W00122

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

DESCRIPTIVE REPORT

Type of Survey HABITAT

Field No.

Registry No. W00122

LOCALITY

State Alaska

General Locality Aleutian Archipelago

Sublocality Aleutian Archipelago

2003

CHIEF OF PARTY
Dean Moyles

LIBRARY & ARCHIVES

DATE

NOAA FORM 77-28 (11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTER NO.

W00122

HYDROGRAPHIC TITLE SHEET

FIELD NO.

INSTRUCTIONS - The hydrographic sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the office.

State: Alaska

General Locality: Aleutian Archipelago

Sublocality: Aleutian Archipelago

Scale:

Date of Survey: 6/13/2003 - 7/ 2/2003

Instructions Dated:

Project No.:

Vessel: R.V. Davidson

Chief of Party: Dean Moyles

Surveyed by: Thales Geosolutions

Soundings taken by echo sounder, hand lead, pole: Reson 8111 and Reson 8150

Graphic record scaled by: Thales Geosolutions

Graphic record checked by: Thales Geosolutions

Evaluation by: John J. Lomnicky

Automated plot by: HP Designjet1050c

Verification by: Physical Scientist: J. Lomnicky, Cartographer: B. Taylor

Soundings in: Meters at MLLW

REMARKS: Revisions and annotations appearing as endnotes were generated by the cartographer during office processing.

All depths listed in this report are referenced to mean lower low water unless otherwise noted.

UTM Zones 1, 2, and 60

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF COAST SURVEY
Pacific Hydrographic Branch
Seattle, Washington 98115-6349

March 26, 2009

MEMORANDUM TO: Captain John E. Lowell, NOAA
Chief, Marine Chart Division

THROUGH: Jeffrey Ferguson
Chief, Hydrographic Surveys Division

FROM: Gary C. Nelson
Gary C. Nelson 2009.03.26 13:45:15 -07'00'
Acting Chief, Pacific Hydrographic Branch

SUBJECT: Approval Memorandum for W00122
Aleutian Archipelago

The Pacific Hydrographic Branch has completed evaluation and chart application of Outside Source Data survey W00122. This survey was conducted for NOAA Fisheries by Thales Geosolutions in 2003. I have reviewed the data, reports and compilation to the chart. Data are suitable for nautical charting except where specifically recommended in the Evaluation and Quality Assurance Memorandum and Chart Application Memorandum.

Within the 2008 NOAA Hydrographic Survey Priorities (NHSP), the Aleutian Archipelago is listed as “Priority 3” and “Priority 2”. Due to the small areal extent of this survey, it is recommended that the areas encompassing survey W00122 retain the existing classification.

cc: Chief, HSD Operations Branch N/CS31

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF COAST SURVEY
Pacific Hydrographic Branch
Seattle, Washington 98115-6349

April 23, 2007

MEMORANDUM TO: Commander Donald W. Haines, NOAA
Chief, Pacific Hydrographic Branch

FROM: LT John J. Lomnicky, NOAA
Benthic Mapping Specialist

Gary C. Nelson
For Lt. Lomnicky
2009.03.26 13:46:27
-07'00'

SUBJECT: Review of Outside Source Data Survey W00122
Thales / National Marine Fisheries Service
Deep Sea Coral Distribution and habitat in the Aleutian Archipelago

I have reviewed outside source hydrographic survey W00122 with regard to data integrity and completeness of the data submission package, survey field procedures, data processing and quality assurance methods, and overall data accuracy and data quality. Survey W00122 complies with specifications and requirements set forth in the NOS Hydrographic Surveys Specifications and Deliverables Manual (HSSDM), with the following exceptions:

- Data were supplied to PHB in gridded ASCII .xyz format only, which cannot be opened in Caris HIPS and SIPS. Data was reviewed in Caris Base Editor 2.0. Full resolution data, as defined in HSSDM 8.5.3, were not supplied[1]
- Tidal, sound velocity, metadata and vessel configuration files were not submitted in accordance with HSSDM 8.5.5[2]
- Because data were only provided in gridded ASCII .xyz format, a crossline comparison cannot be completed; however, the supplied report addresses a small number of "tie lines" completed during surveying and a Caris Quality Control report was included in the supplied report.[3]

Special attention should be given to the following:

- Refer to the Hydrographic Survey Outside Source Data Quality Assurance Checklist for recommendations in specific areas.[4]

Final Recommendations:

- The data should be used to chart soundings and depth curves representing general bathymetric trends, and update shoals that are not adequately depicted on NOAA charts. Although the MBES data may meet higher requirements, the lack of error models and full

resolution, unedited data preclude full application of the data. Data should be charted in areas of low charted sounding density, in deep water where the dangers to navigation are minimal and in near shore areas where W00122 found shoaler soundings than the chart. For safety, charted shoal sounding in near shore areas should not be removed from the charts.[5]

- Although some discrepancies exist between the charts and W00122, further investigation may not be necessary, due to depth of water and location.[6]
- Although MBESB data in this survey may meet higher requirements, the survey area should be classified as Category of Zone of Confidence (CATZOC) “B” if used to update ENC survey area classification.[7]

Revisions compiled during office processing by the cartographer

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[1] Concur.
[2] Concur.
[3] Concur.
[4] Attached to this report. See Chart Comparison in Hydrographic Survey Outside Source Data Quality Assurance Checklist for specific charting recommendations.
[5] Concur with clarification. Data are considered adequate to supplement or supersede charted information within the common areas except as noted in this report. As described in the hydrographer's report of survey, TGP-100904-RPT-01-00W--121.pdf, attached to this report, the purpose of the survey was to map coral and sponge habitats to determine distribution and disturbances. The hydrographer was not required to determine least depths over shoals. The data should not be used to supersede charted shoal soundings and contours. Retain charted shoal soundings and contours as shown on the Hdrawings in green. Retain bottom samples as charted.
[6] Concur.
[7] Concur. See endnote 5 above.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE OFFICE OF COAST SURVEY
Pacific Hydrographic Branch Seattle, Washington
98115-6349

February 18, 2009

MEMORANDUM TO: Captain David O. Neander
Chief, Pacific Hydrographic Branch

FROM: Beth Taylor Gary C. Nelson For Beth Taylor 2009.03.26 13:47:20 -07'00'
Cartographer, Pacific Hydrographic Branch

SUBJECT: Application of Outside Source Data Survey W00122
Thales / National Marine Fisheries Service
Mulitbeam Echosounder Survey in the Aleutian Archipelago

I concur with all recommendations by the reviewer Jay Lomnicky except where noted in this report.

Summary of compilation:

-soundings, curves and features applied
-no rocks, shoals were superseded
-shoreline was retained as charted
-bottom characteristics were retained
-no aids to navigation in survey area.
-no additional Dangers to Navigation were found during compilation.

It is recommended that OSD survey W00122 selectively supersede charted information within the common area and that it be applied to charts 16440, 16450, 16460, 16462, 16463, 16465, 16467, 16471, 16475, 16480, 16486, and 16487, .

Record of Application to Charts is attached.

Review and Approved Gary C. Nelson 2009.03.26 13:48:57 -07'00'

Gary Nelson, Cartographer Team Leader
Pacific Hydrographic Branch

NATIONAL MARINE FISHERIES SERVICE

DEEP SEA CORAL DISTRIBUTION AND HABITAT IN THE ALEUTIAN ARCHIPELAGO

FINAL REPORT – ALEUTIAN ARCHIPELAGO

Thales Document No: TGP-2658-RPT-01-00

Applicable to:	**Thales GeoSolutions (Pacific), Inc.**
Controlled by:	**Data Center Supervisor** **Thales GeoSolutions (Pacific), Inc.** **3738 Ruffin Road** **San Diego, CA 92123**
Telephone:	**(858) 292-8922**
Facsimile:	**(858) 292-5308**

REPORT CERTIFICATION
FOR

NATIONAL MARINE FISHERIES SERVICE

DEEP SEA CORAL DISTRIBUTION AND HABITAT IN THE ALEUTIAN ARCHIPELAGO

TGP-2658-RPT-01-00

This issue of the report has been approved by:

1. Project Manager Robert Pawlowski
2. Data Center Supervisor Carol Lockhart

This report has been distributed to:

1. John Heifetz, National Marine Fisheries Service (NMSF) 4 Copies
2. Edward J VanDenAmeele, NOAA 1 Copy

The following versions of this report have been issued:

0	11/05/03	Final Report	DM	BLD	RP
REV	DATE	DESCRIPTION	APPROVED		

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

Thales GeoSolutions (Pacific), Inc. was contracted by the National Marine Fisheries Service (NMFS), to perform a detailed multibeam echosounder survey on selected sites in the Aleutian Archipelago of Alaska in the North Pacific Ocean and Bering Sea. The data collected will provide the first detailed mapping of deep sea coral and sponge habitats for the Aleutian Islands. It will also provide estimates of the relative abundance of corals and sponges, their importance to commercially valuable fish and invertebrates, and the degree to which these living substrates have been disturbed, including disturbance by fishing gear. The survey required digital, high-resolution multibeam bathymetry along with calibrated backscatter in all survey areas.

1.1 AREA SURVEYED

The survey consisted of seventeen survey sites, located along the center of the Aleutian Archipelago of Alaska in both the North Pacific Ocean and Bering Sea. Data was also collected over an additional eighteen dive sites and while the vessel was transiting between all survey and dive sites.

The coordinates listed in Table 1-1 outline the Aleutian Archipelago Transects & Statistics.

Table 1-1 Aleutian Archipelago Transects & Statistics

SITE	DEEP END	SHALLOW END	LINE KM'S	SQUARE KM'S
1	51.72 N, 173.71 W	51.96 N, 173.19 W	104.18	133.8
2	51.70 N, 173.76 W	52.00 N, 173.98 W	294.57	183.3
3	51.59 N, 175.19 W	51.90 N, 175.25 W	222.26	195.6
21	51.39 N, 176.25 W	51.72 N, 176.29 W	363.2	306.68
5	51.62 N, 177.26 W	51.58 N, 176.99 W	159.44	110.53
6	51.25 N, 177.73 W	51.61 N, 178.01 W	273.15	272.48
7	51.26 N, 178.5 W	51.53 N, 178.64 W	180.00	125.261
8	51.24 N, 179.67 W	51.36N, 179.44 W	77.31	94.20
9	51.62 N, 179.58 W	51.87 N, 179.59 W	79.96	161.51
10	51.91 N, 179.75 E	51.78 N, 179.99 W	122.45	131.98
11	52.76 N, 179.34 W	52.71 N, 179.17 W	86.18	78.68
12	51.96 N, 178.47 W	51.87 N, 178.28 W	51.94	124.52
13	51.91 N, 177.42 W	51.91 N, 177.20 W	81.40	84.55
14	51.98 N, 176.75 W	52.11 N, 176.76 W	52.71	76.12
15	52.33 N, 175.66 W	52.12 N, 175.63 W	217.01	206.16
16	52.49 N, 174.94 W	52.23 N, 174.79 W	146.86	199.26
17	52.29 N, 173.84 W	52.16 N, 173.84 W	294.62	78.4

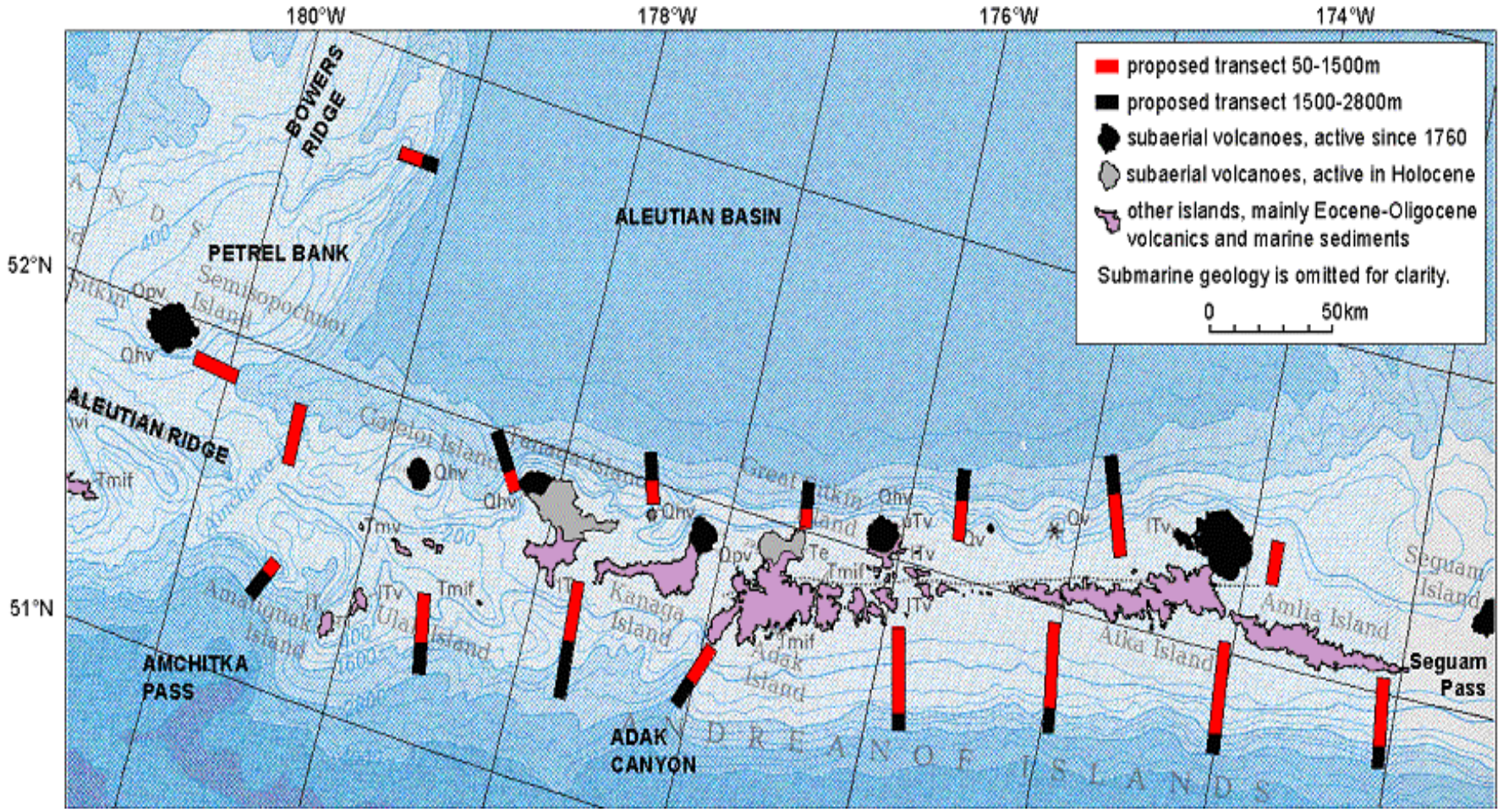


Figure 1-1 Location of the Aleutian Archipelago Sites

2 DATA ACQUISITION

This report describes the hardware and software configurations of the equipment used to perform the multibeam echosounder surveys at Aleutian Archipelago. The R/V Davidson acquired all multibeam sounding data and sound velocity profile data at both survey sites. An equipment list and technical vessel specifications are included in Appendix B and C, respectively.

2.1 VESSEL

The R/V Davidson, a 47-meter survey vessel (Appendix B), provided the survey platform for the deployed Thales survey team and representatives from NMFS, UAF and MLML. The vessel was equipped with the following primary equipment for execution of the survey:

- Reson SeaBat 8150 Multibeam Echosounder (MBES), hull mounted
- Reson SeaBat 8111 Multibeam Echosounder (MBES), hull mounted
- Applanix Position and Orientation System for Marine Vessels 320 (POS/MV 320)
- Sea-Bird Electronics (SBE) SBE 19 Seacat and AML Sound Velocity & Pressure Smart Sensor, for Sound Velocity Profile (SVP) correction
- Sippican XBT and XSV expendable probes, for Sound Velocity Profile (SVP) correction
- Thales GeoSolutions' WinFrog navigation software
- Triton Elics International (TEI) Isis Sonar, DelphMap, and BathyPro Software Suite
- CARIS HIPS

2.2 EQUIPMENT AND PROCEDURES

Detailed equipment specifications are available in APPENDIX C.

2.2.1 POSITIONING

Vessel positions were determined using a DGPS (Differential Global Positioning System) as available from the USCG DGPS network.

2.2.1.1 Vessel Positioning

Primary positioning data was provided by the POS/MV GPS and a RTCM Receiver. The primary GPS antenna was mounted on the mast above the vessel bridge, over the MBES transducer.

Raw GPS observations were corrected using RTCM (Radio Technical Commission for Maritime Services) corrections transmitted from Cold Bay using an MBX-3 differential receiver, that utilizes the U.S. Coast Guard (USCG) network of differential beacons (Table 2-1, below). The RTCM corrections were acquired at one-second intervals using a MBX-3 differential receiver. WinFrog was used to manage the RTCM corrections and then pass a single correction to the POS/ MV, which was used to calculate a position from the raw GPS information and RTCM corrections. This DGPS corrected position was then output as a reasonable estimate of vessel position to the acquisition systems, Isis Sonar, and WinFrog.

Table 2-1 U.S. Coast Guard Base Station

DGPS Base Station	Latitude (N)	Longitude (W)	Station ID
Cold Bay, AK	55-05-30 N	162-31-54 W	296

WinFrog navigation software, running on a Windows 2000 based PC, was used to manage RTCM corrections and provide vessel navigation throughout the survey. WinFrog presented vessel position data in graphical and tabular format for QC purposes. The following display windows were used:

- **Graphics** – the Graphics window showed navigation information in plan view. This included vessel position and orientation, survey lines, background plots, charts, and waypoints.
- **Vehicle** – the Vehicle window was configured to show tabular navigation information. Typically this window was set to display position, time and date, line name, distance to start and end of line, distance off line, heading, course over ground, and speed as well as data logging and event status.
- **Calculations** – the Calculation window was used to look at specific data items in tabular or graphical format.

2.2.1.2 Project Datum

Position information supplied by the DGPS was in a geodetic projection and the WGS84 datum (Table 2-2). For mapping purposes, data sets were transformed and projected during processing to the WGS84 datum and Universal Transverse Mercator Zones 1, 2 and 60 North projections in meters for the Aleutian Transect Sites (
Table 2-3). The vertical datum for the project was Mean Lower Low Water (MLLW).

Table 2-2 Acquisition Datum

Datum	International Terrestrial Reference Frame (ITRF)
Spheroid	WGS84
Semi-major axis	6378137.000
Semi-minor axis	6356752.314
Inverse flattening (1/f)	298.2572236
Eccentricity squared (e^2)	0.006694380

Table 2-3 Survey Projection

Sites 3, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16 & 21	
Projection	UTM
Zone	1N
Central Meridian (C.M.)	177°W
Scale Factor at CM	0.9996
False Easting	500000m
False Northing	0 m
Sites 1, 2 & 17	
Projection	UTM
Zone	2N
Central Meridian (C.M.)	171°W
Scale Factor at CM	0.9996
False Easting	500000m
False Northing	0 m
Site 10	
Projection	UTM
Zone	60N
Central Meridian (C.M.)	177°E
Scale Factor at CM	0.9996
False Easting	500000m
False Northing	0 m

2.2.2 VESSEL ATTITUDE AND MOTION

An Applanix POS/MV 320 position and orientation system measured vessel heading and dynamic motion (heave, pitch and roll). The system consists of a POS/MV processor, an Inertial Measuring Unit (IMU), POS MV Controller software and two GPS antennae.

The IMU uses a series of linear accelerometers and angular rate sensors that work in tandem to determine vessel attitude solutions.

The GPS antennae were mounted on the mast above the vessel's bridge in a bow/stern configuration approximately 2m apart. The POS/MV Processor uses the GPS data, along with data supplied by gyros in the IMU, to compute a dynamic heading alignment. This heading solution is further refined using a GPS Azimuth Measurement Subsystem (GAMS), wherein a vector is computEd between the two GPS antennas using carrier phase ambiguity resolution subroutines. The operational accuracy of the system as documented by the manufacturer is given in
Table 2-4.

Table 2-4 POS MV 220 Accuracy Specifications

ITEM	ACCURACY
Heading	0.05˚ (Multipath and PDOP dependent)
Heave	5 cm or 5% (Whichever is greater)
Pitch / Roll	0.035˚

The POS/MV controller software displayed real time accuracies of heave, pitch, roll, position and velocity for QC purposes. The software was configured to alert the operator if the actual accuracies were outside the user-defined tolerance limits.

Motion, heading and position data were sent to Isis Sonar for data logging purposes during MBES acquisition. Heading and position was sent to WinFrog during SBP acquisition.

2.2.3 SOUND VELOCITY PROFILES

Sound velocity profile (SVP), pressure, temperature, conductivity, salinity, and density data was acquired using Sea-Bird Electronics (SBE) SBE 19 Seacat. In addition, two AML Sound Velocity & Pressure (SV&P) Smart Sensors were deployed with the SBE 19. The SV&P Smart Sensors are direct sound velocity reading sensors. For each cast, the probes were held at the surface for three minutes to reach temperature equilibrium. The probes were then lowered at the rate of about 1m/s and then raised to the surface at the same rate.

SVP data was additionally acquired with Sippican XBT expendable probes. The Sippican XBT probes measure the water temperature as the probes descend, at a calibrated rate, to the seafloor. The sound velocity was calculated using measured water salinity. Data from the probes were logged on a dedicated PC using Sippican software.

Sound velocity casts were conducted so that MBES data could be corrected for sound velocity refraction. Details are given in Table 2-5 and an example SVP cast from the project area is shown in Figure 2-1.

Table 2-5 SVP Cast Details

Date	Time (UTC)	Probe	Latitude	Longitude
11 June 2003	05:30	SV&P	60º 03’ 58” N	149º 22’ 32” W
15 June 2003	09:00	XBT	51º 44’ 08” N	173º 07’ 58” W
15 June 2003	17:25	SV&P	51º 55’ 12” N	173º 08’ 54” W
15 June 2003	23:37	SV&P	51º 55’ 41” N	173º 08’ 53” W
16 June 2003	05:30	XBT	51º 55’ 42” N	173º 08’ 53” W
16 June 2003	19:30	SV&P	51º 51’ 25” N	173º 50’ 45” W
17 June 2003	04:20	SV&P	51º 55’ 22” N	173º 56’ 40” W
17 June 2003	06:10	SV&P	51º 49’ 36” N	173º 53’ 39” W
17 June 2003	08:20	SV&P	51º 59’ 58” N	174º 00’ 26” W

Date	Time (UTC)	Probe	Latitude	Longitude
17 June 2003	11:17	XBT	51º 44’ 24” N	173º 49’ 18” W
18 June 2003	04:40	SV&P	51º 44’ 41” N	175º 14’ 23” W
18 June 2003	14:35	SV&P	51º 44’ 41” N	175º 14’ 23” W
19 June 2003	01:51	SV&P	51º 53’ 27” N	175º 15’ 39” W
19 June 2003	08:50	XBT	51º 24’ 29” N	176º 13’ 29” W
20 June 2003	02:55	SV&P	51º 38’ 04” N	176º 13’ 06” W
20 June 2003	12:50	SV&P	51º 41’ 38” N	176º 13’ 23” W
20 June 2003	23:42	SV&P	51º 43’ 03” N	176º 19’ 11” W
21 June 2003	06:16	SV&P	51º 33’ 48” N	177º 01’ 44” W
21 June 2003	11:20	XBT	51º 34’ 49” N	177º 04’ 06” W
21 June 2003	16:35	SV&P	51º 35’ 05” N	177º 11’ 47” W
21 June 2003	23:56	SV&P	51º 36’ 24” N	177º 15’ 28” W
22 June 2003	07:10	SV&P	51º 15’ 38” N	177º 42’ 23” W
22 June 2003	08:00	XBT	51º 15’ 22” N	177º 41’ 27” W
22 June 2003	19:20	SV&P	51º 32’ 26” N	177º 54’ 39” W
23 June 2003	01:25	SV&P	51º 34’ 50” N	177º 57’ 49” W
23 June 2003	08:25	SV&P	51º 36’ 30” N	178º 02’ 31” W
23 June 2003	16:46	SV&P	51º 17’ 05” N	178º 28’ 25” W
23 June 2003	21:35	SV&P	51º 21’ 38” N	178º 32’ 08” W
24 June 2003	06:30	SV&P	51º 24’ 54” N	178º 34’ 59” W
24 June 2003	10:26	SV&P	51º 31’ 25” N	178º 38’ 59” W
24 June 2003	13:15	SV&P	51º 24’ 34” N	179º 01’ 00” W
24 June 2003	17:00	XBT	51º 13’ 05” N	179º 37’ 06” W
24 June 2003	21:50	SV&P	51º 19’ 22” N	179º 30’ 36” W
25 June 2003	02:48	SV&P	51º 22’ 09” N	179º 27’ 17” W
25 June 2003	05:53	SV&P	51º 37’ 17” N	179º 32’ 10” W
25 June 2003	12:01	XBT	51º 46’ 10” N	179º 35’ 17” W
25 June 2003	17:45	SV&P	51º 55’ 18” N	179º 48’ 44” W
26 June 2003	01:34	SV&P	51º 53’ 39” N	179º 50’ 47” W
26 June 2003	12:20	SV&P	52º 23’ 30” N	179º 53’ 28” W
26 June 2003	17:05	SV&P	52º 46’ 47” N	179º 19’ 09” W
26 June 2003	21:52	XBT	51º 45’ 48” N	179º 15’ 28” W
27 June 2003	10:20	XBT	51º 53’ 03” N	178º 20’ 04” W
27 June 2003	14:30	SV&P	51º 54’ 19” N	178º 13’ 19” W
27 June 2003	22:27	SV&P	51º 52’ 55” N	177º 23’ 59” W
28 June 2003	06:20	SV&P	51º 55’ 54” N	177º 13’ 10” W
28 June 2003	11:50	SV&P	51º 59’ 38” N	176º 42’ 19” W
28 June 2003	15:40	XBT	52º 05’ 09” N	176º 44’ 50” W
28 June 2003	23:20	XBT	52º 17’ 21” N	175º 42’ 27” W
29 June 2003	00:33	XBT	52º 16’ 00” N	175º 39’ 04” W
29 June 2003	05:40	SV&P	52º 08’ 58” N	175º 40’ 43” W

Date	Time (UTC)	Probe	Latitude	Longitude
29 June 2003	12:36	SV&P	52º 06' 30" N	175º 40' 04" W
29 June 2003	19:10	SV&P	52º 05' 40" N	175º 37' 09" W
29 June 2003	20:56	SV&P	52º 06' 30" N	175º 21' 59" W
30 June 2003	02:20	SV&P	52º 14' 28" N	174º 47' 46" W
30 June 2003	05:29	SV&P	52º 15' 15" N	174º 48' 44" W
30 June 2003	08:20	SV&P	52º 16' 14" N	174º 49' 14" W
30 June 2003	12:36	XBT	52º 22' 00" N	174º 51' 59" W
1 July 2003	03:03	SV&P	52º 16' 09" N	173º 52' 03" W
1 July 2003	06:00	SV&P	52º 16' 19" N	173º 51' 00" W
1 July 2003	08:58	SV&P	52º 15' 53" N	173º 49' 55" W
1 July 2003	11:46	SV&P	52º 15' 59" N	173º 48' 24" W
1 July 2003	15:05	SV&P	52º 14' 38" N	173º 50' 23" W
1 July 2003	18:35	SV&P	52º 13' 39" N	173º 47' 53" W
1 July 2003	22:00	SV&P	52º 12' 33" N	173º 50' 24" W
2 July 2003	01:00	SV&P	52º 11' 28" N	173º 50' 23" W
2 July 2003	04:20	SV&P	52º 10' 36" N	173º 50' 23" W
2 July 2003	08:15	SV&P	52º 09' 56" N	173º 48' 03" W

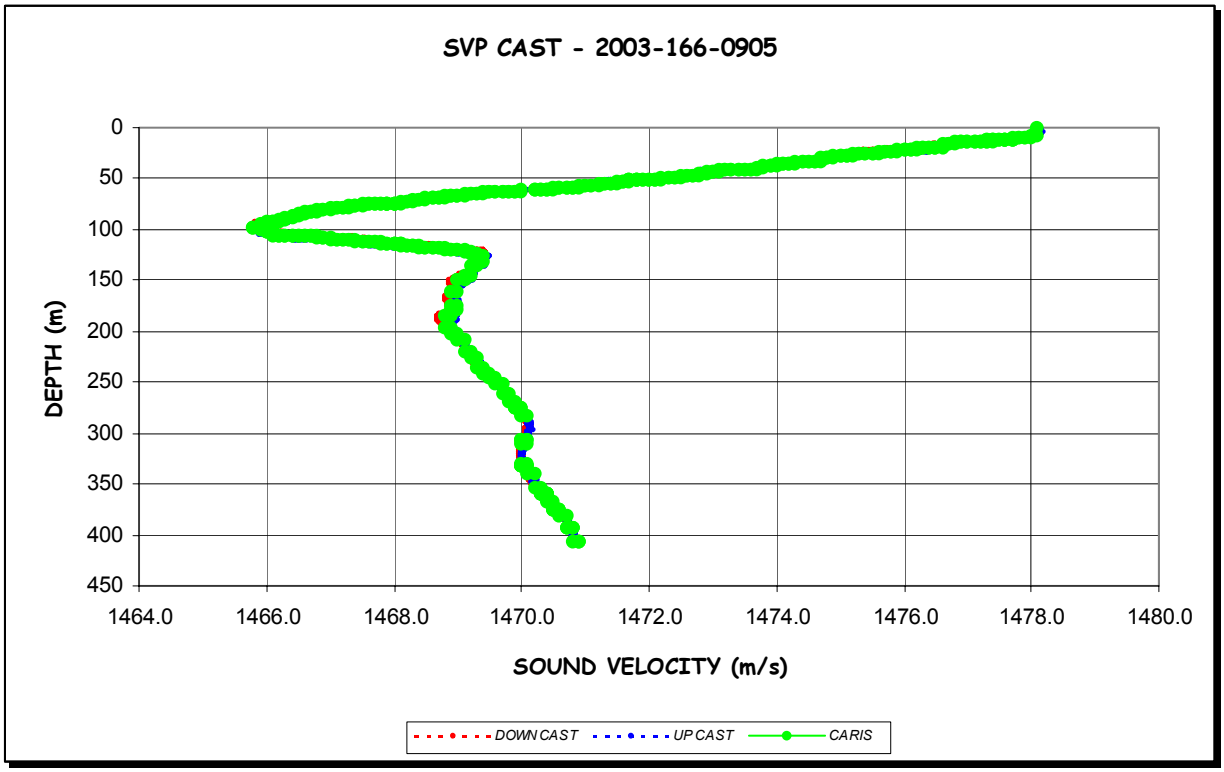


Figure 2-1 Sample SVP Cast

2.2.4 MULTIBEAM ECHOSOUNDER

The R/V Davidson was equipped with the hull mounted Reson SeaBats 8150 & 8111 with option 033 (multibeam sidescan imagery). The Reson 8150 system operates at a frequency of 12 and/or 24 kHz with a depth controlled ping rate. The 24 kHz system was utilized for data acquisition during this survey. The signal is controlled through a Reson 81-P Sonar Processor. The Reson 8150 has 234 horizontal beams, with a beam width of 2º, which make up the 150º across-track beam width. The system also has a 2º along-track beam width. It transmits and receives a sonar signal to measure the relative water depth over the 150º swath. The system was used in water depths ranging from 500 to 3800 meters. The Reson 8111 systems operates at a frequency of 100 kHz, with 101 horizontal beams centered 1.5º apart (150º across-track beam width) and 1.5º along-track beam width. It transmits and receives a sonar signal to measure the relative water depth over the 150º swath. The system was used in water depths ranging from 50 to 500 meters.

Data received by the SeaBat sonar-processing units were sent to Isis Sonar, where backscatter and bathymetry data quality were continually monitored during acquisition operations. Various windows displayed backscatter imagery, a 3D bathymetry profile, and swath coverage so that adjustments to sonar settings or vessel speed could be made, if appropriate, to improve data quality. A parameter window also displayed position, speed, attitude and heading data received from the POS MV, as well as data logging status.

Isis Sonar was used to start and stop data logging in XTF file format, and name lines. Power, gain and range settings were controlled directly through the Reson user interface monitor and varied according to water depth and data quality. Settings were noted on the multibeam line logs, an example of which is given in Appendix D.

The vessel survey speeds varied from 4.5 to 8.0 knots. Survey lines were orientated roughly parallel to the contours in the area. Line spacing varied from site to site, and was adjusted for the water depth and data quality to insure 100% bottom coverage.

The Reson 8150 & 8111 can generate backscatter in one of two distinct modes. For this survey, backscatter data was collected on a beam-by-beam basis. The backscatter from an individual beam is referred to as a snippet.

While a standard sidescan image is produced using one large beam on each side of the sonar, snippets are produced individually from each beam in the multibeam sonar. Snippets can be laced together, end to end, to produce a sidescan type image. The advantage in snippets stems form a large improvement in signal to noise ratio in the image, the result of using a focused beam rather than a broad beam to sample the backscatter.

Snippet data were logged in two formats during survey operations: raw snippets and combined snippets. Both data types are contained within the XTF files. Snippets are combined within the Reson 8150 & 8111 processors to produce a sidescan like image of superior quality. The Reson 8150 & 8111 combined snippets were used to produce the backscatter deliverables for this project. Processing software for the raw snippets is still under development.

2.2.5 SUB-BOTTOM PROFILER

Sub-bottom data was collected on transects 2, 3 and 21 with a GeoAcoustics Model 1036 sub-bottom profiler (SBP). The data was used to characterize the shallow geology of the seabed. The system was towed from the vessel, 1.2m to port of the vessel centerline.

The SBP was operated at a frequency of 3.5kHz, a 250ms shot interval, and a 150ms recording interval. SBP data were monitored using DelphSeismic, which displayed the data in a horizontal profile window as they were being acquired. Gain, time delay, and ping rate adjustments were made during acquisition to optimize data.

DelphSeismic digitally stored unfiltered SBP data, tagged with position supplied by WinFrog, to Triton Elics format (TRA).

2.3 CALIBRATIONS AND QUALITY CONTROL

In addition to the online QC tools and displays available in Isis, DelphSeismic and WinFrog, as described in previous sections, the following calibrations and checks were also conducted.

2.3.1 VESSEL OFFSETS

Dimensions of the vessel were taken after all equipment was mobilized, and offsets between the various sonar systems and sensors were measured. Results are given in Appendix B.

2.3.2 MBES PATCH TEST CALIBRATION

A MBES patch test calibration was carried out to derive the mounting offsets between the sonar head and motion reference unit. Procedures for acquiring patch test data can be found in Appendix F.

Patch test lines were acquired prior to survey and patch test values are applied in processing. Processing method and patch test results can be found in 3.1.1.5.

3 DATA PROCESSING

Data were processed on board to assure data coverage.

3.1 BATHYMETRY

All soundings were processed using CARIS's Hydrographic Information Processing System (HIPS) on Windows 2000 workstations. CARIS was used to clean data, produce Digital Terrain models (DTM's) and generate contours for chart production.

3.1.1 CORRECTIONS TO BATHYMETRY DATA

Within CARIS HIPS, Reson 8150 & 8111 soundings were corrected for calibrated patch test results, vessel offsets, vessel motion, draft, sound velocity and tide.

3.1.1.1 Vessel Offsets

Offsets established prior to survey (Section 2.3.1), were used to correct bathymetry to compensate for differences between the transducer head and GPS antenna position. Offsets are detailed in Appendix B. Offsets were entered in to the Vessel Configuration File in CARIS HIPS, so that CARIS could correct the bathymetry during processing.

3.1.1.2 Sound Velocity Profiles

Processed sound velocity profiles (SVP) were used to correct bathymetry for sound refraction, or ray bending. SVP's were applied within CARIS. Thales' SVP 1.2 Processing Software was used to process the SVP data set, removing duplicated points and noise, to generate a smooth interpolation curve that depicted the original profile at the finest resolution available in CARIS.

CTD and XBT profiles were acquired to about 750 and 2000 meters water depth respectively. All data was utilized to extrapolate the sound velocity profiles to 4000m water depth by use of the Chen–Millero formula, assuming a temperature of 1° C at a depth of 10,000 meters.

3.1.1.3 Static Draft

Static draft observations were measured from both sides of the R/V Davidson. The two measurements were averaged to obtain the static draft correction and the correction was then applied to bring soundings from the transducer level to the water level.

The static draft value (–2.40m) was entered in to the Vessel Configuration file within CARIS. It should be noted that draft is actually distance from the common reference point (CRP) to the water level; CARIS takes into account the distance from the CRP to the transducer head in its calculations as well.

3.1.1.4 Tides

All sounding data were reduced to Mean Lower Low Water (MLLW) by CARIS using NOAA Preliminary Observed tides from Gauge 9461380, Adak Island, AK. Summarized tidal data is located in Appendix H.

3.1.1.5 Patch Test

A patch test was completed using seafloor topology to bring multibeam swaths run at varying speeds, headings, and overlaps into coincidence. Patch tests are employed so that data can be corrected for timing latency, pitch, azimuth and roll offsets, which may exist between the MBES transducer and the MRU.

Patch Test values were obtained in CARIS HIPS calibration mode. Calculated values were then entered in to the Vessel Configuration file so that data could be corrected during the processing procedure. Correction values used are given in Table 3-1 and 3-2.

Table 3-1 8150 Patch Test Results

Test	Correction
Latency	-0.03 sec
Pitch Offset	-0.30º
Azimuth Offset	0.60º
Roll Offset	-0.27º

Table 3-2 8111 Patch Test Results

Test	Correction
Latency	-0.03 sec
Pitch Offset	0.70º
Azimuth Offset	-0.30º
Roll Offset	0.77º

A full patch test report is supplied in Appendix G.

3.1.2 CLEANING

The XTF files were converted to CARIS HIPS format for bathymetry processing. Prior to each survey line being converted from XTF to CARIS's HIPS format, the vessel offsets, patch test calibration values and static draft measurements were entered into the vessel configuration file. Once converted, the SVP file was loaded into each line and the line corrected for sound refraction. During SVP correction the bathymetry was also corrected for dynamic vessel heave, pitch and roll. The attitude, heading, navigation, and bathymetry data were examined for noise and gaps. Nadir beam filters were used to reject data from the outer reaches of the swaths. It should be noted that rejection does not mean deletion from the data set; soundings were simply flagged as 'rejected', and could be re-accepted if necessary.

After each individual line was examined and cleaned in CARIS's Swath Editor (Figure 3-1), the tide file was loaded and the lines merged. During merging, tide and draft corrections were applied. Subsets were then created in CARIS's Subset Edit mode (Figure 3-2) and adjacent overlapping lines of corrected bathymetry data examined to identify any tidal busts, sound velocity errors, motion errors, and data gaps. Any residual noise in the data set was also rejected at this time.

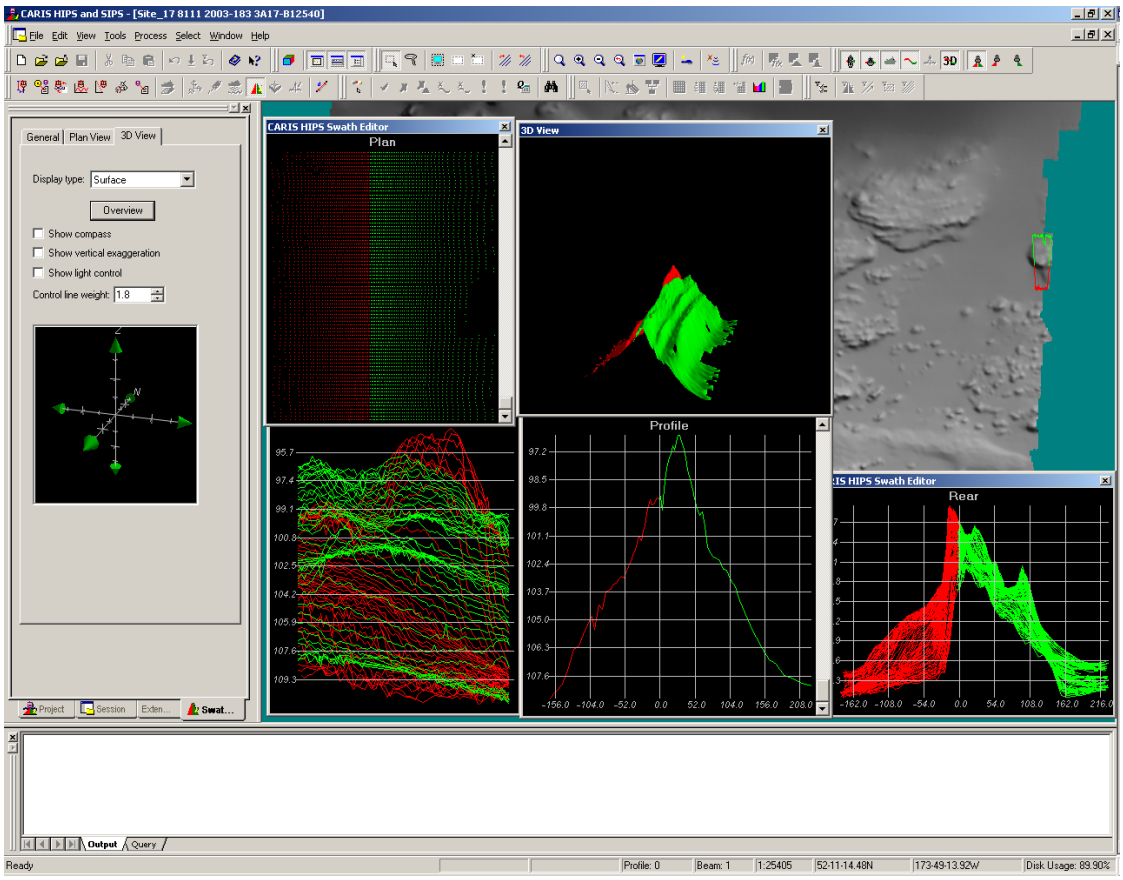


Figure 3-1 CARIS Swath Editor

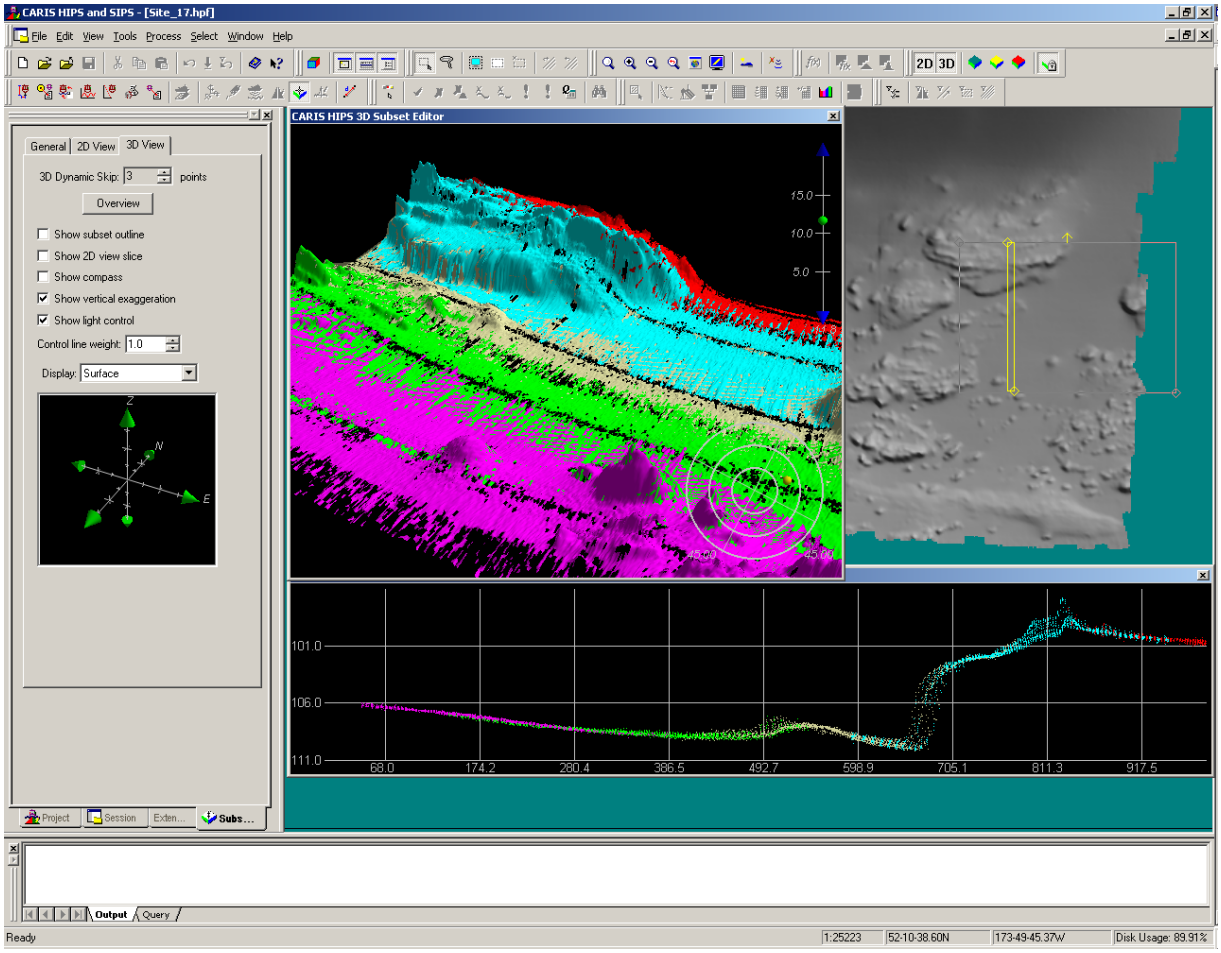


Figure 3-2 CARIS Subset Editor

3.1.3 DTM GENERATION

After data were cleaned in both Swath Editor and Subset Mode, DTM grids were created at various resolutions, depending on water depth.

The grids created within CARIS were mean weighted grids, thus depicting a mean seafloor. Two weighting methods were used in grid creation, range weighting and grazing angle weighting.

Range weighting is based on a sounding's distance from a grid node, where soundings located closer to the node have a greater weight than soundings further away. The number of grid nodes that each sounding influences is determined by the size of the beam footprint. The beam footprint is calculated using water depth; MBES beam width, and grazing angle. Therefore, MBES type is taken in to account during DTM creation.

Grazing angle weighting is based on a beam's intersection angle with the seafloor, whereby a higher weight is given to beams from the inner part of a swath than to outer beams from adjacent track lines. This weighting value is important in areas with adjacent or overlapping track lines.

Sun-illuminated images of the DTMs were created within CARIS using the image manager. These images were then exported in Geotiff format.

3.1.4 CONTOUR PRODUCTION

Once the DTM was generated, it was utilized to create contours at 50m intervals using the CARIS Fieldsheet Contour Wizard. Contours were exported from CARIS in DXF format and imported into Chart-X for labeling. Once labeled, contours were exported to AutoCAD Map 5 for final chart production. Unlabeled versions of the contours were also converted to ArcView Shape format.

