APPENDIX

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Appendix 1:

Coordinates of instruments left on the seafloor during cruise M64/2

Station#	ID	Date / Time (UTC) of deployment	Coordinates	Water depth	Comments
224 ROV	Beacon # 14	12/05/2005 21:35	14°45.221’ N / 44°58.813’ W	3035 m	Beacon northwest of IRINA II
257 ROV	1-channel T-loggers #1854200 to #1854209	21/05/2005 14:50-16:05	14°45.185’ N / 44°58.748’ W	3036 m	10 T-loggers deployed in the IRINA II mussel field
263 ROV	OBP	22/05/2005 21:35	14°45.221’ N / 44°58.813’ W	3035 m	Ocean Bottom Pressure meter (OBP) deployed close to beacon # 14
272 ROV	BWPM + beacon # 15	24/05/2005 17:10	14°45.071’ N / 44°58.685’ W	2932 m	25 m long Bottom Water Profile Monitor (BWPM) mooring deployed close to beacon # 15
281 ROV	1-channel T-loggers #1854210 to #1854219	26/05/2005 17:00-17:36	14°45.219’ N / 44°58.817’ W	3045 m	10 T-loggers deployed in the QUEST mussel field
283 ROV	8-channel T-loggers #10295 #10298	27/05/2005 16:20-16:35	14°45.219’ N / 44°58.817’ W	3045 m	2 T-loggers deployed in the QUEST mussel field
283 ROV	OBT	27/05/2005 17:51	14°45.221’ N / 44°58.8131’ W	3035 m	Ocean Bottom Tiltmeter (OBT) deployed close to beacon # 14
283 ROV	8-channel T-loggers #10296 #10297	27/05/2005 16:20-16:35	14°45.185’ N / 44°58.748’ W	3036 m	2 T-loggers deployed in the IRINA II mussel field

Appendix 2:

List of markers left on the seafloor during cruise M64/2

Station#	Marker	Date / Time (UTC) of deployment	Coordinates	Water depth	Comments
249 ROV	„M4“	18/05/2005 18:24	14°45.0696´N, 44°58.6963´W	2938m	ANNA-LOUISE
249 ROV	„M5“	18/05/2005 19:01	14°45.0696´N, 44°58.6963´W	2938m	IRINA I
252 ROV	„MB“	19/05/2005 17:26	14°45.1865´N, 44°58.7430´W	3038m	Site A
257 ROV	„MA“	20/05/2005 21:12	14°45.1105´N, 44°58.7024´W	2978m	Site B
261 ROV	„MD“	21/05/2005 19:47	14°45.0805´N, 44°58.7124´W	2949m	IRINA I (ex beacon #11)
281 ROV	„MC“	26/05/2005 20:54	14°45.2166´N, 44°58.8141´W	3040m	QUEST

Appendix 3:

Station List

compiled by Harald Strauss

Station	Area	Location	Depth	Date	Brief description
217-CTD	S of Logatchev	13° 30.00' N 45° 00.00' W	2666 m	10.05.05	Background station for CTD
218-HS	S-N track into LHF-1	13°30'N 45°00'W to 14°30'N 45°00'N		10.05.05 and 11.05.05	Bathymetry
219-CTD	QUEST area	14°45,23'N 44°58,81'W	3017 m	11.05.05	Plume mapping and sampling
220-ROV	LHF-1	14°45,28'N 44°58,85'W	3050 m	11.05.05	Terminated early due to technical problems
221-CTD	S of IRINA II	14°45,11'N 44°58,81'W	3044 m	11.05.05	Plume mapping and sampling
222-GTV	SW of LHF-1	14°44,99'N 44°58,97'W	3075 m	11.05.05	Sampling hydrothermal sediments
223-MAPR	LHF-1	14°45,11'N 44°58,81'W		12.05.05	Plume mapping, 5 MAPR, 20 T-sensors, GAPS, Transponder
224-ROV	QUEST and ANNA LOUISE	14°45,21'N 44°58,81'W and 14°45,21'N 44°58,72'W	3046 m and 3038 m	12.05.05	Deployment of Ocean Bottom Tiltmeter near QUEST area, fluid sampling at ANNA LOUISE
225-GTV	SW of IRINA II	14°45,19'N 44°58,82'W	3048 m	13.05.05	Sampling at future drilling site
226-OFOS	Across LHF-1	14°45,42'N 44°58,38'W to 14°44,86'N 44°59,09'W	2954 m to 3108 m	13.05.05	Mapping along NE-SW profile across LHF-1
227-CTD	NE of Site B	14°45,23'N 44°58,82'W	3020 m	13.05.05	Plume mapping
228-MAPR	W of IRINA II	14°45,11'N 44°58,81'W	3050 m	13.05.05	12 hrs stationary plume mapping with 5 MAPRs and 20 T-sensors
229-GTV	W of IRINA I	14°45,07'N 44°58,72'W	3017 m	14.05.05	Sampling at future drilling site
230-GTV	S of ANNA LOUISE	14°45,00'N 44°58,66'W	2996 m	14.05.05	Sampling at future drilling site
231-CTD	NW of LHF-1	14°45,28'N 44°58,90'W	3038 m	14.05.05	Plume mapping and sampling
232-ROV	IRINA II	14°45,11'N 44°58,81'W	3037 m	14.05.05	Mussel experiment with in-situ Profiler measurements and KIPS fluid sampling
233-CTD	N of LHF-1	14°45,28'N 44°58,76'W	3062 m	15.05.05	Plume mapping
234-CTD	N of LHF-1	14°45,50'N 44°58,76'W	3127 m	15.05.05	Plume mapping
235-CTD	N of LHF-1	14°45,56'N 44°58,82'W	3157 m	15.05.05	Plume mapping
236-CTD	N of LHF-1	14°45,61'N	3155 m	15.05.05	Plume mapping

		44°58,89'W			
237-CTD	N of LHF-1	14°45,77'N 44°58,99'W	3200 m	15.05.05	Plume mapping
238-CTD	N of LHF-1	14°46,02'N 44°59,06'W	3215 m	15.05.05	Plume mapping and sampling
239-GTV	N of IRINA II	14°45,23'N 44°58,75'W	2988 m	15.05.05	Sampling at future drilling site
240-HS	E of LHF-1			16.05.05	Bathymetry across two W-E profiles
241-CTD	N of LHF-1	14°45,82'N 44°58,67'W	3225 m	16.05.05	Plume mapping
242-CTD	N of LHF-1	14°46,01'N 44°58,80'W	3225 m	16.05.05	Plume mapping and sampling
243-HS	E of LHF-1			17.05.05	Bathymetry along S-N tracks
244-ROV	IRINA II	14°45,18'N 44°58,73'W	3032 m	17.05.05	OBT and OBP positioned, biological sampling
245-CTD	N of LHF-1	14°46,00'N 44°59,40'W	3331 m	18.05.05	Plume mapping
246-CTD	N of LHF-1	14°46,40'N 44°59,47'W	3539 m	18.05.05	Plume mapping
247-CTD	N of LHF-1	14°46,60'N 44°59,19'W	3416 m	18.05.05	Plume mapping
248-CTD	N of LHF-1	14°46,09'N 44°59,00'W	3223 m	18.05.05	Plume mapping and sampling
249-ROV	ANNA LOUISE and IRINA I	14°45,05'N 44°58,66'W and 14°45,09'N 44°58,71'W	2950 m and 3034 m	18.05.05	Fluid and rock sampling, mussel nets
250-GTV	S of IRINA II	14°45,16'N 44°58,78'W	3047 m	19.05.05	Sampling at future drilling site
251-CTD	N of LHF-1	14°46,10'N 44°59,16'W	3297 m	19.05.05	Terminated early due to technical problems
252-ROV	Site A and IRINA I	14°45,04'N 44°58,63'W and 14°45,09N 44°58,66W	2928 m and 2992 m	19.05.05	Geological and biological sampling, photomosaicing
253-CTD	N of LHF-1	14°46,09'N 44°59,20 'W	3281 m	20.05.05	Plume mapping and sampling
254-CTD	N of LHF-1	14°45,90'N 44°59,20'W	3248 m	20.05.05	Plume mapping
255-CTD	N of LHF-1	14°45,70'N 44°59,30'W	3180 m	20.05.05	Plume mapping
256-CTD	N of LHF-1	14°45,50'N 44°59,40'W	3157 m	20.05.05	Plume mapping and sampling
257-ROV	IRINA II and Site B	14°45,19'N 44°58,76'W and 14°45,12'N 44°58,70'W	3036 m and 2978 m	21.05.05	T-Loggers, fluid and geological sampling
258-GTV	NW of IRINA II	14°45,21'N 44°58,76'W	3106 m	21.05.05	Geological sampling
259-GTV	QUEST	14°45,23'N 44°58,83'W	3110 m	21.05.05	Biological sampling (GTV empty)

260-CTD	N of LHF-1	14°45,94'N 44°59,06'W	3205 m	21.05.05	Plume mapping and sampling
261-ROV	Site A and IRINA I	14°45,06'N 44°58,64'W and 14°45,09'N 44°58,70'W	2928 m and 2986 m	21.05.05	Fluid and sulphide sampling at Site A, fluid and biological sampling at IRINA I
262-HS	E of LHF-1			22.05.05	Bathymetry along W-E tracks
263-ROV	IRINA II QUEST	14°45,20'N 44°58,76'W	3045 m	22.05.05	Biological sampling, OBT re-positioning
264-CTD	W of LHF-1	14°45,19'N 45°01,02'W	3824 m	23.05.05	Plume mapping and sampling
265-CTD	SW of LHF-1	14°44,00'N 45°00,00'W	3716 m	23.05.05	Plume mapping
266-ROV	IRINA II and Site B	14°45,18'N 44°58,74'W and 14°45,10'N 44°58,67'W	3034 m and 3003 m	23.05.05	Profiler and biological sampling, Fluid sampling
267-CTD	S of LHF-1	14°43,96'N 44°58,97'W	3311 m	24.05.05	Plume mapping and sampling
268-CTD	S of LHF-1	14°44,02'N 44°57.98'W	2952 m	24.05.05	Plume mapping and sampling
269-CTD	S of LHF-1	14°44,00'N 44°57,00'W	2861 m	24.05.05	Plume mapping and sampling
270-CTD	S of LHF-1	14°44,50'N 44°57,70'W	2848 m	24.05.05	Plume mapping and sampling
271-MOOR	SE of IRINA I	14°45,09'N 44°58,69'W	2992 m	24.05.05	Deployment of 25 m of T-Logger Mooring
272-ROV	IRINA II	14°45,08'N 44°58,67'W and 14°45,20'N 44°58,74'W	2984 m and 3046 m	24.05.05	Positioning T-Logger-Mooring, Fluid and biological sampling at IRINA II
273-CTD	NW of LHF-1	14°46,04'N 44°59,14'W	3250 m	25.05.05	Plume mapping and sampling
274-CTD	E of IRINA II	14°45,20'N 44°58,70'W	2731 m	25.05.05	Plume mapping and sampling
275-CTD	SE of LHF-1	14°44,41'N 44°57,21'W	2909 m	25.05.05	Plume mapping and sampling
276-CTD	SE of LHF-1	14°45,70'N 44°57,30'W	2912 m	25.05.05	Plume mapping and sampling
277-ROV	IRINA II	14°45,18'N 44°58,72'W	3046 m	25.05.05	Biological and fluid sampling
278-OFOS	NW of LHF-1	14°45,78'N 44°59,02'W	3200 m	26.05.05	SE-NW track, terminated early due to technical problems
279-CTD	NW of QUEST area	14°45,26'N 44°58,85'W	3044 m	26.05.05	Plume mapping and sampling
280-CTD	NW of LHF-1	14°47,01'N 45°00,00'W	3636 m	26.05.05	Plume mapping and sampling
281-ROV	QUEST	14°45,21'N 44°58,81'W	3053 m	26.05.05	Benthic chamber deployed at IRINA II, fluid, biological and geological sampling at QUEST site
282-HS	E of LHF-1	14°45,23'N		27.05.05	Bathymetry along W-E tracks

		44°58,83’W			
283-ROV	QUEST and IRINA II	14°45,22’N 44°58,81’W and 14°45,20’N 44°58,72’W	3047 m and 3033 m	27.05.05	Quest musselbed experiment, Fluid sampling at IRINA II T-measurements
284-OFOS	NW of LHF-1	14°45,23’N 44°58,83’W		28.05.05	Several tracks NW of LHF-1
285-ROV	QUEST and NW of LHF-1	14°45,22’N 44°58,79’W	3044 m	28.05.05	Final biological sampling at QUEST, exploration and mapping NW of LHF-1

Appendix 4:

ROV station & rock sampling protocols

The following abbreviations are used:

AM - Anke Meyerdierks
HS - Harald Strauß
JS - Jan Scholten
KL - Klas Lackschewitz
KS - Katja Schmidt
NA - Nico Augustin
SP - Sven Petersen
TK - Thomas Kuhn

Station Protocol M64/2

Station No.: 220 ROV (Dive 49) **Date (UTC):** 11.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives:

Station Begin

Time (UTC):	11:21	Lat (Ship):	14°45.27´N	Long (Ship):	44°58.83´W
		Depth (HS):	3051m		

Bottom Contact

Time (UTC):		Lat (Ship):		Long (Ship):	
		Depth (HS):		Cable out:	

Comments: 12:15 UTC > high power failure
> communication problem to the ROV
> ROV station cancelled at about 200m waterdepth

Off Bottom

Time (UTC):	-	Lat (Ship):	-	Long (Ship):	-
		Depth (HS):	-	Cable out:	-

Station End

Time (UTC):	12:58	Lat (Ship):	14°45.24	Long (Ship):	44°58.88
		Depth (HS):	3050m		

Summary: station cancelled shortly after ROV deployment

Print Form

Station Protocol M64/2

Station No.: 224 ROV (Dive 50A) **Date (UTC):** 12.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: Deployment of OBT, fluidsampling at IRINA II

Station Begin

Time (UTC):	11:28	Lat (Ship):	14°45.26´N	Long (Ship):	44°58.83´W
		Depth (HS):	3058m		

Bottom Contact

Time (UTC):	-	Lat (Ship):	-	Long (Ship):	-
		Depth (HS):	-	Cable out:	-

Comments: dive cancelled as Station 220 ROV
> same problems due to high power lost

Off Bottom

Time (UTC):	-	Lat (Ship):	-	Long (Ship):	-
		Depth (HS):	-	Cable out:	-

Station End

Time (UTC):	11:30	Lat (Ship):	14°45.26´N	Long (Ship):	44°58.83´W
		Depth (HS):	3058m		

Summary:

Print Form

Station Protocol M64/2

Station No.: 224 ROV (Dive 50B) **Date (UTC):** 12.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: Deployment of OBT, fluidsampling at IRINA II

Station Begin

Time (UTC): 17:15 Lat (Ship): 14°45.22´N Long (Ship): 44°58.87´W

Depth (HS): 3048m

Bottom Contact

Time (UTC): 19:00 Lat (Ship): 14°45.23´N Long (Ship): 44°58.83´W

Depth (HS): 3047m Cable out: -

Comments

Off Bottom

Time (UTC): 23:10 Lat (Ship): 14°45.21´N Long (Ship): 44°58.72´W

Depth (HS): 3037m Cable out: -

Station End

Time (UTC): 03:22 Lat (Ship): 14°45.38´N Long (Ship): 44°58.81´W

Depth (HS): 3020m

Summary

> new beacon and OBT placed on seafloor (3048m ship at 14°45.23N, 44°58.82W)
> beacon No14 placed at 3035m waterdepth (14°45.23´N, 44°58.80´W)
> fluidsampling system successfully tested

Print Form

Station Protocol M64/2

Station No.: 232 ROV **Date (UTC):** 14.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: mussel transplant experiment at IRINA II

Station Begin

Time (UTC): 08:23 Lat (Ship): 14°45.18´N Long (Ship): 44°58.75´W

Depth (HS): 3042m

Bottom Contact

Time (UTC): 13:30 Lat (Ship): 14°45.21´N Long (Ship): 44°58.72´W

Depth (HS): ROV 3049m Cable out: -

Comments

Off Bottom

Time (UTC): 22:01 Lat (Ship): 14°45.18´N Long (Ship): 44°58.72´W

Depth (HS): ROV 3037m Cable out: -

Station End

Time (UTC): 01:22 Lat (Ship): 14°45.19´N Long (Ship): 44°58.95´W

Depth (HS): 3022m

Summary

Print Form

Station Protocol M64/2

Station No.: 244 ROV (Dive 52) **Date (UTC):** 17.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: collecting mussels and place them off vent site

Station Begin

Time (UTC): 11:11 Lat (Ship): 14°45.14´N Long (Ship): 44°58.69´W

Depth (HS): 3009m

Bottom Contact

Time (UTC): 13:24 Lat (Ship): 14°45.18´N Long (Ship): 44°58.76´W

Depth (HS): 3040m Cable out: -

Comments

Off Bottom

Time (UTC): 23:37 Lat (Ship): 14°45.18´N Long (Ship): 44°58.70´W

Depth (HS): 3025m Cable out: -

Station End

Time (UTC): 01:40 Lat (Ship): 14°45.12´N Long (Ship): 44°58.73´W

Depth (HS): 3026m

Summary > six nets with mussels were collected and placed near beacon 14

Print Form

Rocksampling Protocol M64/2

Date (UTC) 17.05.2005 **Station** 244 ROV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
244 ROV-10 (talus from the musselfield of IRINA II)	14°45.176'N 44°58.755'W	-	altered sulfide breccia, sulfide grains look corroded, some atacamite	HS SP

Print Form

Station Protocol M64/2

Station No.: 249 ROV (Dive 53) **Date (UTC):** 13.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: see "Comments"

Station Begin

Time (UTC):	12:19	Lat (Ship):	14°45.16´N	Long (Ship):	44°59.06´N
		Depth (HS):	3050m		

Bottom Contact

Time (UTC):	14:15	Lat (Ship):	14°45.21´N	Long (Ship):	44°58.78´W
		Depth (HS):	3051m	Cable out:	-

Comments: Objectives:
T.-measurement at musselfield of IRINA II, fluid sampling at ANNA LOUISE and IRINA I

Off Bottom

Time (UTC):	22:58	Lat (Ship):	14°45.20´N	Long (Ship):	44°58.74´W
		Depth (HS):	3049m	Cable out:	-

Station End

Time (UTC):	00:57	Lat (Ship):	14°45.20´N	Long (Ship):	44°58.60´W
		Depth (HS):	2990m		

Summary: Fluids were sampled and temperatures were meassured at IRINA I and ANNA LOUISE

Print Form

Station Protocol M64/2

Station No.: 252 ROV (Dive 54) **Date (UTC):** 19.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: Site "A" mapping and sampling

Station Begin

Time (UTC):	11:15	Lat (Ship):	14°45.03´N	Long (Ship):	44°58.69´W
		Depth (HS):	3001m		

Bottom Contact

Time (UTC):	12:58	Lat (Ship):	14°45.07´N	Long (Ship):	44°58.71´W
		Depth (HS):	3016m	Cable out:	-

Comments

Off Bottom

Time (UTC):	21:34	Lat (Ship):	14°45.18´N	Long (Ship):	44°58.74´W
		Depth (HS):	3043m	Cable out:	-

Station End

Time (UTC):	23:30	Lat (Ship):	14°45.20´N	Long (Ship):	44°58.20´W
		Depth (HS):	3044m		

Summary: Found site "A" and took a rock sample

Print Form

Rocksampling Protocol M64/2

Date (UTC) 19.05.2005 **Station** 252 ROV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
252 ROV-1 (A-I)	14°45.067'N 44°58.655'W	max. 15x30x5	sulfides, chimney-piece	AM: A1 HS: A2, E1, H1, G1, G2, E2, D1, F1 KL: A2 SP: A3 JS: A4
252 ROV-2 (1-4)	14°45.068'N 44°58.66'W	10x15x3	layered chalcopyrite - pyrite chimney-piece from IRINA I	HS:1 KL: 2 SP: 3 JS: 4
252 ROV-3	14°45.085'N 44°58.703'W	5x3	sulfide piece from IRINA I	
252 ROV-4	14°45.085'N 44°58.703'W	-	grey sediment sample from border of crater of IRINA I sampled with shovel	
252 ROV-5	14°45.085'N 44°58.703'W	-	sulfide piece from IRINA I	HS:5-1

Print Form

Station Protocol M64/2

Station No.: 257 ROV (Dive 55) **Date (UTC):** 20.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: T-Logger deployment at IRINA II, sampling bacterial mat

Station Begin

Time (UTC): 11:41 Lat (Ship): 14°45.15´N Long (Ship): 44°58.97´W

Depth (HS): 3035m

Bottom Contact

Time (UTC): 14:45 Lat (Ship): 14°45.17´N Long (Ship): 44°58.72´W

Depth (HS): 3042m Cable out: -

Comments

Off Bottom

Time (UTC): 21:40 Lat (Ship): 14°45.10´N Long (Ship): 44°58.70´W

Depth (HS): 3018m Cable out: -

Station End

Time (UTC): 23:42 Lat (Ship): 14°45.10´N Long (Ship): 44°58.70´W

Depth (HS): 3030m

Summary

Print Form

Rocksampling Protocol M64/2

Date (UTC) 20.05.2005 **Station** 257 ROV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
257 ROV-13	14°45.114'N 44°58.7'W	6x10cm	breccia filled Fe-oxide-hydroxide crusts, glimmering sulfides within from Site "B"	KL, NA
257 ROV-14	14°45.123'N 44°58.705'W	4x4cm	sulfide piece, chalcopyrite and pyrite (?), small amounts of quartz from Site "B"	HS: 1 SP: 2

Print Form

Station Protocol M64/2

Station No.: 261 ROV (Dive 56) **Date (UTC):** 21.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: Fluidsampling at Barad-Dûr (Site "A") and IRINA II

Station Begin

Time (UTC): 11:29 Lat (Ship): 14°45.04´N Long (Ship): 44°58.80´W

Depth (HS): 3064m

Bottom Contact

Time (UTC): 13:13 Lat (Ship): 14°45.09´N Long (Ship): 44°58.69´W

Depth (HS): 3005m Cable out: -

Comments

Off Bottom

Time (UTC): 20:01 Lat (Ship): 14°45.07´N Long (Ship): 44°58.66´W

Depth (HS): 2992m Cable out: -

Station End

Time (UTC): 21:53 Lat (Ship): 14°45.09´N Long (Ship): 44°58.79´W

Depth (HS): 3045m

Summary

> Fluid samples taken from Barad-Dûr and IRINA II
> sampled chimney pieces from Barad-Dûr

Print Form

Rocksampling Protocol M64/2

Date (UTC) 21.05.2005 **Station** 261 ROV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
261 ROV-3 (A, B)	14°45.037'N 44°58.683'W	10x15cm	piece of sulfide chimney "Barad-Dur" at site "A"	HS: B1 SP: B2 JS: B3
261 ROV-4	14°45.037'N 44°58.683'W	15x20cm	piece of chimney, layered chalcopyrite	
261 ROV-12	-	7x15cm	layered sulfide chimney samples - accidential sampled	HS: 11-1 SP: 11-2 JS: 11-3
261 ROV-13	-	mm-sized grains	some mm-sized atacamite pieces - accidential sampled	SP

Print Form

Station Protocol M64/2

Station No.: 263 ROV (Dive 57) **Date (UTC):** 22.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: see "Comments"

Station Begin

Time (UTC): 13:15 Lat (Ship): 14°45.10´N Long (Ship): 44°58.70´W

Depth (HS): 3025m

Bottom Contact

Time (UTC): 15:31 Lat (Ship): 14°45.12´N Long (Ship): 44°58.67´W

Depth (HS): 3005m Cable out: -

Comments: ANYA'S GARDEN, QUEST site, positioning OBP near OBT, musselfield experiment at IRINA II

