Final CRUISE REPORT

U.S. Dept. of State CRUISE No.:	State Dept. File Number 2004-056
SHIP NAME:	R/V Knorr
OPERATING INSTITUTE OR AGENCY:	Woods Hole Oceanographic Institution
PROJECT TITLE:	Methane Release in Submarine Landslides - NSF OCE-0221366 (Jan. 1, 2003 to Dec. 31, 2005) $241,443.
CRUISE DATES (INCLUSIVE):	August 29, 2004 to September 19, 2005

CHIEF SCIENTIST:	
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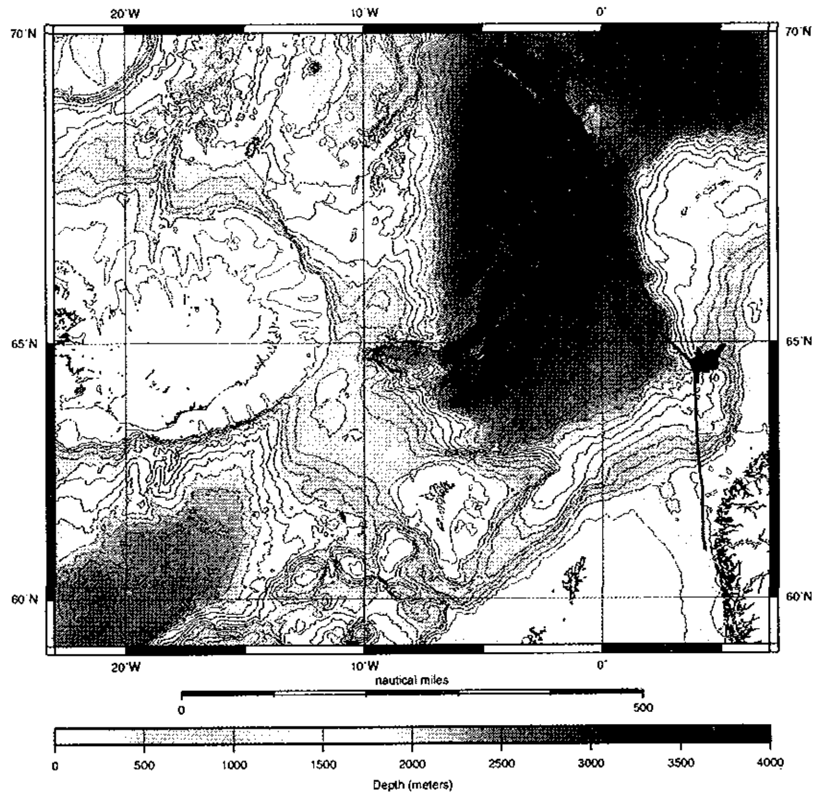
CLEARANCE COUNTRIES:	Norway
FOREIGN PARTICIPANTS:	

DESCRIPTION OF SCIENTIFIC PROGRAM(include page-sized chartlet showing cruise track):
A cruise to the giant Storegga landslide scar, which occurs on the Norwegian continental margin was conducted on the R/V Knorr in August and Sept. 2004 to assess whether gas had escaped as a consequence of this slope failure event. Piston cores on the side have pore water chemical gradients that indicate conditions appropriate for gas hydrates exist in these sediments that presumable reflect the pre-slide sediments. Gradients under that sole of the slide scar and in the deposits in the adjacent basin that were produced by the slide show essential no gradients.

KNORR 179 Leg 3, ETOPO2 Bathymetry



SCHEDULE OF DATA DELIVERY:	
Data Description	Date of Expected Delivery to Dept. of State
Pore water data	This report (Oct. 15, 2005)
Core photographs	"

