



Cruise Report

SIO R/V New Horizon

NEW120713A

Cascadia Initiative Leg 3

July 13 to July 18

Newport, OR – Newport, OR

Bob Dziak

Chief Scientist

Captain & Crew

R/V New Horizon:

Captain: Ian Lawrence

Chief Engineer: Tom Schuller

1st Mate: Rene Buck

2nd Mate: Jack Purdy

Engineer: Willie Brown

Engineer: Jonathan Garcia

Bos'n:

AB: Geoff Quillin

AB: Dave Weaver

AB: John Barnes

Sr. Cook: Ed Lagrasso

Cook: Oscar Buan

Science Party:

Chief Scientists:

Bob Dziak (OSU/NOAA)

Marine Tech

Josh Manger (SIO)

OSU/NCSU Science Party

Matt Fowler (Marine Tech, OSU/NOAA)

Anna Semple (Research Assistant, OSU)

Bill Hanshumaker (Marine Educator, OSU-Sea Grant)

Scripps Institute of Oceanography OBS Team

Martin Rapa (Senior Engineer)

Paul Georgief (Asst. Engineer)

Ray Klein (Asst. Engineer)

UO Department of Geological Sciences

Dean Livelybrooks, Professor

Erik Bengston (undergraduate student)

Erika Jefferson (undergraduate student)

Cascadia Research Marine Mammal Observers

Carol Keiper

Sean Goodside

Introduction

Cruise New120713a aboard the R/V New Horizon was the third cruise of Spring-Summer 2012 to recover portions of an array of ocean bottom seismometers (OBS's) deployed in 2011 as part of the National Science Foundation funded Cascadia Initiative. This community-based experiment represents a combined onshore-offshore seismic and geodetic study of the Cascadia Margin. See the following website for details of the year 1 and 2 science plan and for more information about the Cascadia Initiative <http://pages.uoregon.edu/drt/CIET>.

The objectives for the cruise were to recover fifteen trawl resistant OBSs built by the Scripps Institute of Oceanography (SIO). Both the science party and OBS personnel worked a 24 hour schedule to get all of the instruments recovered as efficiently as possible. All fifteen OBS were successfully recovered; twelve instruments successfully recorded three-component seismic and Dynamic Pressure Gauge (DPG) data for the entire deployment period, one OBS recorded only DPG data, and two failed to record any data. For the majority of the six-day duration of the cruise, swells were 5-8 feet and wind waves 2-6 feet. However there was one day of 10-15 foot seas and 45-50 knot winds that made recovery of OBS impossible.

In addition to the OBS recoveries and seismic data retrieval, two marine mammal observers were onboard from Cascadia Research Organization to visually survey for any animals that may appear near the ship during operations. The observers work is part of a program lead by William Wilcock, and sponsored by ONR, that will scan the OBS hydrophone and seismic records for cetacean vocalizations. Any vocalizations detected might then be correlated with visual observations.

Deployment Site Selection.

Deployment sites were initially selected through a series of community meetings. The Cascadia Initiative Expedition Team (CIET), the Amphibious Array Steering Committee (AASC) and the co-chief scientists made slight modifications to avoid strong currents, seafloor hazards and areas of active shrimp and fish trawling (for sites < 1000 m).

In siting the OBSs, the team relied heavily on input from Barry Ackerman, Canadian Trawlers Association, Scott McMullen of the Oregon Fisherman's Cable Committee (OFCC), Brad Pettinger of the Oregon Trawl Commission, Liam Antrim of the Olympic Coast Marine Sanctuary, and Joe Schumaker from the Quinault Dept of Fisheries, Jennifer Hagen representing the Quileute Natural Resources, Kaety Hildenbrand of Oregon Sea Grant - Marine fisheries extension agent.

Some sites were moved slightly into nearby no-trawl zones, specifically Essential Fish Habitats (EFHs) in Grays Canyon region and Nehalem Bank/Shale Pile, and others were moved near known "hangs" based on specific suggestions by Scott McMullen. Liam Antrim was our contact with the Olympic Coast Sanctuary and expedited our permit to deploy at one location within the sanctuary. Mr. Antrim also initiated contact for us with the Quileute and Quinault tribes to ensure our deployments did not impact their fishery rights. Kaety Hildebrand provided very helpful feedback, and was our main interface with the shrimp fishing and trawling community.

Final deployed locations are shown in Figure 1 and are listed in Table 1 at the end of this document. Detailed bathymetric maps of deployment sites are in given in Appendix 1.

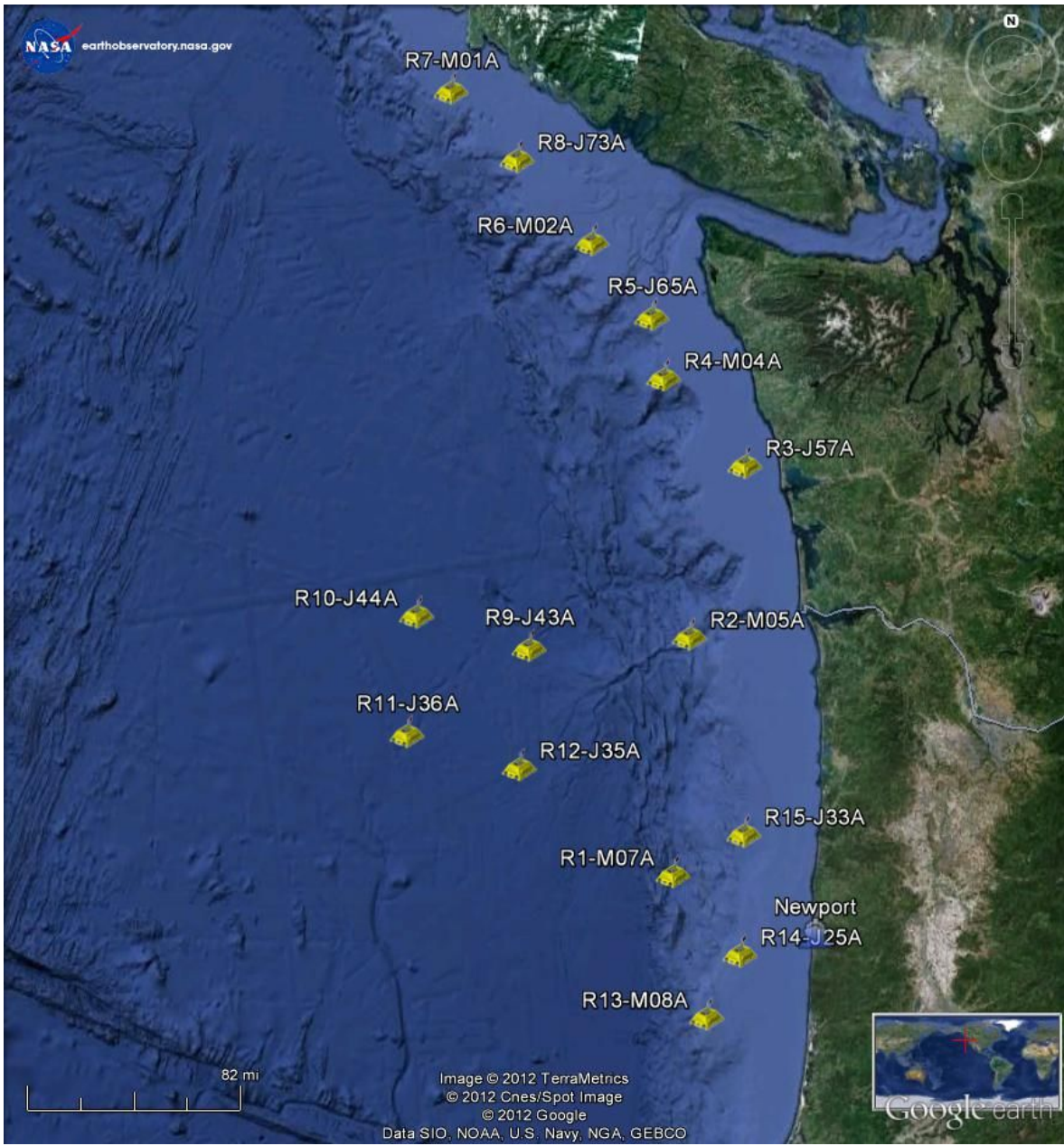


Fig 1: Map of OBS locations. All instruments recovered during this cruise were the Scripps Institute of Oceanography Abalones (picture of Abalones below).

OBS description and Recovery Summary

The fifteen “Abalone” OBSs built by SIO (Fig 2) have a trawl-resistant mount. Each instrument has a beacon and flag that are designed to be “break-away” so as to minimize disturbance by trawlers or damage to trawling equipment. Eleven of these instruments were therefore chosen to occupy the shallowest sites (56-1350 m) along the accretionary prism. The remaining four SIO instrument were deployed in deeper waters. The Abalone instrument package includes a three-axis broadband Trillium Compact OBS (3-channels, each with 24-bit resolution) and a dynamic pressure gauge (24-bit resolution). All four channels are sampled continuously at 50 Hz. All fifteen OBS were successfully recovered; twelve instruments recorded three-component seismic and Dynamic Pressure Gauge (DPG) data for the entire deployment period, one OBS (M02A) recorded only DPG data, and two (M04A, M05A) failed to record any data (Table 1).

All fifteen instruments fit on the fantail of the *R/V New Horizon* without stacking, and only required minor shuffling to organize the instruments on the fantail. All of the instruments are designed to operate autonomously; they are battery powered, with ~ 1-year longevity. They were drop-deployed and were brought to the surface using an acoustically triggered release. Each has a radio beacon, flasher and flag to aid in locating them on the sea surface. When the Abalone OBS were deployed in 2011 their position on the seafloor was determined using the ship’s hull-mounted transducer, which circled the drop site at a radius of 0.5 times the local water depth. Final locations were derived from the recorded acoustic ranges using the Workboat software package (<http://www.seanav.com>). For reference, the bathymetry at each deployment site and screen grabs for each survey are shown in Appendices 1 and 2.

For the majority of the six-day duration of the cruise, swells were 5-8 feet and wind waves 2-6 feet. However there was one day of 10-15 foot seas and 45-50 knot winds that made recovery of OBS impossible. This required us to skip J73A and recover M01A before circling back to recover J73A.



Fig 2: Pictures of SIO Abalone Ocean Bottom Seismometer once on deck and during the recovery procedures. Right shows seismometer instrument cylinder as tethered to the OBS frame.

Marine Mammal Sightings

Two marine mammal observers from the Cascadia Research Organization were onboard the cruise. The observers shared the duty and maintained visual observations from dawn to dusk each day of the cruise. The date, time and brief summary of their observations are listed in Appendix 3.

Outreach

A marine educator from OSU Sea Grant (Bill Hanshumaker) participated on our cruise and maintained a cruise blog (<http://blogs.oregonstate.edu/billgoestosea>). The blog summarized the day to day operations of the cruise. Dean Livelybrooks participated on the cruise and brought two undergraduate students from Oregon junior colleges to experience working at sea.

CRUISE NARRATIVE:

Day 1: Friday July 13, 2012 (Recovered M07A)

We departed Newport at 4:00 PDT (18:00 z, JD: 195) after 1 hour lifeboat and fire drills. The first recovery is ~5.2 hours from Newport at 10 knts. Wind is out of northwest at 10 Knts, swells are ~4 feet.

First recovery location is **M07A**. We will be recovering SIO Abalones during the entire cruise. Depth at site is 1361m. Released enabled, instrument released at 09:28 PDT. Instrument at surface at 10:00 PDT, on deck at 10:45 PDT. The instrument hit the side of the ship twice during recovery causing the knot holding the sensor in position to come undone.

Clock drift and other parameters are assessed and storage in spreadsheet in [Appendix B](#).

This is SIO Abalone instrument number 15.

M07A recorded data for duration of deployment (18.6 Gbytes)

This is not a site of interest to the Navy and the data not embargoed.

M07A recovered position: 44° 53.97' N; 125° 07.36'W depth = 1356.0

Began transit to site M05A at 10:50 PDT.

Day 2: Saturday July 14, 2012 (Recovered M05A, J57A, M04A)

Arrived at site M05A at 07:30 PDT. Wind out of northwest at 5.2 knts. Seas 3-4 feet.

Confirmed release at 7:33 PDT. Recovery location is 46 10.408'N, 124 56.074'W. Depth is 828 m. This is an SIO Abalone site number 14.

M04A: Instrument did not record data, no three-component or DPG data is available.

This is not a site of interest to the Navy and the data was not embargoed.

This was SIO Abalone number 16. The OBS on deck at 8:08 PDT As before, seismometer was hanging from instrument structure by tie off line, this is by design.

M05A recovered position: 45° 10.408'N; 124° 56.074'W depth = 828.0 m

0815 PDT began transit for site J57A.

Arrived at the third recovery site, **J57A**, at 02:33 PDT. Weather continues to be good, with winds out of the northeast at 2 knts and swells of 2-4 ft.

Instrument as enabled and released at 3:20 PDT, on deck at 03:25 PDT. This is SIO Abalone number 7.

J57A recorded data for duration of the deployment (18.6 Gbytes).

Data from this site was not embargoed by the Navy

J57A recovered position: 45° 4.805'N; 124° 27.028'W, depth=56.0

Begin transit to next site M04A at 20:00PDT.

Arrive on site **M04A** at 08:20 PDT. Instrument release enabled.

Wind is 18.6 knts out of the northwest. Swells 6-8 feet.

Instrument communicates but had not released to surface as of 20:45 PDT., no confirmation yet burn wire had been successful.

Instrument on surface at 21:03 PDT. Instrument on deck at 21:15 PDT. This is SIO Abalone number 10.

M04A: Instrument did not record data, no three-component or DPG data is available.

The data from this OBS will be reviewed for signals that have national security interest. **Data will be reviewed and held by the Navy using established NSF-Navy protocols. Data will be released back to the CIET after 90 days.**

M04A recovered position: 45° 31.7697'N; 124° 55.6101'W depth = 563 m

Begin transit to J65A at 21:30 PDT, ETA 23:40 PDT.

Instrument J65A enabled at 11:40 PDT, depth =165m, 45° 55.99'; 125° 17.998'W. This is SIO instrument 13.

At surface at 11:55 PDT, on ship, 00:10 PDT on July 15. At 16:30 PDT (23:30 z). **Data will be reviewed and held by the Navy using established NSF-Navy protocols. Data will be released back to the CIET after 90 days.**

J65A data recorded during entire duration of the deployment (19.05 Gbytes)

J65A recovered position: 47° 53.481'N, 125° 8.378'W depth = 165 m

Day 3: Sunday July 15, 2012 (recovered M02A, M01A)

Begin transit to M02A, arrive at **M02A** at 04:20 PDT. Winds are 12 knts out of northwest, swells are 6-8 feet. This is SIO Abalone number 4.

Instrument released at 04:28 PDT. Very rough recovery, but instrument on board by 04:45 PDT. Instrument location 46° 10.506'N -124° 56.030'W, depth = 139 m .

M02A: DPG on the instrument recorded data, but the three-component seismometer did not record data. The battery was fully charged, so it appears there was a problem with the data connection.

Data will be reviewed and held by the Navy using established NSF-Navy protocols. Data will be released back to the CIET after 90 days.

M02A recovered position: 48° 18.419'N, 125° 36.024'W depth= 139 m

Next site is **J73A**, begin transit at 0450 PDT, ETA is 0848 PDT.

Arrive at station **J73A** at 0930 PDT. The weather was very bad and recovery operations were not possible. We decided to continue transit to stations M01A.

Arrive at **M01A** at 13:15 PDT. Seas are 6-8 feet, winds 10-15 knts, so good enough to recover.

M01A released at 13:33 PDT.

Instrument at surface at PDT location 49° 9.025'N 126 43.328'W . depth = 132 m.

On deck 13:51 PDT.

M01 recorded data for duration of deployment (18.7 Gbytes)

Data from this site, M01A was not embargoed by the Navy

M01A surveyed position: 49° 9.025'N 126 43.328'W . depth = 132 m

Begin transit at 14:05 PDT back to **J73A**. ETA 17:35 PDT. On site at 17:25 PDT. Seas much calmer than earlier in the day, 3-6 ft, wind 10 knts.

Instrument released at 17:27 PDT on surface at 17:38 PDT, on deck at 17:46 PDT.

This is SIO instrument number 3.

J73A recorded data for duration of deployment (18.6 Gbytes).

Data from this site, J73A was not embargoed by the Navy.

Begin transit to J43A. ETA 9:45 PDT.

