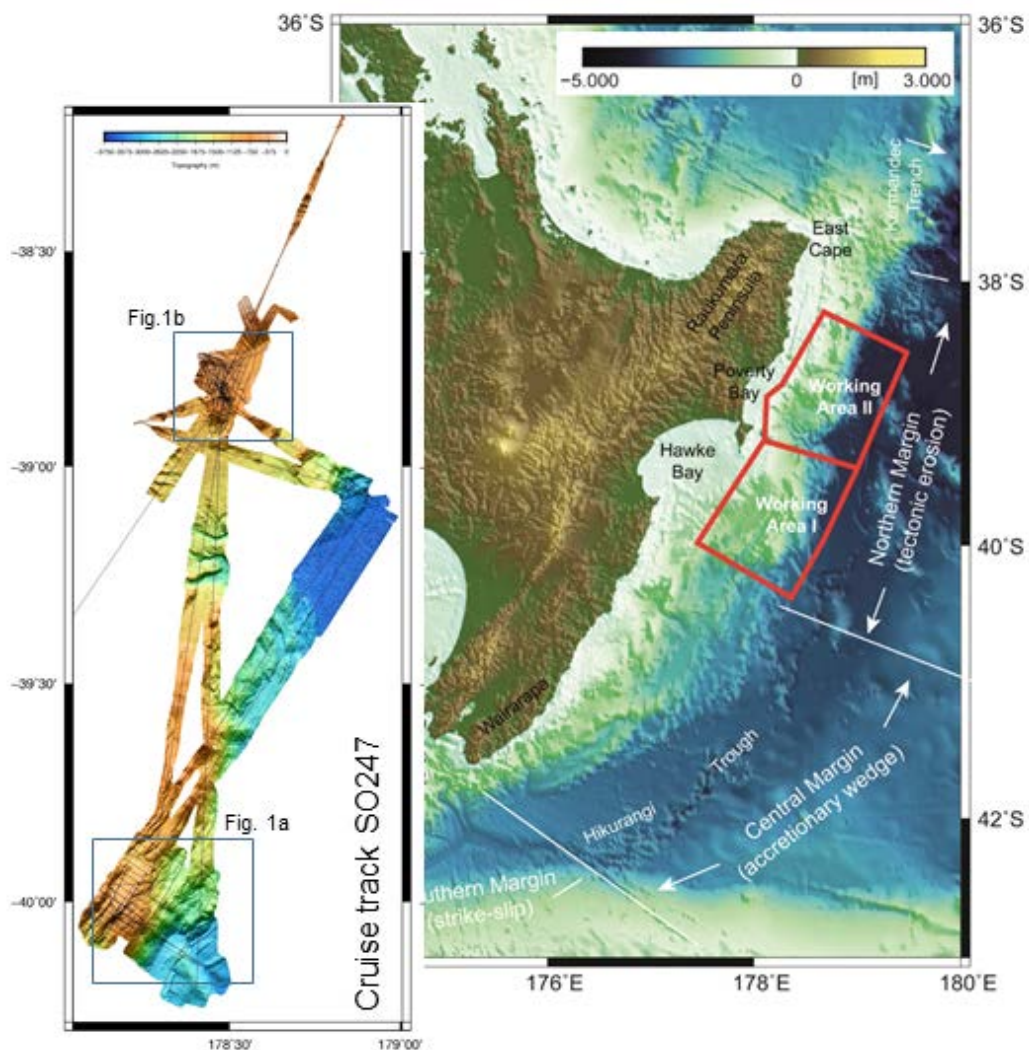


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## Short Cruise Report DSRV Sonne SO247

Wellington - Auckland  
27.03.2016 - 27.04.2016  
Chief Scientist: Katrin Huhn  
Captain: Oliver Meyer