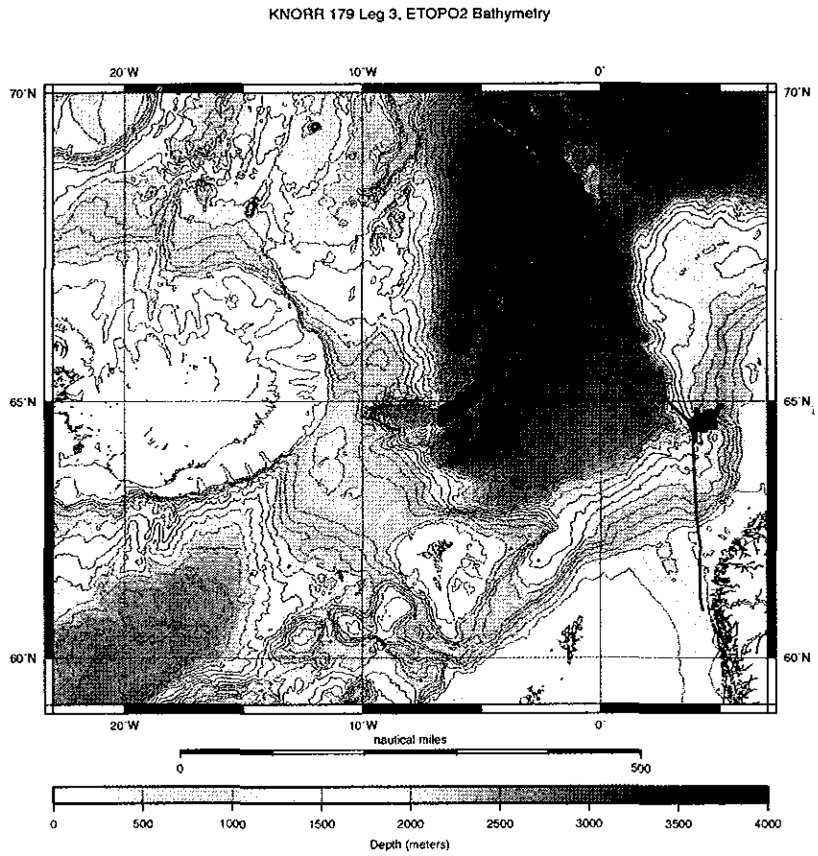
R/V Knorr 179 Leg 3
August – September 11, 2004
Final Post Cruise Report

The objective is to establish the gas contents in the sediments that occur on the flanks, floor, and depositional basin of the Storegga Slide, offshore Norway, using gradients in gas sensitive pore water components especially sulfate. This will help assess whether the source sediments on the flanks of the Storegga Slide initially contained significant amounts of gas and if so, whether gas has escaped a consequence of this slope failure. Thus, we intended to sample the flanks of the slide, the sole of the slide and the deposits that were deposited from the slide.

<u>General Cruise Plan and Preparations:</u>

A master list of potential cores sites was generated pre-cruise. This list includes the IODP Sites 1-7 listed in the proposal and sites 8, 9, and 10 that are likely to be proposed. Additions sites were selected based on seismic reflection data from the University of Wyoming (collected on the R/V Ewing in 2003), industry data for the upper slide area in the care of University of Tromso (courtesy of Juergen Mienert and Karin Andreassen) and industry data for the lower slide area from the University of Bergen (courtesy of Haflidi Haflidasen). These are denoted in the master core list as ST-1 (potential drill sites), MA (Mienert Andreassen), and HH (Haflidi Haflidasen).

Ship tracks are given in Figure 1.



Shipboard Equipment:

GGC – Giant Gravity Core - 900 lb. Weight-stand with PVC barrels up to 20' long.
JPC- Jumbo Piston Corer- 5000 lb. Weight-stand and lengths in multiples of 10' barrels with PVC liner. Both liners are the same size, being standard US 4.5" OD and 4 " ID schedule-40 PVC pipe.
Seabeam 2100
Knudsen 3.5 kHz with digital recording in both SEGY and a Knudsen format.
Geo-Tek Multi-sensor track. (MST)

The MBARI pore water van was shipped to Woods Hole in June and placed on the 01 deck of the R/V Knorr in July before she sailed on the first leg of Knorr 179.

Knorr's Crew

Kent Sheasley (Captain)
Paul Carty (1st mate)
Adam Seamans (2nd mate)
Anthony Quiniola (3rd mate)
Peter Liarikos (Bosun)
Kevin Butler (Able Seaman)
Jennifer Hickey (Able Seaman)
Edward Graham (Able Seaman)
Loran Allison (Ordinary Seaman)
Bankole Salami (Ordinary Seaman)
Steve Walsh (Chief)
John Mcgarth (1st Assistant Engineer)
Keith Strand (2nd Assistant Engineer)
Carrie Bettencourt (3rd Assistant Engineer)
Thidian Kanoute (Electrician)
Tom Keller (Oiler)
Russel Adams (Oiler)
Allen Farrington (Oiler)
Brian O'Nuallain (Steward)
Karen Johnson (Cook)
James Brennan (Messman)

Science Party

Charles Paull, Chief Scientist MBARI
William Ussler, Co-PI. MBARI
Steve Holbrook, PI main project. U. of Wyoming
Joel Johnson, MBARI
Patrick Mitts, MBARI
Rendy Keaten, MBARI
Jeff Nealon, U. of Wyoming
Tom Lorenson USGS
Bill Winters, USGS
Tessa Hill, UCSB

Julia Frazier, UCSC
Michelle Hatton, FSU
Ulla Knudsen, University of Arhus, Denmark

WHOI Technicians
Ellen Rossen (core tech)
Mike McCarthy (core tech)
Peter Lemmond (Seabeam)
Amy Simoneau (Shipboard Science Tech)
Chrissy Van Hilst (Shipboard Science Tech)

CRUISE NARRATIVE

August 29, 2004
Departed Bergen, Norway at 08:00 L in route to ST-3.
10:45 L Ship safety meeting
13:00 L Fire and Boat drill.
14:00 L Science meeting.