Day 3: Monday July 16, 2012--(recovered J43A, J44A, J36A)

The Navy-SAIC representative informed that the data that will be provided immediately will be missing 10 seconds of data per day because of the filtering process. The unfiltered data will be returned to CIET and the community once the data has been reviewed and any sensitive sections of the dataset have been redacted.

Seas remain calm, 3-6 foot swells, winds 7 knts out of the north.

Transiting to **J43A**, arrive on station at 09:50 PDT. Instrument is located at 46° 8.270N 126° 10.325'W depth = 2654 m. Instrument released at 10:10 PDT, at surface at 10:57 PDT, on deck by 11:38 PDT.

SIO OBS number 001.

J43A recorded data for the duration of the deployment (18.5 Gbytes)

Data will be reviewed and held by the Navy using established NSF-Navy protocols. Data will be released back to the CIET after 90 days.

J43A recovered position: 46° 8.270'N 126° 10.325'W depth=2654 m

Begin transit to next site J44A ETA PDT. Arrived at site **J44A** at 15:40 PDT . Winds out of the north 2 knts, swell 3-6 feet.

Instrument released at 15:45 PDT, at surface at 16:50 PDT, on deck at 17:03 PDT.

This is SIO OBS instrument number 5.

J44A all data (18.6 Gbytes) was recorded for the duration of the deployment.

Data will be reviewed and held by the Navy using established NSF-Navy protocols. Data will be released back to the CIET after 90 days.

J44A surveyed position: 46° 19.382'N, 127° 2.340'W, depth = 2724 m

Begin transit to **J36A** at 17:10 PDT, arrive at site at 21:25 PDT.

Seas are calm, foot swell. Winds are light at 11 knts out of the north.

This is SIO instrument number 002.

J36A enabled at 21:26PDT, at surface 22:10 PDT, on deck at 22:35PDT.

J36A recorded data during entire deployment (18.6 Gbytes)

Data will be reviewed and held by the Navy using established NSF-Navy protocols. Data will be released back to the CIET after 90 days.

J36A recovered position: 45° 41.132'N, 127° 7.350'W, depth = 2821 m

10:45 PDT, begin transit to J35A, arrive on site at 03:00 PDT

Day 4 : Tuesday July 17, 2012 – (Recovered J35A, M08A)

Arrive on site at **J35A** at 0330 PDT. The winds are ~7 knts out of northwest, seas 3-6 foot swell.

Instrument was released at 04:50 PDT, on board at 04:59 PDT.
SIO instrument number 009.

J35A instrument recorded data for the entire deployments (18.6 Gbytes).

Data will be reviewed and held by the Navy using established NSF-Navy protocols. Data will be released back to the CIET after 90 days.

J35A recovered position: 45° 29.934'N 126° 16.007'W, depth = 2663 m

Begin transit to next position **M08A** at 05:10 PDT.

Arrive on site at 15:27 PDT,. Winds are 3 knts out of the northeast, swells 2-4 feet.

Enabled at 15:28 PDT. Released at 15:35 PDT. On deck at 15:54 PDT

SIO Instrument number 006.

M08A recorded data for the duration of the deployment (18.5 Gbytes) ?

Data from M08A will not be embargoed by the Navy.

M08A recovered position: 44° 7.124'N, 124° 54.721'W, depth = 126 m

17:00 PDT begin transit to next site **J25A**. ETA 18:30 PDT

On site at 18:35 PDT. Winds at 4 knts out of northwest, seas 3-6 feet.

OBS enabled at 18:35 PDT, released at 18:37 PDT, at surface at 18:45 PDT.

On deck at 18:55 PDT.

J25A recorded data for the duration of the deployment (18.5 Gbytes) ?

Data from J25A will not be embargoed by the Navy.

J25A recovered position: 44° 28.371'N, 124° 37.297'W, depth = 142 m

Begin transit to final recovery site, J33A.

Arrive at J33A at 23:40 PDT. Wind out of northeast at 2 knts, swells 2-4 feet. SIO engineers performed a survey of the instrument location to test their Workboat software. Test survey required ~1.5 hours.

Day 4 : Wednesday July 18, 2012 - (J33A)

OBS released at 01:05 PDT, OBS at surface at

This is SIO instrument number 10.

J33A recorded data for the duration of the deployment (18.5 Gbytes) ?

Data from J33A will not be embargoed by the Navy.

J33A recovered position: 44° 28.371'N, 124° 37.297'W, depth = 142 m

This is final mooring. Begin transit to Newport at 18:30 PDT.

Arrive Newport at NOAA dock at 08:00 PDT.

Table 1: SIO OBS Abalone Data Characteristics

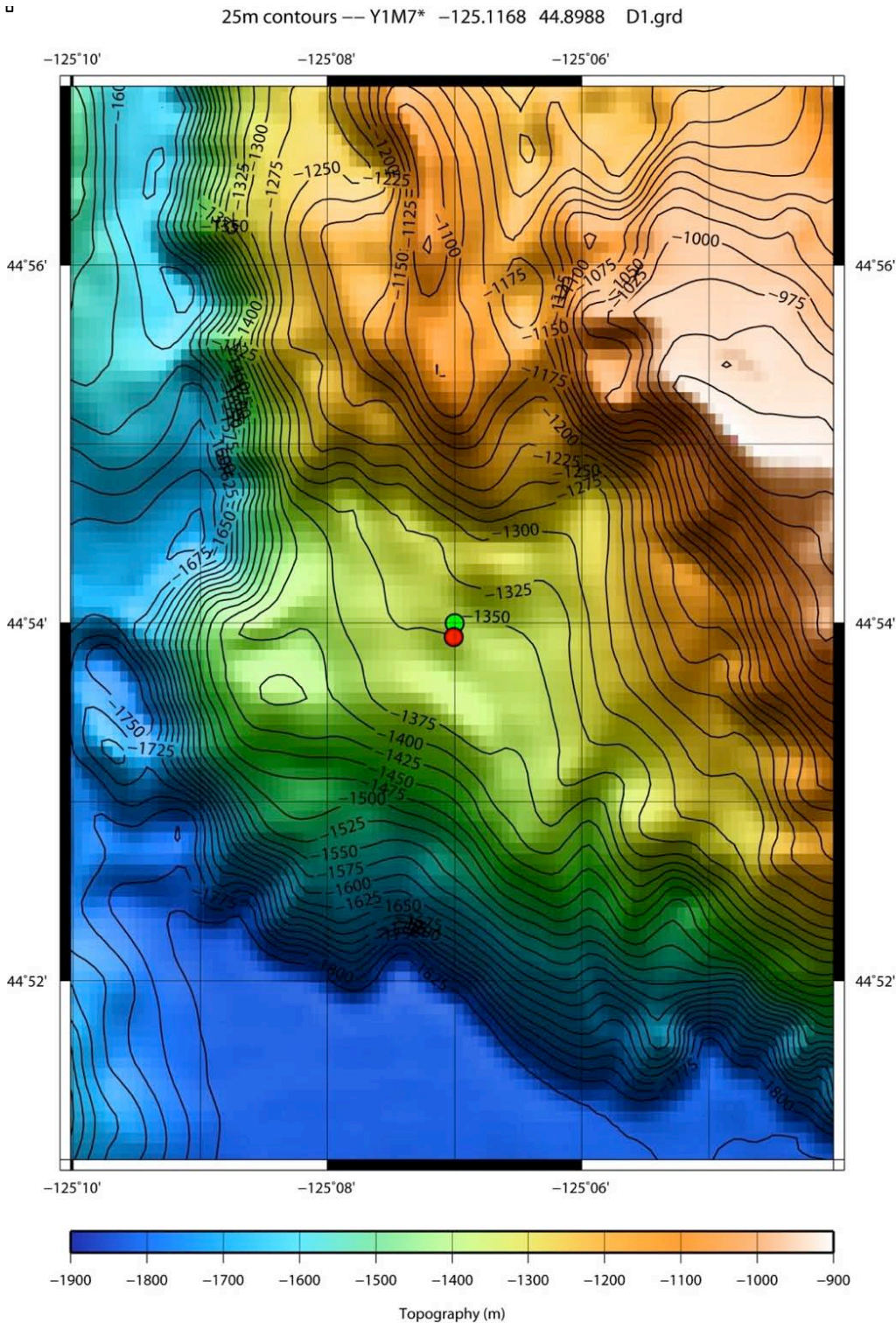
Recovery Number	Site Name	Data Logger	CF Card	Frame	Trillum	DPG	CPU Clock Sync (only active if batteries do not fail)		Difference between CPU Recovery Time and CPU Sync Time	CPU Time Tag (Hex Count of 32,768,000 Clock Ticks From Recovery to Sync)	Drift (seconds)	Drift (with leap second removed) (seconds)
							CPU Sync	CPU Recovery Time				
1	M07A	1	16	15	7	2011-09-0004	2011:288:28:10:00	2012:196:19:9:00	2726:20h:49m:00s	0x2B8E99E49F293	2.291899138	1.291899138
2	J33A	8	3	16	13	7	2011:289:04:07:00	2012:200:08:4:00	2766:04h:34m:00s	0x2C72B0856738A	-1.516902648	-2.516902648
3	M05P	10	16	16	11	2011-09-0003	2011:290:00:00:00	Not Possible	Not Possible	Not Possible	Not Possible	Not Possible
4	J57A	2	11	7	2	2011-09-0002	2011:290:17:13:00	2012:196:22:47:00	2716:09h:34m:00s	0x2BA60977739F6	0.430405945	-0.369594055
5	M05A	10	16	16	11	2011-09-0003	2011:290:00:00:00	Not Possible	Not Possible	Not Possible	Not Possible	Not Possible
6	J65A	No Mark #2	13	13	13	7	2011:290:22:31:00	2012:197:07:21:00	2716:08h:50m:00s	0x2BAC046E5D564	4.341332886	3.341332886
7	M05B	7	16	4	16	7	2011:291:00:00:00	2012:197:12:00:00	2706:09h:30m:00s	0x2BA216079345C	0.810000001	-1.199999999
8	J73A	9	14	3	T003014	7	2011:291:03:52:00	2012:198:00:59:00	2716:21h:07m:00s	0x2BC11AF5905CD	-0.499045318	-1.499045318
9	M01A	5	10	8	3	9	2011:291:04:54:00	2012:197:21:24:00	2716:16h:30m:00s	0x2B892E55C09F6	-1.912030946	-2.912030946
10	J44A	12	7	5	5	10	2011:292:19:12:00	2012:199:00:12:00	2716:09h:00m:00s	0x2BA5703E30929	1.208303437	0.208303437
11	J36A	4	8	2	9	12	2011:292:20:07:00	2012:199:05:42:00	2716:09h:39m:00s	0x2BA0468E0AE50	-0.059361815	-1.059361815
12	J43A	11	2	1	7	13	2011:292:21:28:00	2012:198:18:41:00	2716:21h:16m:00s	0x2B082A4746351	-2.664775908	-3.664775908
13	J35A	3	5	9	11	8	2011:292:23:25:00	2012:198:12:07:00	2716:12h:42m:00s	0x2B82A7FC812C7	1.583853301	0.583853301
14	M08A	6	4	6	10	11	2011:293:23:50:00	2012:199:23:00:00	2706:23h:16m:00s	0x2B9898E5399E4	-0.294444457	-1.294444457
15	J25A	13	9	11	12	1	2011:294:04:26:00	2012:200:02:08:00	2706:23h:42m:00s	0x2B98C87839008	-0.807194911	-1.807194911

* = FILTERED DATA ONLY (Navy Approved). We are not allowed any type of unfiltered data.

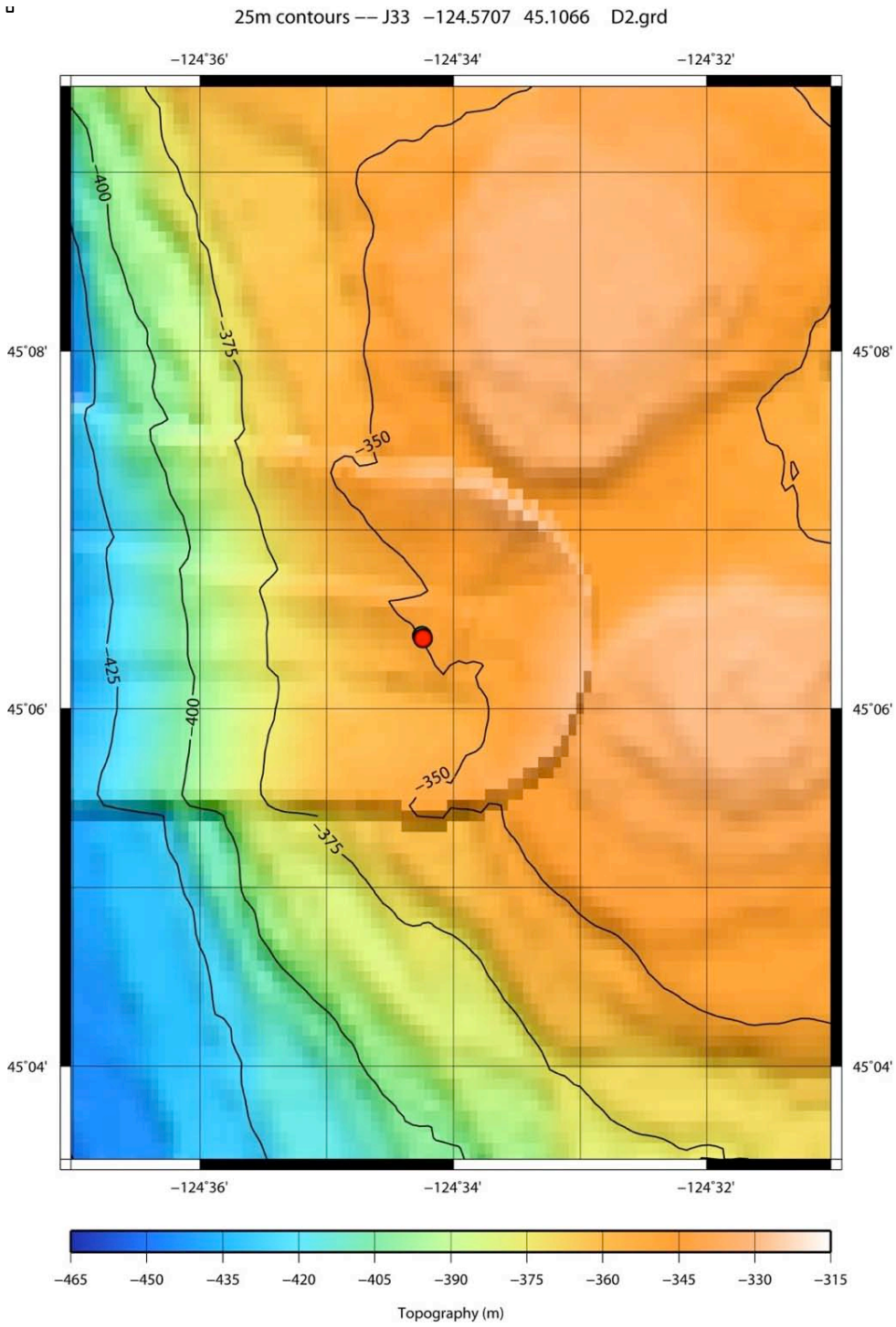
Lat	Lon	Water Depth	Num Channels	SPS	Gain 1 (X)	Gain 2 (Y)	Gain 3 (Z)	Gain 4 (DPG)	File Sizes	Status			
53.0252	44.8967533	-125	7,005	-125.11662	1366.5	4	50	1	1	1	64	18.6 GB	OK. Lost trillum sensor.
6.3972	45.10662	-124	34,2473	-124.57073	348.7	4	50	1	1	1	64	18.9 GB	OK. Noisy. Black errors in early part of raw data - removed ~30 minutes (2000 blocks) of data from start of logger.
29.6376	76.3734	-124	26,8192	-124.89373	526.2	4	50	1	1	1	64	18.7 GB	OK. Data - There is something present, but it is unreliable. SP data had large device saturation - likely to extract info if possible.
4.8059	47.0800863	-124	27,0276	-124.45046	55.3	4	50	1	1	1	64	18.6 GB	OK
29.6376	76.3734	-124	26,8192	-124.89373	526.2	4	50	1	1	1	64	18.7 GB	OK
53.4800	47.8913439	-125	8,3776	-125.13963	165.2	4	50	1	1	1	64	19.05 GB	OK
18.8333	45.5095	-126	36,2019	-126.20935	173	4	50	1	1	1	64	19.06 GB	Not Good - 3000sec coming in 293 (not 1000) - likely like trillum not powered (battery dead). Very low amplitude signal - not extractable. Data cut after analysis. DPG data background.
46.0607	48.7676789	-126	11,55	-126.1925	143.9	4	50	1	1	1	64	18.6 GB	OK. Single block issue - fixed. Data Cut and working.
9.0254	49.1504239	-126	43,3277	-126.72213	132.9	4	50	1	1	1	64	18.7 GB	OK. Z channel looks strange. Z and DPG are noisy - possibly due to shallow depth.
19.387	46.3230333	-127	2,3401	-127.039	2724.1	4	50	1	1	1	64	18.6 GB	OK. See periodic signal on X/Y - motors? (Not present on Z and DPG).
41.1315	45.685525	-127	7,35	-127.1225	2821	4	50	1	1	1	64	18.6 GB	OK. Noisy. Data collection started 3H after Sync.
8.2696	46.1378267	-126	10,325	-126.17208	2654.4	4	50	1	1	1	64	18.5 GB	OK
29.9399	45.4989989	-126	16,0069	-126.26678	2662	4	50	1	1	1	64	18.6 GB	OK
7.1297	44.1187289	-124	53,7209	-124.89599	126.4	4	50	1	1	1	64	18.6 GB	OK. Periodic signal on X/Y (see 2012:010) - Motor? Z is low amplitude (noisy). DPG saturates on occasion (2012:059). Shallow location causing this?
26.371	44.47285	-124	37,2960	-124.62161	142.8	4	50	1	1	1	64	18.6 GB	OK. X/Y saturate. Z is low amplitude and noisy. Shallow location causing this?

