



**RV Johan Hjort, MARECO Trials Cruise
(Oceanlab Cruise Log)**



13th-27th November 2002

Principle Scientist: Dr Olav Rune Godø (IMR, Norway)



Scientific Party of the MARECO trials cruise on the RV Johan Hjort, November 2002

The trial cruise demonstrated that the 2004 event needs thorough planning and strict execution. It will also require technology that has a high degree of reliability. The efficiency of such a multipurpose cruise will totally depend on smooth operation and strict adherence to realistic schedules. Still, there will certainly be a need for flexibility and joint effort when the unexpected happens, which it no doubt will. During the trial cruise we felt the creative fertility of the atmosphere when scientists with different backgrounds and scientific experience are living close together on a vessel over an extended period of time. Several seminars were arranged onboard during the cruise where all teams presented their work. On the CDs in your hand you will find some background material and PP presentations from all teams. Photo galleries by Michal and Martin give you an indication of the work carried out the nature, and the weather we had during the cruise.

We plan to give a more extensive report at a later stage. In the nearest future there will be communication among the teams with the objective to produce proposals regarding further development of relevant technologies to be applied on the MarEco cruise with "G. O. Sars" in 2004.

"Johan Hjort", 27 November 2002

Olav Rune Godø

MARECO TEST CRUISE NOVEMBER 13-27 2002

RESEARCH VESSEL: "Johan Hjort"
DEPARTURE: Bergen 1800 h 13 November 2002
ARRIVAL: Bodø 1200 h 27 November 2002
CALL: Ålesund 0900 h 20 November 2002
STUDY AREAS: Sognefjorden and the Ofotfjord/Tyssfjord

INTRODUCTION

The MarEco project plans a major cruise on the Mid Atlantic Ridge during the summer of 2004. To carry out this cruise efficiently and to meet the main MarEco objectives, it is crucial to have the appropriate technologies available, and equally important to have a survey design and working procedures and routines that facilitate predictable operation of multiple instrumentations. Further, there is a need to evaluate if the available technologies need further development and if additional preparatory efforts are needed in order to have relevant and adequate technologies established and available for the 2004 survey.

The MarEco survey will require a diverse combination of scientific fields represented and cooperating. There will be scientists with high-level skills relative to all major taxonomic groups of the ecosystem, oceanographers, technologist, and even artists. It is a challenge to provide a stimulating working environment for all cruise members and even more important, to create interaction within and between the participating competence groups in order for the program to harvest the added value generated when representatives of these diverse scientific fields are brought together in close quarters within the spirit of cooperation. How can we establish and maintain a strict time budget without generating a great deal of conflict?

OBJECTIVES

The test survey objectives were:

1. to explore the applicability of some of the available technologies with respect to MarEco objectives.
2. to propose improvements or adjustments to selected technologies in order to facilitate the provision of a suite of relevant tools for the 2004 cruise.
3. to generate new ideas and developments in technologies and technical and administrative solutions for the 2004 cruise.

AVAILABLE TECHNOLOGIES

Underwater Video Profiler (UVP)

This technology was presented by the French team and was operated in the Sognefjord. A survey was carried out simultaneously with an acoustic coverage and some trawl sampling. There was an exchange of ideas and a desire to implement this technology in combination with other observation methods. In particular we discussed potential towed solutions and a combined UVP - acoustic platform for plankton monitoring. The UVP results were also compared with the Lander technology for observing bioluminescence.

Lander

A Scottish team used this technology both in Sognefjord and in the Ofoten/Tysfjord area. Combined experiments with the UVP were carried out as mentioned above, and the UVP software was tested on the Lander bioluminescence recordings. To increase the Lander observation volume several acoustic solutions were proposed, including both split beam sounder technology and horizontal sonars. An acoustic buoy with a splitbeam echo sounder was used together with the Lander in shallow water to demonstrate the power of this combination.

AUV

A Norwegian team made several tests with this new technology. After initial severe technical problems, several successful runs were carried out in the Ofoten fjord, where both autonomous operation and remote control through an acoustic link were demonstrated. Diving through dense herring schools, and near bottom operations gave detailed acoustic information that can hardly be obtained with other technologies. The AUV potentially has several applications for the 2004 survey, but further developments with regard to predictable operation, as well as implementation of new instrumentation will be needed.

Ship borne acoustics

A standard acoustic survey for fish abundance estimation was run during the cruise. Due to priority reasons, the planned operation of a multi frequency system with associated analysis was not possible. Therefore this technology was not thoroughly discussed during the cruise, but will be available for the 2004 cruise.

