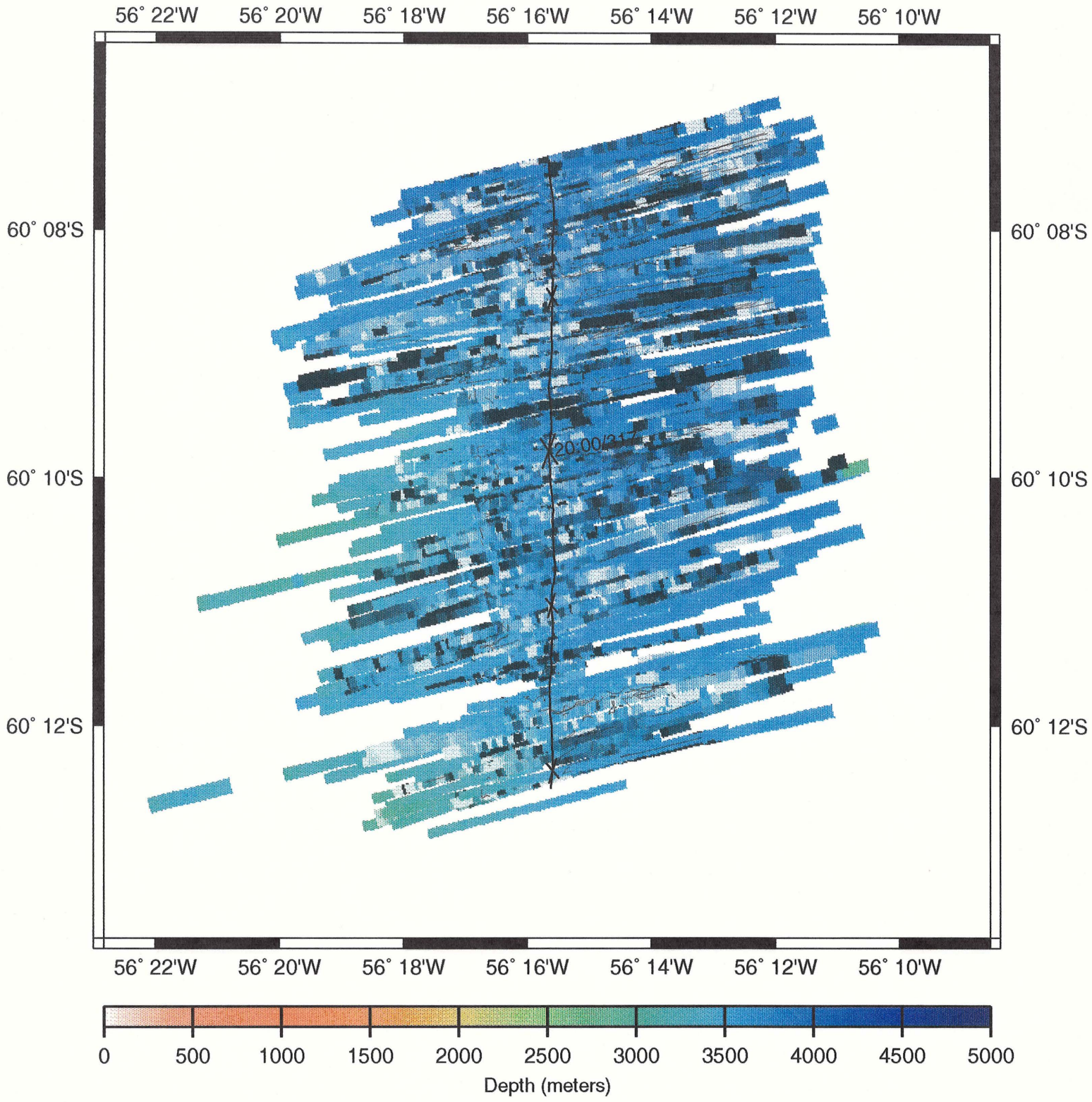


Figure 2b. Example of one hour of data, edited but still noisy.

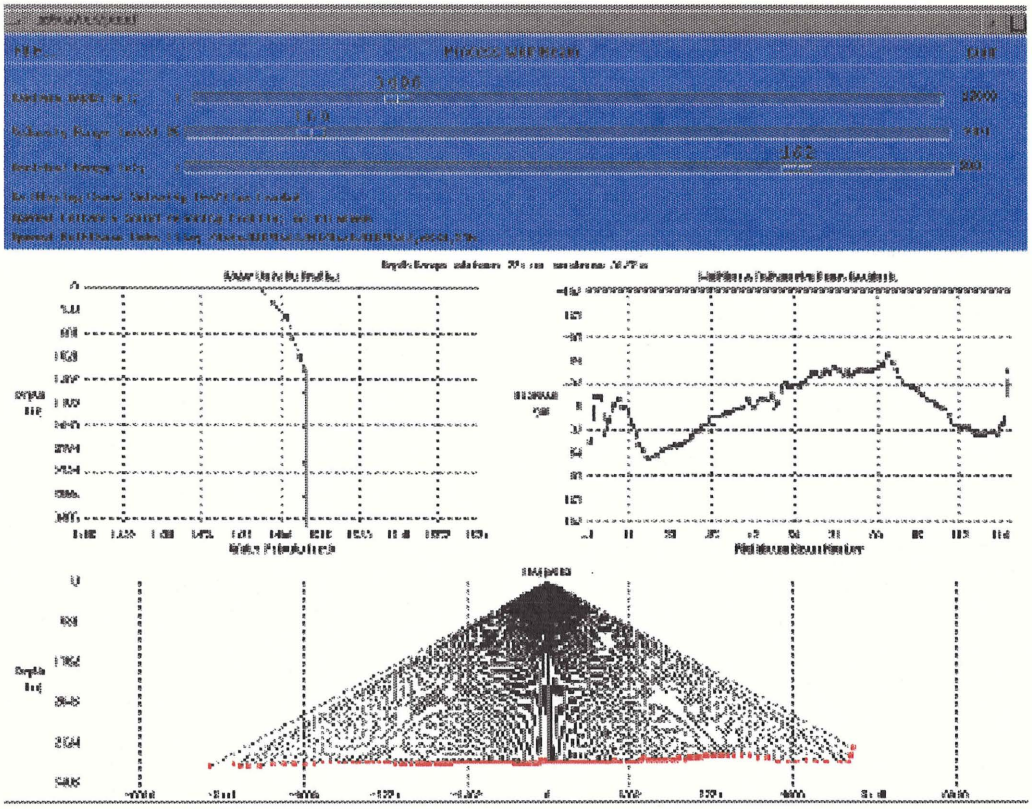
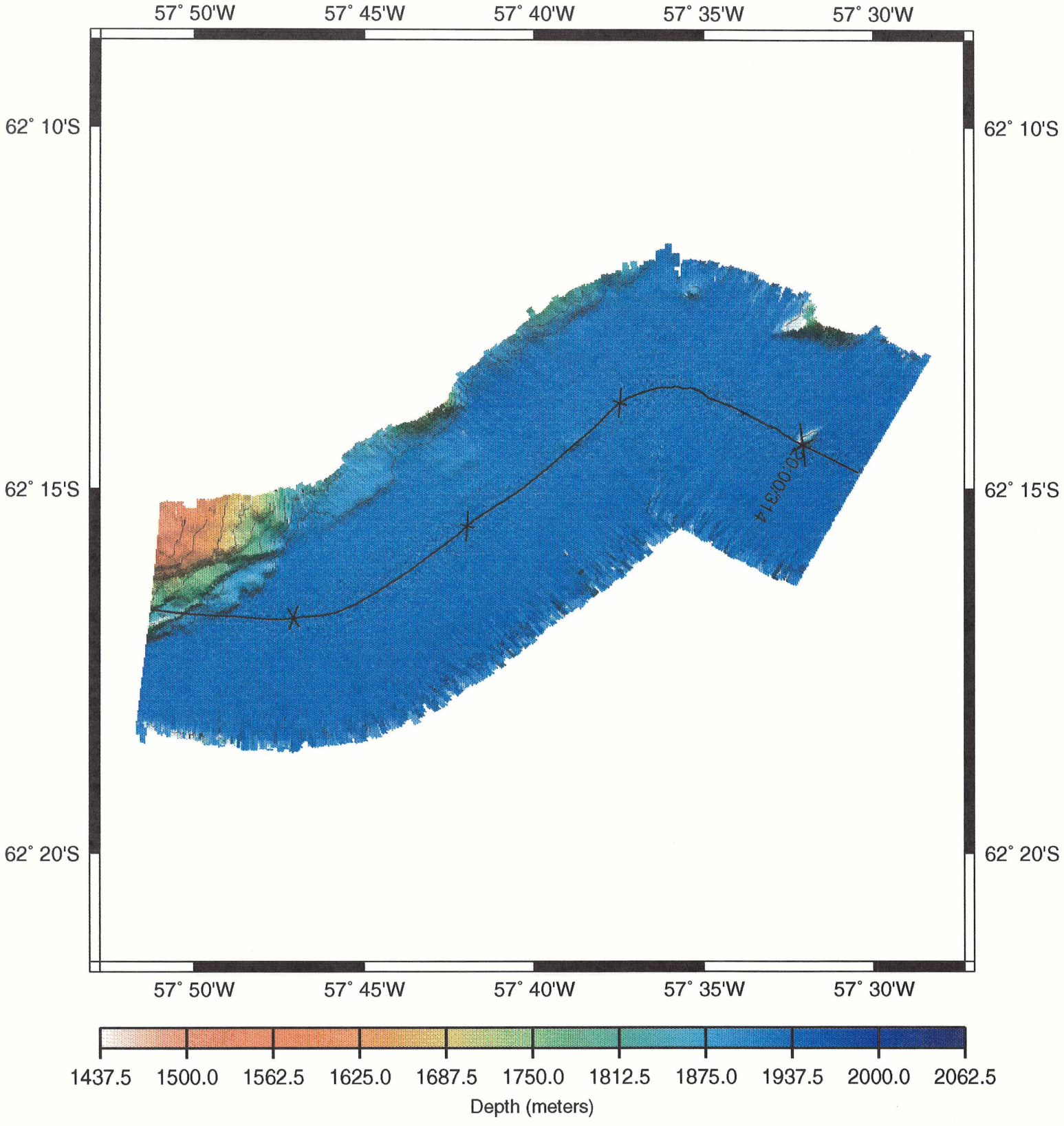