August. 30, 2004
A winch test and wire re-spooling operation was started at ~4 AM about 10 km south of ST-1. The winch had failed on the previous leg and a new wire had been spooled onto the drum in Saint Johns, Newfoundland. However, it was too slack, thus, all 9 km of new wire had to be paid out and re-spooled properly. A PC weight stand was used to anchor one end in 1400 m of water.

This operation went poorly as the trawl winch would kick out every ~30 minutes and take about 20 minutes to restart. The wire was not on board until early on the next day.

August 31, 2004
While the trawl winch was still being worked on, we started by gravity coring on the depressions near the UW-30 site. The position was refined using the reflectivity on the multi-beam data and 3.5khz data. The reflectivity showed circular areas of higher reflectivity that were approximately 200 m across. The 3.5 kHz data indicated that these were bathymetric lows and the area underneath them was wiped-out. Maneuvered ship to be over the slight (2-4 m) depression in the center of a feature we have denoted as pockmark 1. Moved to be centered on the hole. Took 3 GGC in this depression. GGC-1 and GGC-2 were at the same spot and GGC-3 was 50 m to the north, but still in the depression.

The location, time of collection and length of all the cores collected on this voyage are given in Table. 1

Moved to take JPC-4 at ST-8 after lunch. Took JPC-5 at ST-9 around dinner. GGC-6 was taken at the ST-10 site that evening. Seabeam and 3.5 kHz surveys conducted at night.

Sept. 1, 2004
JPC-7 at the ST-1 sites, JPC-8 at the ST-2 site. A 20-foot (?) gravity core (GGC-9) was taken at ST-3 on the sole of the slide, but no core material was recovered as the PVC liner was sheared off, leaving a jagged edge. GGC-10 (12-foot) was taken at the same site with some success. JPC 11 (8 barrel) was taken at the ST-10 site. JPC-12 (4 barrel) was taken at the ST-3 site on an intermediate terrace on the side of the slide scar in the evening. Seabeam and 3.5 kHz surveys conducted at night.

Sept. 2, 2004
GGC-13 was taken in the center of pockmark#2 (~1 km from GGC-1, GGC-2, and GGC-3) which was identified by the strong reflectivity in the multi-beam data. The location was confirmed by surveys prior to coring. JPC-15 (8 barrel) was taken in Pockmark #3. On recovery the pipe was bent at sections 5 and 6. Core was extracted from the lower 4 sections easily. Core was cut off at section 5 with a welding torch, but the pipe was saved. Entire core was ultimately extracted. We noted that the core cutter was not damaged.

After two sections of pipe were replaced, JPC-16 was attempted in 734 m of water. This core was located over the Heland Hansen Arch, but in an area of laterally continuous reflectors in the 3.5 kHz data. On recovery JPC-16 was badly bent at barrels 5 and 6. Bend was facing down making it unsafe to recover. The core was cut off with the torch at barrels near the 5 to 6 junction in rough seas and fell to the seafloor. While the contents of barrels 1-5 was not determined, there was sediment in the barrel above the cut. While this sediment was discarded (after being heated with the torch and mangled trying to extract it from the core) it appears that sediments extended through the 6th barrel into the 7th. Thus, this appears to have been a nearly full penetration.

Considerable discussion of why these cores bent occurred. At the time JPC-15 was bent, the opinion was that we may have encountered authigenic carbonate at ~12 m subsurface. Some tiny specs were seen in the core cutter material that might be insipient carbonate. However, this explanation would not work for JPC-16. The possibility of encountering some significant dropstones also exists. This could explain why we had been successful in collecting 5 long JPC cores in the same general area, but failed on the next two, just by the random chances of encountering the dropstones. Anther possibility was that 8 barrels was just too much, perhaps 6 or 7 should be the maximum for this area. However, we decided we could not afford to collect any more 8-barrel cores on the flanks of the slide scar.

Seabeam and 3.5 kHz surveys conducted at night.

Sept. 3, 2004
Collected GGC-17, GGC-18, GGC-19, GGC-20, and GGC-21 along a transect that extended to the south over the slide scar onto the sole of the slide. GGC-17 and GGC 18 are on U. Of Wyoming line 46. GGC-17 was a 20-foot core at waypoint 46-1. GGC-18 was a 20-footer at waypoint 46-2. GGC-19, GGC-20 and GGC-21 are on U. of Wyoming

Seismic line 50. GGC-19 was a 20-foot core at waypoint 50-1. GGC-20 was a 14-foot attempt at 50-2, but no core was recovered. GGC-21 was a 10-foot core at waypoint 50-3.