Acoustic buoy

This is a free-floating remotely operated split beam echo sounder system that is routinely used on Norwegian research vessels. It has several applications for fish behaviour studies of natural behaviour as well as avoidance reactions during fishing operations and survey situations. Its applicability was demonstrated when combined with the Scottish Lander.

Stationary system

A Norwegian team demonstrated a stationary acoustic system in the Ofoten fjord. This technology is designed for assessing abundance of fish passing the system as well as natural behaviour of the fish. It is not directly applicable for MarEco, but the experience from this system will be used in the development of stationary systems for long-term observations of seasonal variations.

Trawling

Some trawling was carried out during the survey. In addition to pelagic and bottom trawls, a specially designed plankton trawl with an opening of 6,7 x 6,7 m was tested with favourable results. This trawl, or an even larger version will be available for the 2004 cruise. Deep water trawling will be a challenge during the 2004 cruise, but specific developments or testing could not take place during this trial cruise due to limitations of the trawl equipment onboard the "Johan Hjort".

PARICIPANTS AND TEAMS

Participant	Period	Institution/Comment
Phil Bagley	13-27	Aberdeen Univ
David Bailey	13-27	Aberdeen Univ
Odd Aksel Bergstad	13-20	IMR
Ole Sverre Fossheim	13-27	IMR
Martin Dahl	13-27	IMR
Lars Nonboe Andersen	24-27	Simrad
Olav R Godø	13-27	IMR
Ingvar Huse	20-27	IMR
Alan Jamieson	13-27	Aberdeen Univ
Dagfinn Koppang	13-27	NUI
Jan de Lange	13-27	IMR
Webjørn Melle	13-27	IMR
Jouette Olivier,	13-20	CNRS-UPMC
Michael Palmgren	13-20	Klockargårdens Film AB
Ruben Patel	13-27	IMR
Marc Picheral,	13-20	CNRS-UPMC
Geir Romslo	13-27	NUI
Vidar Spord	13-27	NUI
Bjørn Vidar Svendsen	13-27	IMR
Terje Torkelsen	13-27	IMR
Jan Tore Øvredal	20-27	IMR

TECHNOLOGIES AND RESPONSIBLE SCIENTISTS

Technology	Institution	Responsible	Period
AUV- acoustics	NUI Norway IMR Norway	Geir Lasse Kaldestad, Ruben Patel,	13-27
Landers	University of Aberdeen	David Bailey, Phil Bagley, Alan Jamieson	13-27
UVP	Observatoire Oceanologique France	Jouette Olivier, Marc Picheral,	13-20
Acoustic equipment	Simrad Norway	Martin Dahl, Lars Nonboe Andersen	24-27
Stationary acoustics	IMR Norway	Olav R Godø, Terje Torkelsen	20-27
Floating acoustic buoy	IMR Norway	Olav R Godø, Terje Torkelsen	20-27
Plankton trawling	IMR Norway	Webjørn Melle, Ingvar Huse	13-27

Norway Cruise Report (Oceanlab Only)

Ship: Johan Hjort

Dates: 13-28th November 2002

Personnel:

Phil Bagley

p.bagley@abdn.ac.uk

+44 1224 274411

Dave Bailey

d.bailey@abdn.ac.uk

+44 1224 274413

Alan Jamieson

a.jamieson@abdn.ac.uk

+44 1224 274415

Affiliation: Oceanlab, University of Aberdeen, Newburgh. Aberdeenshire. AB41 6AA. Scotland, UK.