Off Bottom

Time (UTC): 22:47 Lat (Ship): 14°45.20´N Long (Ship): 44°58.77´W

Depth (HS): 3053m Cable out: -

Station End

Time (UTC): 00:49 Lat (Ship): 14°45.20´N Long (Ship): 44°58.67´W

Depth (HS): 3019m

Summary

Print Form

Station Protocol M64/2

Station No.: 266 ROV (Dive 58) **Date (UTC):** 23.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: see "Comments"

Station Begin

Time (UTC):	11:06	Lat (Ship):	14°45.06´N	Long (Ship):	44°58.75´W
		Depth (HS):	3038m		

Bottom Contact

Time (UTC):	12:58	Lat (Ship):	14°45.16´N	Long (Ship):	44°58.72´W
		Depth (HS):	3042m	Cable out:	-

Comments: Objectives:
profiler messurements within the musselbed at IRINA II, fluid sampling at site "B"

Off Bottom

Time (UTC):	23:03	Lat (Ship):	14°45.18´N	Long (Ship):	44°58.75´W
		Depth (HS):	3033m	Cable out:	-

Station End

Time (UTC):	01:14	Lat (Ship):	14°45.12´N	Long (Ship):	44°58.65´W
		Depth (HS):	2984m		

Summary: Highest temp. of 350°C were measured at site "B"

Print Form

Rocksampling Protocol M64/2

Date (UTC) 23.05.2005 **Station** 266 ROV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
266 ROV-12	14°45.09´N 44°58.68´W	6x5x5	massive sulfide from site "B", main mineral is chalcopyrite, secondary Cu-sulfides, iron-oxide crust, atacamite on top of crust sample taken accidently by ROV	HS
266 ROV-13	14°45.09´N 44°58.68´W	Filter	fine dark-grey to black dust on glass-fibre filter, some individual larger chalcopyrite crystals	SP

Print Form

Station Protocol M64/2

Station No.: 272 ROV (Dive 59) **Date (UTC):** 24.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: positioning TS-mooring, fluid sampl. + videomosaic at IRINA II

Station Begin

Time (UTC): 14:26 Lat (Ship): 14°45.16´N Long (Ship): 44°58.75´W

Depth (HS): 3034m

Bottom Contact

Time (UTC): 16:13 Lat (Ship): 14°45.12´N Long (Ship): 44°58.63´W

Depth (HS): 2989m Cable out: -

Comments

Off Bottom

Time (UTC): 22:06 Lat (Ship): 14°45.25´N Long (Ship): 44°58.72´W

Depth (HS): 3051m Cable out: -

Station End

Time (UTC): 00:00 Lat (Ship): 14°45.21´N Long (Ship): 44°58.64´W

Depth (HS): 3028m

Summary

Print Form

Rocksampling Protocol M64/2

Date (UTC) 24.05.2005 **Station** 272 ROV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
272 ROV-8	14°45.238'N 44°58.745'W	max. 5x10cm min. 2x2cm	Net with iron-oxide and -hydroxide crusts, some sulfide pebbles from inactive smoker near IRINA II	HS KS SP KL, NA

Print Form

Station Protocol M64/2

Station No.: 277 ROV (Dive 60) **Date (UTC):** 25.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: sampling at IRINA II

Station Begin

Time (UTC): 11:10 Lat (Ship): 14°45.19´N Long (Ship): 44°58.74´W

Depth (HS): 3049m

Bottom Contact

Time (UTC): 12:59 Lat (Ship): 14°45.19´N Long (Ship): 44°58.75´W

Depth (HS): 3047m Cable out: -

Comments

Off Bottom

Time (UTC): 21:55 Lat (Ship): 14°45.22´N Long (Ship): 44°58.77´W

Depth (HS): 3051m Cable out: -

Station End

Time (UTC): 23:53 Lat (Ship): 14°45.26´N Long (Ship): 44°58.54´W

Depth (HS): 2977m

Summary: Fluids and sulfides were sempled at IRINA II

Print Form

Rocksampling Protocol M64/2

Date (UTC) 25.05.2005 **Station** 277 ROV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
277 ROV-2 (A-D)	14°45.176'N 44°58.749'W	ca. 5x10cm	sulfide chimney pieces from IRINA II	HS: D1 SP: D2 JS: D3
277 ROV-7 (A-G)	14°45.177'N 44°58.75'W	max. 15x20cm	sulfide chimney pieces from IRINA II	HS: A1, B1, C1 TK: A4, B4 SP: A2, B2, C2 JS: A3, B3, C3

Print Form

Station Protocol M64/2

Station No.: 281 ROV (Dive 61) **Date (UTC):** 26.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: bentic chamber exp., fluid + pushcore sampl. at QUEST site

Station Begin

Time (UTC): 11:42 Lat (Ship): 14°45.18´N Long (Ship): 44°58.99´W

Depth (HS): 3033m

Bottom Contact

Time (UTC): 13:36 Lat (Ship): 14°45.18´N Long (Ship): 44°58.72´W

Depth (HS): 3036m Cable out: -

Comments

Off Bottom

Time (UTC): 22:00 Lat (Ship): 14°45.20´N Long (Ship): 44°58.75´W

Depth (HS): 3046m Cable out: -

Station End

Time (UTC): 0:00 Lat (Ship): 14°45.20´N Long (Ship): 44°58.80´W

Depth (HS): 3042m

Summary

Print Form

Rocksampling Protocol M64/2

Date (UTC) 26.05.2005 **Station** 281 ROV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
281 ROV-7	14°45.217'N 44°58.815'W	10x15x25cm	massive piece of active sulfide chimney from IRINA II	HS: A SP: B

Print Form

Station Protocol M64/2

Station No.: 283 ROV (Dive 62) **Date (UTC):** 27.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: new positioning of OBT, continue musselbed experiment

Station Begin

Time (UTC): 13:07 Lat (Ship): 14°45.20´N Long (Ship): 44°58.88´W

Depth (HS): 3027m

Bottom Contact

Time (UTC): 15:09 Lat (Ship): 14°45.23´N Long (Ship): 44°58.74´W

Depth (HS): 3043m Cable out: -

Comments

Off Bottom

Time (UTC): 22:21 Lat (Ship): 14°45.20´N Long (Ship): 44°58.73´W

Depth (HS): 3033m Cable out: -

Station End

Time (UTC): 0:12 Lat (Ship): 14°45.21´N Long (Ship): 44°58.71´W

Depth (HS): 3027m

Summary

Print Form

Station Protocol M64/2

Station No.: 285 ROV (Dive 63) **Date (UTC):** 28.05.2005

☒ ***ROV*** ☐ ***OFOS*** ☐ ***GTV*** ☐ ***CTD*** ☐ ***MAPR***

Objectives: mapping the area NW of QUEST site

Station Begin

Time (UTC): 12:11 Lat (Ship): 14°45.23´N Long (Ship): 44°58.97´W

Depth (HS): 3025m

Bottom Contact

Time (UTC): 14:09 Lat (Ship): 14°45.22´N Long (Ship): 44°58.82´W

Depth (HS): 3046m Cable out: -

Comments: discovered new diffuse vent site

Off Bottom

Time (UTC): 21:52 Lat (Ship): 14°45.36´N Long (Ship): 44°58.87´W

Depth (HS): 3061m Cable out: -

Station End

Time (UTC): 23:37 Lat (Ship): 14°45.37´N Long (Ship): 44°58.87´W

Depth (HS): 3064m

Summary: discovered and sampled a new diffuse venting site NW of QUEST site

Print Form

Rocksampling Protocol M64/2

Date (UTC) 28.05.2005

Station 285 ROV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
285 ROV-6	14°45.31'N 44°58.875'W	max. ca. 5cm pieces	Fe-oxide, -hydroxide crusts and mud from new diffuse venting-site NW of QUEST	HS KS KL, NA

Print Form

Appendix 5:

GTV station & rock sampling protocols

The following abbreviations are used:

AM - Anke Meyerdierks
HS - Harald Strauß
JS - Jan Scholten
KL - Klas Lackschewitz
KS - Katja Schmidt
NA - Nico Augustin
SP - Sven Petersen
TK - Thomas Kuhn

Station Protocol M64/2

Station No.: 222 GTV **Date (UTC):** 11.05.2005

☐ *ROV* ☐ *OFOS* ☒ *GTV* ☐ *CTD* ☐ *MAPR*

Objectives: sampling hydrothermal precipitates seen in 2004 (M60/3)

Station Begin

Time (UTC): 17:32 Lat (Ship): 14°44.96´N Long (Ship): 44°58.95´W

Depth (HS): 3067m

Bottom Contact

Time (UTC): 18:43 Lat (Ship): 14°45.00´N Long (Ship): 44°58.94´W

Depth (HS): 3056m Cable out: 3117m

Comments
- VHS record started at 18:35 UTC (Time on VHS is 01:51, 01.01.01)
- Bottom-sight at VHS at 01:59, VHS stopped at 19:09 UTC (VHS 02:24)

- grap at Lat. 14°44.99´N, Long. 44°58.97´W, depth 3069m, cable 3142m

Off Bottom

Time (UTC): 19:10 Lat (Ship): 14°44.99´N Long (Ship): 44°58.97´W

Depth (HS): 3069m Cable out: 3132m

Station End

Time (UTC): 20:15 Lat (Ship): 14°44.96´N Long (Ship): 44°58.95´W

Depth (HS): 3072m

Summary
> serpentinized peridotites and pyroxenites, partly Mn-coated,
> some atacamite
> some sediment samples taken by biologists

Print Form

Rocksampling Protocol M64/2

Date (UTC) 11.05.2005 **Station** 222 GTV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
222 GTV-1 (A-G)	14°44,99´N 44°58,97´W	1-2 dm	serpentinized, coarse grained (up to 3cm) pyroxenites, silica altered graines with a dark green to black mm-sized rim, some <1cm in diameter quartz geodes, partly Mn-stained (<1mm)	KL, NA (A-F) HS (G)
222 GTV-2 (A-D)	14°44,99´N 44°58,97´W	1-1,5 dm	massive serpentinized peridotites, fine grained (mm-sizes), thin Mn- and Fe-oxide coating (<1mm)	KL, NA (A-D)
222 GTV-3 (A-D)	14°44,99´N 44°58,97´W	1-2 dm	strongly weathered, serpentinized pyroxenites, fine to coarse grained, thin (<1mm) Mn-coating and Fe-oxide impregnation	Kl, NA (A-C) KS (D)
222 GTV-4 (A-L)	14°44,99´N 44°58,97´W	1-2 dm	full Mn-coated, serpentinized peridotites, grain size up to 5mm, traces of orange Fe-oxides	KS (A-D) JS (E-F) TK (G-J) Archive (K-N)
222 GTV-5	14°44,99´N 44°58,97´W	some mm up to 1dm	Fe-oxide crust (mm-thick) with thin (<1mm) Mn-coating and atacamite within	SP
			KL - Klas Lackschewitz NA - Nico Augustin HS - Harald Strauß KS - Katja Schmidt JS - Jan Scholten TK - Thomas Kuhn SP - Sven Petersen	

Print Form

Station Protokoll M64/2

Station No.: 225 GTV **Date (UTC):** 12.05.2005

☐ *ROV* ☐ *OFOS* ☒ *GTV* ☐ *CTD* ☐ *MAPR*

Objectives: sampling hydrotherm. sediments and crusts 100m SW IRINA II

Station Begin

Time (UTC): 13:25 Lat (Ship): 14°45.13´N Long (Ship): 44°58.81´W

Depth (HS): 3050m

Bottom Contact

Time (UTC): 14:31 Lat (Ship): 14°45.12´N Long (Ship): 44°58.80´W

Depth (HS): 3047m Cable out: 3048m

Comments
VHS Start: 21:40:13 / 14:26 UTC
VHS Stop: 21:57:45 / 14:43 UTC

Grab: 14°45.19´N, 44°58.82´W, 14:37 UTC, Depth 3049m,Cable 3110m

Off Bottom

Time (UTC): 14:42 Lat (Ship): 14°45.21´N Long (Ship): 44°58.80´W

Depth (HS): 3046m Cable out: 2082m

Station End

Time (UTC): 15:50 Lat (Ship): 14°45.21´N Long (Ship): 44°58.84´W

Depth (HS): 3043m

Summary
no hydrothermal sediments or crusts found, no sulfides
> weakly serpentinized pyroxenites, some Mn-crusts

Print Form

Rocksampling Protocol M64/2

Date (UTC) 12.05.2005 **Station** 225 GTV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
225 GTV-1 (A-F)	14°45.19´N 44°58.82´W	5cm - 2dm (subsample F about 5x2dm)	fine to coarse grained, weakly serpentinized pyroxenites, Mn coated (<1mm up to 1.5cm), some partly Fe-oxide impregnated, dark green to black fissures	
225 GTV-2	14°45.19´N 44°58.82´W	1dm	type like #1 but in great parts silica (Qtz?) cemented, no Fe-oxides	
225 GTV-3 (A-E)	14°45.19´N 44°58.82´W	up to 5cm in diameter	Mn-crusts and small pieces like #1 with Mn-crust	
225 GTV-4	14°45.19´N 44°58.82´W	-	pelagic sediment (bright brown foraminifere-grouse)	

Print Form

Station Protocol M64/2

Station No.: 229 GTV **Date (UTC):** 13.05.2005

☐ *ROV* ☐ *OFOS* ☒ *GTV* ☐ *CTD* ☐ *MAPR*

Objectives: sampling about 50m W of IRINA I

Station Begin

Time (UTC): 00:05 Lat (Ship): 14°45.07´N Long (Ship): 44°58.75´W

Depth (HS): 3039m

Bottom Contact

Time (UTC): 01:10 Lat (Ship): 14°45.01´N Long (Ship): 44°58.70´W

Depth (HS): 3032m Cable out: 3031m

Comments
VHS Start: 08:20:30 / 01:06 UTC
VHS Stop: 08:34:30 / 01:20 UTC

Grap: 14°45.08´N, 44°58.72´W, 01:17 UTC, HS 3023m, cable out 3040m

Off Bottom

Time (UTC): 01:20 Lat (Ship): 14°45.08´N Long (Ship): 44°58.72´W

Depth (HS): 3024m Cable out: 3030m

Station End

Time (UTC): 02:29 Lat (Ship): 14°44.94´N Long (Ship): 44°58.73´W

Depth (HS): 3077m

Summary
silified crusts, Mn-coated, sulfide-sediment, pyroxene mud

> GAPS was tryed but not working

Print Form

Rocksampling Protocol M64/2

Date (UTC) 13.05.2005 **Station** 229 GTV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
229 GTV-1 (A-D)	14°45.08´N 44°58.70´W	40 x 5	silified lamellar crusts with sediment included between lamells, thin (<1mm) Mn, coating on top of samples	
229 GTV-2 (A-C)	14°45.08´N 44°58.70´W	15 x 3	fragile lamellare silified crust like #1 but with small cavities (5 x 10 mm), thin Mn-coating, sample B wih thicker Mn-coating (~ 0.5 to 10mm)	KS: A TK: B JS: C
229 GTV-3	14°45.08´N 44°58.70´W	20 x 5	solidified mud, light-brown, Fe-oxides and glimmering sulfides (pyrite / marcasite ?)	
229 GTV-4 (A-C)	14°45.08´N 44°58.70´W	-	grey to dark-grey sulfide mud, small glimmering pyrite / marcasite (?) grains	KL, NA: A SP: B HS: C
229 GTV-5	14°45.08´N 44°58.70´W	-	grey to dark-grey sulfide mud like #4 but with pyroxene gravel (<10mm)	KL, NA
229 GTV-6	14°45.08´N 44°58.70´W	-	black sulfide-mud including basaltic glass chips, markasite (?) and gypsum (?)	HS, SP

Print Form

Station Protocol M64/2

Station No.: 230 GTV **Date (UTC):** 14.04.2005

☐ *ROV* ☐ *OFOS* ☒ *GTV* ☐ *CTD* ☐ *MAPR*

Objectives: sampling 50m SW of site A

Station Begin

Time (UTC): 03:40 Lat (Ship): 14°44.99´N Long (Ship): 44°58.64´W

Depth (HS): 2967m

Bottom Contact

Time (UTC): 04:50 Lat (Ship): 14°44.97´N Long (Ship): 44°58.61´W

Depth (HS): 2948m Cable out: 2987m

Comments
VHS Start: 12:00:36 / 04:46 UTC
VHS Stop: 12:30:00 / 05:15 UTC

Grap: 14°45.01´N, 48°58.68´N, 05:12 UTC, HS 3000m, cable out 3037m

Off Bottom

Time (UTC): 05:15 Lat (Ship): 14°45.00´N Long (Ship): 44°58.68´W

Depth (HS): 3000m Cable out: -

Station End

Time (UTC): 06:18 Lat (Ship): 14°44.95´N Long (Ship): 44°58.52´W

Depth (HS): 2872m

Summary
Mn-coated, weathered pyroxenites
and some biology

Print Form

Rocksampling Protocol M64/2

Date (UTC) 14.05.2005

Station 230 GTV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
1 (A-H)	14°45.01´N 44°58.68´W	dm-sized	Mn-coated (max. 1cm) pyroxenites, grainsize up to 5cm in lengh, colour of pyroxenes vary from light-brown to black-green, pyroxenites are weathered and brittle, some Qtz (?) inclusions	KL, NA: A, B, C, E2 TK: E1, D1, G JS: D2, H KS: D3, F

Print Form

Station Protocol M64/2

Station No.: 239 GTV **Date (UTC):** 15.05.2005

☐ *ROV* ☐ *OFOS* ☒ *GTV* ☐ *CTD* ☐ *MAPR*

Objectives: sampling 400m E of IRINA II

Station Begin

Time (UTC): 16:47 Lat (Ship): 14°45.22´N Long (Ship): 44°58.53´W

Depth (HS): 2970m

Bottom Contact

Time (UTC): 17:50 Lat (Ship): 14°45.23´N Long (Ship): 44°58.53´W

Depth (HS): 2968m Cable out: 3011m

Comments
VHS Start: 01:00:35 / 17:46 UTC
VHS Stop: 01:29:15 / 18:15 UTC

Grab: 14°45.23´N, 44°58.58´W, 18:11 UTC, HS 2988m, cable 3075m

Off Bottom

Time (UTC): 18:14 Lat (Ship): 14°45.22´N Long (Ship): 44°58.57´W

Depth (HS): 2986m Cable out: 3014m

Station End

Time (UTC): 19:20 Lat (Ship): 14°45.15´N Long (Ship): 44°58.41´W

Depth (HS): 2876m

Summary
light brown clay with mussel- and snail-shells on top and between, in the middle grouse of Mn-crusts, atacamite grouse and talc, hematite-impregnated serpentinites, two bigger (~20cm in diameter) atacamite-crusts

Print Form

Rocksampling Protocol M64/2

Date (UTC) 15.05.2005 **Station** 239 GTV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
239 GTV-1 (A-D)	14°45.23´N, 44°58.58´W	1-10	atacamite and atacamite crusts, very briddle, some inclusions of talc (altered serpentinite) and brown clay, atacamite mostly colomorph but some dark-green crystals (<0.5mm) are viewable, thin Mn-coating (<0.5mm) in some range	SP: A3, B, C KL, NA: A1, A2
239 GTV-2	14°45.23´N, 44°58.58´W	5x20	honeycomb structured, silicified crusts with atacamite and Mn-minerals within, some hematite-impregnated zones	KL, NA
239 GTV-3	14°45.23´N, 44°58.58´W	max. 3cm in diameter	solidified sediment-clusters with red color from hematite, some spots with atacamite, thin Mn-coating (<0.5mm)	KL, NA
239 GTV-4	14°45.23´N, 44°58.58´W	max. 5cm in diameter	massive talc-altered serpentinites, soft, mostly light-brown through clay cover, sometimes fibrillar grains (from chrysotile ?), some atacamite-grains within	KL, NA
239 GTV-5	14°45.23´N, 44°58.58´W	-	max. 1.5cm thick Mn-crusts, partly with some atacamite	
239 GTV-6	14°45.23´N, 44°58.58´W	-	red-brown sediment (hematite rich ?)	
239 GTV-7	14°45.23´N, 44°58.58´W	-	light-brown sediment / clay	

Print Form

Station Protocol M64/2

Station No.: 250 GTV **Date (UTC):** 19.05.2005

☐ *ROV* ☐ *OFOS* ☒ *GTV* ☐ *CTD* ☐ *MAPR*

Objectives: sampling future drilling site, WNW of site "B"

Station Begin

Time (UTC): 01:07 Lat (Ship): 14°45.11´N Long (Ship): 44°58.69´W

Depth (HS): 3014m

Bottom Contact

Time (UTC): 02:10 Lat (Ship): 14°45.14´N Long (Ship): 44°58.71´W

Depth (HS): 3027m Cable out: 3049m

Comments VHS on: 09:21:15
VHS off: 09:54:40

Grab: 14°45.16´N, 44°58.77´W

Off Bottom

Time (UTC): 02:37 Lat (Ship): 14°45.17´N Long (Ship): 44°58.77´W

Depth (HS): 3050m Cable out: 3091m

Station End

Time (UTC): 03:46 Lat (Ship): 14°45.16´N Long (Ship): 44°58.78´W

Depth (HS): 3049m

Summary > green serpentine-grouse layer in sediment with a temp. of 43°C

Print Form

Rocksampling Protocol M64/2

Date (UTC) 19.05.2005 **Station** 250 GTV (1/2)

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
250 GTV -1 (A, B)	14°45.16´N, 44°58.77´W	max. 10x20	completely altered peridotite, green serpentine grains in black matrix, magnetite grains (<0.5mm) in matrix and serpentine, some withe talc (?)	KL, NA
250 GTV -2	14°45.16´N, 44°58.77´W	40x25	nearly complete altered pyroxenite, some former pyroxenes seeable, small (<1mm) honeycomb structures, orange-brown clay minerals in matrix	KL, NA
250 GTV -3 (A, B)	14°45.16´N, 44°58.77´W	20x20	altered, coarse grained pyroxenites, some more or less preserved pyroxene grains, orange-brown colored from clay minerals	KL, NA
250 GTV -4	14°45.16´N, 44°58.77´W	10x10	light green, groused serpentinized peridotite, grain size max 5mm, talc and serpentine are main components	KL, NA
250 GTV -5	14°45.16´N, 44°58.77´W	max. 5x7	massive quartz-veins	
250 GTV -6	14°45.16´N, 44°58.77´W		Mn-coated, Fe-oxide-hydroxide crusts	

Print Form

Rocksampling Protocol M64/2

Date (UTC) 19.05.2005 **Station** 250 GTV (1/2)

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
250 GTV-7	14°45.16´N, 44°58.77´W	-	serpentite-grouse, coarse grained, in-situ temperature was about 43°C	KL, NA
250 GTV-8	14°45.16´N, 44°58.77´W	-	orange-brown sediment	KL, NA

Print Form

Station Protocol M64/2

Station No.: 258 GTV **Date (UTC):** 20.05.2005

☐ *ROV* ☐ *OFOS* ☒ *GTV* ☐ *CTD* ☐ *MAPR*

Objectives: sulfidesampling near M60-3 83GTV, NW of Irina II

Station Begin

Time (UTC): 23:52 Lat (Ship): 14°45.22´N Long (Ship): 44°58.75´W

Depth (HS): 3044m

Bottom Contact

Time (UTC): 00:59 Lat (Ship): 14°45.26´N Long (Ship): 44°58.75´W

Depth (HS): 3049m Cable out: 3088m

Comments VHS on: 08:04:35 (00:50 UTC)
1:22 UTC OBT and Beacon 14 in sight (VHS 08:38 tape-time)

Grab: 14°45.21´N, 44°58.76´W, 1:36 UTC, HS: 3049m

Off Bottom

Time (UTC): 01:38 Lat (Ship): 14°45.21´N Long (Ship): 44°58.76´W

Depth (HS): 3052m Cable out: 3075m

Station End

Time (UTC): 02:48 Lat (Ship): 14°46.50´N Long (Ship): 44°58.82´W

Depth (HS): 3060m

Summary recovered old Calyptogena shills, old clam-field
no sulfides, some Mn-coated serpentinites