3.1.5 ASCII FILES

Two ASCII files were exported from CARIS HIPS; one with XYZ for all DTM grid nodes, and another with XYZ containing all the soundings for later slope analysis.

3.1.6 MBES TIE LINE CHECK

A tie line check was conducted to establish whether the Reson 8111 MBES data met IHO depth accuracy standards for hydrographic survey, laid out in SP44, Ed.4.

The makehist function within CARIS HIPS, was used to produce QC Reports, based on the depth accuracy specification given in SP44:

$$\pm\sqrt{[a^2 + (b * d)^2}$$ where d = depth

and a and b are as follows

ORDER	Special	1st	2nd	3rd
a	0.25m	0.50m	1.00m	1.00m
b	0.0075	0.013	0.023	0.023

However, since a variance of a difference, rather than a variance from a mean is being used, the a and b values defined in the CARIS Class file will be as follows

$$CARIS\_a = a * \sqrt{2}$$
$$CARIS\_b = b * \sqrt{2}$$

ORDER	Special	1st	2nd	3rd
CARIS_a	0.354m	0.707m	1.414m	1.414m
CARIS_b	0.0106	0.0184	0.0325	0.0325

A regular, mean weighted average DTM was created from the main scheme survey lines and compared with soundings from each of the tie lines using the makehist function.

Quality control results, Appendix I, show that the MBES data fully meets IHO Order 1 Specifications. It should be noted that Quality Control tielines were not a requirement under this contract, but on site 17 two lines were ran perpendicular (due to weather conditions) and were used to conducted these Quality Control reports.

3.2 BACKSCATTER

Backscatter data were processed and mosaicked using Isis Sonar and DelphMap.

3.2.1 CORRECTIONS TO BACKSCATTER DATA

Multibeam echo sounder and backscatter data were processed onboard the acquisition vessel and the onboard client representative reviewed the preliminary data.

Prior to processing of final backscatter mosaics, an adjustment to the position within the XTF files was made to reflect the offset between the GPS antenna and the Reson systems. Positions were calculated using offsets from the antenna to the Reson transducers, taking into account vessel attitude (pitch, roll, and heading). The sonar head position was written into the XTF files, replacing the antenna position.

Time Varied Gain curves (TVG) were set to compensate for signal strength variations. The resulting compensated data more accurately indicate the true variations in seabed reflectivity across the area surveyed.

Data from the outer edges of the swath were clipped where there was sufficient overlap, leaving only higher quality, near range data. Bottom tracking settings were adjusted to ensure correct tracking of the seabed. Once the bottom tracking was correctly set, the water column was removed from the data set by applying a slant-range correction.

Backscatter data were terrain-corrected in Isis Sonar. ASCII XYZ files of generated DTM grid nodes were exported from CARIS. These files were imported into BathyPro and DTMs generated that could be recognized by TEI's software suite. The DTMs were then used by Isis Sonar and DelphMap when mosaicking the backscatter data.

Terrain correction takes account of the variation in seabed elevation in order to determine the true cross-line distance of a reflected pulse signal. Slant-range corrections made without using terrain correction assumes a horizontal seabed and assigns reflections to positions at an incorrect distance from the survey track line.

3.2.2 MOSAIC CREATION

Three mosaics of the backscatter data were created using Isis Sonar (Figure 3-3) and DelphMap. DelphMap allows lines to be layered in any order; therefore, lines were mosaicked individually then put in the most desirable order before merging into one final mosaic. Once the mosaic was finalized within DelphMap, it was exported in GeoTiff format.

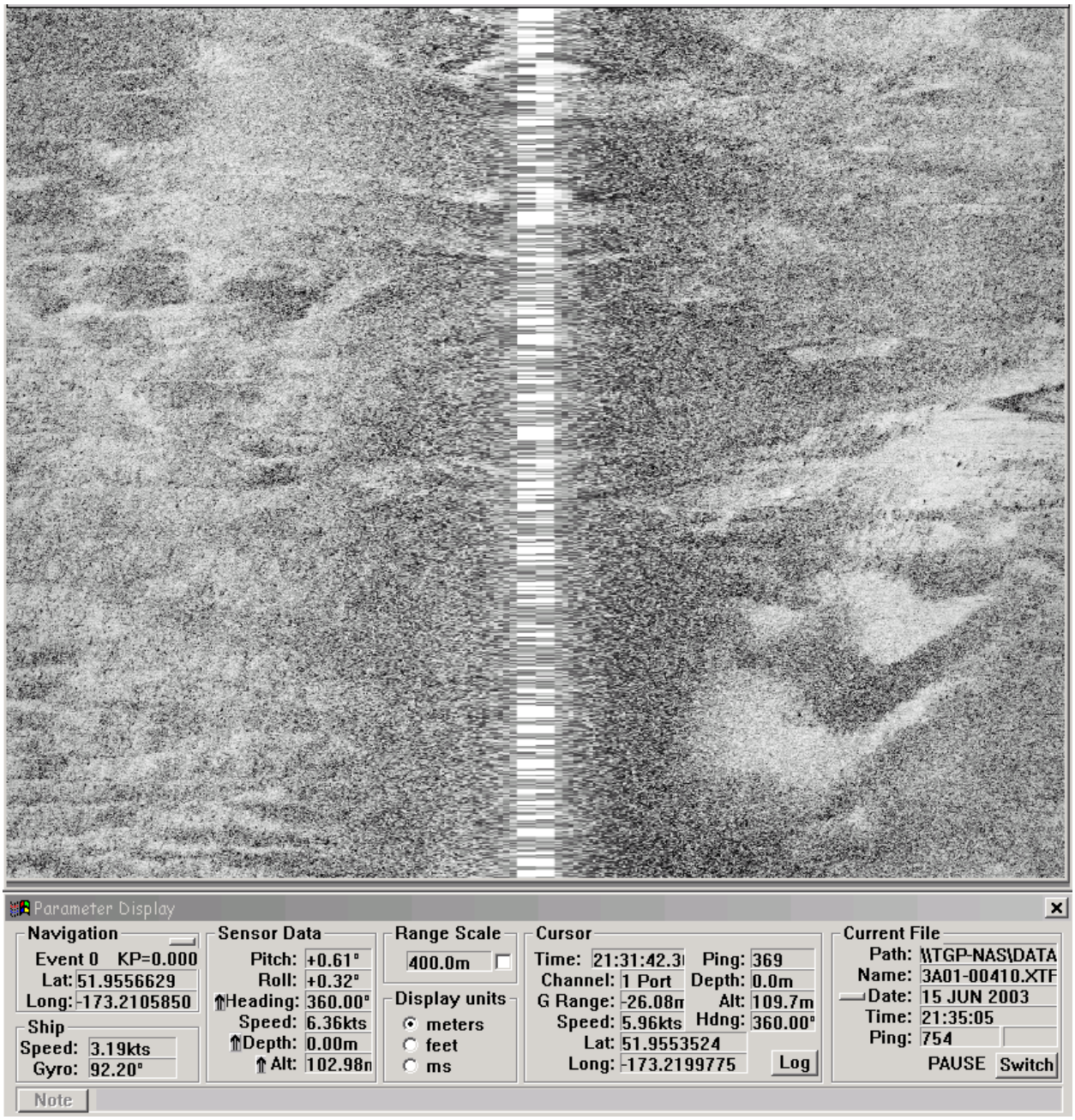


Figure 3-3 Data Playback in Isis Sonar

4 CHARTING AND DATA PRODUCTS

4.1 FINAL PRODUCTS

After all processing was completed at, the following deliverables for the survey were provided:

- Final Report
- All Raw XTF files for Multibeam and Backscatter data
- Raw SBP data for site 2, 3 and 21
- All Processed CARIS HDCS data
- Gridded ASCII XYZ data at appropriate grid intervals
- Grey-scale and Color GeoTiffs of sun-illuminated bathymetry
- Soundings for slope analysis in ASCII
- Bathymetric contours in ArcView SHP format
- GeoTiffs of Backscatter at best resolution
- GeoTiffs of Backscatter at best resolution draped over bathymetry
- Map Products
    - 1:25,000 Charts for all Sites (Paper, DWG and PDF format on CD)
        - 56 X Sun-Illuminated Bathymetry
        - 56 X Color Coded Sun-Illuminated Bathymetry
        - 28 X Multibeam Backscatter
        - 28 X Multibeam Backscatter draped over Bathymetry

APPENDIX A : DAILY LOG

THALES

Date: 06/13/03 Julian Days: 164/165 Project Survey Day#: 1

Summary of Day's Activities*: @ 2147 (AST) Davidson a beam of Dutch Harbor, Position 53º16.3 N 165º54.6 W. Start of operations for NMFS.*

Note: Conducted Patch Test of 8111 and 8150 in Seward on 6/11/03, total of six hours. ***The total hours below include the Patch Test in Seward.***

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	8			
Project	8			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Realtime BathyPro Map issues are still pending.
Diver inspecting wheels and rudders, some small bends and one crack. During the crew change in Dutch Harbor, we should get a diver down to inspect the crack in the wheel.
12KHz not working correctly, Reson techs will take the 12 KHz boards to test in there lab. During the crew change in Dutch Harbor, the Reson boards will be replaced and tested.
We have only the Coast guard for Differential Corrections. We will only get Cold Bay on the NMFS project; therefore if we loose Cold Bay we have no other source. Recommend that on the next project another source is available.
Phone is not working as good as it should, may be an issue. Talked to the Captain, their comms are available for us to use.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: Conducted drills on 6/12/03.

5. Weather
A. NOAA Short Term Weather Forecast:

N/A

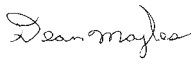
B. NOAA Extended Forecast

N/A

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Transit to Site 01.

B. General Plan/Priorities for the next week
Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/14/03 Julian Days: 165/166 Project Survey Day#: 2

Summary of Day's Activities*: Transit to Site 01.*

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	32			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Realtime BathyPro Map issues are still pending.
Diver inspecting wheels and rudders, some small bends and one crack. During the crew change in Dutch Harbor, we should get a diver down to inspect the crack in the wheel.
12KHz not working correctly, Reson techs will take the 12 KHz boards to test in there lab. During the crew change in Dutch Harbor, the Reson boards will be replaced and tested.
We have only the Coast guard for Differential Corrections. We will only get Cold Bay on the NMFS project; therefore if we loose Cold Bay we have no other source. Recommend that on the next project another source is available.
Phone is not working as good as it should, may be an issue. Talked to the Captain, their comms are available for us to use.

4. Personnel and Logistics:
A. Personnel
Thales Geosolutions (Pacific) 7
LCMF 1
McClane 1
Total Survey Staff: 9
B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: Conducted drills on 6/12/03.

5. Weather
A. NOAA Short Term Weather Forecast:

N/A

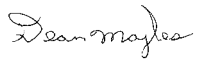
B. NOAA Extended Forecast

N/A

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Transit to Site 01.

B. General Plan/Priorities for the next week
Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/15/03 Julian Days: 166/167 Project Survey Day#: 3

Summary of Day's Activities*: Transit to Site 01. Arrive on site @ 0130 (AST), conducted XPT and CTD sound velocity dips. Start survey of Site 01, with Reson 8150. Completed Site 01 around 0230 AST, re-ran lines 3A01-03600 and 3A01-03000 and started transit to Site 02.*

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	56			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Realtime BathyPro Map issues are still pending.
Diver inspecting wheels and rudders, some small bends and one crack. During the crew change in Dutch Harbor, we should get a diver down to inspect the crack in the wheel.
12KHz not working correctly, Reson techs will take the 12 KHz boards to test in there lab. During the crew change in Dutch Harbor, the Reson boards will be replaced and tested.
We have only the Coast guard for Differential Corrections. We will only get Cold Bay on the NMFS project; therefore if we loose Cold Bay we have no other source. Recommend that on the next project another source is available.
Phone is not working at all. The number for the Davidson is 881 631 831 127, fax 001 872 336 808 614. Got some phone cards from the Captain to use until ours is back online. Bob Richards is working on resolving the problem.
Backscatter is bad on certain lines; we will re-run a couple to determine if it is the Reson 8111 or the bottom type.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: Conducted drills on 6/12/03.

5. Weather
A. NOAA Short Term Weather Forecast:

N/A

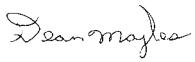
B. NOAA Extended Forecast

N/A

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Transit and start survey of Site 02.

B. General Plan/Priorities for the next week
Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/16/03 Julian Days: 167/168 Project Survey Day#: 4

Summary of Day's Activities*: Weather as picked up considerably. Only running one line up the middle of Site 02 with the 8150, due to weather. We surveyed the shallow region of Site 02 with the 8111; we are getting much better data with this system. Deployed the Pinger @ 1830 AST on a portion of this Site.*

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	80			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Realtime BathyPro Map issues are still pending.
Diver inspecting wheels and rudders, some small bends and one crack. During the crew change in Dutch Harbor, we should get a diver down to inspect the crack in the wheel.
12KHz not working correctly, Reson techs will take the 12 KHz boards to test in there lab. During the crew change in Dutch Harbor, the Reson boards will be replaced and tested.
We will try and setup the Garmin to receive WAAS for another source of Diff. We are experiencing some nav. jumps, but none real significant. Recommend that on the next project another source is available.
Extended the Antenna for the phone, we get a little better signal, but we still can't check email.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: Conducted drills on 6/12/03.

5. Weather

A. NOAA Short Term Weather Forecast:

N/A

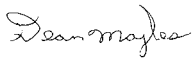
B. NOAA Extended Forecast

N/A

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Complete Site 02 with multibeam and Pinger, and then transit to Site 3.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/17/03 Julian Days: 168/169 Project Survey Day#: 5

Summary of Day's Activities*: Sea state as not changed from yesterday. Completed Site 02 with the 8111, start transit to Site 03. We had considerable SVP cupping in the shallow section of Site 02. This was due to the long lines and weather. It was deemed too rough to conduct an SVP cast. When the weather was suitable a SVP cast was conducted to rectify the SVP cupping. I was able to fix the majority of the cupping, but there is still a little visible in the data set. We are running the lines in Site 03 with the contours; therefore the lines will only be five km's in length.*

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	104			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Realtime BathyPro Map issues are still pending.
Diver inspecting wheels and rudders, some small bends and one crack. During the crew change in Dutch Harbor, we should get a diver down to inspect the crack in the wheel.
12KHz not working correctly, Reson techs will take the 12 KHz boards to test in there lab. During the crew change in Dutch Harbor, the Reson boards will be replaced and tested.
We will try and setup the Garmin to receive WAAS for another source of Diff. We are experiencing some nav. jumps, but none real significant. Recommend that on the next project another source is available.
We will be using the Davidson's phone and email during operations.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: Conducted drills on 6/12/03.

5. Weather
A. NOAA Short Term Weather Forecast:

N/A

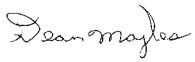
B. NOAA Extended Forecast

N/A

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Complete Site 03 with multibeam, and then transit to Site 21. Complete the subsets for Site 02 and create images and contours for clients.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/18/03 Julian Days: 169/170 Project Survey Day#: 6

Summary of Day's Activities*: Weather as improved over night. Completed Site 03 and conducted two additional lines to the north of Site 03 with the Pinger. These lines extended from the Northern Limit of Site 03 to about the 30-fathom mark off the East side of ATKA Island.*

Completed processing Site 02, due to the line orientation and weather there is some SVP and Roll error present. Site 03 is being cleaned in Subset mode and should be completed tonight or early tomorrow.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	128			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Realtime BathyPro Map issues are still pending.
During the crew change in Dutch Harbor, we should get a diver down to inspect the crack in the wheel.
During the crew change in Dutch Harbor, the Reson 12KHz boards will be replaced and tested.
We will try and setup the Garmin to receive WAAS for another source of Diff. We are experiencing some nav. jumps, but none real significant. Recommend that on the next project another source is available.
Need to know if we have any Side Scan data for Little Tanaga Strait (just East of ADAK), I email Bob Richards, Bob Pawlowski and Bill Gilmour on this issue. The NMFS client would like to survey into the 30-fathom contours on Site 21, but if we already have data, then there would be no need. We need to know this ASAP.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

N/A

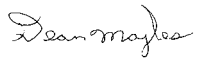
B. NOAA Extended Forecast

N/A

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Transit to Site 21 and commence survey. Complete the subsets for Site 03 and create images and contours for clients.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/19/03 Julian Days: 170/171 Project Survey Day#: 7

Summary of Day's Activities*: Working on Site 21, experiencing some RTCM problems. We mobbed another beacon higher up, but it doesn't make any difference.*

Completed processing Site 03 and 8150 for Site 21. Still seeing SVP and Roll error. I will try to contact Doug Lockhart tomorrow on increasing the output from the POS M/V to 50 Hz, I think this may help a little but my concern is the number of Nav positions being sent to the XTF file.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	152			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Realtime BathyPro Map issues are still pending.
During the crew change in Dutch Harbor, we should get a diver down to inspect the crack in the wheel.
During the crew change in Dutch Harbor, the Reson 12KHz boards will be replaced and tested.
WAAS does not work and if it did there is no way to output it on that system. Waiting on possible solutions to resolve this problem.
We are going ahead and surveying the area of interest north of Site 21.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather

A. NOAA Short Term Weather Forecast:

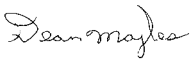
N/A
B. NOAA Extended Forecast
N/A

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Once we finish Site 21, we will be running one predetermined line down through this site. We will then transit north to run over a couple of Dive sites one n Boot Bay and the other around False Bay, then onto Site 5. Complete the subsets for Site 21 8111 data and create images and contours for clients.

After we conclude Site 5, we will transit to Site 6 and conduct the 8150 test at 4000m.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

Date: 06/20/03 Julian Days: 171/172 Project Survey Day#: 8
Summary of Day's Activities*: Completed the multibeam survey of Site 21, we then deployed the Pinger and conducted one line through the shallow section of Site 21. On the transit to Site 5 we deviated from the route to survey two dive sites.*

Note: Client reduced the line lengths on the northern section of Site 21 to 5 KM.

Arrived at Site 5 @ 2230 AST and conducted a SVP and commence survey starting with the 8111 system.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	176			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.
Disconnected the RTCM input from the POS M/V to resolve the navigation problems (this was done @ 0600 AST). I talked to Doug about this problem and we can re-process the nav in the office and use a SkyFix station.
During the next period of bad weather I will be increasing the output from the POS to 50 HZ. I noticed some roll error in the data set for Sites 2 and 3.

4. Personnel and Logistics:
A. Personnel
Thales Geosolutions (Pacific) 7
LCMF 1
McClane 1
Total Survey Staff: 9
B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

0400 6-20-03

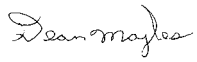
NW 15 Seas 5 feet
B. NOAA Extended Forecast

SUN N 15
MON W 30
TUES NW 20

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Since this Site extends to the Shoreline we will run the 8111 first then the 8150. For safety reasons we will start deep and work shallow.
After we conclude Site 5, we will transit to Site 6 and conduct the 8150 test at 4000m.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/21/03 Julian Days: 172/173 Project Survey Day#: 9

Summary of Day's Activities*: Complete Site 5 @ 1600 AST, start transit to Site 6. Arrive at Site 6 @ 1918 AST, transit to 4000m to conduct 8150 test. Arrive back at Site 6 @ 2310 AST, conducting SVP, CTD and XBT casts.*

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	200			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

0400 6-21-03
V 10 Seas 4 feet

B. NOAA Extended Forecast

MON N 15
TUES N 15

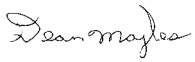
THALES

WED N 25

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Survey Site 6, Finish processing 8111 for Site 5. Re-grid 8111 data at 5m and 10m.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/22/03 Julian Days: 173/174 Project Survey Day#: 10

Summary of Day's Activities*: Continue with Site 6 Survey.*

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	224			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

0400 6-22-03
NW 20 Seas 6 feet

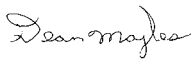
B. NOAA Extended Forecast

TUES W 20
WED W 20
THURS V 20

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Complete the survey of Site 6, transit to Site 7 and commence survey.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/23/03 Julian Days: 174/175 Project Survey Day#: 11

Summary of Day's Activities*: Site 6 was completed @ 0625 AST, we then transited to Site 7. Arrived @ Site 7 @ 0840 and conduct XBT, SV&P and CTD casts.*

Due to time constraints, once we complete the middle section of this site we will skip the8150 section and run three N-S lines on the northern section if the site with the 8111. These lines will run from the 200-fathom contour to about the 30-fathom contour.

Site 26 as been cut in it's entirety, but upon competition of Site 7 we will transit to two dive site locations on the West side of Ulak & Amatignak Islands. We will then transit to Site 8 and commence survey.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	248			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/04/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

N/A

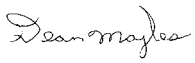
B. NOAA Extended Forecast

N/A

6. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Complete Site 7 and transit to two dive site locations on the West side of Ulak & Amatignak Islands. We will then transit to Site 8 and commence survey.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/24/03 Julian Days: 175/176 Project Survey Day#: 12

Summary of Day's Activities*: Site 7 was completed @ 0225 AST. The transit route to Site 8 included two dive sites, located on the West side of Ulak & Amatignak Islands.*

The Davidson arrived @ Site 8 @ 0900 AST and conduct XBT, SV&P and CTD casts. Survey of Site 8 was completed @ 19:10 AST, we then proceeded to Site 9.

Arrived @ Site 9 around 2130 AST and conduct XBT, SV&P and CTD casts.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	272			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.
Loaded SnapSave to capture 8150 data, but unable to run the program due to errors, I will email Doug Lockhart on this issue.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/03/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

W 30 Seas 10 Feet

B. NOAA Extended Forecast

W 30 Seas 10 Feet

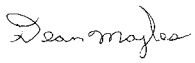
6. Position and General Location

51.65º N 171.58º W, Amchitka Pass.

7. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Complete Site 9, transit and commence survey of Site 10. Note: Site 10 intersects the Date Line.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/25/03 Julian Days: 176/177 Project Survey Day#: 13

Summary of Day's Activities*: Site 9 was completed @ 0650 AST.*

The Davidson arrived @ Site 10 @ 0940 AST and conduct SV&P and CTD casts.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	296			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.
Received a new version of the SnapSave program and it works okay. Will try and capture some snapshots of the8150 data.
Experienced little problems with Delph Map. Needed to create two DDS files, one for Zone 60N and one for Zone 1N.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/03/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

W 30 Seas 13 Feet

B. NOAA Extended Forecast

W 30 Seas 13 Feet

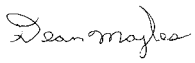
6. Position and General Location

51.85º N 179.88º E, Site 10, just off the east of Semisopochnoi Island.

7. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Complete Site 10, transit and commence survey of Site 11. Note: On the transit route to Site 11 we will be surveying seven dive sites.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/26/03 Julian Days: 177/178 Project Survey Day#: 14

Summary of Day's Activities*: The Davidson arrived @ Site 11 @ 0843 AST and conduct SV&P and CTD casts.*

Site 11 was completed @ 1722 AST, depart for Site 12 which is located on the west side of Tanaga Island.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	320			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/03/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

SW 15 Seas 5 Feet

OUTLOOK S 30 Seas 12 Feet

B. NOAA Extended Forecast

SAT SW 15-25
SUN-MON V15

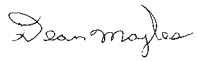
6. Position and General Location

51.98º N 178.45º E, Site 12, located on the west side of Tanaga Island.

7. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Transit and commence survey of Site 12.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/27/03 Julian Days: 178/179 Project Survey Day#: 15

Summary of Day's Activities*: The Davidson arrived @ Site 12 @ 0000 AST and conduct XBT, SV&P and CTD casts.*

Site 12 was completed @ 0620 AST, depart for Site 13 which is located in Kanaga Sound between Bobrof Island and Kanaga Volcano.

On the route to Site 13 we surveyed the Pinnacle south of Bobrof Island and one dive site. Arrived @ Site 13 around 2230 AST and commence survey.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	344			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/03/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

SE 15 Seas 5 Feet

B. NOAA Extended Forecast

SE 15 Seas 5 Feet

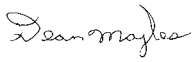
6. Position and General Location

51.98º N 176.79º W, Site 14, located on the north side of Adak Island in Andrew Bay.

7. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Transit and commence survey of Site 14. The route to Site 14 we take us over four dive sites.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/28/03 Julian Days: 179/180 Project Survey Day#: 16

Summary of Day's Activities*: The Davidson arrived @ Site 14 @ 0210 AST and conduct XBT, SV&P and CTD casts.*

Site 14 was completed @ 0840 AST, depart for Site 15 which is located on the west side of Kasatochi Island.

Arrive @ Site 15 around 2047 AST and commence survey. Client revised Site 15, the area as been extended an extra 2.3 KM to the south, they also want to conduct three lines about 20 KM's long that run parallel to the bottom edge of Site 15.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	368			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/03/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

V 15 Seas 4 Feet

B. NOAA Extended Forecast

S 20 Seas 7 Feet

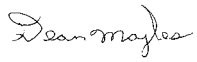
6. Position and General Location

52.12º N 175.63º W, Site 15, located on the west side of Kasatochi Island.

7. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Continue survey of Site 15. This area as been extended an extra 2.3 KM to the south, we will also be conducting three lines about 20 KM's long that run parallel to the bottom edge of Site 15.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/29/03 Julian Days: 180/181 Project Survey Day#: 17

Summary of Day's Activities*: Site 15 was completed @ 1305 AST, depart for Site 16 which is located on the northwest side of Atka Island.*

The Davidson arrived @ Site 16 @ 1600 AST, conduct SV&P cast and commence survey.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	392			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.
Experienced hard drive failure in the server. I will use the remaining spare to replace the bad one, after I conduct and verify another full backup. Recommend that we get another couple of spares to have on board.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/03/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

SW 25 Seas 16 Feet

B. NOAA Extended Forecast

SW 20 Seas 9 Feet

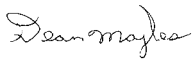
6. Position and General Location

52.35º N 174.90*º W,* Site 16, located on the northwest side of Atka Island.

7. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Continue survey of Site 16. After we complete Site 16, the plan is to meet with the Valero (Dive Boat) to exchange charts and data.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Commence surveys of specified Sites.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 06/30/03 Julian Days: 181/182 Project Survey Day#: 18

Summary of Day's Activities*: Site 16 was completed @ 0750 AST, depart for Banner Bay to meet with Valero.*
The Davidson arrived in Banner Bay @ 1100 AST and transfer plots and digital data to the Valero, @ 1115 AST Davidson depart for Site 17. Arrive at Site 17 1602 AST and commence survey.
The survey line plan was to run in an east-west direction, but due to the weather conditions we were forced to run north-south. The Site will be broken into 3 sections to alleviate any SVP problems.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	416			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *None to note.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.
Server back online, if I need additional hard drives I will use the ones from the backup server.

4. Personnel and Logistics:
A. Personnel
Thales Geosolutions (Pacific) 7
LCMF 1
McClane 1
Total Survey Staff: 9
B. Logistics
Next Rotation Date: 07/03/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

S 25 Seas 10 Feet. Diminishing W 20 Seas 7 Feet.

B. NOAA Extended Forecast

V 15 Seas 7 Feet

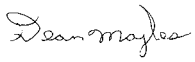
6. Position and General Location

52.23º N 173.84*° W,* Site 17, located on the northwest side of Amlia Island.

7. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Continue survey of Site 17. After we complete Site 17, we will use any remaining time to collect data in the deeper water north of Site 17.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Transit to Dutch Harbor.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 07/01/03 Julian Days: 182/183 Project Survey Day#: 19

Summary of Day's Activities*: Completed the northern section of Site 17. The weather as clamed down, the lines are now being ran east west.*

We expect to break off the survey just after midnight and start the transit to Dutch Harbor.

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	440			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns: *Kelp got caught in the props, which was removed by running in reverse. Still experiencing some vibrating.*

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/03/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

W 15 Seas 5 Feet.

B. NOAA Extended Forecast

SW 15 Seas 6 Feet

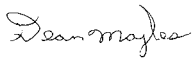
6. Position and General Location

52.16º N 173.84*° W,* Site 17, located on the northwest side of Amlia Island.

7. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Transit to Dutch Harbor. We will collect data and snapshots on transit route.

B. General Plan/Priorities for the next week
Process and Chart completed areas. Transit to Dutch Harbor.

Signed



Dean Moyles
Lead Hydrographer

THALES

Date: 07/02/03 Julian Days: 183/184 Project Survey Day#: 20

Summary of Day's Activities*: End survey @ 0020 AST, commence transit to Dutch Harbor.*

2. Vessel Operations:
Survey Vessel ops #s

Survey Vessels	Survey Operations	Downtime Weather	Survey Equip	Vessel
Davidson (24)				
Today	24			
Project	464			
Project %	100%			

Mother vessel status: *Fully operational, no problems to note.*

Vessel Concerns:

3. Outstanding Technical, Personnel or Equipment Issues:
Props and 8150 12kHz.

4. Personnel and Logistics:
A. Personnel

Thales Geosolutions (Pacific)	7
LCMF	1
McClane	1
Total Survey Staff:	9

B. Logistics
Next Rotation Date: 07/03/03
Personnel Off: None
Personnel On: *N/A*

C. Safety Incidents to Report: None to Note.

5. Weather
A. NOAA Short Term Weather Forecast:

N/A

B. NOAA Extended Forecast

N/A

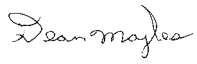
6. Position and General Location

53.39º N 169.29*º W,* Transit to Dutch.

7. Survey Plan
A. Survey Plan/weather impact expected for next 24 hours
Arrive in Dutch Harbor and take on fuel and food.

B. General Plan/Priorities for the next week
N/A

Signed



Dean Moyles
Lead Hydrographer

APPENDIX B : VESSEL SPECIFICATIONS AND OFFSETS

R/V Davidson

The R/V Davidson is a 47 meter (153 foot) 833 GRT survey vessel capable of extended duration offshore survey operations (see Figure B-1). The R/V Davidson accommodates a vessel and survey crew, acquisition hardware, and processing center for reducing acquired data to field quality products. Additional information about the R/V Davidson can be seen in the table below:

Figure B-1 R/V Davidson

Table B-1 R/V Davidson Specifications

SURVEY VESSEL	R/V DAVIDSON
Official Number	D1066485
Owner	Venture Pacific Marine Inc.
Year Built	01/02/67
Length	153 ft
Beam	38 ft
Draft	17.75 ft
Gross Ton	250
Net Ton	833
Power	1800 hp

Three NovAtel antennas were mounted on the ship's mast for positioning and heading. The central antenna was used for vessel position. The two POS/MV antennas were offset 2.0 meters, fore and aft, of one another. The forward antenna functioned as the POS/MV master

antenna while the aft antenna functioned as the POS/MV secondary (see Figure B-4-1). A spare NovAtel GPS antenna was mounted between two differential antennas behind the ship's mast (see Figure B-4-2).

Figure B-4-1 Primary GPS and POS MV Antennas

Figure B-4-2 Spare GPS and Differential Antennas

Offsets are used in WinFrog for display purposes only. Offset values were applied to the data in CARIS HIPS as specified in the vessel configuration file. The vessel offsets used are shown in the following table:

Table B-2 R/V Davidson Vessel Offsets

FROM	TO	X	Y	Z
CRP	8150 Transducer	0.00	9.17	2.16
CRP	8111 Transducer	0.00	0.00	2.04
CRP	Primary Navigation GPS Antenna	0.01	3.82	-23.45
CRP	Backup Navigation GPS Antenna	0.05	-5.95	-14.36
CRP	POS/MV Master Antenna (1)	0.15	5.07	-23.45
CRP	POS/MV Slave Antenna(2)	0.15	3.07	-23.45
CRP	POS/MV (IMU)	0.00	0.00	0.00
CRP	Draft Measuring Point, Port	-5.79	0.00	-5.26
CRP	Draft Measuring Point, Starboard	5.79	0.00	-5.28

Note: All units are meters.
Axis used: X positive toward starboard
Y positive toward bow
Z positive into the water

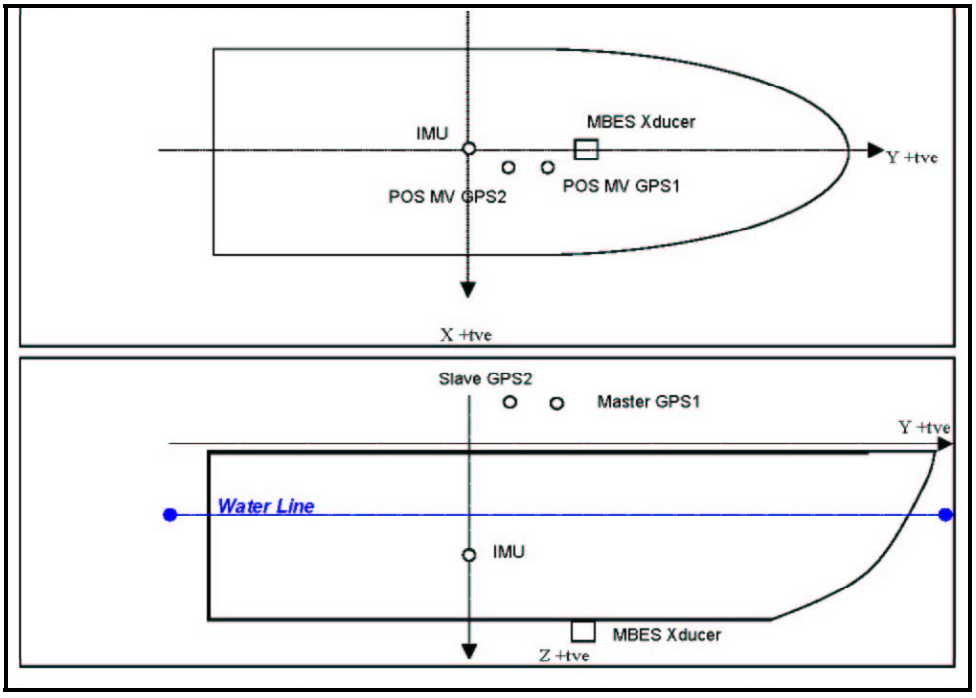


Figure B-5 R/V Davidson Equipment Layout

APPENDIX C : EQUIPMENT SPECIFICATIONS

THALES

MBX-3

2 Channel Automatic Differential Beacon Receiver

Standalone Radiobeacon Receiver

FEATURES

- Dual independent channels for superior automatic beacon tracking
- State-of-the-art digital architecture enhances beacon reception
- Fast acquisition times ensure you are up and running quickly
- 2-line by 16-character LCD display provides more information simultaneously
- Global beacon table listing gives you quick access to beacons by name
- Low power consumption gives extended battery life for portable applications
- Automatic and manual tune modes provide operational versatility
- Optional internal splitter and GPS signal output port for use with combination GPS/beacon antennas
- Firmware upgrades are easily loaded into the receiver through the serial port
- Wide selection of antennas available

Advanced Beacon Receiver Technology

The CSI MBX-3 beacon receiver employs CSI's third generation of digital receiver technology to receive free DGPS signals broadcast by the networks of 300 kHz radiobeacons deployed worldwide.

Using these signals, the MBX-3 beacon receiver outputs differential correction data in the industry standard RTCM SC-104 format accepted by differential-ready GPS receivers.

The advanced digital signal processing techniques of the MBX-3 allow for reliable extraction of DGPS data from the beacon broadcasts, even in noisy environments.

Ease of Operation

The MBX-3 incorporates a large 2-line by 16-character display and 3-switch keypad. The intuitive menu system provides access to receiver status information and operating parameters.

You may configure the MBX-3 beacon receiver for either automatic or manual tune operation using the convenient menu system.

A new global beacon table within the receiver menu system allows selection of beacons by name.

Automatic Operation

In automatic mode, the two channels of the beacon receiver cooperatively construct and maintain a table of radiobeacons available in your area. The receiver's primary channel automatically locks to the station providing the highest quality signal. This ensures that the MBX-3 is always locked to the best beacon in the area.

Antennas

The MBX-3 receiver may use any of a variety of antennas offered by CSI. Options include an E-field Whip antenna, two varieties of H-field beacon Loop antennas, and a combination GPS/beacon antenna.

All CSI antennas incorporate band-pass filtering and integral preamplifiers. The MBX-3 receiver provides power to these active antennas.

H-field beacon Loop antennas do not require a counterpoise ground connection and are ideal for portable applications. They are also less susceptible than a conventional whip antenna to predominate E-field noise, including precipitation static.

Hassle-Free Upgrading

The MBX-3 supports firmware upgrades as improvements to firmware or changes to the global beacon table are made. These upgrades are easily loaded into the receiver through the serial port using a PC computer.

Configuration Software

CSI offers custom Windows 95® software for beacon receiver configuration, monitoring receiver performance, and decoding RTCM data. A terminal interface and data logging capability are also included.

Warranty

CSI is committed to supporting its products and offers a one-year warranty on parts and labor.

Contact us to discover why the MBX-3 is the right choice for your application.

MBX-3 – *2 Channel Automatic Differential Beacon Receiver*

Receiver Specifications

Channels:	2 independent channels
Frequency Range:	283.5 to 325.0 kHz
Channel Spacing:	500 Hz
MSK Bit Rates:	50, 100, and 200 bps
Cold Start Time:	< 1 minute
Warm Start Time:	< 2 seconds
Demodulation:	Minimum shift keying
Sensitivity:	2.5 µV/m for 10 dB SNR
Dynamic Range:	100 dB
Frequency Offset:	± 5 Hz
Adjacent Channel Rejection:	60 dB
Correction Output Protocol:	RTCM SC-104
Input/Status Protocol:	NMEA 0183

Communications

Interface Level:	RS-232C or RS-422
Baud Rates:	2400, 4800, 9600

Environmental Specifications

Operating Temperature:	-30°C to +70°C
Storage Temperature:	-40°C to +80°C
Humidity:	95% non-condensing
EMC:	EN 60945 EN 50081-1 EN 50082-1 FCC: Part 15, sub-part J, class A digital device

Power Specifications

Input Voltage:	9 - 40 VDC
Nominal Power:	2.5 W
Nominal Current:	210 mA
Antenna Voltage Output:	10 VDC (5 VDC optional)

Mechanical Specifications

Dimensions:	150 mm L x 125 mm W x 51 mm H (5.9" L x 4.9" W x 2.0" H)
Weight:	0.64 kg (1.4 lb)
Display:	2-line by 16-character LCD
Keypad:	3-key switch membrane
Power Connector:	2-pin circular locking
Data Connector:	DB9-S
Antenna Connector:	BNC-S
Optional GPS Output Port:	TNC-S

Operating Modes

MBX-3 Mode (Default):	RTCM SC-104 correction and NMEA status message output (Default Mode)
MBX-E Mode:	RTCM SC-104 correction and NMEA status message output and GPS NMEA message input for position and satellite status display.

NMEA 0183 I/O

- Receiver Automatic and Manual tune command
- Frequency and data rate query
- Receiver performance and operating status queries
- Automatic search almanac queries (proprietary)
- Baud rate selection command (proprietary)
- Receiver tune command
- Force cold start command (proprietary)
- Software upgrade command (proprietary)
- Configuration up-load command (proprietary)

Accessories

Antenna:	Various
Power Cables:	Various
Antenna Cables:	Various
Data Cables:	Various
CSI Beacon Command Center:	MS Windows 95® beacon control software

Pin-Out, RS-232C

DB9 Pin #	Description
2	TXD, RTCM SC-104 / status output
3	RXD, configuration input
5	Signal return

Pin-Out, RS-422

DB9 Pin #	Description
1	TXD +, RTCM SC-104 / status output
2	TXD -, RTCM SC-104 / status output
4	RXD -, configuration input
5	Signal return
7	RXD +, configuration input

CSI Authorized Dealer

Communication Systems International, Inc.
1200 – 58th Avenue S.E., Calgary, AB, Canada, T2H 2C9
Phone: (403) 259-3311 Fax: (403) 259-8866
Web: www.csi-dgps.com e-mail: info@csi-dgps.com

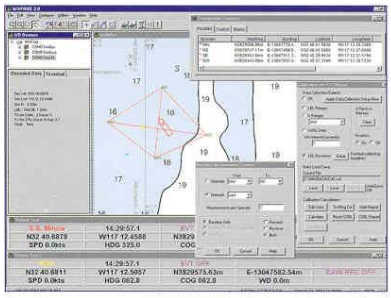
THALES

WinFrog Integrated Navigation System

Thales GeoSolutions (Pacific), Inc. (TGPI), a member of the Thales GeoSolutions family, specializes in providing services and software for the marine survey and positioning industry. We employ the most experienced professionals in the industry, and as a company have more than 20 years of success worldwide. We specialize in integrating systems to provide advanced solutions to handle all of your survey and positioning needs.

We take pride in our ability to give customers the personalized attention of a small company while providing them with the resources and infrastructure of a large, global organization. Our customers benefit from the fact that we develop and test our own solutions, on our own projects, before releasing them commercially. Our clients know they are receiving a system that has been proven in the field.

At TGPI, we understand our customers' needs because we work alongside them. Our project managers and their teams maintain full control of a project from beginning to end to ensure a project's technological and commercial success.
Whether in the field or at the drawing board, our customers are confident that they are receiving a product that meets their needs.



TGPI provides you with the latest innovations in integrated navigation and data management system software.

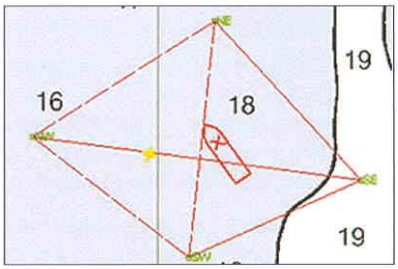
THALES

WinFrog is a complete Integrated Navigation System that combines surface navigation and underwater positioning into one cost-effective package. Its modular design allows customization to meet users' various needs.

The core program provides you with real-time position and navigation information, and can simultaneously collect data from up to 25 types of devices, including other GPSs and sounders. WinFrog currently supports over 300 different devices through either serial or Ethernet communications. It also allows you to define multiple vehicles, each having its own devices, names, offsets, tracks and shapes. In addition, data can be output through industry standard NMEA or customized formats.

WinFrog also supports multiple file formats for graphical display, including C-MAP, ARCS and BSB electronic charts, as well as DXF, DWG, DGN and other file formats.

With over 500 licenses in operation for customers in fields ranging from marine survey to underwater construction, WinFrog is today's integrated navigation and data management system solution. Our success in many industries stems from our commitment to delivering complete solutions based on customers' needs and tailoring our systems to ensure complete satisfaction.



THALES

POS/MV 220

POSITION AND ORIENTATION SYSTEM

- Roll and pitch accuracy to 0.05° in all dynamics
- True heading accuracy to 0.05° independent of latitude and dynamics
- DGPS or RTK position accuracy
- No motion artefacts, even in severe conditions
- Robust high MTBF military grade inertial sensors <10°/hour IMU
- No gyro spin-up time
- Proven technology
- Digital, analogue and Ethernet interfaces
- Self-calibrating for rapid deployment
- Industry standard

Complete navigation and attitude solution for marine vessels

POS/MV is a GPS aided Inertial Navigation System (INS) that delivers full six-degrees of freedom (position and orientation) solutions for marine vessels. POS/MV has the functionality of a gyro-compass, GPS receiver and a motion sensor in a single self-calibrating package.

Modern sonar/acoustic systems can be limited in their performance by the use of conventional motion sensors. The limiting factor is that the accuracy of conventional sensors degrades with increasing dynamics. This results in shorter operational windows and reduced survey accuracy.

POS/MV has been developed to meet the exacting requirements of today's multibeam sonar systems. Using significantly higher performance inertial sensors than conventional systems, and a sophisticated aided inertial navigation algorithm, POS/MV provides high accuracy attitude data regardless of platform dynamics. In addition, POS/MV provides smooth position data at high update rates, continuity of data during GPS outages and high accuracy true heading regardless of latitude.

The inertial heading solution is aided by a carrier phase GPS sub-system (GAMS). Hence POS/MV computes accurate true heading independent of latitude and dynamics (unlike traditional gyro-compasses). This is maintained even where GPS reception is poor, given that the heading drift is only 0.08° per minute during GAMS outage.

The key benefit of POS/MV is the accuracy and stability of the position and attitude data. Hence, with POS/MV, survey operations can continue through deteriorating sea conditions and in areas where GPS/DGPS reception is problematic.

Over 100 POS/MV users are already benefiting by making full use of outer beams, from an increased window of operability, through continuous data collection during turns and by maintaining data during short GPS outages.

POS/MV enables survey operators to make the most of their investment in multibeam sonar.

POS/MV 220

TSS TECHNOLOGY IN MOTION

THALES

POS/MV 220

Technical Specifications		
PERFORMANCE	RTK	DGPS
Position (m CEP)	0.02 - 0.10	0.5 - 2.0
Velocity (m/s)	0.01	0.03
Roll and pitch	<0.05°	0.05°
True heading	4m baseline: 0.05°, 2m baseline: 0.1°	
Heading drift rate during GAMS (GPS) outage	0.08°/minute	
Heave	5% of heave amplitude or 5cm	
PHYSICAL SPECIFICATIONS		
Size	IMU PCS Antenna Choke ring	204 x 204 x 168mm 441 x 111 x 346mm 2.5U, 19" rack mount 178 x 77mm (2 off) 370 x 61mm (2 off)
Weight	IMU PCS	3.5Kg 7 Kg
Power	120/220 VAC, 60/50 Hz, 60W	
Temperature	IMU & Antennas PCS	-40° to +60°C 0° to +60°C
Humidity	IMU & Antennas PCS	0 to 100% 5 to 95% RH non-condensing
Cables	IMU Antennas	8m standard 15m (2 off standard)
INTERFACES		
Ethernet Interface (10base-T)	Function Data UDP Ports IP Port	Operate POS/MV & record data Position, attitude, heading, velocity, track and speed, acceleration, status and performance, raw data. All data has time and distance tags Display port - low rate (1Hz) data Data port - high rate (1-200Hz) data Control port - used by POS controller
RS232 Interface (DB9 males)	NMEA Port High rate attitude data port	GGA, HDT, VTG, GST, ZDA, PASHR, PRDID (1-50Hz) Roll, pitch, true heading and heave in all multibeam proprietary formats (1-200 Hz)
Options	Internal RTK GPS receiver; analogue interface (roll, pitch & heave); field support kit	

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Due to continuous development of our products, specifications may vary from those listed above.

DP1800220E

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www.tss-realworld.com

THALES

SEACAT Profiler

SBE 19*plus*

The SBE 19*plus* is the next generation *Personal CTD*, bringing numerous improvements in accuracy, resolution (in fresh as well as salt water), reliability, and ease-of-use to the wide range of research, monitoring, and engineering applications pioneered by its legendary SEACAT predecessor. The 19*plus* samples faster (4 Hz vs 2), is more accurate (0.005 vs 0.01 in T, 0.0005 vs 0.001 in C, and 0.1% vs 0.25% — with *seven* times the resolution — in D), and has more memory (8 Mbyte vs 1). There is more power for auxiliary sensors (500 ma vs 50), and they are acquired at higher resolution (14 bit vs 12). Cabling is simpler and more reliable because there are four differential auxiliary inputs on two separate connectors, and a dedicated connector for the pump. All exposed metal parts are titanium, instead of aluminum, for long life and minimum maintenance.