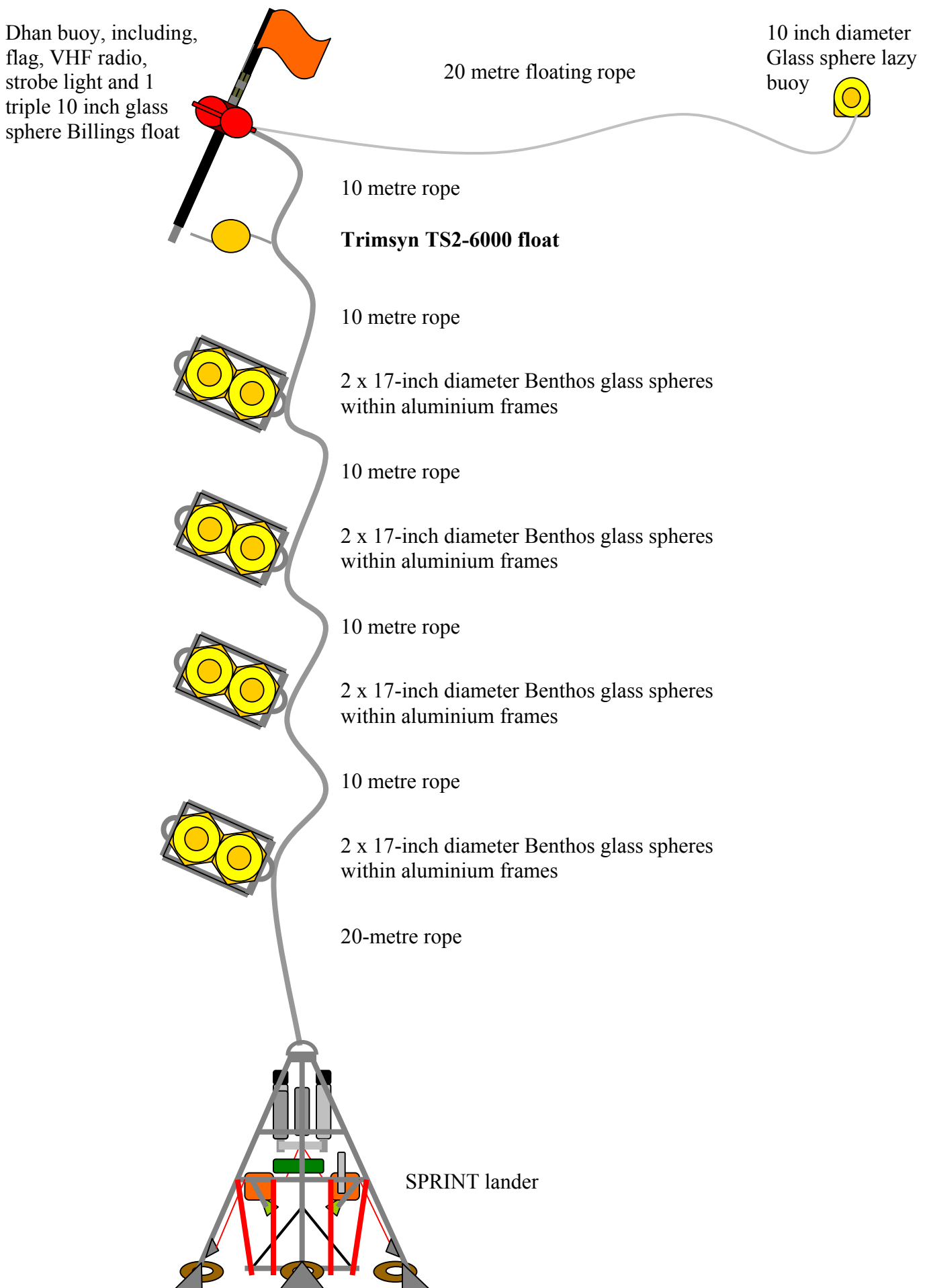
Summary

We completed 12 lander deployments and 6 ISIT (Bioluminescence) profiles on the CTD winch. In the Sognefjord we observed mostly hagfish, invertebrates (crabs, squat lobsters, and amphipods). Although more analysis is required, under similar deployments using white and red light at a nominal 1200m depth the amphipods appear to be more abundant under illumination from red light.

In Ofotenfjord, although very large numbers of fish were present we did not observe any fish at the lander bait. The reason for this is unclear, however deployments in conjunction with the acoustic buoy may show some aspects of the lander configuration deter fish presence.

During the cruise we were grateful to work with the French team to try to help identify bioluminescent particles observed by our ISIT camera, and with the team from IMR who helped us observe fish behaviour outside the range of our video camera using the EK60 acoustic mooring. These collaborations are at the heart of the MAR-ECO work and we hope these collaborations will continue in the future.

SPRINT Lander Mooring Design for Norway cruise on 'Johan Hjort'.



Deployment procedure

The mooring was set out aft of lander. The ship steamed ahead 0.5 knots (over the ground) in to the prevailing wind. The pellet float was deployed first, through the A frame. As the ship steamed ahead the dahn buoy was then deployed followed by remaining floats each separated by a 10m rope. Once all the floatation was streaming aft of the ship the Lander was lifted off the deck by a winch connected to the lander via a quick release through a large block on the A frame. Using both the winch and A frame the lander was lowered in to the water and released from the crane via the quick release.

Recovery procedure

The ship was manoeuvred 3 cables off the Lander deployment position. A transducer was lowered through the CTD deployment hatch, and release codes transmitted to the lander. Confirmation of release was not always received from the Lander. This often occurs in difficult acoustic conditions. However, almost always the Lander will be released on the first attempt. To ensure the Lander was released, release commands were repeated until a release confirmation was received.