Print Form

Rocksampling Protocol M64/2

Date (UTC) 21.05.2005 **Station** 258 GTV

Sample-Number	Lat / Long	Size (cm)	Description	Sample taken by
258 GTV-1	14°45.21´N, 44°58.76´W	max. 3x4	Mn-coated, coarse-grained serpentinized peridotites	
258 GTV-2	14°45.21´N, 44°58.76´W	-	some mud and grouse from GTV	

Print Form

Station Protocol M64/2

Station No.: 259 GTV **Date (UTC):** 21.05.2005

☐ *ROV* ☐ *OFOS* ☒ *GTV* ☐ *CTD* ☐ *MAPR*

Objectives: biological sampling at "QUEST"-site

Station Begin

Time (UTC): 04:05 Lat (Ship): 14°45.21´N Long (Ship): 44°58.84´W

Depth (HS): 2758m

Bottom Contact

Time (UTC): 05:19 Lat (Ship): 14°45.23´N Long (Ship): 44°58.84´W

Depth (HS): 3040m Cable out: 3069m

Comments VHS on: 12:25:30 (05:15 UTC)
VHS off: 14:04

grab: 14°45.24´N, 44°58.84´W

Off Bottom

Time (UTC): 06:45 Lat (Ship): 14°45.28´N Long (Ship): 44°58.90´W

Depth (HS): 3035m Cable out: -

Station End

Time (UTC): 07:45 Lat (Ship): 14°45.13´N Long (Ship): 44°58.79´W

Depth (HS): 3035m

Summary no samples were recovered, grab was open, station was canceled

OBP-discovered at 14°45.233´N, 44°58.827´W

Print Form

Appendix 6:

List of hydrothermal fluid subsamples taken for further analyses on-shore

St. No M 64/2	Instrument	Dive type	Location	CH_4, H^2, ∂D	$\partial^{34}S$ SO_4	$\partial^{34}S$ S^{2-}	$\partial^{13}C$, $\partial^{18}O$	DIC	$\partial^{15}N$ Amino acids	Alka-linity	$\partial^{44}Ca$	Total Trace metals	Diss. Trace metals I	Diss. REE, PGE	Diss. Major ions	An-ions	Diss. Trace metals II	$\partial^{178}Hf$	Metal organic
Lab				U-HH	U-MS	U-MS	U-MS	U-MS	U-MS	GEOM	GEOM	U-KI	U-KI	U-KI	U-KI	IUB	IUB	IUB	U-OTAG
224 ROV- 4	KIPS	Test	Irina-2 Smoker	X	X	X	X	X	-	X	X	-	X	-	X	X	X		
232 ROV-3	KIPS	Bio	Irina-2 Mussel bed	X	X	X	X	X	-	X	X	-	X	-	X	X	X		
232 ROV-7	KIPS	Bio	Irina-2 Mussel bed	X	X	X	X	X	-	X	X	-	X	-	X	X	X		
249 ROV-7	KIPS	Geo	Anna Louise Smoker	X	-	X	X	X	-	X	X	X	X	X	X	X	X		
249 ROV-9	KIPS	Geo	Irina Smoker	X	-	X	X	X	-	X	X	X	X	-	X	X	X		
257 ROV-8	KIPS	Geo	Site „B“ Smoker	X	X	X	X	X	X	X	X	X	X	-	X	X	X		
261 ROV-6	ROV	Geo	Irina Smoker	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
266 ROV-6	ROV	Bio	Irina II musselbed	X	X	-	X	X	X	X	X	-	X	-	X	X	X		
266 ROV-10	ROV	Geo	Site „B“ Smoker	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

St. No M 64/2	Instrument	Dive type	Location	CH_4, H^2, ∂D	$\partial^{34}S$ SO_4	$\partial^{34}S$ S^{2-}	$\partial^{13}C$, $\partial^{18}O$	DIC	$\partial^{15}N$ Amino acids	Alka-linity	$\partial^{44}Ca$	Total Trace metals	Diss. Trace metals I	Diss. REE, PGE	Diss. Major ions	An-ions	Trace metals II	$\partial^{178}Hf$	Metal organic
Lab				U-HH	U-MS	U-MS	U-MS	U-MS	U-MS	GEOM	GEOM	U-KI	U-KI	U-KI	U-KI	IUB	IUB	GEOM	U-OTAG
277 ROV-5	KIPS	Geo	Irina II Smoker	X	X	X	X	X	X	X	X	X	X	-	X	X	X		
281 ROV-2	KIPS	Bio	Quest Mussel bed	X	X	X	X	X	X	X	X	-	X	-	X	X	X		
281 ROV-5	KIPS	Geo	Quest Smoker	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
283 ROV-4	KIPS	Geo	Irina II Smoker	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

U-HH = University of Hamburg, U-MS = University of Münster, GEOM = IFM Geomar-Kiel, U-KI = University of Kiel, IUB = International University Bremen, U-OTAG = University of Otago, New Zealand

Appendix 7:

List of microbiological samples

by Miriam Perner and Andrea Gärtner

(B= Bottle from fluid sampling system N=Niskin bottle; F= Filter fluid sampling system).

Station	Fluid/ Sediment	Clone library	FISH	DSMO/ Glycerin	Enrichments
217 CTD	watercolumn	12 Water depths	12 Water depths	----------	----------
219 CTD	watercolumn	12 Water depths	12 Water depths	----------	----------
221 CTD	watercolumn	12 Water depths	12 Water depths	----------	----------
222 GTV	222 GTV 6 sediment	222 GTV 6	----------	----------	----------
	222 GTV 7 Serpentinit (rock)	222 GTV 7	----------	----------	----------
224 ROV	224 Rov 4a (Subsample of hydrothermal fluid)	224Rov 4a1 (filter)	224 Rov 4a2 (filter)	224 Rov 4a3	6 Enrichments 224 Rov 4a4 224 Rov 4a5 224 Rov 4a6 224 Rov 4a7 224 Rov 4a8 224 Rov 4a9
225 GTV	225 GTV 5 (Sediment)	225 GTV 5	----------	----------	----------
227 CTD	Watercolumn	10 Water depths	10 Water depths	----------	----------
229 GTV	229 GTV A grey Sediment (Pyrit)	229 GTV A1	229 GTV A2	----------	5 enrichments 229 GTV A3 229 GTV A4 229 GTV A5 229 GTV A6 229 GTV A7
	229 GTV B brown sediment	229 GTV B1	229 GTV B1	----------	----------
	229 GTV C manganese crust	229 GTV C1	229 GTV C2	----------	----------
	229 GTV D brown sediment	229 GTV D1	229 GTV D2	----------	----------
	229 GTV E layered crust	229 GTV E1	229 GTV E2	----------	----------
230 GTV	230 GTV 2 (brown sediment)	230 GTV 2	----------	----------	----------
231 CTD	Watercolumn	11 Water depths	11 Water depths	--------	----------
232 ROV	232 Rov 5a Byssus scraped of off mussles	232 Rov 5a1	232 Rov 5a2	232 Rov 5a3	4 enrichments 232 Rov 5a4 232 Rov 5a5 232 Rov 5a6 232 Rov 5a7
	232 Rov 7a (Subsample of hydrothermal fluid)	232 Rov 7a1 (filter)	232 Rov 7a2 (filter)	----------	4 enrichments 232 Rov 7a3 232 Rov 7a4 232 Rov 7a5 232 Rov 7a6
	232 Rov 8	232 Rov 8.1 (filter)	232 Rov 8.2 (filter)	----------	----------

239 GTV	239 GTV A **(**black mud)	----------	----------	----------	4 enrichments 239 GTV A1 239 GTV A2 239 GTV A3 239 GTV A4
	239 GTV D (sticky mud)	----------	----------	----------	4 enrichments 239 GTV D1 239 GTV D2 239 GTV D3 239 GTV D4
	239 GTV E (surface of mussels)	----------	----------	----------	2 enrichments 239 GTV E1 239 GTV E2
248 CTD	Watercolumn	11 Water depths	11 Water depths	----------	----------
249 ROV	249ROV 7a (Subsample of hydrothermal fluid)	249 Rov 7a1 (filters)	249 Rov 7a2 (filters)	249 Rov 7a3	4 enrichments 249 Rov 7a4 249 Rov 7a5 249 Rov 7a6 249 Rov 7a7
	249ROV 9a (Subsample of hydrothermal fluid)	249ROV 9a1 (filter)	249ROV 9a2 (filter)	249ROV 9a3	4 enrichments 249ROV 9a4 249ROV 9a5 249ROV 9a6 249ROV 9a7
250 GTV	250 GTV 7 (brownish sediment)	250 GTV 7.1	250 GTV 7.2	----------	----------
	250 GTV 8 (dark sediment)	250 GTV 8.1	250 GTV 8.2	----------	----------
	250 GTV 9 (brownish sediment)	250 GTV 9.1	250 GTV 9.2	----------	----------
	250 GTV 10 **(**brown sediment)	250 GTV 10.1	250 GTV 10.2	----------	----------
252 ROV	252 ROV 4a (subsample from sediment sample)	252 ROV 4a1	252 ROV 4a2	----------	2 enrichments 252 ROV 4a3 252 ROV 4a4
254 CTD	Watercolumn	9 Water depths	9 Water depths	----------	----------
255 CTD	Watercolumn	3 Water depths	3 Water depths	----------	----------
257 ROV	257 Rov 6a (subsample from microbial mat)	257 Rov 6a1	257 Rov 6a2	----------	5 enrichments 257 Rov 6a3 257 Rov 6a4 257 Rov 6a5 257 Rov 6a6 257 Rov 6a7

	257Rov 8a (subsample from hydrothermal fluid)	----------	----------	----------	6 enrichments 257Rov 8a1 257Rov 8a2 257Rov 8a3 257Rov 8a4 257Rov 8a5 257Rov 8a6 5 enrichments for temperature gradient experiment 257Rov 8a7 257Rov 8a8 257Rov 8a9 257Rov 8a10 257Rov 8a11
	257 ROV 9	257 ROV 9.1 (filter)	257 ROV 9.2 (filter)	----------	----------
261 ROV	261 Rov 1a (subsample from hydrothermal fluid)	----------	----------	261 Rov 1a1	5 enrichments 261 Rov 1a2 261 Rov 1a3 261 Rov 1a4 261 Rov 1a5 261 Rov 1a6
	261 Rov 6a (subsample from hydrothermal fluid)	----------	----------	261 Rov 6a1	6 enrichments 261 Rov 6a2 261 Rov 6a3 261 Rov 6a4 261 Rov 6a5 261 Rov 6a6 261 Rov 6a7 5 enrichments for temperature gradient experiment 261 Rov 6a8 261 Rov 6a9 261 Rov 6a10 261 Rov 6a11 261 Rov 6a12
	261 Rov 7	261 Rov 7.1 (filter)	261 Rov 7.2 (filter)	----------	----------
263 ROV	263 Rov 3a (subsample from Niskin #4)	263 Rov 3a1 (filter)	263 Rov 3a2 (filter)	----------	----------
	263 Rov 6a (Byssus from t-logger #3)	263 Rov 6a1	263 Rov 6a2	263 Rov 6a3	----------
266 ROV	266 Rov 10a (subsample of hydrothermal fluid)	266 Rov 10a1 (filter)	266 Rov 10a2 (filter)	266 Rov 10a3	3 enrichments 266 Rov 10a4 266 Rov 10a5 266 Rov 10a6
272 ROV	272 Rov 3a (subsample from Niskin #2)	272 Rov 3a1 (filter)	272 Rov 3a2 (filter)	----------	----------

277 ROV	277 Rov 2a (surface structure of stone)	277 Rov 2a1	-------	----------	----------
	277 Rov 2b (surface structure of stone)	277 Rov 2b1	277 Rov 2b2	----------	----------
	277 Rov 2c (surface structure of stone)	277 Rov 2c1	277 Rov 2c2	----------	3 enrichments 277 Rov 2c3 277 Rov 2c4 277 Rov 2c5
	277 Rov 2d (surface structure of stone)	277 Rov 2d1	277 Rov 2d2	----------	----------
	277 Rov 3a (subsample of hydrothermal fluid)	277 Rov 3a1 (filter)	277 Rov 3a2 (filter)	----------	----------
	277 Rov 4a (subsample of hydrothermal fluid)	----------	----------	277 Rov 4a1	5 Enrichments for the temperature gradient experiment 277 Rov 4a2 277 Rov 4a3 277 Rov 4a4 277 Rov 4a5 277 Rov 4a6
279 CTD	Watercolumn	10 Water depths	10 Water depths	----------	----------
281 ROV 283 Rov	281 Rov 5a (subsample hydrothermal fluid)	----------	----------	281 Rov 5a1	10 enrichments 281 Rov 5a2 281 Rov 5a3 281 Rov 5a4 281 Rov 5a5 281 Rov 5a6 281 Rov 5a7 281 Rov 5a8 281 Rov 5a9 281 Rov 5a10 281 Rov 5a11
	281 Rov 6 (hydrothermal fluid)	281 Rov 6.1 (filter)	281 Rov 6.2 (filter)	----------	----------
	281 Rov 11 (pushcore experiment – pushcore #2)	281 Rov 11.1	----	281 Rov 11.2	5 enrichments 281 Rov 11.3 281 Rov 11.4 281 Rov 11.5 281 Rov 11.6 281 Rov 11.7
	281 Rov 12 (pushcore experiment – pushcore # 1	281 Rov 12.1	----	281 Rov 12.2	5 enrichments 281 Rov 12.3 281 Rov 12.4 281 Rov 12.5 281 Rov 12.6 281 Rov 12.7

	283 Rov 4a (subsample hydrothermal fluid)	------	------	------	8 enrichments 283 Rov 4a1 283 Rov 4a2 283 Rov 4a3 283 Rov 4a4 283 Rov 4a5 283 Rov 4a6 283 Rov 4a7 283 Rov 4a8
285 ROV	283 Rov 5 (hydrothermal fluid)	283 Rov 5.1 (filter)	283 Rov 5.2 (filter)	-----	------
	285 Rov 2a (subsample from Niskin #4)	285 Rov 2a1	285 Rov 2a2	----	-----

Appendix 8:

Station list of zoological samples

by Jens Stecher

Date	Station No.	Site / Location
11.05.2005	222GTV-A	approx. .450m SW of “IRINA II”
12.05.2005	225 GTV-A	approx.100m SW of “IRINA II”
13.05.2005	229 GTV-A	50m S of “IRINA I”, 25m W of “ANNA LOUISE”
14.05.2005	230 GTV-A	100m S of “ANNA LOUISE2, 150m SW of site “A”
14.05.2005	232ROV#5	IRINA II, 3m S of smoker-complex, mussel-site 1
15.05.2005	239GTV-A	400m E of “IRINA II”, EH-anomaly measured during M60/3
18.05.2005	249 ROV#5	“IRINA II”, 3m NW of smoker-complex, mussel-site 2 (transplantation-experiment)
18.05.2005	244ROV#7 (Net No 4)	“IRINA II”, 3m NW of smoker-complex, mussel-site 2 (transplantation-experiment)
19.05.2005	250GTV	25m S of “IRINA II", possible target for the drilling programme in 2006
19.05.2005	252 ROV#1	Site "A" at the black smoker "Barad-Dur"
19.05.2005	252ROV#6, (Net No 9)	“IRINA II”, 3m NW of smoker-complex, mussel-site 2 (transplantation-experiment)
19.05.2005	244ROV#6, (Net No 6)	“IRINA II”, 3m NW of smoker-complex, mussel-site 2 (transplantation-experiment)
20.05.2005	257 ROV#10	Site "B", Black Smoker (Marker "MA")
20.05.2005	257 ROV#12	Site "B", Black Smoker (Marker "MA")
20.05.2005	258GTV	20m N of “IRINA II”, nearby 83 GTV of cruise M60/3
21.05.2005	261ROV#3	Site "A" at the Black Smoker "Barad-Dur"
21.05.2005	261ROV#5	“IRINA I”, semicircular *Bathymodiolus*-patch, 3m NW of sampled Smoker, nearby marker "MD", former beacon 11
22.05.2005	244ROV#8, (Net No 2)	“IRINA II”, 3m NW of smoker-complex, mussel-site 2 (transplantation-experiment)
22.05.2005	244ROV#5, (Net No 5)	“IRINA II”, 3m NW of smoker-complex, mussel-site 2 (transplantation-experiment)
22.05.2005	263ROV#4	Slope W of “IRINA II”, nearby the marker "Anya"
22.05.2005	263ROV#6	Mussel-patch at "QUEST" site
23.05.2005	266 ROV#7	“IRINA II”, 3m S of the smoker-complex, nearby T-logger No4 of M60/3, mussel-site 1
23.05.2005	266 ROV#11	Site "B", black smoker nearby marker "MA"
24.05.2005	244ROV#9, (Net No 8)	“IRINA II”, 3m NW of smoker-complex, mussel-site 2 (transplantation-experiment)
24.05.2005	268CTD	44°58.0´W; 14°44.0´N, 2972m
24.05.2005	272ROV#6	“IRINA II”, E- wall of the smoker-complex, placed in the "Shrimps Gap"
25.05.2005	277ROV#6	“IRINA II”, E- wall of the smoker-complex, at the basis of the second mussel-dome from N
25.05.2005	277ROV#7	E- wall of the smoker-complex, at the basis of the third dome-structure from N
26.05.2005	281ROV#3	Mussel-patch at "QUEST" site
26.05.2005	281ROV#12	“IRINA II”, 1m S at the basis of the smoker-complex
27.05.2005	244ROV#10, (Net No 10)	“IRINA II”, 3m NW of smoker-complex, mussel-site 2 (transplantation-experiment)
27.05.2005	283ROV#7	“IRINA II”, E- wall of the smoker-complex, placed in the "Shrimps Gap"
27.05.2005	283ROV#11	“IRINA II”, SE of the smoker-complex, 1m away from its basis
28.05.2005	285ROV#1a	Mussel-patch at "QUEST" site
28.05.2005	285ROV#3	Mussel-patch at "QUEST" site
28.05.2005	285ROV#5	Mussel-patch at "QUEST" site

Appendix 9: ROV dive protocols

Protocol M64-2	***Station: 224 ROV (Dive 50B)***	***sample***
time	***Comments***	***#***
17:00:00	Quest in water; Waterdepth HS: 3053m, no GAPS, positioning only by beacon	
17:38:57	Reaching depth of 600m	
17:55:00	1000m waterdepth	
18:00:57	black screen 1300m	
18:02:14	screen on again, diving on	
18:09:08	reaching 1500m	
18:24:00	reaching 2000m	
18:39:19	reaching 2500m	
18:04:00	reaching 3000m	
18:58:00	seafloor in sight ship position 14°45,22N; 44°58,85W, 3053m	
18:59:00	going to the beacon #12 of M60/3 (still actve) after checking the systems	
19:01:00	sedimens, talus, multivalve-pack o.k.	
19:03:00	heading E	
19:04:00	going 130°	
19:08:00	fish, Ophidiiformes	
19:11:00	comming up to 3025m altitute 24	
19:12:00	bottom in sight again, sediments, 80%, talus, going 299°	
19:15:00	sedimented crusts	
19:16:00	beacon #12 of M60/3 in sight 3045m Ship at 14°45,22N, 44°58,82W	
19:18:00	musselfield and T-logger in sight	
19:22:00	going up to 3039m, heading 166°	
19:24:00	going 44m S, looking for placing the Ocean Bottom Tiltmeter (OPT)	
19:25:00	sedimented crusts	
19:27:00	thruster dust	
19:29:00	clear water again, ROV at bottom 3048m, ship at 14°45,22N, 44°58,83W, HS 3047m	
19:34:00	leaving position, going 299°, thruster dust	
19:36:00	new beacon #14 and OBT will be placed on botton, 3048m ship at 14°45,23N, 44°58,82W HS 3046m	
19:50:00	OBT placed on bottom 3048m ship at 14°45,22N, 44°58,81W HS 3045m, trouble-shooting with rope	
20:06:00	robe is free of OBT	
20:09:00	picking up OBT again, searching for a better position, sediment layer to thick	
20:15:00	going N, thruster dust	
20:16:00	turning S	
20:18:00	Going 300° again	
20:19:00	steep slope sediment covered	
20:20:00	moving 239°, ultramaphic block, talus	
20:21:00	going 320° ridge, flow front structure, strongly sedimented	
20:21:00	fish, Ophidiiformes	
20:25:00	thruster dust holding position	
20:29:00	clear water again, block of crust, 3035m ship at 14°45,24N, 44°58,84W HS 3045m	
20:30:00	OBT placed on bottom 3035m ship at 14°45,24N, 44°58,84W HS 3045m	
20:35:00	going 134°, waiting for clear water, dust sedimentation	
20:41:00	moving 130°, sedimented crust	
20:42:00	thruster dust	
20:44:00	going E back to the mussel field, bacterial mats (?) in sight	
20:45:00	hydrothermal crust, yellow sediments	
20:53:00	placing the beacon #14 3035m ship at 14°45,23N, 44°58,80W HS 3046-3050m	
21:16:00	going E towards IRINA II	
21:23:00	deep blue, 3050m	
21:24:00	seafloor in sight again, strongly sedimented 3052m	
21:27:00	slope sedimented talus going down, 3063, bacterian mats, within the field	
21:29:00	Marker "Anya" in sight, mussel-shill	
21:31:00	shells, brownish sediment	
21:31:00	patches of living mussels	
21:33:00	increasing living mussels surrounded by ultramafic precipitates, going E	
21:34:00	sediments again, no life	
21:34:00	going 142°, shells again	
21:35:00	a lot of dead and living (?) shells, than T- logger of M60/3 in sight, 3037m	
21:39:00	smoker of IRINA II in sight	
21:41:00	active smoker	
21:43:00	going 330°, chimneys in sight	
21:44:00	T-logger, active twin-black smokers, new source (?), shells of mussels at the bottom of old smokers 3036m	
21:46:00	trying to sample black smoke with the fluid-sampling-system (ship position14°45,21N, 44°58,71W, HS 3029m)	
21:57:00	open handel #4 ship at 14°45,21N, 44°58,70W, HS 3032m, ROV at 3036m	224ROV#1
22:02:00	hight T-sensor putting into the black smoke	224ROV#2
22:30:00	removing hight t-sensor, stopped measurement	
22:35:00	closing valve (handle) #4	
22:39:00	T-measurement with 8-channel T-logger	224ROV#3a
22:40:00	removing 8-channel T-logger, thruster dust	
22:45:00	T-measurement with 8-channel T-logger; second try	224ROV#3b
22:47:00	the end of a logger, starting logger recovery	
22:53:00	recoverey successfully finished, placed into the toolbox	
23:03:00	showing and flying around the smoker structures	
23:06:00	diving up to 3021m, to escape the thruster dust	
23:09:00	leaving the bottom, diving up	
23:11:00	TEST of the fluid sampling system; handle #1 open; pump on; position 3 (Flasche 3+4) 2971-2696m	224ROV#4
23:22:00	pump off	
23:29:00	pump on; position 18 (Filter 3+4); 2673-2383m	

23:39:00	pump off
23:46:00	pump on; position 2 (Glasfaserfilter 5+6); 2308-2240m
0:06:00	pump off
1:05:00	pump on 969-689m; position 1 (Flasche 1+2)
1:15:00	pump off
1:15:00	pump on; position 17 (Filter 1+2); 668-362m
1:26:00	pump off; end of TEST of fluid sampling system