The 19*plus* can be operated without a computer from even the smallest boat, with data recorded in non-volatile FLASH memory and processed later on your PC. Simultaneous with recording, real-time data can be transmitted over single-core, armored cable directly to your PC's serial port (maximum transmission distance dependent on number of auxiliary sensors, baud rate, and cable properties). The 19*plus'* faster sampling and pump-controlled TC-ducted flow configuration significantly reduces salinity spiking caused by ship heave, and allows slower descent rates for improved resolution of water column features. Auxiliary sensors for dissolved oxygen, pH, turbidity, fluorescense, PAR, and ORP can be added, and for moored deployments the 19*plus* can be set to *time-series* mode using software commands. External power and two-way real-time communication over 10,000 meters of cable can be provided with the SBE 36 CTD Deck Unit and Power and Data Interface Module (PDIM).

The 19*plus* uses the same temperature and conductivity sensors proven in 5000 SEACAT and MicroCAT instruments, and a superior new micro-machined silicon strain gauge pressure sensor developed by Druck, Inc. Improvements in design, materials, and signal acquisition techniques yield a low-cost instrument with superior performance that is also easy to use. Calibration coefficients, obtained in our computer-controlled high-accuracy calibration baths, are stored in EEPROM memory. They permit data output in ASCII engineering units (degrees C, Siemens/m, decibars, Salinity [PSU], sound velocity [m/sec], etc.). The 19*plus* can be factory-configured to emulate the .hex output format and 2 Hz data rate of old SEACATs for compatibility with existing software or instrument fleets.

Accuracy, convenience, portability, software, and support; compelling reasons why the 19*plus* is today's best low-cost CTD.

CONFIGURATION AND OPTIONS

A standard SBE 19*plus* is supplied with:
- Plastic housing for depths to 600 meters
- Strain-gauge pressure sensor
- 8 Mbyte FLASH RAM memory
- 9 D-size alkaline batteries
- Impulse glass-reinforced epoxy bulkhead connectors: 4-pin I/O, 2-pin pump, and two 6-pin (two differential auxiliary A/D inputs each)
- SBE 5M miniature pump and T-C Duct

Options include:
- Titanium housing for depths to 7000 meters
- Sensors for oxygen, pH, fluorescence, light (PAR), light transmission, and turbidity
- SBE 5T pump in place of SBE 5M for use with dissolved oxygen and/or other pumped sensors
- Stainless steel cage
- MCBH *Micro* connectors
- Ni-Cad batteries and charger


Shown with optional cage, SBE 5T pump, & SBE 43 DO sensor

SOFTWARE

SEASOFT®-Win32, our complete Windows 95/98/NT/2000/XP software package, is included at no extra charge. Its modular programs include:
- SEATERM® — communication and data retrieval
- SEASAVE® — real-time data acquisition and display
- SBE Data Processing® — filtering, aligning, averaging, and plotting of CTD and auxiliary sensor data and derived variables

SBE
Sea-Bird Electronics, Inc.
1808 136th Place NE, Bellevue, Washington 98005 USA
Website: http://www.seabird.com
Email: seabird@seabird.com
Telephone: (425) 643-9866
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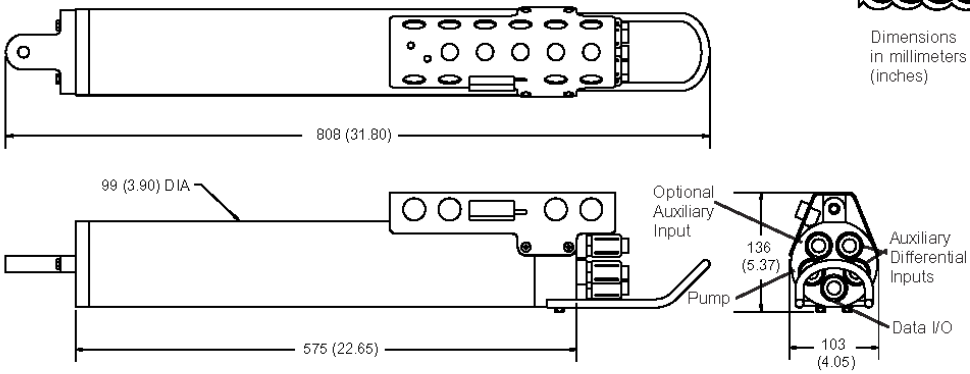
SEACAT Profiler

SBE 19*plus*



Dimensions in millimeters (inches)

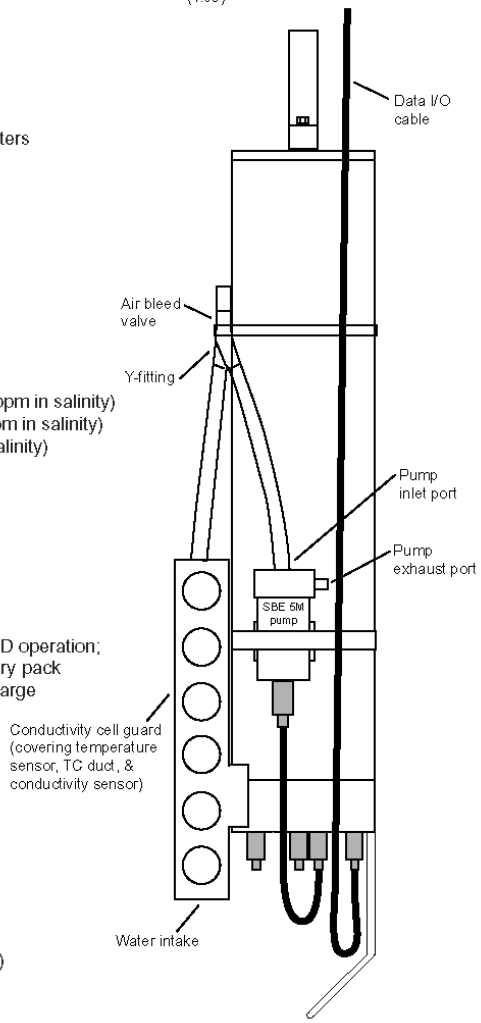
SPECIFICATIONS

Measurement Range	
Temperature	-5 to +35 °C
Conductivity	0 to 9 S/m
Pressure	0 to 20 / 100 / 350 / 1000 / 2000 / 3500 / 7000 meters
Initial Accuracy	
Temperature	0.005 °C
Conductivity	0.0005 S/m
Pressure	0.1% of full scale range
Typical Stability (*per month*)	
Temperature	0.0002 °C
Conductivity	0.0003 S/m
Pressure	0.004% of full scale range
Resolution	
Temperature	0.0001 °C
Conductivity	0.00005 S/m (most oceanic waters; resolves 0.4 ppm in salinity) 0.00007 S/m (high salinity waters; resolves 0.4 ppm in salinity) 0.00001 S/m (fresh waters; resolves 0.1 ppm in salinity)
Pressure	0.002% of full scale range
Memory	8 Mbyte non-volatile FLASH memory
Data Storage	Recorded Parameter — Bytes/Sample T + C — 6 pressure — 5 each external voltage — 2
Real-Time Clock	32,768 Hz TCXO accurate to ±1 minute/year
Internal Batteries	9 alkaline D-cells provide 60 hours continuous CTD operation; optional 9-cell rechargeable nickel-cadmium battery pack provides approximately 24 hours operation per charge
External Power Supply	9 - 28 VDC
Power Requirements	
Sampling	65 mA
SBE 5M pump	95 mA
Quiescent	30 µA
Auxiliary Voltage Sensors	
Auxiliary power out	up to 500 mA at 10.5 - 11 VDC
A/D resolution	14 bits
Input range	0 - 5 VDC

Housing Materials — Depth Rating — Weight

Acetal Copolymer *Plastic* housing — 600 meter (1950 feet) — 7.3 kg (16 lbs)

3AL-2.5V *Titanium* housing — 7000 meter (22,900 feet) — 13.7 kg (30 lbs)



Sea-Bird Electronics, Inc.
1808 136th Place NE, Bellevue, Washington 98005 USA
Website: http://www.seabird.com

Email: seabird@seabird.com
Telephone: (425) 643-9866
Fax: (425) 643-9954

THALES

The **ONLY CHOICE** *for reliable measurements of sound velocity and pressure.*

Sound Velocity & Pressure Smart Sensor

The SV&P Smart Sensor is a low cost instrument designed to measure sound velocity and pressure in water. This highly adaptive sensor is ideal for integration into existing data collection platforms or OEM equipment. Connect it directly to a PC or combine it with an AML Smart View hand-held display and hand hauled profiles can be conducted in real-time. Its small size, extremely fast response time and high sampling rate make the sensor ideal for fast profiles or tow speeds.

Each sensor has internal calibration coefficients and outputs real-time data to allow a "plug and play" environment. The optional addressable features provide for daisy chaining with other sensors allowing the user to create their own system.

Sensors

SOUND VELOCITY

- Proprietary "Time of Flight" technology
- 1400 to 1550 m/s standard measuring range
- ±0.050 meters per second accuracy
- 0.015 meters per second resolution
- 145 µs response time
- Temperature compensated

PRESSURE

- Semiconductor strain gauge (temperature compensated)
- Available ranges: 0-10, 20, 50, 100, 200, 500 dbars (higher ranges available)
- ±0.05% full scale accuracy
- 0.01 dbar resolution
- 10 ms response time

Electrical

- 10 samples per second maximum
- RS-232 ASCII communications
- Optional: RS-485 or TTL
- Autobaud rates from 2,400 to 38,400 baud

Power

- 40 mA sampling current
- External 8 – 16 Vdc (12 Vdc nominal)
- Optional power configurations available upon request

Mechanical

- Weight: 575 grams in air
  180 grams in water
- Dimensions: 45.7 mm (1.80″) Ø x 368 mm (14.5″)
- Construction: Type 316 stainless sensor & plate, INVAR rods, acetal housing rated to 500 meters.
  Optional: Type 316 stainless steel housing rated to 4,500 meters.
  Optional: Titanium housing rated to 10,000 meters
- Connector: IMPULSE Miniature Wet Pluggable™ Series
- Environment: Operating: -20° to 50°C
  Storage: -40° to 60°C

Instrumentation THROUGH *Innovation*

APPLIED MICROSYSTEMS LTD

THALES

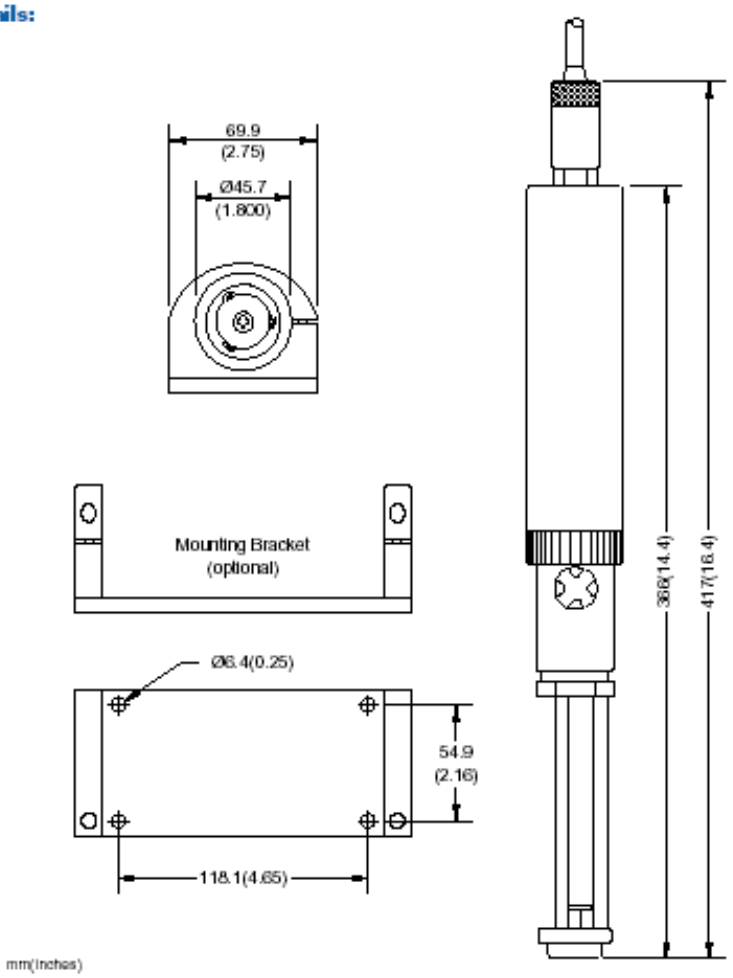
Sound Velocity & Pressure Smart Sensor

Accessories and Software

See Accessories Data Sheet for available options and software.

Smart Talk Data Logging Software is included at no charge with every sensor.

Mechanical Details:



mm(inches)

Instrumentation THROUGH Innovation

APPLIED MICROSYSTEMS LTD

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THALES

XBT / XSV

EXPENDABLE BATHYTHERMOGRAPH / EXPENDABLE SOUND VELOCIMETER

sippican, inc.

EXPENDABLE PROFILING SYSTEMS

Sippican expendable profiling systems offer antisubmarine warfare (ASW) specialists and oceanographers a fast, accurate, cost effective means of collecting environmental data without restricting ship operation.

GENERAL SYSTEM DESCRIPTION

A standard XBT/XSV system consists of an expendable probe, a data processing/recording system, and a launcher. An electrical connection between the probe and the processor/recorder is made when the canister containing the probe is placed within the launcher and the launcher breech door is closed. Following launch, wire dereels from the probe as it descends vertically through the water. Simultaneously, wire dereels from a spool within the probe canister, compensating for any movement of the ship and allowing the probe to freefall from the sea surface unaffected by ship motion or sea state.

The XBT/XSV system uses a sea water ground. As soon as an electrode within the nose of the expendable probe makes contact with the water, the circuit is complete and temperature or sound velocity data can be telemetered to the ship-board data processing equipment. Data are recorded and displayed in real time as the probe falls.

The nose of each expendable probe is precision-weighted and the unit spin-stabilized to assure a predictable rate of descent. From this rate of descent, probe depth is determined to an accuracy of ±2%. When the probe reaches its rated depth (a function of ship speed and the quantity of wire contained within the shipboard spool) the profile is completed and the system is ready for another launch.

THALES

EXPENDABLE BATHYTHERMOGRAPH (XBT)

Temperature profiles and computed sound velocity data obtained by the Expendable Bathythermograph (XBT) are used by ASW operators to identify the impact of temperature on sonar propagation and acoustic range prediction. The XBT also provides a quick and inexpensive means of collecting temperature data for oceanographic and geophysical studies.

The XBT contains a precision thermistor located in the nose of the probe. Changes in water temperature are recorded by changes in the resistance of the thermistor as the XBT falls through the water. The XBT is capable of temperature accuracies of ±0.1°C.

The XBT has proved to be reliable in over 30 years of use. During this time, Sippican has developed several variations of the standard probe to meet the requirements of a wide range of applications.

EXPENDABLE SOUND VELOCIMETER (XSV)

Sippican also offers an Expendable Sound Velocimeter (XSV) for the direct measurement of sound velocity. The XSV obtains accurate sound velocity profiles for the support of ASW operations, mine counter-measure operations and oceanographic research.

The XSV measures the speed of sound in water using a sing around sound velocity sensor. The XSV obtains real time sound velocity data accurate to ±0.25 meters/second at depths up to 2000 meters.

The XSV can significantly increase the accuracy of sonar propagation and acoustic range predictions, improve the accuracy of acoustic positioning systems and provide data for the study of acoustic propagation in the world's oceans. The XSV is most useful in such areas as Arctic, Mediterranean and coastal waters where high salinity variability may cause computed sound velocity data, based upon temperature profiles and assumed salinity data, to be inaccurate.

Both the XBT and XSV are available in air-launched and sub-launched configurations.

EXPENDABLE BATHYTHERMOGRAPH (XBT)

	APPLICATIONS	MAXIMUM DEPTH	RATED SHIP SPEED*	VERTICAL RESOLUTION
T-4	Standard probe used by the US Navy for ASW operations	460 m 1500 ft	30 knots	65 cm
T-5	Deep ocean scientific and military applications	1830 m 6000 ft	6 knots	65 cm
Fast Deep™	Provides maximum depth capabilities at the highest possible ship speed of any XBT	1000 m 3280 ft	20 knots	65 cm
T-6	Oceanographic applications	460 m 1500 ft	15 knots	65 cm
T-7	Increased depth for improved sonar prediction in ASW and other military applications	760 m 2500 ft	15 knots	65 cm
Deep Blue	Increased launch speed for oceanographic and naval applications	760 m 2500 ft	20 knots	65 cm
T-10	Commercial fisheries applications	200 m 660 ft	10 knots	65 cm
T-11 (Fine Structure)	High resolution for US Navy mine countermeasures and physical oceanographic applications	460 m 1500 ft	6 knots	18 cm

EXPENDABLE SOUND VELOCIMETER (XSV)

	APPLICATIONS	MAXIMUM DEPTH	RATED SHIP SPEED*	VERTICAL RESOLUTION
XSV-01	ASW application where salinity varies; Naval and civilian oceanographic and acoustic applications	850 m 2790 ft	15 knots	32 cm
XSV-02	Increased depth for improved ASW operation where salinity varies; Naval and civilian oceanographic and acoustic applications	2000 m 6560 ft	8 knots	32 cm
XSV-03	High resolution data for improved mine counter-measures and ASW operations in shallow water; geophysical survey work; commercial oil industry support	850 m 2790 ft	5 knots	10 cm

System depth accuracy: 4.6 meters or 2% of depth; whichever is larger (for XSV).
*All probes may be used at speeds above rated maximum, however there will be a proportional reduction in depth capability.
All probes are shipped 12 to a case which is constructed of weather-resistant biodegradable material. Shipping weight varies from 25 lbs. to 43 lbs. depending on probe type. Dimensions of the case vary from 17" X 14" X 16" (2.3 cu. ft.) to 17" X 14" X 19" (2.6 cu. ft.).

LAUNCHERS

Sippican launchers are available in three models. Each is compatible with all XBTs, XSVs and shipboard data processing systems.

LM-2A DECK-MOUNTED
The LM-2A is easily installed on the deck of any vessel.

LM-3A HAND-HELD
Provides portability, allows more flexibility in selecting launcher position and reduces interference with other equipment.

LM-4A THRU-HULL
The standard launcher for all military vessels. Employs the same basic assembly as the LM-2A, however, the LM-4A is installed below deck for improved safety and increased convenience under heavy weather conditions.

sippican, inc.

SEA-AIR SYSTEMS DIVISION
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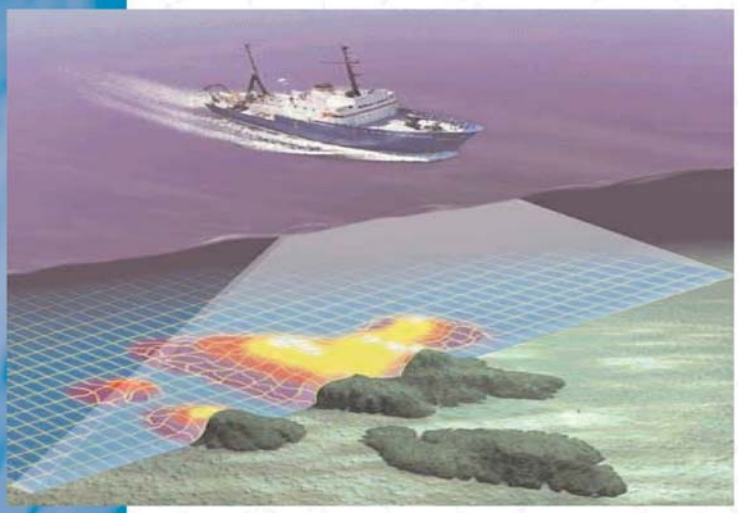
17199 10 02

SeaBat 8150
PRODUCT SPECIFICATION
MULTIBEAM ECHO SOUNDERS



- **Modular design**
- **Single and dual frequency operation (12 and/or 24 kHz)**
- **Uses standard RESON 81-P processor**
- **High-resolution bathymetry to full ocean depth**
- **Beam focusing in shallow water**

The SeaBat 8150 brings the latest multibeam technology to the deep-water market. Featuring a unique modular design, the system can be configured for various resolutions simply by adding or removing array elements. The modular design also reduces the need to perform costly dry-docking for service or installation tasks.

When equipped with the dual-frequency option, the SeaBat 8150 enables the operator to choose a higher frequency for improved resolution in shallower waters, or a lower frequency for improved range in deeper waters.

Like all 8100 Series models, the SeaBat 8150 uses the new-generation RESON 81-P Processor. This user-friendly system is controlled via a simple "point and click" interface. On-screen menus permit fine-tuning for local conditions, if desired. Self-calibration and system diagnosis features speed integration. Configuration changes are a snap: the processor can download new firmware through a communications port or Ethernet, reconfiguring to a new operating mode in seconds.

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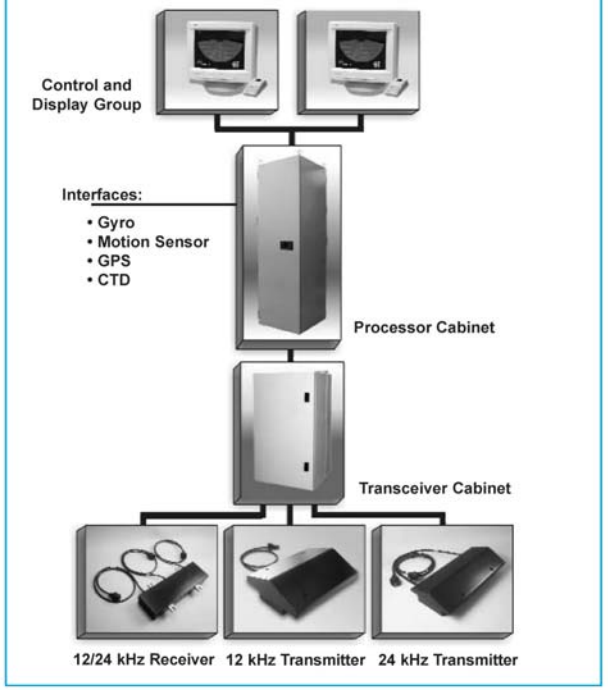
SeaBat 8150 SYSTEM SPECIFICATIONS

SYSTEM PERFORMANCE

Operating Frequency:	12 or 24 kHz (nominal with dual frequency option)	***Max. Update Rate:***	15 swaths per second
		Update Rate:	Range dependent
Number of Beams:	234	***Sidelobe Suppression:***	-25 dB
Transmit and Receive Beams:	1x1°, 1x2°, 2x2°, 4x4°	***Motion Compensation:***	
		Pitch:	±10 degrees
		Roll:	±10 degrees
Range Scales:	10 m to 11,000 m	***Bottom Detection Depth Resolution:***	
		10 to 2,000 m range:	7.6 cm
Pulse Length:		**2,000 to 6,000 m range:**	19 cm
12 kHz system:	0.5 - 20.4 ms	**6,000 to 11,000 m range:**	45 cm
24 kHz system:	0.3 - 15.2 ms		

System Block Diagram



Seven Possible System Configurations

8150-A	Single frequency 12 kHz, 4x4 degrees
8150-B	Single frequency 12 kHz, 2x2 degrees
8150-C	Single frequency 24 kHz, 2x2 degrees
8150-D	Single frequency 24 kHz, 1x1 degree
8150-E	Dual frequency 12 and 24 kHz 4x4 and 2x2 degrees
8150-F	Dual frequency 12 and 24 kHz 2x2 and 1x1 degrees
8150-G	Single frequency 12 kHz, 1x2 degrees

RESON

Version: B031 021024

This specification sheet is based on an 8150-F system with a 6x6x6 array.

Due to our policy of continuous product improvement,
RESON reserves the right change specifications without notice.

THALES

SeaBat 8111
PRODUCT SPECIFICATION
MULTIBEAM ECHOSOUNDER

- Phase and amplitude bottom detection
- 100 kHz frequency
- 150° swath coverage
- Real-time quality control
- Sidescan upgradeable
- Modular and portable
- Pitch stabilization

The SeaBat 8111 is a modular multibeam echosounder system operating at 100 kHz. When installed on a vessel, it produces high-density, high-accuracy soundings on the seafloor over a 150° swath. Major system components include a transducer array, a transceiver unit, and a processor unit.

The SeaBat 8111 transducer array is comprised of a cylindrical receive array and a linear transmitter array, mounted together on a support cradle that provides mounting points to the vessel. Lightweight and portable, the array can be installed temporarily over the side of a vessel of opportunity—a first for a system in this frequency range.

The SeaBat 8111 transceiver features plug-in cards for easy maintenance and is controlled from the sonar processor.

The Seabat 8111 processor is compatible with other SeaBat sonar heads, can be updated in minutes to accommodate future requirements, and features a user-friendly point-and-click interface.

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THALES

SeaBat 8111 SYSTEM SPECIFICATIONS

SYSTEM PERFORMANCE

Frequency:	100 kHz
Range Resolution:	3.7 cm
Swath Coverage:	150º
Range:	3m to 1200m (with Option 040)
Number of Beams:	101
Along-Track Beamwidth:	1.5º 3.0º 4.5º 6.0º*
Across-Track Beamwidth:	1.5º
Stabilization:	Pitch stabilization within +/-15º
Projector Beam Control:	External motion sensor required
Accuracy:	IHO Compliant
Operational Speed:	Up to 20 knots
Max. Update Rate:	35 Hz
Transducer Pressure Rating:	100m

*operator selectable

INTERFACE

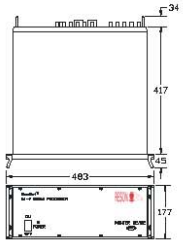
System Supply:	90 to 260VAC, 50/60 Hz, 200W max.
Video Display:	SVGA, 800 x 600, 72 Hz
System Control:	Trackball or from Ethernet
Data Output:	10 MB Ethernet or serial RS232C
Data Uplink:	High-speed digital coax with fiber-optic option
Temperature:	Operating: 0° to +40° C Storage: -30° to +55° C

RELATED PRODUCTS

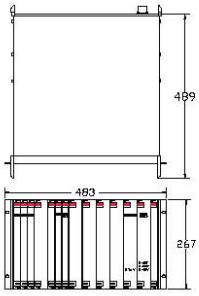
- Option 040 Extended range capabilities
- Option 033 Sidescan upgrade
- Option 051 24DC power supply for SeaBat 81-P Processor

MECHANICAL INTERFACE

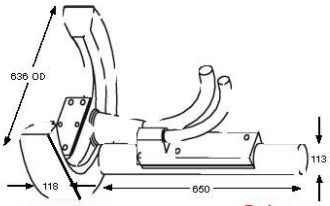
Dimensions (in mm):	
Transducer Array:	
Hydrophone:	636 x 118 (Dia./Length)
Projector:	113 x 650 (Dia./Length)
Processor:	177 x 483 x 417
Transceiver:	267 x 483 x 489
Weight:	
Transducer Array:	72 kg (dry) / 59 kg (wet) with cables
Processor:	20 kg
Transceiver:	13.6 kg
Cable Length:	15m



Processor



Transceiver



Transducer Array

SEAFLOOR COVERAGE

(with Extended Range option)

Bottom Depth (meters)	Swath Width (meters)
5 to 150	Up to 1110 (7.4 x water depth)
300	960 (3.2 x water depth)
450	810 (1.8 x water depth)
600	600 (1.0 x water depth)
750	450 (0.6 x water depth)
900	360 (0.4 x water depth)

Version: B006 030205

GeoAcoustics

GeoPulse
Profiler System

Introduction

The GeoPulse Sub-bottom Profiler is a tried and tested, industry standard sub-bottom profiling system for shallow geophysics. It is highly flexible allowing operation as either a hull mounted deep water system, an "over-the-side mount" system for small boat operations or as a towed system.

The Transmitter (Model 5430A) allows control of the output power, frequency and the number of full cycles included in the outgoing pulse. Seabed returns can be conditioned by analogue means using the GeoPulse Receiver (Model 5210A) or digitally using one of our range of GeoPro Sonar Processors.

Data from the GeoPulse Receiver (Model 5210A) can be displayed directly onto a wide range of industry standard graphic recorders. The GeoPulse Profiler is often used in combination with our Dual Frequency Side Scan sonar.

Features

Transmitter Model 5430A

- Output power continuously adjustable to 10kW.
- 2-12kHz frequency range, operator selectable with front panel dial.
- Pulse length selected by number of cycles to improve efficiency of transducers and reduce "ringing".
- Transmit repetition rate controlled externally or internally, operator selectable.
- Internal switch for 115/230 VAC operation. Unit is protected against damage caused by improper line voltage.
- Impedance matching switch allows operation with single or multiple transducer arrays.
- Separate/combined switch to transmit on portion of transducer array and receive on remaining portion or to modify beam pattern of transducer array.
- Indicators to easily monitor all system parameters.

Receiver Model 5210A

- Combined TVG and operator controllable gain provide up to 100dB of active gain for low amplitude signal processing.
- Automatic bottom tracking provides constant TVG adjustment regardless of bottom variation or degree of slope. (Manual TVG is standard)

- AGC provides operator with the ability to manipulate receiver sensitivity for a given reflector intensity.
- Key program: Multiply and divide-by functions for source triggering flexibility in deep water or extremely shallow water.
- The tape interface allows for recording of either raw or processed data. Eliminates costly interface devices and provides calibration signal for proper recorder adjustment.
- Optic isolation between receiver and source power supply prevents ground loop interference on acoustic record.
- TVG record annotation: Upon switch closure by operator or by Nav interface, places a mark at every 6dB point throughout TVG ramp on record.
- Compensates for spreading and attenuation losses through the water column in deep water.
- All gain controls, manual or TVG, are in fixed increments enabling relative reflectivity of different areas to be compared.
- Signal output to tape recorder is displayed by LEDs signifying maximum possible dynamic range or presence of "clipping".
- Data can be displayed directly onto a wide range of industry standard graphic recorders.

Over-the Side Transducer Mount Model 132B

The 132B transducer array is specifically designed for small boat operation at lower speeds. The transducers are mounted on a plate at the end of a vertical, gimballed staff. The staff, in turn, is supported by a mounting pad, which can be fastened to either the deck of the boat, or to an athwart-ships timber. The gimballed unit relieves excess strain on the mounting pad and provides freedom of motion fore, aft, and athwart-ships to ensure the transducer beam remains directed at the sea floor despite motion of the vessel.

THALES

Towed Transducer Vehicle Model 136A

The Model 136A fish is the workhorse of the GeoAcoustics profiling systems. It has logged more survey kilometres and more pipeline crossings than any other profiling vehicle in the world. Its design allows for stable, noise-free towing in high seas and at speeds up to 12 knots. The rugged galvanised body and fibreglass cowling, provides protection for four profiling transducers and will stand up to the punishment encountered at sea. Standard options available for the 136A Fish include side scan sonar transducers to allow simultaneous profiling and side scanning from one vehicle.

Basic System

The basic system includes the following:

- GeoPulse Transmitter (Model 5430A)
- GeoPulse Receiver (Model 5210A)
- Towfish (Model 136) containing
- Profiling Transducers (Model 137D)

The four transducer Model 136 Towfish provides a stable sub-tow survey platform, which may be towed down to 600 metres using a standard 2000 metre armoured tow cable. Alternative deployment options for the profiling transducers are:

- Hull Mount – Can be configured with up to 16 transducers providing a narrow beam pattern for deep water operation, whilst still achieving good penetration.
- Over-the-side Transducer Mount (Model 132) – It is possible to use the system in very small boats for river, harbour or shallow lake surveys and also bridge scour investigations.

For more advanced applications we recommend that the GeoPulse Receiver (Model 5210A) is replaced by one of our range of GeoPro Sonar Processors.

Specifications

Transmitter Model 5430A

Output:	10kW with 0.75% duty cycle, continuously adjustable. 2 to 12kHz, continuously adjustable. Short circuit proof. Impedance matched.
Pulse Cycles:	1, 2, 4, 8, 16 or 32 cycles of the frequency selected. The transmitted output pulse will be phase coherent within 22.5°.
Key: External:	2 to 12V pulse, either + or – leading edge triggered. Maximum width 50ms to eliminate double triggering. Transformer isolated.
Internal:	Set by internal potentiometer, 1 to 10pps, uncalibrated.
Output to Receiver or GeoPro Sonar	Transformer isolated. Frequency response flat
Processor:	between approximately 1kHz and 20kHz. Two modes of operation: A: Flat gain –0dB gain B: Short range TVG -20dB (10:1) of attenuation during transmit pulse and a –20dB to 0dB ramp within 15ms after end of transmit signal.
Power:	115/230 VAC ± 10%, 47 to 63Hz, 220W maximum.
Auxiliary Power:	IEC connector, unfused, 6A maximum.
Environmental:	Operational: -5 to 50°C, Storage: -15 to 85°C
Dimensions:	45.7cm (L) x 43cm (W) x 13cm (H), 18kg

Receiver Model 5210A

Amplifier:	Differential common mode rejection: 100dB at 60Hz. Sensitivity 30µV RMS in, produces 1V RMS out at 90dB total gain with TVG.
Signal to noise:	20dB at 100dB gain 1kHz centre frequency and 1kHz bandwidth.
Coarse gain:	40dB maximum.
Fine gain:	0 – 30dB in 3dB increments.
Filter:	Low pass and high pass, active type, maximally flat, 24dB/octave minimum roll-off, 0 gain, 0.02kHz to 15kHz adjustable in ½ octave increments. Knobs interlock to prevent overlap.
TVG:	Dynamic range: 30dB Rate: approximately flat to 30dB in 14ms. Manual delay: vernier adjust from 1 to 14ms with multiplier of x 1, x 10, x 100 and internal select of x 1000.
AGC:	Attack adjustable from 330µs to 330ms. Decay: adjustable from 330µs to 330ms. Range: 20dB
Power:	115/230VAC ± 10% (internal switch selectable), 47 to 63Hz, 45W maximum.
Environmental:	Operational: -5 to 50°C, Storage: -15 to 85°C
Dimensions:	45.7cm (L), x 43cm (W), x 17.8cm (H), 12kg.

Models 132B & 136A (fitted with Model 137D transducers for general sub-bottom profiling)

Beam width:	55° at 3.5kHz. 40° at 5.0kHz. 30° at 7.0kHz (4 Transducers)
Source level:	214dB re 1µPa/1M
Dimensions:	
132B	70 cm (L) x 52 cm (W) x 46 cm (H), 120kg Mounting Staff: One section 183 cm, two sections 360 cm
136A:	156 cm (L) x 46 cm (W) x 46 cm (H), 125kg

Specification sheet subject to change without notice (9-Profiler-6900/A 01/2001)

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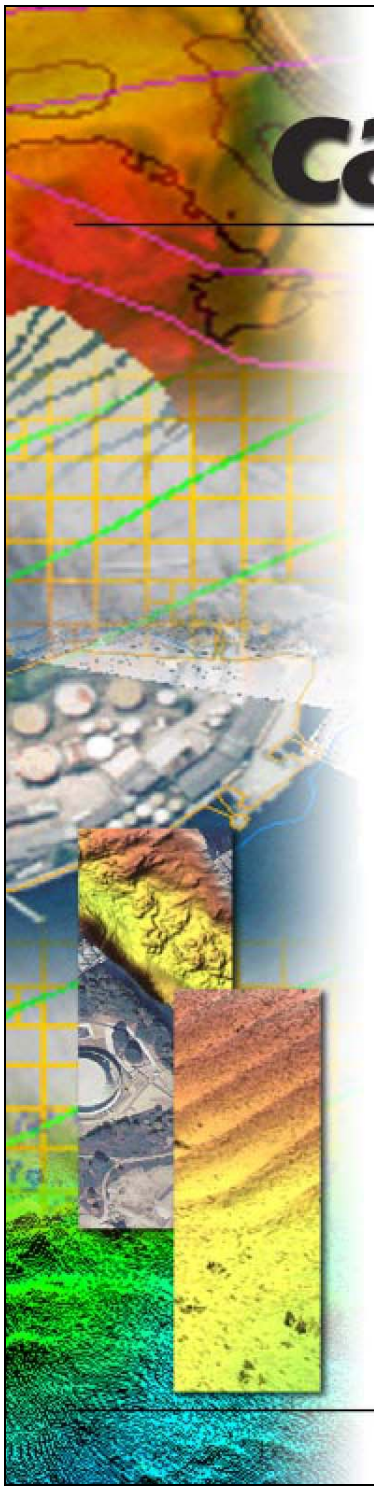
THALES



caris®

Bathymetric and Sonar Data Processing and Production

CARIS HIPS & CARIS SIPS

Hydrography. Cable and Pipeline Routing. Minecountermeasures. Side Scan search and recovery. Geophysical Exploration. Management of Fisheries. No matter what the application, the reliability and usability of your cleaned bathymetric and side scan sonar survey data is critical.

Based on its reputation for rigorous and proven algorithms, CARIS HIPS, for processing large bathymetric datasets, and CARIS SIPS, for processing side scan sonar imagery and multibeam backscatter data, have been selected number one among marine and hydrographic specialists for over 10 years.

PURPOSE-BUILT PROCESSING

Area and line based cleaning, 3D visualization, integrated sensor cleaning tools. These are but a few of the features that clearly suggest one thing: CARIS HIPS and CARIS SIPS are purpose-built processing and production systems.

INFORMATION YOU CAN USE

Tiling, contours, depth areas, shoal-biased sounding selection and an interactive dynamic profile are among the multitude of outputs that can be generated from your clean bathymetry and sonar data. Bottom line, CARIS software turns your survey data into information you can use.

ENGINEERED TO WORK TOGETHER

CARIS software systems are engineered to work together. CARIS HIPS and CARIS SIPS are standalone systems but are also capable of operating in unison offering the functionality and format support allowing you to take your clean data further.

BUILT TO GROW ON

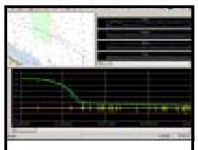
Open an S-57 ENC file and display the data with other data types such as BSB, HCRF, and GeoTIFF as well as vector CARIS map data. Regardless of your current workflow, CARIS HIPS and CARIS SIPS are built to grow on.

CARIS HIPS and CARIS SIPS are backed by training from subject matter experts, assistance in data production flowline implementation, and by knowledgeable and responsive support personnel.

Review the suite of CARIS HIPS and CARIS SIPS products described on the reverse side and contact CARIS today about a solution that is right for you.

turning data into information

CARIS HIPS & CARIS SIPS Product Suite

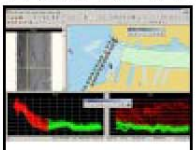


HIPS Singlebeam

Supported Formats:
- Hypack, Winfrog
- Generic ASCII Data

Data Cleaning:
- Interactive singlebeam depth cleaning
- Automatic singlebeam spike filters

Data Processing:
- Apply tides / zoning
- Apply SV corrections

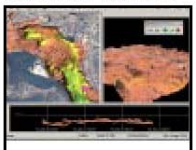


HIPS Multibeam Lite

Supported Formats:
- *HIPS Singlebeam, PLUS*
- Atlas, Furuno, GSF, LADS, Seabeam / Elac, SeaFalcon, Simrad, UNB, XTF

Data Cleaning:
- *HIPS Singlebeam, PLUS*
- Interactive swath cleaning
- Automatic swath filters
- Refraction repair
- Integrated side scan display

Data Processing:
- Apply tides / zoning
- Apply SV corrections

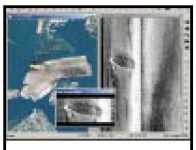


HIPS Multibeam Professional

Supported Formats:
- *same as HIPS Multibeam Lite*

Data Cleaning:
- *HIPS Multibeam Lite, PLUS*
- 3D subset area cleaning
- Statistical surface cleaning

Data Processing:
- *HIPS Multibeam Lite, PLUS*
- Weighted gridding

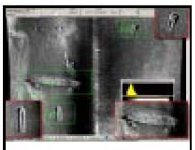


SIPS Lite

Supported Formats:
- Cmax, Coda, EdgeTech, GSF, MarineSonics, Qmips, Segy, XTF
- Generic ASCII Data

Data Cleaning:
- Side Scan viewing and cleaning
- Digitize towfish altitude

Data Processing:
- Re-compute towfish navigation
- Slant range correction
- Mosaic



SIPS Professional

Supported Formats:
- *same as SIPS Lite*

Data Cleaning:
- *same as SIPS Lite*

Data Processing:
- *SIPS Lite, PLUS*
- Generate side scan contacts database

HIPS & SIPS Common

Data Tools:
- Vessel configuration
- Tide / Svp preparation
- Attitude / Navigation cleaning
- GPS RTK Tide
- Background displays (CARIS, S-57, BSB, HCRF, TIF...)

Mapping Tools:
- Variable depth tiling
- Sounding selection
- Contouring
- Plotting

For more information on CARIS HIPS and CARIS SIPS contact:

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264 Rookwood Avenue
Fredericton, New Brunswick
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info@caris.com
www.caris.com

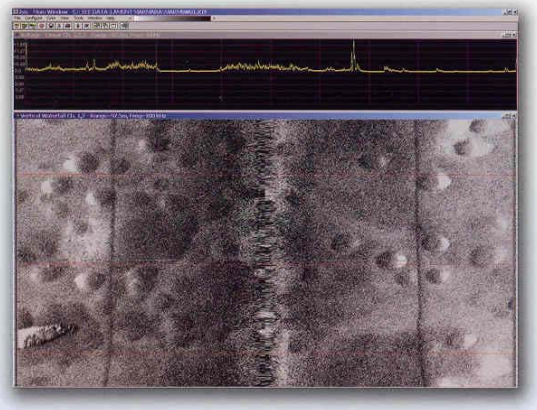
caris® marine
www.caris.com

THALES

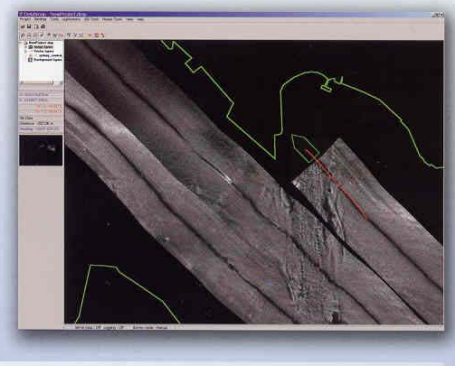
Isis Sonar

Sidescan Sonar Aquisition and Processing

Integration | Acquisition | Processing | Mapping & Analysis



TEI Isis® Sonar continues to be the most advanced sidescan sonar acquisition system available today. Isis Sonar is the tool of choice for a variety of applications including: mine-hunting, hydrography, archeology, environmental studies, oilfield engineering, civil engineering, oceanography, and law enforcement.



Quality Control

Isis Sonar typically displays a waterfall display of the sonar data, a signal window, and a survey parameter screen. Isis Sonar produces a real-time mosaic which greatly increases survey productivity. The mosaic is created in TEI Delph® Map as the survey proceeds, allowing the operator to alter the survey plan to ensure full coverage or gather more data on a feature of interest. Surveying is made easier with the possibility of setting different types of alarms.

Wide Compatibility

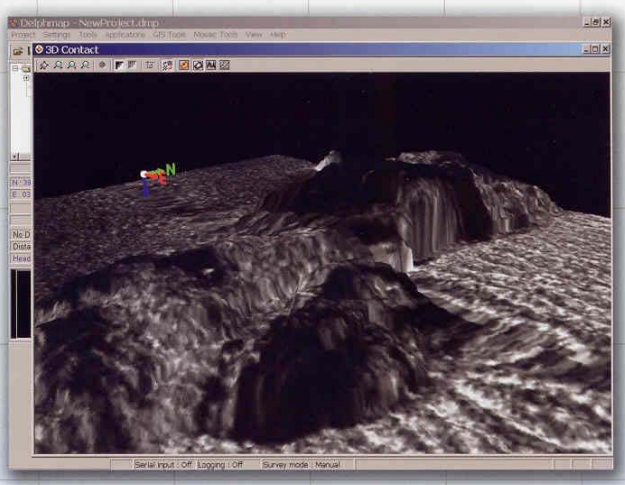
Isis Sonar can be smoothly integrated to any sidescan sonar available today. It performs accurate data logging for both analog and digital sonars from: Edgetech, Klein, Benthos, and many others. Isis Sonar can be delivered with a special rugged workstation designed to withstand the rigors of offshore work.

Accurate Data Acquisition

The quality of the sonar imagery is ensured by TEI's experience in system integration. Isis Sonar is delivered with a custom interface to each sonar model. Isis Sonar can also simultaneously acquire data from additional sensors including magnetometers, sub-bottom profilers, and gravity meters. Isis Sonar's mosaic processing options are the most extensive available with an emphasis on rigorous data geo-referencing.

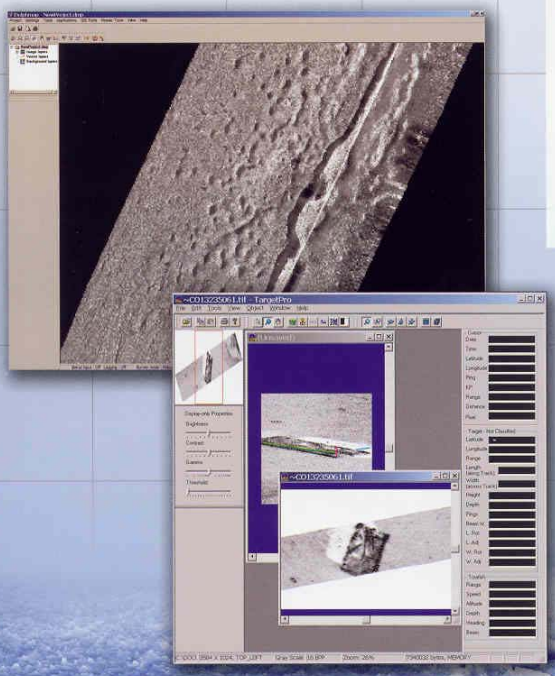
THALES

Isis Sonar



Rich Features

Isis Sonar rigorously integrates external sensors including GPS & gyros, and correctly logs & geo-references sonar imagery. Isis Sonar stores sonar data in TEI's open XTF (eXtended Triton Format), an industry standard. Isis Sonar may also be used in conjunction with a short baseline acoustic positioning system to more accurately determine the exact position of the towfish. The ability to take into account the towfish layback is a standard feature. It is possible to view 3D sidescan draped over bathymetry in Delph Map.



Continuous R & D

Isis Sonar is also the result of a long-term effort conducted in cooperation with TEI customers, the most advanced sidescan sonar users in the world. It incorporates innumerable improvements based on their expert feedback and exacting requirements. As a result, Isis Sonar offers a depth of features unmatched by any other sidescan acquisition and processing system.