Appendix 1: Bathymetry of surveyed area. Green circles denotes target locations, red are surveyed locations. All contours are 25 m.

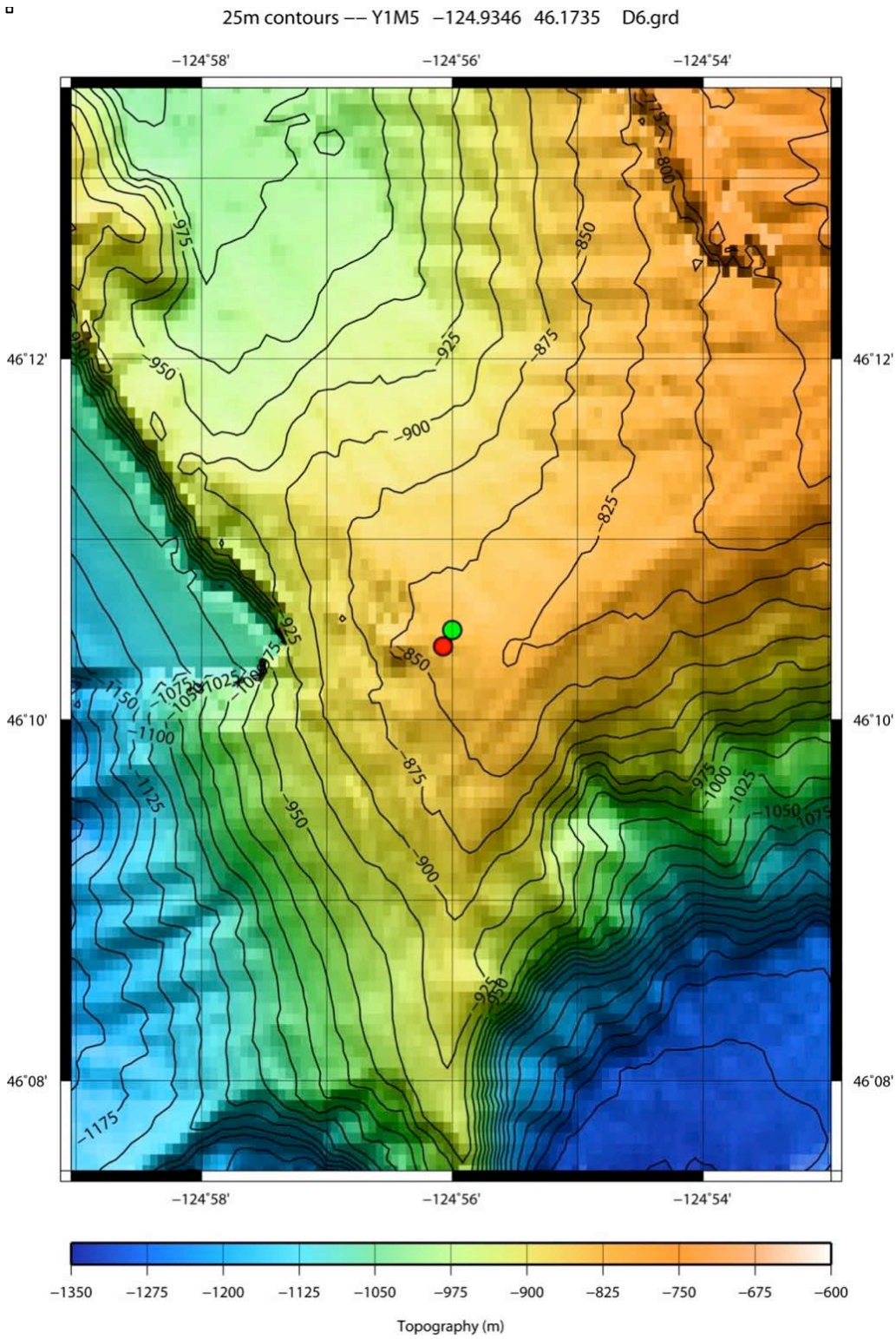
D1-Y1M7 Surveyed position: 44 53.9252N; 125 0.00089W depth = 1356.0



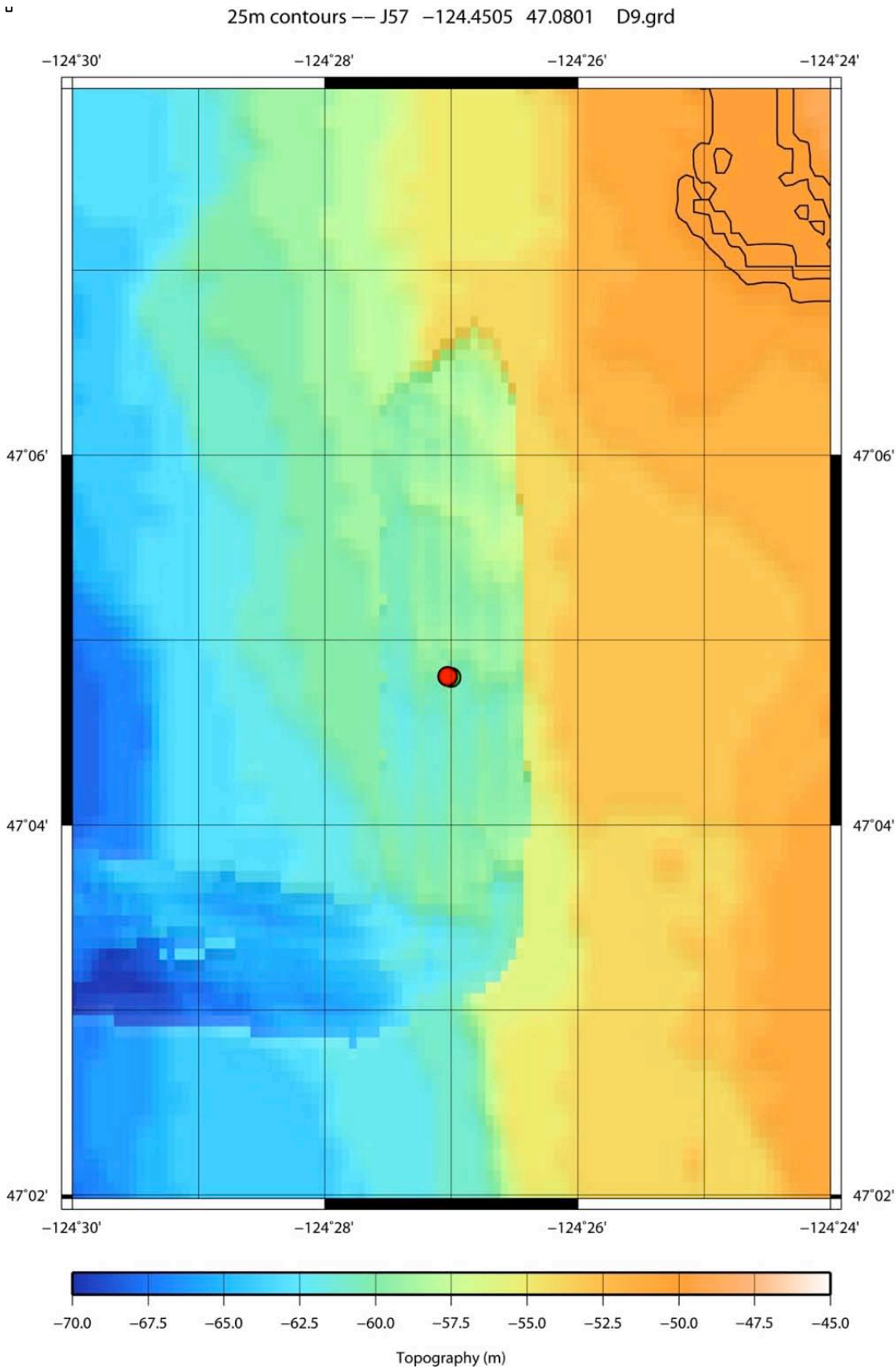
D2-J33 Surveyed position: 45 06,3972; 124 34.2473 depth = 348.0 m



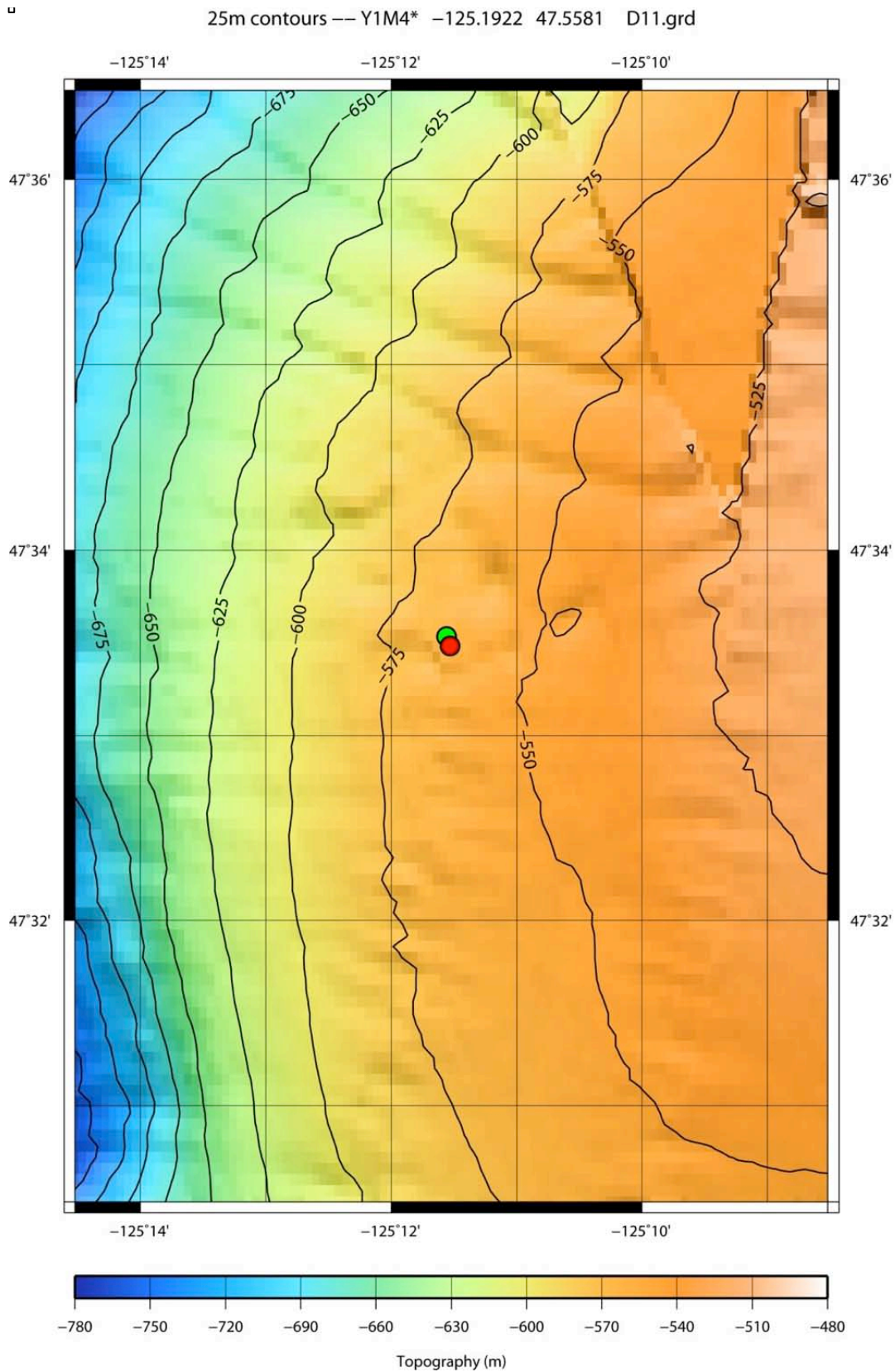
D6-Y1M5 surveyed position: 46 10.4076, 124 56.0743 depth= 828.2 m



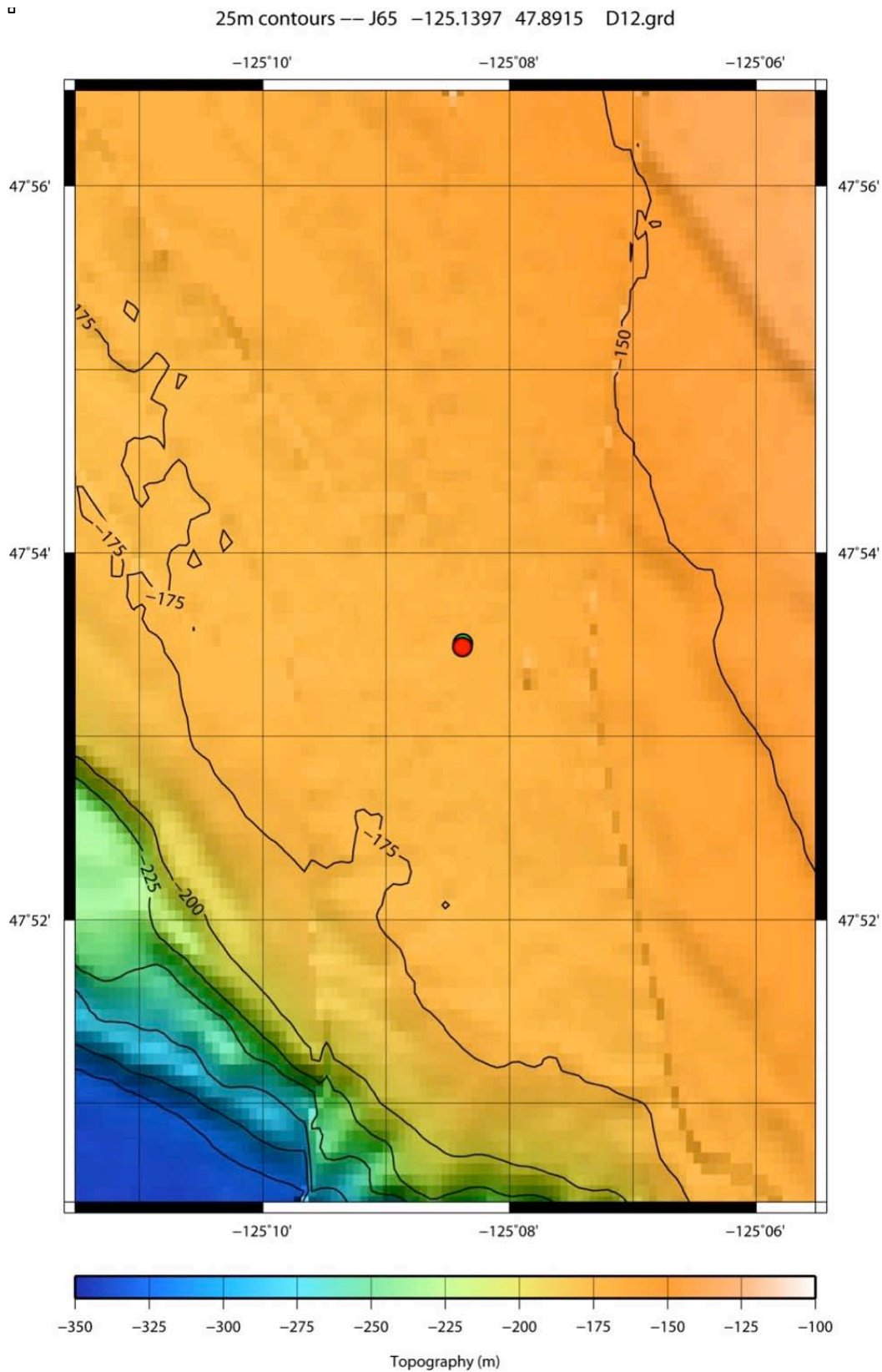
D9-J57 surveyed position: 47 04.8053, 124 27.0276W, depth = 55.8 m