Protocol M64-2	***Station: 232 ROV (Dive 51)***	***sample***
time	***Comments***	***#***
8:23	Start of station 232ROV (dive 51), 14°45.18 N/44°58.75 W	
13:14	2840 m, all screens black, software reset	
13:24	all systems working, continue to dive	
13:30	bottom contact at: 14°45,21 N/44°58,78 W, 3037m +5.1m, heavily sedimented talus	
13:35	moving to beacon #12 for positioning	
13:38	moving across sedimented area	
13:45	still moving across sedimented talus	
13:57	still moving across sedimented talus	
14:11	still searching for beacon	
14:17	14°45,18 N/44°58,73 W (GAPS), 3057m + 2.4m	
14:19	whitish sediment cover (?)	
14:20	old rusty tin can	
14:21	moving across talus	
14:28	marker ahead, beacon #12, T-logger from last year	
14:03	stop at beacon #12 (QUEST site)	
14:33	start searching for mussel patch for transplantation experiment	
14:39	mussel-shell in sight	
14:40	mussel patch found with t-logger and bacterian mats	
14:43	going W, leaving the patch, sediment gets coarser (might be pteropoda, thecosomata)	
14:44	going 239°, some single mussels and shells in sight	
14:03	thruster dust, going E	
14:49	going N, thruster dust, turn to E going ahead	
14:03	diving up to 3052 m to escape the thruster dust	
14:51	clear water	
14:55	leaving "QUEST" site, going to IRINA II site, heading E, altitute 3051m+7,4m	
14:59	looking around altitute 3051m+5,2m	
15:02	going 148°, partly thruster dust 3059m+5,6m	
15:07	seafloor in sight, going back to "QUEST" to place the profiler heading 165°	
15:09	bacterian mats in sight	
15:10	shells, slope in sight	
15:11	smoke appears, mussel beds comming up we are within IRINA II, SE part	
15:13	mussel shells in between ultramafic structures,	
15:14	fish, (Ophidiiformes), Matruschca and smokers of IRINA II in sight,	
15:17	going ahead S	
15:18	flying at the bottom of smokers, going to T-Logger, smoke appears	
15:19	at T-logger, holding position 3035m+3,6m	
15:23	zoom in: many scavangers (Phymorhynchus) feeding on Bathymodiolus, no smaller sizes of Bathymodiolus in sight, many Ophiuroidae	
15:29	ROV placed at bottom, starting the transplantation experiment	
15:35	putting the scale beside for better handling the marker (T-logger) and profiler	
15:40	start to remove the profiler	
15:44	profiler is placed on the mussel bed, shrimps and Phymorhynchus	232ROV-1
15:54	t-logger placed within the musselfield ;T°max:4,6°C	232ROV-2
15:57	t-logger removed	
16:04	valve #3 of fluid-sampler opened	
16:10	fluid sampler nozzle at surface of mussel bed, below profiler	
16:12	pump on with medium power (approx. 22VDC) pumping max. 5cm above the field	232ROV-3
16:16	fish, (Ophidiiformes)	
17:01	still pumping	
17:05	Pegasus zoom in shimmering water: Segonzacia cf. mesatlantica, Rimicaris, Pantopoda, Ophiuroidea, among Bathymodiolus and Phymorhynchus	
17:07	end of fluid sampling	
17:15	starting to replace the profiler	
17:21	profiler is placed besides the mussel bed	
17:24	close vavle #3	
17:27	placing the 7 nets from the poarch, laying down besides the musselfield	
17:32	starting the searching for a better mussel-patch to locate the profiler again	
17:36	going S around the smoker complex	
17:36	going further S, mussels shells within live specimens	
17:39	looking around the smoker-complex,moving back, heading 124° up to E	
17:45	accident sampling at smoker	
17:46	less shrimps at the smokers than during M60/3 ???	
17:47	zoom in on the musselfield at the bottom of the smokers. Bathymodiolus specimens coated with brown layer	

17:49	fish, Zoaceres in sight	
17:49	starting T-measuremt with T-logger in between mussels, surounded by shrimps (Mirocaris ?)	
17:55	nice sequence of Zoaceres	
18:02	end of T-measuremet: T1 47°C (bottom 1cm); T2 39°C; T3 26°C; T4 22°C; T5 26°C; T6-T8 callibration error (every 1cm measured)	232ROV-4
18:05	going back to the first experiment site, to take up the profiler	
18:09	taking up the profiler	
18:18	lots of snails	
18:21	putting down the profiler	
18:22	Profilur on ground	
18:23	problems with balancing the profilur	
18:30	going back to first site	
18:36	collecting nets from first site	
18:41	collecting mussle sample with net #7 from first site	232ROV-5
18:50	positioning T-logger #4144 at the spot where mussles were removed (first site)	232ROV-6
18:57	net #7 placed into large box #7	
19:07	collecting ruler from sample point	
19:10	collecting other nets from first site	
19:31	10m westward from second site; dropping all the empty nets	
19:48	placing ruler at second site	
19:51	Nozzle of fluid-sampler broken by removing out of the tube	
19:55	open handle #4 (KIPS)	
20:02	trying to handle the nozzle	
20:04	nozzle of fluid-sampler placed in source of shimmering water	
20:38	detailed study of fish lying next to nozzle	
20:48	moving nozzle out, pumps off, changing nozzle from Orion to Rigmaster	232ROV-7
20:51	closing handle # 4	
20:56	opening handle # 2	
20:57	Orion takes nozzle again from Rigmaster and placing into musselbed	
21:00	pump ON, pumping Mirjam's filter, same position as 232ROV#7, at the end of ruler	232ROV-8
21:16	pump OFF	
21:23	nozzle in parking position	
21:34	closing handle # 2	
21:34	starting to move Profiler into upright position	
21:38	profiler in position, recording, but ruler was moved from previous position	
21:54	all recording done, photos taken, packing Profiler	
21:59	Profiler on the porch of ROV, securing with Rigmaster and Orion	
22:01	leaving site, going up, end of dive	
23:00	ROV on board - end of station	

Protocol M64-2 time	Station: 244 ROV (Dive 52) Comments	sample #
	ROV in water, ship's position: 14°45,11'N, 44°58,69'W, depth 3015m, on board: profiler, ocean bottom pressure meter (OBP)	
13:21	bottom sight, 14°45,18'N, 44°58,76'W, water depth 3027m + 13,1m sediment covered talus	
13:24	moving to mussel field at IRINA II, place profiler there	
13:25	patch of mussel shells	
13:30	thruster dust	
13:32	heavily sedimented area	
13:34	talus with sediment in between	
13:40	still moving, about 13 m above ground	
13:41	sitting above IRINA II, positioning to beacon #12, moving direction 120°	
13:46	fish	
13:50	outcrop area	
13:53	patch of mussel shells	
13:56	more mussel shells	
13:56	IRINA II directly in front with two markers	
13:58	thick black smoke emanating from small chimney	
14:00	moving around Irina II central structure, Nicole's nets in sight	
14:06	arriving at mussel bed, depositing profiler	
14:27	still at site, turning profiler on the side, getting a better grip with Orion	
14:45	positioning profiler on its side	
14:50	finished deposition of the profiler	
15:07	beginning the deposition of the profiler again; upright; near the ruler	
15:14	finished deposition of the profiler near the ruler on the mussle patch (site 2)	244 ROV-1
15:15	leaving towards the spot where the OBT is; going W	
15:23	moving across sedimented talus	
15:26	rocky area, patches filled with pteropod shells	
15:27	reddish-brown colored sediment	
15:28	intense yellow and brown staining	
15:29	white bacterial mats, black smoker in the back	
15:30	thick talus area	
15:31	holothuria in sight	
15:32	vast sedimented area	
15:34	talus with sediment in between	
15:35	tin can in sight	
15:37	rocky area	
15:39	arriving at site for positioning OBP	
15:48	OBP in position, ship's position: 14°45,22'N, 44°58,77'W	244 ROV-2
15:56	moving across white bacterial mats	
15:57	beacon #14 in sight	
16:03	OBT in sight	
16:12	OBT was picked up, placed on porch for transit to final position	
16:18	picking up beacon #14 with Rigmaster, moving to site where OBP stands	
16:29	fish approaching ROV	
16:32	water column above OBP site filled with dust	
16:42	still searching for proper position for OBT	
17:01	sitting next to tin can	
17:35	water column filled with dust	
17:37	OBT (ocean bottom tiltmeter) placed on ocean floor next to beacon #14	
18:07	searching for OBP, going 325°	
18:09	searching for OBP, going 46°	
18:11	searching for OBP, going 178°	
18:12	going 297°	
18:17	back at beacon #14	
18:24	given up looking for OBP;	
18:37	GAPS Position von Beacon #14: 14°45,212 N, 44°58,796 W , going N	
18:41	going back heading 144° up to 110°	
18:41	stopped again, looking around	
18:42	going further to 110° up to 182°	
18:45	going E	
18:53	placed OBT on ultramafic talus 3051m	
19:02	levelling OBT	
19:09	OBT levelled GAPS 14°45,201 N, 44°58,784 W	
	y-orientation 48°E	244 ROV-3
19:17	leaving OBT site	

19:20	leaving for beacon #14	
19:29	picking up beacon #14 with Rigmaster, moving to site where OBT stands	
19:32	diving u to 3036m+16m, going E	
19:33	going down again, heading E, found OBT, 3047m+3,0m	
19:35	placed Beacon No 14 nearby OBT, 3m SSW, 3050m, Position (GAPS): 14°45,199 N, 44°58,783 W	244 ROV-4
19:44	going to IRINA II, heading 112° up to 137°	
19:50	flying across sediments and ultramafic talus, actinaria	
19:57	sediments with single shells, sediments color change to yellow, 3043m	
20:00	stopped and looking around, oriantation lost ????	
20:02	going on 156°, sedimented talus, big block	
20:04	stopped again, looking around facing N, flying N	
20:05	fish, Ophidiiformes	
20:06	sediments increasing, two large talus blocks	
20:07	flying on, heading 315°	
20:08	sediments, big talus block going on to W	
20:10	one single Bathymodiolus on talus, sediment covered	
20:11	sediments with big talus block	
20:11	shells increasing, going S	
20:12	field is found, dead shells	
20:13	profiler in sight, felt down, lying at side, nets in sight	
20:17	beginning the photomosaicing	
20:22	DSPL recording for photomosaicing	
20:24	starting the photomosaicing going E first record	
20:26	moving back, second record	
20:27	moving forward again, third record	
20:28	showing up to the smoker-complex	
20:29	fourth photomosaicing	
20:33	photoshooting with scorpio, with scale as well lasers	
20:39	collecting nets from holding point, then move to sampling site	
20:54	Orion grabs net #5	
20:56	net back on porch	
20:57	lid of net #5 now open	
20:59	difficulties to securely grab net	
21:01	net #5 now in the right position in Orion manipulator	
21:03	net #5 successfully sampled thereby stirring up mussels	
21:06	resampling net #5 causing black cloud of dust	
21:08	sample finally taken	244 ROV-5
21:10	lid closed	
21:12	net #5 positioned next to sampling site	
21:15	net # 6 grabbed	
21:16	sampling causes black dust again	
21:17	sample taken	244 ROV-6
21:19	net #6 placed on porch	
21:19	net #3	
21:22	while trying to sample mussels net #3 melted partially	
21:25	net #3 can not be used anymore	
21:29	next net grabbed (#4)	
21:31	sample taken	244 ROV-7
21:33	lid of net #4 closed	
21:39	now net #2	
21:41	sample taken	244 ROV-8
21:41	lid of net #2 closed	
21:44	net #8 grabbed	
21:47	sample taken	244 ROV-9
21:49	lid of net #8 closed and placed on porch	
21:57	moving nets on ROV porch	
22:07	net #? grabbed	
22:11	attempting to sample however lid is not fully open	
22:13	lid is now fully opened	
22:22	obviously something wrong with net (melted?)	
22:25	ROV back to get remaining 2 nets from storing location	
22:28	the 2 nets stick together, trying to separate them with second manipulator	
22:30	reason for sticking together is cable ties	
22:31	nets separated	
22:37	back to sampling location	
22:42	first and second attempt to sample mussels failed	

22:45	a few mussels now in net	
22:46	and may be one more	
22:50	net # is 10	
22:51	lid of net #10 closed and placed on porch	244 ROV-10
22:53	sampling of all nets finished, now looking for a location to place the nets for the coming days	
23:06	location close to tilt meter with marker found	
23:10	starting to unload nets and placing them on rocky ground	
23:13	two nets unloaded	
23:15	third net placed	
23:17	fourth net placed	
23:18	fifth net placed	
23:22	putting unused and broken nets in sampling box	
23:37	decision to abort dive due to leaking camera	
1:40	ROV on Board - end of station	

Protocol M64-2	***Station: 249 ROV (Dive 53)***	***sample***
time	***Comments***	***#***
12:19	ROV in water, ship's position: 14°45,16'N, 44°59,06'W, depth: 3050m	
14:15	bottom sight, water depth: 3025m + 7m, ship's position: 14°45,21'N, 44°58,78'W	
14:15	move to beacon #14	
14:30	talus with sediment inbetween	
14:30	arriving at site with beacon #14, OBT, mussel nets	
14:35	checking leveling of OBT, everything is ok	
14:38	approaching Nicole's nets	
14:42	collecting mussel net #4 (sample No: 244ROV-7) in large box #7	
14:50	leaving for IRINA II	
15:11	arriving en-route at white square marker "ANYA"	
15:13	Grenadierfisch	
15:14	thick mussel patches	
15:15	arriving at IRINA II, profiler lying on the side	
15:27	start positioning 8-channel-temperature logger at site where mussels have been collected	
15:29	temperature measurement 30 cm in mussel bed: 7-8 °C	249 ROV-1
15:33	T at tip: 8°C, 10 cm above: 12°C, values remain constant	
15:35	T at tip: 8.7°C, 10 cm above: 11.7°C, 9°C at surface	
15:37	second position about 20 cm NW, deeper in mussel bed	
15:38	T at tip: 16°C at depth, 6°C at surface	249 ROV-2
15:40	third position, 20 cm E, deeper in mussel bed (50 cm)	
15:42	T at tip (45cm): 21 °C, 41 cm: 7-8°C, 35 cm 17-18°C	249 ROV-3
15:47	measuring again at site where mussels have been removed, hard surface	
15:58	T measurement at tip uncovered by mussels, only covered by ophiuroidea (2 cm in mussel bed, hard crust underneath): 2.7 °C, seawater: 2.6°C	249 ROV-4
15:58	terminating T measurements, start sediment sampling	
16:06	taking shovel with lit from box #6	
16:08	try to collect a bio and sediment (?) sample from site 249 ROV-4, 3036m	
16:14	no sediment at this tip, unsuitable place, searching for a better one	
16:16	trying to sample 30cm right of the tip before, unsuccessful	
16:19	secound try more or less successful, tool was not suitable for this sampling goal, single mussels were removed and shifted beside, shovel replaced in box #6	249 ROV-5
16:29	t-logger # 4143 stuck in between experimental patch of mussel site II	249 ROV-6
16:40	end of mussel experiment, going for hot fluid-sampling to ANNA LOUISE heading 155°	
16:43	flying across ultramafic talus, covered by sediments	
16:43	bacteria mats in sight	
16:44	gap in the sediment, possible from TV-grab 239?, covered by white sediments (bacteria or anhydrit?)	
16:48	approaching site "B", 2977+5,4m waterdepth	
16:50	little smoker / smoking crater	
16:53	some ultramafic outrcrop and blocky talus	
16:55	sulfide sediment	
16:56	approaching site "IRINA I", grab-mark	
16:57	sulfide-talus, -crusts and Fe-oxides	
16:59	arriving "ANNA LOUISE"	
17:03	flying from south arround "ANNA LOUISE" and arriving again from east	
17:11	end of surrounding "ANNA LOUISE" and arriving again from NNE	
17:15	smoking crater in sight - min.4 vents / fish: Bythitidae	
17:20	only few biota, some death mussels, crab	
17:28	try to go to little smoker in center of the crater	
17:36	may the candelabra-smoker	
17:40	try to go to smoker ~2m west of proposed candelabra to sampling hot fluid	
17:58	change of pilots	
18:00	seaching for a better position	
18:06	try to sample the fluids, first try at 2938,5m	
18:12	open handle No1	
18:18	nozzle placed into the smoker source	249 ROV-7
18:18	pump on, at least pumping for 45 up to 60 min	
19:07	stop pumping	
19:16	changing position slightly to close handle # 1	
19:38	measuring temperature fluid of sampled smoker T1 (held in chimney) 123°C, 150°C, 160°C, 151°C; measuring temperature a second time T2: 140°C, 150°C, 160°C, 172°C, 180°C, 185°C, 187°C, 201°C, **205°C**	249ROV-8
19:46	very few white shrimps; crab	
19:56	trying to sample a little bit of chimney structure-aborted; shrimps in picture	

19:56	leaving ANNA-LOUISE and flying to IRINA I for second fluid sampling	
20:05	arrived at "B"	
20:15	arrived at IRINA I	
20:25	searching for a good position to sample hot fluids from chimney structure (2950m)	
20:25	change of pilots	
20:27	open handle # 3	
20:29	nozzle placed into smoker source; crab, very few shrimps	
20:29	pump on	
20:32	pump off changing position of nozzle	
20:33	nozzle placed into smoker source	249ROV-9
20:33	pump on, at least pumping for 45 up to 60 min	
20:49	still pumping, measuring other chimney structure; it is 2-3m away N, 20cm in diameter, 60 cm high and shimmering water is coming out of base ; field has 3 active, 2 inactive smokers at this site; looking candelaber like; microbial mats	
21:17	stop pumping	
21:18	close handle # 3	
21:20	open handle # 2 in order to pump on large filter	
21:21	start pumping, single shrimps	249ROV-10a
21:24	pump off because slipped off of chimney opening	
21:29	diving up to escape the smoke and the thruster dust to 2940m	
21:32	second run begins	
21:35	smoke is going to SW	
21:35	nozzle placed into the smoker source, pump on	249ROV-10b
21:50	pump of, 0,7A Power o.k.	
21:53	close handle # 2, nozzle replaced into the tube	
21:57	starting T°-measurment, big opening: 130, 160, 175, 182, 186, 187. Little opening: 123° , T max: 188°	249ROV-11
22:01	stop T-measurement	
22:06	fying to IRINA II heading 331°-335° 2987m+24m	
22:21	going down to 3000m +10m	
22:24	changing direction to W, seafloor in sight, sediments with rocks 3006m + 8m	
22:28	going deeper 3015m +8m, heading still W	
22:30	seafoor in sight again 3022m +4m, Sedimets and talus, single mussel patch	
22:32	slope with sediments and large talus block	
22:34	strongly sedimented ultramafic talus, heading still W	
22:35	going to 213°	
22:37	looking around, orientation lost?	
22:41	flying to 220°, seafloor is changing	
22:42	again sediments with talus	
22:46	sedimented ultramafic talus	
22:50	stongly sedimented slope with talus	
22:53	going W again	
22:55	going E following slope upwards	
22:56	lost bottom contact 3007m, no Altitute (>35m)	
22:58	lost beacon contact, stopp searching for musselfield at IRINA II, diving up	
0:59	ROV on board - End of station	

Protocol M64-2	Station: 252 ROV (Dive 53)	sample
time	Comments	#
11:15	ROV in water, ship's position: 14°45,03'N, 44°58,69'W, depth: 3001m	
12:58	bottom sight, 2951+6.8 m, ships position: 14°45,07'N, 44°58,71'W	
13:10	seafloor in sight, E of ANNA LOUISE, sediment-covered talus	
13:12	moving in SW direction to southern rim of ANNA LOUISE, trying to locate Candelabrum, positioning beacon somewhere in that area	
13:16	crossing large sedimented area	
13:22	fish: Ophidiiformes	
13:23	moving direction N-NE, large blocks, (?) rim of ANNA LOUISE	
13:26	talus, some larger blocks	
13:29	carser sediments 2970m+3,2m, heading still N	
13:31	signal from beacon #12 received, try to positioning to beacon, 2072,5m	
13:33	going W	
13:35	going 33°	
13:36	single actinian sitting on a talus block, sediments	
13:37	sediments getting coarser again, track of russian cable (?) 2983m	
13:39	going N	
13:40	track of cable again in sight	
13:40	block of talus, ridge like formation	
13:41	fish lying on the bottom (strange, ventral fins two pairs positioning like legs)	
13:46	colored sedimets, hydrothermal character, TV-grab station	
13:47	brownish sediments, ultramafic talus	
13:48	single shell, Ophidiiformes, colored sediments	
13:49	nice ultramafic structures , 2057m	
13:50	hit the point, mussel-shells increasing, sulifide-mound	
13:51	black smoke in sight, 2952m, moving to the smoker,	
13:54	moving parallel E, towards the other smokers, crabs and some mussel in sight	
13:55	shifting the position going from south to the smokers	
13:57	nice smoker, zoom in, looking W, E-site the structure	
13:58	we are at IRINA I	
14:00	going 67° at the crater rim	
14:03	we are at the smoker, at which we sampled fluids during 249ROV , same smoker as at 13:51	
14:07	going E W-view of the smokers	
14:11	large musselpatch, heading S	
14:12	going W, to place one marker	
14:14	over the musselfield again, heading S, 2050m	
14:25	positioning to beacon #11, water depth 2949.4 m, ships position 14°45'07 N, 44°58'69, target #23 in ROV DVL	target23
14:33	probably not in IRINA I to check it, going 30m S if there is nothing, than we were at ANNA LOUISE, if we hit another site, than were at IRINA I	
14:36	hit ANNA LOUISE, beacon # 11 stands in IRINA I	
14:37	strong current, going to S, direction N to S, 2939m	
14:41	photoshooting of a nice smoker at ANNA LOUISE, S-view of the structure	
14:43	flying S along the crater rim	
14:45	going 131° (SE) along the rim	
14:49	candelabrum (?) in sight	
14:56	leaving ANNA LOIUSE, start mapping Site A, first 125m direction 150°	
15:00	much sediment, little talus	
15:02	heading 153°	
15:11	small structure, altered sulfides (or old TV Grab hole), surrounded by sediment	
15:12	large blocks	
15:16	first turning point: moving 10 m direction 60°,	
15:18	second turning point: moving 80 m direction 330°	
15:21	third turningpoint approaching, slope of colored weathered ultramafic sedimens	
15:22	hit site "A", old aktive smoker, chimney aprox. 7-8m height, diamater 1m - 1,5m, crabs and single mussels at the bottom	target 24
15:26	DVL coordinates 14°45,047 N, 44°58,671W, 2931m	
15:29	accident sampling, 50cm lost of chimney	
15:30	fish Bythitidae	
15:32	going 10m NE, following the track	
15:33	third turningpiont, going 150°	
15:35	sediments, weathered old ultramafic rocks, steep slope	
15:36	strongly weathered ultramafic and hydrothermal structures	
15:36	sediments again, 2913m	
15:37	sediments and ultramafic talus, fourth turningpoint, going to 60° for 10 m	
15:39	fifth turningpiont 80m going 330°	
15:44	going deeper, 2935m, from container: seventh waypoint, (sixth turningpoint) 10m to 60°	
15:51	sediments, stopped, facing 151°, 2935m	
16:02	Turningpoint 8: going 151°	
16:05	sediments	
16:09	turningpoint 9, 10m 60° ENE	
16:10	turningpoint 10, 80m 330°WNW	
16:11	sediments	
16:14	sediments with ripples	
16:15	turningpoint 11, 5m 60° ENE 2935m	
16:16	tuningpoint 12, 5m 150° SES, going a track that should cross site A like sketched in map but did not cross	
16:17	sediments with ripples	
16:19	sediments without ripples	
16:19	ultamafic talus, some fragments	
16:21	ultamafic talus, blocks and sedment with ripples	
16:23	turningpoint 13, 8-10m, 60°	
16:25	turningpoint 14, 7m, 330°NWN, 2912m	