Object Database

Isis Sonar can be augmented with TEI Target Pro which creates a database of images of submerged objects, and allows measurement of each object directly on the sonar image.

Isis Sonar is the standard search and recovery system of the US Navy, NOAA, and many other US government agencies. A demonstration version can be downloaded from www.tritonelics.com.

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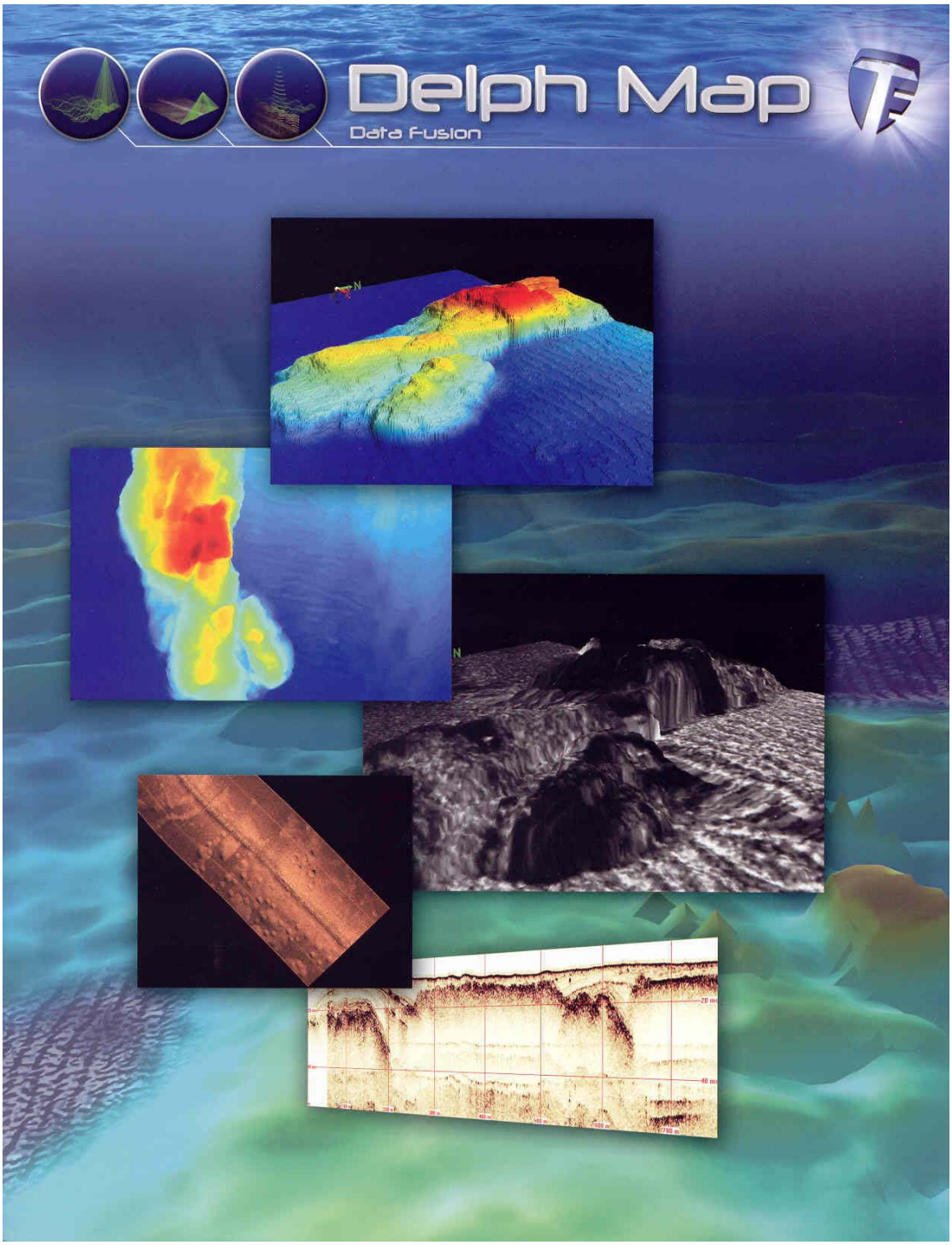
Delph Map
Data Fusion

THALES

Data Fusion

All data acquired and processed by TEI acquisition and processing modules can be displayed in Delph® Map; this includes sidescan data from Isis® Sonar, multibeam data from Isis® Bathy and Bathy Pro™, and sub-bottom and shallow seismic data from Delph® Seismic+Plus. Delph Map displays and allows manipulation of the following types of raster data sets: bathymetry DTMs, sidescan sonar mosaics, sub-bottom profiles, seismic sections, GPR profiles, and gridded surfaces from magnetometers and gravity meters. Various display modes and definable color palettes are available to maximize the usefulness of raster imagery. Computing the difference between two maps produced at a time interval is possible for bathymetry DTMs with the Volume Computation tool and forsidescan sonar mosaics with the A-B tool. Delph Map imports raster images as background information, such as GeoTIFF files (e.g., satellite imagery, scanned navigation charts) and C-MAP electronic navigation charts.

Vector Objects

Vector information can be imported into Delph Map in a variety of formats including DXF, SHP, and CLA. Contacts saved during playback and analysis of raw sonar data may also be imported and displayed as vector objects (symbols) laid-over raster imagery. Other vector objects that may be displayed include iso-contours, boundaries of seabed types (e.g., as identified by TEI's SeaClass™ bottom classification module), depth soundings, and navigation hazards.

Delph Map offers full digitizing capabilities. Operators may draw directly on the screen to highlight areas and objects of interest. All on-screen interpretations are stored as vector objects exportable to other software packages in DXF format. Profiles may be extracted across a given region of the survey area, with all layers (surface and subsurface) associated with that region displayed in the profile window. Position and depth information associated with the profile may be exported as an ASCII file for reporting and analysis purposes.

Specialized Tools

A number of tools in Delph Map are designed to minimize interpretation time for a data set. The tools include: automated pipeline tracking and span detection, automated object detection, automated digitization, and automated object measurement. Databases are created with each of these tools, which may be exported as ASCII files for reports or manipulated to modify the results of the automated interpretations.

Data Analysis

Delph Map allows 3D analysis of data layers in two different ways. The first involves creation of a full resolution 3D model through selection of a point on the mosaic or DTM. The second involves selecting an area to analyze and then viewing all data files composing that area in a 3D perspective window. Both methods allow free rotation of the data for better viewing and interpretation. An example is draping a mosaic over a DTM to analyze texture information relative to relief.

Survey Planning & Operations Monitoring

Delph Map offers full survey planning and control through its Delph® Nav option. Survey lines may be imported into or created within Delph Map, and vessel position relative to these lines may be monitored in real-time. An option exists for ROV monitoring and simulation against a geo-referenced background layer (e.g., mosaic or DTM) with the ROV Flight module. The same function is available for tracking the position of a dredge's cutting head in TEI Nessie Dredge.

Printing

Any Windows-supported printer or plotter can be used to create hard copies of imagery and maps displayed in Delph Map, with the direction of printing controlled by the operator.

All images displayed in Delph Map can be exported as TIFF, GeoTIFF or DXF (AutoCad) files.

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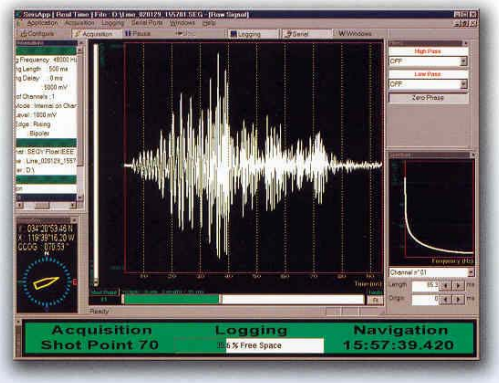
THALES

Delph Seismic+Plus

Next Generation Logging and Processing

Integration | Acquisition | Processing | Mapping & Analysis

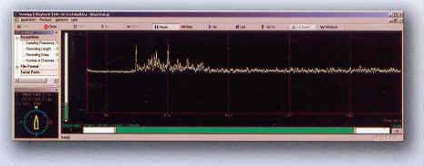


TEI's new data acquisition and processing system is the result of 12 years of experience in accurately logging data from shallow seismic systems and sub-bottom profilers.

The acquisition and the processing functions are increasingly performed by different teams aboard survey vessels. Delph® Seismic+Plus reflects this structure by providing a data logger that creates a SEG-Y file, -and- a full-featured processing module that may run on the same computer or on a remote computer connected to a network.

Top Priority: Online Quality Control

Recording prime quality data can be a challenge, especially when simultaneously supervising several pieces of equipment. Delph Seismic+Plus' data logger features an easy-to-read display with warning messages, color-coded (Green, Yellow or Red background) to indicate the nature and severity of the warning.



Data Input Status

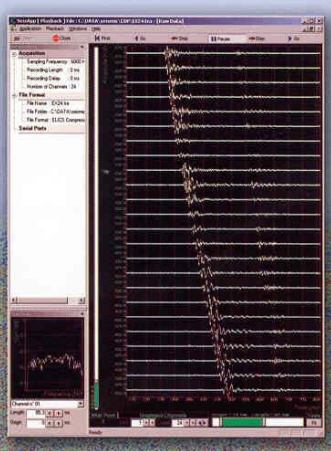
- Status indicating either the system is acquiring data (or not)
- Automatic detection and warning display of data clipping
- Automatic detection of low level signal

Navigation/Ancillary Sensors Status

- Status indicating that the input is active (or not)
- User-defined time-out warning

Logging Status

- Logging proceeding (or not)
- File size display
- Available space remaining
- Automatic line switching based on file size, number of shots
- Data logging in SEG-Y format, 32-bit floating point, when 24-bit data are acquired.



Process and Workflow

Different users with different tasks may access the same file from different locations. A typical scenario consists of a client's representative performing quality control and processing on selected portions of a data set while a geophysicist processes and interprets the data.

THALES

Delph Seismic+Plus

High Quality Acquisition for Analog Systems

The use of a 24 bits A/D converter simplifies data acquisition when using sparkers, boomers, and air guns, and maintains an extremely high dynamic range for digitized data. This sigma/delta converter also performs anti-aliasing, which improves data quality.

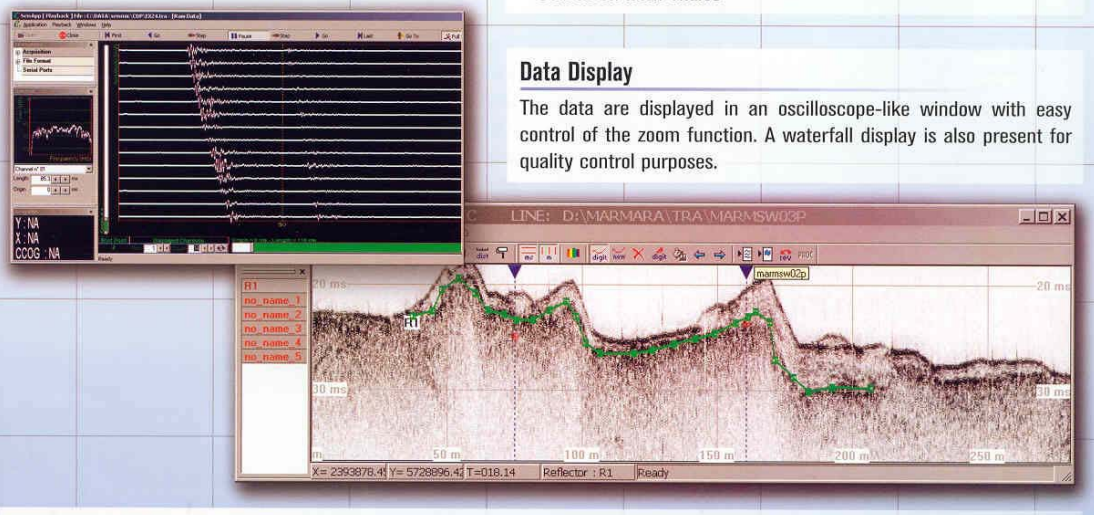
Dedicated Interface

The logging system connects with existing devices through a dedicated purpose-built interface; a single interface will not require any selection. The set-up parameters are specific to each device. Interfaces available for sub-bottom profilers include:

- Chirp II from Benthos
- FSSB from Edgetech
- SeaFalcon from Thales

Data Display

The data are displayed in an oscilloscope-like window with easy control of the zoom function. A waterfall display is also present for quality control purposes.



Advanced Processing

Delph Seismic+Plus reads the file being recorded and performs digital signal processing such as band pass filters, adaptive gain control, and bottom detection and finally geo-references the data.

The geo-referencing occurs in near real-time. After a maximum delay of 10 pings, the data are displayed in profile view with a user-defined zoom on the vertical and horizontal axes. In this geo-referenced form, true slope measurements are possible. The profile is corrected for depth in the case of a deep-tow system.

A one-dimension migration algorithm is included. This algorithm can be applied on the grid data to remove edge artifacts and to convert the data from a time series to a depth series.

The fully processed data can be displayed in two ways: at a fixed scale with the data slowly scrolling in the window or- at a dynamic scale where the full recorded line is displayed.

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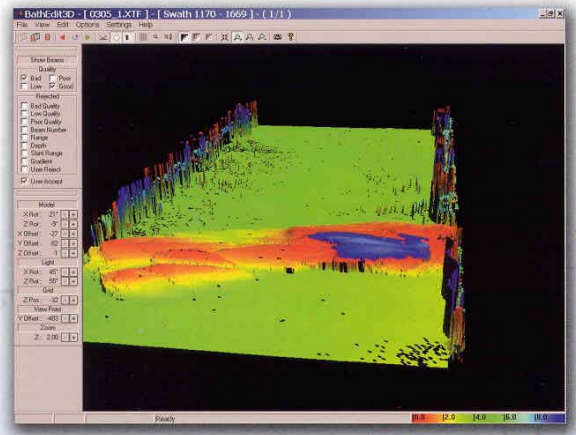
THALES

Bathy Pro

Advanced Bathymetry Processing

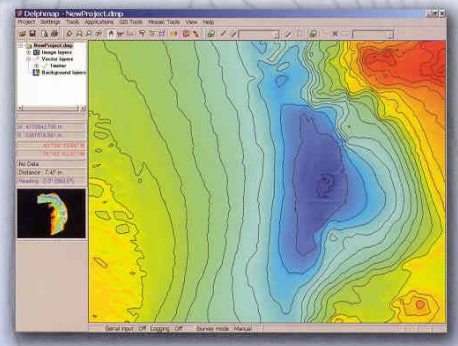
Integration | Acquisition | **Processing** | Mapping & Analysis

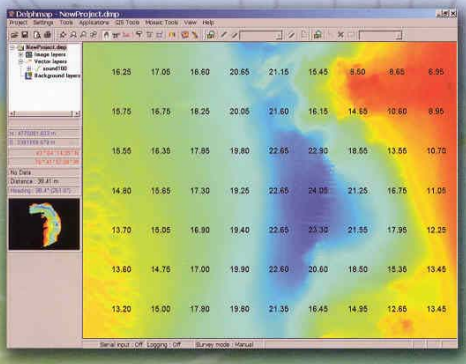


TEI Bathy Pro™ is a powerful solution designed for the challenges of modern bathymetry data processing. Bathy Pro offers the flexibility of producing grid, contour and sounding files to any user defined specification while keeping the processing-to-collection ratio to a minimum. It is the result of years cooperation with hydrographers and surveyors working in a variety of operations.

Automatic Processing

In automatic mode, the operator chooses processing parameters to be used to edit the data, and tags unacceptable data points. The resulting data set, the grid, sounding or contour file, use only the soundings that meet a minimum quality level. Bathy Pro's automatic processing is very fast: 1 million soundings can be processed in a matter of minutes. A typical eight hour survey day can be processed in under one hour.



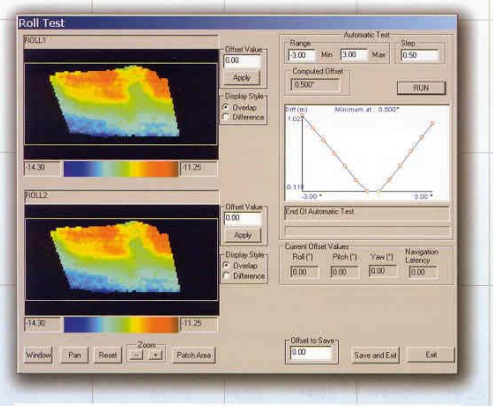


Interactive Bathymetry Processing

Bathy Pro gives the operator control over processing. Bathymetry data can be processed interactively or automatically: processed in batch modes for multiple line files, or for a specific selection of a line's segment. In interactive mode, the operator can review each sounding point and data from vessel motion for data anomalies. This process allows for each swath to be viewed, compared and analyzed. Filters can be set to flag data points that do not fit user-defined criteria.

THALES

Bathy Pro



Calibration & Patch Test

Bathy Pro includes an advanced tool for determining offsets to compensate for biases and latencies present in an integrated multibeam system. The patch test will automatically compute optimal offset values from a set of overlapping survey lines using either bathymetry or (for greater accuracy) sidescan data, if available.

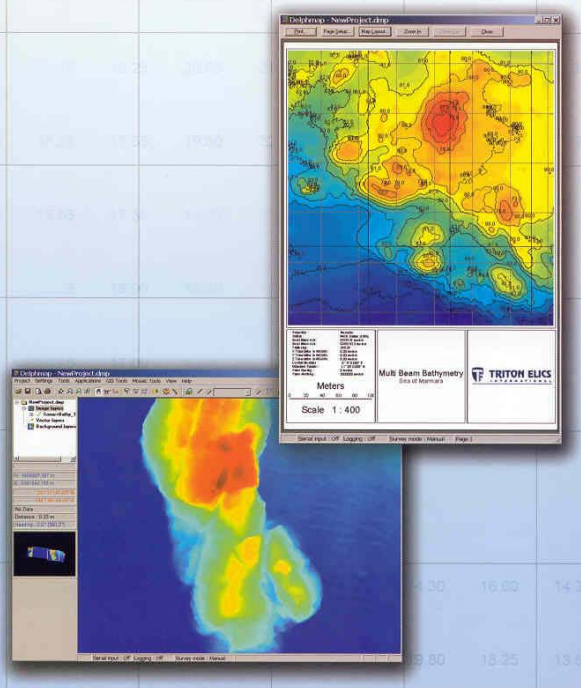
Processing Options

When processing data, the raw file remains unmodified throughout, allowing for re-processing with different parameters. A database is built for those selected points that have been flagged during the processing routine, allowing for quick access for re-evaluating those suspected points. The many filters that can be implemented include the following:

- Beam Quality
- Angle from vertical
- Beam number
- Depth Range
- Gradient
- Slant range

Manual Processing on a 3D Map

Bathy Pro now delivers ultimate control in manual editing with editing on a 3D representation of the raw data. With the ability to rotate the data and illuminate the model, subtle artifacts become visible. Any dubious points can be flagged in this view. The operator may select single points or entire areas with the mouse, query the data for information, and eliminate points from the final data set. Automated processing will re-compute surrounding areas, and rebuild the contours, sounding charts, and grid files.



Special Maps

After building a DTM, Bathy Pro can compute iso-contours or produce a traditional soundings chart. Volume computations are also available. The operator has full control over the parameters to produce any type of map.

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APPENDIX D : MULTIBEAM LINE LOG EXAMPLE

THALES

TGPI Project # : P2658 | Multibeam Log : 4A01-25240

PROJECT INFORMATION
Client : *NOAA-NMFS*
Project : *Hydrographic Survey*
Location : *SITE 1*

GEODETICS
Horizontal Datum : *WGS84*
Vertical Datum : *MLLW*
Projection : *UTM*
Zone / Units : *1N / Meters*

EQUIPMENT
Vessel : *R/V Davidson*
Sounder : *RESON 8150*
Motion Reference : *POS/MV*
Positioning : *POS/MV with USCG DGPS*
Timing Source : *POS/MV*
Multibeam Acquisition System : *Triton ISIS (ver6.099)*

SURVEY DATA
Survey Crew : *AO,BI*
Vessel Crew :
Logged By : *AO*

Line Name :	*4A01-25240*
XTF File Name :	*4A01-25240*
POS/MV File Name :	*2003-166-0923*
WFrog RAW File Name :	*4A01-25240*
Weather / SeaState :	*Clear/Sunny / 1-2m Seas*
Depressors :	*N/A*

Date :	*15-Jun-03*
Julian Day :	*2003-166*
Heading :	*267.0°*
Length of Line :	*~5.00 Km*
DGPS Station ID :	*COLD BAY*
Max Ping Rate / Sec :	*10.0*

TIME	RPM	SPEED	HDOP	POWER	RANGE	GAIN	PULSE	COMMENT
9:35:30	0	5.3	0.9	FULL	7500	26	10	SOL
10:08:16	0	5.3	0.9	FULL	5000	26	10	EOL

Comments :

LINE QUALITY ☑ GOOD ☐ BAD

PROCESSING

Project :	*P2658*		
Date :	*2003-166*	*ISIS TIMING* ☐	
Convert :		*POS/MV TIMING* ☑	

Draft File :		☐ *LOADED*
SVP File :	*HWite01.UVP*	☑ *LOADED*
Tide File :	*EXPLORERBAY.TID*	☑ *LOADED*

LINE EDIT:

GHPR :	LC	☑ *Delayed Heave*	Comments :
Nav :	LC	Comments :	
Draft :	LC	Comments :	
Bathy :	LC	Settings File :	

Comments:

Additional Filters

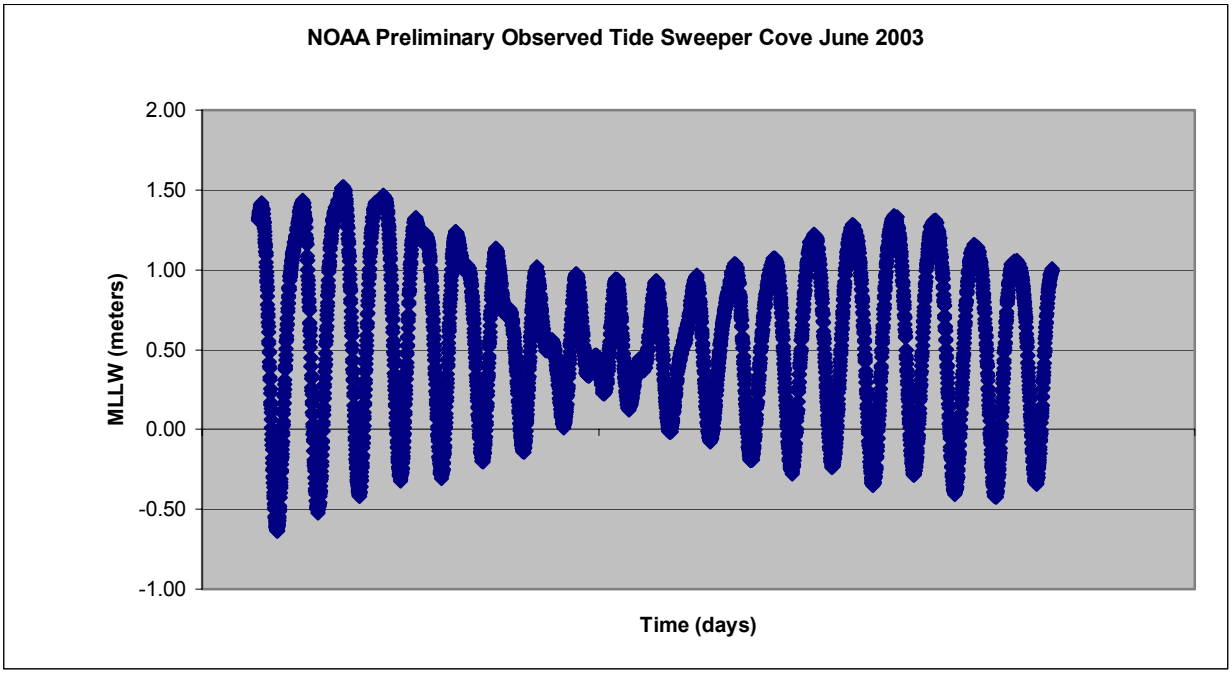
Depth	Beams :	
	Min :	
	Max :	
Nadir	Port :	50
	Stbd :	50

Merge : LC

LINE QUALITY ☑ GOOD ☐ BAD

THALES

APPENDIX E : TIDAL DATA SUMMARY



Tide Zoning

Site No.	Tidal Station	Time HW	Time LW	Mean Time	Excel Time	Height HW	Height LW
1	Cape Utalug	-01:38	-02:32	-02:05	0.096180555	1.19	1.19
2	Cape Utalug	-01:38	-02:32	-02:05	0.096180555	1.19	1.19
3	Atka Pass	-01:07	-02:10	-01:39	0.068750000	1.24	1.24
5	Cape Chunu	-01:44	-01:54	-01:49	0.075694444	1.11	1.11
6	Cape Chunu	-01:44	-01:54	-01:49	0.075694444	1.11	1.11
7	Gareloi Island	-00:08	-00:30	-00:19	0.013194444	1.00	1.00
8	Gareloi Island	-00:08	-00:30	-00:19	0.013194444	1.00	1.00
9	Gareloi Island	-00:08	-00:30	-00:19	0.013194444	1.00	1.00
10	Gareloi Island	-00:08	-00:30	-00:19	0.013194444	1.00	1.00
11	Gareloi Island	-00:08	-00:30	-00:19	0.013194444	1.00	1.00
12	Gareloi Island	-00:08	-00:30	-00:19	0.013194444	1.00	1.00
13	Cape Chunu	-01:44	-01:54	-01:49	0.075694444	1.11	1.11
14	Andrew Bay	+00:13	-00:12	+00:01	0.000694444	0.97	0.97
15	Atka Pass	-01:07	-02:10	-01:39	0.068750000	1.24	1.24
16	Atka Pass	-01:07	-02:10	-01:39	0.068750000	1.24	1.24
17	Cape Utalug	-01:38	-02:32	-02:05	0.096180555	1.19	1.19
21	Cemetary Point	-00:45	-00:29	-00:37	0.025694444	0.92	0.92

APPENDIX F : PATCH TEST ACQUISITION PROCEDURES

THALES

PATCH TEST PROCEDURES

RECOMMENDED METHOD: *Using A Point Target*

A patch test over a point target can be completed by running as few as 5 lines.

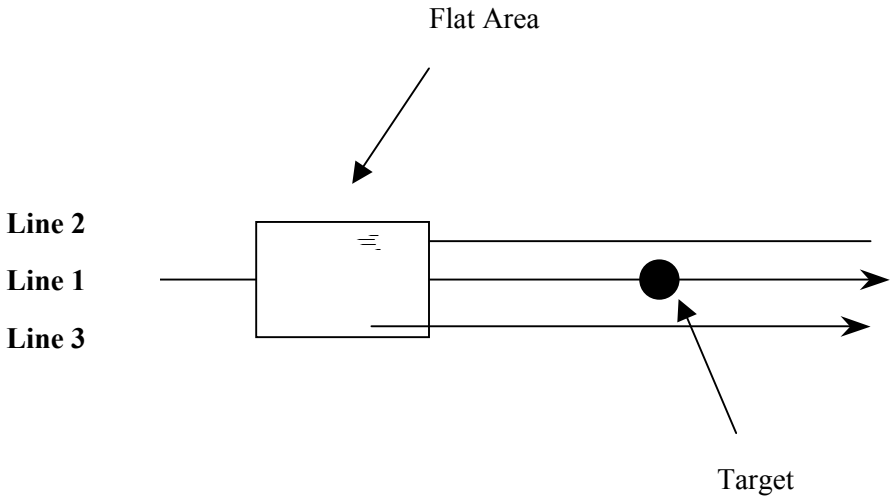
Four of these lines should be run at a slow survey speed to increase sounding density and reduce noise. They need to be run only fast enough to maintain good steerage.

The fifth line, (listed below as Run 3), should be run as fast as practical while still maintaining good data quality. This line is used to calibrate the Navigation (time) latency and will be compared with one of the slower lines. The greater the difference in velocity between the two lines, the more accurate the calibration.

All lines should be run along the same azimuth. Perpendicular lines are not required or desirable.

There are three lines, the center line is run three times, directly over the target. The lines should be run as follows:

Run	Line	Direction	RPM
1	1	Right	Low
2	1	Left	Low
3	1	Right	High
4	2	Left	Low
5	3	Right	Low



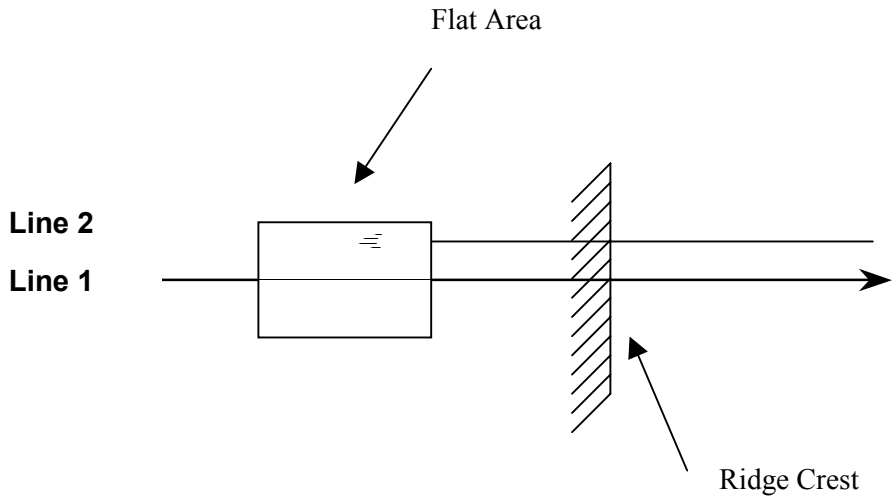
The distance between lines, should be equal to the water depth. If the survey vessel is crabbing, the line spacing must be adjusted to ensure the swaths from Runs 4 & 5 overlap at 45 degrees from nadir.

The runs will be processed as follows.

Calibration	Runs	
Navigation	1	3
Pitch	1	2
Azimuth	4	5
Roll	1	2

ALTERNATIVE METHOD 1: *Using A Ridge As A Target*

A linear target such as a small ridge, dredge cut, or sand ripples can be used in place of a point target. In this case, only 4 lines need to be run. They are all run perpendicular to the ridge or ripple crests.



There are two lines, Line 1 is run three times. The lines should be run as follows:

Run	Line	Direction	RPM
1	1	Right	Low
2	1	Left	Low
3	1	Right	High
4	2	Left	Low

The distance between Lines 1 and 2 should be equal to twice the water depth. If the survey vessel is crabbing, the line spacing must be adjusted to ensure the swaths from Runs 1 and 4 overlap at 45 degrees from nadir.

The runs will be processed as follows.

Calibration	Runs	
Navigation	1	3
Pitch	1	2
Azimuth	1	4
Roll	1	2

ALTERNATIVE METHOD 2: *Individual Line Pairs*

Most documents pertaining to multibeam patch tests suggest that a pair of lines be run for each of the four calibrations. This is generally unnecessary for data quality, takes additional boat time, and takes longer to process than the above techniques. Individual line pairs should be used only if mandated in the contract, or required by local conditions.

Line patterns for each of the four calibrations follow.

NAVIGATION

Line 1

Target

PITCH

Line 2

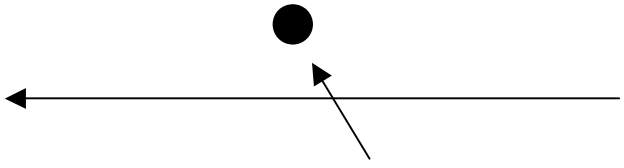
Target

AZIMUTH (YAW)

- *Point Target*.
  The distance from the line to the target should be equal to the water depth. The Distance between lines should be twice the water depth.

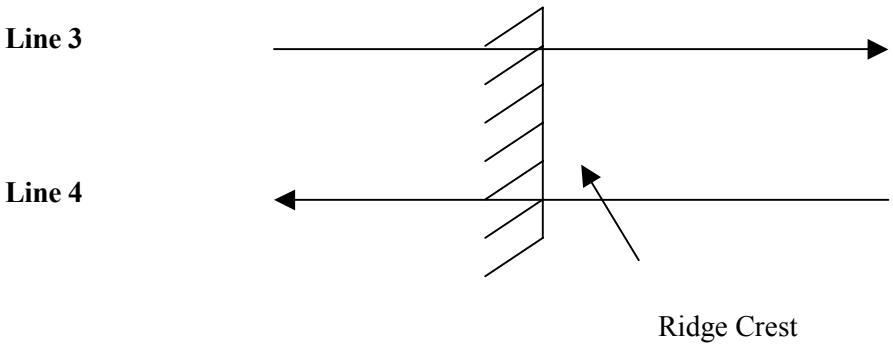
Line 3

Line 4

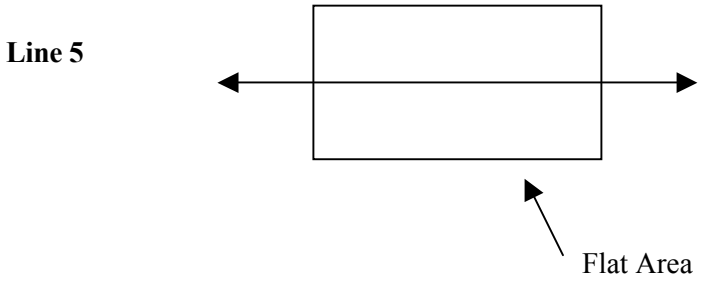


Target

- *Linear Target*.
  The distance between lines should be equal to twice the water depth.



ROLL



Run	Line	Direction	RPM
1	1	Right	Low
2	1	Right	High
3	2	Left	Low
4	2	Right	Low
5	3	Right	Low
6	4	Left	Low
7	5	Right	Low
8	5	Left	Low

Calibration	Runs	
Navigation	1	2
Pitch	3	4
Azimuth	5	6
Roll	7	8

APPENDIX G : PATCH TEST PROCESSING REPORT

THALES

PATCH TEST REPORT

A patch test was completed using seafloor topology to bring multibeam swaths run at varying speeds, headings, and overlaps into coincidence. Patch tests are employed so that data can be corrected for timing latency, pitch, azimuth and roll offsets, which may exist between the MBES transducer and the MRU.

The physical offsets were determined in the following order: Latency (Timing), Pitch, Yaw and Roll. Results used were:

Reson 8150

Offset	Latency	Pitch	Yaw	Roll
Correction	-0.03 sec	-0.30°	0.60°	-0.27°

Reson 8111

Offset	Latency	Pitch	Yaw	Roll
Correction	-0.03 sec	0.70°	-0.30°	0.77°

Latency

TGPI has implemented a new timing protocol for multibeam data acquisition. In this new scheme, UTC time tags generated within the POSMV are applied to all position, heading and attitude data. The POSMV UTC string is also sent to the SeaBat, where the ping data are tagged. The architecture of the POSMV ensures that there is zero latency between the position, heading and attitude strings. The only latency possible is in the ping time. In addition, the navigation-to-ping latency will be identical to the attitude-to-ping and heading-to-ping latencies.

Navigation latency is generally difficult to measure using standard timing and patch testing techniques. However, using TGPI's timing protocol, the navigation latency will be the same as the roll latency. Fortunately, roll latencies are very easy to identify. Data with a roll timing latency will have a rippled appearance along the edge of the swath. During patch test analysis, the roll latency is adjusted until the ripple is gone. This latency value is then applied to the ping time, synchronizing it with the position, attitude and heading data.

This rippled appearance was evident in this case, hence, a latency of –0.03 seconds was applied.

Pitch

The Pitch error adjustment was performed on sets of two coincident lines, run at the same velocity, over a conspicuous topographic feature, in opposite directions. The

latency error was already identified. The nadir beams from each line were compared and brought in to alignment, by adjusting the pitch error value.

Yaw

The azimuth error adjustment was performed on sets of two lines, run over a conspicuous topographic feature. Lines were run in opposite directions, at the same velocity with the same outer beams crossing the feature. The latency error and pitch error were already identified. Data from the same outer beams for each line were compared and brought in to alignment, by adjusting the azimuth error value.

Roll

The roll error adjustment was performed on sets of two coincident lines, run at the same velocity, in the opposite direction. The latency error, pitch error and azimuth error were already identified. Data across a swath was compared for each line and brought in to agreement, by adjusting the roll error value.

Patch test data were then corrected using the identified values, and the process repeated to check their validity.

APPENDIX H : BATHYMETRY QUALITY CONTROL

THALES

Quality Control Report for file : C:\P2658\CARIS\Fieldsheets\Site_17\A17-QC001\a17-qc001

Elevation Range is : -111.119(m) -108.734(m)

Total number of 3D points used: 15233

Starting Time: 29-JUN-2003 00:00:01.82
Ending Time: 29-JUN-2003 00:00:01.82

Minimum tidal reduction: 818 (mm)
Maximum tidal reduction: 828 (mm)

User#	Total	Max(+)	Max(-)	Mean	Std.	3dm(%)	5dm(%)	1%(%)	1.6%(%)
8	3	0.065	-0.108	0.000	0.0939	100.0	100.0	100.0	100.0
9	13	0.241	-0.170	0.001	0.1144	100.0	100.0	100.0	100.0
10	27	0.189	-0.231	-0.064	0.1238	100.0	100.0	100.0	100.0
11	51	0.199	-0.199	-0.023	0.0943	100.0	100.0	100.0	100.0
12	75	0.245	-0.221	-0.031	0.1291	100.0	100.0	100.0	100.0
13	133	0.406	-0.221	0.033	0.1416	94.7	100.0	100.0	100.0
14	139	0.473	-0.313	0.075	0.1848	85.6	100.0	100.0	100.0
15	181	0.465	-0.273	0.037	0.1535	93.9	100.0	100.0	100.0
16	185	0.378	-0.237	0.019	0.1411	95.1	100.0	100.0	100.0
17	201	0.500	-0.273	0.054	0.1635	91.0	100.0	100.0	100.0
18	205	0.443	-0.232	0.053	0.1481	91.7	100.0	100.0	100.0
19	211	0.532	-0.236	0.071	0.1440	92.4	99.5	100.0	100.0
20	211	0.534	-0.210	0.084	0.1510	91.0	99.5	100.0	100.0
21	205	0.422	-0.269	0.074	0.1466	93.2	100.0	100.0	100.0
22	199	0.423	-0.249	0.071	0.1518	93.0	100.0	100.0	100.0
23	204	0.434	-0.293	0.067	0.1429	93.1	100.0	100.0	100.0
24	194	0.440	-0.267	0.031	0.1361	97.4	100.0	100.0	100.0
25	201	0.433	-0.224	0.072	0.1356	95.0	100.0	100.0	100.0
26	216	0.436	-0.176	0.082	0.1452	91.7	100.0	100.0	100.0
27	216	0.407	-0.159	0.085	0.1432	88.9	100.0	100.0	100.0
28	216	0.497	-0.153	0.099	0.1632	81.5	100.0	100.0	100.0
29	219	0.488	-0.164	0.117	0.1656	79.9	100.0	100.0	100.0
30	217	0.481	-0.092	0.145	0.1489	78.8	100.0	100.0	100.0
31	215	0.544	-0.131	0.141	0.1524	78.1	99.5	100.0	100.0
32	218	0.575	-0.148	0.157	0.1497	78.9	99.5	100.0	100.0
33	216	0.495	-0.085	0.151	0.1428	81.0	100.0	100.0	100.0
34	215	0.656	-0.057	0.161	0.1664	77.7	96.7	100.0	100.0
35	216	0.550	-0.102	0.159	0.1590	79.2	96.8	100.0	100.0
36	213	0.697	-0.053	0.158	0.1619	80.3	95.3	100.0	100.0
37	215	0.698	-0.154	0.146	0.1643	79.5	98.1	100.0	100.0
38	213	0.688	-0.168	0.143	0.1676	79.3	97.2	100.0	100.0
39	214	0.786	-0.129	0.166	0.1612	80.4	96.7	100.0	100.0
40	209	0.764	-0.198	0.143	0.1573	84.2	97.1	100.0	100.0
41	207	0.689	-0.148	0.164	0.1657	81.2	95.7	100.0	100.0
42	196	0.805	-0.145	0.168	0.1639	81.1	96.9	100.0	100.0
43	203	0.779	-0.178	0.175	0.1571	81.8	95.6	100.0	100.0
44	202	0.642	-0.222	0.170	0.1686	77.7	96.5	100.0	100.0
45	207	0.674	-0.139	0.183	0.1578	77.8	97.1	100.0	100.0
46	205	0.682	-0.129	0.185	0.1424	81.0	96.1	100.0	100.0
47	201	0.586	-0.089	0.167	0.1318	85.1	98.0	100.0	100.0
48	174	0.658	-0.125	0.164	0.1211	89.7	98.3	100.0	100.0
49	153	0.476	-0.132	0.192	0.1146	83.7	100.0	100.0	100.0
50	167	0.594	-0.335	0.203	0.1444	73.1	98.8	100.0	100.0
51	183	0.531	-0.082	0.248	0.1286	66.1	97.3	100.0	100.0
52	199	0.545	-0.092	0.233	0.1362	72.9	97.5	100.0	100.0
53	193	0.585	-0.283	0.180	0.1559	78.8	96.9	100.0	100.0
54	198	0.604	-0.099	0.204	0.1484	75.8	96.0	100.0	100.0
55	208	0.593	-0.185	0.192	0.1512	78.4	96.6	100.0	100.0
56	208	0.669	-0.140	0.194	0.1606	77.4	95.7	100.0	100.0
57	204	0.773	-0.064	0.210	0.1517	76.0	96.6	100.0	100.0
58	207	0.673	-0.130	0.203	0.1366	79.7	96.6	100.0	100.0
59	208	0.569	-0.096	0.206	0.1472	74.0	95.7	100.0	100.0
60	205	0.682	-0.097	0.205	0.1573	74.6	96.6	100.0	100.0
61	201	0.651	-0.195	0.210	0.1628	77.1	94.0	100.0	100.0
62	209	0.623	-0.171	0.183	0.1593	78.5	95.2	100.0	100.0
63	212	0.586	-0.065	0.188	0.1499	78.8	95.8	100.0	100.0
64	212	0.568	-0.056	0.182	0.1400	79.2	97.6	100.0	100.0
65	209	0.575	-0.131	0.177	0.1327	81.8	98.6	100.0	100.0

66	213	0.557	-0.063	0.175	0.1423	81.7	96.7	100.0	100.0
67	213	0.557	-0.107	0.164	0.1423	82.2	98.6	100.0	100.0
68	214	0.520	-0.077	0.154	0.1309	84.6	98.6	100.0	100.0
69	212	0.597	-0.162	0.155	0.1434	81.6	97.2	100.0	100.0
70	213	0.514	-0.100	0.132	0.1356	85.4	99.5	100.0	100.0
71	214	0.428	-0.156	0.125	0.1349	83.6	100.0	100.0	100.0
72	212	0.487	-0.153	0.108	0.1345	85.8	100.0	100.0	100.0
73	208	0.438	-0.095	0.114	0.1116	93.8	100.0	100.0	100.0
74	210	0.405	-0.232	0.120	0.1284	86.2	100.0	100.0	100.0
75	206	0.471	-0.196	0.144	0.1561	79.6	100.0	100.0	100.0
76	211	0.583	-0.159	0.141	0.1516	81.0	99.5	100.0	100.0
77	210	0.536	-0.107	0.131	0.1458	83.8	98.1	100.0	100.0
78	208	0.520	-0.129	0.117	0.1376	87.0	99.5	100.0	100.0
79	211	0.490	-0.170	0.074	0.1462	89.1	100.0	100.0	100.0
80	207	0.416	-0.279	0.081	0.1478	87.4	100.0	100.0	100.0
81	207	0.546	-0.205	0.084	0.1635	85.0	99.0	100.0	100.0
82	210	0.509	-0.214	0.073	0.1646	88.1	98.6	100.0	100.0
83	205	0.472	-0.284	0.045	0.1629	88.3	100.0	100.0	100.0
84	209	0.440	-0.216	0.019	0.1556	91.9	100.0	100.0	100.0
85	203	0.457	-0.276	0.033	0.1387	94.6	100.0	100.0	100.0
86	126	0.425	-0.288	0.028	0.1536	95.2	100.0	100.0	100.0
87	62	0.368	-0.222	0.077	0.1367	95.2	100.0	100.0	100.0
88	12	0.313	0.000	0.169	0.0934	91.7	100.0	100.0	100.0

THALES

Classification report 1 of 2

IHO statistics a/b are : 0.500 0.013

User#	Total	# fail	% fail	# pass	% pass
8	3	0	0.00	3	100.00
9	13	0	0.00	13	100.00
10	27	0	0.00	27	100.00
11	51	0	0.00	51	100.00
12	75	0	0.00	75	100.00
13	133	0	0.00	133	100.00
14	139	0	0.00	139	100.00
15	181	0	0.00	181	100.00
16	185	0	0.00	185	100.00
17	201	0	0.00	201	100.00
18	205	0	0.00	205	100.00
19	211	0	0.00	211	100.00
20	211	0	0.00	211	100.00
21	205	0	0.00	205	100.00
22	199	0	0.00	199	100.00
23	204	0	0.00	204	100.00
24	194	0	0.00	194	100.00
25	201	0	0.00	201	100.00
26	216	0	0.00	216	100.00
27	216	0	0.00	216	100.00
28	216	0	0.00	216	100.00
29	219	0	0.00	219	100.00
30	217	0	0.00	217	100.00
31	215	0	0.00	215	100.00
32	218	0	0.00	218	100.00
33	216	0	0.00	216	100.00
34	215	0	0.00	215	100.00
35	216	0	0.00	216	100.00
36	213	0	0.00	213	100.00
37	215	0	0.00	215	100.00
38	213	0	0.00	213	100.00
39	214	0	0.00	214	100.00
40	209	0	0.00	209	100.00
41	207	0	0.00	207	100.00
42	196	0	0.00	196	100.00
43	203	0	0.00	203	100.00
44	202	0	0.00	202	100.00
45	207	0	0.00	207	100.00
46	205	0	0.00	205	100.00
47	201	0	0.00	201	100.00
48	174	0	0.00	174	100.00
49	153	0	0.00	153	100.00
50	167	0	0.00	167	100.00
51	183	0	0.00	183	100.00
52	199	0	0.00	199	100.00
53	193	0	0.00	193	100.00
54	198	0	0.00	198	100.00
55	208	0	0.00	208	100.00
56	208	0	0.00	208	100.00
57	204	0	0.00	204	100.00
58	207	0	0.00	207	100.00
59	208	0	0.00	208	100.00
60	205	0	0.00	205	100.00
61	201	0	0.00	201	100.00
62	209	0	0.00	209	100.00
63	212	0	0.00	212	100.00
64	212	0	0.00	212	100.00
65	209	0	0.00	209	100.00
66	213	0	0.00	213	100.00
67	213	0	0.00	213	100.00
68	214	0	0.00	214	100.00
69	212	0	0.00	212	100.00
70	213	0	0.00	213	100.00
71	214	0	0.00	214	100.00
72	212	0	0.00	212	100.00