By this time the JPC system was ready and a 3-barrel core was prepared and deployed at essentially the same site as GGC-21. JPC-22 was successful on the sole of the slide.

Seabeam and 3.5 kHz surveys conducted at night.

Sept. 4, 2004
Day started with gale winds and high seas. We were clearly unable to core at the Heland Hansen Arch Site. So moved to W toward ST-4. Weather subsided and by early afternoon, took JPC-23, a 4-barrel core, at ST-4 site. This was the same site where JPC-16 was attempted.

Moved off to ST-5 and took JPC-23 a 3 barrel the core late in the evening.

Collected multi-beam and 3.5 kHz data at night.

Sept. 5, 2004
Arrived at core site (UW-17) at 7 AM L and deployed 3 barrel JPC for core 25. The core could not be pulled out with the winch (24,000 lbs.). Additional tension brought on by lifting up with the crane block under the captains direction. Wire parted at 30,000 lbs. The entire coring system and 2,800 m of wire was lost. (Understand that the wires strength was 32,000 lbs.)

Decided that we would not be able to core the sole of the slide. Thus, plans for the day rearranged to Seabeam down slope. Progress was slow in moderate seas and strong winds. Also stopped to move spare weight stand into place.

One small Seabeam survey conducted near the HH-9, 10, 11 and 12 sites.

Sept. 6, 2004
Collected a gravity core at the ST-6 site early in the morning. Core was very short (~50 cm) and ended in a sandy horizon. Fire and boat drill 10:30. Discovered that the alarm in the pore water van does cannot be heard. Steamed on to the HH-1 site and collected both GGC-27 and JPC-28. Extremely soft, watery sediment observed over upper several meters. Pushed on to HH-2 site for JPC –29 that night in moderate seas anticipating weather might deteriorate for a late deployment.

Sept. 7, 2004
During early morning deployment, the wire tension indicated a jolt in mid-water that was suspected to be a pre-trip on JPC-29. The bottom contact lacked a sharp sudden reduction in weight. Rather the weight was progressively reduced. No significant pull out. When the core got to the surface, it was noted that a strand was broken at the trigger arm attachment. It was deemed to be too dangerous to recover. Wire was cut above the trigger with a torch, thus losing the second and last JPC rig.

Proceeded with Seabeam surveys to HH-5 with one short overlapping line to outline the ST-7 core site. Upon arrival, the texture of the bottom was noted to be wrong. Inspection of the master files of coordinates for this site showed that there was an inconsistency in the longitude of reported for this site and we are not in the correct location. Thus, we commenced our Seabeam program.

Sept. 8
Arrived at proper ST-7 site at 4 AM Local. 3.5 kHz survey collected on way in showed that the ST-7 site also did not contain much or any sediment drape. However, an appropriate site existed about 2 nm away. Thus, we move the core site to be over transparent sediments in the basin.

Steamed during the mid-morning to HH-3 site, where GGC-31 was collected. On the way waypoints were added to assure that a deeper basin imaged on the survey on the previous day was crossed at 23:35 Z. This site is at 67° 48.16' N 3° 44.63' W.

At 2PM local, started our transit toward Iceland. Seabeam and 3.5kHz systems were turned off at the Norway-Iceland jurisdiction line.

Sept. 9.
Transit

Sept. 10
Transit

Sept. 11
Arrive Reykjavik, Iceland

Analysis

On deck the cores were cut into 100 and 105 cm sections. These were chosen to allow the cut sections fit into the bins that were being used to hold and ship the cores and to have the joints between the 10' long PVC pipes occur at the cuts. Thus, each 10' PVC pipe was marked prior to use with two 100 cm sections and one 105 cm sections. Sections were numbered with 1 at the bottom and counting upwards in the core.

188 water samples were collected. Pore water samples were extracted from 159 sediment samples. These were from 5 cm long whole round sections cut from the PVC liner using a band saw that was adjusted to cut only through the liner. A wire was then drawn through the core to cut the sediment. The surface was scraped and the outer rind avoided as sediment was placed into Reeburgh-style squeezers. Pore waters were extracted from whole-round sediment samples primarily using Reeburgh-style squeezers for shallow and softer sediments. However, four firm samples from JPC-24 were squeezed in Manheim-type squeezers. Core top waters were also collected from 27 cores, one mid-core void, and one surface-seawater sample.

The surface of each whole round section was photographed. (Unfortunately, the images for one day were lost when the down load went poorly.) Three 5 cm samples from each whole round sample were taken and placed in pre-weigh glass vials (for percent water, organic isotopes, and carbonate isotopes). After the samples were placed in the squeezers, additional samples (~50 CC in volume) were taken for paleontology and grain size analyses. Paleontology and grain size samples were also taken from the core cutter/catcher. Paleontology samples will be sent to Tessa Hill. Grain size samples will be sent to Bill Winters for analysis at the USGS in Woods Hole.