Figure 4. Velocity-modelling tool, `mbvelocitytool`. Window shows an editable velocity profile (upper left). The display at the bottom is the average of some SEABEAM 2100 data which has been loaded, showing raypaths to the seafloor, which is indicated by the red dots. The upper right window is the average residual of each beam after raytracing through the selected velocity profile. If the bottom is flat in this area, the residual should be flat to less than 0.5% of the water depth, if possible.



igure 5b. Edited and velocity-corrected data has somewhat cleaner edges, flat bottom.

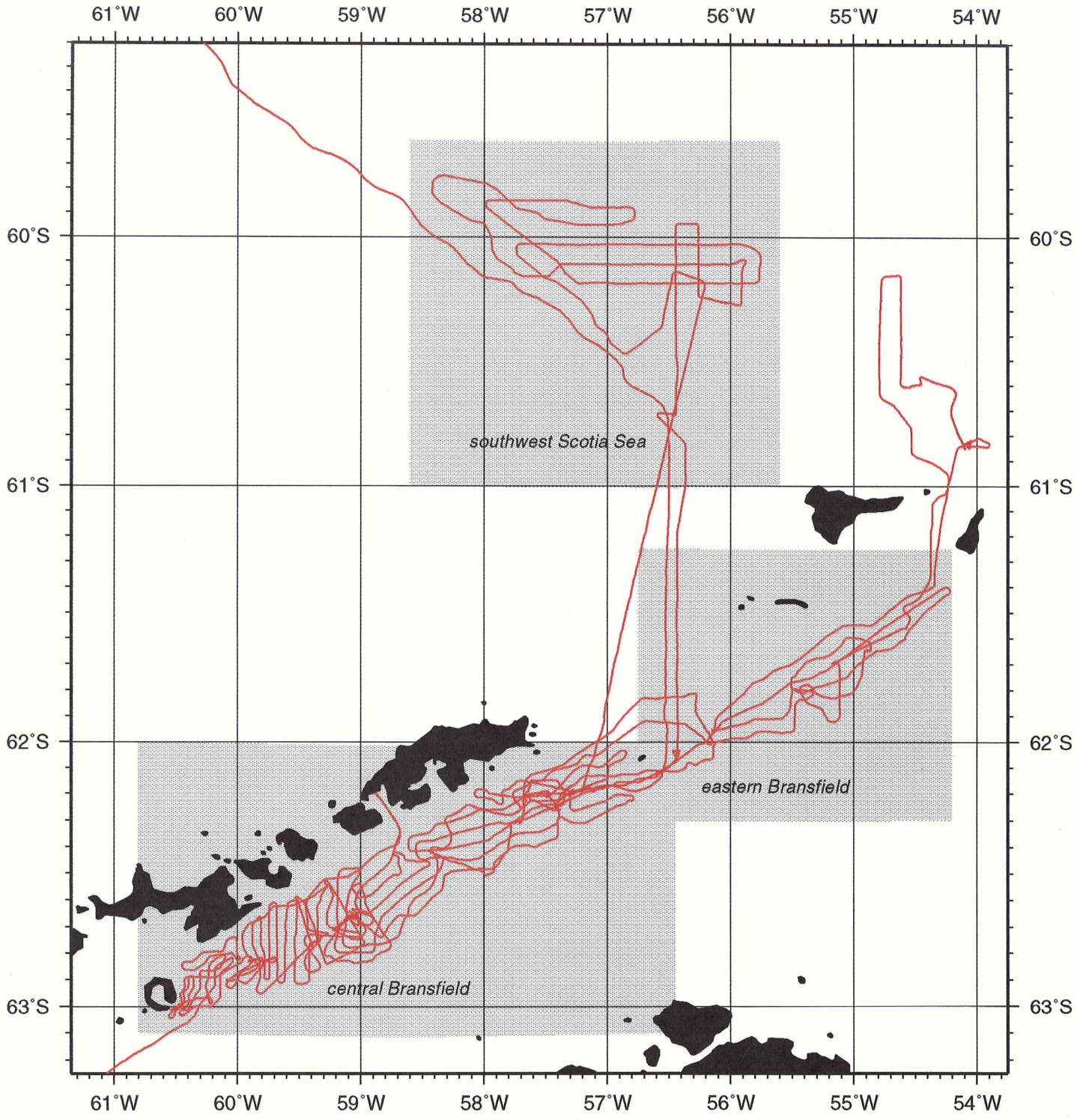


Figure 6. NBP9507 cruise route and locations of three survey areas.