73	208	0	0.00	208	100.00
74	210	0	0.00	210	100.00
75	206	0	0.00	206	100.00
76	211	0	0.00	211	100.00
77	210	0	0.00	210	100.00
78	208	0	0.00	208	100.00
79	211	0	0.00	211	100.00
80	207	0	0.00	207	100.00
81	207	0	0.00	207	100.00
82	210	0	0.00	210	100.00
83	205	0	0.00	205	100.00
84	209	0	0.00	209	100.00
85	203	0	0.00	203	100.00
86	126	0	0.00	126	100.00
87	62	0	0.00	62	100.00
88	12	0	0.00	12	100.00

Classification report 2 of 2

IHO statistics a/b are : 0.707 0.018

User#	Total	# fail	% fail	# pass	% pass
8	3	0	0.00	3	100.00
9	13	0	0.00	13	100.00
10	27	0	0.00	27	100.00
11	51	0	0.00	51	100.00
12	75	0	0.00	75	100.00
13	133	0	0.00	133	100.00
14	139	0	0.00	139	100.00
15	181	0	0.00	181	100.00
16	185	0	0.00	185	100.00
17	201	0	0.00	201	100.00
18	205	0	0.00	205	100.00
19	211	0	0.00	211	100.00
20	211	0	0.00	211	100.00
21	205	0	0.00	205	100.00
22	199	0	0.00	199	100.00
23	204	0	0.00	204	100.00
24	194	0	0.00	194	100.00
25	201	0	0.00	201	100.00
26	216	0	0.00	216	100.00
27	216	0	0.00	216	100.00
28	216	0	0.00	216	100.00
29	219	0	0.00	219	100.00
30	217	0	0.00	217	100.00
31	215	0	0.00	215	100.00
32	218	0	0.00	218	100.00
33	216	0	0.00	216	100.00
34	215	0	0.00	215	100.00
35	216	0	0.00	216	100.00
36	213	0	0.00	213	100.00
37	215	0	0.00	215	100.00
38	213	0	0.00	213	100.00
39	214	0	0.00	214	100.00
40	209	0	0.00	209	100.00
41	207	0	0.00	207	100.00
42	196	0	0.00	196	100.00
43	203	0	0.00	203	100.00
44	202	0	0.00	202	100.00
45	207	0	0.00	207	100.00
46	205	0	0.00	205	100.00
47	201	0	0.00	201	100.00
48	174	0	0.00	174	100.00
49	153	0	0.00	153	100.00
50	167	0	0.00	167	100.00
51	183	0	0.00	183	100.00
52	199	0	0.00	199	100.00
53	193	0	0.00	193	100.00
54	198	0	0.00	198	100.00
55	208	0	0.00	208	100.00
56	208	0	0.00	208	100.00
57	204	0	0.00	204	100.00
58	207	0	0.00	207	100.00
59	208	0	0.00	208	100.00
60	205	0	0.00	205	100.00
61	201	0	0.00	201	100.00
62	209	0	0.00	209	100.00
63	212	0	0.00	212	100.00
64	212	0	0.00	212	100.00
65	209	0	0.00	209	100.00
66	213	0	0.00	213	100.00
67	213	0	0.00	213	100.00
68	214	0	0.00	214	100.00
69	212	0	0.00	212	100.00
70	213	0	0.00	213	100.00
71	214	0	0.00	214	100.00
72	212	0	0.00	212	100.00

73	208	0	0.00	208	100.00
74	210	0	0.00	210	100.00
75	206	0	0.00	206	100.00
76	211	0	0.00	211	100.00
77	210	0	0.00	210	100.00
78	208	0	0.00	208	100.00
79	211	0	0.00	211	100.00
80	207	0	0.00	207	100.00
81	207	0	0.00	207	100.00
82	210	0	0.00	210	100.00
83	205	0	0.00	205	100.00
84	209	0	0.00	209	100.00
85	203	0	0.00	203	100.00
86	126	0	0.00	126	100.00
87	62	0	0.00	62	100.00
88	12	0	0.00	12	100.00

THALES

Quality Control Report for file : C:\P2658\CARIS\Fieldsheets\Site_17\A17-QC002\a17-qc002

Elevation Range is : -109.976(m) -107.611(m)

Total number of 3D points used: 19657

Starting Time: 29-JUN-2003 00:00:01.82
Ending Time: 29-JUN-2003 00:00:01.82

Minimum tidal reduction: 1065 (mm)
Maximum tidal reduction: 1078 (mm)

User#	Total	Max(+)	Max(-)	Mean	Std.	3dm(%)	5dm(%)	1%(%)	1.6%(%)
7	1	0.000	-0.162	-0.162	0.0000	100.0	100.0	100.0	100.0
8	20	0.134	-0.405	-0.120	0.1500	85.0	100.0	100.0	100.0
9	66	0.376	-0.486	-0.072	0.1864	83.3	100.0	100.0	100.0
10	65	0.272	-0.337	-0.028	0.1273	98.5	100.0	100.0	100.0
11	106	0.414	-0.387	-0.031	0.1959	85.8	100.0	100.0	100.0
12	154	0.415	-0.424	-0.046	0.2067	88.3	100.0	100.0	100.0
13	194	0.542	-0.399	-0.031	0.2194	84.5	99.5	100.0	100.0
14	222	0.511	-0.434	0.004	0.1986	88.7	99.5	100.0	100.0
15	243	0.561	-0.346	0.022	0.2049	84.8	99.6	100.0	100.0
16	248	0.474	-0.304	0.046	0.1875	83.9	100.0	100.0	100.0
17	238	0.618	-0.298	0.085	0.1975	81.1	96.6	100.0	100.0
18	239	0.531	-0.442	0.085	0.1732	85.4	99.2	100.0	100.0
19	244	0.527	-0.371	0.093	0.1634	87.3	99.6	100.0	100.0
20	235	0.571	-0.310	0.093	0.1851	83.0	98.7	100.0	100.0
21	239	0.542	-0.373	0.084	0.1785	85.4	99.2	100.0	100.0
22	239	0.450	-0.374	0.065	0.1562	92.1	100.0	100.0	100.0
23	243	0.519	-0.414	0.091	0.1773	85.6	99.6	100.0	100.0
24	237	0.465	-0.186	0.107	0.1407	88.2	100.0	100.0	100.0
25	224	0.409	-0.158	0.087	0.1172	95.5	100.0	100.0	100.0
26	243	0.500	-0.225	0.082	0.1131	95.9	100.0	100.0	100.0
27	252	0.382	-0.186	0.100	0.1158	95.6	100.0	100.0	100.0
28	252	0.479	-0.220	0.111	0.1294	89.7	100.0	100.0	100.0
29	252	0.466	-0.166	0.116	0.1313	90.1	100.0	100.0	100.0
30	257	0.381	-0.126	0.127	0.1059	96.1	100.0	100.0	100.0
31	257	0.372	-0.118	0.106	0.1037	95.7	100.0	100.0	100.0
32	259	0.391	-0.129	0.118	0.0944	97.7	100.0	100.0	100.0
33	259	0.463	-0.146	0.119	0.0925	98.5	100.0	100.0	100.0
34	260	0.423	-0.327	0.118	0.1187	92.7	100.0	100.0	100.0
35	258	0.417	-0.199	0.137	0.1195	90.3	100.0	100.0	100.0
36	257	0.456	-0.240	0.146	0.1212	86.4	100.0	100.0	100.0
37	254	0.499	-0.160	0.152	0.1282	84.6	100.0	100.0	100.0
38	256	0.486	-0.078	0.149	0.1289	84.4	100.0	100.0	100.0
39	255	0.458	-0.101	0.149	0.1178	85.1	100.0	100.0	100.0
40	250	0.470	-0.165	0.129	0.1208	90.0	100.0	100.0	100.0
41	243	0.472	-0.125	0.124	0.1154	92.6	100.0	100.0	100.0
42	243	0.703	-0.180	0.130	0.1268	91.8	99.6	100.0	100.0
43	245	0.439	-0.219	0.110	0.1169	94.7	100.0	100.0	100.0
44	249	0.543	-0.111	0.148	0.1232	88.0	99.6	100.0	100.0
45	248	0.654	-0.112	0.165	0.1267	86.7	98.4	100.0	100.0
46	247	0.467	-0.095	0.147	0.1174	89.9	100.0	100.0	100.0
47	229	0.483	-0.275	0.151	0.1269	88.6	100.0	100.0	100.0
48	211	0.460	-0.226	0.147	0.1206	92.4	100.0	100.0	100.0
49	191	0.423	-0.228	0.150	0.1179	89.0	100.0	100.0	100.0
50	172	0.530	-0.101	0.190	0.1306	77.3	98.8	100.0	100.0
51	196	0.635	-0.078	0.222	0.1420	74.5	95.9	100.0	100.0
52	231	0.668	-0.079	0.223	0.1545	72.3	93.9	100.0	100.0
53	235	0.591	-0.255	0.174	0.1667	75.3	97.9	100.0	100.0
54	246	0.665	-0.229	0.148	0.1668	78.0	98.0	100.0	100.0
55	249	0.613	-0.153	0.149	0.1751	77.5	94.8	100.0	100.0
56	248	0.603	-0.198	0.133	0.1705	80.6	98.0	100.0	100.0
57	245	0.534	-0.159	0.140	0.1654	78.4	98.4	100.0	100.0
58	247	0.630	-0.191	0.137	0.1595	80.2	98.8	100.0	100.0
59	245	0.600	-0.141	0.151	0.1624	80.4	96.7	100.0	100.0
60	246	0.623	-0.131	0.158	0.1576	79.3	96.7	100.0	100.0
61	246	0.633	-0.122	0.168	0.1623	75.2	98.0	100.0	100.0
62	244	0.568	-0.110	0.150	0.1487	79.9	98.8	100.0	100.0
63	248	0.496	-0.075	0.160	0.1334	81.9	100.0	100.0	100.0

64	249	0.505	-0.118	0.152	0.1317	85.1	99.6	100.0	100.0
65	252	0.453	-0.088	0.147	0.1224	86.5	100.0	100.0	100.0
66	250	0.456	-0.110	0.139	0.1134	89.2	100.0	100.0	100.0
67	248	0.437	-0.096	0.132	0.1101	90.7	100.0	100.0	100.0
68	248	0.410	-0.105	0.125	0.1223	88.3	100.0	100.0	100.0
69	243	0.446	-0.137	0.108	0.1216	91.4	100.0	100.0	100.0
70	249	0.376	-0.169	0.093	0.1091	98.0	100.0	100.0	100.0
71	246	0.311	-0.118	0.095	0.0968	98.8	100.0	100.0	100.0
72	248	0.328	-0.134	0.070	0.1004	99.2	100.0	100.0	100.0
73	249	0.391	-0.180	0.098	0.1003	97.2	100.0	100.0	100.0
74	248	0.357	-0.113	0.107	0.0988	98.0	100.0	100.0	100.0
75	243	0.432	-0.178	0.122	0.1084	93.8	100.0	100.0	100.0
76	242	0.462	-0.158	0.106	0.1231	90.9	100.0	100.0	100.0
77	244	0.430	-0.169	0.116	0.1213	90.2	100.0	100.0	100.0
78	246	0.415	-0.283	0.109	0.1274	92.3	100.0	100.0	100.0
79	243	0.411	-0.272	0.114	0.1307	89.3	100.0	100.0	100.0
80	240	0.412	-0.137	0.111	0.1397	87.1	100.0	100.0	100.0
81	238	0.445	-0.220	0.090	0.1525	87.8	100.0	100.0	100.0
82	240	0.391	-0.239	0.072	0.1466	91.7	100.0	100.0	100.0
83	233	0.398	-0.219	0.063	0.1442	93.6	100.0	100.0	100.0
84	214	0.456	-0.239	0.041	0.1402	97.7	100.0	100.0	100.0
85	215	0.328	-0.205	0.059	0.1295	99.5	100.0	100.0	100.0
86	208	0.466	-0.189	0.069	0.1329	94.7	100.0	100.0	100.0
87	223	0.451	-0.349	0.088	0.1466	88.8	100.0	100.0	100.0
88	204	0.428	-0.210	0.084	0.1306	94.1	100.0	100.0	100.0
89	209	0.411	-0.215	0.108	0.1239	92.3	100.0	100.0	100.0
90	202	0.409	-0.191	0.104	0.1125	95.5	100.0	100.0	100.0
91	191	0.385	-0.158	0.123	0.1065	97.9	100.0	100.0	100.0
92	157	0.331	-0.143	0.085	0.0912	99.4	100.0	100.0	100.0
93	149	0.391	-0.138	0.097	0.0991	97.3	100.0	100.0	100.0
94	89	0.593	-0.036	0.159	0.1090	91.0	98.9	100.0	100.0
95	15	0.436	-0.138	0.233	0.1534	53.3	100.0	100.0	100.0

Classification report 1 of 2

IHO statistics a/b are : 0.500 0.013

User#	Total	# fail	% fail	# pass	% pass
7	1	0	0.00	1	100.00
8	20	0	0.00	20	100.00
9	66	0	0.00	66	100.00
10	65	0	0.00	65	100.00
11	106	0	0.00	106	100.00
12	154	0	0.00	154	100.00
13	194	0	0.00	194	100.00
14	222	0	0.00	222	100.00
15	243	0	0.00	243	100.00
16	248	0	0.00	248	100.00
17	238	0	0.00	238	100.00
18	239	0	0.00	239	100.00
19	244	0	0.00	244	100.00
20	235	0	0.00	235	100.00
21	239	0	0.00	239	100.00
22	239	0	0.00	239	100.00
23	243	0	0.00	243	100.00
24	237	0	0.00	237	100.00
25	224	0	0.00	224	100.00
26	243	0	0.00	243	100.00
27	252	0	0.00	252	100.00
28	252	0	0.00	252	100.00
29	252	0	0.00	252	100.00
30	257	0	0.00	257	100.00
31	257	0	0.00	257	100.00
32	259	0	0.00	259	100.00
33	259	0	0.00	259	100.00
34	260	0	0.00	260	100.00
35	258	0	0.00	258	100.00
36	257	0	0.00	257	100.00
37	254	0	0.00	254	100.00
38	256	0	0.00	256	100.00
39	255	0	0.00	255	100.00
40	250	0	0.00	250	100.00
41	243	0	0.00	243	100.00
42	243	0	0.00	243	100.00
43	245	0	0.00	245	100.00
44	249	0	0.00	249	100.00
45	248	0	0.00	248	100.00
46	247	0	0.00	247	100.00
47	229	0	0.00	229	100.00
48	211	0	0.00	211	100.00
49	191	0	0.00	191	100.00
50	172	0	0.00	172	100.00
51	196	0	0.00	196	100.00
52	231	0	0.00	231	100.00
53	235	0	0.00	235	100.00
54	246	0	0.00	246	100.00
55	249	0	0.00	249	100.00
56	248	0	0.00	248	100.00
57	245	0	0.00	245	100.00
58	247	0	0.00	247	100.00
59	245	0	0.00	245	100.00
60	246	0	0.00	246	100.00
61	246	0	0.00	246	100.00
62	244	0	0.00	244	100.00
63	248	0	0.00	248	100.00
64	249	0	0.00	249	100.00
65	252	0	0.00	252	100.00
66	250	0	0.00	250	100.00
67	248	0	0.00	248	100.00
68	248	0	0.00	248	100.00
69	243	0	0.00	243	100.00
70	249	0	0.00	249	100.00
71	246	0	0.00	246	100.00
72	248	0	0.00	248	100.00

73	249	0	0.00	249	100.00
74	248	0	0.00	248	100.00
75	243	0	0.00	243	100.00
76	242	0	0.00	242	100.00
77	244	0	0.00	244	100.00
78	246	0	0.00	246	100.00
79	243	0	0.00	243	100.00
80	240	0	0.00	240	100.00
81	238	0	0.00	238	100.00
82	240	0	0.00	240	100.00
83	233	0	0.00	233	100.00
84	214	0	0.00	214	100.00
85	215	0	0.00	215	100.00
86	208	0	0.00	208	100.00
87	223	0	0.00	223	100.00
88	204	0	0.00	204	100.00
89	209	0	0.00	209	100.00
90	202	0	0.00	202	100.00
91	191	0	0.00	191	100.00
92	157	0	0.00	157	100.00
93	149	0	0.00	149	100.00
94	89	0	0.00	89	100.00
95	15	0	0.00	15	100.00

Classification report 2 of 2

IHO statistics a/b are : 0.707 0.018

User#	Total	# fail	% fail	# pass	% pass
7	1	0	0.00	1	100.00
8	20	0	0.00	20	100.00
9	66	0	0.00	66	100.00
10	65	0	0.00	65	100.00
11	106	0	0.00	106	100.00
12	154	0	0.00	154	100.00
13	194	0	0.00	194	100.00
14	222	0	0.00	222	100.00
15	243	0	0.00	243	100.00
16	248	0	0.00	248	100.00
17	238	0	0.00	238	100.00
18	239	0	0.00	239	100.00
19	244	0	0.00	244	100.00
20	235	0	0.00	235	100.00
21	239	0	0.00	239	100.00
22	239	0	0.00	239	100.00
23	243	0	0.00	243	100.00
24	237	0	0.00	237	100.00
25	224	0	0.00	224	100.00
26	243	0	0.00	243	100.00
27	252	0	0.00	252	100.00
28	252	0	0.00	252	100.00
29	252	0	0.00	252	100.00
30	257	0	0.00	257	100.00
31	257	0	0.00	257	100.00
32	259	0	0.00	259	100.00
33	259	0	0.00	259	100.00
34	260	0	0.00	260	100.00
35	258	0	0.00	258	100.00
36	257	0	0.00	257	100.00
37	254	0	0.00	254	100.00
38	256	0	0.00	256	100.00
39	255	0	0.00	255	100.00
40	250	0	0.00	250	100.00
41	243	0	0.00	243	100.00
42	243	0	0.00	243	100.00
43	245	0	0.00	245	100.00
44	249	0	0.00	249	100.00
45	248	0	0.00	248	100.00
46	247	0	0.00	247	100.00
47	229	0	0.00	229	100.00
48	211	0	0.00	211	100.00
49	191	0	0.00	191	100.00
50	172	0	0.00	172	100.00
51	196	0	0.00	196	100.00
52	231	0	0.00	231	100.00
53	235	0	0.00	235	100.00
54	246	0	0.00	246	100.00
55	249	0	0.00	249	100.00
56	248	0	0.00	248	100.00
57	245	0	0.00	245	100.00
58	247	0	0.00	247	100.00
59	245	0	0.00	245	100.00
60	246	0	0.00	246	100.00
61	246	0	0.00	246	100.00
62	244	0	0.00	244	100.00
63	248	0	0.00	248	100.00
64	249	0	0.00	249	100.00
65	252	0	0.00	252	100.00
66	250	0	0.00	250	100.00
67	248	0	0.00	248	100.00
68	248	0	0.00	248	100.00
69	243	0	0.00	243	100.00
70	249	0	0.00	249	100.00
71	246	0	0.00	246	100.00
72	248	0	0.00	248	100.00

73	249	0	0.00	249	100.00
74	248	0	0.00	248	100.00
75	243	0	0.00	243	100.00
76	242	0	0.00	242	100.00
77	244	0	0.00	244	100.00
78	246	0	0.00	246	100.00
79	243	0	0.00	243	100.00
80	240	0	0.00	240	100.00
81	238	0	0.00	238	100.00
82	240	0	0.00	240	100.00
83	233	0	0.00	233	100.00
84	214	0	0.00	214	100.00
85	215	0	0.00	215	100.00
86	208	0	0.00	208	100.00
87	223	0	0.00	223	100.00
88	204	0	0.00	204	100.00
89	209	0	0.00	209	100.00
90	202	0	0.00	202	100.00
91	191	0	0.00	191	100.00
92	157	0	0.00	157	100.00
93	149	0	0.00	149	100.00
94	89	0	0.00	89	100.00
95	15	0	0.00	15	100.00

THALES

Quality Control Report for file : C:\P2658\CARIS\Fieldsheets\Site_17\A17-QC003\a17-qc003

Elevation Range is : -109.406(m) -103.870(m)

Total number of 3D points used: 15624

Starting Time: 29-JUN-2003 00:00:01.82
Ending Time: 29-JUN-2003 00:00:01.82

Minimum tidal reduction: 1274 (mm)
Maximum tidal reduction: 1284 (mm)

User#	Total	Max(+)	Max(-)	Mean	Std.	3dm(%)	5dm(%)	1%(%)	1.6%(%)
11	18	0.000	-0.389	-0.209	0.0845	94.4	100.0	100.0	100.0
12	76	0.176	-0.425	-0.168	0.1250	85.5	100.0	100.0	100.0
13	123	0.292	-0.539	-0.170	0.1424	82.1	99.2	100.0	100.0
14	162	0.454	-0.622	-0.163	0.1356	88.9	99.4	100.0	100.0
15	176	0.457	-0.402	-0.130	0.1314	93.2	100.0	100.0	100.0
16	188	0.245	-0.369	-0.105	0.1129	96.8	100.0	100.0	100.0
17	194	0.380	-0.400	-0.051	0.1422	96.9	100.0	100.0	100.0
18	197	0.492	-0.408	-0.037	0.1486	95.4	100.0	100.0	100.0
19	200	0.426	-0.336	0.008	0.1545	97.5	100.0	100.0	100.0
20	201	0.427	-0.403	0.020	0.1610	94.5	100.0	100.0	100.0
21	197	0.368	-0.250	0.040	0.1313	97.0	100.0	100.0	100.0
22	196	0.400	-0.459	0.008	0.1490	94.9	100.0	100.0	100.0
23	197	0.374	-0.334	-0.001	0.1318	97.0	100.0	100.0	100.0
24	201	0.378	-0.283	0.003	0.1313	99.0	100.0	100.0	100.0
25	200	0.309	-0.356	0.014	0.1300	98.5	100.0	100.0	100.0
26	204	0.340	-0.241	0.018	0.1103	99.5	100.0	100.0	100.0
27	204	0.320	-0.247	0.051	0.1158	97.5	100.0	100.0	100.0
28	203	0.730	-0.184	0.066	0.1277	96.1	99.5	100.0	100.0
29	203	0.466	-0.148	0.072	0.1029	98.5	100.0	100.0	100.0
30	202	0.431	-0.089	0.103	0.1040	95.5	100.0	100.0	100.0
31	202	0.424	-0.101	0.097	0.1024	96.0	100.0	100.0	100.0
32	204	0.399	-0.116	0.095	0.1010	95.6	100.0	100.0	100.0
33	204	0.435	-0.210	0.108	0.1251	91.7	100.0	100.0	100.0
34	203	0.425	-0.332	0.095	0.1172	95.6	100.0	100.0	100.0
35	203	0.495	-0.147	0.100	0.1182	92.1	100.0	100.0	100.0
36	205	0.580	-0.124	0.113	0.1325	89.8	99.5	100.0	100.0
37	206	0.454	-0.147	0.102	0.1225	92.2	100.0	100.0	100.0
38	206	0.517	-0.210	0.116	0.1291	89.3	99.5	100.0	100.0
39	204	0.613	-0.133	0.112	0.1350	88.7	99.5	100.0	100.0
40	207	0.504	-0.208	0.091	0.1349	93.2	99.0	100.0	100.0
41	205	0.448	-0.260	0.103	0.1424	91.2	100.0	100.0	100.0
42	207	0.581	-0.214	0.109	0.1339	91.3	99.5	100.0	100.0
43	205	0.479	-0.195	0.095	0.1222	92.7	100.0	100.0	100.0
44	198	0.527	-0.183	0.108	0.1213	93.4	99.5	100.0	100.0
45	196	0.410	-0.148	0.097	0.1211	93.4	100.0	100.0	100.0
46	203	0.468	-0.259	0.084	0.1140	98.5	100.0	100.0	100.0
47	192	0.399	-0.377	0.069	0.1186	96.4	100.0	100.0	100.0
48	175	0.449	-0.216	0.096	0.1235	92.6	100.0	100.0	100.0
49	167	0.499	-0.176	0.103	0.1350	89.8	100.0	100.0	100.0
50	156	0.550	-0.367	0.092	0.1527	89.7	99.4	100.0	100.0
51	175	0.533	-0.201	0.177	0.1224	85.1	99.4	100.0	100.0
52	191	0.506	-0.299	0.162	0.1300	84.8	99.5	100.0	100.0
53	195	0.570	-0.275	0.124	0.1492	88.7	99.0	100.0	100.0
54	197	0.534	-0.201	0.124	0.1336	90.9	99.5	100.0	100.0
55	203	0.447	-0.277	0.141	0.1328	86.2	100.0	100.0	100.0
56	199	0.485	-0.162	0.113	0.1249	93.5	100.0	100.0	100.0
57	206	0.564	-0.338	0.097	0.1310	94.7	99.5	100.0	100.0
58	207	0.409	-0.164	0.099	0.1146	94.7	100.0	100.0	100.0
59	206	0.498	-0.192	0.119	0.1243	92.2	100.0	100.0	100.0
60	202	0.562	-0.195	0.118	0.1494	86.6	99.0	100.0	100.0
61	203	0.392	-0.136	0.111	0.1216	91.1	100.0	100.0	100.0
62	204	0.591	-0.251	0.114	0.1460	85.8	99.5	100.0	100.0
63	208	0.491	-0.126	0.142	0.1397	81.7	100.0	100.0	100.0
64	206	0.449	-0.219	0.131	0.1247	89.8	100.0	100.0	100.0
65	208	0.366	-0.158	0.120	0.1130	90.9	100.0	100.0	100.0
66	209	0.507	-0.085	0.119	0.1163	91.9	99.5	100.0	100.0
67	212	0.450	-0.143	0.106	0.1183	92.9	100.0	100.0	100.0
68	208	0.418	-0.116	0.102	0.1059	97.1	100.0	100.0	100.0

69	211	0.486	-0.182	0.097	0.1096	96.2	100.0	100.0	100.0
70	211	0.358	-0.120	0.080	0.1046	97.6	100.0	100.0	100.0
71	209	0.591	-0.178	0.085	0.1190	96.7	99.5	100.0	100.0
72	210	0.470	-0.135	0.081	0.1335	91.0	100.0	100.0	100.0
73	209	0.506	-0.184	0.076	0.1374	88.0	99.5	100.0	100.0
74	211	0.495	-0.252	0.097	0.1525	85.3	100.0	100.0	100.0
75	206	0.532	-0.198	0.108	0.1644	83.5	98.1	100.0	100.0
76	207	0.495	-0.279	0.065	0.1449	90.8	100.0	100.0	100.0
77	209	0.445	-0.210	0.049	0.1279	95.2	100.0	100.0	100.0
78	211	0.319	-0.218	0.027	0.1205	98.1	100.0	100.0	100.0
79	213	0.262	-0.302	0.023	0.1137	99.5	100.0	100.0	100.0
80	216	0.391	-0.270	0.010	0.1172	98.6	100.0	100.0	100.0
81	215	0.366	-0.286	-0.011	0.1219	99.1	100.0	100.0	100.0
82	215	0.229	-0.264	-0.050	0.1103	100.0	100.0	100.0	100.0
83	215	0.420	-0.297	-0.064	0.1318	98.1	100.0	100.0	100.0
84	215	0.321	-0.384	-0.121	0.1297	96.7	100.0	100.0	100.0
85	210	0.344	-0.363	-0.099	0.1267	96.7	100.0	100.0	100.0
86	204	0.436	-0.392	-0.100	0.1644	90.7	100.0	100.0	100.0
87	195	0.357	-0.385	-0.109	0.1594	90.3	100.0	100.0	100.0
88	166	0.146	-0.398	-0.143	0.1166	92.2	100.0	100.0	100.0
89	166	0.139	-0.446	-0.136	0.1172	90.4	100.0	100.0	100.0
90	123	0.152	-0.411	-0.157	0.1192	91.9	100.0	100.0	100.0
91	48	0.089	-0.403	-0.164	0.1008	93.8	100.0	100.0	100.0

THALES

Classification report 1 of 2

IHO statistics a/b are : 0.500 0.013

User#	Total	# fail	% fail	# pass	% pass
11	18	0	0.00	18	100.00
12	76	0	0.00	76	100.00
13	123	0	0.00	123	100.00
14	162	0	0.00	162	100.00
15	176	0	0.00	176	100.00
16	188	0	0.00	188	100.00
17	194	0	0.00	194	100.00
18	197	0	0.00	197	100.00
19	200	0	0.00	200	100.00
20	201	0	0.00	201	100.00
21	197	0	0.00	197	100.00
22	196	0	0.00	196	100.00
23	197	0	0.00	197	100.00
24	201	0	0.00	201	100.00
25	200	0	0.00	200	100.00
26	204	0	0.00	204	100.00
27	204	0	0.00	204	100.00
28	203	0	0.00	203	100.00
29	203	0	0.00	203	100.00
30	202	0	0.00	202	100.00
31	202	0	0.00	202	100.00
32	204	0	0.00	204	100.00
33	204	0	0.00	204	100.00
34	203	0	0.00	203	100.00
35	203	0	0.00	203	100.00
36	205	0	0.00	205	100.00
37	206	0	0.00	206	100.00
38	206	0	0.00	206	100.00
39	204	0	0.00	204	100.00
40	207	0	0.00	207	100.00
41	205	0	0.00	205	100.00
42	207	0	0.00	207	100.00
43	205	0	0.00	205	100.00
44	198	0	0.00	198	100.00
45	196	0	0.00	196	100.00
46	203	0	0.00	203	100.00
47	192	0	0.00	192	100.00
48	175	0	0.00	175	100.00
49	167	0	0.00	167	100.00
50	156	0	0.00	156	100.00
51	175	0	0.00	175	100.00
52	191	0	0.00	191	100.00
53	195	0	0.00	195	100.00
54	197	0	0.00	197	100.00
55	203	0	0.00	203	100.00
56	199	0	0.00	199	100.00
57	206	0	0.00	206	100.00
58	207	0	0.00	207	100.00
59	206	0	0.00	206	100.00
60	202	0	0.00	202	100.00
61	203	0	0.00	203	100.00
62	204	0	0.00	204	100.00
63	208	0	0.00	208	100.00
64	206	0	0.00	206	100.00
65	208	0	0.00	208	100.00
66	209	0	0.00	209	100.00
67	212	0	0.00	212	100.00
68	208	0	0.00	208	100.00
69	211	0	0.00	211	100.00
70	211	0	0.00	211	100.00
71	209	0	0.00	209	100.00
72	210	0	0.00	210	100.00
73	209	0	0.00	209	100.00
74	211	0	0.00	211	100.00
75	206	0	0.00	206	100.00

76	207	0	0.00	207	100.00
77	209	0	0.00	209	100.00
78	211	0	0.00	211	100.00
79	213	0	0.00	213	100.00
80	216	0	0.00	216	100.00
81	215	0	0.00	215	100.00
82	215	0	0.00	215	100.00
83	215	0	0.00	215	100.00
84	215	0	0.00	215	100.00
85	210	0	0.00	210	100.00
86	204	0	0.00	204	100.00
87	195	0	0.00	195	100.00
88	166	0	0.00	166	100.00
89	166	0	0.00	166	100.00
90	123	0	0.00	123	100.00
91	48	0	0.00	48	100.00

THALES

Classification report 2 of 2

IHO statistics a/b are : 0.707 0.018

User#	Total	# fail	% fail	# pass	% pass
11	18	0	0.00	18	100.00
12	76	0	0.00	76	100.00
13	123	0	0.00	123	100.00
14	162	0	0.00	162	100.00
15	176	0	0.00	176	100.00
16	188	0	0.00	188	100.00
17	194	0	0.00	194	100.00
18	197	0	0.00	197	100.00
19	200	0	0.00	200	100.00
20	201	0	0.00	201	100.00
21	197	0	0.00	197	100.00
22	196	0	0.00	196	100.00
23	197	0	0.00	197	100.00
24	201	0	0.00	201	100.00
25	200	0	0.00	200	100.00
26	204	0	0.00	204	100.00
27	204	0	0.00	204	100.00
28	203	0	0.00	203	100.00
29	203	0	0.00	203	100.00
30	202	0	0.00	202	100.00
31	202	0	0.00	202	100.00
32	204	0	0.00	204	100.00
33	204	0	0.00	204	100.00
34	203	0	0.00	203	100.00
35	203	0	0.00	203	100.00
36	205	0	0.00	205	100.00
37	206	0	0.00	206	100.00
38	206	0	0.00	206	100.00
39	204	0	0.00	204	100.00
40	207	0	0.00	207	100.00
41	205	0	0.00	205	100.00
42	207	0	0.00	207	100.00
43	205	0	0.00	205	100.00
44	198	0	0.00	198	100.00
45	196	0	0.00	196	100.00
46	203	0	0.00	203	100.00
47	192	0	0.00	192	100.00
48	175	0	0.00	175	100.00
49	167	0	0.00	167	100.00
50	156	0	0.00	156	100.00
51	175	0	0.00	175	100.00
52	191	0	0.00	191	100.00
53	195	0	0.00	195	100.00
54	197	0	0.00	197	100.00
55	203	0	0.00	203	100.00
56	199	0	0.00	199	100.00
57	206	0	0.00	206	100.00
58	207	0	0.00	207	100.00
59	206	0	0.00	206	100.00
60	202	0	0.00	202	100.00
61	203	0	0.00	203	100.00
62	204	0	0.00	204	100.00
63	208	0	0.00	208	100.00
64	206	0	0.00	206	100.00
65	208	0	0.00	208	100.00
66	209	0	0.00	209	100.00
67	212	0	0.00	212	100.00
68	208	0	0.00	208	100.00
69	211	0	0.00	211	100.00
70	211	0	0.00	211	100.00
71	209	0	0.00	209	100.00
72	210	0	0.00	210	100.00
73	209	0	0.00	209	100.00
74	211	0	0.00	211	100.00
75	206	0	0.00	206	100.00

76	207	0	0.00	207	100.00
77	209	0	0.00	209	100.00
78	211	0	0.00	211	100.00
79	213	0	0.00	213	100.00
80	216	0	0.00	216	100.00
81	215	0	0.00	215	100.00
82	215	0	0.00	215	100.00
83	215	0	0.00	215	100.00
84	215	0	0.00	215	100.00
85	210	0	0.00	210	100.00
86	204	0	0.00	204	100.00
87	195	0	0.00	195	100.00
88	166	0	0.00	166	100.00
89	166	0	0.00	166	100.00
90	123	0	0.00	123	100.00
91	48	0	0.00	48	100.00

THALES

Quality Control Report for file : C:\P2658\CARIS\Fieldsheets\Site_17\A17-QC004\a17-qc004

Elevation Range is : -111.694(m) -93.973(m)

Total number of 3D points used: 15968

Starting Time: 29-JUN-2003 00:00:01.82
Ending Time: 29-JUN-2003 00:00:01.82

Minimum tidal reduction: 1508 (mm)
Maximum tidal reduction: 1513 (mm)

User#	Total	Max(+)	Max(-)	Mean	Std.	3dm(%)	5dm(%)	1%(%)	1.6%(%)
9	43	0.031	-1.515	-0.663	0.3746	16.3	32.6	81.4	100.0
10	69	0.378	-1.487	-0.598	0.3572	14.5	33.3	87.0	100.0
11	81	0.182	-2.221	-0.540	0.3757	19.8	54.3	87.7	97.5
12	89	0.318	-1.338	-0.526	0.2961	21.3	56.2	91.0	100.0
13	118	0.527	-1.071	-0.363	0.2221	33.1	80.5	99.2	100.0
14	138	0.128	-0.837	-0.341	0.1425	34.8	89.1	100.0	100.0
15	154	0.562	-1.176	-0.293	0.2062	57.8	90.3	99.4	100.0
16	171	0.249	-0.683	-0.217	0.1372	70.8	97.7	100.0	100.0
17	192	0.389	-0.586	-0.156	0.1566	82.3	98.4	100.0	100.0
18	199	0.452	-0.556	-0.159	0.1648	78.9	98.0	100.0	100.0
19	210	0.344	-0.496	-0.116	0.1455	91.4	100.0	100.0	100.0
20	214	0.267	-0.674	-0.120	0.1364	93.5	99.1	100.0	100.0
21	214	0.248	-0.432	-0.107	0.1263	93.5	100.0	100.0	100.0
22	214	0.537	-0.483	-0.108	0.1353	93.0	99.5	100.0	100.0
23	214	0.168	-0.349	-0.084	0.1001	98.6	100.0	100.0	100.0
24	210	0.310	-0.562	-0.101	0.1277	95.2	99.5	100.0	100.0
25	213	0.206	-0.364	-0.073	0.1023	98.6	100.0	100.0	100.0
26	211	0.589	-0.334	-0.055	0.1273	97.2	99.5	100.0	100.0
27	215	0.249	-0.304	-0.049	0.0991	99.5	100.0	100.0	100.0
28	215	0.383	-0.456	-0.031	0.1252	98.1	100.0	100.0	100.0
29	215	0.368	-0.407	-0.033	0.1195	98.6	100.0	100.0	100.0
30	215	0.347	-0.590	-0.019	0.1250	97.7	99.5	100.0	100.0
31	215	0.308	-0.299	-0.020	0.1133	99.5	100.0	100.0	100.0
32	214	0.336	-0.320	-0.015	0.0936	98.6	100.0	100.0	100.0
33	213	0.373	-0.255	-0.012	0.0970	99.5	100.0	100.0	100.0
34	214	0.339	-0.334	0.012	0.1109	98.6	100.0	100.0	100.0
35	213	0.343	-0.236	0.018	0.1190	99.1	100.0	100.0	100.0
36	214	0.404	-0.295	0.006	0.1188	98.1	100.0	100.0	100.0
37	213	0.348	-0.359	-0.024	0.1153	98.6	100.0	100.0	100.0
38	213	0.380	-0.422	-0.039	0.1378	94.8	100.0	100.0	100.0
39	214	0.418	-0.342	-0.013	0.1329	97.7	100.0	100.0	100.0
40	214	0.448	-0.318	-0.023	0.1286	98.1	100.0	100.0	100.0
41	210	0.347	-0.366	-0.009	0.1362	95.2	100.0	100.0	100.0
42	212	0.446	-0.358	-0.004	0.1464	95.3	100.0	100.0	100.0
43	211	0.393	-0.424	-0.006	0.1553	95.3	100.0	100.0	100.0
44	211	0.446	-0.393	-0.006	0.1501	96.2	100.0	100.0	100.0
45	212	0.547	-0.305	0.003	0.1444	95.3	99.5	100.0	100.0
46	209	0.906	-0.873	-0.031	0.1947	91.4	97.6	100.0	100.0
47	208	0.507	-0.707	-0.024	0.1933	88.0	97.6	100.0	100.0
48	190	0.521	-0.895	-0.053	0.2335	81.1	94.7	100.0	100.0
49	184	0.468	-0.982	-0.095	0.2519	79.9	91.3	100.0	100.0
50	187	0.505	-0.856	-0.050	0.2434	83.4	92.5	100.0	100.0
51	196	0.509	-0.949	0.010	0.2237	86.2	95.9	100.0	100.0
52	200	0.564	-0.709	0.016	0.2122	86.0	96.0	100.0	100.0
53	201	0.384	-0.726	-0.037	0.1997	88.1	97.5	100.0	100.0
54	203	0.549	-0.730	-0.075	0.1908	89.7	95.6	100.0	100.0
55	207	0.636	-0.665	-0.058	0.1698	93.2	97.1	100.0	100.0
56	207	0.347	-0.669	-0.049	0.1542	94.2	99.0	100.0	100.0
57	209	0.395	-0.562	-0.051	0.1612	91.4	98.6	100.0	100.0
58	209	0.397	-0.633	-0.054	0.1611	94.7	99.0	100.0	100.0
59	209	0.301	-0.663	-0.069	0.1349	96.7	98.6	100.0	100.0
60	208	0.618	-0.738	-0.077	0.1435	92.3	98.6	100.0	100.0
61	208	0.599	-0.510	-0.075	0.1389	93.3	99.0	100.0	100.0
62	209	0.281	-0.552	-0.064	0.1186	97.6	99.0	100.0	100.0
63	209	0.185	-0.498	-0.057	0.1031	98.1	100.0	100.0	100.0
64	209	0.262	-0.405	-0.046	0.1012	99.0	100.0	100.0	100.0
65	210	0.213	-0.263	-0.039	0.0996	100.0	100.0	100.0	100.0
66	210	0.207	-0.295	-0.053	0.0930	100.0	100.0	100.0	100.0

67	210	0.193	-0.391	-0.065	0.1060	99.5	100.0	100.0	100.0
68	209	0.154	-0.278	-0.072	0.0951	100.0	100.0	100.0	100.0
69	210	0.147	-0.335	-0.070	0.0975	99.5	100.0	100.0	100.0
70	210	0.196	-0.287	-0.097	0.0994	100.0	100.0	100.0	100.0
71	209	0.169	-0.268	-0.095	0.0960	100.0	100.0	100.0	100.0
72	209	0.217	-0.387	-0.093	0.1059	99.5	100.0	100.0	100.0
73	209	0.241	-0.391	-0.102	0.1041	99.5	100.0	100.0	100.0
74	209	0.260	-0.352	-0.102	0.1031	99.0	100.0	100.0	100.0
75	208	0.258	-0.289	-0.092	0.0960	100.0	100.0	100.0	100.0
76	208	0.098	-0.384	-0.120	0.1045	97.6	100.0	100.0	100.0
77	207	0.125	-0.315	-0.126	0.0990	99.0	100.0	100.0	100.0
78	207	0.126	-0.360	-0.138	0.0928	99.0	100.0	100.0	100.0
79	206	0.143	-0.400	-0.166	0.1068	90.8	100.0	100.0	100.0
80	206	0.129	-0.386	-0.179	0.0973	87.9	100.0	100.0	100.0
81	205	0.054	-0.393	-0.196	0.0938	82.4	100.0	100.0	100.0
82	202	0.072	-0.466	-0.221	0.1081	75.7	100.0	100.0	100.0
83	199	0.057	-0.553	-0.251	0.1150	62.8	99.5	100.0	100.0
84	183	0.002	-0.501	-0.297	0.1039	47.5	99.5	100.0	100.0
85	182	0.066	-0.558	-0.291	0.1205	51.6	97.3	100.0	100.0
86	161	0.059	-0.591	-0.359	0.1172	21.7	93.2	100.0	100.0
87	138	0.000	-0.603	-0.385	0.1118	19.6	87.7	100.0	100.0
88	112	0.000	-0.613	-0.412	0.1147	14.3	80.4	100.0	100.0
89	97	0.085	-0.550	-0.375	0.1119	17.5	92.8	100.0	100.0
90	98	0.000	-0.581	-0.357	0.0969	21.4	94.9	100.0	100.0
91	70	0.000	-0.569	-0.383	0.0898	12.9	91.4	100.0	100.0
92	36	0.000	-0.595	-0.431	0.0664	5.6	88.9	100.0	100.0
93	22	0.000	-0.487	-0.336	0.1375	36.4	100.0	100.0	100.0
94	35	0.016	-0.501	-0.240	0.1318	68.6	97.1	100.0	100.0
95	22	0.039	-0.487	-0.261	0.1356	59.1	100.0	100.0	100.0

THALES

Classification report 1 of 2

IHO statistics a/b are : 0.500 0.013

User#	Total	# fail	% fail	# pass	% pass
9	43	3	6.98	40	93.02
10	69	2	2.90	67	97.10
11	81	3	3.70	78	96.30
12	89	0	0.00	89	100.00
13	118	0	0.00	118	100.00
14	138	0	0.00	138	100.00
15	154	0	0.00	154	100.00
16	171	0	0.00	171	100.00
17	192	0	0.00	192	100.00
18	199	0	0.00	199	100.00
19	210	0	0.00	210	100.00
20	214	0	0.00	214	100.00
21	214	0	0.00	214	100.00
22	214	0	0.00	214	100.00
23	214	0	0.00	214	100.00
24	210	0	0.00	210	100.00
25	213	0	0.00	213	100.00
26	211	0	0.00	211	100.00
27	215	0	0.00	215	100.00
28	215	0	0.00	215	100.00
29	215	0	0.00	215	100.00
30	215	0	0.00	215	100.00
31	215	0	0.00	215	100.00
32	214	0	0.00	214	100.00
33	213	0	0.00	213	100.00
34	214	0	0.00	214	100.00
35	213	0	0.00	213	100.00
36	214	0	0.00	214	100.00
37	213	0	0.00	213	100.00
38	213	0	0.00	213	100.00
39	214	0	0.00	214	100.00
40	214	0	0.00	214	100.00
41	210	0	0.00	210	100.00
42	212	0	0.00	212	100.00
43	211	0	0.00	211	100.00
44	211	0	0.00	211	100.00
45	212	0	0.00	212	100.00
46	209	0	0.00	209	100.00
47	208	0	0.00	208	100.00
48	190	0	0.00	190	100.00
49	184	0	0.00	184	100.00
50	187	0	0.00	187	100.00
51	196	0	0.00	196	100.00
52	200	0	0.00	200	100.00
53	201	0	0.00	201	100.00
54	203	0	0.00	203	100.00
55	207	0	0.00	207	100.00
56	207	0	0.00	207	100.00
57	209	0	0.00	209	100.00
58	209	0	0.00	209	100.00
59	209	0	0.00	209	100.00
60	208	0	0.00	208	100.00
61	208	0	0.00	208	100.00
62	209	0	0.00	209	100.00
63	209	0	0.00	209	100.00
64	209	0	0.00	209	100.00
65	210	0	0.00	210	100.00
66	210	0	0.00	210	100.00
67	210	0	0.00	210	100.00
68	209	0	0.00	209	100.00
69	210	0	0.00	210	100.00
70	210	0	0.00	210	100.00
71	209	0	0.00	209	100.00
72	209	0	0.00	209	100.00
73	209	0	0.00	209	100.00

74	209	0	0.00	209	100.00
75	208	0	0.00	208	100.00
76	208	0	0.00	208	100.00
77	207	0	0.00	207	100.00
78	207	0	0.00	207	100.00
79	206	0	0.00	206	100.00
80	206	0	0.00	206	100.00
81	205	0	0.00	205	100.00
82	202	0	0.00	202	100.00
83	199	0	0.00	199	100.00
84	183	0	0.00	183	100.00
85	182	0	0.00	182	100.00
86	161	0	0.00	161	100.00
87	138	0	0.00	138	100.00
88	112	0	0.00	112	100.00
89	97	0	0.00	97	100.00
90	98	0	0.00	98	100.00
91	70	0	0.00	70	100.00
92	36	0	0.00	36	100.00
93	22	0	0.00	22	100.00
94	35	0	0.00	35	100.00
95	22	0	0.00	22	100.00