Once on the surface, a radio beacon and flashing strobe light identifies the mooring position. The ship then approached the mooring with the prevailing wind on the starboard bow. This attitude allows the ship to be blown away from the mooring position, and also allows the floats on the surface to be oriented correctly with the pellet float and floating rope down wind of the main mooring, and therefore accessible first to be grappled. As the mooring approaches the aft starboard side quarter the floating rope was grappled, and brought aboard. The pellet float removed and the mooring line connected to the trawl winch via a large block on the A frame. Once the mooring had drifted aft, the ship was steering in to the wind and the floats brought in board, each being unclipped from the mooring line as it became accessible to the crew. Once all floatation was in board the A frame was fully extended aft and the lander was then lifted clear of the water and brought in board using a combination of the A frame and trawl winch.

Cruise deployment no.	1
Experiment	Sognefjord visual census & fast start
Payload	JVC Camera, white light, electric pulse generator, Aquadopp current meter. Bait in mesh bag. 1.5 mackerel (gutted)
Program timings	Recording starts 30min after switch on; 45 min tape time without shocks. Final 15mins tape time with shocks. Time lapse recording 1min on;
Total planned duration	4h 06min
Lander	SPRINT

Deployment

Station no.	
Deployment location	Lat: 61° 07.218'N Long: 05° 41.774'E
Deployment depth	1246m
Date started	14 November 2002
Time started	22:29:37
Time Dahn Buoy sank	22:36
Descent rate	45m/min (actual)

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	15 November 2002
Time released	08:05
Ascent rate	27m/min (actual)
ETA	
ATA	

Results

Comments	Bait untouched even though there was a small hole at the opening of the bait bag. Hag fish seen at bait, No escape response noted. Pulse generator checked and OK. Star fish and squat lobster (<i>Munida tenuimana</i>). Image dark, reposition lights so that they focus onto bait position for next deployment. No lice visible in video.
-----------------	--

Cruise deployment no.	2
Experiment	Sognefjord visual census & fast start
Payload	JVC Camera, white light, electric pulse generator, Aquadopp current meter. Bait in mesh bag. 1.5 mackerel (gutted)
Program timings	Recording starts 30min after switch on; 45 min tape time without shocks. Final 15mins tape time with shocks. Time lapse recording 1min on;
Total planned duration	4h 06 min
Lander	SPRINT

Deployment

Station no.	
Deployment location	Lat: 61° 08.4632'N Long: 05° 50.8552'E
Deployment depth	1265m
Date started	15 November 2002
Time started	15:42
Time Dahn Buoy sank	15:48
Descent rate	45m/m

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	15 November 2002
Time released	22:21
Ascent rate	27m/min
ETA	
ATA	23:06

Results

Comments	Hagfish arrive in first recording sequence. Very few amphipods (lice) scavengers. Image much improved from previous deployment. Lander sunk slightly in mud.
-----------------	--

Cruise deployment no.	3
Experiment	Sognefjord visual census & fast start
Payload	JVC Camera, Red light (Jessops series 5 red filter on 75watt lamps), electric pulse generator Bait in mesh bag. 1.5 mackerel (gutted)
Program timings	Recording starts 30min after switch on; 45 min tape time without shocks. Final 15mins tape time with shocks. Time lapse recording 1min on; 3 min off
Total planned duration	4h 06 min
Lander	SPRINT

Deployment

Station no.	
Deployment location	Lat: 61° 07.8698'N Long: 05° 50.8072'E
Deployment depth	1240m
Date started	16 November 2002
Time started	02:01
Time Dahn Buoy sank	02:07:14
Descent rate	45m/m

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	16 November 2002
Time released	08:37
Ascent rate	27m/min
ETA	09:22
ATA	09:21

Results

Comments	Hagfish again, lots of amphipods (lice) on bait bag after recovery. No lice observed on the white light deployments. Hard to tell from video whether lice are on the bait bag during the deployment. Further analysis required. Appear to be more hagfish under red light. Possibly feeding on amphipods.
-----------------	---

Cruise deployment no.	4
Experiment	Sognefjord visual census & fast start
Payload	JVC Camera, Red light (Jessops series 5 red filter on 75watt lamps), electric pulse generator, Aquadopp current meter. Bait in mesh bag. 1.5 mackerel (gutted)
Program timings	Recording starts 30min after switch on; 45 min tape time without shocks. Final 15mins tape time with shocks. Time lapse recording 1min on; 3 min off
Total planned duration	4h 06 min
Lander	SPRINT

Deployment

Station no.	
Deployment location	Lat: 61° 06.5461'N Long: 05° 50.2493'E
Deployment depth	273m
Date started	16 November 2002
Time started	14:27
Time Dahn Buoy sank	14:22:30
Descent rate	45m/m

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	16 November 2002
Time released	
Ascent rate	27m/min
ETA	
ATA	

Results

Comments	Lots of Amphipods (lice) on bait bag, also visible on video image. Sample collected. Good red light image. One Gadoid fish attached (Torsk). Lander tilted 17° X and 6° Y. Mud sample taken.
-----------------	--