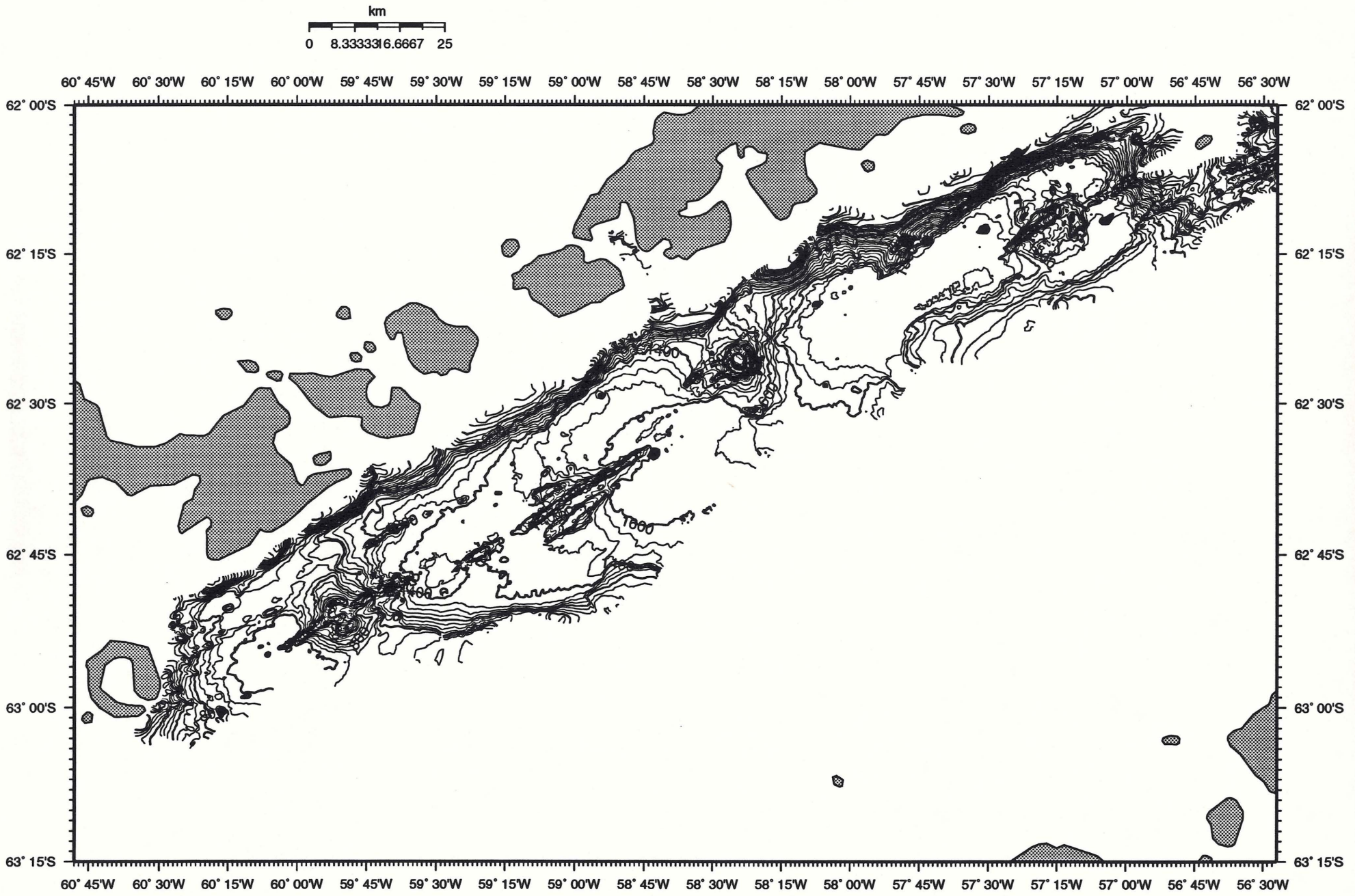


Figure 7. Central Bransfield bathymetry, semi-final gridded contour map.

Appendix I. Processing Recipe

The following is short list of the steps taken in processing Seabeam 2100 data from NBP9507. This procedure ought to apply to other cruises on the *Palmer*.

1. **Plot raw data.** Plot the raw data from each day using `mbm_plot` (`mbswath` or `mbcontour`) and check it for errors in scale, navigation, excessive noise, gaps due to system crashes or glitches in the data.

2. **Unclean data.** Run `mbunclean` on the raw data to unflag the beams which the system autoflags. Data will now be completely unflagged. Place unflagged data with a ".cl" extension in the Unclean directory where editors can find it.

3. **Edit data.** Editors should clean all noise out of data using `mbedit`. Edited files automatically get a ".ed" extension added to their filename. These should be examined, then moved to the Edit directory. The original file can now be deleted from the Unclean directory.

4. **Compile data lists.** Use the daily plots to create a list of all the files which include data for a given survey area. Make sure the file pointed to in the list refers to the location of the best version of the each datafile since some will be raw, some edited, some with new navigation, etc, depending on the particular file.

5. **Preliminary swath plots.** Make shaded and contoured swath plots using `mbm_plot` for a given survey area. Examine the plots and check the data quality. Look for gaps in the data, overlap, and differences in data vintages over the same area. Adjust the data list, re-edit data files as needed and/or make plans to return to the survey area to fill in gaps. Plot the location of XBT or CTD information from the survey area to be used in velocity modeling.

6. **Velocity correction.** Load relevant XBT, CTD and other velocity information (such as Levitus tables) into `mbvelocitytool` along with a piece of Seabeam data from an area of very simple bathymetry, preferably a flat place. Create a reasonable sound velocity profile and save it. Run `mbbath` to re-raytrace a small sample of the data. If it looks okay when you plot it, then apply the new velocity profile to the entire survey area and place the corrected files in a new directory, such as NewVel. You may then delete the originals from the Edit directory.

7. **Final maps.** Use `mbgrid` to grid the data and interpolate gaps. Plot contoured shaded maps using GMT and adding in other information, such as coastlines, stations, cruisetracks, etc., even other bathymetric data. Pull subsets of the map area out of the grid file for blowups.

Appendix II. Broken Seabeam File Pathologies

This is a list of file problems observed on NBP9507 which are of interest to the multibeam processing slave. Some of these will probably occur on future cruises. Files subject to these problems are noted in the list in Appendix 3.

1. **Time warp.** Occasionally the system will write out a ping or series of pings which have the wrong date on them. The quality checking routines run by the multibeam engineers usually find these errors, but beam editors may observe them also. Bad dates may not affect processing if one does not try to use the date information in the files. (This problem is supposed to be fixed now.)

2. **Location warp.** Sometimes a ping will have erroneous latitude and longitude information associated with it. This will be fairly apparent when the data are plotted on a map. One may either remerge new navigation with the file or excise the bad data using `mbcopy`.

3. **Glitch.** A few files had unreadable sections which caused the MB-System software to experience a segmentation fault when they were read with `mblist` or `mbinfo`. This files have to be dissected into good and bad portions.

4. **Depth Times Ten.** An inadvertent invocation of an old version of the `mbunclean` program multiplied seemingly random bathymetries by ten. This caused some excitement when the data were contoured. The fix for this is to re-unclean the data (using the correct version of `mbunclean`), then, if they have been edited, use `mbgetmask` and `mbmask` to apply the editing to the cleaned file.

5. **Overwriting.** When the Seabeam was restarted in the middle of a day, the system would sometimes append data to the first file of the day, rather than starting a new file or appending to the most recent file. In a few cases six or eight files would be badly mixed up and very tedious to sort out. These errors are first caught when examining the time when the files were last modified since the first file would have a modification time later than succeeding files. Then, `mblist` will show the full magnitude of the scrambling.

6. **Pinger.** During some ZAPS stations, particularly later in the cruise, the Seabeam system was left on and picked up signals from the 12 kHz pinger on the sled. These data files are not necessarily "broken", but do not contain strictly bathymetric information and should not be used for mapping.