THALES

Classification report 2 of 2

IHO statistics a/b are : 0.707 0.018

User#	Total	# fail	% fail	# pass	% pass
9	43	0	0.00	43	100.00
10	69	0	0.00	69	100.00
11	81	1	1.23	80	98.77
12	89	0	0.00	89	100.00
13	118	0	0.00	118	100.00
14	138	0	0.00	138	100.00
15	154	0	0.00	154	100.00
16	171	0	0.00	171	100.00
17	192	0	0.00	192	100.00
18	199	0	0.00	199	100.00
19	210	0	0.00	210	100.00
20	214	0	0.00	214	100.00
21	214	0	0.00	214	100.00
22	214	0	0.00	214	100.00
23	214	0	0.00	214	100.00
24	210	0	0.00	210	100.00
25	213	0	0.00	213	100.00
26	211	0	0.00	211	100.00
27	215	0	0.00	215	100.00
28	215	0	0.00	215	100.00
29	215	0	0.00	215	100.00
30	215	0	0.00	215	100.00
31	215	0	0.00	215	100.00
32	214	0	0.00	214	100.00
33	213	0	0.00	213	100.00
34	214	0	0.00	214	100.00
35	213	0	0.00	213	100.00
36	214	0	0.00	214	100.00
37	213	0	0.00	213	100.00
38	213	0	0.00	213	100.00
39	214	0	0.00	214	100.00
40	214	0	0.00	214	100.00
41	210	0	0.00	210	100.00
42	212	0	0.00	212	100.00
43	211	0	0.00	211	100.00
44	211	0	0.00	211	100.00
45	212	0	0.00	212	100.00
46	209	0	0.00	209	100.00
47	208	0	0.00	208	100.00
48	190	0	0.00	190	100.00
49	184	0	0.00	184	100.00
50	187	0	0.00	187	100.00
51	196	0	0.00	196	100.00
52	200	0	0.00	200	100.00
53	201	0	0.00	201	100.00
54	203	0	0.00	203	100.00
55	207	0	0.00	207	100.00
56	207	0	0.00	207	100.00
57	209	0	0.00	209	100.00
58	209	0	0.00	209	100.00
59	209	0	0.00	209	100.00
60	208	0	0.00	208	100.00
61	208	0	0.00	208	100.00
62	209	0	0.00	209	100.00
63	209	0	0.00	209	100.00
64	209	0	0.00	209	100.00
65	210	0	0.00	210	100.00
66	210	0	0.00	210	100.00
67	210	0	0.00	210	100.00
68	209	0	0.00	209	100.00
69	210	0	0.00	210	100.00
70	210	0	0.00	210	100.00
71	209	0	0.00	209	100.00
72	209	0	0.00	209	100.00
73	209	0	0.00	209	100.00

74	209	0	0.00	209	100.00
75	208	0	0.00	208	100.00
76	208	0	0.00	208	100.00
77	207	0	0.00	207	100.00
78	207	0	0.00	207	100.00
79	206	0	0.00	206	100.00
80	206	0	0.00	206	100.00
81	205	0	0.00	205	100.00
82	202	0	0.00	202	100.00
83	199	0	0.00	199	100.00
84	183	0	0.00	183	100.00
85	182	0	0.00	182	100.00
86	161	0	0.00	161	100.00
87	138	0	0.00	138	100.00
88	112	0	0.00	112	100.00
89	97	0	0.00	97	100.00
90	98	0	0.00	98	100.00
91	70	0	0.00	70	100.00
92	36	0	0.00	36	100.00
93	22	0	0.00	22	100.00
94	35	0	0.00	35	100.00
95	22	0	0.00	22	100.00

THALES

Quality Control Report for file : C:\P2658\CARIS\Fieldsheets\Site_17\A17-QC005\a17-qc005

Elevation Range is : -117.174(m) -113.199(m)

Total number of 3D points used: 16441

Starting Time: 29-JUN-2003 00:00:01.82
Ending Time: 29-JUN-2003 00:00:01.82

Minimum tidal reduction: 1527 (mm)
Maximum tidal reduction: 1529 (mm)

User#	Total	Max(+)	Max(-)	Mean	Std.	3dm(%)	5dm(%)	1%(%)	1.6%(%)
11	3	0.185	-0.516	-0.250	0.3796	33.3	66.7	100.0	100.0
12	14	0.000	-0.497	-0.347	0.1403	21.4	100.0	100.0	100.0
13	66	0.000	-0.650	-0.309	0.1407	47.0	93.9	100.0	100.0
14	83	0.000	-0.541	-0.296	0.1167	44.6	98.8	100.0	100.0
15	118	0.047	-0.605	-0.299	0.1354	44.9	96.6	100.0	100.0
16	152	0.028	-0.523	-0.296	0.1078	52.0	98.7	100.0	100.0
17	193	0.832	-0.497	-0.259	0.1503	50.8	99.5	100.0	100.0
18	196	0.090	-0.540	-0.250	0.1329	64.8	98.5	100.0	100.0
19	204	0.268	-0.522	-0.180	0.1483	76.0	99.5	100.0	100.0
20	215	0.225	-0.487	-0.186	0.1572	74.4	100.0	100.0	100.0
21	209	0.223	-0.492	-0.191	0.1505	74.2	100.0	100.0	100.0
22	214	0.282	-0.491	-0.204	0.1429	73.4	100.0	100.0	100.0
23	215	0.230	-0.475	-0.184	0.1302	79.1	100.0	100.0	100.0
24	195	0.172	-0.505	-0.189	0.1237	79.5	99.5	100.0	100.0
25	193	0.112	-0.457	-0.177	0.1157	85.5	100.0	100.0	100.0
26	196	0.124	-0.446	-0.176	0.1228	83.2	100.0	100.0	100.0
27	215	0.221	-0.442	-0.165	0.1189	88.8	100.0	100.0	100.0
28	223	0.281	-0.399	-0.152	0.1238	94.2	100.0	100.0	100.0
29	237	0.431	-0.393	-0.141	0.1404	90.3	100.0	100.0	100.0
30	237	0.192	-0.513	-0.131	0.1505	90.3	99.6	100.0	100.0
31	237	0.238	-0.410	-0.146	0.1621	84.0	100.0	100.0	100.0
32	237	0.321	-0.440	-0.143	0.1557	84.0	100.0	100.0	100.0
33	237	0.286	-0.386	-0.119	0.1563	90.3	100.0	100.0	100.0
34	237	0.298	-0.412	-0.129	0.1572	88.6	100.0	100.0	100.0
35	235	0.321	-0.488	-0.112	0.1511	91.5	100.0	100.0	100.0
36	232	0.224	-0.426	-0.126	0.1497	90.9	100.0	100.0	100.0
37	237	0.200	-0.440	-0.150	0.1519	87.3	100.0	100.0	100.0
38	237	0.299	-0.462	-0.131	0.1532	91.1	100.0	100.0	100.0
39	236	0.288	-0.422	-0.101	0.1620	93.2	100.0	100.0	100.0
40	226	0.298	-0.510	-0.113	0.1539	89.8	99.6	100.0	100.0
41	219	0.284	-0.472	-0.111	0.1575	92.2	100.0	100.0	100.0
42	228	0.454	-0.567	-0.091	0.1828	89.9	99.6	100.0	100.0
43	223	0.428	-0.540	-0.089	0.1791	84.3	99.6	100.0	100.0
44	232	0.471	-0.574	-0.097	0.1751	87.5	99.1	100.0	100.0
45	236	0.305	-0.461	-0.108	0.1496	89.4	100.0	100.0	100.0
46	236	0.280	-0.401	-0.113	0.1439	91.1	100.0	100.0	100.0
47	232	0.231	-0.453	-0.129	0.1387	88.8	100.0	100.0	100.0
48	207	0.247	-0.458	-0.129	0.1416	89.9	100.0	100.0	100.0
49	175	0.204	-0.711	-0.137	0.1239	93.1	99.4	100.0	100.0
50	161	0.183	-0.412	-0.113	0.1239	93.2	100.0	100.0	100.0
51	184	0.237	-0.404	-0.080	0.1227	95.7	100.0	100.0	100.0
52	214	0.257	-0.426	-0.056	0.1215	99.5	100.0	100.0	100.0
53	216	0.240	-0.374	-0.080	0.1396	94.0	100.0	100.0	100.0
54	211	0.307	-0.445	-0.116	0.1331	91.5	100.0	100.0	100.0
55	226	0.237	-0.532	-0.138	0.1424	88.1	99.6	100.0	100.0
56	226	0.245	-0.542	-0.126	0.1422	90.3	99.1	100.0	100.0
57	235	0.243	-0.453	-0.119	0.1385	92.8	100.0	100.0	100.0
58	235	0.264	-0.421	-0.114	0.1479	91.9	100.0	100.0	100.0
59	236	0.342	-0.444	-0.118	0.1479	92.4	100.0	100.0	100.0
60	237	0.388	-0.448	-0.087	0.1450	94.1	100.0	100.0	100.0
61	237	0.353	-0.437	-0.118	0.1494	91.6	100.0	100.0	100.0
62	235	0.378	-0.428	-0.119	0.1389	93.6	100.0	100.0	100.0
63	235	0.288	-0.404	-0.126	0.1545	90.6	100.0	100.0	100.0
64	234	0.286	-0.463	-0.128	0.1582	91.5	100.0	100.0	100.0
65	236	0.244	-0.385	-0.132	0.1461	93.6	100.0	100.0	100.0
66	235	0.191	-0.452	-0.159	0.1313	88.9	100.0	100.0	100.0
67	234	0.467	-0.492	-0.163	0.1464	85.0	100.0	100.0	100.0

68	233	0.111	-0.426	-0.168	0.1261	85.0	100.0	100.0	100.0
69	233	0.142	-0.414	-0.180	0.1168	86.7	100.0	100.0	100.0
70	231	0.083	-0.426	-0.195	0.1170	77.9	100.0	100.0	100.0
71	230	0.111	-0.498	-0.188	0.1222	83.0	100.0	100.0	100.0
72	227	0.232	-0.388	-0.186	0.1254	84.1	100.0	100.0	100.0
73	225	0.083	-0.406	-0.186	0.1010	88.4	100.0	100.0	100.0
74	228	0.160	-0.560	-0.206	0.1181	78.1	99.6	100.0	100.0
75	226	0.112	-0.436	-0.211	0.1085	79.6	100.0	100.0	100.0
76	223	0.074	-0.468	-0.246	0.1086	65.9	100.0	100.0	100.0
77	222	0.072	-0.508	-0.244	0.1104	67.1	99.5	100.0	100.0
78	229	0.065	-0.557	-0.263	0.1117	62.4	99.6	100.0	100.0
79	221	0.175	-0.540	-0.284	0.1027	50.7	99.5	100.0	100.0
80	223	0.221	-0.493	-0.305	0.1094	37.2	100.0	100.0	100.0
81	216	0.000	-0.594	-0.334	0.0893	35.6	95.8	100.0	100.0
82	215	0.000	-0.628	-0.357	0.0853	22.3	98.1	100.0	100.0
83	214	0.003	-0.571	-0.388	0.0973	17.3	91.6	100.0	100.0
84	188	0.000	-0.619	-0.418	0.0824	9.6	82.4	100.0	100.0
85	212	0.026	-0.679	-0.417	0.1012	11.3	83.0	100.0	100.0
86	186	0.017	-0.731	-0.453	0.1050	5.9	69.9	100.0	100.0
87	166	0.042	-0.744	-0.467	0.1115	5.4	59.6	100.0	100.0
88	110	0.000	-0.750	-0.521	0.0952	3.6	38.2	100.0	100.0
89	102	0.000	-0.718	-0.488	0.0877	2.9	48.0	100.0	100.0
90	87	0.000	-0.645	-0.464	0.0967	5.7	62.1	100.0	100.0
91	35	0.000	-0.665	-0.456	0.1332	11.4	65.7	100.0	100.0
92	1	0.000	-0.307	-0.307	0.0000	0.0	100.0	100.0	100.0
93	1	0.000	-0.383	-0.383	0.0000	0.0	100.0	100.0	100.0
94	13	0.000	-0.489	-0.390	0.0767	7.7	100.0	100.0	100.0

THALES

Classification report 1 of 2

IHO statistics a/b are : 0.500 0.013

User#	Total	# fail	% fail	# pass	% pass
11	3	0	0.00	3	100.00
12	14	0	0.00	14	100.00
13	66	0	0.00	66	100.00
14	83	0	0.00	83	100.00
15	118	0	0.00	118	100.00
16	152	0	0.00	152	100.00
17	193	0	0.00	193	100.00
18	196	0	0.00	196	100.00
19	204	0	0.00	204	100.00
20	215	0	0.00	215	100.00
21	209	0	0.00	209	100.00
22	214	0	0.00	214	100.00
23	215	0	0.00	215	100.00
24	195	0	0.00	195	100.00
25	193	0	0.00	193	100.00
26	196	0	0.00	196	100.00
27	215	0	0.00	215	100.00
28	223	0	0.00	223	100.00
29	237	0	0.00	237	100.00
30	237	0	0.00	237	100.00
31	237	0	0.00	237	100.00
32	237	0	0.00	237	100.00
33	237	0	0.00	237	100.00
34	237	0	0.00	237	100.00
35	235	0	0.00	235	100.00
36	232	0	0.00	232	100.00
37	237	0	0.00	237	100.00
38	237	0	0.00	237	100.00
39	236	0	0.00	236	100.00
40	226	0	0.00	226	100.00
41	219	0	0.00	219	100.00
42	228	0	0.00	228	100.00
43	223	0	0.00	223	100.00
44	232	0	0.00	232	100.00
45	236	0	0.00	236	100.00
46	236	0	0.00	236	100.00
47	232	0	0.00	232	100.00
48	207	0	0.00	207	100.00
49	175	0	0.00	175	100.00
50	161	0	0.00	161	100.00
51	184	0	0.00	184	100.00
52	214	0	0.00	214	100.00
53	216	0	0.00	216	100.00
54	211	0	0.00	211	100.00
55	226	0	0.00	226	100.00
56	226	0	0.00	226	100.00
57	235	0	0.00	235	100.00
58	235	0	0.00	235	100.00
59	236	0	0.00	236	100.00
60	237	0	0.00	237	100.00
61	237	0	0.00	237	100.00
62	235	0	0.00	235	100.00
63	235	0	0.00	235	100.00
64	234	0	0.00	234	100.00
65	236	0	0.00	236	100.00
66	235	0	0.00	235	100.00
67	234	0	0.00	234	100.00
68	233	0	0.00	233	100.00
69	233	0	0.00	233	100.00
70	231	0	0.00	231	100.00
71	230	0	0.00	230	100.00
72	227	0	0.00	227	100.00
73	225	0	0.00	225	100.00
74	228	0	0.00	228	100.00
75	226	0	0.00	226	100.00

76	223	0	0.00	223	100.00
77	222	0	0.00	222	100.00
78	229	0	0.00	229	100.00
79	221	0	0.00	221	100.00
80	223	0	0.00	223	100.00
81	216	0	0.00	216	100.00
82	215	0	0.00	215	100.00
83	214	0	0.00	214	100.00
84	188	0	0.00	188	100.00
85	212	0	0.00	212	100.00
86	186	0	0.00	186	100.00
87	166	0	0.00	166	100.00
88	110	0	0.00	110	100.00
89	102	0	0.00	102	100.00
90	87	0	0.00	87	100.00
91	35	0	0.00	35	100.00
92	1	0	0.00	1	100.00
93	1	0	0.00	1	100.00
94	13	0	0.00	13	100.00

THALES

Classification report 2 of 2

IHO statistics a/b are : 0.707 0.018

User#	Total	# fail	% fail	# pass	% pass
11	3	0	0.00	3	100.00
12	14	0	0.00	14	100.00
13	66	0	0.00	66	100.00
14	83	0	0.00	83	100.00
15	118	0	0.00	118	100.00
16	152	0	0.00	152	100.00
17	193	0	0.00	193	100.00
18	196	0	0.00	196	100.00
19	204	0	0.00	204	100.00
20	215	0	0.00	215	100.00
21	209	0	0.00	209	100.00
22	214	0	0.00	214	100.00
23	215	0	0.00	215	100.00
24	195	0	0.00	195	100.00
25	193	0	0.00	193	100.00
26	196	0	0.00	196	100.00
27	215	0	0.00	215	100.00
28	223	0	0.00	223	100.00
29	237	0	0.00	237	100.00
30	237	0	0.00	237	100.00
31	237	0	0.00	237	100.00
32	237	0	0.00	237	100.00
33	237	0	0.00	237	100.00
34	237	0	0.00	237	100.00
35	235	0	0.00	235	100.00
36	232	0	0.00	232	100.00
37	237	0	0.00	237	100.00
38	237	0	0.00	237	100.00
39	236	0	0.00	236	100.00
40	226	0	0.00	226	100.00
41	219	0	0.00	219	100.00
42	228	0	0.00	228	100.00
43	223	0	0.00	223	100.00
44	232	0	0.00	232	100.00
45	236	0	0.00	236	100.00
46	236	0	0.00	236	100.00
47	232	0	0.00	232	100.00
48	207	0	0.00	207	100.00
49	175	0	0.00	175	100.00
50	161	0	0.00	161	100.00
51	184	0	0.00	184	100.00
52	214	0	0.00	214	100.00
53	216	0	0.00	216	100.00
54	211	0	0.00	211	100.00
55	226	0	0.00	226	100.00
56	226	0	0.00	226	100.00
57	235	0	0.00	235	100.00
58	235	0	0.00	235	100.00
59	236	0	0.00	236	100.00
60	237	0	0.00	237	100.00
61	237	0	0.00	237	100.00
62	235	0	0.00	235	100.00
63	235	0	0.00	235	100.00
64	234	0	0.00	234	100.00
65	236	0	0.00	236	100.00
66	235	0	0.00	235	100.00
67	234	0	0.00	234	100.00
68	233	0	0.00	233	100.00
69	233	0	0.00	233	100.00
70	231	0	0.00	231	100.00
71	230	0	0.00	230	100.00
72	227	0	0.00	227	100.00
73	225	0	0.00	225	100.00
74	228	0	0.00	228	100.00
75	226	0	0.00	226	100.00

76	223	0	0.00	223	100.00
77	222	0	0.00	222	100.00
78	229	0	0.00	229	100.00
79	221	0	0.00	221	100.00
80	223	0	0.00	223	100.00
81	216	0	0.00	216	100.00
82	215	0	0.00	215	100.00
83	214	0	0.00	214	100.00
84	188	0	0.00	188	100.00
85	212	0	0.00	212	100.00
86	186	0	0.00	186	100.00
87	166	0	0.00	166	100.00
88	110	0	0.00	110	100.00
89	102	0	0.00	102	100.00
90	87	0	0.00	87	100.00
91	35	0	0.00	35	100.00
92	1	0	0.00	1	100.00
93	1	0	0.00	1	100.00
94	13	0	0.00	13	100.00

THALES

Quality Control Report for file : C:\P2658\CARIS\Fieldsheets\Site_17\A17-QC006\a17-qc006

Elevation Range is : -128.111(m) -121.115(m)

Total number of 3D points used: 14278

Starting Time: 29-JUN-2003 00:00:01.82
Ending Time: 29-JUN-2003 00:00:01.82

Minimum tidal reduction: 1516 (mm)
Maximum tidal reduction: 1519 (mm)

User#	Total	Max(+)	Max(-)	Mean	Std.	3dm(%)	5dm(%)	1%(%)	1.6%(%)
14	5	0.000	-0.385	-0.201	0.1375	60.0	100.0	100.0	100.0
15	35	0.194	-0.481	-0.249	0.1520	62.9	100.0	100.0	100.0
16	32	0.054	-0.580	-0.335	0.1389	28.1	93.8	100.0	100.0
17	53	0.217	-0.563	-0.282	0.1844	37.7	94.3	100.0	100.0
18	63	0.404	-0.550	-0.217	0.2140	52.4	95.2	100.0	100.0
19	127	0.358	-0.573	-0.221	0.1889	62.2	98.4	100.0	100.0
20	130	0.215	-0.535	-0.227	0.1568	60.0	99.2	100.0	100.0
21	155	0.336	-0.562	-0.218	0.2068	53.5	98.1	100.0	100.0
22	146	0.394	-0.518	-0.233	0.1891	53.4	99.3	100.0	100.0
23	146	0.285	-0.569	-0.245	0.1677	56.2	95.2	100.0	100.0
24	151	0.158	-0.539	-0.264	0.1521	50.3	97.4	100.0	100.0
25	155	0.177	-0.662	-0.273	0.1602	54.8	96.8	100.0	100.0
26	190	0.389	-0.582	-0.254	0.1715	56.8	96.8	100.0	100.0
27	205	0.251	-0.623	-0.213	0.1774	62.9	98.0	100.0	100.0
28	217	0.280	-0.601	-0.234	0.1869	52.5	96.8	100.0	100.0
29	220	0.162	-0.524	-0.219	0.1635	63.6	97.3	100.0	100.0
30	226	0.245	-0.578	-0.227	0.1643	59.3	98.2	100.0	100.0
31	225	0.197	-0.492	-0.227	0.1300	68.9	100.0	100.0	100.0
32	226	0.161	-0.597	-0.232	0.1288	69.0	98.2	100.0	100.0
33	224	0.270	-0.487	-0.213	0.1354	70.5	100.0	100.0	100.0
34	225	0.206	-0.512	-0.225	0.1362	66.2	99.6	100.0	100.0
35	223	0.189	-0.512	-0.225	0.1454	63.2	99.6	100.0	100.0
36	222	0.146	-0.524	-0.226	0.1427	62.6	99.5	100.0	100.0
37	224	0.226	-0.512	-0.231	0.1566	62.5	99.1	100.0	100.0
38	224	0.328	-0.579	-0.236	0.1659	56.2	98.2	100.0	100.0
39	223	0.218	-0.664	-0.209	0.1691	65.9	98.2	100.0	100.0
40	219	0.334	-0.624	-0.230	0.1911	56.6	96.3	100.0	100.0
41	220	0.410	-0.655	-0.206	0.2069	59.1	96.8	100.0	100.0
42	220	0.419	-0.593	-0.204	0.1989	60.9	95.9	100.0	100.0
43	223	0.499	-0.659	-0.197	0.2265	60.5	93.7	100.0	100.0
44	220	0.352	-0.603	-0.202	0.2109	58.6	96.8	100.0	100.0
45	223	0.508	-0.590	-0.182	0.2257	61.4	96.4	100.0	100.0
46	223	0.239	-0.579	-0.215	0.1849	60.5	97.8	100.0	100.0
47	217	0.322	-0.573	-0.219	0.1590	61.8	98.6	100.0	100.0
48	196	0.302	-0.574	-0.220	0.1668	66.8	99.0	100.0	100.0
49	166	0.309	-0.554	-0.217	0.1754	60.2	98.2	100.0	100.0
50	132	0.381	-0.604	-0.225	0.1962	53.8	96.2	100.0	100.0
51	172	0.380	-0.659	-0.172	0.1828	71.5	98.8	100.0	100.0
52	191	0.367	-0.532	-0.170	0.2061	70.2	98.4	100.0	100.0
53	206	0.387	-0.658	-0.190	0.2061	65.0	96.6	100.0	100.0
54	216	0.290	-0.607	-0.212	0.2011	59.3	96.3	100.0	100.0
55	217	0.375	-0.633	-0.224	0.2013	59.9	94.5	100.0	100.0
56	225	0.199	-0.584	-0.223	0.1779	59.6	97.8	100.0	100.0
57	224	0.364	-0.610	-0.203	0.1904	64.3	96.4	100.0	100.0
58	224	0.265	-0.624	-0.211	0.2032	62.1	94.2	100.0	100.0
59	221	0.235	-0.620	-0.226	0.1741	62.0	97.3	100.0	100.0
60	224	0.316	-0.599	-0.244	0.1736	58.5	94.2	100.0	100.0
61	217	0.321	-0.585	-0.213	0.1812	61.3	96.8	100.0	100.0
62	224	0.282	-0.632	-0.230	0.1837	56.2	95.5	100.0	100.0
63	224	0.237	-0.610	-0.227	0.1752	60.3	96.9	100.0	100.0
64	221	0.171	-0.603	-0.245	0.1816	48.0	97.7	100.0	100.0
65	226	0.263	-0.587	-0.262	0.1702	49.6	96.5	100.0	100.0
66	222	0.199	-0.574	-0.285	0.1679	41.9	95.5	100.0	100.0
67	223	0.338	-0.615	-0.302	0.1576	40.4	92.8	100.0	100.0
68	227	0.119	-0.628	-0.322	0.1412	35.7	93.8	100.0	100.0
69	226	0.256	-0.694	-0.312	0.1488	40.3	92.0	100.0	100.0
70	228	0.235	-0.636	-0.338	0.1460	35.1	87.7	100.0	100.0

71	227	0.113	-0.612	-0.320	0.1426	43.2	90.7	100.0	100.0
72	226	0.066	-0.633	-0.342	0.1478	32.7	85.4	100.0	100.0
73	227	0.196	-0.679	-0.339	0.1537	33.0	86.8	100.0	100.0
74	225	0.269	-0.640	-0.330	0.1763	36.4	84.9	100.0	100.0
75	224	0.338	-0.670	-0.322	0.1785	39.7	87.5	100.0	100.0
76	217	0.228	-0.701	-0.358	0.1671	35.5	81.1	100.0	100.0
77	216	0.230	-0.874	-0.367	0.1711	33.3	77.8	100.0	100.0
78	218	0.055	-0.708	-0.360	0.1638	30.7	78.4	100.0	100.0
79	219	0.097	-0.718	-0.411	0.1524	20.5	68.5	100.0	100.0
80	223	0.009	-0.848	-0.426	0.1436	16.6	70.9	100.0	100.0
81	214	0.244	-0.747	-0.419	0.1576	27.6	63.6	100.0	100.0
82	212	0.000	-0.815	-0.459	0.1629	18.9	51.4	100.0	100.0
83	178	0.010	-0.828	-0.470	0.1777	20.2	50.6	100.0	100.0
84	122	0.040	-0.765	-0.474	0.1923	20.5	45.9	100.0	100.0
85	106	0.161	-0.755	-0.484	0.2070	21.7	41.5	100.0	100.0
86	72	0.000	-0.801	-0.497	0.2044	22.2	43.1	100.0	100.0
87	60	0.000	-0.781	-0.567	0.1675	10.0	23.3	100.0	100.0
88	54	0.000	-0.793	-0.582	0.1784	13.0	24.1	100.0	100.0
89	62	0.000	-0.863	-0.554	0.1582	9.7	32.3	100.0	100.0
90	47	0.000	-0.725	-0.586	0.0957	0.0	21.3	100.0	100.0
91	39	0.066	-0.729	-0.536	0.1493	5.1	38.5	100.0	100.0
92	1	0.000	-0.335	-0.335	0.0000	0.0	100.0	100.0	100.0

THALES

Classification report 1 of 2

IHO statistics a/b are : 0.500 0.013

User#	Total	# fail	% fail	# pass	% pass
14	5	0	0.00	5	100.00
15	35	0	0.00	35	100.00
16	32	0	0.00	32	100.00
17	53	0	0.00	53	100.00
18	63	0	0.00	63	100.00
19	127	0	0.00	127	100.00
20	130	0	0.00	130	100.00
21	155	0	0.00	155	100.00
22	146	0	0.00	146	100.00
23	146	0	0.00	146	100.00
24	151	0	0.00	151	100.00
25	155	0	0.00	155	100.00
26	190	0	0.00	190	100.00
27	205	0	0.00	205	100.00
28	217	0	0.00	217	100.00
29	220	0	0.00	220	100.00
30	226	0	0.00	226	100.00
31	225	0	0.00	225	100.00
32	226	0	0.00	226	100.00
33	224	0	0.00	224	100.00
34	225	0	0.00	225	100.00
35	223	0	0.00	223	100.00
36	222	0	0.00	222	100.00
37	224	0	0.00	224	100.00
38	224	0	0.00	224	100.00
39	223	0	0.00	223	100.00
40	219	0	0.00	219	100.00
41	220	0	0.00	220	100.00
42	220	0	0.00	220	100.00
43	223	0	0.00	223	100.00
44	220	0	0.00	220	100.00
45	223	0	0.00	223	100.00
46	223	0	0.00	223	100.00
47	217	0	0.00	217	100.00
48	196	0	0.00	196	100.00
49	166	0	0.00	166	100.00
50	132	0	0.00	132	100.00
51	172	0	0.00	172	100.00
52	191	0	0.00	191	100.00
53	206	0	0.00	206	100.00
54	216	0	0.00	216	100.00
55	217	0	0.00	217	100.00
56	225	0	0.00	225	100.00
57	224	0	0.00	224	100.00
58	224	0	0.00	224	100.00
59	221	0	0.00	221	100.00
60	224	0	0.00	224	100.00
61	217	0	0.00	217	100.00
62	224	0	0.00	224	100.00
63	224	0	0.00	224	100.00
64	221	0	0.00	221	100.00
65	226	0	0.00	226	100.00
66	222	0	0.00	222	100.00
67	223	0	0.00	223	100.00
68	227	0	0.00	227	100.00
69	226	0	0.00	226	100.00
70	228	0	0.00	228	100.00
71	227	0	0.00	227	100.00
72	226	0	0.00	226	100.00
73	227	0	0.00	227	100.00
74	225	0	0.00	225	100.00
75	224	0	0.00	224	100.00
76	217	0	0.00	217	100.00
77	216	0	0.00	216	100.00
78	218	0	0.00	218	100.00

79	219	0	0.00	219	100.00
80	223	0	0.00	223	100.00
81	214	0	0.00	214	100.00
82	212	0	0.00	212	100.00
83	178	0	0.00	178	100.00
84	122	0	0.00	122	100.00
85	106	0	0.00	106	100.00
86	72	0	0.00	72	100.00
87	60	0	0.00	60	100.00
88	54	0	0.00	54	100.00
89	62	0	0.00	62	100.00
90	47	0	0.00	47	100.00
91	39	0	0.00	39	100.00
92	1	0	0.00	1	100.00

THALES

Classification report 2 of 2

IHO statistics a/b are : 0.707 0.018

User#	Total	# fail	% fail	# pass	% pass
14	5	0	0.00	5	100.00
15	35	0	0.00	35	100.00
16	32	0	0.00	32	100.00
17	53	0	0.00	53	100.00
18	63	0	0.00	63	100.00
19	127	0	0.00	127	100.00
20	130	0	0.00	130	100.00
21	155	0	0.00	155	100.00
22	146	0	0.00	146	100.00
23	146	0	0.00	146	100.00
24	151	0	0.00	151	100.00
25	155	0	0.00	155	100.00
26	190	0	0.00	190	100.00
27	205	0	0.00	205	100.00
28	217	0	0.00	217	100.00
29	220	0	0.00	220	100.00
30	226	0	0.00	226	100.00
31	225	0	0.00	225	100.00
32	226	0	0.00	226	100.00
33	224	0	0.00	224	100.00
34	225	0	0.00	225	100.00
35	223	0	0.00	223	100.00
36	222	0	0.00	222	100.00
37	224	0	0.00	224	100.00
38	224	0	0.00	224	100.00
39	223	0	0.00	223	100.00
40	219	0	0.00	219	100.00
41	220	0	0.00	220	100.00
42	220	0	0.00	220	100.00
43	223	0	0.00	223	100.00
44	220	0	0.00	220	100.00
45	223	0	0.00	223	100.00
46	223	0	0.00	223	100.00
47	217	0	0.00	217	100.00
48	196	0	0.00	196	100.00
49	166	0	0.00	166	100.00
50	132	0	0.00	132	100.00
51	172	0	0.00	172	100.00
52	191	0	0.00	191	100.00
53	206	0	0.00	206	100.00
54	216	0	0.00	216	100.00
55	217	0	0.00	217	100.00
56	225	0	0.00	225	100.00
57	224	0	0.00	224	100.00
58	224	0	0.00	224	100.00
59	221	0	0.00	221	100.00
60	224	0	0.00	224	100.00
61	217	0	0.00	217	100.00
62	224	0	0.00	224	100.00
63	224	0	0.00	224	100.00
64	221	0	0.00	221	100.00
65	226	0	0.00	226	100.00
66	222	0	0.00	222	100.00
67	223	0	0.00	223	100.00
68	227	0	0.00	227	100.00
69	226	0	0.00	226	100.00
70	228	0	0.00	228	100.00
71	227	0	0.00	227	100.00
72	226	0	0.00	226	100.00
73	227	0	0.00	227	100.00
74	225	0	0.00	225	100.00
75	224	0	0.00	224	100.00
76	217	0	0.00	217	100.00
77	216	0	0.00	216	100.00
78	218	0	0.00	218	100.00

79	219	0	0.00	219	100.00
80	223	0	0.00	223	100.00
81	214	0	0.00	214	100.00
82	212	0	0.00	212	100.00
83	178	0	0.00	178	100.00
84	122	0	0.00	122	100.00
85	106	0	0.00	106	100.00
86	72	0	0.00	72	100.00
87	60	0	0.00	60	100.00
88	54	0	0.00	54	100.00
89	62	0	0.00	62	100.00
90	47	0	0.00	47	100.00
91	39	0	0.00	39	100.00
92	1	0	0.00	1	100.00

THALES

Quality Control Report for file : C:\P2658\CARIS\Fieldsheets\Site_17\A17-QC007\a17-qc007

Elevation Range is : -137.253(m) -130.242(m)

Total number of 3D points used: 15885

Starting Time: 29-JUN-2003 00:00:01.82
Ending Time: 29-JUN-2003 00:00:01.82

Minimum tidal reduction: 1460 (mm)
Maximum tidal reduction: 1460 (mm)

User#	Total	Max(+)	Max(-)	Mean	Std.	3dm(%)	5dm(%)	1%(%)	1.6%(%)
15	1	0.000	-0.470	-0.470	0.0000	0.0	100.0	100.0	100.0
16	27	0.000	-0.729	-0.513	0.1431	11.1	44.4	100.0	100.0
17	142	0.000	-0.867	-0.548	0.1690	9.2	35.9	100.0	100.0
18	183	0.125	-0.917	-0.511	0.1985	16.9	42.6	100.0	100.0
19	209	0.078	-0.956	-0.474	0.1945	21.5	49.8	100.0	100.0
20	214	0.056	-0.918	-0.442	0.2066	29.4	55.1	100.0	100.0
21	221	0.135	-0.895	-0.424	0.2130	28.1	62.4	100.0	100.0
22	219	0.164	-0.915	-0.421	0.2193	32.0	56.6	100.0	100.0
23	221	0.099	-0.921	-0.441	0.2209	27.1	55.2	100.0	100.0
24	209	0.142	-0.960	-0.425	0.2324	25.8	60.3	100.0	100.0
25	221	0.285	-0.908	-0.401	0.2162	26.7	66.5	100.0	100.0
26	235	0.139	-0.821	-0.392	0.1984	29.8	66.0	100.0	100.0
27	233	0.241	-0.811	-0.387	0.1916	27.5	70.0	100.0	100.0
28	233	0.202	-0.798	-0.366	0.1931	32.6	71.2	100.0	100.0
29	237	0.279	-0.614	-0.332	0.1856	35.0	82.3	100.0	100.0
30	238	0.257	-0.654	-0.288	0.1824	44.5	92.9	100.0	100.0
31	238	0.312	-0.653	-0.298	0.2070	38.7	89.1	100.0	100.0
32	237	0.404	-0.628	-0.284	0.1977	44.3	89.0	100.0	100.0
33	238	0.237	-0.665	-0.261	0.1727	49.6	94.5	100.0	100.0
34	238	0.223	-0.642	-0.269	0.1907	50.4	92.0	100.0	100.0
35	238	0.204	-0.574	-0.257	0.1932	47.5	94.5	100.0	100.0
36	238	0.109	-0.660	-0.283	0.1839	42.0	91.2	100.0	100.0
37	236	0.185	-0.656	-0.284	0.1641	46.2	94.1	100.0	100.0
38	237	0.285	-0.596	-0.278	0.1605	53.2	93.7	100.0	100.0
39	238	0.069	-0.690	-0.273	0.1533	55.0	95.0	100.0	100.0
40	234	0.165	-0.643	-0.276	0.1619	49.1	93.6	100.0	100.0
41	236	0.262	-0.680	-0.264	0.1870	53.8	92.4	100.0	100.0
42	235	0.323	-0.681	-0.265	0.2153	48.5	88.1	100.0	100.0
43	233	0.273	-0.695	-0.291	0.2143	47.2	81.5	100.0	100.0
44	235	0.349	-0.742	-0.263	0.2092	47.7	90.2	100.0	100.0
45	237	0.408	-0.602	-0.249	0.1814	56.1	94.9	100.0	100.0
46	237	0.288	-0.627	-0.252	0.1736	54.0	94.9	100.0	100.0
47	235	0.207	-0.649	-0.257	0.1860	50.6	93.2	100.0	100.0
48	221	0.293	-0.625	-0.246	0.1980	51.6	93.7	100.0	100.0
49	190	0.224	-0.674	-0.255	0.1983	48.9	93.2	100.0	100.0
50	158	0.140	-0.668	-0.249	0.1788	57.0	94.3	100.0	100.0
51	159	0.153	-0.638	-0.218	0.1725	66.0	97.5	100.0	100.0
52	210	0.228	-0.670	-0.205	0.1766	65.2	97.6	100.0	100.0
53	228	0.249	-0.698	-0.205	0.1808	66.2	96.5	100.0	100.0
54	230	0.326	-0.641	-0.234	0.1991	53.0	94.3	100.0	100.0
55	233	0.327	-0.681	-0.259	0.1892	52.4	93.1	100.0	100.0
56	235	0.335	-0.687	-0.275	0.1798	50.6	91.5	100.0	100.0
57	236	0.254	-0.692	-0.245	0.1870	55.1	94.5	100.0	100.0
58	235	0.337	-0.665	-0.270	0.1896	48.5	93.2	100.0	100.0
59	234	0.285	-0.719	-0.293	0.1987	43.2	88.9	100.0	100.0
60	238	0.448	-0.666	-0.301	0.1886	39.9	89.1	100.0	100.0
61	236	0.370	-0.697	-0.288	0.1779	44.1	91.5	100.0	100.0
62	235	0.441	-0.606	-0.301	0.1733	41.3	90.6	100.0	100.0
63	236	0.221	-0.702	-0.267	0.1907	46.2	94.1	100.0	100.0
64	238	0.267	-0.613	-0.261	0.1999	48.7	92.9	100.0	100.0
65	237	0.272	-0.642	-0.306	0.1913	45.6	84.8	100.0	100.0
66	236	0.133	-0.685	-0.332	0.2049	36.4	74.2	100.0	100.0
67	236	0.124	-0.656	-0.349	0.1732	33.9	80.1	100.0	100.0
68	235	0.148	-0.672	-0.356	0.1638	39.6	77.0	100.0	100.0
69	236	0.066	-0.694	-0.358	0.1532	35.2	78.0	100.0	100.0
70	236	0.058	-0.687	-0.386	0.1639	28.0	70.8	100.0	100.0
71	236	0.190	-0.689	-0.365	0.1789	30.1	75.8	100.0	100.0
72	236	0.121	-0.700	-0.377	0.1738	27.5	72.5	100.0	100.0

73	235	0.118	-0.708	-0.369	0.1960	27.7	70.6	100.0	100.0
74	235	0.133	-0.820	-0.360	0.1909	32.3	73.2	100.0	100.0
75	233	0.233	-0.748	-0.339	0.2077	34.8	75.5	100.0	100.0
76	219	0.285	-0.760	-0.392	0.2077	30.1	63.0	100.0	100.0
77	225	0.223	-0.760	-0.368	0.1955	32.9	72.9	100.0	100.0
78	228	0.285	-0.766	-0.380	0.2126	32.9	66.7	100.0	100.0
79	234	0.321	-0.817	-0.394	0.2237	28.2	60.3	100.0	100.0
80	225	0.301	-0.808	-0.406	0.2270	25.8	59.6	100.0	100.0
81	230	0.156	-0.819	-0.410	0.2505	32.2	56.1	100.0	100.0
82	230	0.151	-0.869	-0.472	0.2279	23.0	43.5	100.0	100.0
83	209	0.036	-0.906	-0.495	0.2074	21.5	45.0	100.0	100.0
84	152	0.072	-0.934	-0.484	0.2322	25.7	46.1	100.0	100.0
85	147	0.028	-0.848	-0.500	0.2354	20.4	37.4	100.0	100.0
86	96	0.000	-0.854	-0.513	0.2238	21.9	34.4	100.0	100.0
87	70	0.000	-0.829	-0.465	0.2239	28.6	41.4	100.0	100.0
88	36	0.000	-0.814	-0.505	0.1881	19.4	41.7	100.0	100.0
89	41	0.000	-0.798	-0.487	0.1813	17.1	53.7	100.0	100.0
90	44	0.049	-0.796	-0.478	0.2062	27.3	47.7	100.0	100.0
91	31	0.033	-0.809	-0.458	0.2405	25.8	51.6	100.0	100.0
92	11	0.138	-0.734	-0.421	0.2538	27.3	54.5	100.0	100.0
93	13	0.000	-0.703	-0.512	0.1060	7.7	38.5	100.0	100.0
94	33	0.000	-0.646	-0.368	0.1634	33.3	75.8	100.0	100.0
95	5	0.000	-0.475	-0.336	0.1194	40.0	100.0	100.0	100.0

THALES

Classification report 1 of 2

IHO statistics a/b are : 0.500 0.013

User#	Total	# fail	% fail	# pass	% pass
15	1	0	0.00	1	100.00
16	27	0	0.00	27	100.00
17	142	0	0.00	142	100.00
18	183	0	0.00	183	100.00
19	209	0	0.00	209	100.00
20	214	0	0.00	214	100.00
21	221	0	0.00	221	100.00
22	219	0	0.00	219	100.00
23	221	0	0.00	221	100.00
24	209	0	0.00	209	100.00
25	221	0	0.00	221	100.00
26	235	0	0.00	235	100.00
27	233	0	0.00	233	100.00
28	233	0	0.00	233	100.00
29	237	0	0.00	237	100.00
30	238	0	0.00	238	100.00
31	238	0	0.00	238	100.00
32	237	0	0.00	237	100.00
33	238	0	0.00	238	100.00
34	238	0	0.00	238	100.00
35	238	0	0.00	238	100.00
36	238	0	0.00	238	100.00
37	236	0	0.00	236	100.00
38	237	0	0.00	237	100.00
39	238	0	0.00	238	100.00
40	234	0	0.00	234	100.00
41	236	0	0.00	236	100.00
42	235	0	0.00	235	100.00
43	233	0	0.00	233	100.00
44	235	0	0.00	235	100.00
45	237	0	0.00	237	100.00
46	237	0	0.00	237	100.00
47	235	0	0.00	235	100.00
48	221	0	0.00	221	100.00
49	190	0	0.00	190	100.00
50	158	0	0.00	158	100.00
51	159	0	0.00	159	100.00
52	210	0	0.00	210	100.00
53	228	0	0.00	228	100.00
54	230	0	0.00	230	100.00
55	233	0	0.00	233	100.00
56	235	0	0.00	235	100.00
57	236	0	0.00	236	100.00
58	235	0	0.00	235	100.00
59	234	0	0.00	234	100.00
60	238	0	0.00	238	100.00
61	236	0	0.00	236	100.00
62	235	0	0.00	235	100.00
63	236	0	0.00	236	100.00
64	238	0	0.00	238	100.00
65	237	0	0.00	237	100.00
66	236	0	0.00	236	100.00
67	236	0	0.00	236	100.00
68	235	0	0.00	235	100.00
69	236	0	0.00	236	100.00
70	236	0	0.00	236	100.00
71	236	0	0.00	236	100.00
72	236	0	0.00	236	100.00
73	235	0	0.00	235	100.00
74	235	0	0.00	235	100.00
75	233	0	0.00	233	100.00
76	219	0	0.00	219	100.00
77	225	0	0.00	225	100.00
78	228	0	0.00	228	100.00
79	234	0	0.00	234	100.00

80	225	0	0.00	225	100.00
81	230	0	0.00	230	100.00
82	230	0	0.00	230	100.00
83	209	0	0.00	209	100.00
84	152	0	0.00	152	100.00
85	147	0	0.00	147	100.00
86	96	0	0.00	96	100.00
87	70	0	0.00	70	100.00
88	36	0	0.00	36	100.00
89	41	0	0.00	41	100.00
90	44	0	0.00	44	100.00
91	31	0	0.00	31	100.00
92	11	0	0.00	11	100.00
93	13	0	0.00	13	100.00
94	33	0	0.00	33	100.00
95	5	0	0.00	5	100.00

Classification report 2 of 2

IHO statistics a/b are : 0.707 0.018

User#	Total	# fail	% fail	# pass	% pass
15	1	0	0.00	1	100.00
16	27	0	0.00	27	100.00
17	142	0	0.00	142	100.00
18	183	0	0.00	183	100.00
19	209	0	0.00	209	100.00
20	214	0	0.00	214	100.00
21	221	0	0.00	221	100.00
22	219	0	0.00	219	100.00
23	221	0	0.00	221	100.00
24	209	0	0.00	209	100.00
25	221	0	0.00	221	100.00
26	235	0	0.00	235	100.00
27	233	0	0.00	233	100.00
28	233	0	0.00	233	100.00
29	237	0	0.00	237	100.00
30	238	0	0.00	238	100.00
31	238	0	0.00	238	100.00
32	237	0	0.00	237	100.00
33	238	0	0.00	238	100.00
34	238	0	0.00	238	100.00
35	238	0	0.00	238	100.00
36	238	0	0.00	238	100.00
37	236	0	0.00	236	100.00
38	237	0	0.00	237	100.00
39	238	0	0.00	238	100.00
40	234	0	0.00	234	100.00
41	236	0	0.00	236	100.00
42	235	0	0.00	235	100.00
43	233	0	0.00	233	100.00
44	235	0	0.00	235	100.00
45	237	0	0.00	237	100.00
46	237	0	0.00	237	100.00
47	235	0	0.00	235	100.00
48	221	0	0.00	221	100.00
49	190	0	0.00	190	100.00
50	158	0	0.00	158	100.00
51	159	0	0.00	159	100.00
52	210	0	0.00	210	100.00
53	228	0	0.00	228	100.00
54	230	0	0.00	230	100.00
55	233	0	0.00	233	100.00
56	235	0	0.00	235	100.00
57	236	0	0.00	236	100.00
58	235	0	0.00	235	100.00
59	234	0	0.00	234	100.00
60	238	0	0.00	238	100.00
61	236	0	0.00	236	100.00
62	235	0	0.00	235	100.00
63	236	0	0.00	236	100.00
64	238	0	0.00	238	100.00
65	237	0	0.00	237	100.00
66	236	0	0.00	236	100.00
67	236	0	0.00	236	100.00
68	235	0	0.00	235	100.00
69	236	0	0.00	236	100.00
70	236	0	0.00	236	100.00
71	236	0	0.00	236	100.00
72	236	0	0.00	236	100.00
73	235	0	0.00	235	100.00
74	235	0	0.00	235	100.00
75	233	0	0.00	233	100.00
76	219	0	0.00	219	100.00
77	225	0	0.00	225	100.00
78	228	0	0.00	228	100.00
79	234	0	0.00	234	100.00