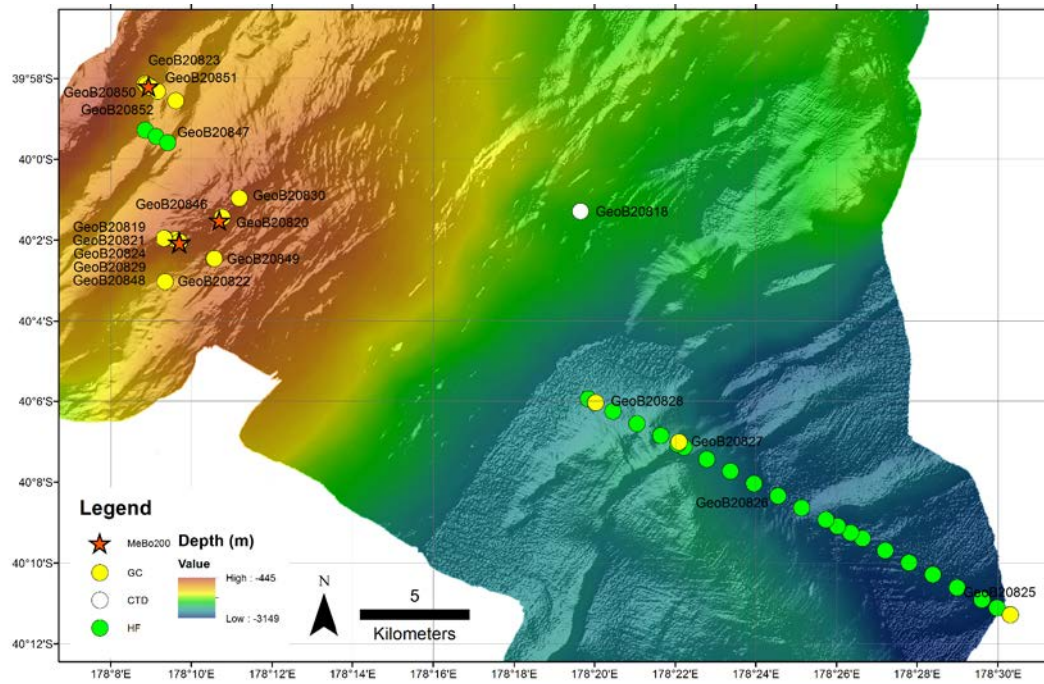


Fig. 1a: Map and stations in Working\_Area\_I (Rock Garden).

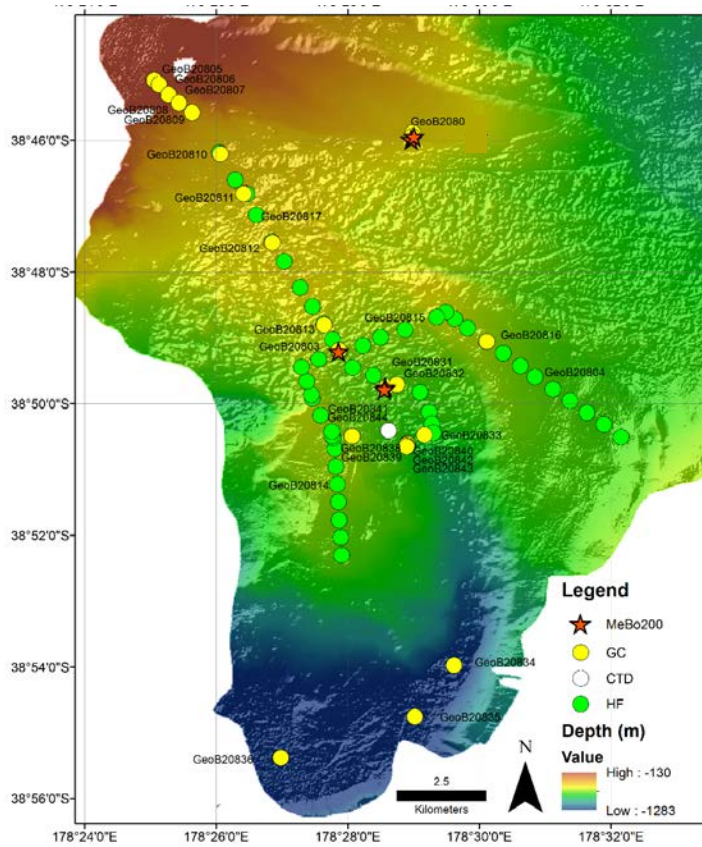


Fig. 1b: Map and stations in Working\_Area\_II (Tuaheni slide complex).

## Objectives

Submarine landslides are important geologic hazards. Although they are in the focus of research since decades, there is still a clear lack in knowledge with respect to the interplay between tectonic movements, slope architecture and sediment physical properties of slope strata, as well as gas hydrate dissociation as controlling factors of slope stability or respectively slope failure processes.

Main scientific goal of the Sonne expedition SO247 was to investigate submarine landslide masses at different tectonic settings along the Hikurangi convergent margin offshore the east coast of the northern island of New Zealand. Target areas were the frontal accreted ridge at Rock Garden in the Poverty Bay (Working\_Area\_I; Fig.1a) and the Tuaheni slide complex further north offshore Gisborne (Working\_Area\_II; Fig. 1b).

Based on bathymetric and hydro-acoustic data, 53 gravity cores with a total length of ~150m were recovered along systematic transects from the undisturbed slope sections to the slid masses. In addition, six long sediment cores with a total length of approx. 470 m were drilled utilizing the Bremer drill rig MeBo200. These include a 105 m long continuous sediment core (core recovery < 95%) from an undisturbed slope section in the vicinity of the Tuaheni slide complex. Therewith the first long sediment record from the Hikurangi margin was recovered.

Sedimentological, geotechnical, geophysical and geochemical analysis of these core materials as well as sampled pore fluids and gases enables a deeper insight into the slide mobility, potential trigger mechanisms and timing of failure events. Furthermore, these data allow to test a variety of hypotheses regarding how gas hydrates and gas hydrate dissociation control sediment physics and therewith the mechanics of submarine landslides; what are potential trigger mechanisms: uplift and over-steepening vs. sediment physical behavior.

This drilling operation was paired with dense in-situ heat-flow measurements. These data will be used to characterized the thermal regime of the Hikurangi forearc and thus enabling a better understanding of hydrate stability. These information are essential to test a number of hypothesis regarding influence of gas hydrate dissociation as potential trigger mechanisms of slides. Besides, heat-flow data will serve as input parameter for numerical simulation of thermal conditions of the Hikurangi margin.