Appendix III. NBP9507 Seabeam files

FILENAME	LAST MODIFICATION	NOTES
NBP9507.d301.00	28-Oct-95 20:19:00	these files in very shallow water; time warp
NBP9507.d301.01	28-Oct-95 17:05:00	time warp
NBP9507.d301.02	28-Oct-95 10:23:00	
NBP9507.d301.03	28-Oct-95 11:23:00	Seabeam restart
NBP9507.d301.04	28-Oct-95 12:00:00	
NBP9507.d301.05	28-Oct-95 12:13:00	
NBP9507.d301.06	28-Oct-95 13:15:00	
NBP9507.d301.07	28-Oct-95 14:19:00	
NBP9507.d301.08	28-Oct-95 15:19:00	
NBP9507.d301.09	28-Oct-95 15:54:00	
NBP9507.d301.10	28-Oct-95 18:05:00	
NBP9507.d301.11	28-Oct-95 18:59:00	
NBP9507.d301.12	28-Oct-95 20:13:00	
NBP9507.d301.13	28-Oct-95 21:24:00	
NBP9507.d301.14	28-Oct-95 22:24:00	
NBP9507.d301.15	28-Oct-95 23:22:00	
NBP9507.d301.16	29-Oct-95 00:01:00	
NBP9507.d302.00	29-Oct-95 01:03:00	
NBP9507.d302.01	29-Oct-95 02:01:00	
NBP9507.d302.02	29-Oct-95 03:03:00	
NBP9507.d302.03	29-Oct-95 04:00:00	
NBP9507.d302.04	29-Oct-95 05:10:00	
NBP9507.d302.05	29-Oct-95 06:12:00	
NBP9507.d302.06	29-Oct-95 07:11:00	
NBP9507.d302.07	29-Oct-95 08:11:00	
NBP9507.d302.08	29-Oct-95 08:53:00	buoy deployment station
NBP9507.d302.09	29-Oct-95 11:06:00	time gap for ZAPS station
NBP9507.d302.10	29-Oct-95 14:49:00	
NBP9507.d302.11	29-Oct-95 15:49:00	
NBP9507.d302.12	29-Oct-95 16:49:00	
NBP9507.d302.13	29-Oct-95 17:49:00	
NBP9507.d302.14	29-Oct-95 18:49:00	
NBP9507.d302.15	29-Oct-95 19:49:00	
NBP9507.d302.16	29-Oct-95 20:18:00	
NBP9507.d302.17	29-Oct-95 21:19:00	
NBP9507.d302.18	29-Oct-95 22:19:00	
NBP9507.d302.19	29-Oct-95 23:19:00	
NBP9507.d302.20	30-Oct-95 00:01:00	
NBP9507.d303.00	30-Oct-95 01:01:00	
NBP9507.d303.01	30-Oct-95 02:01:00	
NBP9507.d303.02	30-Oct-95 03:01:00	
NBP9507.d303.03	30-Oct-95 04:01:00	

NBP9507.d303.04	30-Oct-95 05:01:00	
NBP9507.d303.05	30-Oct-95 06:01:00	
NBP9507.d303.06	30-Oct-95 07:01:00	
NBP9507.d303.07	30-Oct-95 08:01:00	
NBP9507.d303.08	30-Oct-95 09:02:00	
NBP9507.d303.09	30-Oct-95 10:02:00	
NBP9507.d303.10	30-Oct-95 11:02:00	
NBP9507.d303.11	30-Oct-95 12:02:00	
NBP9507.d303.12	30-Oct-95 13:02:00	
NBP9507.d303.13	30-Oct-95 14:02:00	
NBP9507.d303.14	30-Oct-95 15:02:00	
NBP9507.d303.15	30-Oct-95 16:02:00	
NBP9507.d303.16	30-Oct-95 17:02:00	
NBP9507.d303.17	30-Oct-95 18:02:00	
NBP9507.d303.18	30-Oct-95 19:02:00	
NBP9507.d303.19	30-Oct-95 20:02:00	
NBP9507.d303.20	30-Oct-95 21:02:00	
NBP9507.d303.21	30-Oct-95 22:03:00	
NBP9507.d303.22	30-Oct-95 23:03:00	Seabeam restart
NBP9507.d303.23	31-Oct-95 00:01:00	
NBP9507.d304.00	31-Oct-95 01:01:00	
NBP9507.d304.01	31-Oct-95 02:01:00	Seabeam restart
NBP9507.d304.02	31-Oct-95 03:01:00	
NBP9507.d304.03	31-Oct-95 04:01:00	
NBP9507.d304.04	31-Oct-95 05:02:00	
NBP9507.d304.05	31-Oct-95 06:02:00	
NBP9507.d304.06	31-Oct-95 07:02:00	
NBP9507.d304.07	31-Oct-95 08:02:00	
NBP9507.d304.08	31-Oct-95 09:02:00	
NBP9507.d304.09	31-Oct-95 10:02:00	
NBP9507.d304.10	31-Oct-95 11:02:00	
NBP9507.d304.11	31-Oct-95 12:02:00	
NBP9507.d304.12	31-Oct-95 13:02:00	
NBP9507.d304.13	31-Oct-95 14:02:00	
NBP9507.d304.14	31-Oct-95 15:02:00	
NBP9507.d304.15	31-Oct-95 16:02:00	
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NBP9507.d304.17	31-Oct-95 18:03:00	
NBP9507.d304.18	31-Oct-95 19:03:00	
NBP9507.d304.19	31-Oct-95 20:03:00	
NBP9507.d304.20	31-Oct-95 21:03:00	
NBP9507.d304.21	31-Oct-95 22:03:00	
NBP9507.d304.22	31-Oct-95 23:03:00	
NBP9507.d304.23	1-Nov-95 00:01:00	
NBP9507.d305.00	1-Nov-95 01:01:00	
NBP9507.d305.01	1-Nov-95 02:01:00	
NBP9507.d305.02	1-Nov-95 03:01:00	

NBP9507.d305.03	1-Nov-95 04:01:00	
NBP9507.d305.04	1-Nov-95 05:01:00	Seabeam restart
NBP9507.d305.05	1-Nov-95 06:02:00	
NBP9507.d305.06	1-Nov-95 06:53:00	
NBP9507.d305.07	1-Nov-95 08:16:00	time gap
NBP9507.d305.08	1-Nov-95 09:16:00	
NBP9507.d305.09	1-Nov-95 10:16:00	
NBP9507.d305.10	1-Nov-95 11:16:00	
NBP9507.d305.11	1-Nov-95 12:16:00	
NBP9507.d305.12	1-Nov-95 13:16:00	
NBP9507.d305.13	1-Nov-95 14:12:00	ZAPS Station 2, CTD 2
NBP9507.d305.14	1-Nov-95 18:55:00	
NBP9507.d305.15	1-Nov-95 19:55:00	
NBP9507.d305.16	1-Nov-95 20:55:00	
NBP9507.d305.17	1-Nov-95 21:55:00	
NBP9507.d305.18	1-Nov-95 22:55:00	
NBP9507.d305.19	1-Nov-95 23:55:00	
NBP9507.d305.20	2-Nov-95 00:01:00	
NBP9507.d306.00	2-Nov-95 01:01:00	
NBP9507.d306.01	2-Nov-95 02:01:00	
NBP9507.d306.02	2-Nov-95 03:01:00	
NBP9507.d306.03	2-Nov-95 03:35:00	
NBP9507.d306.04	2-Nov-95 04:28:00	ZAPS Station 3
NBP9507.d306.05	2-Nov-95 07:32:00	
NBP9507.d306.06	2-Nov-95 08:32:00	
NBP9507.d306.07	2-Nov-95 09:32:00	
NBP9507.d306.08	2-Nov-95 10:32:00	
NBP9507.d306.09	2-Nov-95 11:32:00	
NBP9507.d306.10	2-Nov-95 12:32:00	
NBP9507.d306.11	2-Nov-95 13:32:00	
NBP9507.d306.12	2-Nov-95 14:32:00	ZAPS Station 4
NBP9507.d306.13	2-Nov-95 15:04:00	
NBP9507.d306.14	2-Nov-95 18:25:00	ZAPS Station 5
NBP9507.d306.15	2-Nov-95 18:58:00	CTD Station 3. Seabeam idle 2125-2307
NBP9507.d306.16	3-Nov-95 00:01:00	
NBP9507.d307.00	3-Nov-95 01:01:00	
NBP9507.d307.01	3-Nov-95 02:01:00	
NBP9507.d307.02	3-Nov-95 03:01:00	
NBP9507.d307.03	3-Nov-95 04:01:00	
NBP9507.d307.04	3-Nov-95 05:01:00	
NBP9507.d307.05	3-Nov-95 06:01:00	
NBP9507.d307.06	3-Nov-95 07:01:00	
NBP9507.d307.07	3-Nov-95 08:01:00	
NBP9507.d307.08	3-Nov-95 09:01:00	
NBP9507.d307.09	3-Nov-95 10:01:00	
NBP9507.d307.10	3-Nov-95 11:01:00	
NBP9507.d307.11	3-Nov-95 12:01:00	