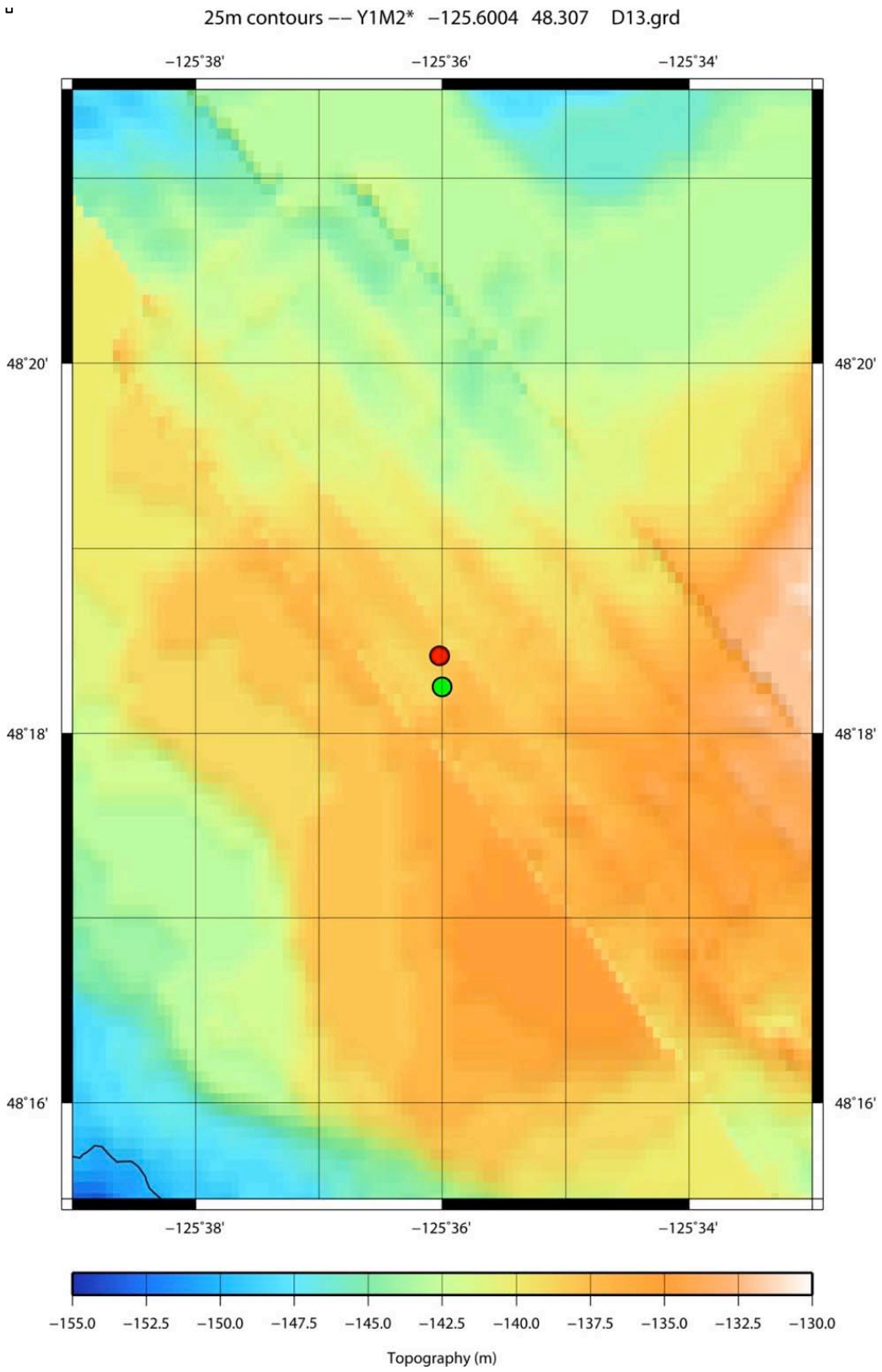
D11-Y1M4 surveyed position: 47 33.4855 125 11.5305, depth = 563.4 m



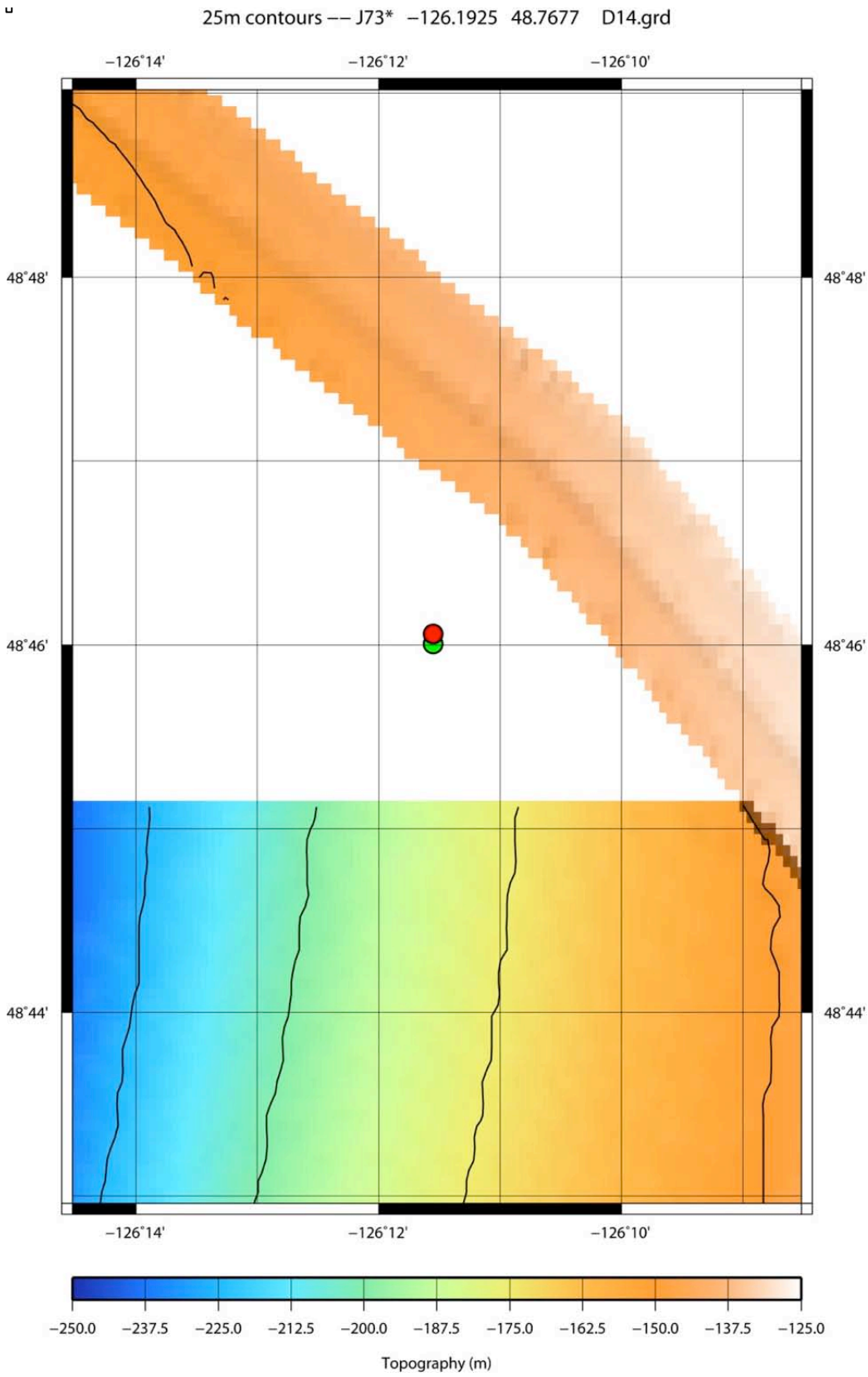
D12-J65 surveyed position: 47 53.4806N, 125 08.3776W, depth = 165.2 m



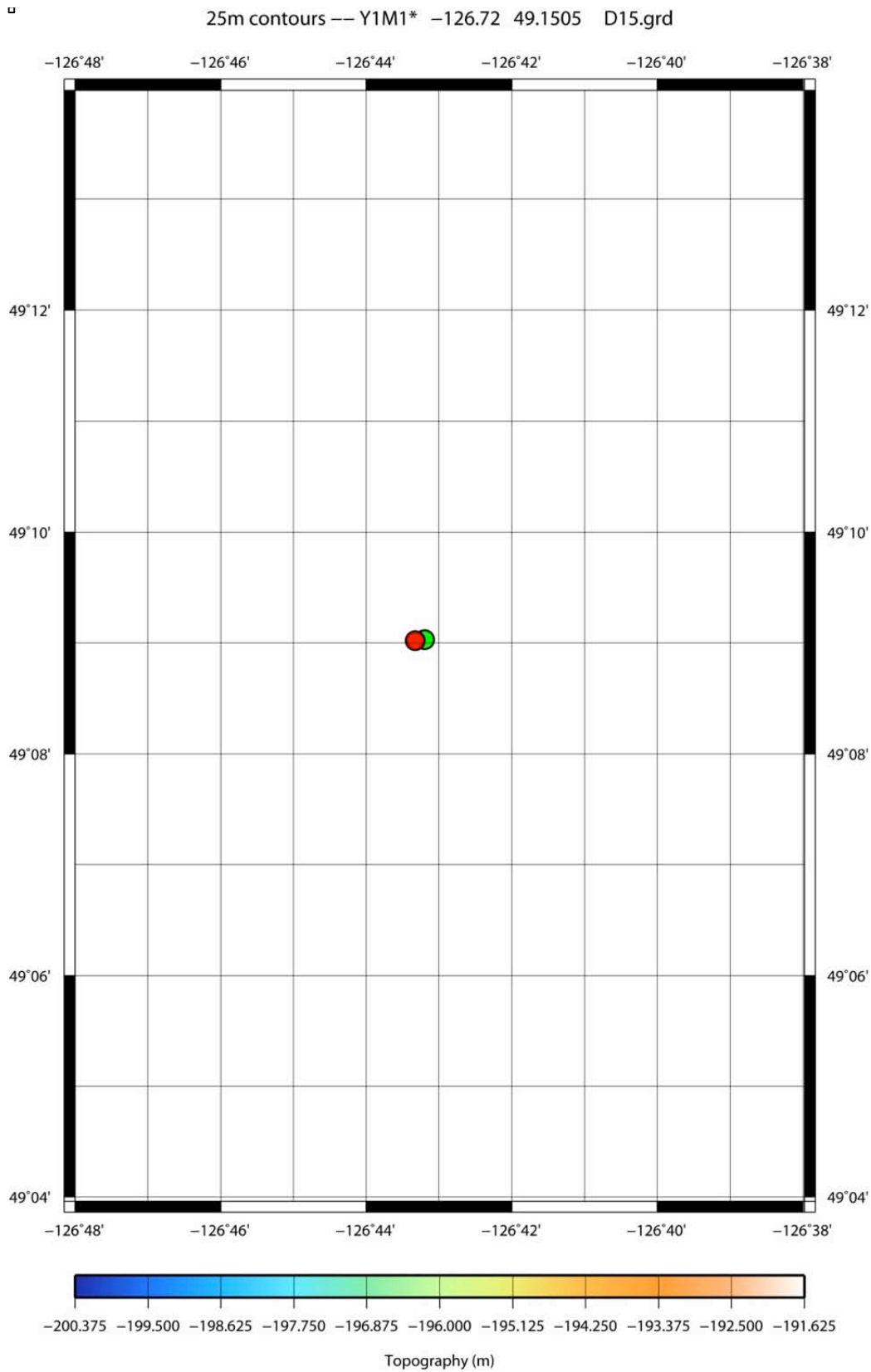
D13-Y1M2 surveyed position: 48 18.4194'N, 125 36.0236'W depth = 139.0 m



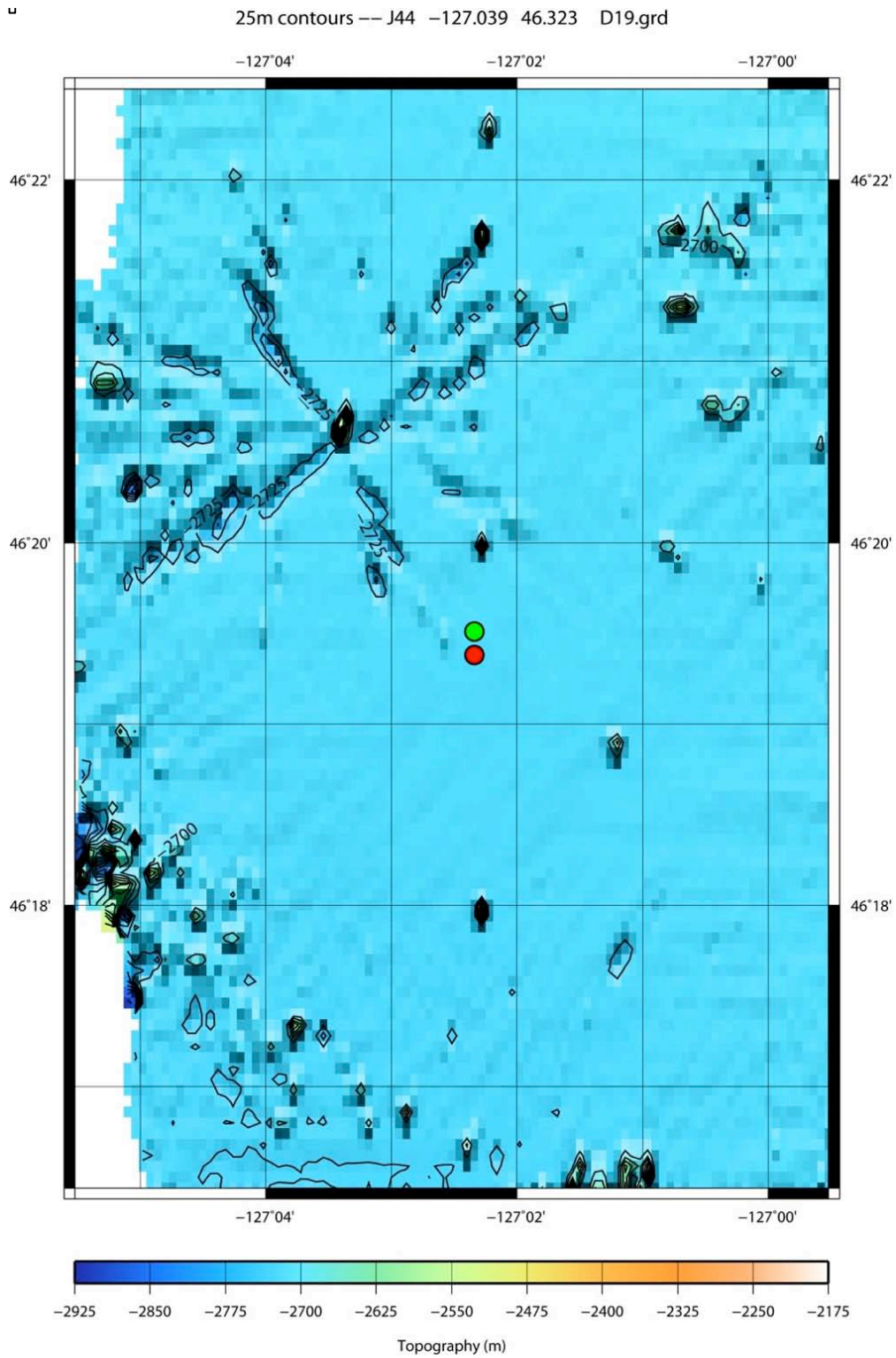
D14-J73 surveyed position: 48 46.0607'N, 126 11.550'W, depth = 143.0 m