## Narrative

The scientific crew of expedition SO247 – 39 scientists and technicians from Germany, the US and from New Zealand, boarded the DSRV SONNE in the port of Wellington (New Zealand) on the 25<sup>th</sup> March 2016. The first two days were used to setup the MeBo200 system as well as the laboratories on board. After a successful MeBo200 harbour test, we left the port of Wellington at lunchtime of Sunday the 27<sup>th</sup> March 2016. Further details of in chronological order:

After arriving in the Working\_Area\_II in the vicinity of the Tuaheni slide complex, the first sound velocity profile was recorded to calibrate the EM122 and EM710 before

starting with the Multibeam surveys. Simultaneously to bathymetrical mapping, PARASOUND and EK60 data were collected. In combination with high-resolution 3D seismic data provided by NZ colleagues and colleagues from the University Kiel (Germany), these data were used to select a reference core site at the undisturbed slope and the MeBo200 site at the extensional part of the slid masses of the southern Tuaheni slide. After gravity cores were taken at both locations, MeBo200 was deployed the first time at the slid masses. Unfortunately, drilling had to be stopped two times because of a technical problem with the core catcher before it continued until 30<sup>th</sup> March to a final depth of 31.9 mbsf with a core recovery of 88.5%. Drilled sediments consist mostly of a greenish-grey clayey silts with numerous interbedded ash layers. The material is very stiff and no evidence for gas and/or gas hydrates. Besides several layers of sandy material were recovered. Maintenance times between MeBo deployments were used for further gravity cores along a systematic transect from the undisturbed slope down to the slid masses of the compressional part of Tuaheni south. Besides, two heat flow profiles were recorded along the slide complex of Tuaheni south and the outer part of the slide masses.

A second deployment in the extensional part of Tuaheni started on the 2<sup>nd</sup> April and was continued until 4<sup>th</sup> April to a final depth of 82.3 mbsf. Although the drilling parameters gave no identification that there were significant changes in the lithology, drilling of the inner sections between 24.9 mbsf and 70.4 mbsf failed with no or even less than 2% core recovery. Nevertheless, the shallower sediment section down to 24.90% could be drilled with a core recovery of 56.6% whereas the lower sections below 70.4 mbsf to 82.4 mbsf exhibited a core recovery of 71%.

The following night was used for the transit to the Working\_Area\_I: Rock Garden where we started early in the morning with a CTD profile in deep water to calibrate the EM122 and EM710 for the following high-resolution bathymetry mapping. To prepare for coring and drilling, we undertook altogether three mapping surveys, and also took the gravity cores from the Rock Garden working area to test potential MeBo sites close to the ridge top and in a small sediment pond close by. Core length at the first sites was significantly less than a meter of over-consolidated, quite stiff material, whereas we recovered 3.5 m of greenish-gray clayey silt in the sediment pond. As this site looked most promising among the sites tested close to the ridge top but with water-depth sufficiently deep to be within the hydrate stability zone, we decided to deploy MeBo here. We then tested two different combinations of drill bits, steel tubes, and liners because we expected quite stiff and hard material and drilled down to about 36.5 mbsf. In eight out of 11 3.5m long sections, core recovery was well beyond 90 % and in four of them even beyond 100 %. In the remaining sections, it was still close to 50% on average. The drilled sediments consist of stiff greenish clayey silt with also turbiditic material and numerous tephra layer. At around 20 m depth facies changes completely with now distinctly laminated stiff clayey silt down to the final depth. This material will significantly aid to test the behaviour of uplifting and eroding sediment, which also beneath a certain depth contains noticeable amounts of methane, and therefore to the “frost heave” hypothesis. After MeBo was back on board on the 11<sup>th</sup> April, we continued

with the long heat flow profile in deep water with altogether 22 successful penetrations. Coevally three gravity cores were taken close to the re-entrant of the north-west trending ridge with a length of more than 5.5 m, and at an active flare site as well as an extinct one close to the top of Rock Garden where we found evidence for gas. Finally, we continued mapping and then headed back to the Tuaheni working area where Sonne arrived on the on the 13<sup>th</sup> April for a second campaign.

First several gravity cores were taken to continue the systematic transect from the headwall along the slid masses down to the deeper canyon system. In addition, several cores were taken at the outer edge of the slid masses where the potential basal detachment could be reached by gravity coring. As the MeBo deployment had to be postponed to the late 13<sup>th</sup> April because of bad weather condition, another dense heat-flow profile could be conducted before MeBo was deployed. This deployment had to be stopped because of technical problems before it was continued until 16<sup>th</sup> April. Maintenance times were used for further gravity coring and heat-flow measurements. The final MeBo drill depth at site GeoB20831 was 78.7mbsf with a coring length of 75.1 m. After a short maintenance which was used for further gravity coring, MeBo was again deployed at the undisturbed slope section in the vicinity of the Tuaheni slide complex. After a continuous drilling of more than 40 hours a maximum drill depth of 105.4 mbsf was reached on Tuesday 19<sup>th</sup> April. Therewith the longest continuous sediment core from the Hikurangi margin so far was recovered. Core recovery rate was more than 95% which enables an almost continuous record over a long time period which excellently enables besides submarine landslide studies further paleocenography studies. In addition, during this deployment a pressure dense MeBo core (MDP9 was recovered the first time in a depth of 23.1 mbsf. This core could be degassed on deck and gas sampling was successful on board. Therewith, this technique was successfully utilized the first time. The last half day in the Tuanheni area was used for gravity cores and a few heat flow measurements.