NBP9507.d307.12	3-Nov-95 13:02:00	
NBP9507.d307.13	3-Nov-95 14:02:00	
NBP9507.d307.14	3-Nov-95 15:02:00	
NBP9507.d307.15	3-Nov-95 16:02:00	
NBP9507.d307.16	3-Nov-95 17:02:00	
NBP9507.d307.17	3-Nov-95 17:42:00	ZAPS Station 6
NBP9507.d307.18	3-Nov-95 21:25:00	
NBP9507.d307.19	3-Nov-95 22:26:00	
NBP9507.d307.20	3-Nov-95 23:03:00	ZAPS Station 7
NBP9507.d308.00	4-Nov-95 14:46:00	time warp. file scrambled
NBP9507.d308.01	4-Nov-95 04:11:00	
NBP9507.d308.02	4-Nov-95 05:09:00	ZAPS Station 8
NBP9507.d308.03	4-Nov-95 09:02:00	
NBP9507.d308.04	4-Nov-95 10:02:00	
NBP9507.d308.05	4-Nov-95 11:02:00	
NBP9507.d308.06	4-Nov-95 12:02:00	
NBP9507.d308.07	4-Nov-95 13:02:00	
NBP9507.d308.08	4-Nov-95 14:02:00	
NBP9507.d308.09	4-Nov-95 14:11:00	time gap
NBP9507.d308.10	4-Nov-95 14:29:00	
NBP9507.d308.11	4-Nov-95 14:37:00	time gap
NBP9507.d308.12	4-Nov-95 15:45:00	
NBP9507.d308.13	4-Nov-95 16:44:00	
NBP9507.d308.14	4-Nov-95 17:44:00	
NBP9507.d308.15	4-Nov-95 18:02:00	Buoy deployment #2- Seabeam idle
NBP9507.d308.16	4-Nov-95 19:57:00	Slow for streamer balancing
NBP9507.d308.17	4-Nov-95 20:57:00	
NBP9507.d308.18	4-Nov-95 21:57:00	
NBP9507.d308.19	4-Nov-95 22:57:00	
NBP9507.d308.20	4-Nov-95 23:57:00	
NBP9507.d308.21	5-Nov-95 00:01:00	
NBP9507.d309.00	5-Nov-95 14:55:00	time warp. horribly scrambled
NBP9507.d309.01	5-Nov-95 02:01:00	
NBP9507.d309.02	5-Nov-95 03:01:00	
NBP9507.d309.03	5-Nov-95 04:01:00	
NBP9507.d309.04	5-Nov-95 05:01:00	streamer balancing complete
NBP9507.d309.05	5-Nov-95 06:02:00	
NBP9507.d309.06	5-Nov-95 07:02:00	
NBP9507.d309.07	5-Nov-95 08:02:00	
NBP9507.d309.08	5-Nov-95 09:02:00	
NBP9507.d309.09	5-Nov-95 10:02:00	
NBP9507.d309.10	5-Nov-95 11:02:00	
NBP9507.d309.11	5-Nov-95 12:02:00	
NBP9507.d309.12	5-Nov-95 13:02:00	
NBP9507.d309.13	5-Nov-95 14:00:00	Seabeam idle
NBP9507.d309.14	5-Nov-95 14:14:00	time gaps; Seabeam restart
NBP9507.d309.15	5-Nov-95 15:55:00	

NBP9507.d309.16	5-Nov-95 16:55:00	
NBP9507.d309.17	5-Nov-95 17:55:00	
NBP9507.d309.18	5-Nov-95 18:55:00	
NBP9507.d309.19	5-Nov-95 18:58:00	ZAPS Station 9
NBP9507.d310.00	6-Nov-95 21:43:00	time warp. great scrambling of data.
NBP9507.d310.01	6-Nov-95 01:47:00	
NBP9507.d310.02	6-Nov-95 02:20:00	ZAPS Station 10
NBP9507.d310.03	6-Nov-95 05:48:00	
NBP9507.d310.04	6-Nov-95 06:49:00	
NBP9507.d310.05	6-Nov-95 07:49:00	
NBP9507.d310.06	6-Nov-95 08:49:00	
NBP9507.d310.07	6-Nov-95 09:49:00	
NBP9507.d310.08	6-Nov-95 10:49:00	
NBP9507.d310.09	6-Nov-95 11:49:00	
NBP9507.d310.10	6-Nov-95 12:49:00	
NBP9507.d310.11	6-Nov-95 13:49:00	
NBP9507.d310.12	6-Nov-95 14:49:00	
NBP9507.d310.13	6-Nov-95 15:49:00	
NBP9507.d310.14	6-Nov-95 16:49:00	
NBP9507.d310.15	6-Nov-95 17:49:00	
NBP9507.d310.16	6-Nov-95 18:49:00	
NBP9507.d310.17	6-Nov-95 19:49:00	
NBP9507.d310.18	6-Nov-95 20:19:00	Seabeam restart. Data scrambled
NBP9507.d310.19	6-Nov-95 20:35:00	Seabeam restart. Data scrambled
NBP9507.d310.20	6-Nov-95 20:46:00	
NBP9507.d310.21	6-Nov-95 21:12:00	Seabeam restart. Data scrambled. Begin seismic acquisition.
NBP9507.d310.22	6-Nov-95 21:34:00	
NBP9507.d310.23	6-Nov-95 21:47:00	
NBP9507.d310.24	6-Nov-95 22:48:00	
NBP9507.d310.25	6-Nov-95 23:48:00	
NBP9507.d310.26	7-Nov-95 00:01:00	
NBP9507.d311.00	7-Nov-95 07:29:00	Time warp
NBP9507.d311.01	7-Nov-95 02:01:00	
NBP9507.d311.02	7-Nov-95 02:22:00	Seabeam shut off. Time gap. End seismic acquistion
NBP9507.d311.03	7-Nov-95 04:43:00	
NBP9507.d311.04	7-Nov-95 05:43:00	
NBP9507.d311.05	7-Nov-95 06:38:00	Time gap. Scrambling.
NBP9507.d311.06	7-Nov-95 08:29:00	
NBP9507.d311.07	7-Nov-95 09:29:00	
NBP9507.d311.08	7-Nov-95 10:29:00	
NBP9507.d311.09	7-Nov-95 11:29:00	
NBP9507.d311.10	7-Nov-95 12:24:00	ZAPS Station 11; Core 1
NBP9507.d311.11	7-Nov-95 23:22:00	
NBP9507.d311.12	8-Nov-95 00:01:00	
NBP9507.d312.00	8-Nov-95 00:30:00	Seabeam crash; small time gap
NBP9507.d312.01	8-Nov-95 02:14:00	ZAPS Station 12