Cruise deployment no.	5
Experiment	Sognefjord visual census & fast start
Payload	JVC Camera, Red light (Jessops series 5 red filter on 75watt lamps), electric pulse generator, Aquadopp current meter. Bait in mesh bag. 1.5 mackerel (gutted). White cloth added to bait string to aid camera focus under red light
Program timings	Recording starts 30min after switch on; 45 min tape time without shocks. Final 15mins tape time with shocks. Time lapse recording 1min on; 3 min off
Total planned duration	4h 06 min
Lander	SPRINT

Deployment

Station no.	
Deployment location	Lat: 61° 08.3505'N Long: 05° 51.3084'E
Deployment depth	1265m
Date started	17 November 2002
Time started	01:34
Time Dahn Buoy sank	01:41
Descent rate	45m/m

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	17 November 2002
Time released	08:05
Ascent rate	27m/min
ETA	
ATA	08:50

Results

Comments	Amphipods (lice) on bait when recovered. Good video of hag fish. No Amphipods visible on video.
-----------------	---

Cruise deployment no.	6
Experiment	Co-operative deployment with acoustic IMR acoustic buoy. Lander deployed with 15m of acoustic buoy to look at fish presence out of the field of view of the Lander
Payload	JVC Camera, White light (Jessops series 5 red filter on 75watt lamps), electric pulse generator, Aquadopp current meter. Bait in mesh bag. 1.5 mackerel (gutted).
Program timings	Recording starts 30min after switch on; 45 min tape time without shocks. Final 15mins tape time with shocks. Time lapse recording 1min on;
Total planned duration	12 hours
Lander	SPRINT

Deployment

Station no.	Sognefjord	
Deployment location	Lat: 61° 06.5301'N	Long: 05° 50.1635'E
Deployment depth	275m	
Date started	17 November 2002	
Time started	14:28:30	
Time Dahn Buoy sank	14:35	
Descent rate	45m/m	

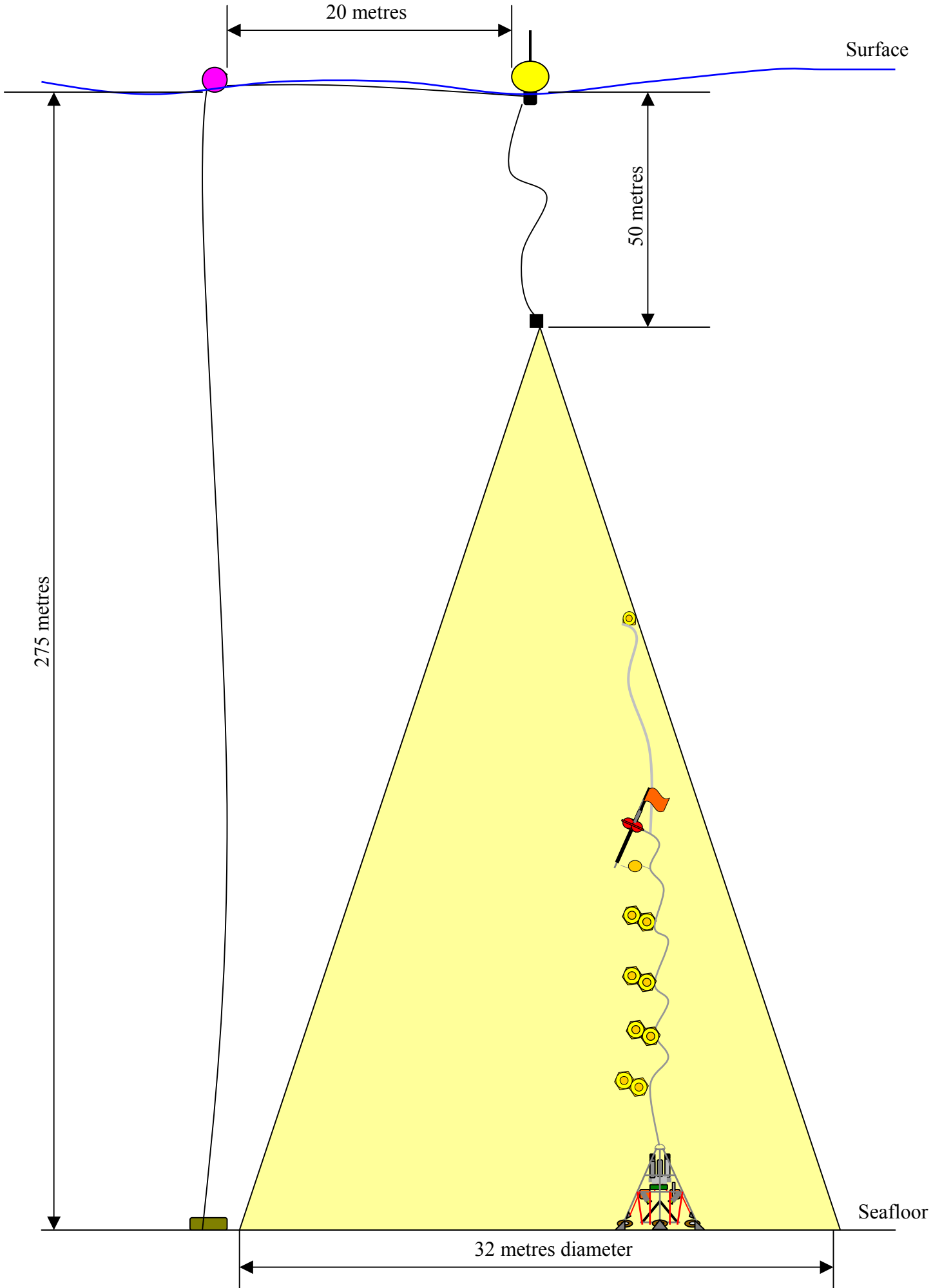
Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	18 November 2002
Time released	08:39
Ascent rate	27m/min
ETA	08:47
ATA	