Gas can samples were collected from the bottom of all the cores and from occasional sections above. These will be shipped to Tom Lorenson at the USGS at Menlo Park for hydrocarbon analysis.

Pore waters samples analyzed shipboard for chloride, sulfate, and methane concentrations and sub-samples were preserved for latter shore-base analysis by Bill Ussler (Table 2). Shipboard major anion analysis was performed using a Dionex (DX-120) ion chromatograph. Methane concentrations were measured on some of the headspace gas samples using a Shimadzu mini-2 gas chromatograph at sea. However the hydrogen gas generator failed mid-trip and the rest of the gas samples were preserved for shore based analysis.

Porewater sub-samples from the lower most sample from most cores were frozen for acetate analysis. These will be sent to Tom Lorenson.

Shear strength measurements were performed on sediments from five distinct geographical areas within and north of the Storegga slide. The tests were performed on an intact surface of the core adjacent to a 5-cm-long whole-round sample taken for pore-water geochemistry and sediment water content. Undrained shear strength was determined in fine-grained material using (1) a Wykeham-Farrance mini-vane shear machine with a 1.27-cm high by 1.27-cm diameter vane, (2) a hand-held surface Torvane device, and (3) a Pocket Penetrometer with and without a soft sediment adapter. The mini-vane device drives a vane 1.27 cm beneath the sediment surface, whereas both the Torvane and penetrometer are performed at and near the cut sediment surface.

Preliminary results indicate that sediment north of the slide is depositional in nature, whereas a pockmark feature (JPC-15), also north of the slide, has significantly higher shear strength to a depth of 14 m. A shorter core (JPC-12) located within and near the head of the northern slide scarp also has higher shear strength. The highest shear strength (relative to subbottom depth) is within the sole of the slide (JPC-24) and reflects the removal of overburden during the slide event(s). Interestingly, the weakest strengths were recorded near the distal end of the slide (JPC-28, GGC-30, and GGC-32) in very uniform down-core material indicating that the slide event(s) remolded and homogenized sediment during flow out.

Furthermore, ten 30-cm-long whole-round samples (Table 3) were collected for shore-based consolidation and triaxial strength testing. Values determined from those tests will be used to model slope stability. Salinity-corrected water content (total and solids based) will be determined on 5-ml sediment samples collected at sea and dried at 105 degrees C for at least 24 hours. Porosity, void ratio, and wet and dry bulk density will be calculated after grain density is measured.

After the shear strength measurements were made, the cores sections were allowed to warm to room temperature before they were run through the multi-sensor track. Magnetic susceptibility and P-wave velocity measurements were collected for all cores using the GEOTEK Multi-Sensor Core Logger (MSCL). This logging system is owned and operated by Woods Hole Oceanographic Institution. Whole-round sections from each core were run through the logger and measurements were obtained at a 2 cm sample interval downcore. P-wave measurements were performed first as the cores passed through the logger, followed by magnetic susceptibility. Poor records of P-wave velocity resulted from either abundant pore water in the cores or poor contact between the detectors and the core liner. Because of this, the magnetic susceptibility records are the more complete and most useful data set of the two collected during this cruise. The absence of the gamma source (137Cs) prevented gamma density measurements from being performed during this leg. Missing sections associated with the whole rounds and occasional other problems were filled with spacers to get the total length to come out correctly. Magnetic susceptibility data for all cores is given in the Appendix. Core voids are associated with the regularly spaced low value spikes.

To account for pore water and physical property samples taken from the cores prior to logging, sample spacers (empty PVC core liner or 5 cm rolls of duct tape) were placed on the track to account for the intervals of missing stratigraphy. These gaps in the records are recorded as very low to even negative excursions on the magnetic susceptibility records. Section breaks between the logging of each section are also recorded as brief low to negative excursions on the magnetic susceptibility records.

After the MST measurements were made, the end caps on the core sections were taped with black electric tape and placed into shipping bins. The plan is to have all cores except JPC-28 stored in these bins on deck until the R/V Knorr returns to Woods Hole in October. Then they will be loaded into an empty van and shipped to MBARI along with the porewater van. The hope is that a core cutting party will occur at MBARI in November.

Core JPC-28 will be shipped to Prof. Haflidi Haflidason at the University of Bergen in aluminum crates he provided.

Multi-beam and 3.5 kHz data were collected between core sites and at night. Steve Holbrook ran this night program and selected areas to be surveyed and still arrived back at the coring site at the arranged hour the following morning. The original paper record of the 3.5 kHz data will go with Steve Holbrook to the U. of Wyoming.

In total, 2680 km of Seabeam and 3.5 kHz data were collected. This included 181,000 pings, 22,317,000 soundings and 2.6 GB of data.