NBP9507.d312.02	8-Nov-95 03:14:00	on station
NBP9507.d312.03	8-Nov-95 04:14:00	on station
NBP9507.d312.04	8-Nov-95 05:14:00	on station to 04:45
NBP9507.d312.05	8-Nov-95 06:14:00	
NBP9507.d312.06	8-Nov-95 07:14:00	
NBP9507.d312.07	8-Nov-95 08:14:00	
NBP9507.d312.08	8-Nov-95 09:14:00	
NBP9507.d312.09	8-Nov-95 10:14:00	
NBP9507.d312.10	8-Nov-95 11:14:00	
NBP9507.d312.11	8-Nov-95 12:14:00	
NBP9507.d312.12	8-Nov-95 15:31:00	ZAPS Station 13
NBP9507.d312.13	8-Nov-95 16:31:00	
NBP9507.d312.14	8-Nov-95 16:51:00	
NBP9507.d312.15	8-Nov-95 19:23:00	ZAPS Station 14, 15
NBP9507.d312.16	8-Nov-95 22:05:00	ZAPS Station 16
NBP9507.d313.00	9-Nov-95 01:01:00	ZAPS Station 17
NBP9507.d313.01	9-Nov-95 07:48:00	
NBP9507.d313.02	9-Nov-95 08:48:00	
NBP9507.d313.03	9-Nov-95 09:48:00	
NBP9507.d313.04	9-Nov-95 10:48:00	
NBP9507.d313.05	9-Nov-95 11:48:00	
NBP9507.d313.06	9-Nov-95 12:48:00	
NBP9507.d313.07	9-Nov-95 13:48:00	
NBP9507.d313.08	9-Nov-95 14:48:00	
NBP9507.d313.09	9-Nov-95 15:48:00	
NBP9507.d313.10	9-Nov-95 16:03:00	ZAPS Station 18
NBP9507.d313.11	9-Nov-95 18:44:00	drifting
NBP9507.d313.12	9-Nov-95 19:44:00	drifting
NBP9507.d313.13	9-Nov-95 20:44:00	drifting
NBP9507.d313.14	9-Nov-95 21:44:00	drifting
NBP9507.d313.15	9-Nov-95 22:44:00	drifting
NBP9507.d313.16	9-Nov-95 23:44:00	drifting to 23:40
NBP9507.d313.17	10-Nov-95 00:01:00	
NBP9507.d314.00	10-Nov-95 01:01:00	This day originally mbuncleaned with old version. Raw
NBP9507.d314.01	10-Nov-95 02:01:00	data should be fine.
NBP9507.d314.02	10-Nov-95 03:01:00	
NBP9507.d314.03	10-Nov-95 04:01:00	
NBP9507.d314.04	10-Nov-95 05:01:00	
NBP9507.d314.05	10-Nov-95 06:01:00	
NBP9507.d314.06	10-Nov-95 07:01:00	
NBP9507.d314.07	10-Nov-95 08:01:00	
NBP9507.d314.08	10-Nov-95 09:01:00	
NBP9507.d314.09	10-Nov-95 10:01:00	
NBP9507.d314.10	10-Nov-95 11:01:00	
NBP9507.d314.11	10-Nov-95 12:01:00	
NBP9507.d314.12	10-Nov-95 12:37:00	ZAPS Station 19; Seabeam restart
NBP9507.d314.13	10-Nov-95 17:05:00	

NBP9507.d314.14	10-Nov-95 18:05:00	
NBP9507.d314.15	10-Nov-95 19:06:00	
NBP9507.d314.16	10-Nov-95 20:05:00	
NBP9507.d314.17	10-Nov-95 21:06:00	ZAPS Station 20
NBP9507.d314.18	10-Nov-95 22:06:00	on station
NBP9507.d314.19	10-Nov-95 23:06:00	on station
NBP9507.d314.20	11-Nov-95 00:01:00	on station
NBP9507.d315.00	11-Nov-95 01:01:00	on station
NBP9507.d315.01	11-Nov-95 02:01:00	on station
NBP9507.d315.02	11-Nov-95 03:01:00	on station
NBP9507.d315.03	11-Nov-95 04:01:00	on station
NBP9507.d315.04	11-Nov-95 05:01:00	on station
NBP9507.d315.05	11-Nov-95 06:01:00	on station to 05:35
NBP9507.d315.06	11-Nov-95 06:59:00	ZAPS Station 21; Seabeam shutdown
NBP9507.d315.07	11-Nov-95 08:07:00	on station
NBP9507.d315.08	11-Nov-95 09:07:00	
NBP9507.d315.09	11-Nov-95 10:08:00	
NBP9507.d315.10	11-Nov-95 11:08:00	
NBP9507.d315.11	11-Nov-95 12:07:00	
NBP9507.d315.12	11-Nov-95 13:07:00	
NBP9507.d315.13	11-Nov-95 14:07:00	
NBP9507.d315.14	11-Nov-95 15:07:00	
NBP9507.d315.15	11-Nov-95 16:07:00	
NBP9507.d315.16	11-Nov-95 17:07:00	
NBP9507.d315.17	11-Nov-95 18:07:00	
NBP9507.d315.18	11-Nov-95 19:07:00	
NBP9507.d315.19	11-Nov-95 20:07:00	
NBP9507.d315.20	11-Nov-95 21:07:00	
NBP9507.d315.21	11-Nov-95 22:08:00	
NBP9507.d315.22	11-Nov-95 23:08:00	
NBP9507.d315.23	12-Nov-95 00:01:00	
NBP9507.d316.00	12-Nov-95 01:01:00	
NBP9507.d316.01	12-Nov-95 02:01:00	
NBP9507.d316.02	12-Nov-95 03:01:00	
NBP9507.d316.03	12-Nov-95 04:01:00	
NBP9507.d316.04	12-Nov-95 05:01:00	
NBP9507.d316.05	12-Nov-95 06:01:00	
NBP9507.d316.06	12-Nov-95 07:01:00	
NBP9507.d316.07	12-Nov-95 08:01:00	
NBP9507.d316.08	12-Nov-95 09:01:00	
NBP9507.d316.09	12-Nov-95 10:01:00	
NBP9507.d316.10	12-Nov-95 11:02:00	
NBP9507.d316.11	12-Nov-95 12:02:00	
NBP9507.d316.12	12-Nov-95 13:02:00	
NBP9507.d316.13	12-Nov-95 14:02:00	
NBP9507.d316.14	12-Nov-95 15:02:00	
NBP9507.d316.15	12-Nov-95 16:02:00	