Results

Comments	Blue ling in second video sequence, reappears after 14mins. Lots of amphipods (lice) visible on bait bag. Rapid movement of brittle stars (rowing action). Acoustic buoy showed small fish making avoidance movements during the descent of the lander. Nice acoustic image of lander and floats falling through the water column. Current moves acoustic buoy away from lander a few minutes after deployment.
-----------------	---

SPRINT Lander and IMR Acoustic Buoy Experiment Set-up (not to scale)



Cruise deployment no.	7
Experiment	Sognefjord visual census & fast start Video operational from 200m to 500m to determine if any fish observed during descent.
Payload	JVC Camera, White light (Jessops series 5 red filter on 75watt lamps), electric pulse generator, Aquadopp current meter. Bait in mesh bag. 1.5 mackerel (gutted).
Program timings	Recording starts at 8mins stops at 18mins. Then operational 1min in every 3.5 mins after 30 mins after start.
Total planned duration	3.5hours
Lander	SPRINT

Deployment

Station no.	Sognefjord	
Deployment location	Lat: 61° 08.0198'N	Long: 05° 51.1419'E
Deployment depth	1260m	
Date started	18 November 2002	
Time started	14:28:30	
Time Dahn Buoy sank	14:09	
Descent rate	45m/m	

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	18 November 2002
Time released	20:00
Ascent rate	27m/min
ETA	20:45
ATA	

Results

Comments	Lots of hagfish, squat lobsters, and sea stars. Very few amphipods (lice). Bait still intact at the end of video but completely consumed by time of recovery. Inter species interactions observed.
-----------------	--

Cruise deployment no.	8a and 8b
Experiment	Sognefjord ISIT profile in co-operation with French UVP (Underwater video profiler) to determine the possibility of identifying particles and size of particles that generate the bioluminescence observed with the ISIT camera. ISIT lowered on CTD frame at 60m/min (CTD data available in file). The UVP profile followed by another CTD ISIT profile.
Payload	ISIT camera and controller on CTD frame.
Program timings	2 x 30 min profiles. Preferred night time deployment however only day time deployment available
Total planned duration	2 x 30 mins
Lander	ISIT hardware on CTD frame