Table 1. Cores collected on KNR-179-3

Core_no	Date	GMT	Depth_acoustic_m	Lat_CKP	Lon_CKP	Core_Length
GGC01	2004/8/31	323	799	64.78565	4.80825	347
GGC02	2004/8/31	619	798	64.78563	4.80831	552
GGC03	2004/8/31	729	799	64.78584	4.8083	485
JPC04	2004/8/31	1124	806	64.79589	4.77881	1631
JPC05	2004/8/31	1630	962	64.70366	4.52866	1816
GGC06	2004/8/31	1850	1306	64.63979	4.43965	375
JPC07	2004/9/1	325	870	64.75519	4.47213	1727
JPC08	2004/9/1	718	993	64.71853	4.38976	1840
GGC09	2004/9/1	1030	1437	64.63218	4.20431	NO CORE
JPC10	2004/9/1	1143	1453	64.63216	4.20433	186
JPC11	2004/9/1	1429	1308	64.63993	4.43983	1745
JPC12	2004/9/1	1830	1408	64.63226	4.20495	799
GGC13	2004/9/1	235	811	64.74811	4.79915	410
GGC14	2004/9/1	406	809	64.74773	4.79766	562
JPC15	2004/9/1	607	807	64.75243	4.819	1650
JPC16	2004/9/2	1740	734	64.93464	5.08687	NO CORE
GGC17	2004/9/3	610	1210	64.7209	4.03788	522
GGC18	2004/9/3	739	1296	64.6991	4.01591	528
GGC19	2004/9/3	946	1524	64.62043	4.01298	165
GGC20	2004/9/3	1123	1711	64.59391	3.98413	NO CORE
GGC21	2004/9/3	1319	1801	64.55345	3.94235	236
JPC22	2004/9/3	1648	1801	64.55298	3.94231	423
JPC23	2004/9/4	1317	1100	64.87595	3.99946	1009
JPC24	2004/9/4	1949	1782	64.26115	3.99958	437
JPC25	2004/9/5	633	2831	65.16065	2.44118	NO CORE
GGC26	2004/9/6	310	3496	66.4703	-1.09	53
GGC27	2004/9/6	1328	3794	67.48295	-2.04025	537
JPC28	2004/9/6	1516	3795	67.48301	-2.0407	2047
JPC29	2004/9/6	2224	3791	67.94306	-1.2251	NO CORE
GGC30	2004/9/7	1038	3799	67.65083	-3.44606	538
GGC31	2004/9/8	405	3744	68.11493	-4.34474	514
GGC32	2004/9/8	1116	3825	67.32886	-3.53408	552

Table 2: Porewater Geochemical Data from the Støregga Slide.

CORE[a]	INTERVAL (cmbsf)[b]	Cl (mM)	SO_4 (mM)	CH_4 (μM) in water	$\delta^{18}O$ ‰ (SMOW)	δD ‰ (SMOW)
GGC-1	ctw[c]	543.4	28.12	0.0	-0.2	0
GGC-1	322-327	555.7	24.15	1.6	0.2	-1
GGC-1	95-100	545.5	26.97	0.2	0.3	1
GGC-1	195-200	552.7	25.62	0.6	0.3	2
GGC-1	295-300	545.7	23.88	0.5		
GGC-2	ctw	534.5	27.55	0.0		
GGC-3	ctw	535.3	27.57	0.1	0.0	0
GGC-2	527-532	550.6	19.57	0.9	0.2	3
GGC-2	495-500	547.5	19.34	2.8	0.2	1
GGC-2	395-400	544.7	18.46	4.6	0.3	2
GGC-2	295-300	551.5	18.91	5.5	0.5	3
GGC-2	95-100	539.7	22.63	1.0	0.3	2
GGC-2	195-200	550.4	20.44	2.7	0.5	2
GGC-3	460-465	541.6	13.75	14.2	0.1	1
GGC-3	395-400	549.8	13.66	22.7	0.2	1
GGC-3	275-300	545.4	15.16	10.3	0.2	2
GGC-3	195-200	542.7	17.56	1.5	0.4	2
GGC-3	95-100	543.0	21.37	1.3	0.6	2
JPC-4	167-172	547.9	16.26	0.2	0.3	2
JPC-4	268-272	548.4	9.75	0.4	0.2	2
JPC-4	367-372	549.0	4.25	20.7	0.0	3
JPC-4	572-577	551.6	0.00	1313.0	0.6	3
JPC-4	777-782	551.4	0.00	2026.0	0.2	4
JPC-4	977-982	552.0	0.00	2007.0	0.3	4
JPC-4	1182-1187	554.8	0.00	3728.0	0.5	5
JPC-4	1587-1592	558.5	0.00	835.8	0.4	5
JPC-4	1387-1392	556.3	0.00	1573.0	0.7	4
JPC-4	ctw	389.8	20.15	0.1		
JPC-5	void water	530.4	26.81	164.3		
JPC-5	ctw	532.2	27.33	0.0		
JPC-5	1774-1779	553.5	4.19	908.2		
JPC-5	182-187	559.4	16.78	3.9		
JPC-5	382-387	554.9	4.29	8.1		
JPC-5	587-592	551.5	0.85	1009.0		
JPC-5	792-797	555.2	0.00	863.7		
JPC-5	92-997	555.6	0.00	1236.0		
JPC-5	1198-1203	557.4	0.00	748.4		
JPC-5	1574-1579	555.0	1.19	510.8		
JPC-5	1403-1408	554.0	0.00	480.8		
GGC-6	295-300	546.7	14.58	2.2		
GGC-6	95-100	545.1	23.14	0.2		
GGC-6	335-340	547.1	13.03	7.1		