16:26	ultamafic talus, some blocks	
16:28	ultamafic talus, blocks and sedment with ripples	
16:28	turningpoint 15, 7m, 60°, 2933m	
16:29	ultamafic talus, blocks, framents	
16:29	truningpoint 16, 150°,2932m	
16:30	ultamafic talus, blocks framents	
16:31	ultamafic talus, larger blocks, framents, few sediments with ripples	
16:33	sediments, few blocks of talus	
16:34	turningpoint 17, 7m, 60° ENE, 2900m	
16:34	blocks of talus	
16:35	turningpoint (TP) 18, 7m, 330°, 2900m,	
16:36	ultamafic talus, blocks, framents	
16:38	ultamafic talus, blocks, framents and sediments	
16:39	end of mapping at north-east corner of mapping area, 2930m, going to the "tower" smoker, target 24	
16:41	60m 230° to the tower, target 24	
16:49	going to 60°ENE, 2935m	
16:52	...355° NWN, 2935m	
16:53	...33° NNE, 2935m, searching chimney with sonar	
16:56	…150° SSE, 2935m, searching …	
16:57	… 180° S, 2935m, searching …	
16:58	… 240°WSW, 2935m, searching …	
17:00	… 307°, WNW,2935m, searching …	
17:01	… 275° …	
17:02	… 218°, …	
17:04	smoker of site "A" in sight, ROV facing 218°. NE-site of chimney, 2931m	
17:06	fish: bythitidae	
17:09	measuring distances to beacon #11 + #12	
17:14	fish: bythitidae dist. to beacon #11: 93 m to 278° , to beacon #12: 480 m to 300°	
17:26	marker "MB" ("Meteor-B", white dish with two white cable ties) deployed at top of the talus mound of smoker at site "A"	
17:36	try take a sample from basis of smoker with rig-master- fragment of sample placed on porch in front of atlas camera, fish	252ROV-1
17:42	photo mosaicing of smoker, target 24, view in direction 140° SE, with ATLAS camera on tape B5	
18:03	view direction changed to 60° ENE	
18:04	top secton of smoker: shrips, vent crab	
18:08	view direction changed to 120°	
18:08	view direction changed to 295°	
18:10	end of photo mosaicing, no further samples here, going to site "IRINA 1"	
18:12	site "ANNA LOUISE"	
18:24	Marker "M4" in "ANNA LOUISE" ("Meteor-4", white dish without cable ties) deployed at smoker target 249ROV-7, 2940m	
18:28	in direction °0 N to "IRINA 1"	
18:30	fish	
18:30	direction 270° W	
18:32	arriving at beacon 11, 2950m, at site "IRINA 1"	
18:47	sample of older sulfid talus from site "IRINA1", placed in sample box mid/front Nr.2	252ROV-2
19:00	arriving at smoker 249ROV-9 in "IRINA1"	
19:01	Marker "M5" in "IRINA1" ("Meteor-5", white dish without cable ties and with blue rope) deployed west of smoker target 249ROV-9, 2952m, diffusive venting at this place	
19:03	shimering water, vent crab, rock sample of anhydrite in box front/right Nr.3	252ROV-3
19:08	With "Ankes Schaufel", grey sediment sample from border of crater "IRINA1" in box Nr.6	252ROV-4
19:17	another rock samples from the same place like before in box Nr.1, front/left	252ROV-5
19:20	moving around	
19:21	moving to loansome mussels at the OBT	
19:43	flying at a waterdepth of 2954m heading W, altimeter out of range	
19:48	changing direction to N	
20:01	changing direction to 241	
20:10	changing direction to N, 2971m, altimeter out of range	
20:13	going deeper, heading 252°	
20:16	holding depth at 3042m+ 8,3m	
20:17	seafloor in sight, heading 226°, beacon #14 and OBT in sight	
20:23	starting recoverey of net # 6, Vent lobster: Munidopsis in sight	
20:37	net # 6 packaget	244 ROV-6
20:38	try to make some pictures of Munidopsis	
20:40	making some pics of "mussel-cementary"	
20:42	flying to SE (heading 131°), depth 3049m	
20:46	changing directory to 110°	
20:49	changing directory to 90°	
20:50	changing directory to 268°	
20:52	IRINA II in sight	
20:58	try to get mussel samples with new net # 9	
21:00	finishing mussel-sampling	252 ROV-6
21:02	go to pick up the profiler (244ROV-1)	
21:06	moving away from IRINA II to close the Niskin bottle	
21:16	swirl up to much dust, go a little higher, Profiler on bottom	
21:21	find profilur again	
21:25	closing Niskin	252 ROV-7
21:27	pick up profiler again	
21:31	finishing profiler loading	
21:35	off bottom - starting emerging	

Protocol M64-2 time	Station: 257 ROV (Dive 55) Comments	sample #
	Atlas HiRes camera dismounted, DSPL and Pegasus cameras will be video	
12:38	taped.	
13:40	bottom sight: 14°45,19'N, 44°58,74'W, depth: 3030+2.7 m, near IRINA II	
13:44	sedimented talus, some large blocks	
	DSPL upper left, VCR tape B, Pegasus upper right VCR A, overview camera	
13:49		
	mussel patch and white patch and thick bacterial mats + jelly like object (?)	
13:53	measuring position relative to beacon #14	
14:03	fish	
14:05	large sediment covered area	
14:06	small mussel patch with fish	
14:07	large mussel patch	
14:08	large area covered with thick white bacterial mat, likely a different type than observed at 13:49	
14:09	measuring position relative to beacon #14: 130m in direction 150°	
14:18	moving to beacon #14	
14:23	mussel patch	
14:24	arriving at IRINA II	
14:31	surveying the entire musselfield for positioning the T-loggers	
14:38	positioning 10 T-logger along a temperature gradient from NNW to SSE, starting at the white flote positioned on the mussle field at large chimney	
14:49	positioning t-logger with a distance of ca. 50cm to each other; starting with t-logger #0 (ca. 50cm W (?) from t-logger #4143) continuing with t-logger #1, #2, up to #4 ; going from t-logger #4143 (NNW) towards SSE	257ROV-1a, -1b
15:18	T-logger #2 placed	257ROV-1c
15:23	T-logger #3 placed in some big mussels layed up site down with opened shells	257ROV-1d
15:26	T-logger #4 placed	257ROV-1e
15:32	beginning to place the following T-loggers W-wards in a parallel line, distance 1m to the eastern (first) line	
15:45	T-logger #5 dropped on the bed parallel to T-logger #4	257ROV-1f
15:48	T-Logger #6 stuck into the bed	257ROV-1g
15:52	replacing T-logger #5 as second logger after logger #6 in line	
15:54	placing T-Logger #7 after #5	257ROV-1h
15:59	placing T-Logger #8	257ROV-1i
16:05	placing T-Logger #9	257ROV-1j
16:05	releasing starboard niskin T=2,7°	257 ROV-2
16:06	releasing middle niskin T=2,7°	257 ROV-3
16:06	releasing port niskin T=2,7°	257 ROV-4
16:10	T-measurement with 8-channel T-logger	257 ROV-5
16:13	second try	
16:16	third try	
16:16	fourth try	
16:17	end of T-measurement (T= 3.4°C)	
16:24	positioning the acoustic marker, beacon #13	
16:38	collecting T-logger #4143	
16:48	pilot change	
16:57	positioning from beacon #13 to beacon #11, #12 und #14	
16:58	going to site "B"	
17:00	position from beacon #13 to beacon #12 is 303° and 144m	
17:02	position from beacon #13 to beacon #14 is 330° and 78m	
17:02	taking turn out of wire	
17:19	arrived on seafloor (3044m)	
17:20	back to IRINA II, beacon #13 and t-loggers, going south and than south-west	
17:27	found thick white bacterial mat, taking sample with Anke's shovel	
17:35	sitting ROV on ground, new positioning of shovel in the orion	
17:36	taking sample of white bacterial mat; shimmering water observed	257ROV-6
17:49	put shovel in box 5	
17:52	measuring temperature in bacterial mat 27°C with 8-channel T probe channel 4	257ROV-7
18:02	positioning of bacterial mat: from bacterial mat to site "B" 93m 126°	
18:05	going towards site "B"	
18:18	repositioning	

18:20	arrived at site "B", circling site "B" to find smoker on outer rim	
18:22	two active chimney structures are visible, going NW	
18:31	SE of crater occurs a mussel shill patch, single srimps at the smokers, on the periphery of the smoker actinia	
18:32	handle #1 opened	
18:32	nozzle of fluidsampling system stuck in the smoker hole	
18:34	started pumping from larger structure	257ROV-8
18:47	smoke flows out of the outlet tube of pumping system	
19:04	still pumping	
19:06	water depth at this place 2979.0m	
19:13	GAPS position (?) of the sampled smoker 14,45.1092 N, (44,57.489 W -	
19:28	crab	
19:33	pump off, closing handle #1	
19:36	handle #1 closed	
19:39	handle #2 with Mirjams filter opened	257ROV-9
19:39	nozzle inserted in smoker, pump on	
19:42	crab of 5cm width	
19:49	ROV slightly moved, nozzle out of chimney - pump off - nozzle reinjected -	
19:50	ROV slightly moved again - pump off, nozzle out of chimney - nozzle reinjected, but not as good as before, possibly surrounding sea water in filter, pump off	
19:53	again nozzle out of chimney - reinjected - pump on	
20:08	electrical pump current raised from 0.8A to 1.0A	
20:17	nozzle out of chimney, pump off, pump current at end 1.1A	
20:20	handle #2 closed	
20:33	set of "Svenonator" (particel catcher + t-logger)	
20:45	measuring temperature and catching particles for 5 minutes	257ROV-10
20:50	stopping the "Svenonator"	
21:03	placing "Haraldonator" on smoking chimney	257ROV-11
21:06	finished sampling particles	
21:12	deposition of marker (Marker MA) at sampled vent	257ROV-12
21:17	collection of old sulfides and pieces of chimney structure	257ROV-13
21:18	put sample into Box1	
21:31	collecting another sulfide piece, greyish, placed in box 1, 2978,4m	257ROV-14
21:38	leaving bottom, diving up	

Protocol M64-2 time	Station: 261 ROV (Dive 56) Comments	sample #
13:18	bottom sight: 14°45,08'N, 44°58,69'W, depth: 2949+5.3 m,	
13:20	at beacon #11, IRINA I	
13:25	positioning according to different beacons	
13:26	from beacon #11 to beacon #13: distance 265m, heading 330°	
13:27	from beacon #11 to beacon #12: distance 389m, heading 300°	
13:27	from beacon #11 to beacon #14: distance 345m, heading 330°	
13:30	moving to Site A, searching with sonar	
13:35	moving across sediment	
13:36	whitish surface patches	
13:37	small rocky and brownish colored mound, also some white patches on it	
13:40	rocky surface, ?weathered ultramafics	
13:41	Barad-Dur at Site A directly in front	
13:42	mosaicing from N	
13:45	tape A DSPL, tape B Pegasus	
13:47	move marker out of picture	
14:08	first fotomosaic from N to S, second one (with shrimp in picture) from E to W	
14:09	now with Scorpio again from N to S	
14:10	looking at the NW side	
14:15	measuring position relative to beacon	
14:21	Site A to beacon #11: distance 96m, heading 300°	
14:22	Site A to beacon #13: distance 360m, heading 320°	
14:23	Site A to beacon #12: distance 487m, heading 310°	
14:25	trying fluid sampling	
14:28	handle #1 open	
14:48	pump is running since 14:29, impossible to place nozzle into chimney, structure too fragile, pumping fluid from top part of structure within thick smoke cloud (will be diluted with seawater)	261ROV-1
15:10	still working on fluids	
15:21	finish fluid sampling, total pumping time 15 minutes, two fishes (Bythitidae) at the bottom of the tower	
15:25	starting to close Niskin bottles	
15:26	closing front port site Niskin, background water sample	261ROV-2
15:30	three Bythitidae fish, taking nice pictures	
15:40	collecting freshly broken chimney piece, which fell down from the top, placed into box No.1	261ROV-3
15:42	second piece, putting again into box No 1	261ROV-4
15:45	laser focused in, distance 20cm, moving up	
15:49	going to IRINA I directly towards beacon #11, heading 306°	
15:51	crossing over colored sedimented ultramafic structures parallel to a slope	
15:55	arrived at beacon #11, old smoker-complex, mussel bed	
16:00	moving toward the marker, nearby the sampled smoker	
16:08	searching for smoker on crater rim which was sampled for fluid during cruise M60/3 (sample # 53ROV)	
16:12	first move back to beacon #11 for sampling the mussel field	
16:25	beacon #11 left side of picture, looking N, large mussel field directly ahead	
16:31	most mussels are *Bathymodiolus* but many are dead, still wanting to collect a sample	
16:32	taking net from box #2, start sampling	
16:38	mussel field describes a half circle, open to the E, may be around a former fluid source	
16:56	mussel sample collected from three different spots in this mussel field, sample net placed in box #2	261ROV-5
17:09	located the chimney which was sampled during M60/3	
17:13	fluid sampling, nozzle out	
17:17	opening handle #4, filling five bottles	
17:20	pump on	261ROV-6
17:25	pump off	
17:26	pump on again	
18:22	pump off	
18:41	closing handle #4	
18:42	opening handle #2, pumping through Mijam's filter	
18:50	positioning nozzle into chimney	

18:53	pump on	261ROV-7
18:58	pump current 0,8-0,9A	
19:29	pump off	
19:30	back row, port site niskin, background water	261ROV-8
19:30	back row, centre niskin, background water	
19:38	closing handle #2	
19:47	placing marker MD	
19:47	closing Niskin starboard bottle in front row (in smoke)	261ROV-9
19:53	collecting beacon #11	
19:57	last Niskin bottle (back row, starboard bottle) closed in water column	261ROV-10
19:57	removing T-logger from parking position	
20:00	T-measurent: at discharge, flat lying device: 108°, 135°, 164°, 173°, **200°**, 182°, 174°, 167°	261ROV-11
20:03	end of station, diving up	
	sulfide sample on porch	261ROV-12
	atacamite samples on porch	261ROV-13

Protocol M64-2	***Station: 263 ROV (Dive 57)***	***sample***
time	***Comments***	***#***
13:15	ROV in water, ship's position: 14°45,10 'N, 44°57,70 'W, depth: 3025m	
14:50	reaching 2000m	
15:31	bottom sight, ship's position: 14°45,12 'N, 44°58,67 'W, depth: 3002+2.9m, HS 2995m	
15:33	moving to Site from SW side	
15:43	moving across sediment, several areas with colored hydrothermal sediments	
16:19	problems with orientation, moing back to beacon #13 at IRINA II	
16:46	going now to beacon #14, recovering one mussel-net and controlling OBT, following by searching for Marker "ANYA"	
16:49	approaching beacon #14	
16:53	OBT still in position and leveled to < 2°, orientation of the short axis approx. 89 °	
17:06	collecting net # 2 of musselbed experiment (244ROV-8), on porch	
17:23	moving to marker ANYA, moving E	
17:26	going N	
17:40	arriving at large musselfield, 3053m depth, shells of Bathymodiolus and shells of Calyptogena,snails	
17:44	marker ANYA (name underlined)	
	positioning with respect to beacons	
17:53	Anya to beacon #12: distance 114m, diection 288°	
17:53	Anya to beacon #13: distance 33m, direction 120°	
17:53	Anya to beacon #14: distance 51m, direction 328°	
18:08	placing beacon # 11 at ANYA site	
18:28	wanting to collect push cores at this site	
18:30	checking bacterial mat	
18:47	first pushcore taken, but sediment fell out	
18:49	pushcore (# 2 from Jens Stecher) successfully taken	263ROV-1
18:52	taking another pushcore	
18:56	pushcore (yellow handle from Jens Stecher) successfully taken	263ROV-2
18:58	sediment	
19:04	at this site taking Niskin-bottle # 4 (middle/front row)	263ROV-3
19:08	marker ANYA in sight, photo taken, beacon SE of marker ANYA	
19:11	next to beacon: rusty rocks, small mound with mussels, snails, Schlangensternen	
19:12	searching for live Calyptogena mussels	
19:18	up the slope live mussels with shimmering water, also: marker C from Gebruk paper, depth 3050m, red+purple colored surface	
19:29	larger musselbed, 3045m, photo taken	
19:38	collecting mussel sample, presumably *Calyptogena* , in box	263ROV-4
19:47	outcrop as described by Gebruck	
19:50	Marker "Irina Microsmoke 1995" 3040m	
20:07	arriving at beacon #13 and temperature loggers	
20:07	picking up the mussel net (**244ROV-5**) for Jens, placed in box	
20:09	crab in net	
20:16	leaving beacon #13, going in west direction	
20:20	arriving at a musselpatch with an overgrown temperature logger # 3	
20:21	Temp-logger #3, the beacon has been fallen down during the last three or four days	263ROV-5 ??
20:29	arriving at smoker in QUEST	
20:37	removing net from box 2 (front+center)	
20:41	this site resembles picture ANYA'S GARDEN from J.Stecher presentation during Etelsen meeting in 2004	
20:42	taking photos from mussel patch with shimmering water	
20:45	putting net back into drawer, then collecting T-logger #3 of cruise M60/3 (station 23ROV)	
20:59	replacing old Temp-logger # 3 with new Temp-logger # 11	263ROV-6
21:08	moving around close to this site	
21:23	moving to TV-grab site GTV 259	
21:35	moving OBP to site of OBT	
21:41	from trap (J.Stecher) flew 216° towards beacon #12	
21:55	positioning OBP at site near beacon #14 and OBT are	
22:12	close up on OBT, fallen over	
22:14	OBT positioned but not levelled	
22:41	trying to level OBT	
22:46	not satisfied with leveling	
22:47	end of station; diving up	

Protocol M64-2 time	Station: 266 ROV (Dive 58) Comments	sample #
	ROV in water, ship's position: 14°45,06 'N, 44°58,75 'W, depth: 3038 m	
12:20	reaching 2000m	
	bottom sight, 14°45,16'N, 44°58,72'W, depth: 3016+3.1m	
12:58	Video Pegasus = B, DSPL = A	
13:26	at 'Anya' marker, setting ROV position	
13:31	at IRINA-II, northern slope, view towards course 205°, depth 3032.5 m, height above ground 3.9	
13:34	heading 232°, fish	
13:38	small chimney and markers	
13:40	course 354 --> 48, musselbed experiment in front, beacon # 13	
13:41	view towards course 72	
13:49	course 98	
13:50	chimney in front	
13:52	view towards course 51	
13:59	view 53°, very large fish with wounded dorsal fin , chimney	
14:08	heading 294	
14:13	heading 268	
14:15	heading 169, near musselbed experiment	
14:20	back at chimney	
14:25	placing profiler, view 50 °, adjacent to T logger # 4	
14:33	profiler laid on its side	
14:36		
	repositioning T-Logger #4 few meters towards 80°E from mussel field position so that profiler can be placed; T-Logger layed on ground outside of mussel field	
14:41	back to profiler	
14:44	zoomed in on sensors; sensors look ok assumed they are still functioning	
14:49	positioning profiler upright	
14:51	Orion holding profiler ca. 20cm over ground for 20 minutes (moving slightly) - measurement #1 of transect. 3033.6 m water depth	266 ROV-1
15:05	zooming in on mussel field: shrimps, mussels, schlangensterne	
15:12	profiler lifted and placed to another location within the same musselbed, ROV not moved; 20 min measurement #2 of transect	266 ROV-2
15:32	profiler lifted and placed to another location within the same musselbed, ROV not moved; 20 min measurement #3 of transect	266 ROV-3
15:42	shrimps, schlangensterne	
15:52	profiler lifted and placed to another location within the same musselbed, close to logger #4, ROV not moved; 20 min measurement #4 of transect	266 ROV-4
16:32		
	leaving the site moving ROV, new measurement location close to small chimney	
16:42	starting measurement with profiler, will continue until recovery shortly before dive end	266 ROV-5
16:48	leaving the site moving ROV, going to logger #4, transect position #4, for diffuse fluid sampling	
17:01	fluid sampling through valve #4 (open valve #3 closed), pump on, nozzle tip approx. 10 cm below musselbed surface	266 ROV-6
17:05	nozzle moved, pump current 0.8 A	
17:14	moving nozzle	
17:17	moving nozzle	
17:02	pump off, valve #4 closed	
18:13	sampled musselbed with net	266 ROV-7
18:24	temperature logger # 4144 recovered	
18:30	reset at beacon #13, flying to beacon #11	
18:32	distance beacon #13 to #11: 40 m, heading 300°	
18:35	arrival at beacon #11, prepare to transfer beacon to site of beacon #13	
18:37	distance beacon #11 to #13: 34 m, heading 120°	
18:43	take off with beacon #11 for flight to beacon #13	
18:46	reset at beacon #13	
18:47	flight to Site "B" course 120	
18:51	cable on seafloor	
18:54	following cable 120°	
18:55	track on seafloor	
18:55	cable on seafloor	

19:02	course 270 °, then course 120 °, now course 157 °	
19:03	old equipment on seafloor	
19:04	growth disk with bacterial filaments; IRINA-I site M60/3- 66 ROV	
19:08	distance to beacon #13: 224m, 315°; "new" position of IRINA-1 is 60m in direction 60° from old position in scetch map	
19:13	flying 53m course 328	
19:18	arriving at site B	
19:28	2981m depth	
19:34	moving around at site "B"	
19:43	ROV takes the svenonator for temperature measurement at smoker used for sample 257ROV-7	
19:47	temperature measurement with svenonator	
19:49	temperature measurement with svenonator for 10 min at chimney 1 (left); T=350°C	266 ROV-8
20:07	temperature measurement with svenonator for 10 min at chimney 2 (right) facing NW; T=300°C	266 ROV-9
20:20	opening handle # 1	
20:24	placing nozzle into smoker	
20:30	pump on	266 ROV-10
20:33	crab, 5cm	
20:35	about 30 shrimps on pumped smoker	
20:36	ROV orientation during pumping from both smokers 308°, left smoker is in WSW and right smoker in NNE direction with respect to this rov view, water depth 2979.1m	
20:53	knocked top of chimney off	
21:08	pump off	
21:12	closing handle # 1	
21:12	opening handle # 2	
21:23	not possible to reach chimney structure to sample on filter; aborting	
21:44	taking Haralds particle catcher	
21:47	catching particles from smoker	266 ROV-11
21:53	stop catching particles	
21:56	dropping catcher in box	
22:04	going to beacon #13	
22:15	arrived at beacon #13 to collect profiler	
22:34	collecting profiler	
23:03	profiler on ROV	
23:03	start diving up	