Deployment

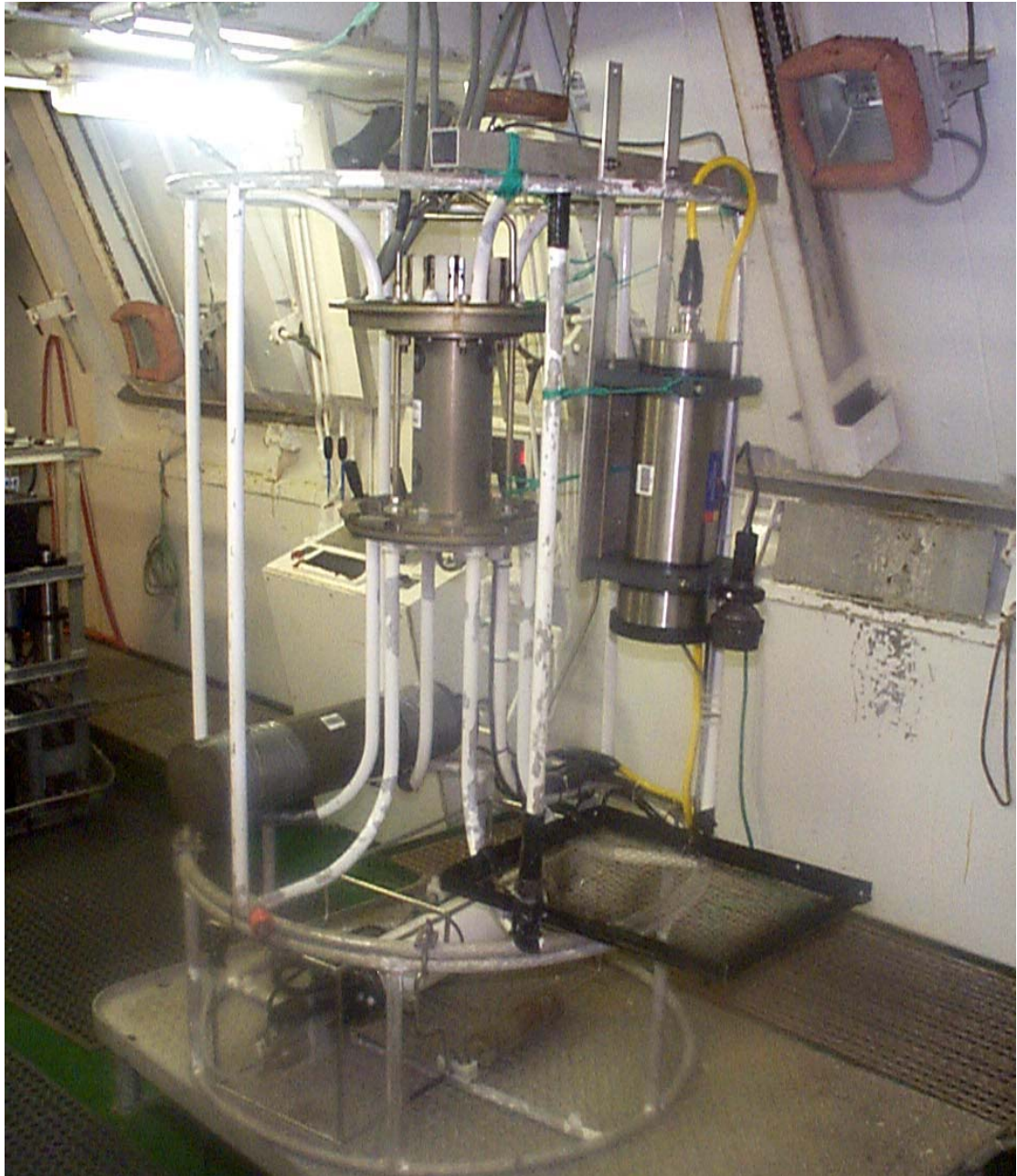
Station no.	Sognefjord	
Deployment location	Lat: 61° 08.3689'N	Long: 05° 51.3509'E
Deployment depth	>1000m	
Date started	19 November 2002	
Time started	08:35 (8a) 10:41 (8b)	
Time Dahn Buoy sank		
Descent rate	60m/min	

Recovery

AR	
RT	
Radio Channel	
Flag Colour	
Date released	
Time released	
ETA	
ATA	

Results

Comments	All worked well. Large amounts of bioluminescence seen. 10 mins of data analysed by French (UVP) team. Data available in file. Seemed to work fine however analysis done in a rush and could do much better given a little more analysis time.
-----------------	--



Bioluminescence profiling system used during the MAR-ECO trials cruise. The Intensified Silicon Intensifier Target (ISIT) camera was mounted on the CTD frame, facing downwards towards a mesh screen. As the CTD was lowered bioluminescent animals impacted on the screen and their responses were recorded by the camera. Counts of bioluminescent events per second can be used to calculate the density of bioluminescent animals in the water column.

Cruise deployment no.	9
Experiment	Ofoten fjord visual census & fast start
Payload	JVC Camera, White, electric pulse generator, Aquadopp current meter. 2 x Open and 1 x closed (bagged) mackerel bait (gutted).
Program timings	Recording starts at 30 mins. Then operational 1min in every 3.5 mins..
Total planned duration	3.5hours
Lander	SPRINT

Deployment

Station no.	Ofoten Fjord	
Deployment location	Lat: 68° 17.60'N	Long: 16° 01.79'E
Deployment depth	235m	
Date started	22 November 2002	
Time started	13:54	
Time Dahn Buoy sank	14:05	
Descent rate	45m/m	

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	22 November 2002
Time released	16:56
Ascent rate	27m/min
ETA	
ATA	17:04