After arriving back in the Rock Garden working area, we deployed MeBo very close to the ridge top and drilled down to the target depth of about 35 m. Again we got a successful pressure core, which was degassed after recovery. On Thursday 21<sup>st</sup> April, we took more gravity cores and started a heat flow profile across the accretionary wedge. As only a few penetrations were successful, heat flow measurements we stopped and we undertook high resolution multibeam mapping till the next MeBo deployment close to Paoanui Ridge where we aim to study the sedimentary sequence and hydrate systems with a target depth of more than 40 m. After ongoing sand influx, however, we had to abandon this drill hole at a depth of 28 mbsf and recovered MeBo on Sunday 24<sup>th</sup> April. Methane concentration in the sampled cored was the highest among all measured cores during SO247. We finished our working programme in the Rock Garden area with taking several gravity in the immediate vicinity of the last MeBo drill site.

After heading back to the Tuaheni working area we undertook final heat flow measurements and several gravity cores. In the last core for the first time we found evidence for the presence of massive hydrates from IR thermography, opened the core

immediately and could sample some pieces of hydrate. After finishing our working programme we transited to Auckland.

### **Acknowledgements**

We like to thank Captain Oliver Meyer, his officers and the crew of the SONNE expedition SO247 for their excellent, ever-present and always friendly support of our work at sea.

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We also thank all the shore-based technicians, administrative personal and colleagues for their excellent work prior and during the cruise who helped to fulfil the goals of SO247. Particular thanks are also directed to the New Zealand colleagues from NIWA and GNS, as well as the Leitstelle Deutsche Forschungsschiffe in Hamburg, Germany, and Briese Schifffahrts GmbH & Co. KG for their support and assistance.

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## Station list

Station	Date / Time UTC	Device	Action	Latitude	Longitude	Depth (m)
SO247_1-1	2016/03/27 20:17:00,000	CTD	station start	38° 50,399' S	178° 28,611' E	744,8
SO247_1-1	27.03.2016 21:18:00	CTD	station end	38° 50,381' S	178° 28,628' E	750
SO247_2-1	27.03.2016 21:20:00	KONGSBERG EM122	station start	38° 50,381' S	178° 28,625' E	746,7
SO247_2-1	28.03.2016 18:31:36	KONGSBERG EM122	station end	38° 48,736' S	178° 27,447' E	608,3
SO247_3-1	27.03.2016 22:20:00	Gravity Corer	station start	38° 45,915' S	178° 28,970' E	533,7
SO247_3-1	27.03.2016 23:27:00	Gravity Corer	station end	38° 45,917' S	178° 28,982' E	552,2
SO247_4-1	28.03.2016 03:00:00	Gravity Corer	station start	38° 49,190' S	178° 27,842' E	658,8
SO247_4-1	28.03.2016 04:51:00	Gravity Corer	station end	38° 49,156' S	178° 28,251' E	674
SO247_5-1	28.03.2016 07:31:00	Heat-Flow probe	station start	38° 50,487' S	178° 32,127' E	744,1
SO247_5-1	28.03.2016 17:05:09	Heat-Flow probe	station end	38° 48,596' S	178° 29,464' E	613
SO247_6-1	28.03.2016 19:05:12	Gravity Corer	station start	38° 45,937' S	178° 28,996' E	556,6
SO247_6-1	28.03.2016 19:58:59	Gravity Corer	station end	38° 45,935' S	178° 28,998' E	557,7
SO247_7-1	28.03.2016 20:00:28	MeBo200	station start	38° 45,935' S	178° 28,998' E	557,3
SO247_7-1	29.03.2016 06:54:47	MeBo200	station end	38° 45,891' S	178° 28,992' E	550,6
SO247_8-1	29.03.2016 07:29:00	KONGSBERG EM122	station start	38° 44,797' S	178° 24,717' E	139,4
SO247_8-1	29.03.2016 18:20:43	KONGSBERG EM122	station end	38° 41,003' S	178° 35,103' E	606
SO247_9-1	29.03.2016 19:50:22	Gravity Corer	station start	38° 45,103' S	178° 25,051' E	153,5
SO247_9-1	29.03.2016 20:20:35	Gravity Corer	station end	38° 45,112' S	178° 25,069' E	153,7
SO247_10-1	29.03.2016 20:33:12	Gravity Corer	station start	38° 45,162' S	178° 25,128' E	160,9
SO247_10-1	29.03.2016 21:03:03	Gravity Corer	station end	38° 45,175' S	178° 25,141' E	166,6
SO247_11-1	29.03.2016 21:16:50	Gravity Corer	station start	38° 45,295' S	178° 25,278' E	279
SO247_11-1	29.03.2016 22:12:18	Gravity Corer	station end	38° 45,392' S	178° 25,382' E	325,1
SO247_12-1	29.03.2016 22:20:56	Gravity Corer	information	38° 45,424' S	178° 25,428' E	338