GGC-6	195-200	550.2	19.01	0.4		
JPC-7	67-72	551.3	21.89	0.7		
JPC-7	272-277	550.4	8.24	3.5		
JPC-7	427-477	550.2	0.41	275.0		
JPC-7	678-683	546.1	0.06	417.6		
JPC-7	883-888	549.3	0.00	1117.0		
JPC-7	1083-1088	550.8	0.00	175.9		
JPC-7	1288-1293	553.3	0.00	567.0		
JPC-7	1493-1498	555.1	0.00	376.9		
JPC-7	1693-1698	558.4	0.00	494.6		
JPC-7	ctw	516.8	26.71	0.1		
JPC-8	205-210	551.7	16.79	2.6		
JPC-8	405-410	556.1	6.85	3.5		
JPC-8	610-615	560.9	0.55	120.3		
JPC-8	815-820	564.3	0.00	521.5		
JPC-8	1015-1020	560.0	0.00	851.1		
JPC-8	1220-1225	557.9	0.00	1188.0		
JPC-8	1825-1830	557.8	0.00	468.2		
JPC-8	1425-1430	560.1	0.00	897.1		
JPC-8	1625-1630	557.1	2.76	1283.0		
JPC-8	ctw	539.8	27.97			
GGC-10	c/catcher[d]	548.7	27.65	0.2		
GGC-10	160-165	544.1	27.57	3.2		
JPC-11	ctw	533.8	27.51	0.0		
JPC-11	145-150	550.4	16.01	0.7		
JPC-11	555-560	553.8	13.79	0.9		
JPC-11	1291-1296	557.4	12.89	1.1		
JPC-11	960-965	554.4	13.04	0.5		
JPC-11	1701-1706	559.0	12.17	1.6		
JPC-11	1501-1506	553.2	12.24	0.7		
JPC-11	350-355	557.1	14.39	0.9		
JPC-11	1165-1170	560.7	12.94	0.5		
JPC-11	755-760	553.6	13.43	0.4		
JPC-12	ctw	542.9	27.89	0.0		
JPC-12	450-455	551.1	26.33	4.1		
JPC-12	250-255	545.7	26.86	2.9		
JPC-12	350-355	551.9	26.78	0.3		
JPC-12	555-560	550.9	26.40	6.6		
JPC-12	655-660	546.0	26.22	51.4		
JPC-12	145-150	545.6	27.97	1.7		
JPC-12	755-760	548.0	26.21	10.9		
GGC-13	ctw	537.3	27.84	0.0		
GGC-13	95-100	545.1	25.87	0.4	0.3	4
GGC-13	195-200	548.8	23.94	0.1	0.3	2
GGC-13	295-300	547.7	21.96	0.2	0.0	2
GGC-13	375-400	552.1	20.81		0.2	1