NBP9507.d316.16	12-Nov-95 17:02:00	
NBP9507.d316.17	12-Nov-95 18:02:00	
NBP9507.d316.18	12-Nov-95 19:02:00	
NBP9507.d316.19	12-Nov-95 20:02:00	
NBP9507.d316.20	12-Nov-95 21:03:00	
NBP9507.d316.21	12-Nov-95 22:03:00	
NBP9507.d316.22	12-Nov-95 23:03:00	
NBP9507.d316.23	13-Nov-95 00:01:00	
NBP9507.d317.00	13-Nov-95 01:01:00	
NBP9507.d317.01	13-Nov-95 02:01:00	
NBP9507.d317.02	13-Nov-95 03:01:00	
NBP9507.d317.03	13-Nov-95 04:01:00	
NBP9507.d317.04	13-Nov-95 05:01:00	
NBP9507.d317.05	13-Nov-95 06:01:00	
NBP9507.d317.06	13-Nov-95 07:01:00	
NBP9507.d317.07	13-Nov-95 08:01:00	
NBP9507.d317.08	13-Nov-95 09:02:00	
NBP9507.d317.09	13-Nov-95 10:02:00	
NBP9507.d317.10	13-Nov-95 11:02:00	
NBP9507.d317.11	13-Nov-95 12:02:00	
NBP9507.d317.12	13-Nov-95 13:02:00	begin seismic acquisition
NBP9507.d317.13	13-Nov-95 14:02:00	seismic acquisition
NBP9507.d317.14	13-Nov-95 15:02:00	seismic acquisition
NBP9507.d317.15	13-Nov-95 16:02:00	seismic acquisition
NBP9507.d317.16	13-Nov-95 17:02:00	seismic acquisition
NBP9507.d317.17	13-Nov-95 18:02:00	seismic acquisition
NBP9507.d317.18	13-Nov-95 18:08:00	seismic acquisition
NBP9507.d317.19	13-Nov-95 18:29:00	seismic acquisition
NBP9507.d317.20	13-Nov-95 19:29:00	seismic acquisition
NBP9507.d317.21	13-Nov-95 20:29:00	seismic acquisition
NBP9507.d317.22	13-Nov-95 21:29:00	seismic acquisition
NBP9507.d317.23	13-Nov-95 22:29:00	seismic acquisition
NBP9507.d317.24	13-Nov-95 23:29:00	seismic acquisition
NBP9507.d317.25	14-Nov-95 00:01:00	seismic acquisition
NBP9507.d318.00	14-Nov-95 01:01:00	seismic acquisition
NBP9507.d318.01	14-Nov-95 02:01:00	seismic acquisition
NBP9507.d318.02	14-Nov-95 03:01:00	seismic acquisition
NBP9507.d318.03	14-Nov-95 04:01:00	seismic acquisition
NBP9507.d318.04	14-Nov-95 05:01:00	seismic acquisition
NBP9507.d318.05	14-Nov-95 06:01:00	seismic acquisition
NBP9507.d318.06	14-Nov-95 07:01:00	seismic acquisition
NBP9507.d318.07	14-Nov-95 08:02:00	seismic acquisition; Seabeam down five minutes
NBP9507.d318.08	14-Nov-95 09:02:00	seismic acquisition
NBP9507.d318.09	14-Nov-95 10:02:00	end seismic acquisition
NBP9507.d318.10	14-Nov-95 11:02:00	
NBP9507.d318.11	14-Nov-95 12:02:00	
NBP9507.d318.12	14-Nov-95 13:02:00	

NBP9507.d318.13	14-Nov-95 14:04:00	
NBP9507.d318.14	14-Nov-95 15:02:00	glitches in file; can not read all of it
NBP9507.d318.15	14-Nov-95 16:02:00	
NBP9507.d318.16	14-Nov-95 17:02:00	
NBP9507.d318.17	14-Nov-95 18:02:00	
NBP9507.d318.18	14-Nov-95 19:02:00	ZAPS Station 22
NBP9507.d318.19	14-Nov-95 20:02:00	on station
NBP9507.d318.20	14-Nov-95 21:02:00	on station to 21:25
NBP9507.d318.21	14-Nov-95 22:02:00	
NBP9507.d318.22	14-Nov-95 23:02:00	
NBP9507.d318.23	15-Nov-95 00:01:00	
NBP9507.d319.00	15-Nov-95 01:01:00	
NBP9507.d319.01	15-Nov-95 02:01:00	ZAPS Station 23
NBP9507.d319.02	15-Nov-95 03:01:00	on station
NBP9507.d319.03	15-Nov-95 04:01:00	on station
NBP9507.d319.04	15-Nov-95 05:01:00	on station
NBP9507.d319.05	15-Nov-95 06:01:00	on station
NBP9507.d319.06	15-Nov-95 07:01:00	on station; dredge
NBP9507.d319.07	15-Nov-95 08:01:00	on station
NBP9507.d319.08	15-Nov-95 09:01:00	on station
NBP9507.d319.09	15-Nov-95 09:18:00	on station
NBP9507.d319.10	15-Nov-95 10:20:00	time gap; restart; on station to 1400
NBP9507.d319.11	15-Nov-95 15:51:00	
NBP9507.d319.12	15-Nov-95 16:51:00	
NBP9507.d319.13	15-Nov-95 17:54:00	
NBP9507.d319.14	15-Nov-95 18:51:00	
NBP9507.d319.15	15-Nov-95 19:51:00	Core Station 2
NBP9507.d319.16	15-Nov-95 20:52:00	on station to 20:37
NBP9507.d319.17	15-Nov-95 21:52:00	
NBP9507.d319.18	15-Nov-95 22:52:00	
NBP9507.d319.19	15-Nov-95 23:52:00	
NBP9507.d319.20	16-Nov-95 00:01:00	
NBP9507.d320.00	16-Nov-95 01:01:00	ZAPS Station 24
NBP9507.d320.01	16-Nov-95 02:01:00	on station
NBP9507.d320.02	16-Nov-95 03:01:00	on station
NBP9507.d320.03	16-Nov-95 03:22:00	on station
NBP9507.d320.04	16-Nov-95 05:34:00	on station
NBP9507.d320.05	16-Nov-95 06:34:00	on station
NBP9507.d320.06	16-Nov-95 07:34:00	on station
NBP9507.d320.07	16-Nov-95 08:02:00	on station
NBP9507.d320.08	16-Nov-95 11:07:00	on station to 10:59
NBP9507.d320.09	16-Nov-95 12:07:00	
NBP9507.d320.10	16-Nov-95 13:07:00	
NBP9507.d320.11	16-Nov-95 14:07:00	
NBP9507.d320.12	16-Nov-95 15:07:00	
NBP9507.d320.13	16-Nov-95 16:07:00	
NBP9507.d320.14	16-Nov-95 17:07:00	