SO247_12-1	29.03.2016 23:15:36	Gravity Corer	station end	38° 45,513' S	178° 25,525' E	394,1
SO247_13-1	29.03.2016 23:32:28	Gravity Corer	station start	38° 45,592' S	178° 25,628' E	417,4
SO247_13-1	30.03.2016 00:24:42	Gravity Corer	station end	38° 45,591' S	178° 25,635' E	420,6
SO247_14-1	30.03.2016 01:06:37	MeBo200	station start	38° 45,972' S	178° 28,973' E	552,3
SO247_14-1	30.03.2016 17:41:13	MeBo200	station end	38° 45,984' S	178° 28,989' E	554,9
SO247_15-1	30.03.2016 19:12:00	KONGSBERG EM122	station start	38° 50,483' S	178° 32,112' E	745,1
SO247_15-1	30.03.2016 20:49:35	KONGSBERG EM122	profile end	38° 52,309' S	178° 27,922' E	716,6
SO247_16-1	30.03.2016 21:42:35	Gravity Corer	station start	38° 46,183' S	178° 26,059' E	522
SO247_16-1	30.03.2016 22:51:47	Gravity Corer	station end	38° 46,760' S	178° 26,430' E	543
SO247_17-1	30.03.2016 23:02:58	Gravity Corer	station start	38° 46,809' S	178° 26,417' E	548,5
SO247_17-1	31.03.2016 00:05:30	Gravity Corer	station end	38° 47,122' S	178° 26,614' E	556,2
SO247_18-1	31.03.2016 00:20:46	Gravity Corer	station start	38° 47,551' S	178° 26,845' E	561
SO247_18-1	31.03.2016 01:20:41	Gravity Corer	station end	38° 48,058' S	178° 27,181' E	570,1
SO247_19-1	31.03.2016 01:37:36	Gravity Corer	station start	38° 48,812' S	178° 27,636' E	627
SO247_19-1	31.03.2016 02:44:22	Gravity Corer	station end	38° 48,892' S	178° 27,643' E	643,4
SO247_20-1	31.03.2016 03:45:20	KONGSBERG EM122	station start	38° 41,291' S	178° 35,153' E	654,3
SO247_20-1	31.03.2016 05:59:48	KONGSBERG EM122	station end	38° 43,530' S	178° 36,711' E	996,9
SO247_21-1	31.03.2016 06:45:39	MeBo200	station start	38° 45,948' S	178° 28,986' E	552,5
SO247_21-1	01.04.2016 04:10:51	MeBo200	station end	38° 45,902' S	178° 28,985' E	550,1
SO247_22-1	01.04.2016 05:31:09	Heat-Flow probe	station start	38° 52,301' S	178° 27,856' E	711,9
SO247_22-1	01.04.2016 20:46:47	Heat-Flow probe	station end	38° 48,678' S	178° 29,340' E	623,1
SO247_23-1	01.04.2016 21:54:05	KONGSBERG EM122	station start	38° 44,348' S	178° 24,797' E	136,3
SO247_23-1	01.04.2016 23:21:13	KONGSBERG EM122	profile end	38° 45,306' S	178° 30,733' E	690,8
SO247_24-1	02.04.2016 00:00:46	Gravity Corer	station start	38° 49,085' S	178° 30,122' E	665
SO247_24-1	02.04.2016 01:22:09	Gravity Corer	station end	38° 49,054' S	178° 30,107' E	662,8

SO247_25-1	02.04.2016 02:00:40	MeBo200	station start	38° 49,192' S	178° 27,852' E	666,2
SO247_25-1	04.04.2016 09:58:30	MeBo200	station end	38° 49,224' S	178° 27,789' E	666,4
SO247_26-1	04.04.2016 10:43:08	Heat-Flow probe	station start	38° 46,179' S	178° 26,034' E	514,7
SO247_26-1	05.04.2016 01:33:11	Heat-Flow probe	station end	38° 50,416' S	178° 29,251' E	790,9
SO247_27-1	05.04.2016 08:55:58	CTD	station start	40° 1,254' S	178° 19,629' E	1965,9
SO247_27-1	05.04.2016 10:31:07	CTD	station end	40° 1,282' S	178° 19,647' E	1975,3
SO247_28-1	05.04.2016 11:03:49	KONGSBERG EM122	station start	39° 59,314' S	178° 15,711' E	1272,8
SO247_28-1	06.04.2016 03:02:55	KONGSBERG EM122	station end	40° 0,398' S	178° 5,584' E	645,7
SO247_29-1	06.04.2016 03:40:59	Gravity Corer	station start	40° 2,063' S	178° 9,686' E	669,7
SO247_29-1	06.04.2016 04:42:07	Gravity Corer	station end	40° 2,048' S	178° 9,711' E	667,4
SO247_30-1	06.04.2016 05:03:47	Gravity Corer	station start	40° 1,406' S	178° 10,789' E	601,6
SO247_30-1	06.04.2016 05:58:21	Gravity Corer	station end	40° 1,429' S	178° 10,766' E	605,9
SO247_31-1	06.04.2016 06:26:47	Gravity Corer	station start	40° 1,972' S	178° 9,488' E	671
SO247_31-1	06.04.2016 07:32:47	Gravity Corer	station end	40° 1,991' S	178° 9,608' E	665,5
SO247_32-1	06.04.2016 07:47:21	Gravity Corer	station start	40° 3,041' S	178° 9,347' E	1093,6
SO247_32-1	06.04.2016 08:57:19	Gravity Corer	station end	40° 3,028' S	178° 9,351' E	1093,6
SO247_33-1	06.04.2016 09:00:00	KONGSBERG EM122	station start	40° 3,022' S	178° 9,333' E	1101,9
SO247_33-1	06.04.2016 19:00:54	KONGSBERG EM122	station end	39° 53,393' S	178° 18,798' E	1417,4
SO247_34-1	06.04.2016 20:42:06	Gravity Corer	station start	39° 58,129' S	178° 8,843' E	1020
SO247_34-1	06.04.2016 21:53:57	Gravity Corer	station end	39° 58,130' S	178° 8,838' E	1018,6
SO247_35-1	06.04.2016 23:22:17	Gravity Corer	station start	40° 2,039' S	178° 9,701' E	666
SO247_35-1	07.04.2016 00:18:48	Gravity Corer	station end	40° 2,037' S	178° 9,705' E	659,8
SO247_36-1	07.04.2016 01:49:21	MeBo200	station start	40° 2,025' S	178° 9,742' E	645,9
SO247_36-1	07.04.2016 19:45:01	MeBo200	station end	40° 2,011' S	178° 9,727' E	658,7
SO247_37-1	07.04.2016 20:55:42	Parasound P70	station start	39° 55,145' S	178° 21,621' E	1924,8