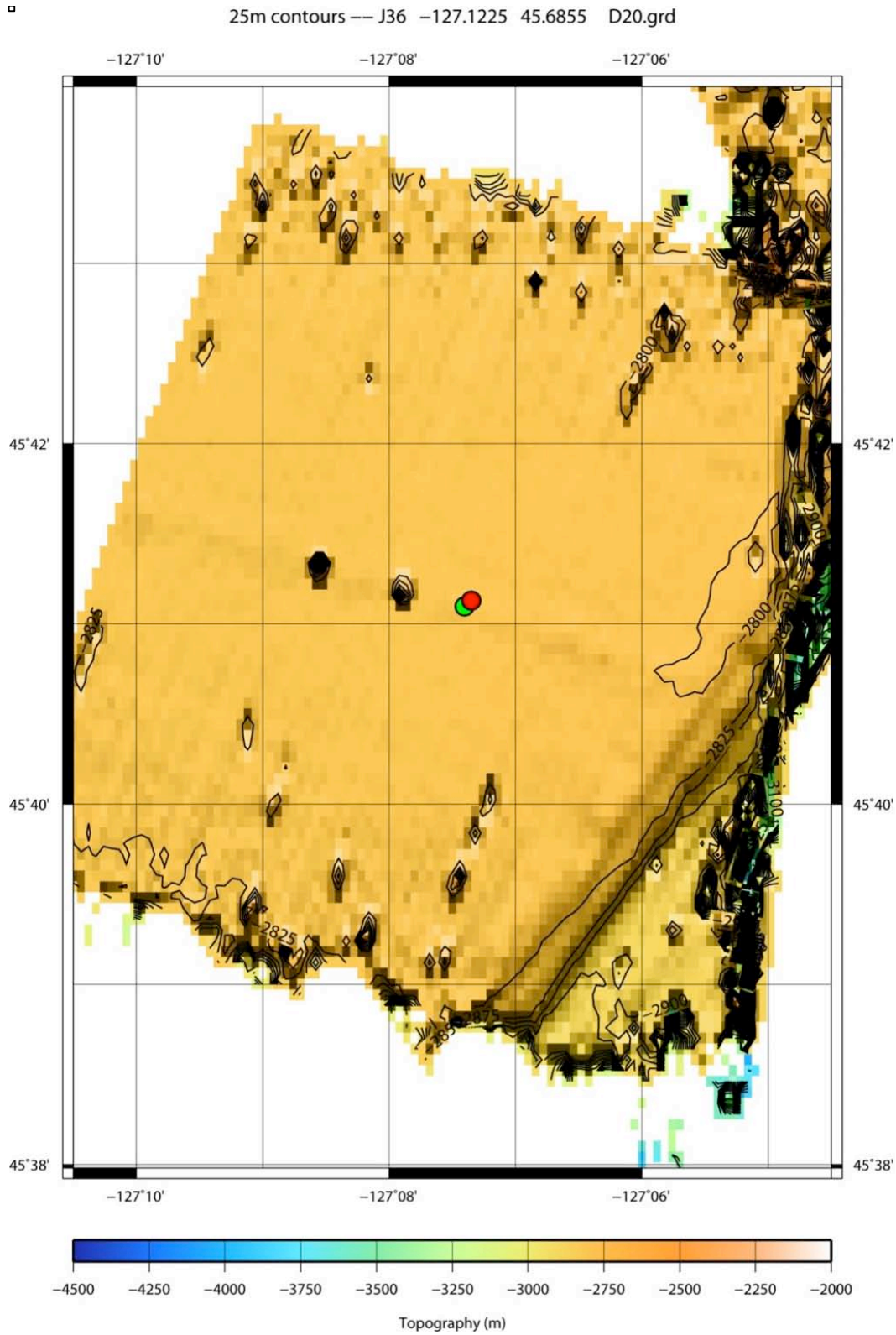
D15-Y1M1 surveyed position: 49 09.0254'N 126 43.3277'W depth = 133.0 m.



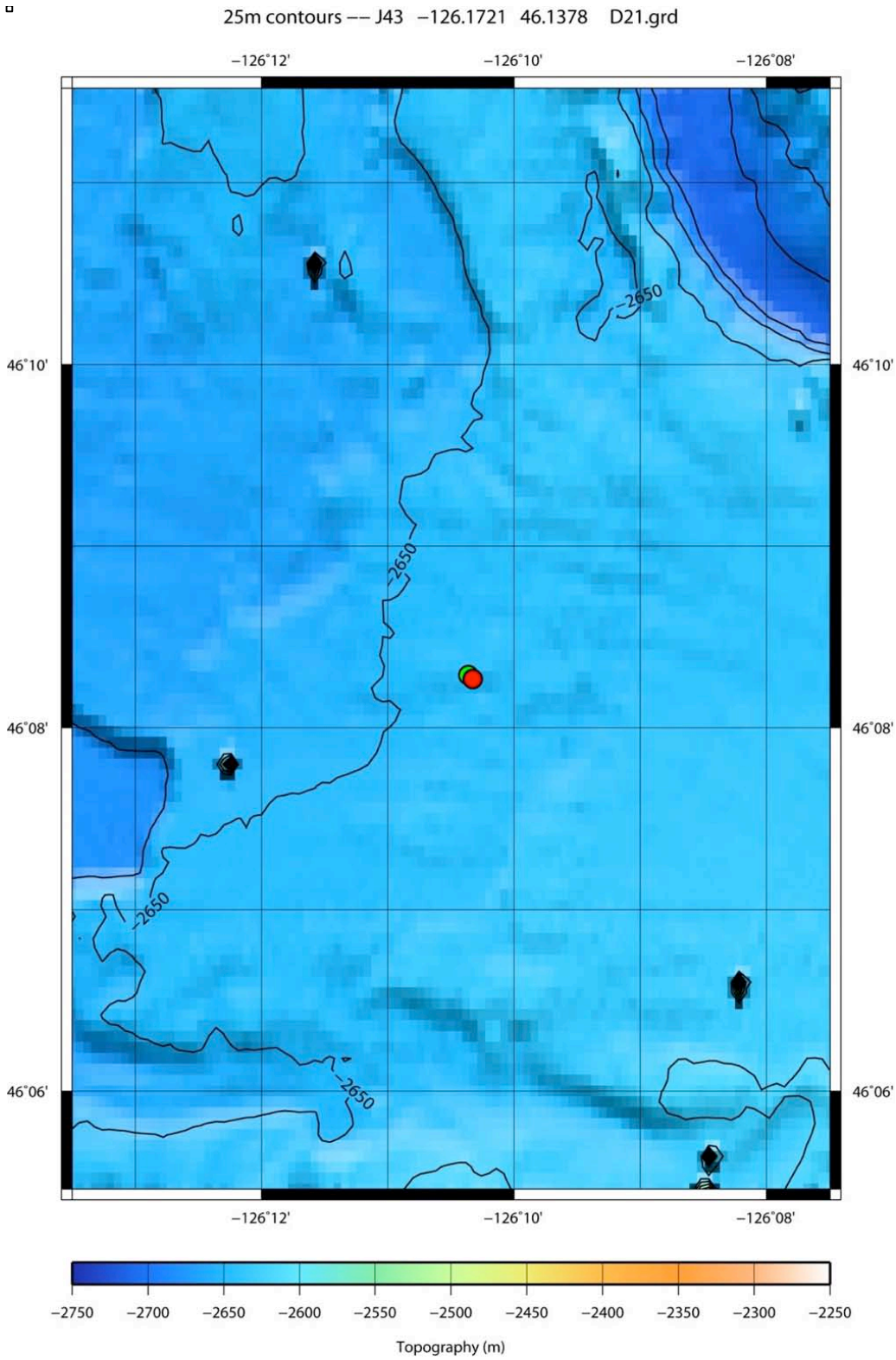
D19-J44 surveyed position: 46 19.3820'N 127 02.3401'W depth = 2724.0 m.



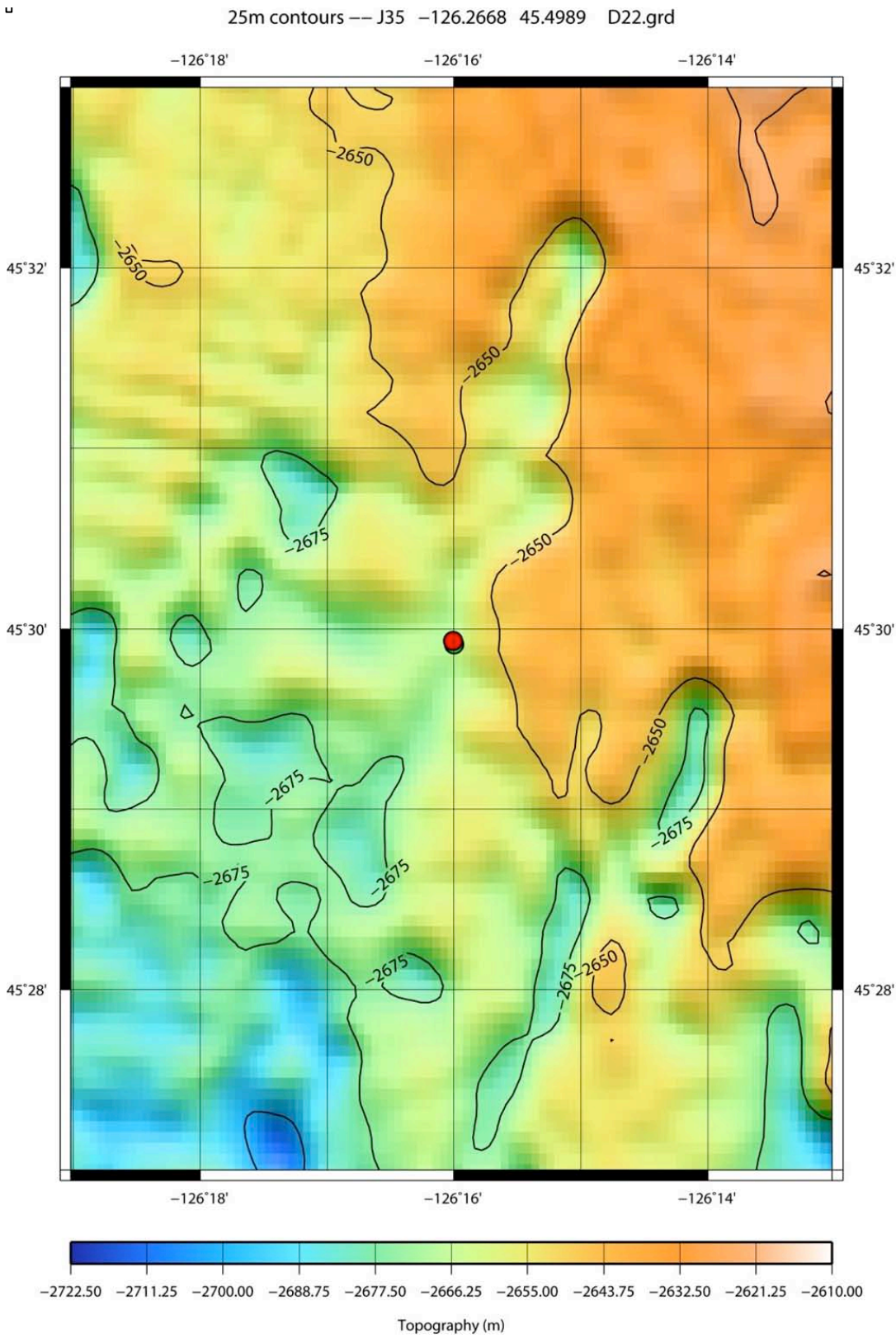
D20-J36 surveyed position: 45 41.1315'N 127 07.3500'W depth = 2821.0 m



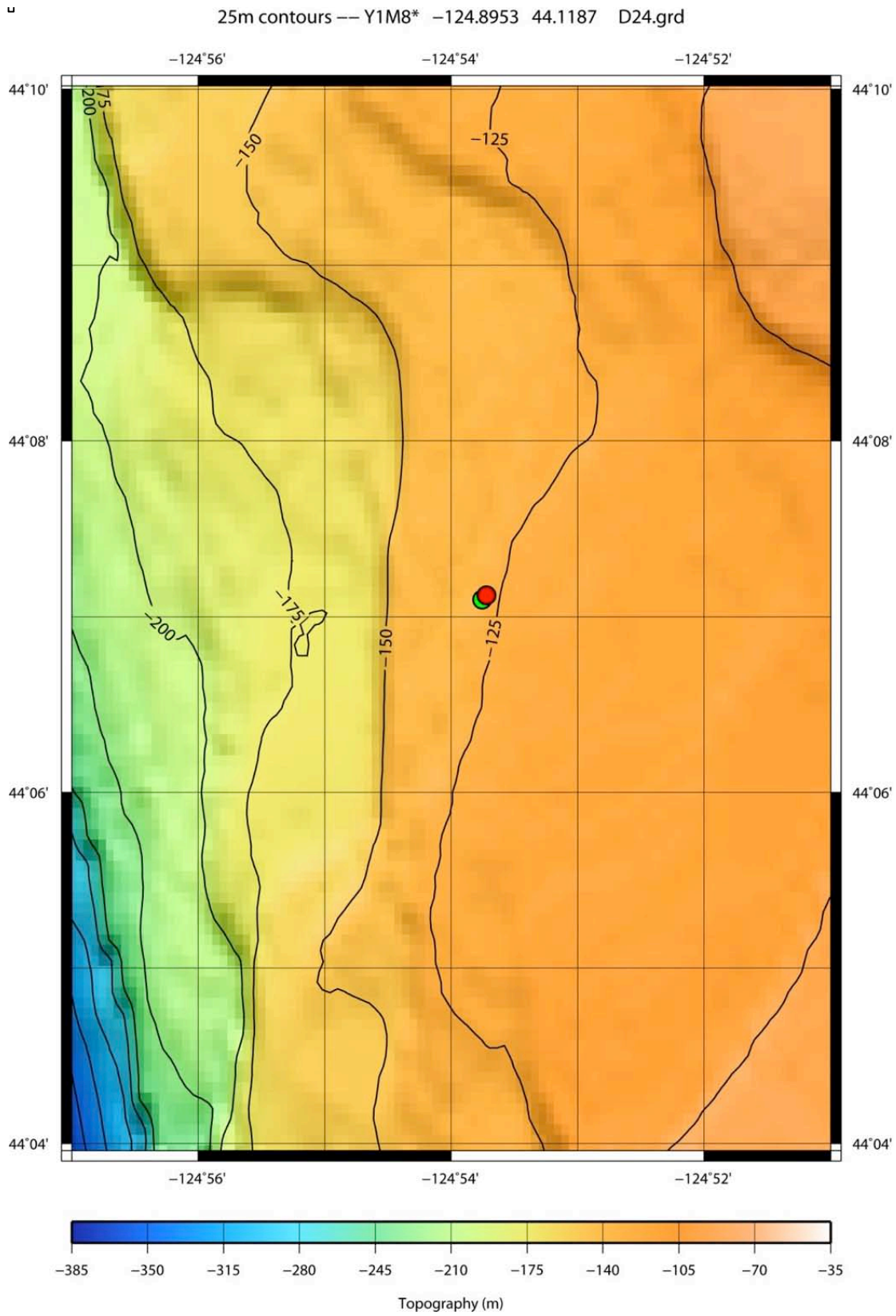
D21-J43 surveyed position: 46 08.2696'N 126 10.3250'W, depth = 2654.0 m.