NBP9507.d320.15	16-Nov-95 18:07:00	
NBP9507.d320.16	16-Nov-95 19:07:00	
NBP9507.d320.17	16-Nov-95 20:07:00	
NBP9507.d320.18	16-Nov-95 21:07:00	ZAPS Station 25
NBP9507.d320.19	16-Nov-95 22:07:00	on station
NBP9507.d320.20	16-Nov-95 23:07:00	on station
NBP9507.d320.21	17-Nov-95 00:01:00	on station
NBP9507.d321.00	17-Nov-95 01:01:00	ZAPS Station 26
NBP9507.d321.01	17-Nov-95 02:01:00	
NBP9507.d321.02	17-Nov-95 03:01:00	
NBP9507.d321.03	17-Nov-95 04:01:00	
NBP9507.d321.04	17-Nov-95 05:01:00	Core Station 3
NBP9507.d321.05	17-Nov-95 06:01:00	on station
NBP9507.d321.06	17-Nov-95 07:01:00	
NBP9507.d321.07	17-Nov-95 08:01:00	
NBP9507.d321.08	17-Nov-95 09:01:00	
NBP9507.d321.09	17-Nov-95 10:01:00	
NBP9507.d321.10	17-Nov-95 11:01:00	
NBP9507.d321.11	17-Nov-95 12:01:00	
NBP9507.d321.12	17-Nov-95 13:02:00	
NBP9507.d321.13	17-Nov-95 14:02:00	
NBP9507.d321.14	17-Nov-95 14:30:00	Seabeam restart
NBP9507.d321.15	17-Nov-95 18:25:00	
NBP9507.d321.16	17-Nov-95 19:25:00	
NBP9507.d321.17	17-Nov-95 20:25:00	
NBP9507.d321.18	17-Nov-95 21:25:00	
NBP9507.d321.19	17-Nov-95 22:25:00	
NBP9507.d321.20	17-Nov-95 23:25:00	ZAPS Station 27
NBP9507.d321.21	18-Nov-95 00:01:00	on station
NBP9507.d322.00	18-Nov-95 01:01:00	on station
NBP9507.d322.01	18-Nov-95 02:01:00	on station
NBP9507.d322.02	18-Nov-95 03:01:00	on station
NBP9507.d322.03	18-Nov-95 04:01:00	on station
NBP9507.d322.04	18-Nov-95 05:01:00	on station
NBP9507.d322.05	18-Nov-95 06:01:00	on station
NBP9507.d322.06	18-Nov-95 07:01:00	on station
NBP9507.d322.07	18-Nov-95 07:34:00	time gap? on station
NBP9507.d322.08	18-Nov-95 10:35:00	
NBP9507.d322.09	18-Nov-95 11:35:00	
NBP9507.d322.10	18-Nov-95 12:35:00	
NBP9507.d322.11	18-Nov-95 13:35:00	
NBP9507.d322.12	18-Nov-95 14:35:00	
NBP9507.d322.13	18-Nov-95 15:35:00	
NBP9507.d322.14	18-Nov-95 16:35:00	
NBP9507.d322.15	18-Nov-95 17:35:00	
NBP9507.d322.16	18-Nov-95 18:35:00	
NBP9507.d322.17	18-Nov-95 19:35:00	

NBP9507.d322.18	18-Nov-95 20:37:00	
NBP9507.d322.19	18-Nov-95 21:37:00	
NBP9507.d322.20	18-Nov-95 22:38:00	
NBP9507.d322.21	18-Nov-95 23:35:00	
NBP9507.d322.22	18-Nov-95 23:56:00	
NBP9507.d323.00	19-Nov-95 01:18:00	Seabeam reboot
NBP9507.d323.01	19-Nov-95 01:45:00	ZAPS Station 28
NBP9507.d323.02	19-Nov-95 03:31:00	on station
NBP9507.d323.03	19-Nov-95 04:31:00	on station
NBP9507.d323.04	19-Nov-95 05:27:00	on station; restart Seabeam
NBP9507.d323.05	19-Nov-95 07:03:00	on station
NBP9507.d323.06	19-Nov-95 08:03:00	on station
NBP9507.d323.07	19-Nov-95 09:03:00	on station
NBP9507.d323.08	19-Nov-95 10:03:00	on station
NBP9507.d323.09	19-Nov-95 11:03:00	
NBP9507.d323.10	19-Nov-95 12:05:00	begin seismic acquisition
NBP9507.d323.11	19-Nov-95 13:03:00	seismic acquisition
NBP9507.d323.12	19-Nov-95 14:03:00	seismic acquisition
NBP9507.d323.13	19-Nov-95 15:03:00	seismic acquisition
NBP9507.d323.14	19-Nov-95 16:03:00	seismic acquisition
NBP9507.d323.15	19-Nov-95 17:03:00	seismic acquisition
NBP9507.d323.16	19-Nov-95 18:04:00	end seismic acquisition
NBP9507.d323.17	19-Nov-95 19:04:00	
NBP9507.d323.18	19-Nov-95 20:06:00	
NBP9507.d323.19	19-Nov-95 21:06:00	
NBP9507.d323.20	19-Nov-95 22:06:00	
NBP9507.d323.21	19-Nov-95 23:05:00	
NBP9507.d323.22	20-Nov-95 00:01:00	
NBP9507.d324.00	21-Nov-95 00:01:00	ZAPS Station 29
NBP9507.d324.01	20-Nov-95 02:06:00	on station
NBP9507.d324.02	20-Nov-95 03:06:00	on station
NBP9507.d324.03	20-Nov-95 04:06:00	on station
NBP9507.d324.04	20-Nov-95 05:06:00	on station
NBP9507.d324.05	20-Nov-95 06:06:00	ZAPS Station 30
NBP9507.d324.06	20-Nov-95 07:06:00	on station
NBP9507.d324.07	20-Nov-95 08:06:00	on station
NBP9507.d324.08	20-Nov-95 09:06:00	on station
NBP9507.d324.09	20-Nov-95 10:06:00	Core Station 4
NBP9507.d324.10	20-Nov-95 11:06:00	on station to 10:39
NBP9507.d324.11	20-Nov-95 11:51:00	restart Seabeam
NBP9507.d324.12	20-Nov-95 13:19:00	
NBP9507.d324.13	20-Nov-95 14:19:00	
NBP9507.d324.14	20-Nov-95 15:18:00	
NBP9507.d324.15	20-Nov-95 16:19:00	
NBP9507.d324.16	20-Nov-95 17:19:00	
NBP9507.d324.17	20-Nov-95 18:19:00	
NBP9507.d324.18	20-Nov-95 19:19:00	

NBP9507.d324.19	20-Nov-95 20:19:00	
NBP9507.d324.20	20-Nov-95 21:19:00	
NBP9507.d324.21	20-Nov-95 22:19:00	
NBP9507.d324.22	20-Nov-95 23:19:00	wrong depths from ZAPS pinger! ZAPS Station 31
NBP9507.d324.23	21-Nov-95 00:00:00	on station
NBP9507.d325.00	21-Nov-95 01:00:00	on station
NBP9507.d325.01	21-Nov-95 02:00:00	on station
NBP9507.d325.02	21-Nov-95 03:00:00	on station
NBP9507.d325.03	21-Nov-95 04:02:00	on station
NBP9507.d325.04	21-Nov-95 05:01:00	ZAPS Station 32
NBP9507.d325.05	21-Nov-95 06:01:00	on station
NBP9507.d325.06	21-Nov-95 07:01:00	on station
NBP9507.d325.07	21-Nov-95 08:01:00	Core Station 5
NBP9507.d325.08	21-Nov-95 09:01:00	
NBP9507.d325.09	21-Nov-95 10:01:00	
NBP9507.d325.10	21-Nov-95 11:01:00	
NBP9507.d325.11	21-Nov-95 12:01:00	
NBP9507.d325.12	21-Nov-95 13:01:00	
NBP9507.d325.13	21-Nov-95 14:01:00	
NBP9507.d325.14	21-Nov-95 15:01:00	
NBP9507.d325.15	21-Nov-95 16:01:00	
NBP9507.d325.16	21-Nov-95 17:01:00	
NBP9507.d325.17	21-Nov-95 18:01:00	
NBP9507.d325.18	21-Nov-95 19:01:00	
NBP9507.d325.19	21-Nov-95 20:02:00	
NBP9507.d325.20	21-Nov-95 21:00:00	
NBP9507.d325.21	21-Nov-95 22:00:00	
NBP9507.d325.22	21-Nov-95 23:02:00	
NBP9507.d325.23	22-Nov-95 00:01:00	

Files from days 326-340 were collected in transit to New Zealand and not examined as rigorously.

Known problems: Files 334.21, 334.22, 334.23 do not have navigation

Seabeam reboots:		
	Nov 22 0210	Dec 2 1043
	Nov 22 1815	Dec 2 1055
	Nov 23 1017	Dec 2 1252
	Nov 23 2040	Dec 2 1321
	Nov 25 1026	Dec 2 2326
	Nov 29 1040	Dec 3 1005
	Nov 29 1650	Dec 3 1141
	Nov 30 1626	