SO247_37-1	08.04.2016 00:56:06	Parasound P70	profile end	40° 3,788' S	178° 19,229' E	2301
SO247_38-1	08.04.2016 02:00:08	MeBo200	station start	40° 2,025' S	178° 9,671' E	662,9
SO247_38-1	09.04.2016 05:19:52	MeBo200	station end	40° 2,074' S	178° 9,688' E	669,9
SO247_39-1	09.04.2016 05:44:15	KONGSBERG EM122	station start	40° 1,669' S	178° 11,570' E	654,9
SO247_39-1	09.04.2016 08:45:51	KONGSBERG EM122	station end	40° 11,273' S	178° 30,233' E	3098,6
SO247_40-1	09.04.2016 08:55:14	Gravity Corer	station start	40° 11,283' S	178° 30,317' E	3097,1
SO247_40-1	09.04.2016 11:23:52	Gravity Corer	station end	40° 11,281' S	178° 30,317' E	3097,9
SO247_41-1	09.04.2016 11:54:35	Heat-Flow probe	station start	40° 11,280' S	178° 30,308' E	3097,6
SO247_41-1	10.04.2016 01:50:19	Heat-Flow probe	station end	40° 8,937' S	178° 25,730' E	2895,1
SO247_42-1	10.04.2016 02:28:27	Gravity Corer	station start	40° 7,072' S	178° 22,024' E	2461,6
SO247_42-1	10.04.2016 04:57:25	Gravity Corer	station end	40° 7,018' S	178° 22,086' E	2496,4
SO247_43-1	10.04.2016 06:15:48	MeBo200	station start	40° 2,058' S	178° 9,685' E	654,3
SO247_43-1	11.04.2016 06:48:40	MeBo200	station end	40° 2,013' S	178° 9,729' E	659,2
SO247_44-1	11.04.2016 08:08:23	Heat-Flow probe	station start	40° 8,677' S	178° 25,132' E	2916,3
SO247_44-1	11.04.2016 23:24:36	Heat-Flow probe	station end	40° 5,956' S	178° 19,883' E	2665,1
SO247_45-1	11.04.2016 23:38:14	Gravity Corer	station start	40° 6,039' S	178° 20,022' E	2672,1
SO247_45-1	12.04.2016 01:45:13	Gravity Corer	station end	40° 6,039' S	178° 20,021' E	2667,8
SO247_46-1	12.04.2016 02:00:18	Gravity Corer	station start	40° 6,040' S	178° 20,016' E	2667,4
SO247_46-1	12.04.2016 04:32:45	Gravity Corer	station end	40° 6,016' S	178° 20,036' E	2665
SO247_47-1	12.04.2016 05:41:19	Gravity Corer	station start	40° 1,957' S	178° 9,349' E	650,2
SO247_47-1	12.04.2016 06:42:31	Gravity Corer	station end	40° 1,935' S	178° 9,350' E	652,6
SO247_48-1	12.04.2016 07:08:32	Gravity Corer	station start	40° 0,964' S	178° 11,168' E	585,1
SO247_48-1	12.04.2016 07:58:12	Gravity Corer	station end	40° 0,962' S	178° 11,186' E	593
SO247_49-1	12.04.2016 08:43:58	Parasound P70	station start	40° 3,960' S	178° 19,099' E	2348,9
SO247_49-1	12.04.2016 14:15:42	Parasound P70	station end	40° 11,619' S	178° 23,959' E	2523,4