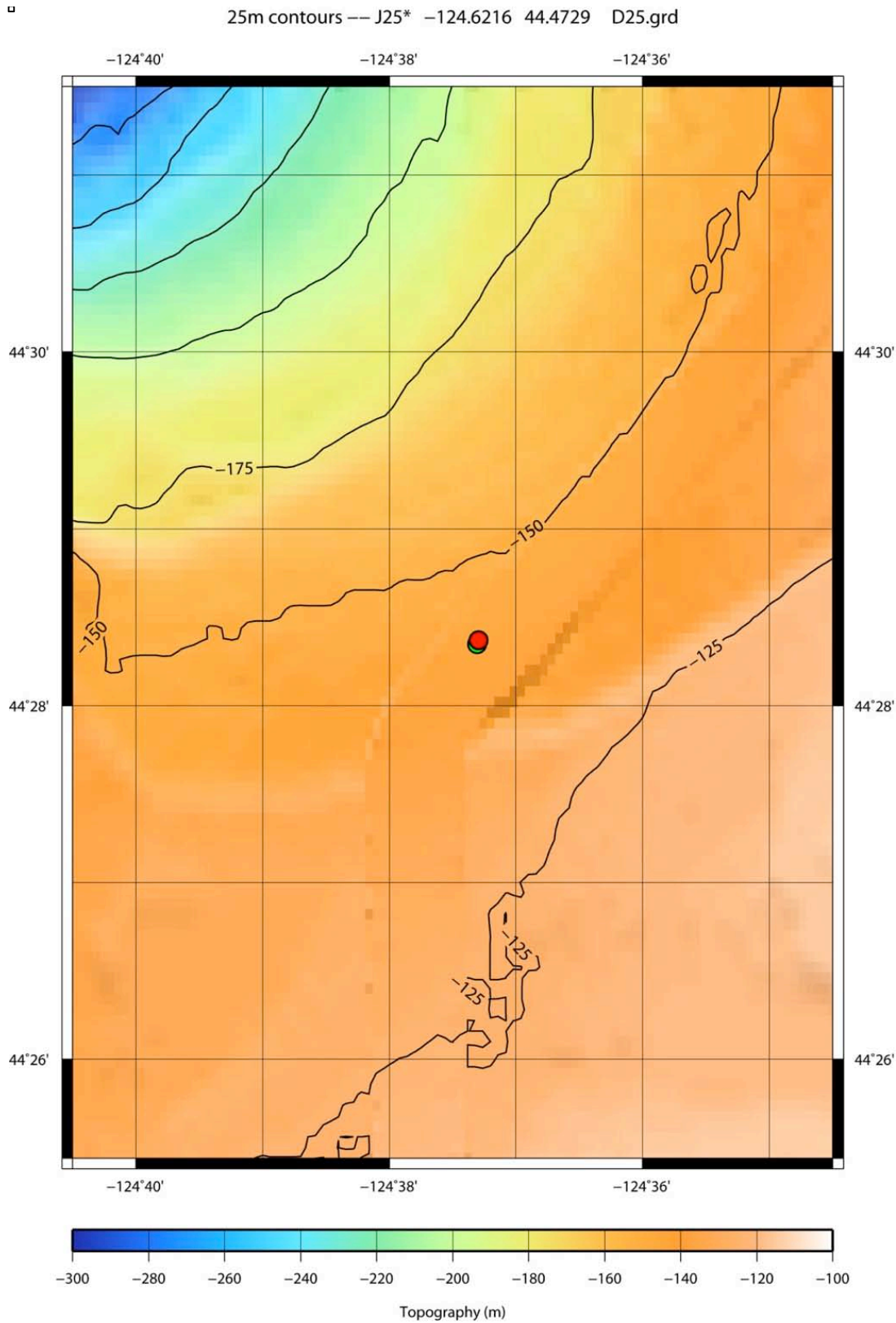
D22-J35 surveyed position: 45 29.9339'N 126 16.0069'W depth = 2662 m.



D24-Y1M8 surveyed position: 44 07.1237 124 53.7209'W, depth = 126.4 m.

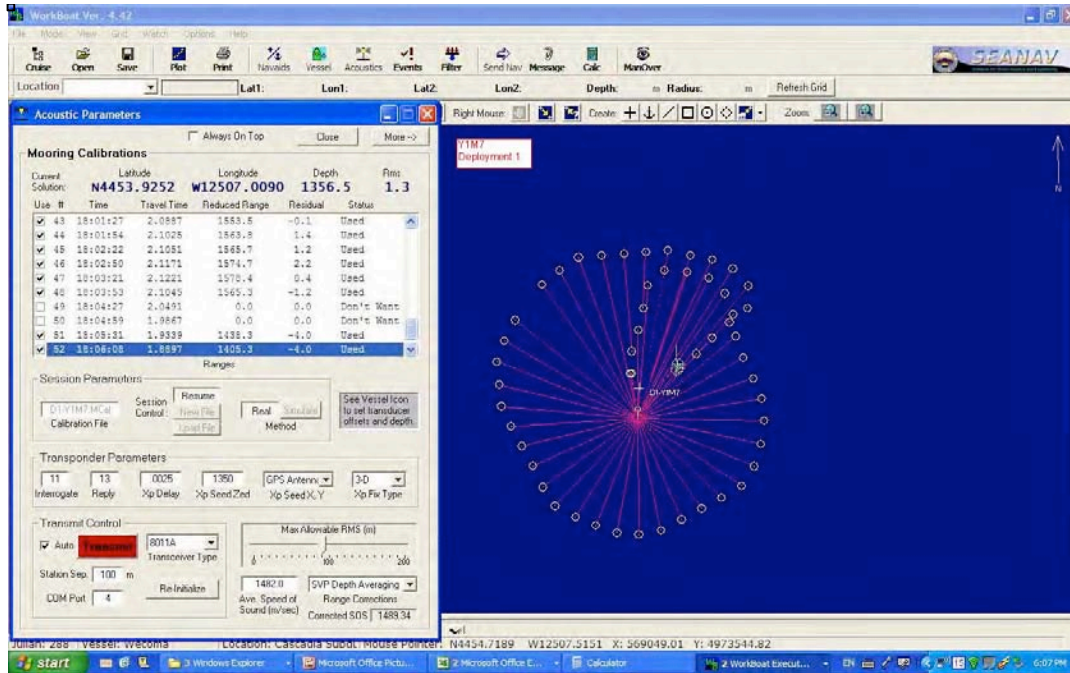


D25-J25 surveyed position: 44 28.3710'N 124 37.2968'W, depth = 143.0 m.