80	225	0	0.00	225	100.00
81	230	0	0.00	230	100.00
82	230	0	0.00	230	100.00
83	209	0	0.00	209	100.00
84	152	0	0.00	152	100.00
85	147	0	0.00	147	100.00
86	96	0	0.00	96	100.00
87	70	0	0.00	70	100.00
88	36	0	0.00	36	100.00
89	41	0	0.00	41	100.00
90	44	0	0.00	44	100.00
91	31	0	0.00	31	100.00
92	11	0	0.00	11	100.00
93	13	0	0.00	13	100.00
94	33	0	0.00	33	100.00
95	5	0	0.00	5	100.00

THALES

Quality Control Report for file : C:\P2658\CARIS\Fieldsheets\Site_17\A17-QC008\a17-qc008

Elevation Range is : -145.904(m) -140.628(m)

Total number of 3D points used: 15871

Starting Time: 29-JUN-2003 00:00:01.82
Ending Time: 29-JUN-2003 00:00:01.82

Minimum tidal reduction: 1208 (mm)
Maximum tidal reduction: 1218 (mm)

User#	Total	Max(+)	Max(-)	Mean	Std.	3dm(%)	5dm(%)	1%(%)	1.6%(%)
16	2	0.000	-0.734	-0.603	0.1846	0.0	50.0	100.0	100.0
17	5	0.000	-0.753	-0.558	0.1149	0.0	40.0	100.0	100.0
18	9	0.000	-0.591	-0.452	0.1252	11.1	44.4	100.0	100.0
19	38	0.000	-0.838	-0.572	0.1017	0.0	21.1	100.0	100.0
20	46	0.127	-0.808	-0.518	0.1976	10.9	37.0	100.0	100.0
21	68	0.063	-0.850	-0.568	0.1755	5.9	29.4	100.0	100.0
22	67	0.000	-0.866	-0.591	0.1889	7.5	25.4	100.0	100.0
23	78	0.000	-0.896	-0.621	0.1508	3.8	20.5	100.0	100.0
24	95	0.000	-0.898	-0.603	0.1500	4.2	27.4	100.0	100.0
25	111	0.000	-0.969	-0.593	0.1686	5.4	24.3	100.0	100.0
26	140	0.000	-0.933	-0.597	0.1722	8.6	23.6	100.0	100.0
27	177	0.000	-0.847	-0.572	0.1340	4.5	27.1	100.0	100.0
28	200	0.000	-0.903	-0.585	0.1499	6.0	27.0	100.0	100.0
29	236	0.000	-0.934	-0.585	0.1429	3.8	25.8	100.0	100.0
30	265	0.000	-0.869	-0.576	0.1394	4.9	26.4	100.0	100.0
31	271	0.000	-0.897	-0.566	0.1386	3.3	29.2	100.0	100.0
32	285	0.000	-1.147	-0.569	0.1357	3.9	24.6	100.0	100.0
33	287	0.000	-0.921	-0.587	0.1281	3.8	19.5	100.0	100.0
34	291	0.000	-1.036	-0.594	0.1386	3.1	22.3	100.0	100.0
35	285	0.000	-1.077	-0.600	0.1312	2.5	18.6	100.0	100.0
36	291	0.000	-1.031	-0.589	0.1365	3.8	21.6	100.0	100.0
37	284	0.000	-0.906	-0.577	0.1353	4.6	25.7	100.0	100.0
38	285	0.000	-0.884	-0.587	0.1204	1.4	22.5	100.0	100.0
39	289	0.000	-0.900	-0.573	0.1376	4.2	24.2	100.0	100.0
40	285	0.000	-0.840	-0.575	0.1470	6.0	23.5	100.0	100.0
41	277	0.000	-0.915	-0.557	0.1515	5.4	33.2	100.0	100.0
42	281	0.111	-0.958	-0.527	0.1693	9.3	37.4	100.0	100.0
43	284	0.007	-0.892	-0.531	0.1834	11.6	36.6	100.0	100.0
44	278	0.045	-0.911	-0.522	0.1751	10.4	36.3	100.0	100.0
45	280	0.278	-0.873	-0.504	0.1699	10.0	43.6	100.0	100.0
46	283	0.000	-0.818	-0.515	0.1654	13.4	37.1	100.0	100.0
47	281	0.108	-0.920	-0.512	0.1823	15.3	39.5	100.0	100.0
48	243	0.169	-0.919	-0.530	0.1810	12.8	30.9	100.0	100.0
49	193	0.000	-1.033	-0.533	0.1746	13.5	33.7	100.0	100.0
50	141	0.000	-0.997	-0.489	0.2052	20.6	45.4	100.0	100.0
51	175	0.052	-0.906	-0.467	0.1941	17.7	47.4	100.0	100.0
52	217	0.277	-0.742	-0.456	0.1675	16.1	52.1	100.0	100.0
53	249	0.311	-0.929	-0.473	0.2045	16.5	43.8	100.0	100.0
54	260	0.185	-0.942	-0.494	0.2234	17.7	44.6	100.0	100.0
55	273	0.122	-0.923	-0.518	0.1895	12.8	37.0	100.0	100.0
56	280	0.241	-0.816	-0.495	0.1873	14.6	40.0	100.0	100.0
57	277	0.294	-0.844	-0.489	0.1980	17.0	42.6	100.0	100.0
58	281	0.349	-0.903	-0.524	0.1889	13.2	38.8	100.0	100.0
59	281	0.000	-1.048	-0.535	0.1849	12.8	35.9	100.0	100.0
60	283	0.061	-0.955	-0.537	0.1998	13.4	39.2	100.0	100.0
61	284	0.046	-0.948	-0.551	0.1976	12.7	35.2	100.0	100.0
62	287	0.145	-1.065	-0.556	0.2206	15.3	35.2	100.0	100.0
63	293	0.048	-0.917	-0.534	0.2144	18.8	36.2	100.0	100.0
64	299	0.051	-0.846	-0.541	0.1972	14.0	33.1	100.0	100.0
65	299	0.001	-0.929	-0.552	0.1997	12.0	36.5	100.0	100.0
66	299	0.024	-0.972	-0.565	0.1904	10.4	33.8	100.0	100.0
67	298	0.006	-0.954	-0.588	0.1957	8.7	29.2	100.0	100.0
68	300	0.187	-0.898	-0.582	0.2113	12.0	27.3	100.0	100.0
69	300	0.158	-0.939	-0.592	0.1988	9.0	27.0	100.0	100.0
70	297	0.090	-0.970	-0.625	0.2057	9.8	23.9	100.0	100.0
71	296	0.155	-0.921	-0.607	0.2199	13.2	28.0	100.0	100.0
72	295	0.061	-1.000	-0.635	0.2131	10.2	26.8	100.0	100.0

73	292	0.000	-0.986	-0.641	0.2034	10.6	23.3	100.0	100.0
74	293	0.001	-1.034	-0.644	0.2092	9.6	22.2	100.0	100.0
75	289	0.200	-0.996	-0.617	0.2191	11.8	26.3	100.0	100.0
76	282	0.221	-1.179	-0.629	0.1962	7.4	23.8	100.0	100.0
77	277	0.000	-1.011	-0.645	0.2054	8.3	25.3	100.0	100.0
78	276	0.000	-1.046	-0.682	0.1923	3.6	22.1	100.0	100.0
79	264	0.000	-1.074	-0.710	0.1963	3.8	18.6	100.0	100.0
80	245	0.000	-1.068	-0.719	0.2094	2.4	20.0	100.0	100.0
81	217	0.049	-1.126	-0.710	0.2200	4.6	19.8	100.0	100.0
82	152	0.000	-1.144	-0.747	0.2371	3.9	18.4	100.0	100.0
83	92	0.000	-1.059	-0.767	0.2029	1.1	14.1	100.0	100.0
84	42	0.000	-1.119	-0.785	0.2367	2.4	16.7	100.0	100.0
85	39	0.000	-1.070	-0.791	0.1755	0.0	5.1	100.0	100.0
86	19	0.000	-1.067	-0.858	0.1341	0.0	0.0	100.0	100.0
87	12	0.000	-1.013	-0.931	0.0828	0.0	0.0	100.0	100.0
88	3	0.000	-0.863	-0.802	0.0690	0.0	0.0	100.0	100.0
89	6	0.000	-1.005	-0.895	0.0956	0.0	0.0	100.0	100.0
90	9	0.000	-1.029	-0.763	0.1165	0.0	0.0	100.0	100.0
91	5	0.000	-1.059	-0.847	0.1687	0.0	0.0	100.0	100.0
92	1	0.000	-0.709	-0.709	0.0000	0.0	0.0	100.0	100.0
93	1	0.000	-0.901	-0.901	0.0000	0.0	0.0	100.0	100.0
94	1	0.000	-0.507	-0.507	0.0000	0.0	0.0	100.0	100.0

THALES

Classification report 1 of 2

IHO statistics a/b are : 0.500 0.013

User#	Total	# fail	% fail	# pass	% pass
16	2	0	0.00	2	100.00
17	5	0	0.00	5	100.00
18	9	0	0.00	9	100.00
19	38	0	0.00	38	100.00
20	46	0	0.00	46	100.00
21	68	0	0.00	68	100.00
22	67	0	0.00	67	100.00
23	78	0	0.00	78	100.00
24	95	0	0.00	95	100.00
25	111	0	0.00	111	100.00
26	140	0	0.00	140	100.00
27	177	0	0.00	177	100.00
28	200	0	0.00	200	100.00
29	236	0	0.00	236	100.00
30	265	0	0.00	265	100.00
31	271	0	0.00	271	100.00
32	285	0	0.00	285	100.00
33	287	0	0.00	287	100.00
34	291	0	0.00	291	100.00
35	285	0	0.00	285	100.00
36	291	0	0.00	291	100.00
37	284	0	0.00	284	100.00
38	285	0	0.00	285	100.00
39	289	0	0.00	289	100.00
40	285	0	0.00	285	100.00
41	277	0	0.00	277	100.00
42	281	0	0.00	281	100.00
43	284	0	0.00	284	100.00
44	278	0	0.00	278	100.00
45	280	0	0.00	280	100.00
46	283	0	0.00	283	100.00
47	281	0	0.00	281	100.00
48	243	0	0.00	243	100.00
49	193	0	0.00	193	100.00
50	141	0	0.00	141	100.00
51	175	0	0.00	175	100.00
52	217	0	0.00	217	100.00
53	249	0	0.00	249	100.00
54	260	0	0.00	260	100.00
55	273	0	0.00	273	100.00
56	280	0	0.00	280	100.00
57	277	0	0.00	277	100.00
58	281	0	0.00	281	100.00
59	281	0	0.00	281	100.00
60	283	0	0.00	283	100.00
61	284	0	0.00	284	100.00
62	287	0	0.00	287	100.00
63	293	0	0.00	293	100.00
64	299	0	0.00	299	100.00
65	299	0	0.00	299	100.00
66	299	0	0.00	299	100.00
67	298	0	0.00	298	100.00
68	300	0	0.00	300	100.00
69	300	0	0.00	300	100.00
70	297	0	0.00	297	100.00
71	296	0	0.00	296	100.00
72	295	0	0.00	295	100.00
73	292	0	0.00	292	100.00
74	293	0	0.00	293	100.00
75	289	0	0.00	289	100.00
76	282	0	0.00	282	100.00
77	277	0	0.00	277	100.00
78	276	0	0.00	276	100.00
79	264	0	0.00	264	100.00
80	245	0	0.00	245	100.00

81	217	0	0.00	217	100.00
82	152	0	0.00	152	100.00
83	92	0	0.00	92	100.00
84	42	0	0.00	42	100.00
85	39	0	0.00	39	100.00
86	19	0	0.00	19	100.00
87	12	0	0.00	12	100.00
88	3	0	0.00	3	100.00
89	6	0	0.00	6	100.00
90	9	0	0.00	9	100.00
91	5	0	0.00	5	100.00
92	1	0	0.00	1	100.00
93	1	0	0.00	1	100.00
94	1	0	0.00	1	100.00

THALES

Classification report 2 of 2

IHO statistics a/b are : 0.707 0.018

User#	Total	# fail	% fail	# pass	% pass
16	2	0	0.00	2	100.00
17	5	0	0.00	5	100.00
18	9	0	0.00	9	100.00
19	38	0	0.00	38	100.00
20	46	0	0.00	46	100.00
21	68	0	0.00	68	100.00
22	67	0	0.00	67	100.00
23	78	0	0.00	78	100.00
24	95	0	0.00	95	100.00
25	111	0	0.00	111	100.00
26	140	0	0.00	140	100.00
27	177	0	0.00	177	100.00
28	200	0	0.00	200	100.00
29	236	0	0.00	236	100.00
30	265	0	0.00	265	100.00
31	271	0	0.00	271	100.00
32	285	0	0.00	285	100.00
33	287	0	0.00	287	100.00
34	291	0	0.00	291	100.00
35	285	0	0.00	285	100.00
36	291	0	0.00	291	100.00
37	284	0	0.00	284	100.00
38	285	0	0.00	285	100.00
39	289	0	0.00	289	100.00
40	285	0	0.00	285	100.00
41	277	0	0.00	277	100.00
42	281	0	0.00	281	100.00
43	284	0	0.00	284	100.00
44	278	0	0.00	278	100.00
45	280	0	0.00	280	100.00
46	283	0	0.00	283	100.00
47	281	0	0.00	281	100.00
48	243	0	0.00	243	100.00
49	193	0	0.00	193	100.00
50	141	0	0.00	141	100.00
51	175	0	0.00	175	100.00
52	217	0	0.00	217	100.00
53	249	0	0.00	249	100.00
54	260	0	0.00	260	100.00
55	273	0	0.00	273	100.00
56	280	0	0.00	280	100.00
57	277	0	0.00	277	100.00
58	281	0	0.00	281	100.00
59	281	0	0.00	281	100.00
60	283	0	0.00	283	100.00
61	284	0	0.00	284	100.00
62	287	0	0.00	287	100.00
63	293	0	0.00	293	100.00
64	299	0	0.00	299	100.00
65	299	0	0.00	299	100.00
66	299	0	0.00	299	100.00
67	298	0	0.00	298	100.00
68	300	0	0.00	300	100.00
69	300	0	0.00	300	100.00
70	297	0	0.00	297	100.00
71	296	0	0.00	296	100.00
72	295	0	0.00	295	100.00
73	292	0	0.00	292	100.00
74	293	0	0.00	293	100.00
75	289	0	0.00	289	100.00
76	282	0	0.00	282	100.00
77	277	0	0.00	277	100.00
78	276	0	0.00	276	100.00
79	264	0	0.00	264	100.00
80	245	0	0.00	245	100.00

81	217	0	0.00	217	100.00
82	152	0	0.00	152	100.00
83	92	0	0.00	92	100.00
84	42	0	0.00	42	100.00
85	39	0	0.00	39	100.00
86	19	0	0.00	19	100.00
87	12	0	0.00	12	100.00
88	3	0	0.00	3	100.00
89	6	0	0.00	6	100.00
90	9	0	0.00	9	100.00
91	5	0	0.00	5	100.00
92	1	0	0.00	1	100.00
93	1	0	0.00	1	100.00
94	1	0	0.00	1	100.00

Registry No: W00122

State: Alaska

General Locality: Aleutian Islands

Sub Locality: Aleutian Islands

Dates of Survey: 6/13/03 - 7/02/03

OSD Supplier: Thales GeoSolutions (Pacific), Inc.

OSD Project No: TGP-2658-RPT-01-00

Reviewer: LT Jay Lomnicky **Review Date:** 4/19/07

I. DATA INVENTORY

A. Reports

Report Type	Format	Document Title	Date
Descriptive Report or equivalent	.pdf	Deep Sea Coral Distribution and Habitat in the Aleutian Archopelago	11/05/03
Data Acquisition and Processing Report or equivalent	.pdf	Deep Sea Coral Distribution and Habitat in the Aleutian Archopelago (included in above report)	11/05/03
Horizontal and Vertical Control Report or equivalent	.pdf	Deep Sea Coral Distribution and Habitat in the Aleutian Archopelago (included in above report)	11/05/03
System Certification Report or Equivalent	none	none submitted	
Other			

B. Data

Data Type	Format	Description (Raw, Processed)
Smooth Sheet Sounding Plots	none	
XYZ ASCII Files	.xyz	processed data of varying resolution (1)
Multibeam	none	
Side Scan Sonar	none	
LIDAR	none	
Single Beam	none	no(5)

Data Type	Format	Description (Raw, Processed)
Detached Position Point Feature	none	
Kinematic / Static GPS	none	Differentially corrected GPS positioning applied to data, but raw data not submitted
Sound Velocity	none	sound speed corrector applied, but data not submitted
Water Levels		NOAA preliminary tides applied, but data not subnmitted
AWOIS	none	
DtoN	none	
Shoreline	none	
Bottom Sample	none	

yes All data open correctly and without error (MBES lines, SSS lines, VBES, Crosslines, Fieldsheets, Smooth Sheets, Sessions, DTM's, BASE grids, Mosaics, and DP's).

C. Sensors

List all sensor(s) that were used to acquire data.

Sensor	Manufacturer	System	Model	Vessel / Platform
MBES	Reson	SeaBat	8111	R/V DAVIDSON
MBES	Reson	SeaBat	8150	R/V DAVIDSON
Position	Applanix	POS/MV	POS/MV 320	R/V DAVIDSON
Sound speed	SBE		SBE 19 SEACAT	R/V DAVIDSON
Sound speed	AML	SV&P	Smart Sensor	R/V DAVIDSON
Sound speed	Sippican		XBT & XSV	R/V DAVIDSON
		8111		

yes Are all sensors listed above capable of meeting NOAA HSSDM accuracy and object detection requirements? Provide information in the comments section.

II. DATA ACQUISITION AND PROCESSING

A. System Calibrations and/or Certifications

yes A sensor offset and alignment survey was conducted to NOAA HSSDM requirements

yes Offset values provided

yes Patch tests were conducted for shallow-water multibeam systems

yes Alignment bias and latency values provided

yes Draft measurements were conducted

✔ Static Draft ___ Dynamic Draft ___ Loading

no Draft values were provided

unknown Sensors were calibrated in accordance with manufacturer requirements and NOAA specifications

no Calibration reports were provided.

B. Sound Velocity Corrections

yes Sound velocity sampling regimen is in accordance with NOAA HSSDM requirements

no Sound velocity profiles were supplied

n/a All profiles appear valid

C. Water Levels

yes Water level measuring equipment and methods are consistent with NOAA equipment and methods and are capable of meeting specifications

Equipment / method used: NOAA Tide Gauge 9461380, Adak, AK

no Tide corrector files were supplied

n/a All tide correctors appear valid

yes(2) Water level correctors applied to sounding data

___ Verified ✔ Observed ___ Predicted ___ NOAA Zoning ✔ Other zoning

no Water level error estimate provided by CO-OPS

Water level / zoning error estimate: _____

E. Survey Methodology

yes The surveyor has conducted adequate quality control of horizontal positioning data

yes DTM, BASE surface, and/or mosaics indicate that seafloor coverage requirements (per NOAA HSSDM) were met and no significant coverage holidays exist.

no(3) All least depths over shoals, wrecks, rocks, obstructions, and other features have been determined

no(4) The Hydrographer has conducted the required quantity of cross lines, or acquired sufficient redundant data, in accordance with the HSSDM, to assess internal data consistency.

F. Data Processing and Quality Control

yes An adequate description of data processing and quality control methods is provided in documentation.

Processing software used: Caris HIPS and SIPS

yes Data processing methodology is robust enough and adequate to provide a dataset suitable for charting.

yes Data have been reviewed and are cleaned appropriately with no noise, fliers, or systematic errors noted.

no Crossline agreement or redundant data overlap has been visually inspected by the hydrographer

n/a Disagreements have been noted

yes A Chart comparison was conducted by the hydrographer

yes Disagreements have been noted.

III. DATA QUALITY AND RESULTS

A. Internal Data Consistency

no — Full resolution data was provided in order to gauge the adequacy of cleaning and/or processing of the data.

no(5) — A review of the data reveals no positioning errors exceeding NOAA specifications

no(5) — Crossline agreement or redundant data overlap shows no disagreements exceeding NOAA HSSDM tolerances.

no — **A**nomalous data (fliers, noise, etc) were apparent in the BASE surface, DTM, and/or selected sounding set.

no(5) — Are there any tide errors exceeding NOAA HSSDM requirements observable in the data

no — Are there any observable SV errors exceeding NOAA HSSDM accuracy standards.

yes — All shoals are valid (no fliers) and the proper least depth has been retained.

no(5) — Where multiple systems, platforms, and/or sensors were used, junctioning or overlapping data agree within NOAA HSSDM tolerance between platforms.

yes — Any statistical assessment of the data (e.g. BASE standard deviation, QC reports, etc) indicate that data agree within NOAA HSSDM tolerances.

B. Error Budget Analysis

no — An error budget analysis was provided by the surveyor

n/a — The error budget analysis indicates that data are capable of meeting NOAA HSSDM standards

n/a — The evaluator concurs with the provided error budget analysis

no — The evaluator has conducted an error budget analysis

n/a — The error budget analysis indicates that data are capable of meeting NOAA HSSDM standards

D. Automated Wreck and Obstruction Information System (AWOIS) Items

no — AWOIS Items are located within the limits of the survey.

n/a — AWOIS Items can be sufficiently confirmed or disproved using data from this survey (Attach AWOIS pages to the certification memorandum.).

E. Dangers to Navigation

no Dangers to Navigation (DTONs) were selected and submitted by the surveyor / data provider

n/a DTONs have been verified by the office evaluator.

no Additional DTONs were noted during office evaluation and submitted

F. Aids to Navigation

no Aids to Navigation (ATONs) were positioned during this survey

n/a New ATONS were positioned during this survey

n/a Survey positions match charted positions

n/a The surveyor / data provider issued DTONs or notified the USCG for any ATON discrepancies

n/a ATON discrepancies were noted during office evaluation and submitted as DTONs.

G. Shoreline and Bottom Samples

no The shoreline (MHW and/or MLLW lines) were included as part of this survey

n/a Surveyed shoreline matches charted shoreline

n/a Surveyed shoreline compares with NGS/RSD source data

n/a Surveyed shoreline should be used to revise nautical charts

no Shoreline features were positioned during this survey

n/a Surveyed features match charted shoreline

n/a Surveyed features compares with NGS/RSD source data

n/a Surveyed features should be used to revise nautical charts

no Bottom samples were acquired during this survey

n/a Bottom sample spacing was in accordance with NOAA HSSDM requirements

n/a Bottom samples should be used to update NOAA charts

IV. COMMENTS

1. Thales supplied many .xyz files. Each site was broken into areas of similar resolution and .xyz files were supplied for each of these areas. The naming convention is "Site_xx-yym.xyz", where "xx" is the Thales site number, "yy" is resolution and "m" denotes meters. A master file was supplied for each site with the naming convention "Site_xx.xyz". ASCII files were imported into Caris Base Editor 2.0 at the native resolution supplied by Thales. Thales also supplied a single Individual workspaces were also created at PHB using Caris Base Editor 2.0 for each site including all created surfaces and the charts that are affected in that area. Workspaces were also created for groups of site that that lie nearby each other.

2. The supplied report contains Tide Zoning in Appendix E of the report, but does not site a source.

3. Site 17 contains a 29.2m (16ftm) shoal in its southwester most corner at position 52º 09.84'N / 173º 52.65'W, which does not have complete coverage (See attached chart comparison).

4. Crosslines (called "tie lines" in the report) were not required as part of this project. Two lines were perpendicular to the "main scheme" lines in Site 17 due to weather. A Caris QC report was generated and attached to Appendix H of the report.

5. Internal data consistency cannot be determined from line to line, because only .xyz files were provided. Trends in the data do; however, tend to match the charted soundings, contours and features.

V. CHART COMPARISON

Affected charts

Chart	Scale	Edition	Date

see attached pages

Smooth Sheet Soundings

n/a

Reported Obstructions

none

Charted Features

none

New Features

none

W00122 Affected Charts and Chart Comparisons

Affected charts[1]:
Chart 16440 14th Ed Jul 04 (1:300,000)
Chart 16450 2nd Ed Jun 04 (1:100,000)
Chart 16460 15th Ed Jun 01 (1:300,000)
Chart 16462 6th Ed May 04 (1:50,000)
Chart 16463 7th Ed Nov 03 (1:50,000)
Chart 16465 2nd Ed Jul 04 (1:100,000)
Chart 16467 2nd Ed Jul 04 (1:100,000)
Chart 16471 11th Ed Aug 00 (1:120,000)
Chart 16480 11th Ed Nov 04 (1:300,000)
Chart 16486 7th Ed May 04 (1:40,000)
Chart 16487 6th Ed Mar 04 (1:40,000)

Chart comparisons:

Overall, W00122 agrees fairly well with the affected charts. Discrepancies of hundreds of meters have been noted in some extremely deep areas (~1000 fathoms). Unless noted, there is no discernable trend with the survey being consistently shoaler or deeper than a particular chart. 100% multibeam coverage has allowed for the finding of seafloor features not present on the charts. None of these are significant enough to warrant classification as DToNs.[2] Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth.[3]

Chart 16440 14th Ed Jul 04 (1:300,000)
Site 10
W00122 agrees with chart within 5 ftm in shallow waters (Waters less than 100 ftm) and is generally shoaler than the chart. Deep water agrees within 10-30 ftm, generally shoaler than chart.[4]

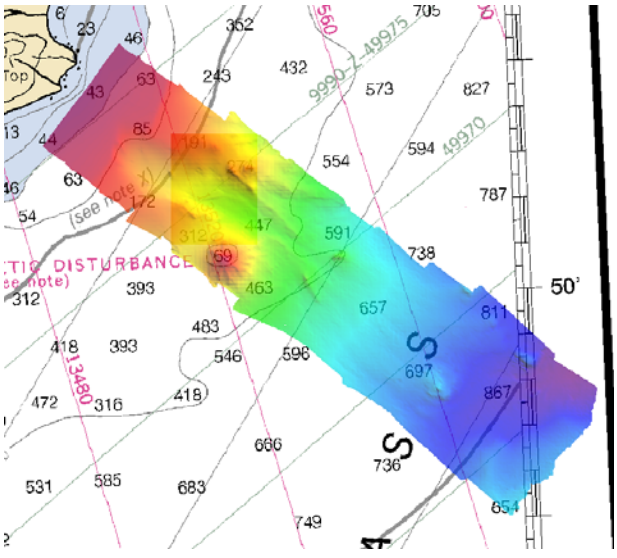


Chart 16450 2nd Ed Jun 04 (1:100,000)

Site 10

W00122 Agrees within 1 meter with the chart, including seamount centered approximately at charted position 51° 50.77N / 179° 50.01E[5]

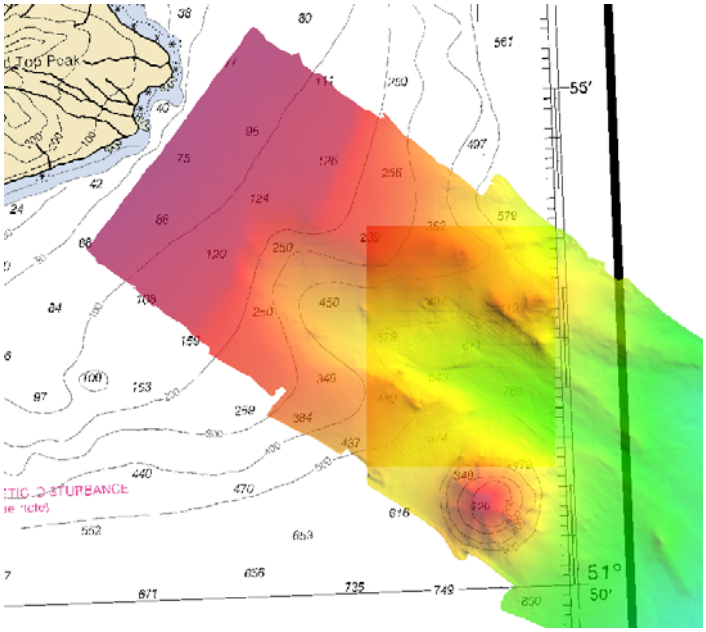
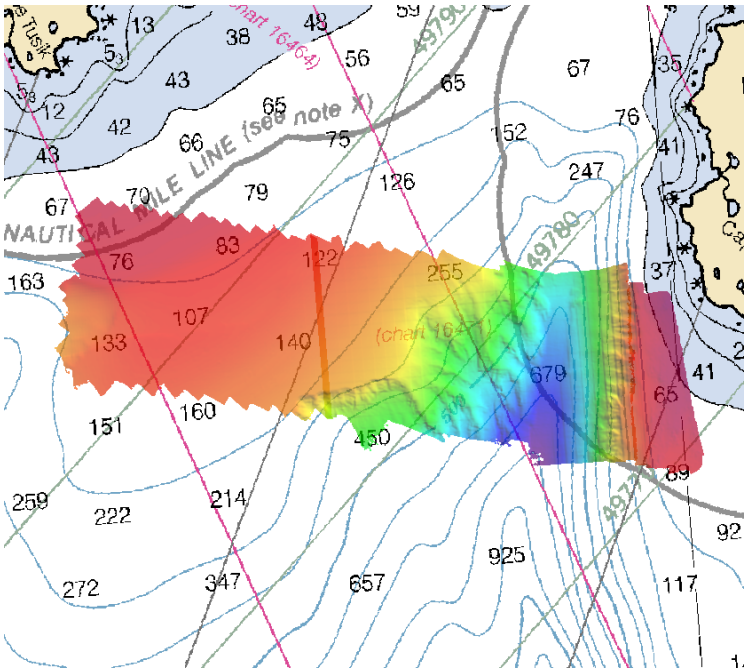


Chart 16460 15th Ed Jun 01 (1:300,000)

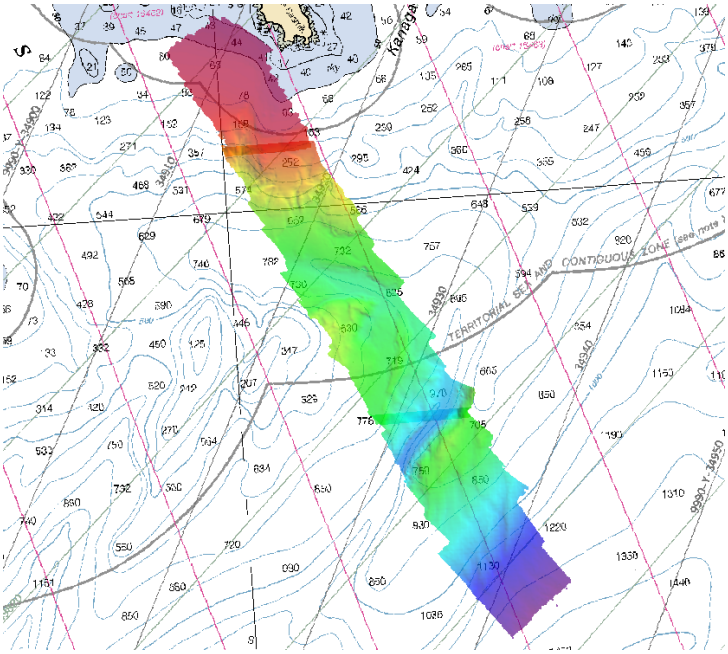
Site 5

W00122 agrees with the charts reasonable well. Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth.[6]



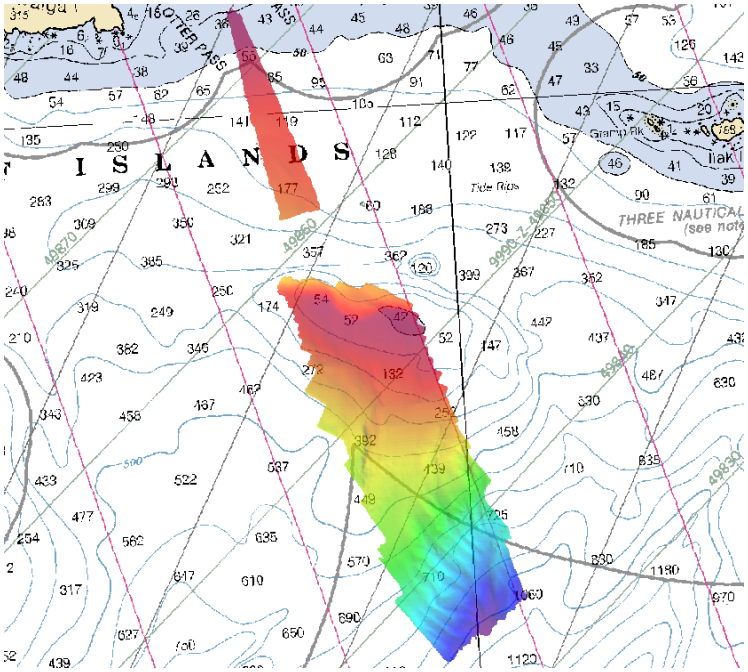
Site 6

W00122 agrees with the charts reasonable well. Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth.[7]



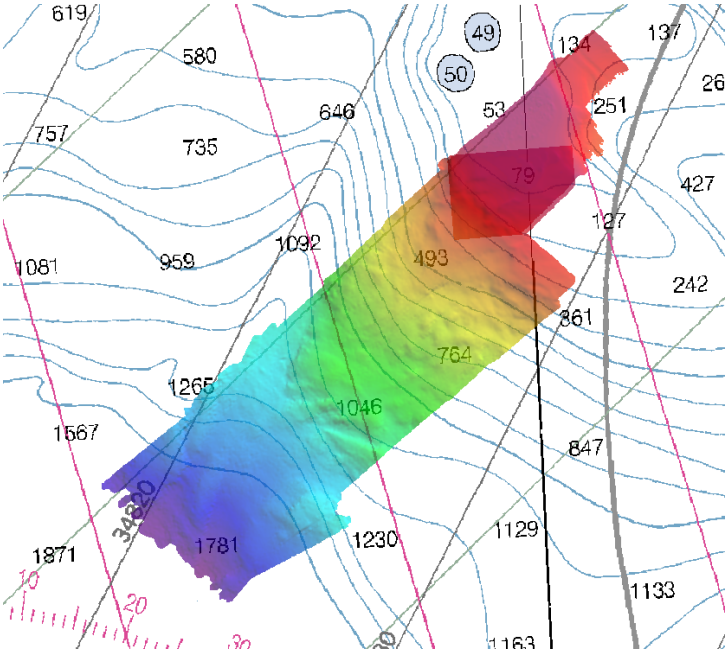
Site 7

W00122 generally agrees with the chart within 1-2 ftm in shallow water[8], and within 10 ftm in deeper water.[9]



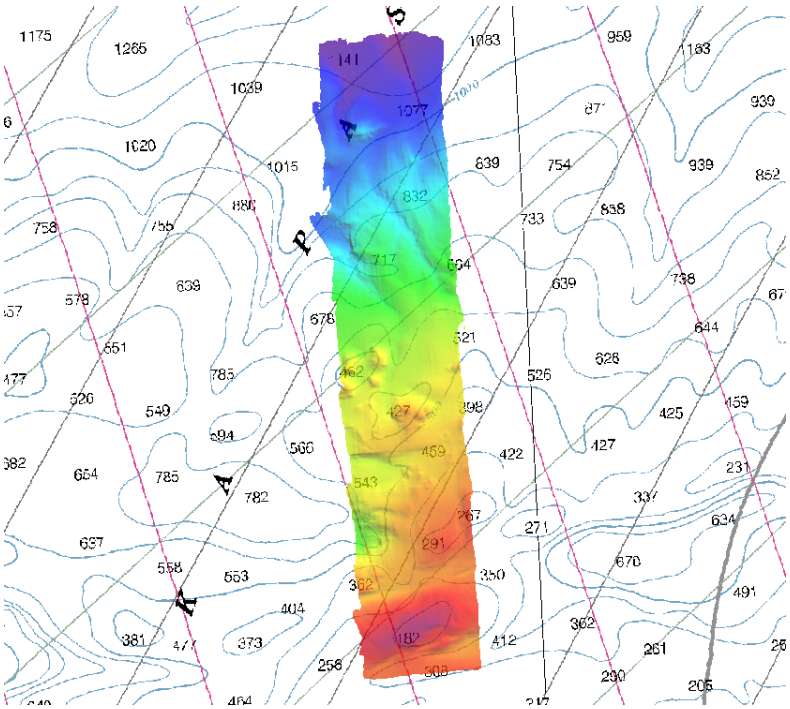
Site 8

W00122 generally agrees with the chart within 1 ftm, except some deeper sites are as much as 50 ftm shoaler than the chart.[10]



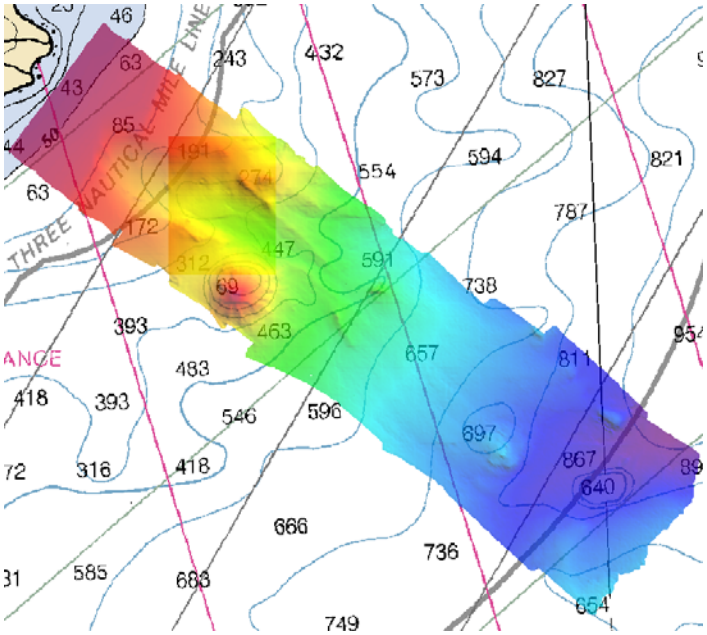
Site 9

W00122 generally agrees with the chart within 5 ftm. The rocky area around 51° 44.02N / 179° 35.45W has shoaler soundings than chart.[11]



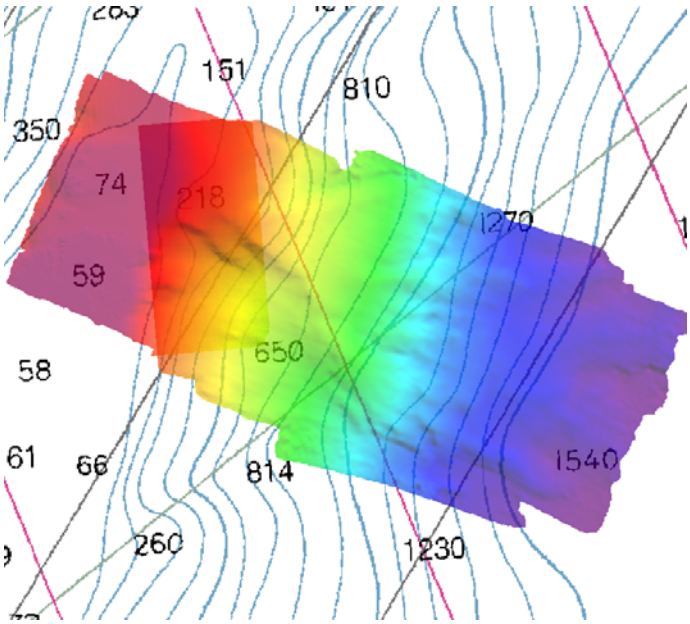
Site 10

W00122 generally agrees with the chart within 2 ftm in shallow[12], and within 10 ftm in deep water[13]. Charted 640 ftm sounding at 51° 47.27N/179° 59.80E not seen in W00122 data.[14]



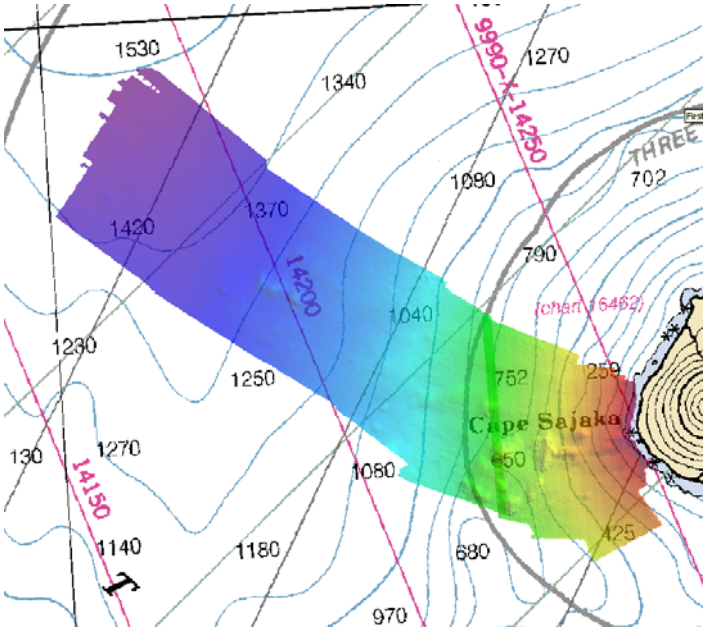
Site 11

W00122 agrees with the charts reasonable well. Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth. The rocky area around 52° 45.57N / 179° 20.01W has shoaler soundings than chart.[15]



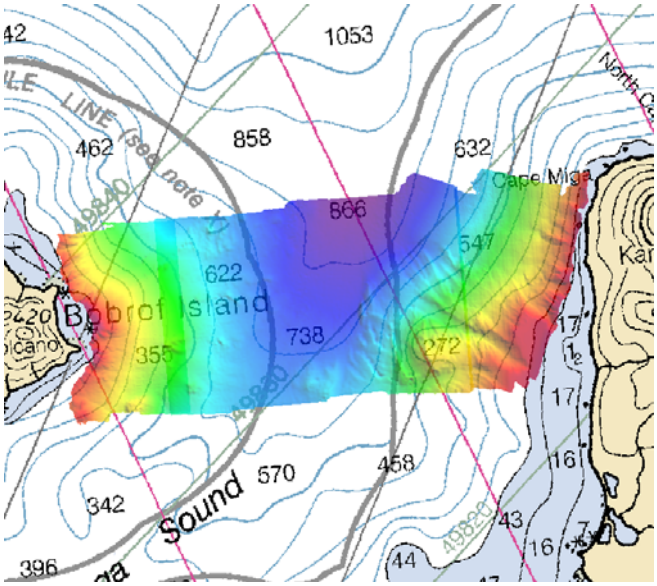
Site 12

W00122 generally agrees with the chart within 5-20 ftm,[16] slope make it tough.[17] Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth. Rocky area 51° 51.60N / 178° 16.50W has shoaler soundings than chart.[18]



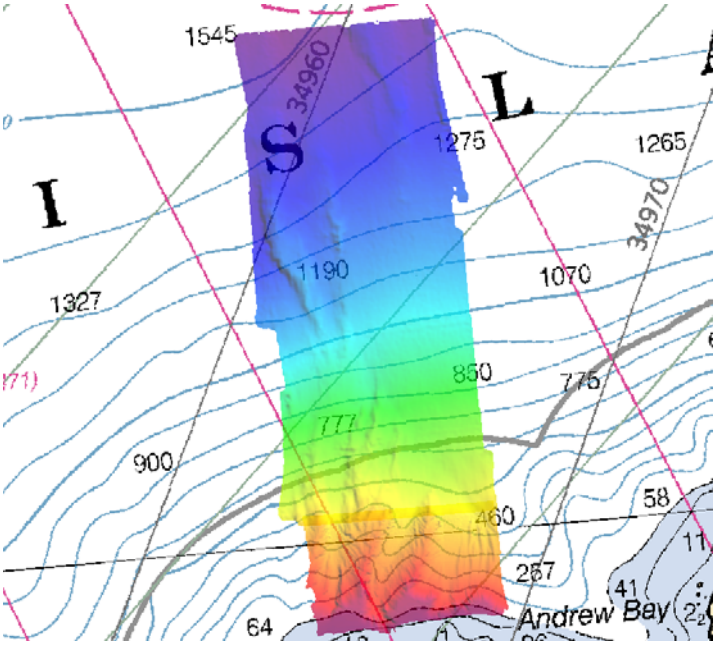
Site 13

W00122 agrees with the charts reasonable well. Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth.



Site 14

W00122 agrees with the charts reasonable well. Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth.



Site 21

W00122 agrees with the charts reasonable well. Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth.