GGC-14	ctw	540.8	27.85	0.0	0.4	3
GGC-14	95-100	548.0	21.87	0.7	0.9	2
GGC-14	195-200	556.6	21.76		0.3	3
GGC-14	295-300	555.8	22.36		0.4	4
GGC-14	395-400	556.1	22.80		0.2	3
GGC-14	495-500	552.0	23.13		0.2	2
JPC-15	ctw	536.5	27.23			
JPC-15	1594-1599	551.8	0.33			
JPC-15	1494-1499	553.9	0.24			
JPC-15	1399-1404	547.7	0.46			
JPC-15	1250-1255	553.7	7.58			
JPC-15	1045-1050	556.3	12.88			
JPC-15	840-845	550.9	17.62			
JPC-15	435-440	556.0	23.63			
JPC-15	640-645	557.7	20.30			
JPC-15	535-540	556.9	21.80			
GGC-17	95-100	552.9	25.41			
GGC-17	195-200	554.0	22.93			
GGC-17	295-300	555.9	20.09			
GGC-17	395-400	557.7	17.67			
GGC-17	485-490	555.0	14.64			
GGC-17	ctw	549.6	28.26			
GGC-18	ctw	547.9	28.38			
GGC-18	90-95	550.8	26.05			
GGC-18	195-200	549.7	23.50			
GGC-18	295-300	551.1	21.23			
GGC-18	395-400	554.4	18.89			
GGC-18	495-500	551.1	16.25			
GGC-19	ctw	553.1	28.61			
GGC-19	c/catcher 120cm	549.7	24.70			
GGC-19	surface water	540.6	28.10		0.7	3
GGC-19	135-140	549.3	24.76			
GGC-21	ctw	545.0	28.16			
GGC-21	200-205	548.6	27.06			
GGC-21	c/catcher	548.1	26.73			
JPC-22	ctw	542.5	28.06			
JPC-22	c/cutter[e]	550.6	25.70			
JPC-22	169-174	551.6	27.24			
JPC-22	269-274	545.5	26.10			
JPC-22	369-374	549.6	25.79			
JPC-23	c/catcher	553.6	0.16			
JPC-23	234-239	550.8	19.54			
JPC-23	134-139	550.8	23.07			
JPC-23	334-339	554.7	16.30			
JPC-23	439-444	556.2	12.87			
JPC-23	539-544	553.4	10.26			

JPC-23	639-644	549.1	8.02		
JPC-23	744-749	553.8	6.12		
JPC-23	844-849	554.6	4.01		
JPC-23	939-944	552.1	1.94		
JPC-23	944-949	550.0	1.95		
JPC-23	ctw	545.7	28.20		
JPC-24	95-100	548.6	27.63		
JPC-24	200-205	551.3	27.78		
JPC-24	300-305	564.2	28.30		
JPC-24	ctw	548.0	28.14		
JPC-24	ctw	549.7	28.12		
JPC-24	90-95	544.6	27.27		
JPC-24	195-200	549.7	28.10		
JPC-24	395-400	545.0	27.83		
JPC-24	295-300	548.5	27.79		
JPC-24	ctw	388.9	20.00		
GGC-26	ctw	547.7	28.31		
GGC-27	c/cutter	556.6	30.02		
GGC-27	195-200	554.9	29.10		
GGC-27	ctw	557.2	28.81		
GGC-27	295-300	549.4	29.04		
GGC-27	395-400	557.4	29.95		
GGC-27	495-500	554.5	29.78		
JPC-28	2003-2008	554.5	29.72	0.5	2
JPC-28	1998-2003	553.4	29.61	0.4	3
JPC-28	1598-1603	553.9	30.24	0.3	4
JPC-28	1803-1808	552.6	30.13	0.3	3
JPC-28	1193-1198	551.9	29.95	0.2	2
JPC-28	1393-1398	549.6	29.98	0.1	3
JPC-28	988-993	550.1	29.60	-0.1	4
JPC-28	783-788	548.9	29.28	0.1	4
JPC-28	578-588	549.2	29.09	0.1	4
JPC-28	378-383	551.5	28.95	-0.2	4
JPC-28	173-178	549.1	28.60	0.1	2
JPC-28	ctw	551.1	28.42	-0.2	5
GGC-30	ctw	543.1	28.15		
GGC-30	495-500	552.0	29.16		
GGC-30	395-400	550.7	28.89		
GGC-30	295-300	546.6	28.57		
GGC-30	195-200	547.5	28.49		
GGC-30	95-100	545.1	28.16		
GGC-30	490-495	547.2	28.83		
GGC-31	ctw	544.5	28.22		
GGC-31	95-100	544.1	27.79		
GGC-31	195-200	544.6	27.67		
GGC-31	295-300	550.0	27.75		

GGC-31	395-400	547.2	27.26
GGC-31	480-485	548.5	27.25
GGC-31	485-490	550.6	27.37
GGC-32	ctw	553.9	28.78
GGC-32	95-100	552.0	28.68
GGC-32	195-200	550.0	28.80
GGC-32	495-500	549.0	29.62
GGC-32	490-495	549.7	29.53
GGC-32	395-400	549.2	29.30
GGC-32	295-300	545.2	28.78

Notes: [a]GGC=giant gravity core, JPC=jumbo piston core; [b]cmbsf=centimeters below seafloor; [c]ctw=core top water; [d]c/catcher=core catcher; [e]c/cutter=core cutter.

File folders on accompanying DVD are:

Storegga_Primary_data_table_1.doc
Pore water data, which was the primary objective of this expedition. Same as table 2 of this cruise report.

A_1_Core_Slice_Images
Folder containing jpg files with photographs of the whole round core samples from which pore waters were extracted.

KNR179-03-MSCL data
Folder with all the Multi Sensor Core Logging (MSCL) data. These are in two formats, raw data files and excel data files.

Norway_Core_Photos
Photographs of the split cores sections.