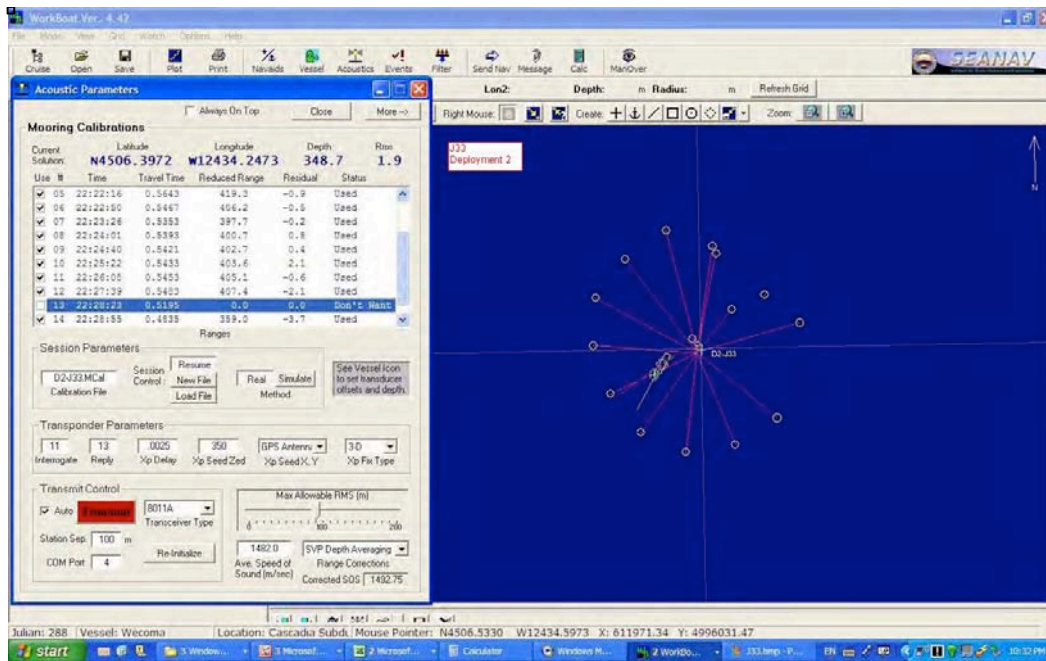


Appendix 2: Workboat survey solutions

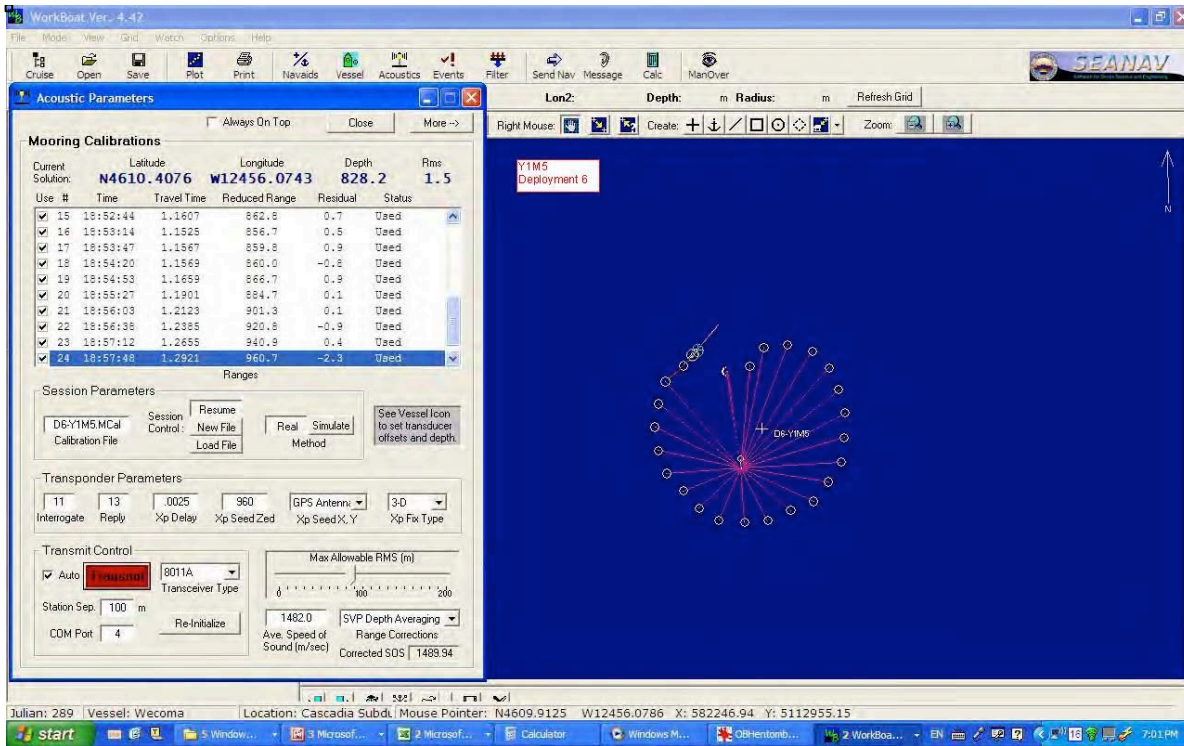
D1-Y1M7



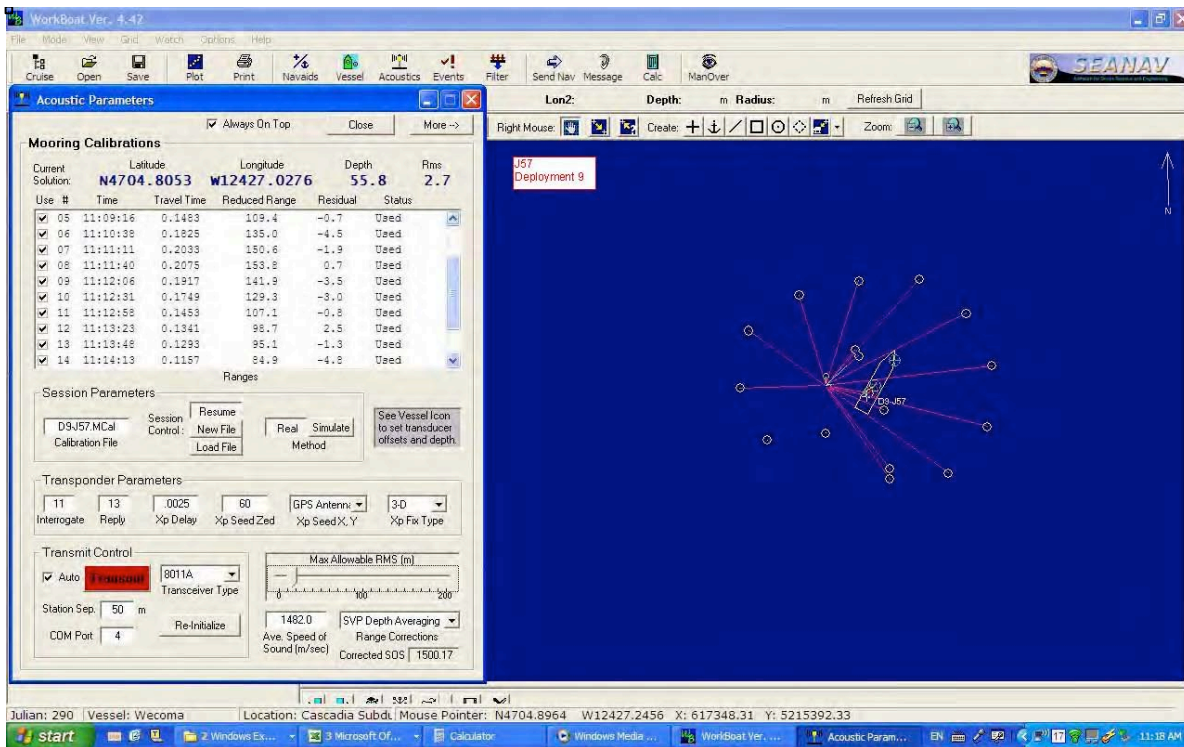
D2-J33



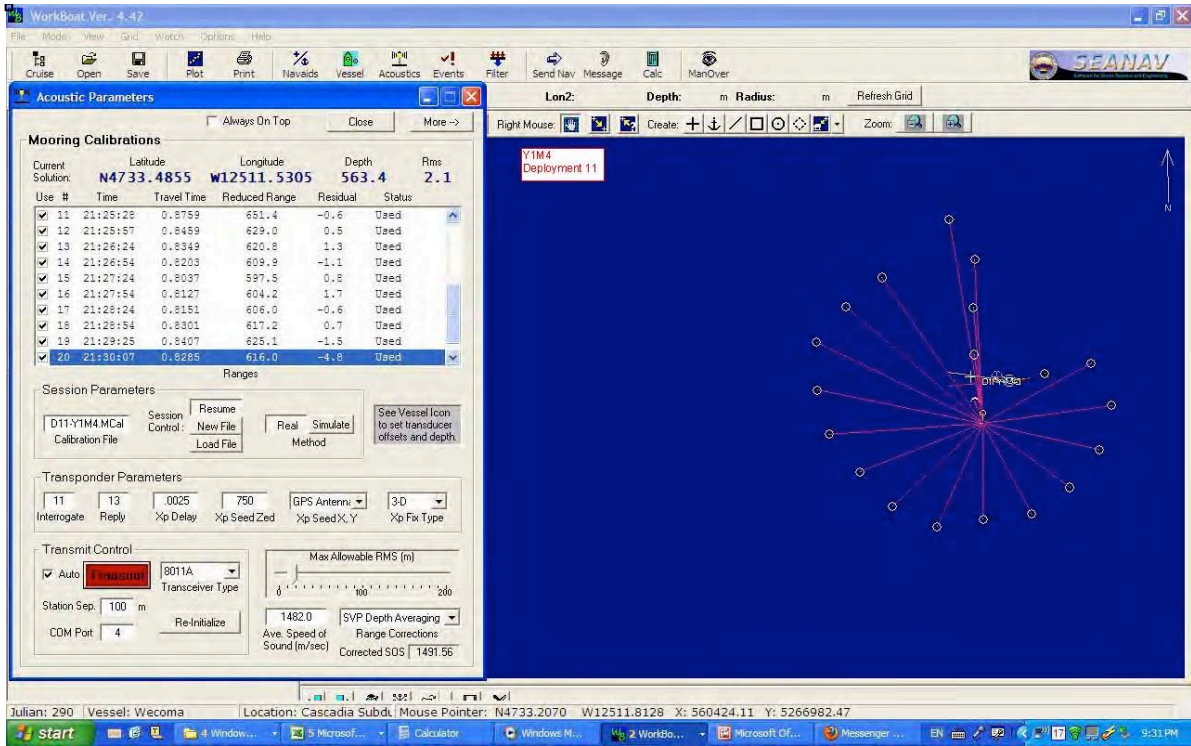
D6-Y1M5



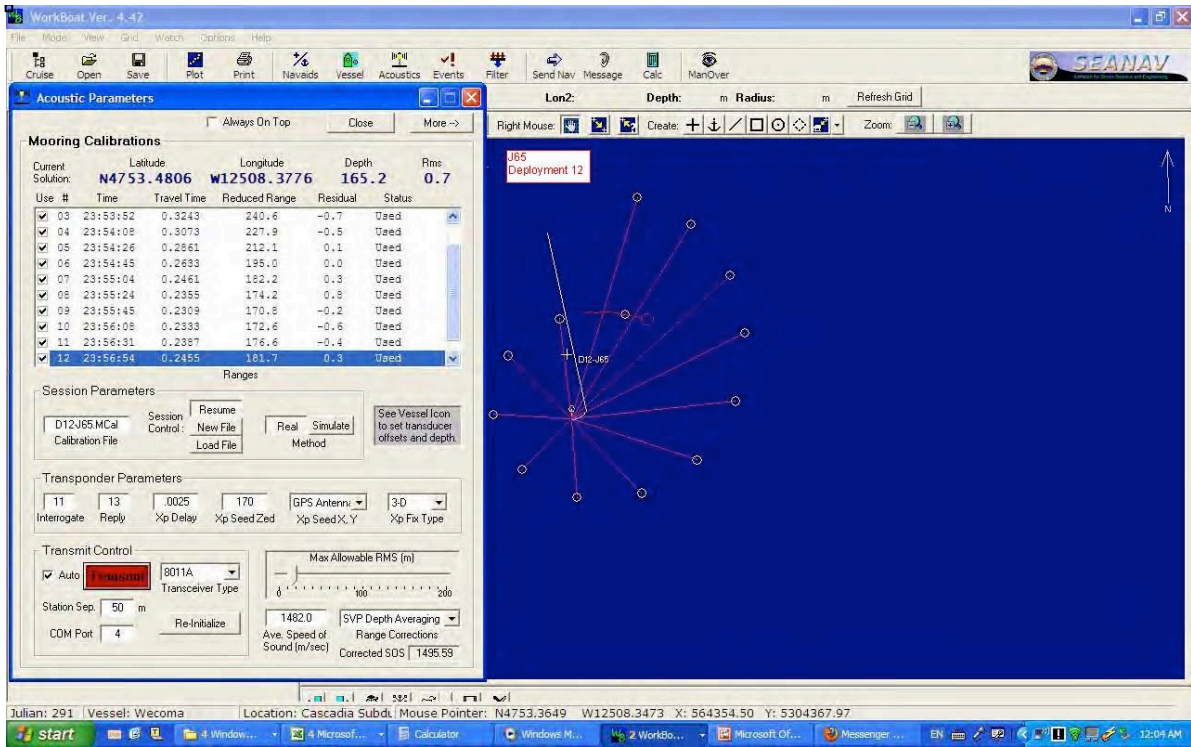
D9-J57



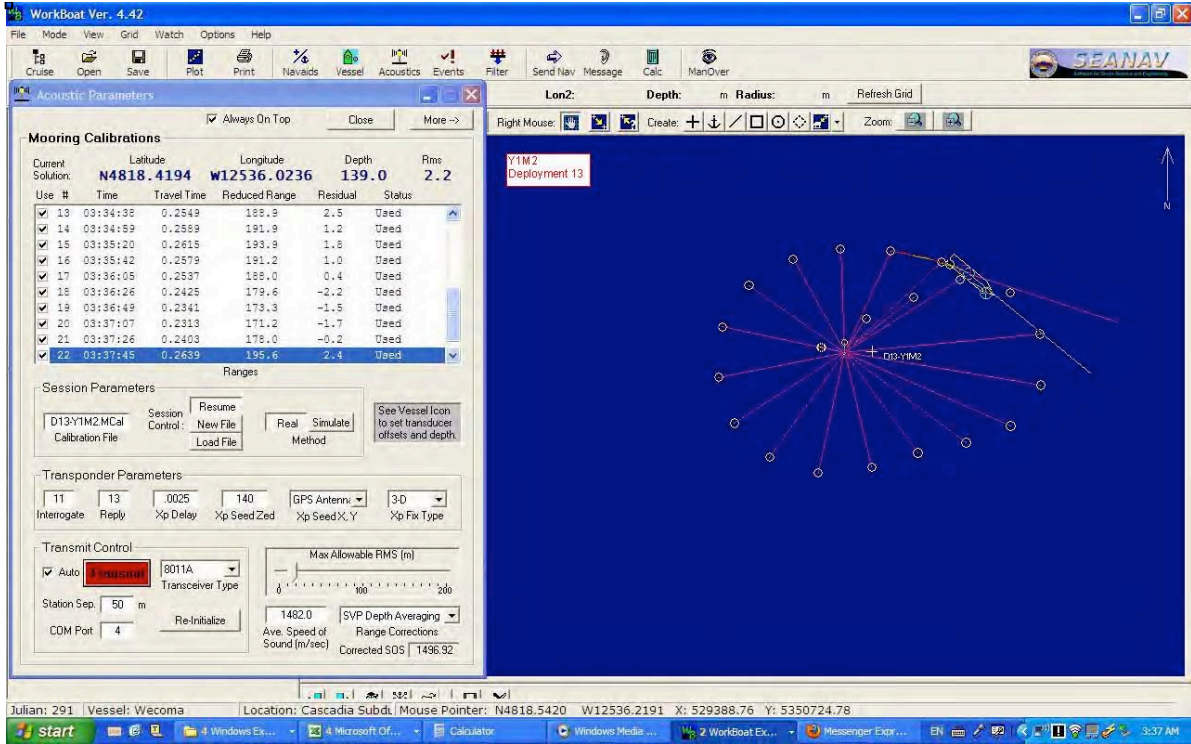
D11-Y1M4



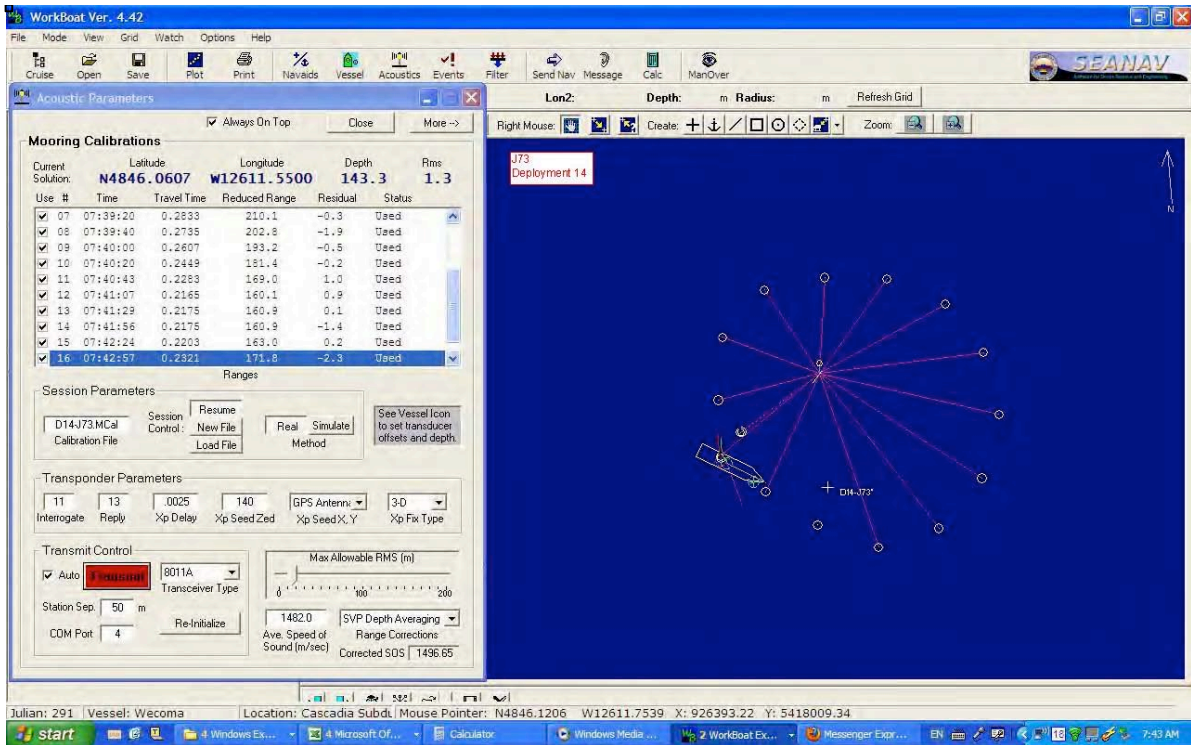
D12-J65



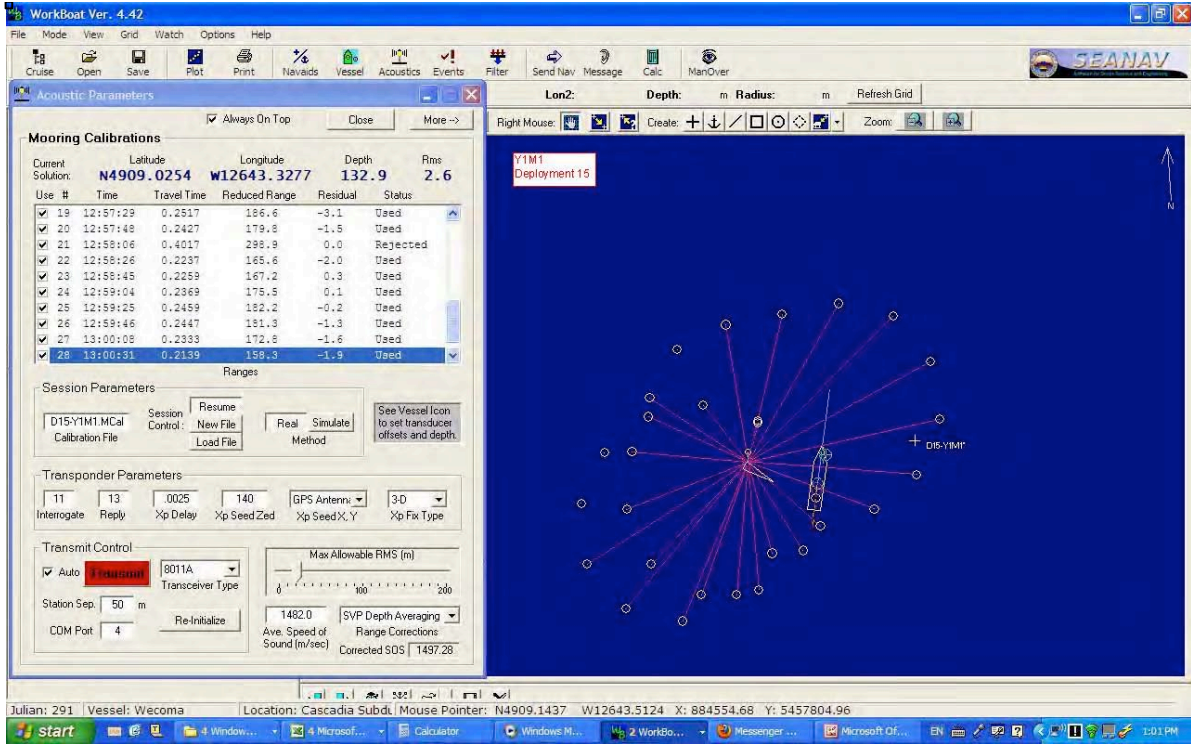
D13-Y1M2



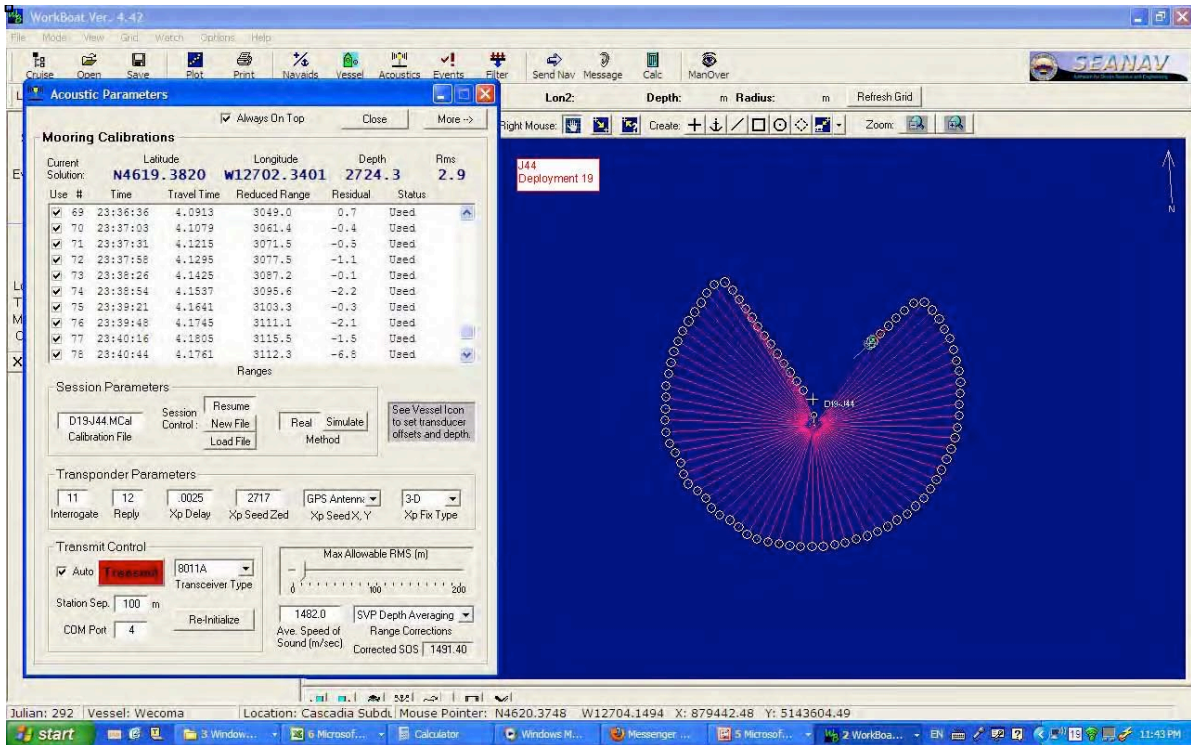
D14-J73



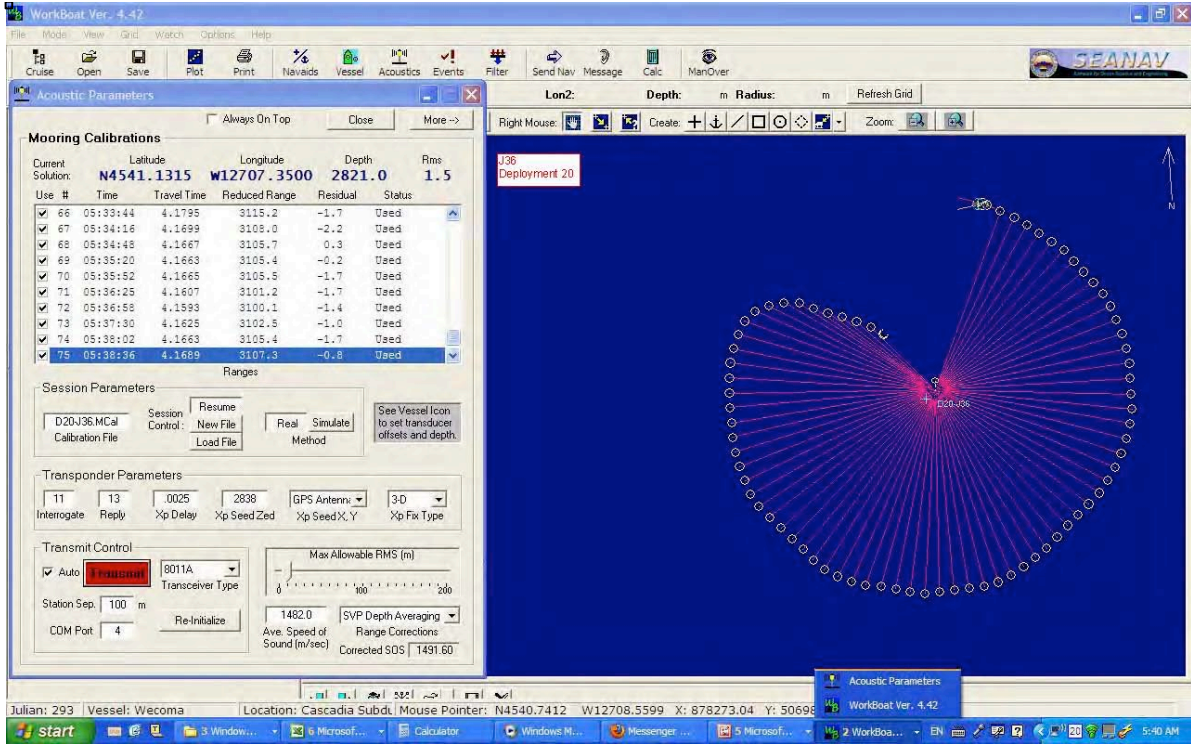
D15-Y1M1



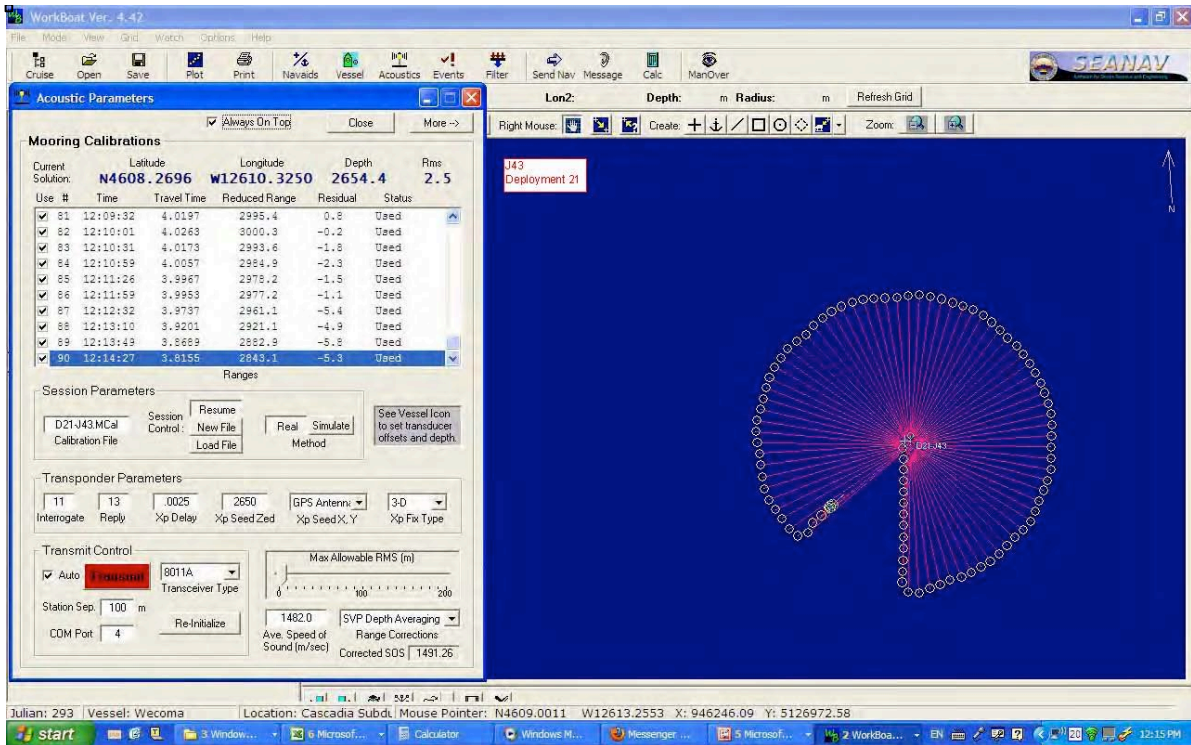
D19-J44



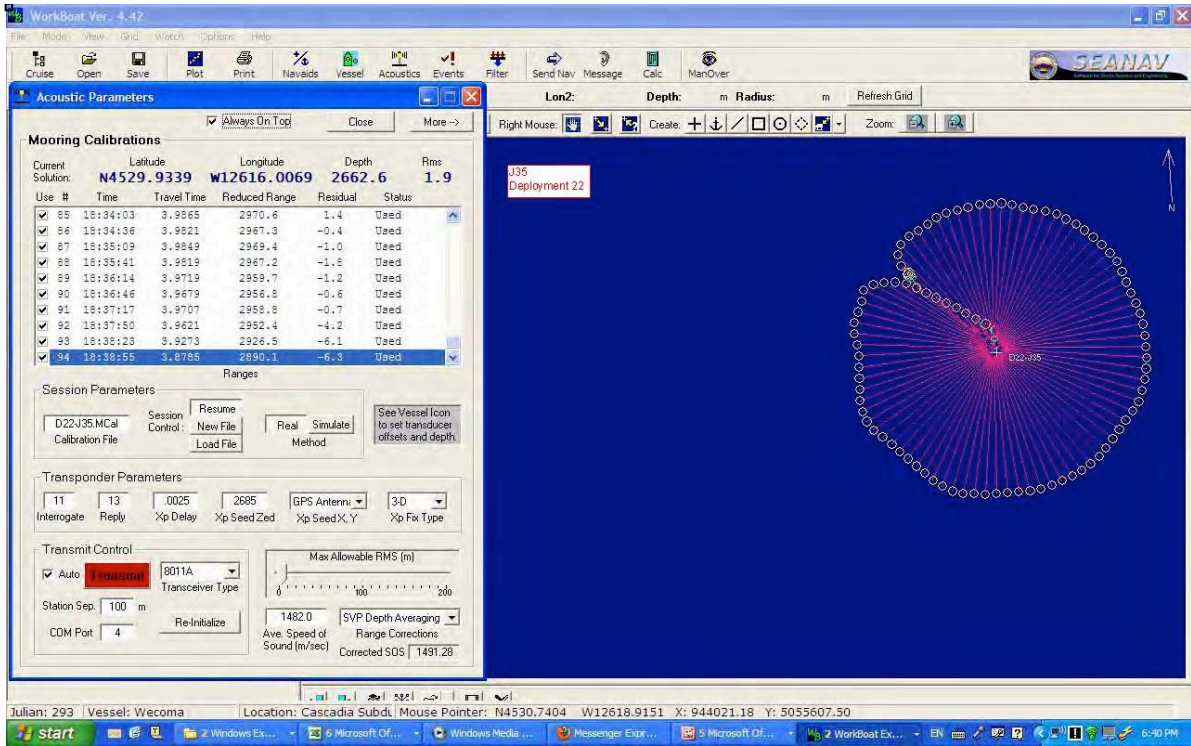
D20-J36



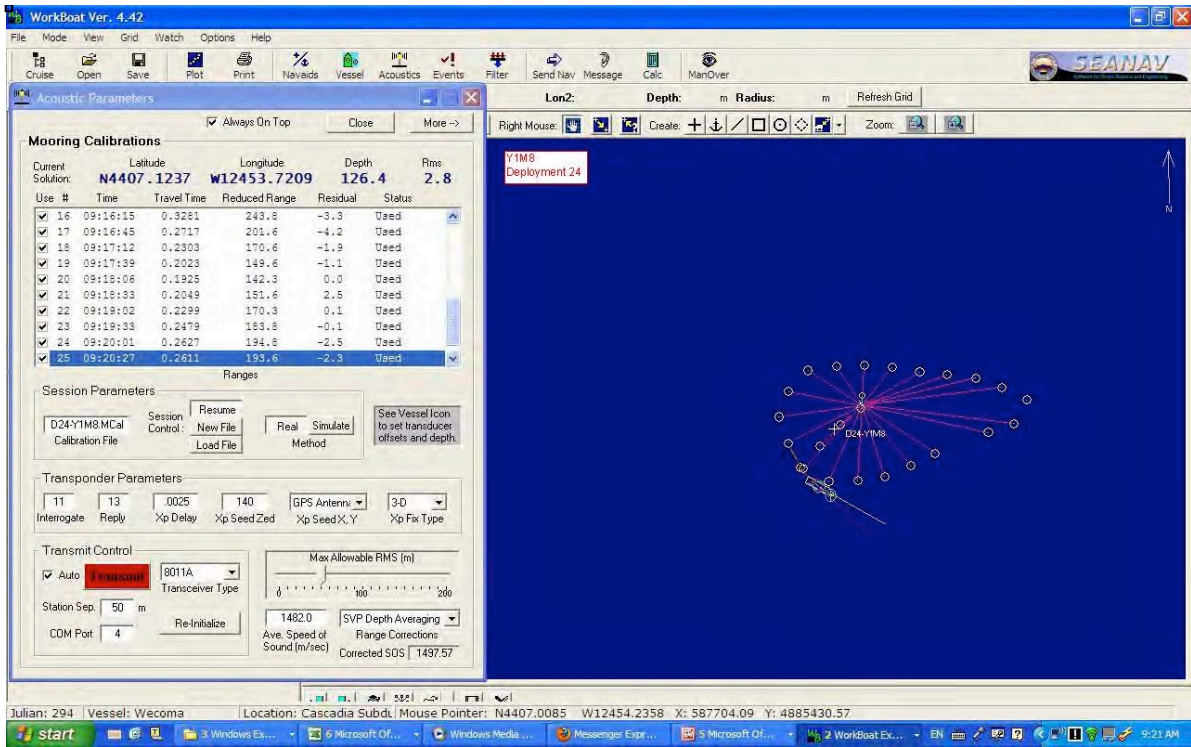
D21-J43



D22-J35



D24-Y1M8



D25-J25

WorkBoat Ver. 4.42

File Mode View Grid Watch Options Help

SEANAV

Acoustic Parameters

Lon2: Depth: m Radius: m Refresh Grid

Right Mouse: Create: + ↓ / □ ○ ⊕ ⊖ Zoom: [Icons]

Mooring Calibrations Always On Top Close More ->

Current Solution: Latitude **N4428.3710** Longitude **W12437.2968** Depth **142.8** Rms **1.8**

Use #	Time	Travel Time	Reduced Range	Residual	Status
<input checked="" type="checkbox"/>	11 18:12:02	0.2705	200.5	1.1	Used
<input checked="" type="checkbox"/>	12 18:12:26	0.2691	198.7	2.5	Used
<input checked="" type="checkbox"/>	13 18:12:50	0.2665	197.5	2.5	Used
<input checked="" type="checkbox"/>	14 18:13:15	0.2615	193.7	1.3	Used
<input checked="" type="checkbox"/>	15 18:13:42	0.2475	183.3	-0.3	Used
<input checked="" type="checkbox"/>	16 18:14:11	0.2223	164.4	-2.6	Used
<input checked="" type="checkbox"/>	17 18:14:39	0.2069	152.9	-0.5	Used
<input checked="" type="checkbox"/>	18 18:15:05	0.2125	157.1	0.1	Used
<input checked="" type="checkbox"/>	19 18:15:29	0.2407	178.2	1.8	Used
<input checked="" type="checkbox"/>	20 18:15:54	0.6307	469.9	0.0	Rejected

Ranges

Session Parameters

D25-J25.MCal Calibration File

Resume Control: New File Load File

Real Simulate Method

See Vessel Icon to set transducer offsets and depth.

Transponder Parameters

Interrogate: 11 Reply: 13 Xp Delay: 0025 Xp Seed Zed: 145 GPS Antenna: 3D Xp Seed X,Y: Xp Fix Type

Transmit Control

Auto Transmitter 8011A Transceiver Type

Station Sep: 50 m Re-Initialize

COM Port: 4

Max Allowable RMS (m): 0 100 200

Ave. Speed of Sound (m/sec): 1482.0 SVP Depth Averaging

Range Corrections: Corrected SOS: 1496.10

J25 Deployment 25

Julian: 294 Vessel: Wecoma Location: Cascadia Subdl | Mouse Pointer: N4428.3938 W12437.5408 X: 609305.49 Y: 4925354.03

start CEIT_Leg2 OBS Surveys WorkBoat Ver. 4.42 Acoustic Parameters EN 6:16 PM

Appendix 3: Summary of Marine Mammal Observer sightings

07.14.2012:

08:53 Small boat 46Deg 16.00N 124Deg 53.004W

10:00 Fishing Vessel 46 Deg24.94N 124Deg 48.37W

11:04 Tug and Barge 46Deg 34.64N 124Deg 43.34W

11:10 1 Northern fur seal 46Deg 35.42N 124Deg 43.23W

12:00 Fishing Vessel 46Deg 42.57N 124Deg 39.67N

12:41 Fishing Vessel 46Deg 48.47N 124Deg 36.04W

12:47 1 Humpback whale 46Deg 49.38N 124Deg 35.47W Lunge feeding and spy-hopping