SO247_50-1	12.04.2016 21:15:31	Gravity Corer	station start	38° 49,742' S	178° 28,577' E	725,8
SO247_50-1	12.04.2016 22:13:56	Gravity Corer	station end	38° 49,736' S	178° 28,625' E	720
SO247_51-1	12.04.2016 22:27:43	Gravity Corer	station start	38° 49,713' S	178° 28,747' E	731,7
SO247_51-1	12.04.2016 23:19:22	Gravity Corer	station end	38° 49,713' S	178° 28,746' E	732,8
SO247_52-1	12.04.2016 23:42:30	Gravity Corer	station start	38° 50,468' S	178° 29,162' E	789,2
SO247_52-1	13.04.2016 00:37:40	Gravity Corer	station end	38° 50,472' S	178° 29,159' E	797,4
SO247_53-1	13.04.2016 02:30:01	Gravity Corer	station start	38° 53,975' S	178° 29,619' E	1164,7
SO247_53-1	13.04.2016 03:41:32	Gravity Corer	station end	38° 53,980' S	178° 29,601' E	1164,5
SO247_54-1	13.04.2016 04:05:13	Gravity Corer	station start	38° 54,758' S	178° 29,004' E	1195
SO247_54-1	13.04.2016 05:31:50	Gravity Corer	station end	38° 54,750' S	178° 29,015' E	1194,4
SO247_55-1	13.04.2016 07:28:24	Heat-Flow probe	station start	38° 38,017' S	178° 38,303' E	458,1
SO247_55-1	13.04.2016 18:44:27	Heat-Flow probe	station end	38° 39,487' S	178° 41,561' E	873,8
SO247_56-1	13.04.2016 21:19:29	MeBo200	station start	38° 49,771' S	178° 28,588' E	723,9
SO247_56-1	14.04.2016 18:54:28	MeBo200	station end	38° 49,762' S	178° 28,546' E	715
SO247_57-1	14.04.2016 19:21:03	Parasound P70	station start	38° 51,123' S	178° 27,156' E	683,8
SO247_57-1	14.04.2016 23:02:03	Parasound P70	station end	38° 49,491' S	178° 29,707' E	709,5
SO247_58-1	15.04.2016 00:00:00	Gravity Corer	station start	38° 55,370' S	178° 26,987' E	1248,4
SO247_58-1	15.04.2016 01:10:16	Gravity Corer	station end	38° 55,381' S	178° 26,982' E	1249,4
SO247_59-1	15.04.2016 02:27:04	Gravity Corer	station start	38° 50,458' S	178° 29,108' E	797,2
SO247_59-1	15.04.2016 03:20:05	Gravity Corer	station end	38° 50,470' S	178° 29,159' E	804
SO247_60-1	15.04.2016 03:47:55	MeBo200	station start	38° 49,770' S	178° 28,546' E	708
SO247_60-1	16.04.2016 20:09:50	MeBo200	station end	38° 49,704' S	178° 28,574' E	712,4
SO247_61-1	16.04.2016 22:12:00	Parasound P70	station start	38° 50,773' S	178° 29,702' E	802,9
SO247_61-1	16.04.2016 23:00:07	Parasound P70	station end	38° 48,684' S	178° 27,624' E	607,1
SO247_62-1	16.04.2016 23:33:43	Gravity Corer	station start	38° 50,714' S	178° 28,901' E	786,1

SO247_62-1	17.04.2016 00:26:31	Gravity Corer	station end	38° 50,626' S	178° 28,892' E	771,2
SO247_63-1	17.04.2016 00:44:32	Gravity Corer	station start	38° 50,627' S	178° 28,898' E	774,2
SO247_63-1	17.04.2016 01:37:58	Gravity Corer	station end	38° 50,626' S	178° 28,890' E	774,5
SO247_64-1	17.04.2016 01:51:09	Gravity Corer	station start	38° 50,628' S	178° 28,895' E	775,5
SO247_64-1	17.04.2016 02:46:47	Gravity Corer	station end	38° 50,623' S	178° 28,888' E	771,6
SO247_65-1	17.04.2016 03:03:46	Gravity Corer	station start	38° 50,478' S	178° 29,061' E	762
SO247_65-1	17.04.2016 03:58:04	Gravity Corer	station end	38° 50,474' S	178° 29,061' E	762,7
SO247_66-1	17.04.2016 04:55:51	MeBo200	station start	38° 45,932' S	178° 28,967' E	548,2
SO247_66-1	19.04.2016 00:15:01	MeBo200	station end	38° 45,962' S	178° 28,965' E	556,2
SO247_67-1	19.04.2016 00:45:44	Parasound P70	station start	38° 46,608' S	178° 29,458' E	648
SO247_67-1	19.04.2016 03:17:17	Parasound P70	station end	38° 50,477' S	178° 29,057' E	797,3
SO247_68-1	19.04.2016 03:53:36	Gravity Corer	station start	38° 50,654' S	178° 28,904' E	765,8
SO247_68-1	19.04.2016 04:53:09	Gravity Corer	station end	38° 50,662' S	178° 28,901' E	785,2
SO247_69-1	19.04.2016 05:06:01	Gravity Corer	station start	38° 50,662' S	178° 28,903' E	792,3
SO247_69-1	19.04.2016 06:01:21	Gravity Corer	station end	38° 50,654' S	178° 28,910' E	789,8
SO247_70-1	19.04.2016 06:18:59	Gravity Corer	station start	38° 50,495' S	178° 29,067' E	794,2
SO247_70-1	19.04.2016 07:15:54	Gravity Corer	station end	38° 50,490' S	178° 29,073' E	797,9
SO247_71-1	19.04.2016 09:25:28	Heat-Flow probe	station start	39° 4,023' S	178° 53,793' E	3102
SO247_71-1	19.04.2016 21:29:35	Heat-Flow probe	station end	39° 5,242' S	178° 56,448' E	3396
SO247_72-1	20.04.2016 03:54:21	MeBo200	station start	40° 1,530' S	178° 10,683' E	620,4
SO247_72-1	21.04.2016 07:23:57	MeBo200	station end	40° 1,533' S	178° 10,711' E	615
SO247_74-1	21.04.2016 02:27:47	KONGSBERG EM710	alter course	40° 1,535' S	178° 10,682' E	620,3
SO247_74-1	21.04.2016 20:23:40	KONGSBERG EM710	station end	39° 59,038' S	178° 15,087' E	1170
SO247_73-1	21.04.2016 07:53:49	Heat-Flow probe	station start	39° 59,228' S	178° 8,815' E	980,9
SO247_73-1	21.04.2016 10:16:53	Heat-Flow probe	station end	39° 59,589' S	178° 9,418' E	914,5