Protocol M64-2	***Station: 272 ROV (Dive 59)***	***sample***
time	***Comments***	***#***
14:15	ROV in water, ship's position: 14°45,18 'N, 44°58,65 'W, depth: 3009 m	
16:13	bottom sight, ROV depth: 2985+7.5m, ship's position: 14°45,11'N, 44°58,65'W	
16:14	NW of Site B, beacon #11 in sight	
16:16	heading 257°	
16:19	Bottom Water Temperature Mooring (BWTM) in sight straight ahead	
16:24	position to beacon #11: 82m, heading 35°	
16:28	grabing rope at BWTM with Rigmaster	
16:29	BWTM off the ground, heading 66°	
16:31	first move to beacon #11, from there directly to IRINA I	
16:33	at Site B, now heading 120° for 55m	
16:55	moving around, searching for spot	
16:56	smoking crater in the back, plastic marker in front near bacterial mat	
16:59	deploying BWTM near mussel field between IRINA I and ANNA LOUISE, another plastic marker close by	272ROV-1
17:00	deploying beacon #15 at BWTM	
17:03	ROV cable (?) very close to BWTM	
17:09	leaving positioned BWTM	
17:09	position to beacon #11: 60m, heading 340°, water depth at BWTM: 2958m	
17:16	end of this station, moving to beacon #11, collecting this beacon and continue to beacon #14 in order to work on OBT	
17:20	beacon #11 in sight	
17:40	collecting beacon #11	
18:04	beacon #14 and OBT in sight	
18:09	beacon #11 placed on the ground	
18:14	picking up beacon #14 and placing it some distance away from OBT	
18:19	picking up OBT	
18:37	levelling OBT; very foggy	
18:41	repositioned OBT slightly SSW	
18:45	repositioned OBT slightly SSW	
18:59	trying yet another spot	
19:09	OBT positioned and leveled	
19:18	going to mussel cemetery	
19:23	collecting mussle net #8 (**244 ROV-9**)	
19:29	beacon #11 collected	
19:34	to beacon #13 77m 134°	
19:39	approachig IRINA II	
20:04	closing Niskin No 1 (right) at the west side of smoker-complex	272ROV-2
20:04	closing Niskin No 2 (middle) at the west side of smoker-complex	272ROV-3
20:04	closing Niskin No 3 (left) at the West side of smoker-complex	272ROV-4
20:12	placing Pushcore No. 2 on shimmering water coverd by mussels	272ROV-5
20:21	placing Pushcore No. 1 on shimmering water slightly covered by mussels more sediments, 50cm left of pushcore No2	272ROV-6
20:24	collecting Temp-Logger #4 from M60/3 (station 38ROV), not covered by any mussels, although it was placed directly in the vicinty of mussels	
20:38	leaving beacon # 11 back, going round of the smoker complex, approaching it from the E for mapping its west-side	
20:47	positioning for photos and than video mosaicing	
21:00	photomosaicing (5m high, 3m sideways)	
21:04	video tapes at end start all over again	
21:05	photomosaiking (4m high, 1m sideways)	
21:11	going from the eastside to the north for photomosaicing/overview	
21:14	…and back from were they have started	
21:17	end of photomosaicing	
21:33	collecting shrimps with net #8 at the E-Site of smoker complex (heading W) wihin a gap of the smoker complex, between by mussels unsettled tower and the dome structure settled with mussels at north site of the smoker complex ("shrimps	272ROV-7
21:37	Fish, Bythitidae	
21:39	taking beacon #11, end of working in IRINA II	
21:40	going for 100m N, searching an old inactive chimney	
21:43	flying above sediments	
21:44	crossing ultramafic structures, changing with sediments	
21:51	going W, into the direction of 258 GTV were we found vsicomyid shells	
21:52	outcorp, massivsulfid colored sediments 3047+0,7m	
21:54	direction to beacon #14, fish, Bythitidae	
21:56	trying to get a sample by Orion, unsuccessfully attempt	
22:06	taking a GEO-sample at the inactive smoker with net at the bottom of the inactive smoker, putting into box No 1. heading N, S-Side of smoker was sampled	272ROV-8
22:08	diving up, position Meteor: 14°45,25N, 44°58,72W, HS 3055m	

Protocol M64-2	***Station: 277ROV (Dive 60)***	***sample***
time	***Comments***	***#***
11:10	ROV in water, ship's position: 14°45,19'N, 44°58,74'W, 3049 m depth	
12:19	2000 m reached	
12:59	bottom sight, ship's position: 14°45,19'N, 44°58,75'W, 3043+6 m ROV depth	
13:03	move to IRINA II	
13:04	fish: Ophidiiformis	
13:06	mussel patch with six fishes: Bythitidae	
13:07	arriving at IRINA II, beacon #14	
13:19	deploying profiler at SW position of IRINA II above shimmering water, not far from Mirjam's pushcore experiments	277ROV-1
13:40	deployment finished, taking photos	
13:49	deploying Jens' fishing gear at the SE corner of IRINA II, next to two fishes	
14:08	taking a sonar image of IRINA II	
14:22	waiting for ship, then doing another photomosaic	
14:39	picking up fishing gear to place it closer to the main structure (up onto the mussle field)	
14:43	first try to catch the vent fish which seems to be dead	
14:45	catching the vent fish with the mussel net (fish is not dead)	
14:47	placing the mussel net with the fish in Box5; fish lost during ascent	
14:51	taking a sulphide sample with Orion to put it also in box 5	277ROV -2
15:02	flying around the the main structure	
15:10	moving the fishing gear away from the diffuse fluid region	
15:20	placing the fishing gear eastwards	
15:32	preparing the fluid sample	
15:35	open valve# 2 to pump through mirjams filter	
15:37	dspl-camera is damaged and can`t be moved	
15:50	starting to pump in a diffuse venting mussel field in between the gap of the northern and the following mussel-dome source is only be settled by shrimps	277ROV -3
16:00	on the basis of the left mussel dome, is an uncovered black area, surrounded by shrimps reflctions of particles were seen, may be sulfide or anhydrite particles	
16:10	Pump current 0.7, 26 VDC (=100%)	
16:27	Pump off during pull out, back again and pump on	
16:37	Pump off	
16:38	ROV backwards, valve #2 closed, handle #1 open (3 bottles, Rack B)	
16:47	pump on	277 ROV -4
16:50	pump off	
16:51	pump on	
17:28	fluid sampling is in ROV hovering mode; ROV position is quite stable; "fumes" from small vent a few meters below drift across the sampling point	
17:35	pump off, valve #1 closed	
17:38	open valve #4 (5 bottles)	
17:43	pump on; taking fluid sample from the smal vent at the bottem (crowded with shrimps)	277 ROV -5
17:47	at the top of the structure is a mineral complex (maybe composed of anhydrid???)	
18:02	again view on the mineral-like complex at the very top	
18:05	taking two sonar pictures; one with 5m resolution and the other with 2.5m resolution	
18:07	view on something biological (maybe snails) also at the top of the structure	
18:44	fluid sampling from a small black smoker inside the east side of a larger structure with a lot of mussels, shrimps and other beasts	
18:47	pump off	
18:50	closing handle #4 of KIPS	
18:56	handle #4 closed	
19:09	taking detail photos from east, north and west side of smoker structure (the two mussels-domes in the north of the smoker complex)	
19:24	distance measurements at the structure with laser pointer: diameter of tower like part on the north west corner is about 20cm	
19:32	taking a mussel net of mussel from the second mussel-dome from north at the basis of ist east side , nearby the fluid-sampling-station 277ROV-5	277 ROV -6
19:48	still on sampling site	
19:59	ready	

	moving to the east side of the IRINA-II smoker complex to find a position for photo
20:03	mosaicing
20:06	replacing beacon #13 about 3 meters to south east
20:16	start of photo mosaicing
20:40	flying E over sediments with ultramafic structures
20:41	going up a slope 3022m+2,5m
20:42	arriving the top of the slope 3019m+2,2m, going further E, only sediments
20:48	going up a slope 3012m+2.2m
20:50	flying east over sediments with ultramafic structures
20:51	reaching the top of the slope 3010m+2.1m
20:54	reset , distance from start 200m east
20:55	flying further up the slope 3002m+2.2m
20:58	distance from start 250m east, now flying 75m south, water depth 3003m
21:00	going up a slope 2979m+2.2m
21:01	arriving 75m south, going back to IRINA II
21:02	distance to beacon #15 at temperature mooring 190m
21:05	distance to beacon #13 265m in 280°
21:09	going west down slope, 3000m + 2.1m, over sediments
21:18	195m west from last point, coloured sediment
21:22	back at IRINA II
21:23	replacing Jen's fishing box closer to the vent structure
21:28	because of steep slopes problems by replacing the fishing box
21:34	fish
21:37	profiler collected
21:42	tape 10 for photo mosaicing
21:45	start of photo mosaicing
21:49	stop of photo mosaicing
21:55	end of dive, returning to surface

Protocol M64-2	***Station: 281 ROV (Dive 61)***	***sample***
time	***Comments***	***#***
8:30	ROV in water, ship's position: 14°45,17'N, 44°58,97'W, 3028 m depth	
13:35	bottem sight; ship`s position: 14°45,19'N, 44°58,73'W, 3045 m depth	
13:44	arriving IRINA II; searching for a position to place the benthic chamber	
14:09	placing benthic chamber at IRINA II close to beacon #13	281 ROV-1
14:14	going to site QUEST	
14:23	arriving at QUEST and viewing mussel bed	
14:25	arriving at beacon #12	
14:27	moving around	
14:28	possibly small landslide or something similar	
14:33	rocks and hollows	
14:34	steep slopes and rocks with sediment cover	
14:35	white mat	
14:52	again mussel bed with diffuse venting near beacon #12, 3049.6m	
14:54	preparing diffuse fluid sampling	
14:56	open valve #1 (rack B, 5 bottles)	
15:17	pump on	281ROV-2
15:20	six crabs and about 20 shrimps at the place of recovered temperature logger # 3	
15:25	a crab is interested in the nozzel of the pumping system	
16:16	pump stop	
16:21	handle #1 closed	
16:28	taking a mussel net from the former place of temperatur logger # 3	
16:35	sample fall out and is now lying on the porch in front of the box	
16:36	taking another sample from the same place, a piece of mussel cake, sample is in the net	281ROV-3
16:41	going to the other side of the mussel bed to deploy temperatur loggers	
16:43	placing the mussel net on the sea floor that the mussels can relax for a moment	
16:47	temperatur logger dance on the porch of ROV	
16:49	trying to insert t-logger # 10 in soil. soil is too hard.	
16:58	inserting the temperature loggers on other different points of mussel bed	
16:59	T-logger numbers are: 10, 12, 13, 14, 15, 16, 17, 18, 19	281ROV-4a-i
17:36	temperatur loggers installed	
17:39	loosing sample on porch	
17:40	picking up the mussel net 281ROV-3 in box 1	
17:52	moving to QUEST site, searching for black smoker	
17:53	flying over TV grab station	
17:54	mussel covered ridge	
17:54	6 black smokers in sight, in central depression, looking 221°	
18:01	nozzle from fluid sampling system broken off, opening strongly deformed, will still try to sample	
18:01	opening handle #4	
18:05	sampling small front right chimney, pump on	281ROV-5
19:05	pump off	
19:07	handle #4 closed	
19:09	opening handle# 2	
19:11	pump on, sampling for Mirjam's filter	281ROV-6
19:13	pump off	
19:15	pump on	
19:40	single mussel directly on smoker	
19:44	crab on smoker	
19:52	small mussel patch in fissure	
20:09	pump off	
20:11	handle# 2 closed	
20:15	taking a rock sample, placed in box 5	281ROV-7
20:17	particle sampling with a white net, placed in box 6	281ROV-8
20:20	probing the vent with helium pipe No. 3	281ROV-9

20:24	rov plays with helium pipe	
20:25	taking the helium sample	
20:32	helium pipe closed ship position: 14°45,22N, 44°58,81W, 3040m	
20:38	T-measurement with Svenonator	281 ROV-10
20:42	smoke comes out of the valve-side	
20:49	end of T-measurement; Tmax.= 285°C	
	placing Marker "MC" (with blue and yellow rope) at this sampling site of an aktive	
20:54	black smoker	
20:58	leaving site Quest, going to beacon #12	
21:00	moving along a small rigde or border of crater with a few mussel patches	
21:02	beacon #12 in sight	
21:08	beacon #12 picked up	
21:11	moving to the mussel field on QUEST site to check alignment of temperature loggers	
21:13	temperatur loggers in mussel field are aligned in 325°	
21:16	moving to beacon #13 in site IRINA II	
21:18	small ridge of rocks	
21:20	sediments with some rocks	
21:21	rock formations	
21:23	arriving at beacon #13	
21:27	brown "Russenmarker"	
21:30	ROV sits down in front of push core samplers	
21:32	taking push core sampler No. 2	281ROV-11
21:40	taking push core sampler No. 1	281ROV-12
21:51	picking up bentic chamber sampler	
21:57	end of dive, ascending to Meteor	
0:00	ROV on board, end of station.	

Protocol M64-2	***Station: 283 ROV (Dive 62)***	***sample***
time	***Comments***	***#***
12:20	ROV in water, ship's position: 14°45,23'N, 44°58,75'W, 3049 m depth	
14:43	reaching 2500m	
15:05	bottom sight; ship`s position: 14°45,18'N, 44°58,79'W, ROV depth: 3037,5+11,3 m	
15:05	first positioning with respect to beacon #14	
15:10	OBT in sight	
15:20	ROV is on the ground next to OBT, OBT not leveled anymore	
15:24	off the ground again, moving to QUEST site first	
16:01	mussel bed experiment in sight	
16:10	3 Niskin bottles triggered, collecting shimmering water above this mussel bed (two front ones, left one from second row)	283ROV-1
16:20	starting to place two T-loggers (8-channel) within the mussel patch started with No 295, 298	283ROV-2a, 283ROV-2b
16:35	finishing t-logger positioning, 3044m, ship at 44°58,82W, 14°45,20N	
16:41	staring photomosaicing	
16:43	removing the poarch out of the picture frame DSPL, recorder VCRB (tape: DIVE 62-B-3), heading 232°, altitute 2,2m starting at 16:45:00, Waterdepth 3043m Direction to WNW (moving from left to right)	
16:47	starting into the opposite direction, ESE	
16:49	moving back to 52°, 1,5 m down the slope, starting the sequenz parallel to mussel patch from left to right and from right to left. Stopping the record at: 16:53	
16:53	going ahead moving up the slope crossing over the musselpatch	
16:54	starting the third mosaicing from left to right and returning to complete the mosaicing	
16:56	end of photomosaicing	
16:59	going E	
17:07	approaching OBT and OBP, recovering net **244ROV-10**	
17:16	starting for new positioning of OBT	
17:51	end new positioning of OBT	
17:53	going to IRINA II	
18:07	at beacon # 13	
18:14	Irina II musselbed	
18:21	mussel net # 3 fishing vent fish. Failed.	
18:25	musselbed experiment: 8-channel logger # 297 vertical	283ROV-3a
18:34	musselbed experiment: 8-channel logger # 296 horizontal	283ROV-3b
18:42	Position of T probes:	
18:55	2m (directed to 60°) away from the basis of smoker complex and 4m away from the T -loggers No297 and No296. They are standing in SSW of the smoker comlpex	
19:05	open valve #1, resampling site 281ROV-10 at "Glitter Vent"	
19:08	placing the nozzle into the opening, pump on ; ship at 44°58,72W; 14°45,21N, 3035m	283ROV-4
19:35	pump off	
19:35	reinserting pump nozzle in vent	
19:37	pump on	
19:41	somewhat larger shrimp on top of smoker structure	
19:47	inspecting shrimps, nice video sequences of biozenosis	
19:54	and inspecting mussels	
20:03	crab eats a mussel ?	
20:06	pump off	
20:06	reinserting pump nozzle in vent	
20:10	pump on	
20:12	nozzle out of vent - reinserting	
20:21	pump off	
20:27	handle #1 closed	
20:32	handle #2 open, pump on with Mirjams filter from smoker	283ROV-5
20:46	photo mosaic auf DSPL tape B6	
20:50	end of photomosaic	
21:16	pump off	
21:18	handle #2 closed	
21:25	shrimp sample	283ROV-6
21:37	temperature measurement with "svenonator"	

21:39	temperature measurement at diffusive fluids; Tmax.= 225°C	283ROV-7
21:41	end of measurement	
21:41	temperature measurement at black smoker	283ROV-8
21:46	end of measurement	
21:50	collecting beacon 13	
21:55	temperature measurement at smoker SSW of IRINA II smoker complex	283ROV-9
22:01	end of measurement; Tmax.= 170°C	
22:03	collecting beacon # 13	
22:12	collecting the fishing box	
22:17	moving around at smoker complex	
22:18	check for luminiscence	
22:22	ascending and end of ROV session	
0:45	ROV on deck	

Protocol M64-2	***Station: 285 ROV (Dive 63)***	***sample***
time	***Comments***	***#***
12:10	ROV in water, ship's position: 14°45,23'N, 44°58,98'W, 3034 m depth	
13:52	2777m	
14:03	bottom sight, ship's position: 14°45,24 'N, 44°58,82 'W, ROV depth: 3032	
14:22	lost CTD "bottom contact-warning weight" found on top or large boulder	
14:26	rough surface with rock outcrops, boulders	
14:29	OBT, OBP in sight, keeping large distance to the instruments	
14:31	going W 254°	
14:32	tectonized rock outcrop	
14:35	going uphill, steep slope with boulders, still 240° WSW	
14:37	QUEST musselfield experiment in sight	
14:43	heading 329°, site view picture	
15:13	try to take sample SW of mussel field and 0.5m SW of T-logger #19 with push core - failed	
15:15	push core #4 can not be removed from its socket, 8 damaged, thickness of sediments is at least 0.3m	
15:22	moving west about 1.5m	
15:26	next try with push core 3 - failed	
15:28	thickness of white layer is about 5cm	
15:29	another try with push core 3 0.3m east of the last try	
15:32	push core 3 completely filled, layering from top to bottom 2cm white, 15cm brown, 10cm white	
15:34	loosing some sediment from push core, dropped in push core socket 8 and 3	
15:38	push core sockets in rov box blocked by T-handles and ropes	
15:40	placing push core 3 on porch and removing of T-handles and ropes	
15:41	picking up push core 3 from porch	
15:44	push core 3 back in its socket	285ROV-1
15:50	niskin bottle 4 closed, right bottle in front row	285ROV-2
15:52	leaving the position	
15:55	push core sample with No. 4 about 1m NNE from mussel field at Quest site, push completely inserted and completely filled with brown sediments	285ROV-3
15:59	push core 4 back in ist socked	
16:03	niskin bottle 5 closed next to musselpatch, left bottle in front row	285ROV-4
16:34	collecting mussel net, placing in box #3, front right	285ROV-5
16:55	start mapping along a profile, first moving 150m in direction WEST (271°)	
16:57	flying across sediment, some ripples, few blocks, 3038 m depth	
16:59	sediment covered talus	
17:03	sediment, 3025 m depth	
17:06	waypoint 1, now 10 m direction NORTH (0°)	
17:10	waypoint 2, now 180 m direction EAST (91°), 3018 m	
17:11	sediment covered talus	
17:13	larger blocks in sight, followed by sediment covered talus 3028 m depth	
17:17	flying at northern rim of QUEST hydrothermal field	
17:19	sediment covered outcrop area 3056 m	
17:20	waypoint 3, now 10 m direction NORTH (1°)	
17:21	waypoint 4, now 180 m direction WEST (270°), 3056 m depth	
17:23	moving across sediment covered outcrop area again)	
17:23	sediment with ripples, few blocks	
17:25	3036 m depth	
17:25	larger boulders, 3029 m depth	
17:27	sediment covered talus, followed by rocks ridge 3020 m depth	
17:29	sediment, 3015 m depth	
17:31	sediment covered talus, 3012 m depth	
17:32	waypoint 5, now 10 m direction NORTH (1°), 3010 m depth	
17:33	waypoint 6, now 180 m direction EAST (89°), 3009 m depth	
17:35	talus and large block	
17:38	sediment covered talus	
17:41	3031 m depth	
17:42	blocky talus	

17:44	sediment with ripples
17:45	waypoint 7, now 20 m NORTH (0°), 3055 m depth
17:46	sediment covered mound
17:46	waypoint 8, now 180 m WEST (270°), 3059 m depth
17:49	sediment, 3041 m depth
17:52	larger blocks with sediment, 3020 m depth
17:54	large fractured boulder in sediment, 3013 m depth
17:57	sediment, 3010 m depth
17:57	waypoint 9, now 20 m NORTH (0°), 3011 m depth
18:02	waypoint 10, now 180 m EAST (83°), 3014 m depth, talus hill
18:06	holothuria on sediment, 3013 m depth
18:10	sediment covered talus, 3020 m depth
18:12	sediment with ripples in direction W-E, 3038 m depth
18:16	high particle flux in water, 3058 m depth
18:17	waypoint 11, "something in sonar straight ahead", moving 100 m in this direction (EAST)
18:19	sediment with ripples, 3059 m depth
18:20	rocky ridge, 3061 m depth
18:25	waypoint 12, now 20 m NORTH (0°), 3050 m depth
18:25	sediment covered talus
18:27	waypoint 13, now 265 m WEST (270°), 3050 m depth
18:31	sediment covered talus
18:33	yellow colored sediment
18:34	high particle flux in water, 3058 m depth
18:35	tracks across ripples
18:36	rocky ridge, 3048 m depth
18:37	blocky area, 3040 m depth
18:38	blocky area, 3030 m depth
18:40	few larger boulders, 3027 m deepth
18:44	sediment, 3020 m depth
18:45	talus
18:46	sediment, 3020 m depth
18:48	waypoint 14, now 20 m direction NORTH (0°), 3025 m depth (14°45,27'N, 44°58,87'W)
18:50	sediment with talus
18:51	waypoint 15, now 180 m EAST (90°), 3025 m depth
18:56	sediment, 3030 m depth
18:57	talus on ridge
19:00	sediment, 3047.5 m depth
19:03	rock outcrop, 3052 m depth
19:04	waypoint 16, now 20 m direction NORTH (0°), 3052.6 m depth (Ship:14°45,28'N, 44°58,82'W)
19:05	outcrop on top of hill, steep slope towards N
19:07	sediment covered rock
19:08	waypoint 17, now 180 m WEST (270°), 3057.5 m depth (Ship:14°45,29'N, 44°58,83'W)
19:15	sediment, 3035 m depth
19:19	rock outcrop, 3024 m depth
19:22	waypoint 18, now 25 m direction NORTH (0°), 3029 m depth (Ship:14°45,29'N, 44°58,84'W)
19:22	sediment covered rock, outcrop
19:24	waypoint 19, now 180 m EAST (90°), 3027 m depth
19:25	sediment covered rock, outcrop
19:27	TV grab mark in sediment (Ship:14°45,31'N, 44°58,84'W) M60/3-82 GTV ??
19:36	sediment, 3072.4 m
19:38	waypoint 20, now 25 m NORTH (0°), 3072.6 m depth (Ship:14°45,31'N, 44°58,84'W)
19:40	waypoint 21, now 180 m WEST (270°), 3075.3 m depth (Ship:14°45,32'N, 44°58,84'W)
19:40	sediment covered rock, outcrop
19:45	sediment, depth 3062 m

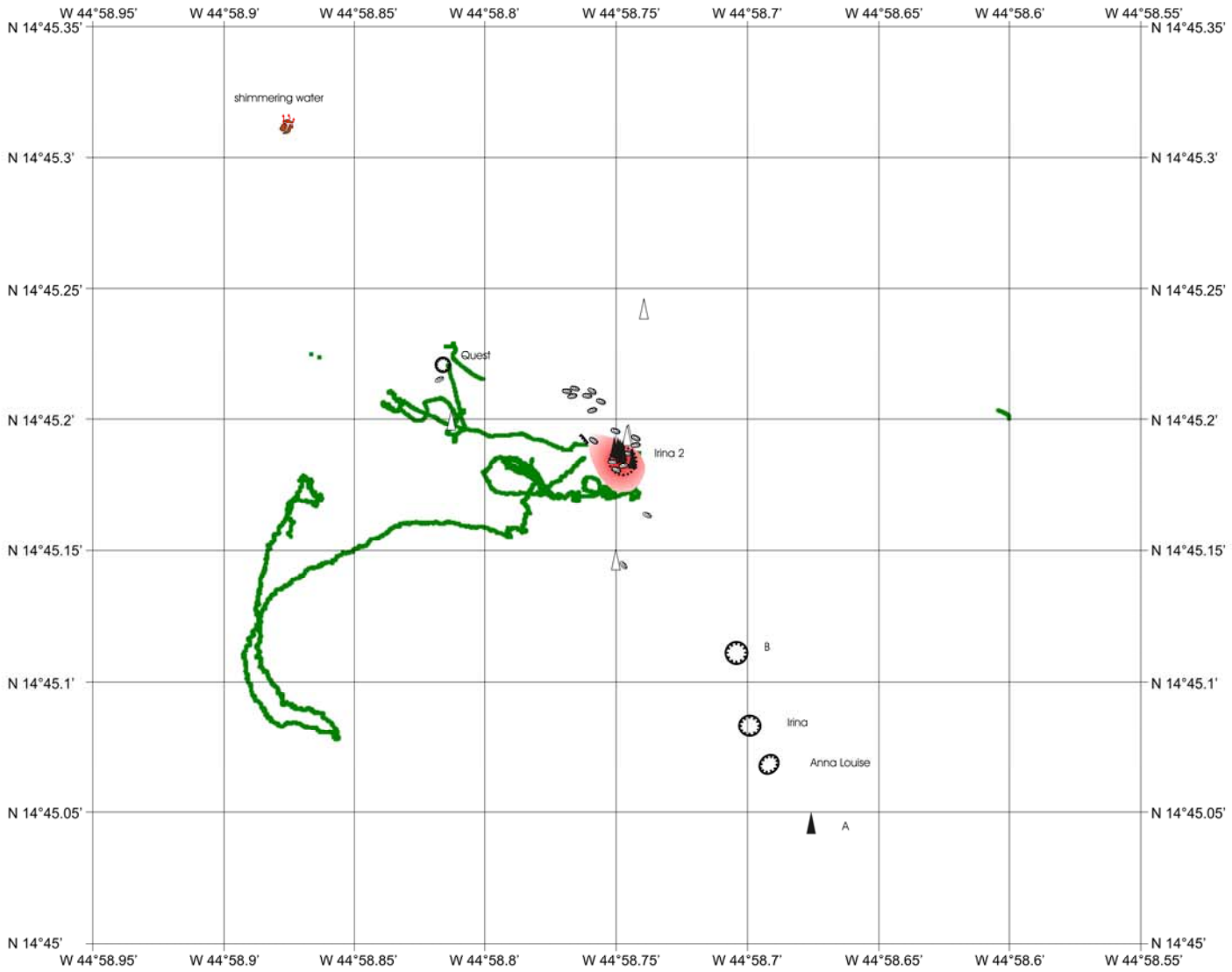
19:46	rock outcrop, 3059 m depth	
19:47	brownish-orange crusts on rock, shimmering water, orange sediment surface	
20:24	sample of orange crust taken with shovel	285ROV-6
20:35	at the northern end small former orifices, no shimmering water anymore	
20:38	continue the mapping track, due WEST to waypoint 22	
20:44	waypoint 22, now 20 m direction NORTH, 3050 m depth	
20:47	waypoint 23, now 180 m direction EAST, 3056 m depth	
20:53	sediment, some blocks, 3069 m depth	
20:57	sediment covered talus	
20:59	ridge with lots of reddish-orange crusts	
20:59	waypoint 24, now 20 m NORTH, 3078 m	
21:02	waypoint 25, now 180 m WEST, 3080 m	
21:03	red hydrothermal crusts	
21:14	waypoint 26, now 20 m NORTH, 3060 m (above old hydrothermal crusts)	
21:19	waypoint 27, now 180 m EAST, 3065 m	
21:27	sediment, few large boulders, 3080 m	
21:30	*Munidopsis*	
21:33	waypoint 28, now 20m NORTH, 3090 m	
21:37	waypoint 29, now 180 m WEST, 3090 m	
21:47	large blocks	
21:50	waypoint 30, end of station, end of M64-2 cruise program	

Appendix 10:

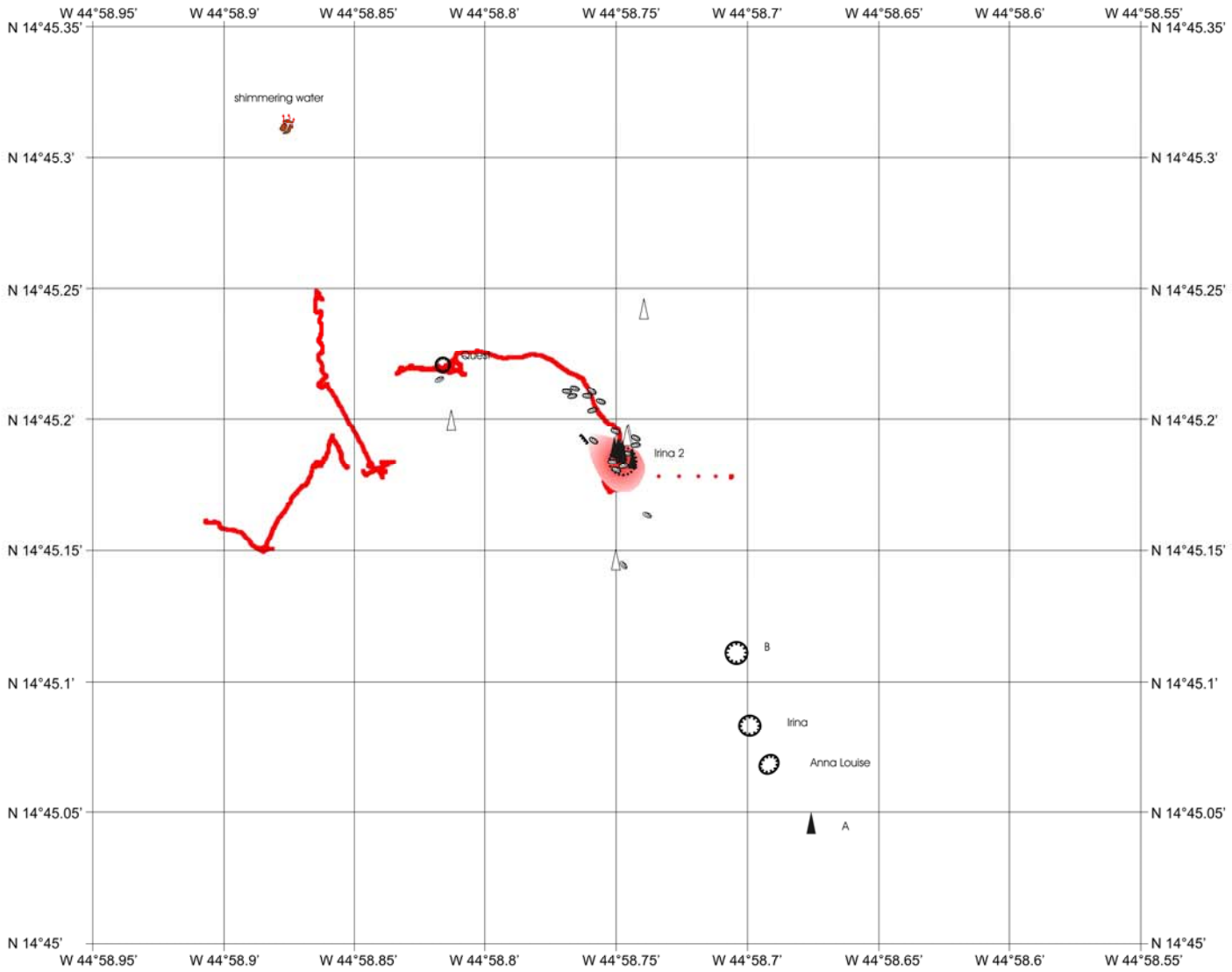
Detailed maps of ROV tracks

compiled by Kerstin Schreiber

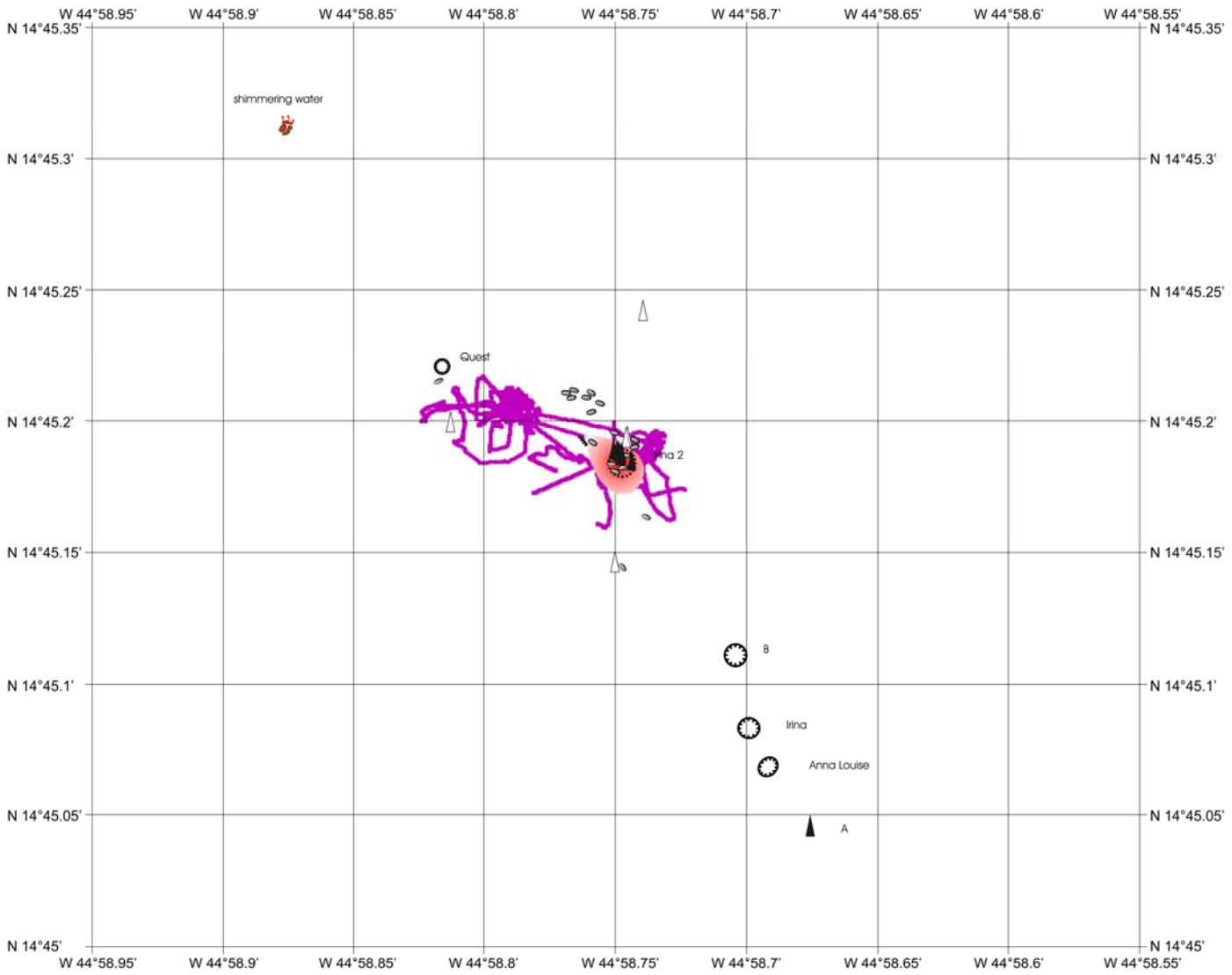
224 ROV (Dive 50B)



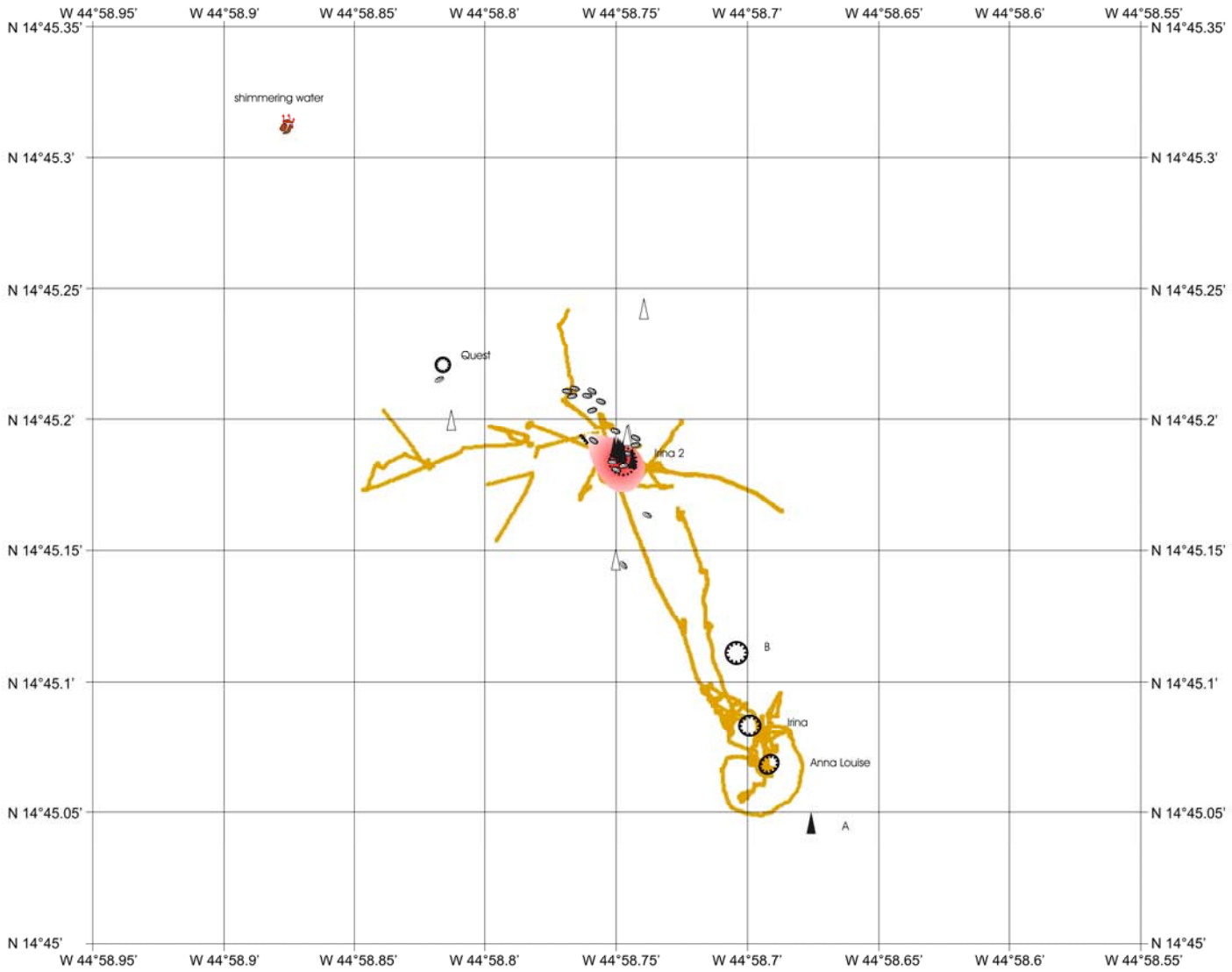
232 ROV (Dive 51)



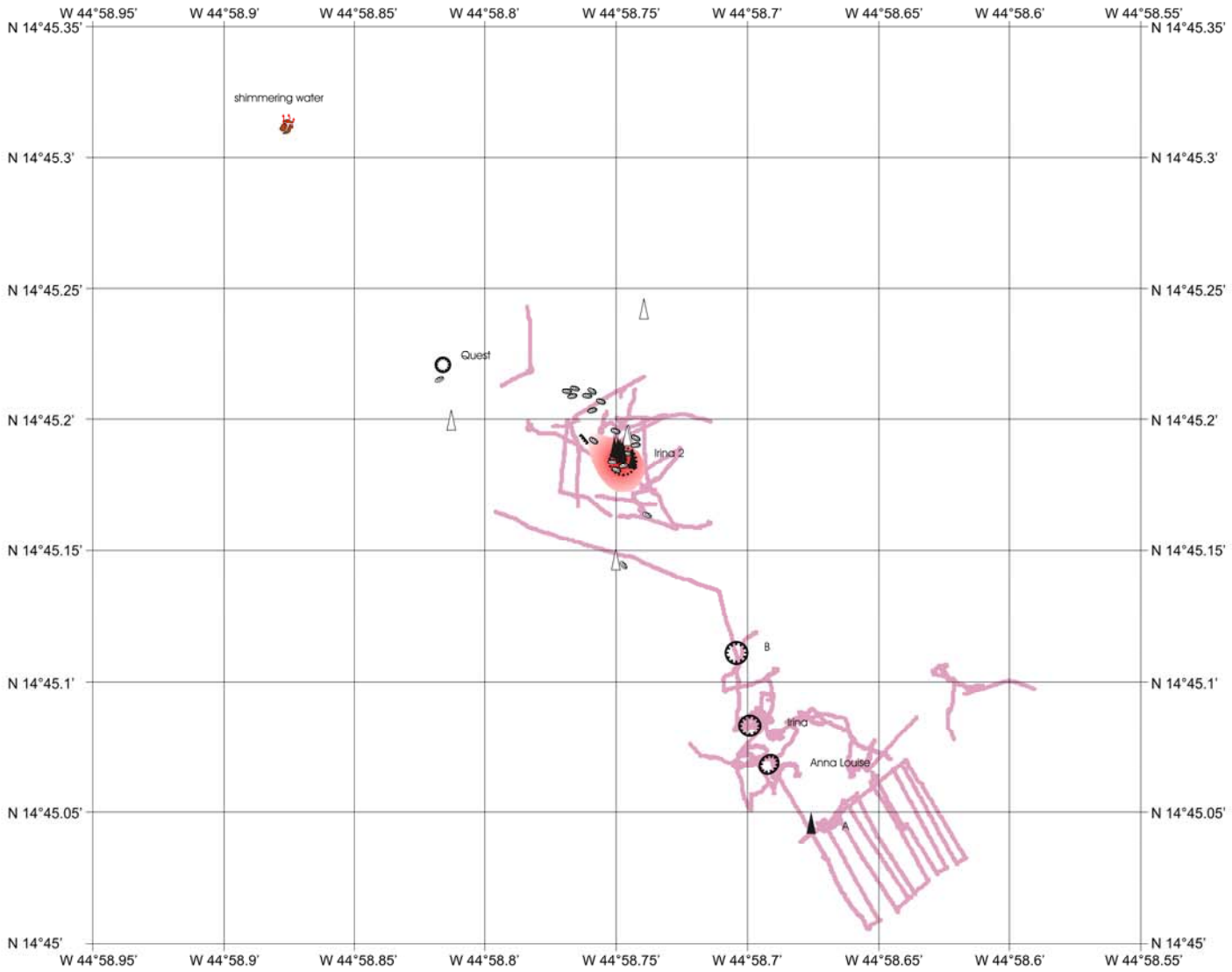
244 ROV (Dive 52)



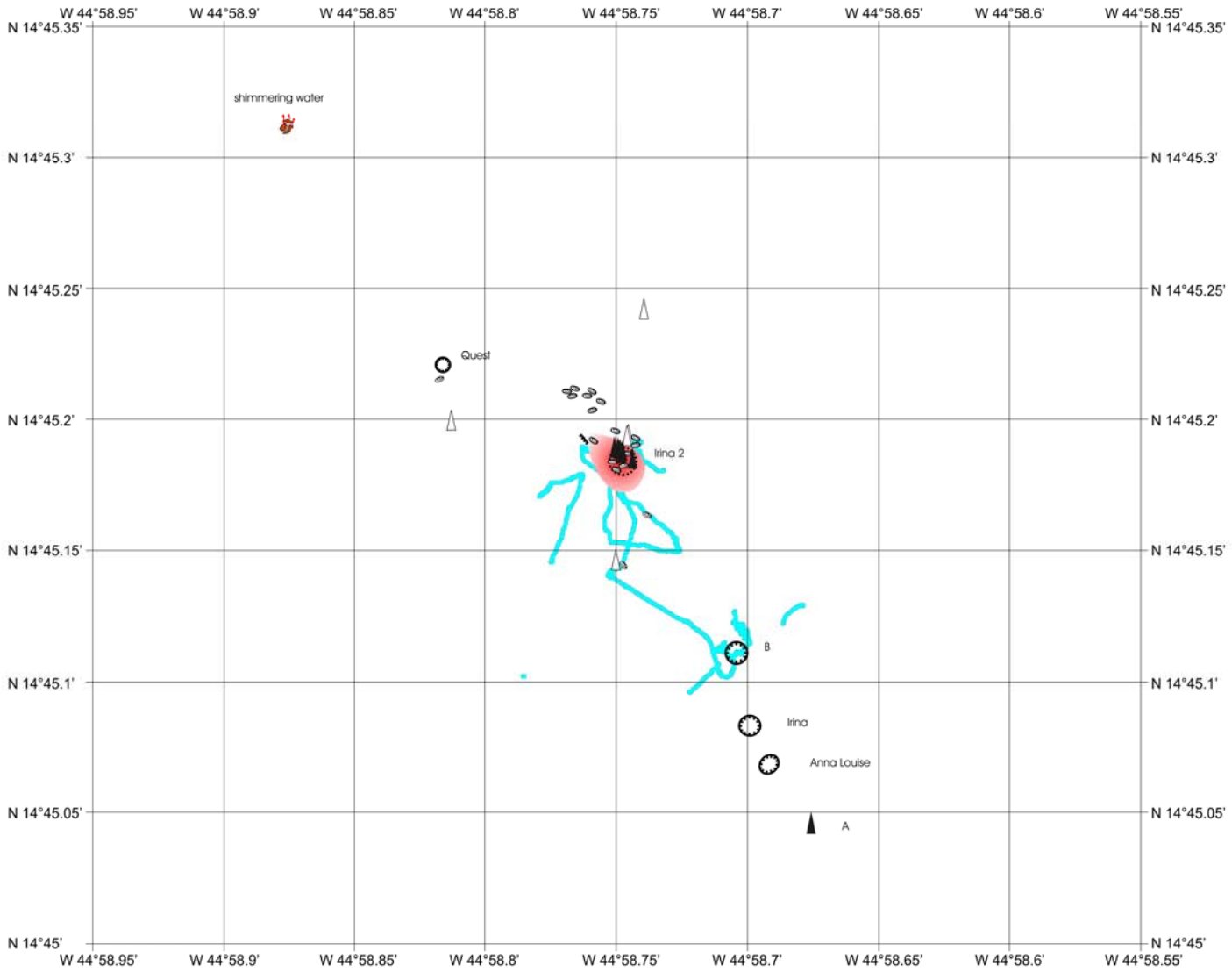
249 ROV (Dive 53)



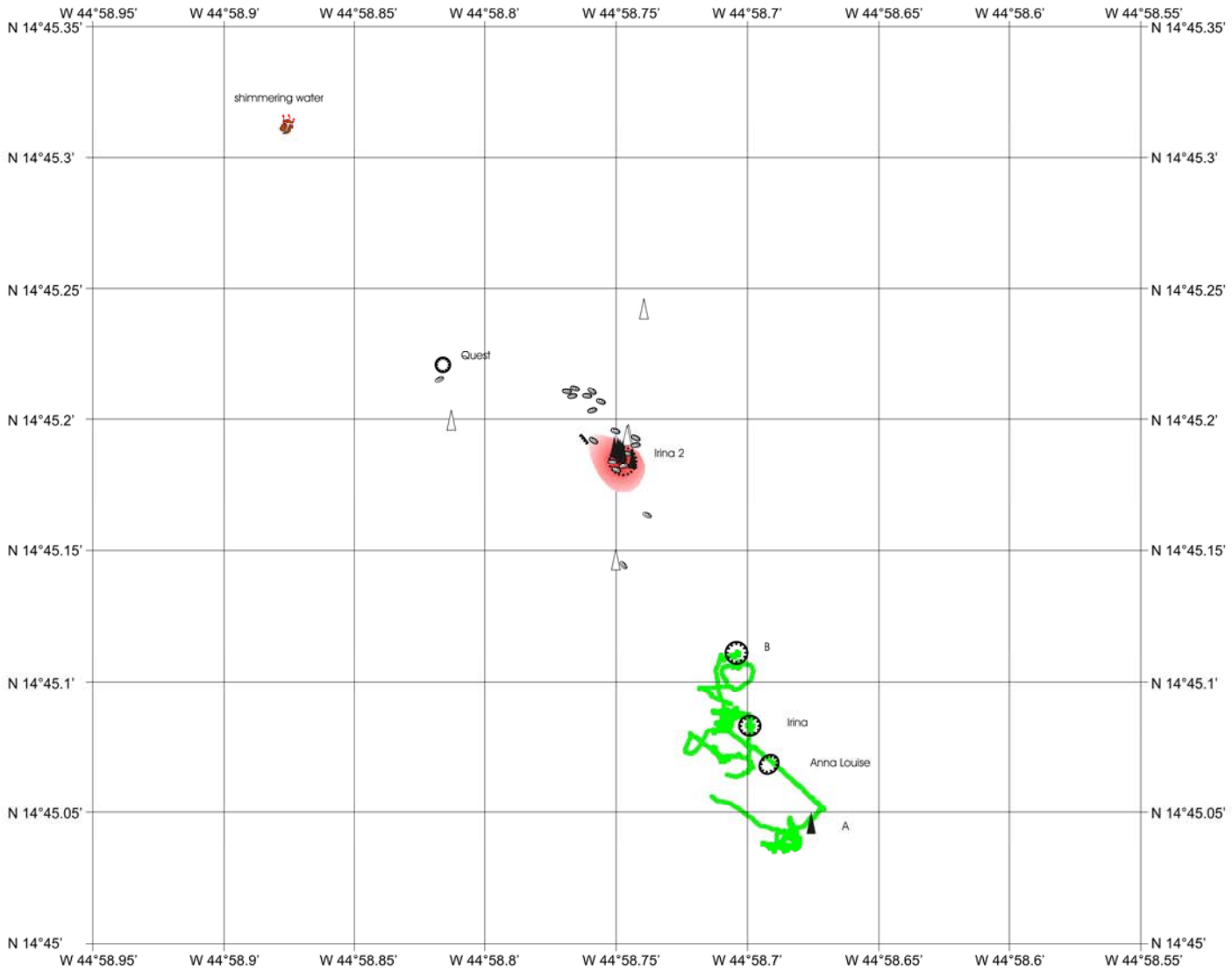
252 ROV (Dive 54)



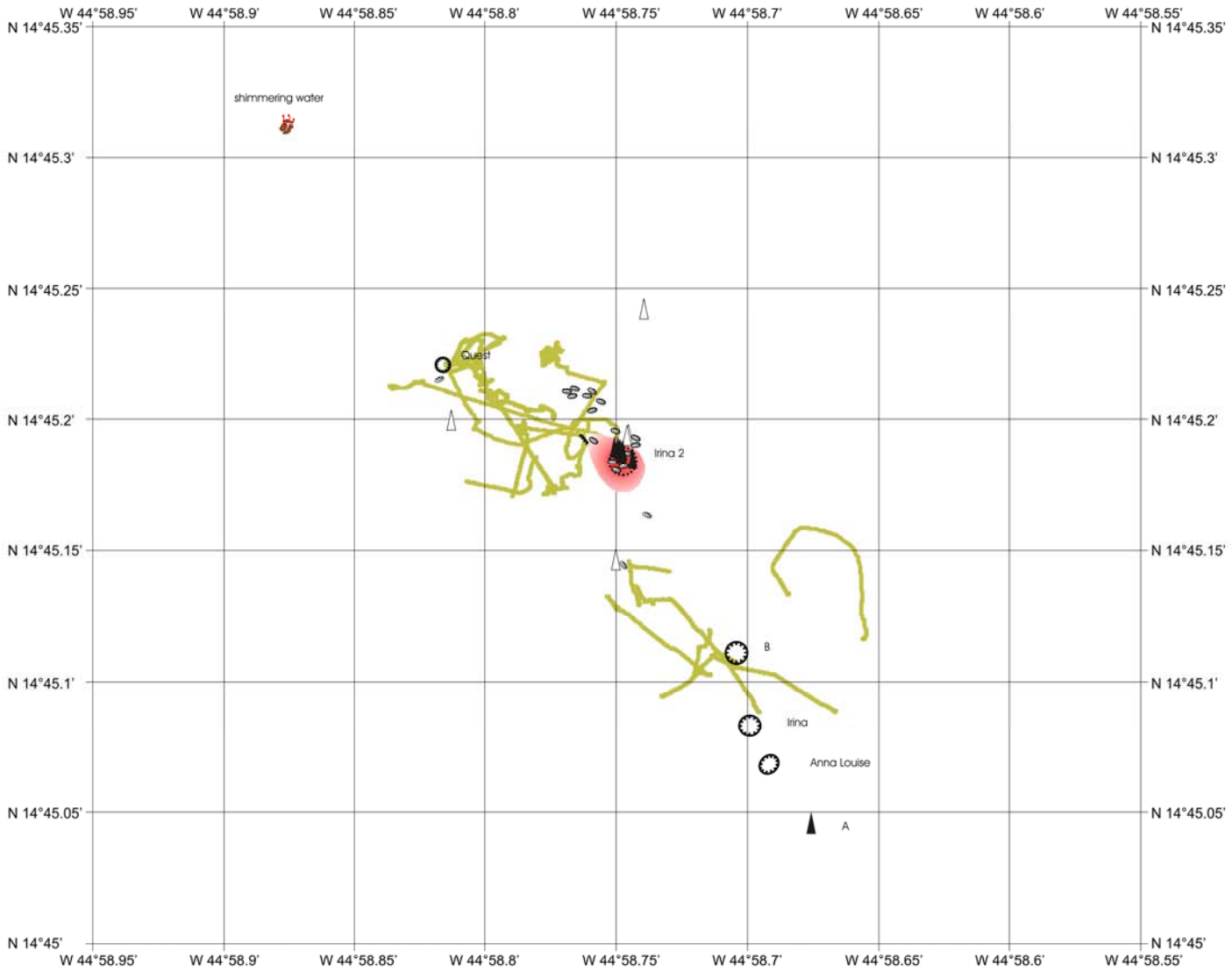
257 ROV (Dive 55)



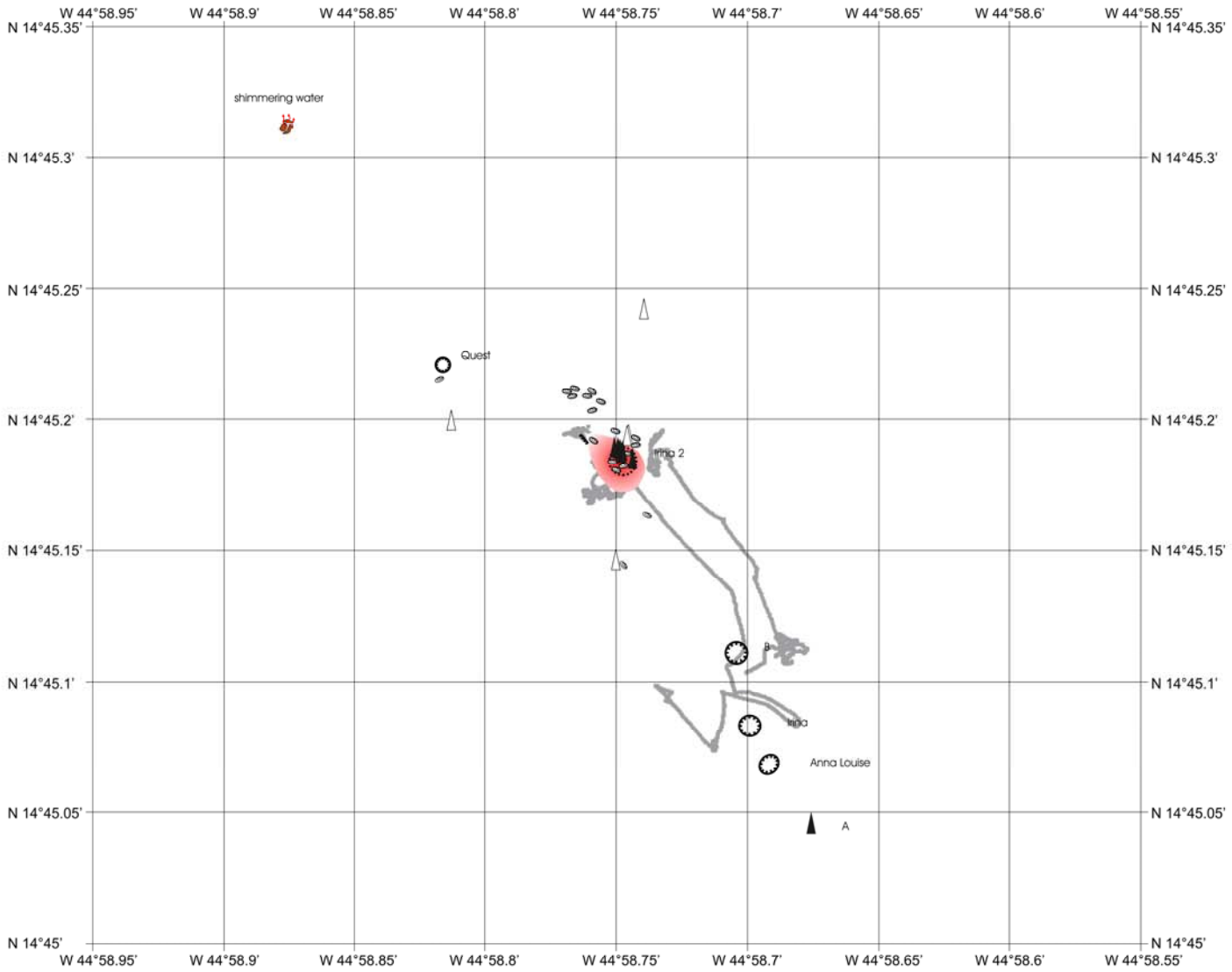
261 ROV (Dive 56)



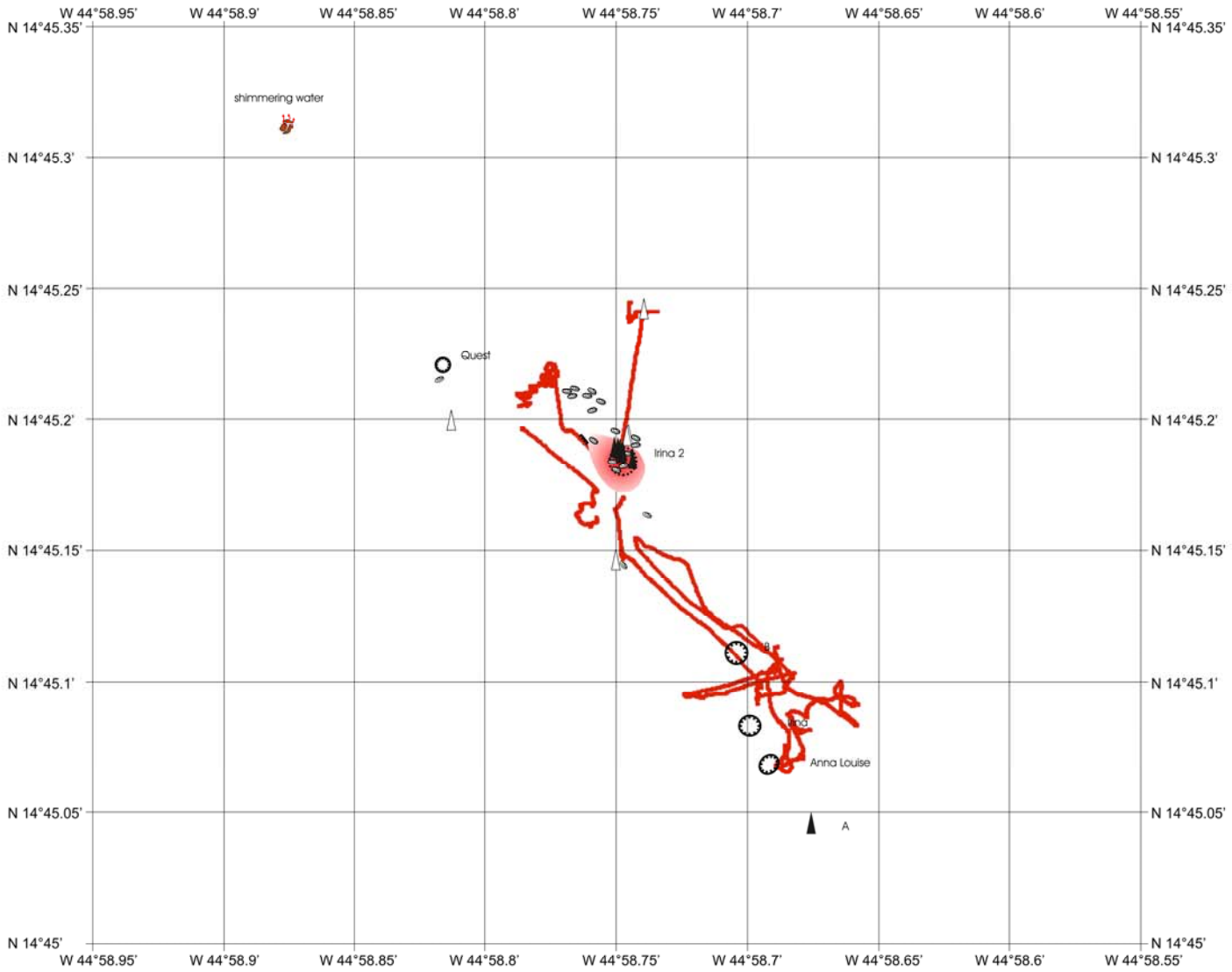
263 ROV (Dive 57)



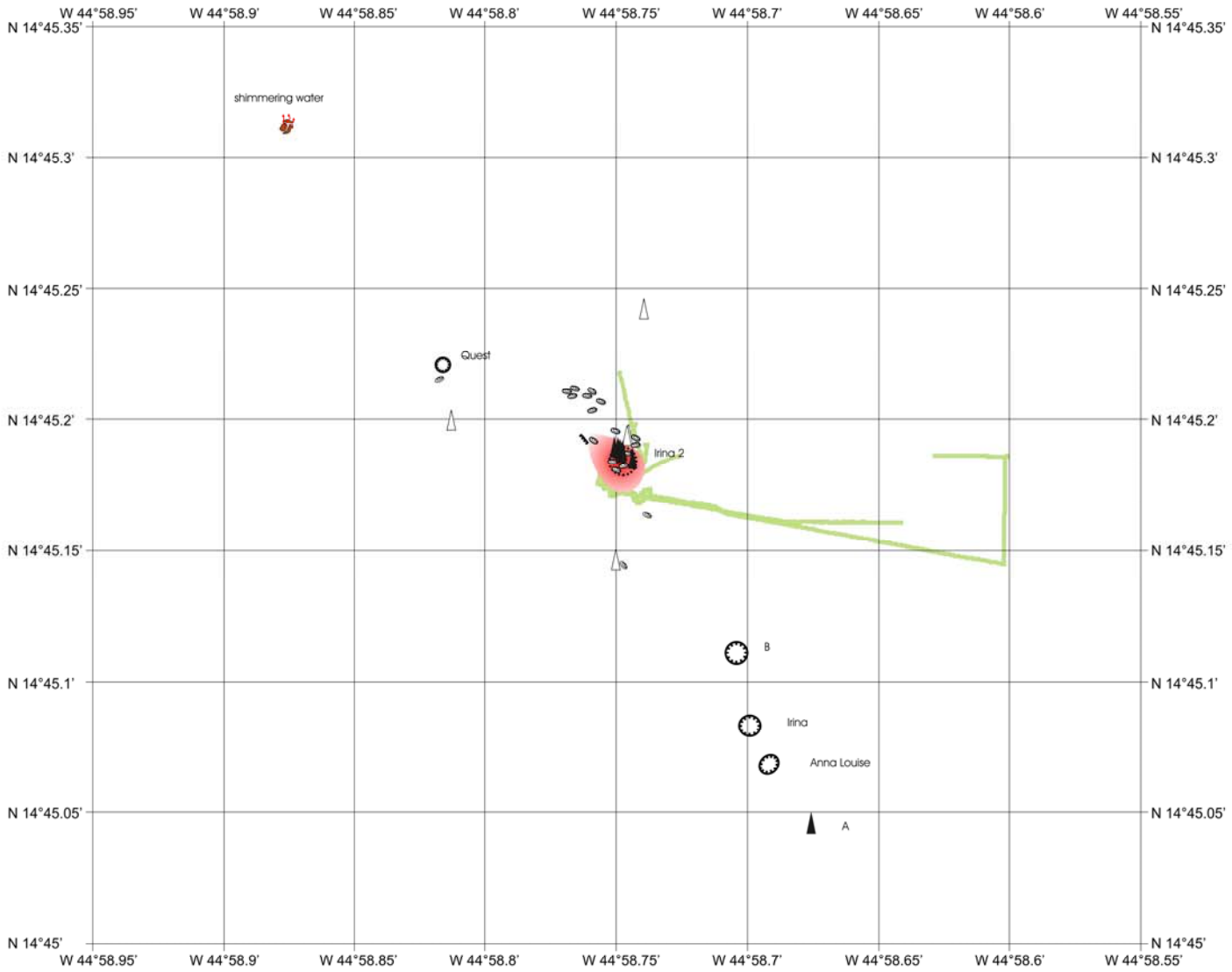
266 ROV (Dive 58)



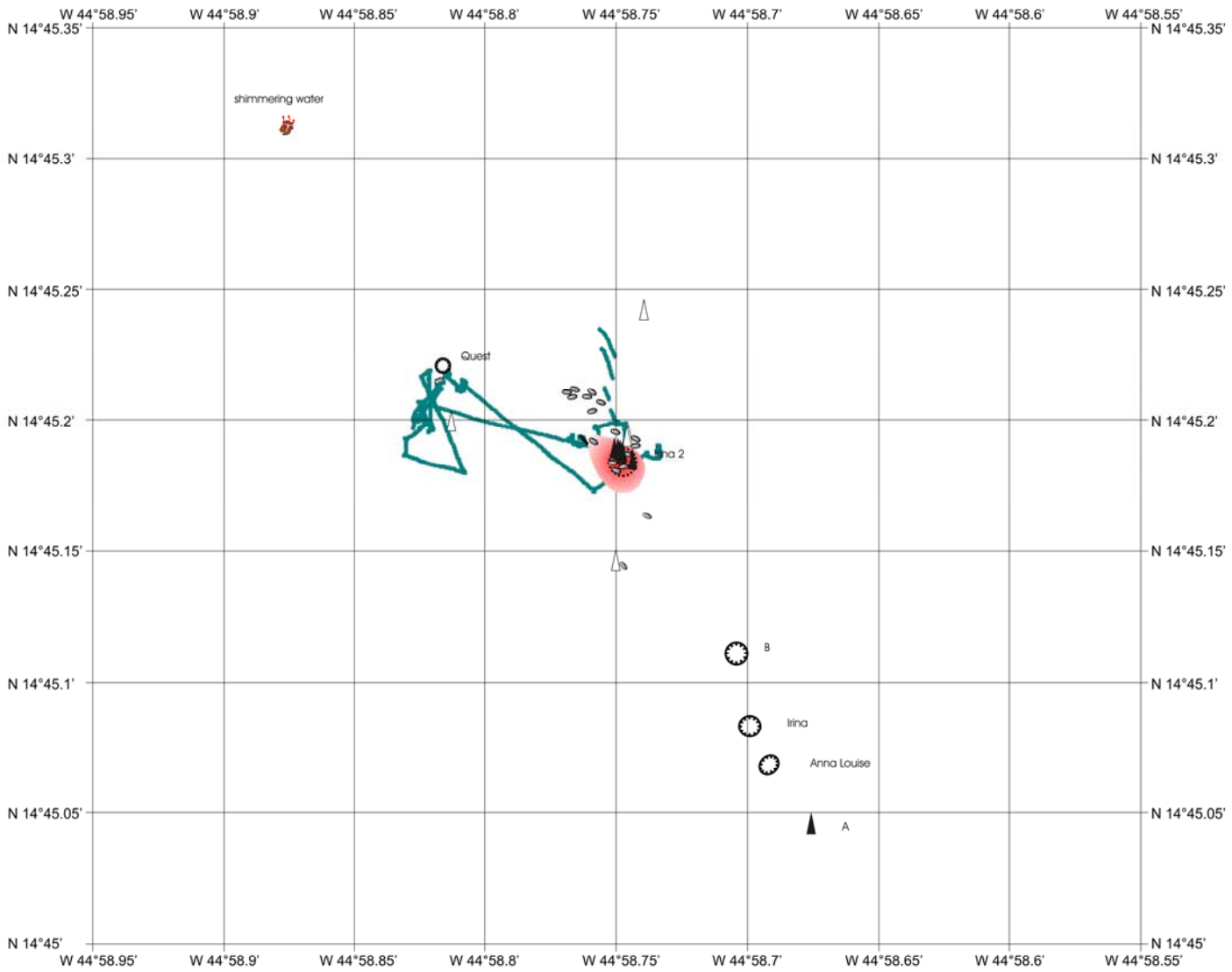
272 ROV (Dive 59)



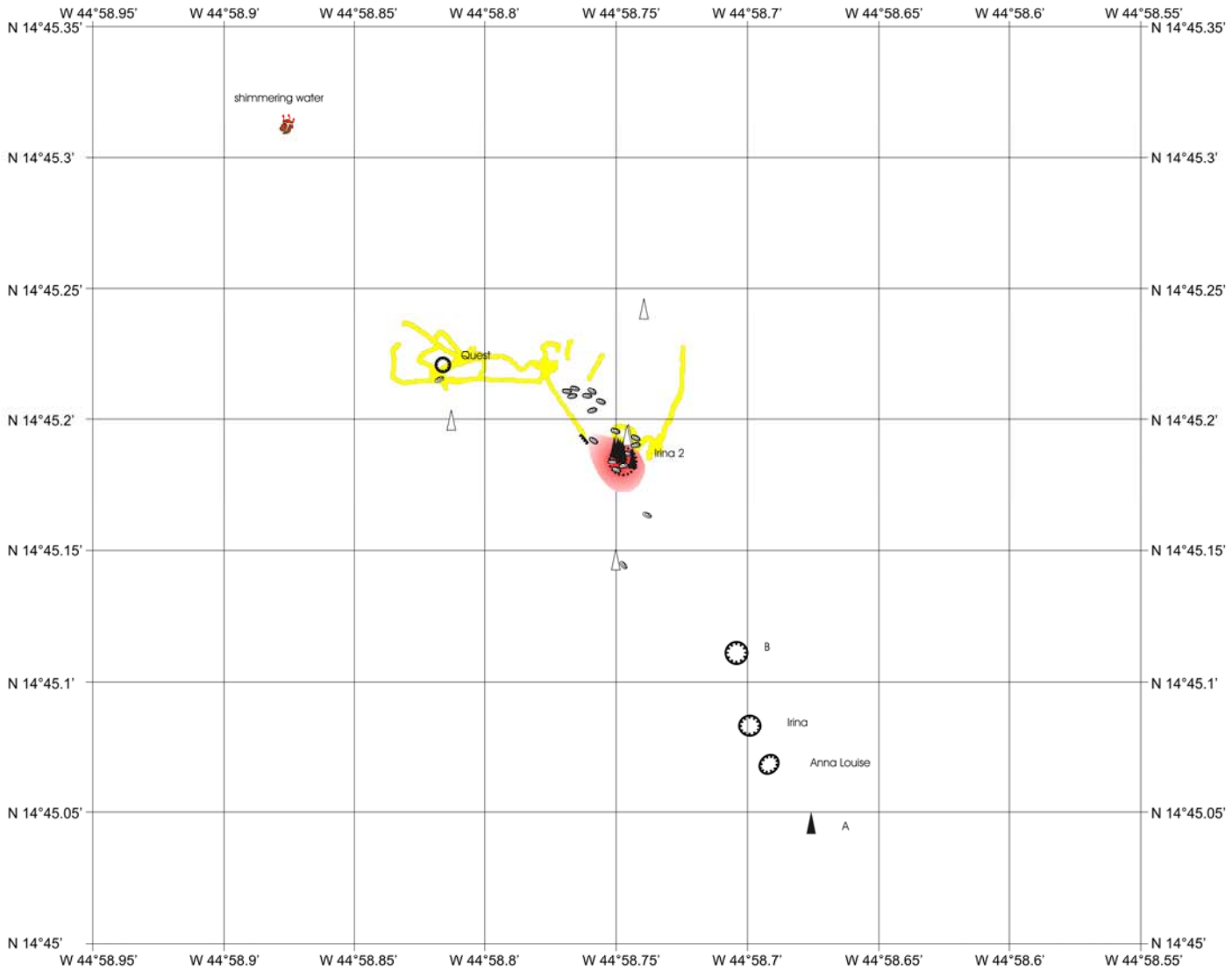
277 ROV (Dive 60)



281 ROV (Dive 61)



283 ROV (Dive 62)



285 ROV (Dive 63)