Results

Comments	Only crabs observed. Quite nice inter species activity. However, problems with camera. Occasionally turned off and skip recording sessions. Looked at camera and increased the camera power supply to 7v from 6.7v. Replaced camera flash card. However, there appears to be problems with connectors in the controller. Poor high impedance connections measurable on all connectors. No spares. Cleaned and managed to reduce connection impedance. Still not perfect. Will have to monitor. Shallow deployments possibly highlighting connector problems (less mating pressure than in deep ocean)
-----------------	---

Cruise deployment no.	10
Experiment	Ofoten fjord visual census & fast start
Payload	JVC Camera, Red light (Jessops series 5 red filter on 75watt lamps), No electric pulse generator or controller, Aquadopp current meter. 2 x Open and 1 x closed (bagged) mackerel bait (gutted).
Program timings	Recording starts at 30 mins. Then operational 1min in every 3.5 mins..
Total planned duration	3.5hours
Lander	SPRINT

Deployment

Station no.	Ofoten Fjord	
Deployment location	Lat: 68° 23.28'N	Long: 16° 12.67'E
Deployment depth	544m	
Date started	24 November 2002	
Time started	09:31:30	
Time Dahn Buoy sank	09:37	
Descent rate	45m/m	

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	25 November 2002
Time released	03:38
Ascent rate	27m/min
ETA	
ATA	03:53

Results

Comments	Only crabs and squat lobster observed. Again problems with camera only working for first 15mins tape time. Can not reproduce error on bench. Possible fault due to camera entering safe mode.
-----------------	---

Cruise deployment no.	11a 11b 11c 11d
Experiment	Ofoten fjord ISIT profile. Four bioluminescent profiles each 15min duration. All 4 recorded on same DV tape.
Payload	ISIT camera and controller on CTD frame.
Program timings	Four ISIT recordings on one DV tape, each 15mins duration
Total planned duration	4 x 15mins
Lander	ISIT

Deployment

Station no.	Ofoten Fjord	
Deployment location	Lat: 68°21.30'N	Long: 15°58.39'E
	Lat: 68°21.70'N	Long: 16°02.51'E
	Lat: 68°23.10'N	Long: 16°02.53'E
	Lat: 68°22.43'N	Long: 16°05.85'E
Deployment depth		
Date started	24 November 2002	
Time started	05:04(11a); 05:37(11b); 06:08:40(11c); 06:42:50(11d)	
Time Dahn Buoy sank		
Descent rate	60m/min	

Recovery

AR	
RT	
Radio Channel	
Flag Colour	
Date released	
Time released	
Ascent rate	
ETA	
ATA	

Results

Comments	All worked. Bioluminescence observed in all four casts.
-----------------	---

Cruise deployment no.	12
Experiment	Ofoten fjord visual census
Payload	ISIT Camera and controller, 2 x chopped mackerel in bag, herring slashed, white light 15w.
Program timings	2 mins ISIT (no light) 15secs LED, 3 mins light. X 10 repeats
Total planned duration	
Lander	SPRINT

Deployment

Station no.	Ofoten Fjord	
Deployment location	Lat: 68° 16.4681'N	Long: 15° 49.2462'E
Deployment depth	604m	
Date started	25 th November 2002	
Time started	08:47	
Time Dahn Buoy sank	08:52	
Descent rate	45m/m	

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	26 November 2002
Time released	05:18
Ascent rate	27m/min
ETA	
ATA	05:35

Results

Comments	<p>ISIT camera did not operate. Works ok on bench. 12v battery slightly discharged, 24v battery not discharged at all. Possibly did not start correctly. System thoroughly checked all seemed ok. Set up for redeployment.</p> <p>Although, no film bait only slightly eaten after almost a days deployment.</p>
-----------------	--

Cruise deployment no.	13
Experiment	Ofoten fjord visual census and acoustic buoy monitoring
Payload	ISIT Camera and controller, 2 x chopped mackerel in bag, herring slashed, white light 15w. Deployed as the ballast for the Acoustic buoy. Acoustic buoy to insonify lander and surrounding area to observe surrounding fish behaviour.
Program timings	
Total planned duration	12h
Lander	SPRINT

Deployment

Station no.	Ofoten Fjord	
Deployment location	Lat: 68° 11.142'N	Long: 16° 24.749'E
Deployment depth	174 m	
Date started	26 th November 2002	
Time started	09:49	
Time Dahn Buoy sank	N/A	
Descent rate	45m/m	

Recovery

AR	
RT	
Radio Channel	B
Flag Colour	Orange
Date released	26 November 2002
Time released	05:18
Ascent rate	27m/min
ETA	
ATA	05:35

Results

Comments	Acoustic buoy positioned over lander for the majority of the deployment and many fish seen swimming down from the water column towards the lander.
-----------------	--