SO247_75-1	21.04.2016 21:14:36	Gravity Corer	station start	40° 1,945' S	178° 9,310' E	652
SO247_75-1	21.04.2016 22:11:21	Gravity Corer	station end	40° 1,975' S	178° 9,448' E	656,4
SO247_76-1	21.04.2016 22:30:51	Gravity Corer	station start	40° 2,450' S	178° 10,560' E	722,7
SO247_76-1	21.04.2016 23:30:04	Gravity Corer	station end	40° 2,453' S	178° 10,576' E	726,9
SO247_77-1	21.04.2016 23:42:56	Gravity Corer	station start	40° 2,455' S	178° 10,585' E	727,7
SO247_77-1	22.04.2016 00:33:30	Gravity Corer	station end	40° 2,453' S	178° 10,587' E	725,2
SO247_78-1	22.04.2016 01:08:36	Gravity Corer	station start	40° 2,455' S	178° 10,581' E	726,6
SO247_78-1	22.04.2016 02:11:56	Gravity Corer	station end	40° 2,454' S	178° 10,587' E	725,8
SO247_79-1	22.04.2016 03:11:21	Gravity Corer	station start	39° 58,206' S	178° 8,959' E	1030,1
SO247_79-1	22.04.2016 04:14:07	Gravity Corer	station end	39° 58,188' S	178° 8,949' E	1029,3
SO247_80-1	22.04.2016 04:30:54	MeBo200	station start	39° 58,186' S	178° 8,950' E	1027,7
SO247_80-1	23.04.2016 22:16:18	MeBo200	station end	39° 58,168' S	178° 8,883' E	1024,2
SO247_81-1	23.04.2016 23:08:00	Gravity Corer	station start	39° 58,164' S	178° 8,883' E	1019,4
SO247_81-1	24.04.2016 00:10:35	Gravity Corer	station end	39° 58,166' S	178° 8,892' E	1023,1
SO247_82-1	24.04.2016 00:24:02	Gravity Corer	station start	39° 58,223' S	178° 8,997' E	1033,8
SO247_82-1	24.04.2016 01:29:40	Gravity Corer	station end	39° 58,232' S	178° 8,994' E	1033,2
SO247_83-1	24.04.2016 01:43:20	Gravity Corer	station start	39° 58,318' S	178° 9,171' E	1046,3
SO247_83-1	24.04.2016 02:53:25	Gravity Corer	station end	39° 58,318' S	178° 9,186' E	1045,3
SO247_84-1	24.04.2016 03:14:40	Gravity Corer	station start	39° 58,554' S	178° 9,638' E	986,6
SO247_84-1	24.04.2016 04:14:16	Gravity Corer	station end	39° 58,554' S	178° 9,628' E	990,4
SO247_85-1	24.04.2016 04:30:01	Gravity Corer	information	39° 58,217' S	178° 8,989' E	1036,9
SO247_85-1	24.04.2016 05:33:23	Gravity Corer	station end	39° 58,230' S	178° 8,996' E	1039,8
SO247_86-1	24.04.2016 11:04:00	Heat-Flow probe	station start	39° 4,743' S	178° 54,243' E	3277
SO247_86-1	24.04.2016 19:40:40	Heat-Flow probe	station end	39° 4,010' S	178° 54,588' E	3272,2
SO247_87-1	24.04.2016 22:45:55	Gravity Corer	station start	38° 54,070' S	178° 13,001' E	106,3

SO247_87-1	24.04.2016 23:22:05	Gravity Corer	station end	38° 54,068' S	178° 13,009' E	1822,7
SO247_88-1	25.04.2016 00:44:54	Gravity Corer	station start	38° 50,478' S	178° 29,102' E	790,3
SO247_88-1	25.04.2016 01:39:27	Gravity Corer	station end	38° 50,493' S	178° 29,073' E	789,2
SO247_89-1	25.04.2016 02:06:02	Gravity Corer	station start	38° 50,443' S	178° 27,741' E	654,6
SO247_89-1	25.04.2016 02:55:31	Gravity Corer	station end	38° 50,473' S	178° 27,785' E	652
SO247_90-1	25.04.2016 03:19:01	Gravity Corer	station start	38° 50,516' S	178° 29,006' E	799,7
SO247_90-1	25.04.2016 04:11:04	Gravity Corer	station end	38° 50,535' S	178° 28,974' E	782,8
SO247_91-1	25.04.2016 04:30:04	Gravity Corer	station start	38° 50,476' S	178° 27,754' E	654,2
SO247_91-1	25.04.2016 05:24:15	Gravity Corer	station end	38° 50,478' S	178° 27,795' E	653,9