12:52 1 Unidentified Large Cetacean 46Deg 50.15N 124Deg 34.96W

12:52 1 Humpback whale 46Deg 50.87N 124Deg 34.96W

13:52 1 Unidentified small Cetacean 46Deg 58.97N 124Deg 30.20W

16:33 1 Humpback whale 47Deg 10.41N 124Deg 36.31W Slow travel

16:34 2 Steller sea lions 47Deg 10.60N 124Deg 37.10W Stationary

16:46 1 - 2 Humpback whales 47Deg 11.74N 124Deg 38.25W Slow travel

16:49 2 Steller sea lions 47Deg 12.14N 124Deg 38.79W Stationary

17:10 1 Humpback whale 47Deg 14.32N 124DEg 41.99W Spyhopping

19:18 300 Pacific white-sided dolphins and 200 Northern right whale dolphins 47Deg 26.90N 124Deg 45.96W

Seabird sightings: Black-footed albatross, Pink-footed shearwaters, Sooty shearwaters, Common murre, Brown pelican

07.15.2012:

15:26 1 Northern fur seal 48Deg 59.60N 126Deg 30.79 Juvenile

16:05 1 Humpback whale 48Deg 54.79N 126Deg 24.18W Breaching 5 times

16:25 1 Large vessel 48Deg 52.30N 126Deg 20.20W Container ship

18:50 7 Pacific white-sided dolphins 48Deg 37.78N 126Deg 11.17W Fast traveling

18:53 1 Northern fur seal 48Deg 36.93N 126Deg 11.11W

Seabird sightings: Black-footed albatross, Pink-footed shearwaters, Sooty shearwaters, Northern fulmars

07.16.2012:

09:15 2 Fishing vessels 46Deg 14.93N 126Deg 10.32W

09:18 1 Fishing vessel 46Deg 14.21N 126Deg 10.32W

09:35 1 Unidentified large Cetacean 46Deg 11.24N 126Deg 10.40W Sighted 3 tall blows

Comment: 08:27 2-3 tuna were sighted and Dall's porpoise approached the NH stern; only seabirds were occasional Leach's storm petrels; at 18:45 we started to have more regular sightings of LESP

07.17.2012:

08:56 2 Fishing vessels 44Deg 59.46N 125Deg 45.54W

09:19 1 Container ship 44Deg 56.52N 125Deg 42.57W

09:22 6 Dall's porpoise 44Deg 56.03N 125Deg 42.09W Fast traveling

11:07 6 Dall's porpoise 44Deg 41.50N 125Deg 27.68W Fast traveling

11:10 6 Pacific white-sided dolphins 44Deg 41.31N 125Deg 27.48W Fast traveling and quick bow riding

11:16 10 Pacific white-sided dolphins 44Deg 40.60N 125Deg 26.71W Fast traveling and quick bow riding

12:30 1 Large Cable-laying vessel and one guard ship 44Deg 30.36N 125Deg 16.31W

14:04 1 Fishing vessel 44Deg 17.65N 125Deg 04.41W

15:02 2 Fishing vessels 44Deg 10.28N 124Deg 56.73W

15:06 2 Humpback whales 44Deg 09.73N 124Deg 56.22W Slow traveling

17:15 1 Fishing vessel 44Deg 17.29N 124Deg 46.15W

17:30 1 Humpback whale 44Deg 19.43N 124Deg 44.32W Slow traveling

Comments: 09:24 South Polar Skua; unidentified 3 ft shark at 09:39; a few blue-fin tuna; 11:26 5 ft blue shark; 13:20 regular sightings of Forked-tailed storm petrels, and one Rhinoceros auklet and a few Northern fulmars; 14:26 started to have more sightings of Black-footed albatross on a regular basis; 14:53 unidentified shark, same as the former unidentified shark; one Tufted puffin flying around the vessel at 14:56; 16:57 unknown shark species with a white rippled band around its head.

07.18.2102: No sightings on OFF EFFORT opportunistic searching by CK from 06:00 – 07:00 inside the bridge enroute to Newport.