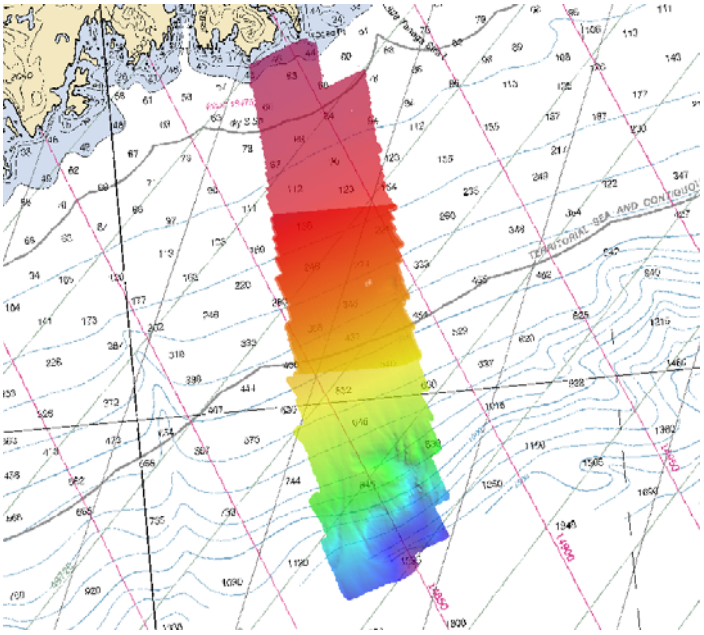


Chart 16462 6th Ed May 04 (1:50,000)
Site 6
W00122 generally aggress with the chart within Agrees well within 2 ftm in all depths.[19]

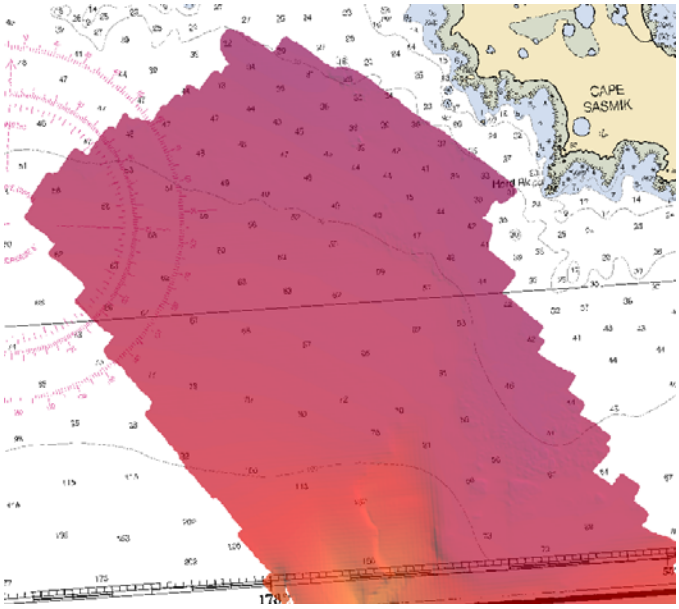


Chart 16463 7th Ed Nov 03 (1:50,000)
Site 13
W00122 is generally approximately 20 ftm deeper than the chart.[20]

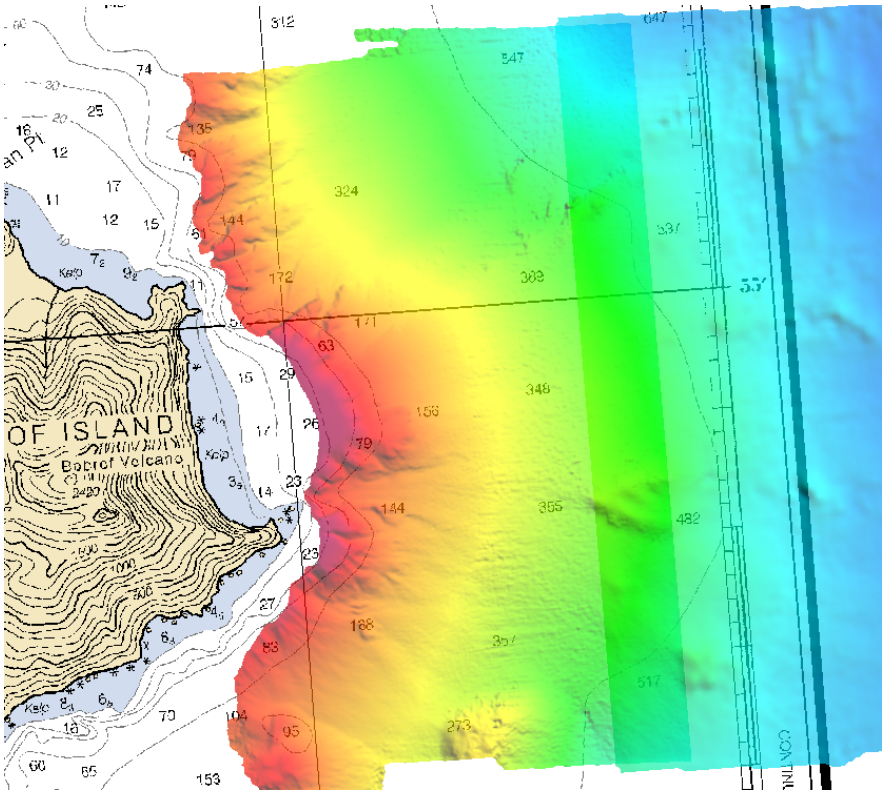
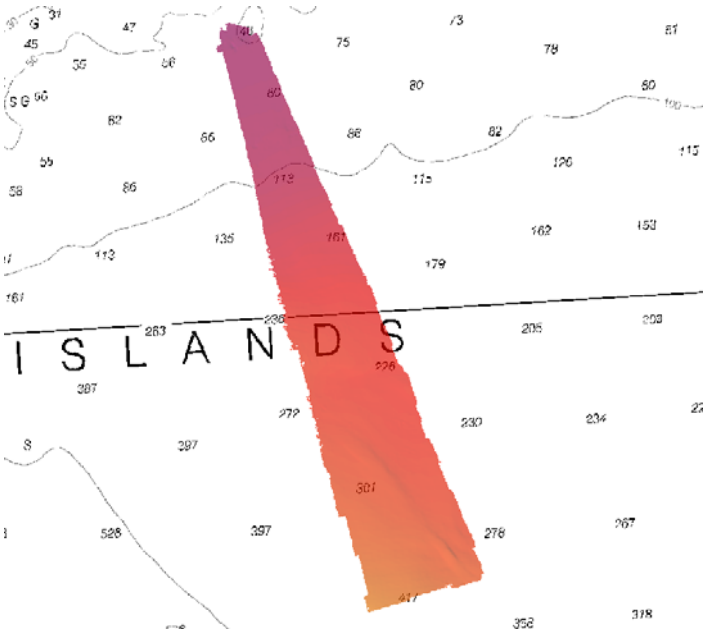


Chart 16465 2nd Ed Jul 04 (1:100,000)

Site 7

W00122 generally agrees with the chart within 1-2 meters in all depths.[21]



Site 12

W00122 agrees within 1-2 meters throughout the charted areas.[22]

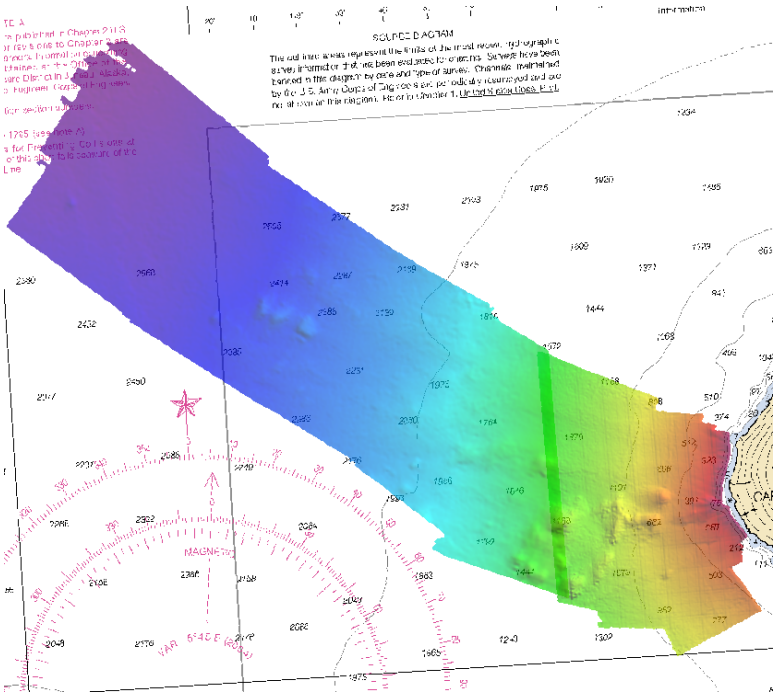
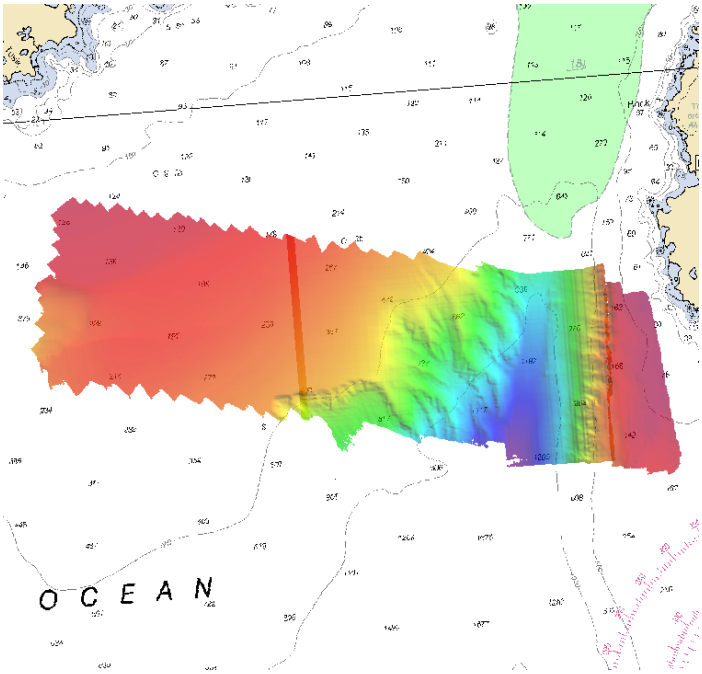


Chart 16467 2nd Ed Jul 04 (1:100,000)

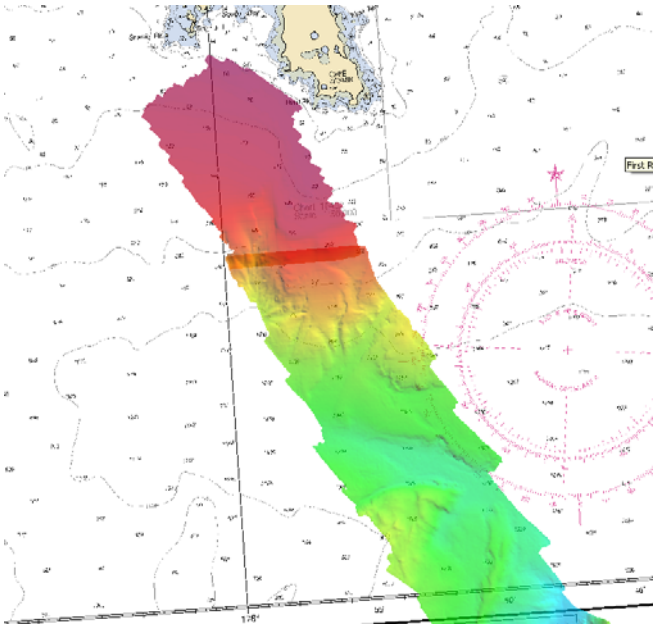
Site 5

W00122 agrees with the chart within 1-2 meters in waters less than 600 meters, and within 50 meters in deeper waters.[23]



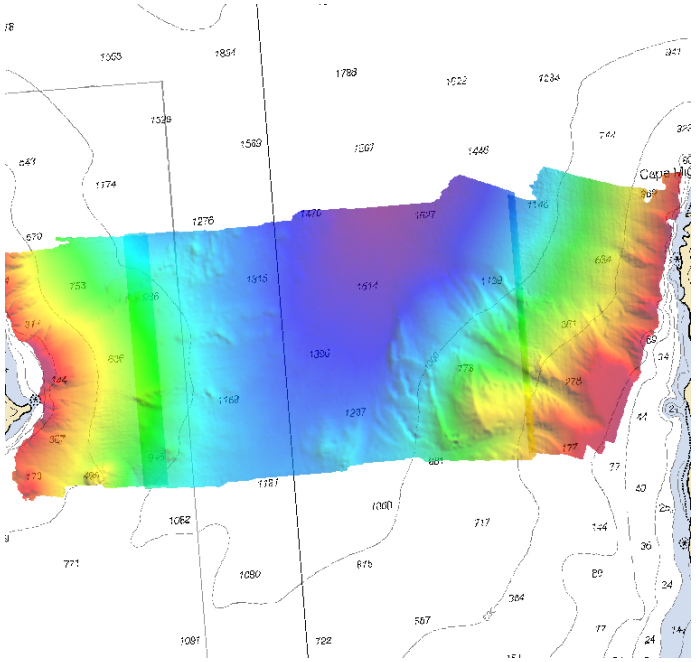
Site 6

W00122 agrees with the chart very closely (within 1-2 meters) in water up to approximately 800 meters. The difference in deeper water and areas of steep slope can be tens of meters.[24]



Site 13

W00122 generally agrees with the chart.within 5 meters.[25] Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth.



Site 14

W00122 agrees with the chart within 5 meters in waters less than 100 meters. The difference in deeper water and areas of steep slope can be tens of meters, as much as 100 meters in the deepest areas.[26]

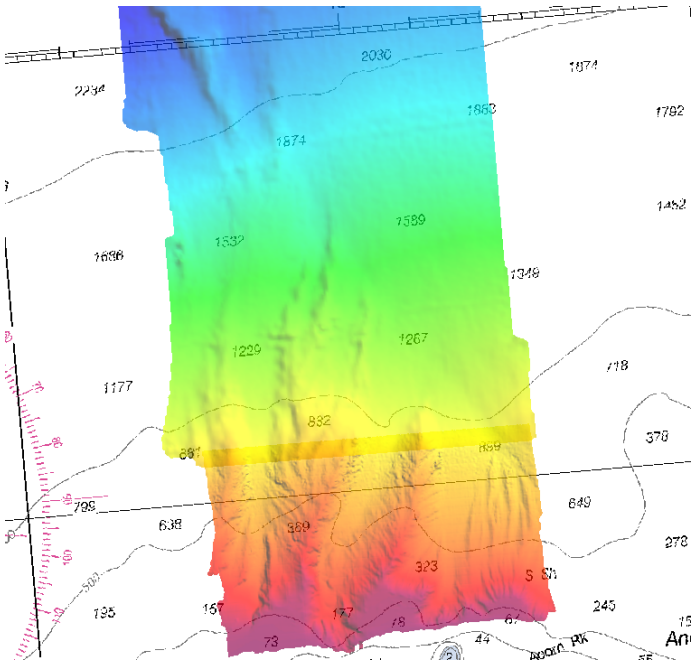
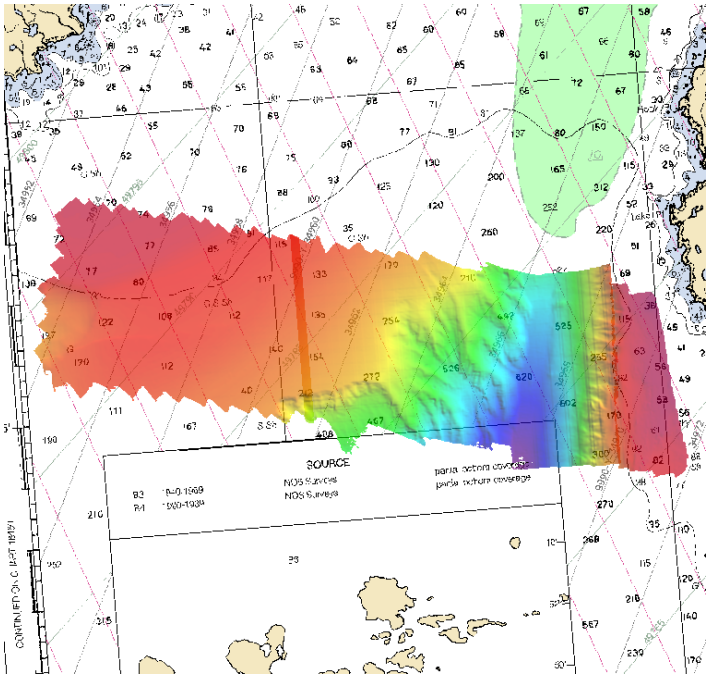


Chart 16471 11th Ed Aug 00 (1:120,000)

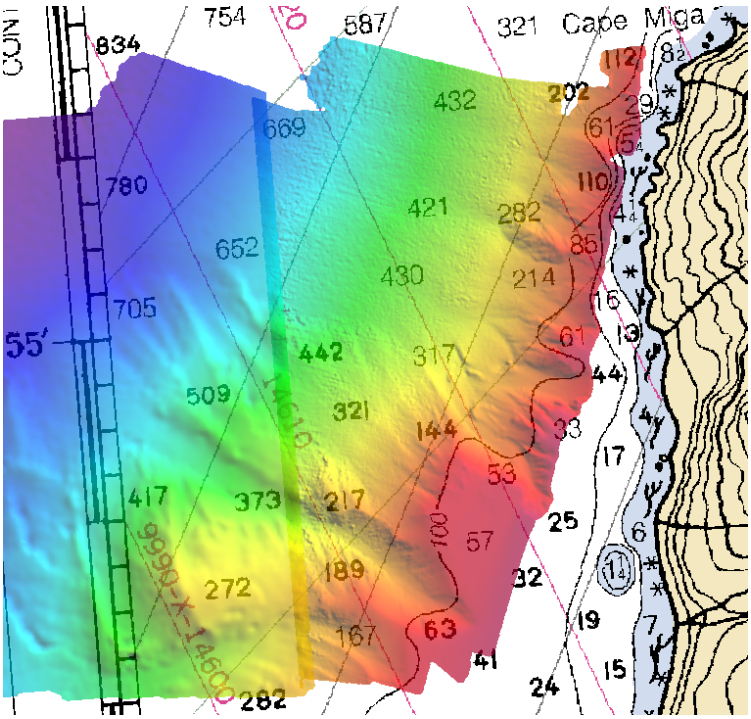
Site5

W00122 generally agrees with the chart within 3 meters[27] in waters shallower than 100 fathoms. The difference in deeper waters can be as much as 80 meters.[28]

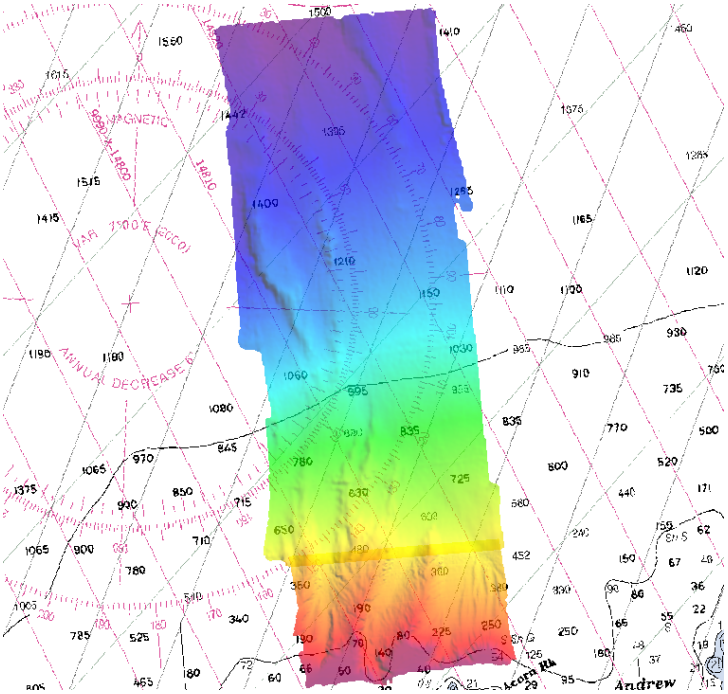


Site 13

W00122 generally agrees with the chart within approximately 2 fathoms in all depths.[29]



Site 14
W00122 generally agrees with the chart within 1-5 fathoms in waters shallower than 500 fathoms. Deeper waters differ by 7-30 fathoms, with W00122 being deeper than the chart.[30]



Site 21
W00122 generally agrees with the chart within 1-3 fathoms in waters shallower than 100 meters and within 8 fathoms in deeper waters.[31]

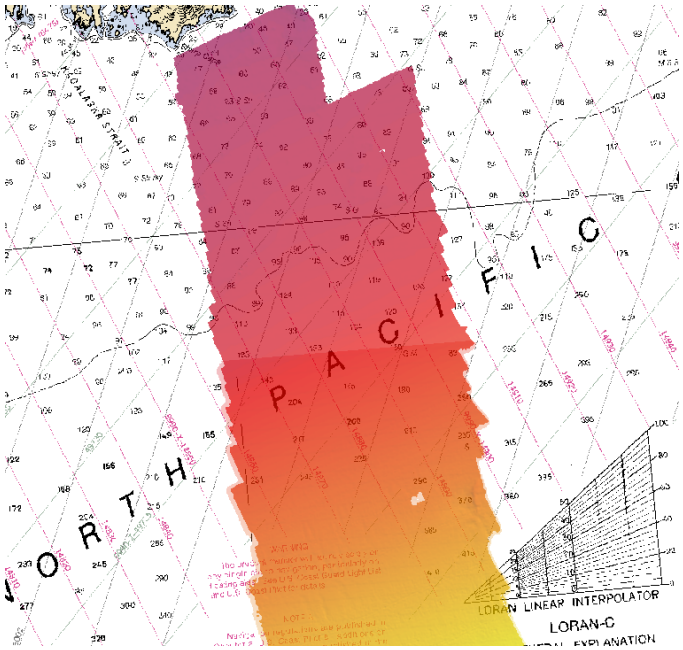
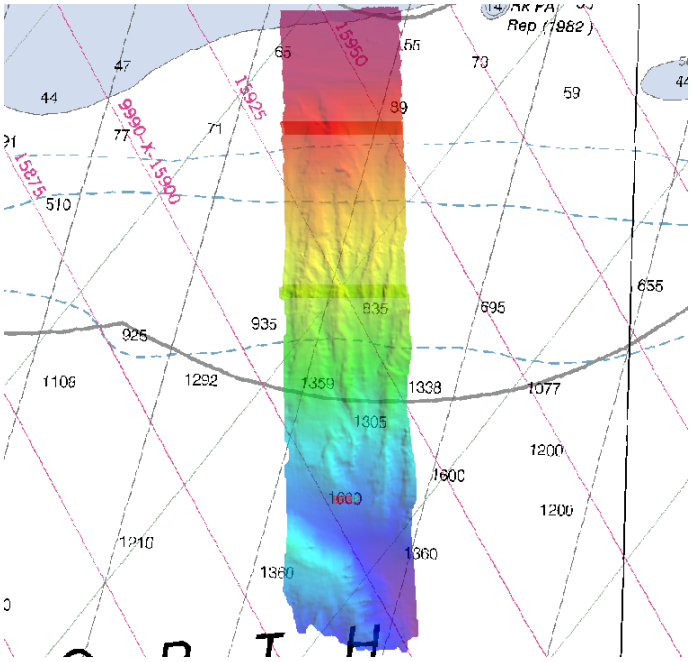


Chart 16480 11th Ed Nov 04 (1:300,000)

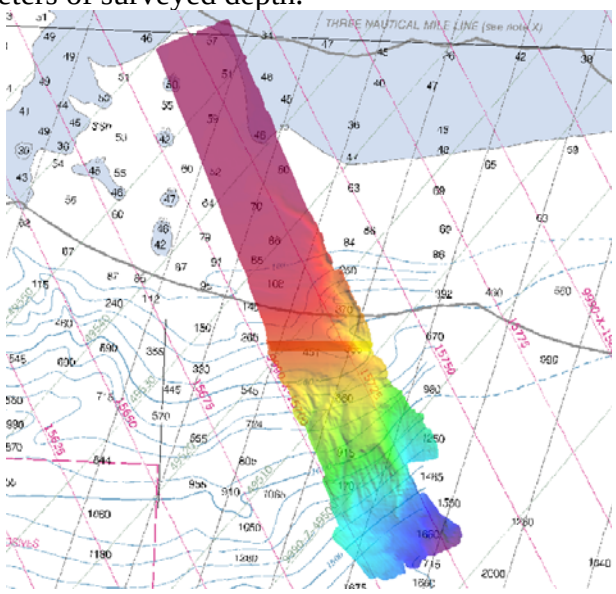
Site 1

Charted soundings within W00122 are sparse at the chart scale. Soundings[32] agree, though the slope, scale of the survey and seabed features detected with 100% MBES coverage cause large discrepancies. For example, W00122 found depths of 1093.1 ftm over a charted sounding 1359 sounding at position 51° 48.89N / 173° 12.13W.[33]



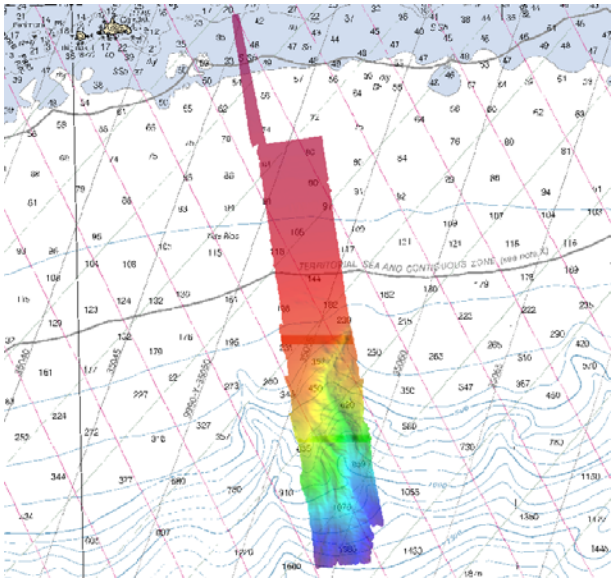
Site 2

W00122 generally agrees within 1-2 fathoms in water less than 100 ftms. Differences of tens of fathoms are apparent in deeper waters. Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth.[34]



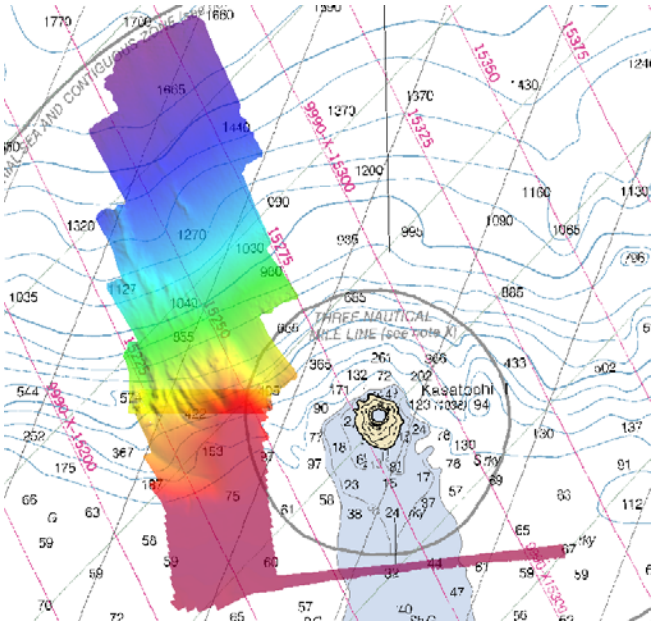
Site 3

W00122 generally agrees within 1-2 fathoms in water less than 100 ftms. Differences of tens of fathoms are apparent in deeper waters. Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth. Charted contours appear to follow the trend of W00122.[35]



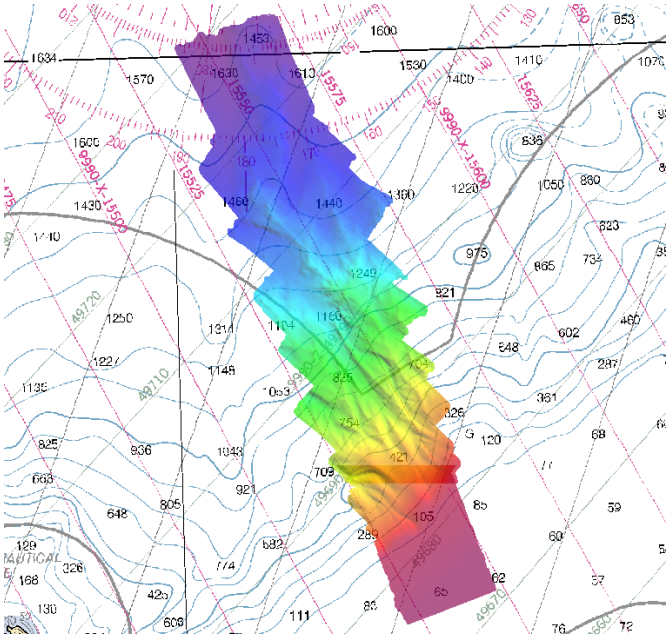
Site 15

W00122 generally agrees within 3 fathoms in water less than 100 ftms. Differences of tens of fathoms are apparent in deeper waters. Because of the scale of the charts and exceptionally steep slope in some areas, the physical size of charted sounding digits may span many tens of meters of surveyed depth.[36]



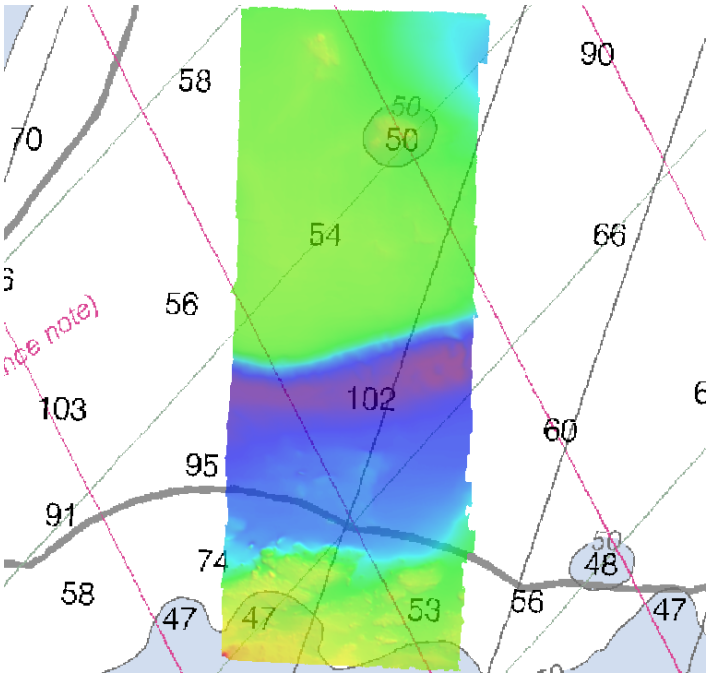
Site 16

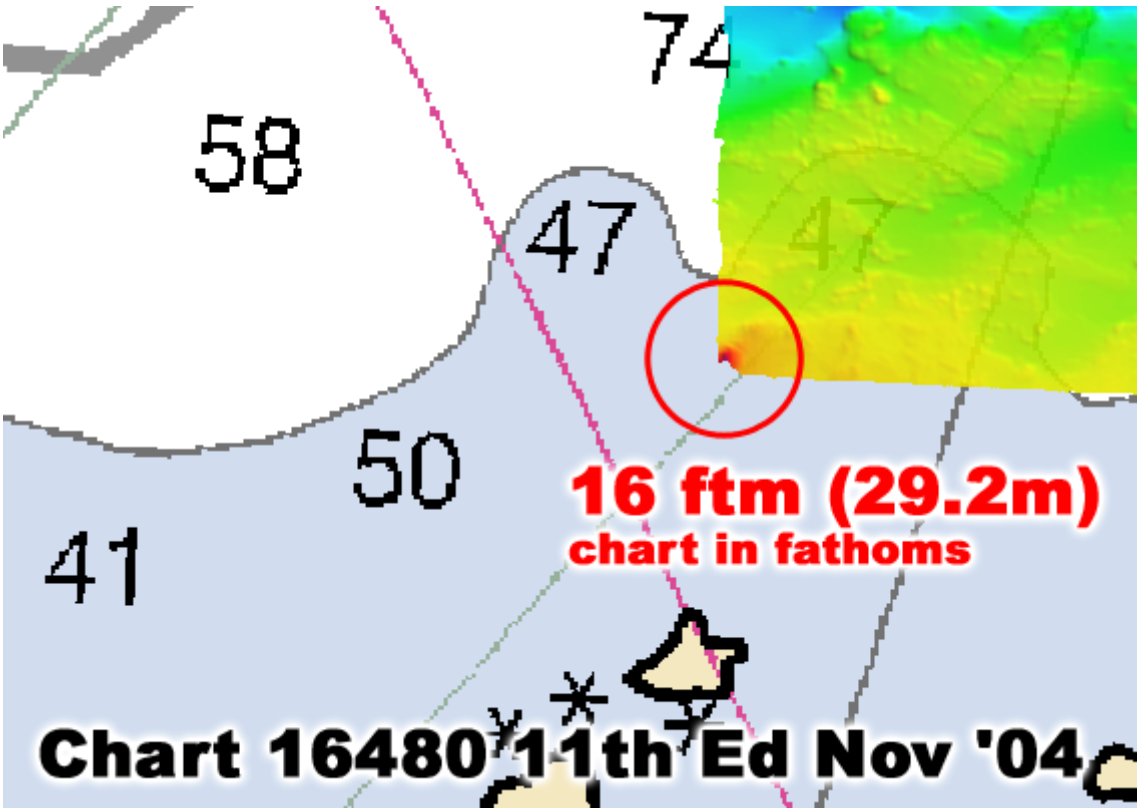
W00122 agrees within 1-2 ftms in waters less then 105 ftms, and within 30 ftms in deep water greater than 1100 ftms. Sounding along the slope (105-1100 ftms) can vary as much as 50 ftms.[37]

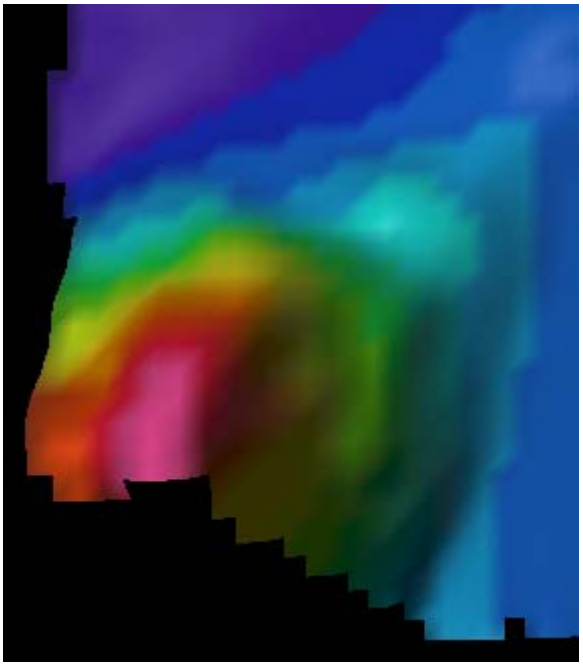


Site 17

W00122 agrees with the chart within 1-2 ftms.[38] W00122 found a 16 ftm feature at 52º 09.84'N / 173º 52.65'W, however the survey did not obtain 100% coverage and the shoalest depth is unknown.[39] (next three images)





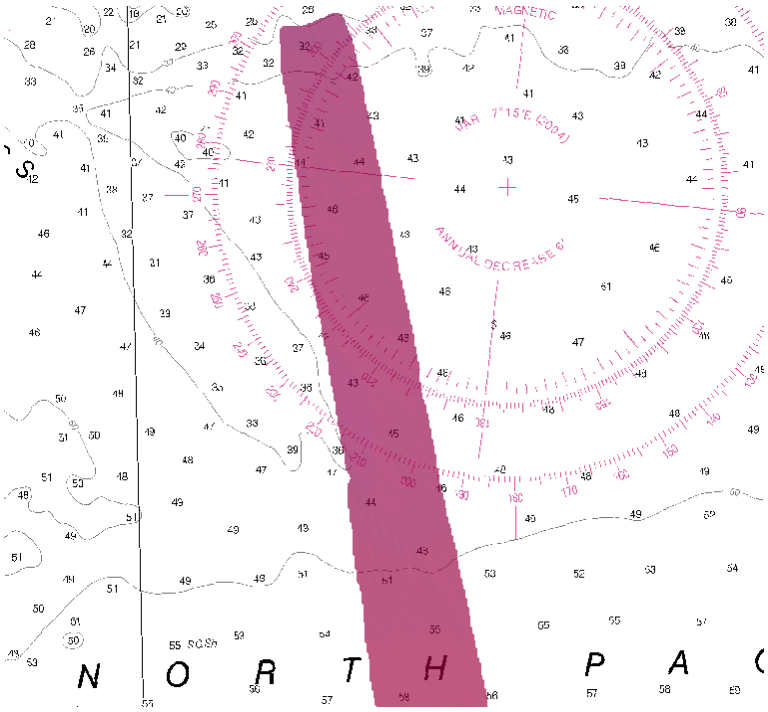


Coverage over 16 ftm sounding in Site 17
(created with Fledermaus)

Chart 16486 7th Ed May 04 (1:40,000)

Site 3

W00122 agrees with the chart within 1-2 ftms.[40]



Site 15

W00122 agrees with the chart within 1-2 ftms.[41]

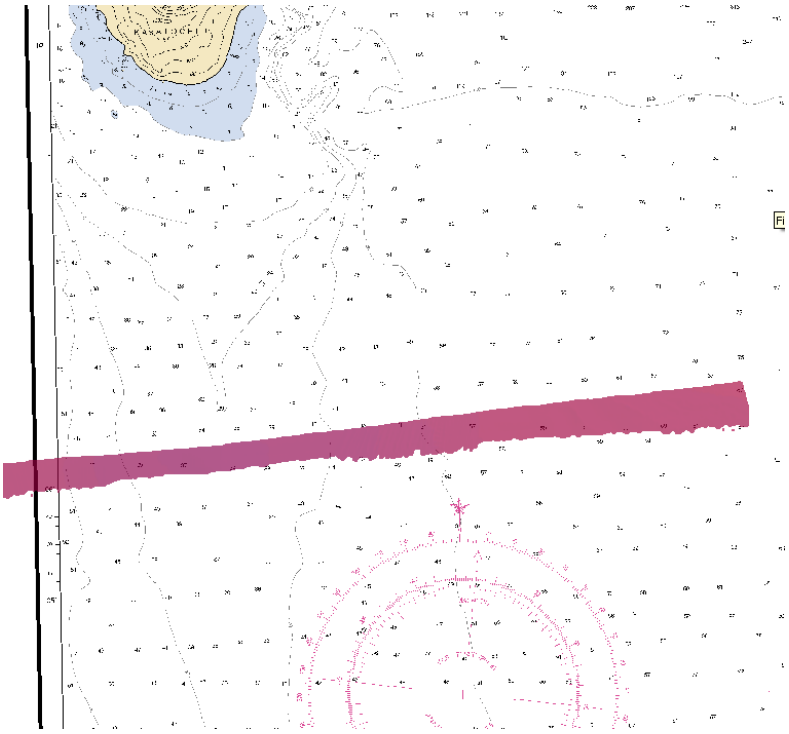
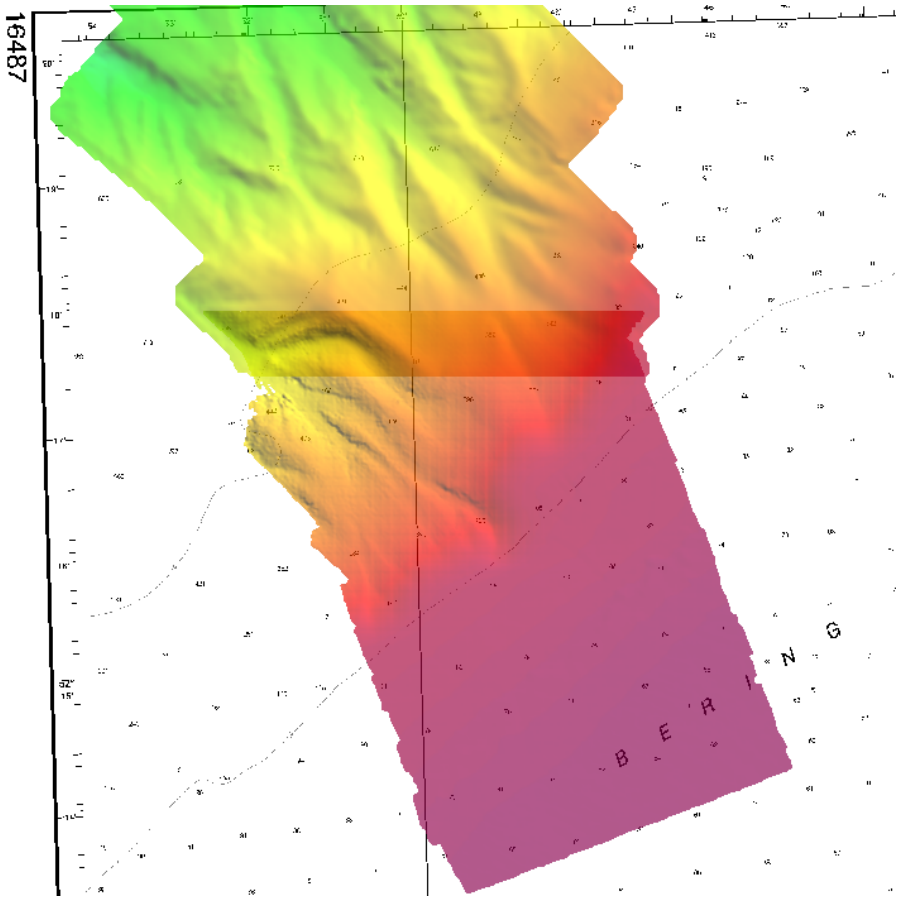


Chart 16487 6th Ed Mar 04 (1:40,000)

Site 17 [42]

W00122 agrees with the chart within 1-2 ftms in shallow water less than 100 ftms. Seabed features (ridges and valleys) cause discrepancies of several tens of fathoms along the slope.[43]



Revisions compiled during office processing by the cartographer

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[1] During PHB processing, W00122 was also compared with:

- Chart 16440, 14th Ed, continuous maintenance raster dated Dec 4,'08 (1:300,000)
- Chart 16450, 2nd Ed, continuous maintenance raster dated Dec 8,'08 (1:100,000)
- Chart 16460, 15th Ed, continuous maintenance raster dated Nov 24,'08 (1:300,000)
- Chart 16462, 6th Ed, continuous maintenance raster dated Dec 4, 08 (1:50,000)
- Chart 16463, 7th Ed, continuous maintenance raster dated Dec 4,'08 (1:50,000)
- Chart 16465, 2nd Ed, continuous maintenance raster dated Dec 4,'08 (1:100,000)
- Chart 16467, 2nd Ed, continuous maintenance raster dated Dec 4,'08 (1:100,000)
- Chart 16471, 11th Ed, continuous maintenance raster dated Dec 4,'08 (1:120,000)
- Chart 16475, 9th Ed, continuous maintenance raster dated Dec 4,'08 (1:30,000)
- Chart 16480, 11th Ed, continuous maintenance raster dated Dec 4,'08 (1:300,000)
- Chart 16486, 7th Ed, continuous maintenance raster dated Dec 8,'08 (1:40,000)
- Chart 16487, 6th Ed, continuous maintenance raster dated Dec 4,'08 (1:40,000)

16475 chart comparison for Site 21: W00122 Site 21 shows good agreement with the chart, generally to within 0-2 fathoms.

[2] Concur.

[3] The cartographer concurs with the evaluator's statements below except as noted. Retain charted shoal soundings and contours and chart all areas according to the smooth sheets and Hdrawings.

[4] Concur.

[5] Concur with clarification. W00122 agrees with the chart to within 1 meter in many areas, with discrepancies up to approximately 11 meters in from charted soundings in some areas. However, since smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 shows localized seaward movement of the 500 meter curve.

[6] Concur with clarification. W00122 shows localized seaward movement of the 50 fathom curve. Chart as shown on the Hdrawing.

[7] Concur with clarification. W00122 shows localized seaward movement of depth curves. Chart as shown on the Hdrawing.

[8] Insert "(less than 100 fathoms deep)".

[9] Insert "(greater than 100 fathoms deep)". Concur with clarification. Since smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 shows localized seaward movement of depth curves. Chart as shown on the Hdrawing.

[10] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.

[11] Concur with clarification. W00122 also found depths of up to approximately 33 fathoms shoaler than charted in the vicinity of Latitude 51/43/15N, Longitude 179/35/00W. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.

[12] Insert “(less than 100 fathoms deep)”.
[13] Insert “(greater than 100 fathoms deep)”. Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.
[14] Concur with clarification. Retain 640 fathom sounding as charted.
[15] Concur.
[16] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.
[17] Strikethrough ~~slope make it tough~~, replace with “the slope preventing accurate comparison of surveyed and charted soundings.”
[18] Concur.
[19] Strikethrough ~~aggress with the chart within Agrees well within 2 ftm in all depths~~, replace with “agrees with the chart to within 2 fathoms”. Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.

16462 Chart comparison for Site 12: W00122 generally agrees with the chart to within 35 fathoms or less. W00122 found localized seaward movement of the 100, 500 and 1000 fathom curves. Chart as shown on the Hdrawing.
[20] Concur with clarification. In many areas, W00122 surveyed depths are within 10 fathoms of charted depths. In some areas, W00122 is shoaler than charted. However, since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 found localized seaward movement of the 30 and 100 fathom contours.
[21] Concur with clarification. In some areas, W00122 smooth sheet soundings show differences of up to nine meters from charted depths. However, since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.
[22] Concur with clarification. In some areas, W00122 smooth sheet soundings show differences of fifty meters or more from charted depths. However, since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.
[23] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 found localized seaward movement of the 100 and 500 meter contours.
[24] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 found localized seaward movement of the 100 and 500 meter contours.
[25] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 found localized seaward movement of the 50, 100 and 500 meter contours.

[26] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 found localized seaward movement of the 100 and 500 meter contours.
[27] Strikethrough ~~meters~~, replace with "fathoms."
[28] Strikethrough ~~meters~~, replace with "fathoms." Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.
[29] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.
[30] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.
[31] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 found localized seaward movement of the 100 fathom contour.
[32] Insert "generally".
[33] Concur.
[34] Concur with clarification. W00122 found localized seaward movement of the 50 fm contour.
[35] Concur.
[36] Concur.
[37] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.
[38] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined.
[39] Concur. Chart 16 fathom sounding as shown on the smooth sheet and Hdrawing.
[40] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 found localized seaward movement of the 40 fathom contour.
[41] Concur with clarification. Since W00122 smooth sheet soundings rarely fall on charted soundings, differences between surveyed and charted soundings cannot be accurately determined. W00122 found localized seaward movement of the 50 fathom contour.
[42] Strikethrough ~~17~~, replace with "16".
[43] Concur. W00122 found localized seaward movement of the 100 and 500 fathom contours.

APPROVAL SHEET
W00122

Evaluated by:

Gary C. Nelson
For Lt. Lomnicky
2009.03.26 13:51:17 -07'00'

LT (jg) Jay Lomnicky, NOAA
Pacific Hydrographic Branch

Review by:

Digitally signed by Kurt Brown
Date: 2009.03.26 13:55:36 -07'00'

Kurt Brown
Hydrographic Team Leader
Pacific Hydrographic Branch

Cartography

The evaluated survey has been inspected with regard to delineation of the depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data

Compiled by:

Gary C. Nelson
For Beth Taylor
2009.03.26 13:52:01 -07'00'

Beth Taylor
Cartographer
Pacific Hydrographic Branch

Reviewed by:

Digitally signed by Charles R. Davies
DN: cn=Charles R. Davies, c=US, o=Pacific Hydrographic Branch, ou=NOAA,NOS,OCS, email=Russ.Davies@NOAA.GOV
Date: 2009.03.26 14:08:36 -07'00'

Russ Davies
Cartographer
Pacific Hydrographic Branch

Approval

I have reviewed the data, and reports. Data are suitable for nautical charting except where specifically recommended in this report.

Gary C. Nelson
for Capt. Neander
2009.03.26 13:53:02 -07'00'

David O. Neander
Captain, NOAA
Chief, Pacific Hydrographic Branch

Digitally signed by David Scharff
DN: cn=David Scharff, o=OCS, ou=NOAA, email=david.scharff@noaa.gov, c=US
Reason: AWOIS and Surf Check complete
Date: 2009.04.16 14:08:28 -04'00'

NOAA FORM 75-96
(10-83)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. W00122

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.
1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
16475	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 SMOOTH SHEET.
16486	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 SMOOTH SHEET.
16487	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 SMOOTH SHEET.
16462	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 SMOOTH SHEET.
16463	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 SMOOTH SHEET.
16450	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 60 SMOOTH SHEET.
16465	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 SMOOTH SHEET.
16467	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 SMOOTH SHEET.
16471	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 SMOOTH SHEET.
16460	12/8/08	B. TAYLOR	~~Full~~ (Part) ~~Before After Marine Center Approval Signed Via~~ PARTIAL APPLICATION ~~Drawing No.~~ OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 & ZONE 60 SMOOTH SHEETS.
16480	12/8/08	B. TAYLOR	(PART) PARTIAL APPLICATION OF SOUNDINGS, FEATURES & CURVES FROM ZONE 1 & ZONE 2 SMOOTH SHEETS.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED