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**Short Cruise Report**  
**RV Sonne SO313**  
**Auckland – Auckland (NZ)**  
**04.06.2025 – 13.07.2025**  
**Chief Scientist: Dr. Thomas Kuhn**  
**Captain: Oliver Meyer**

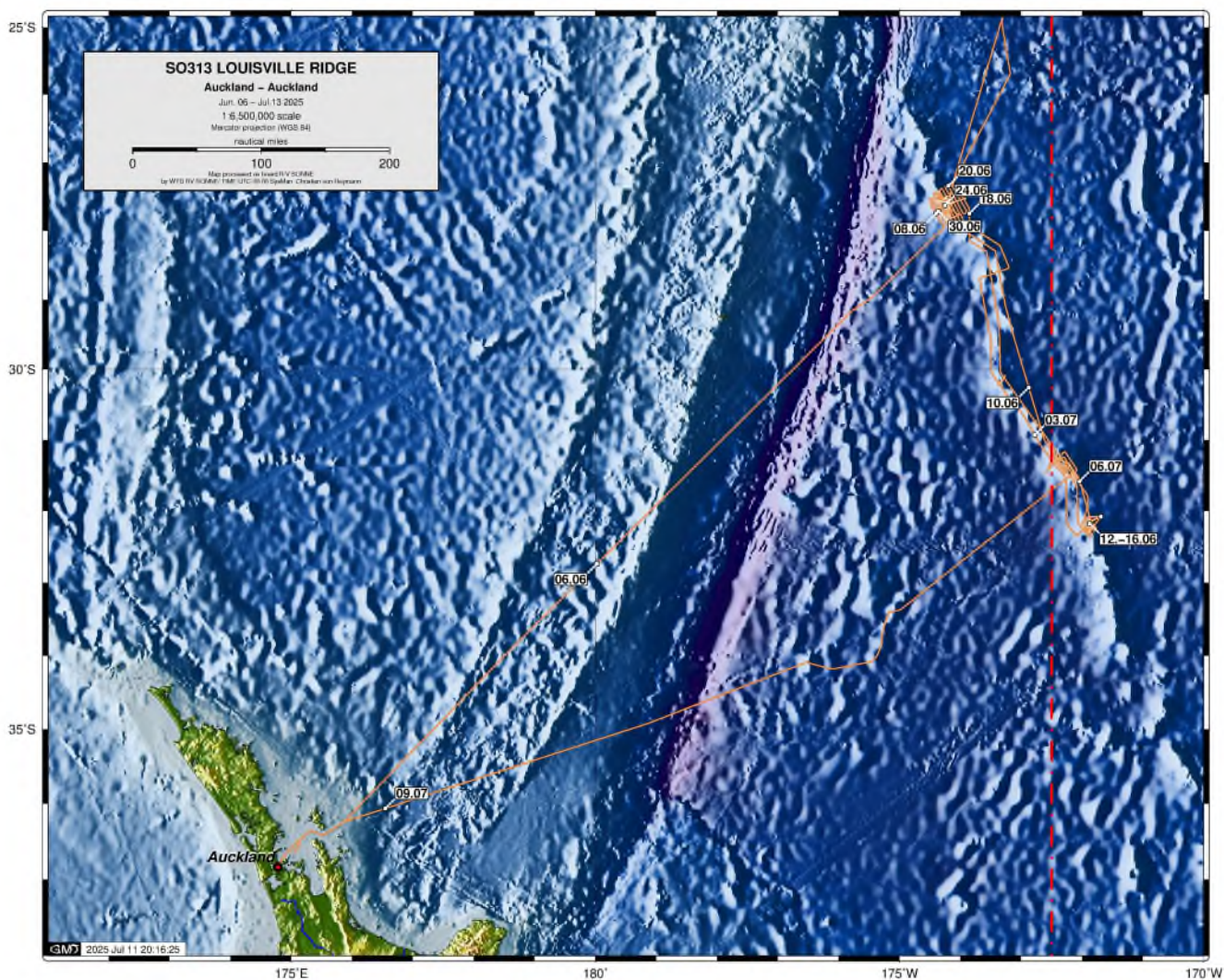


Figure 1: Cruise track of SO 313

## **Objectives of the project**

The objective of the project SO313 is to determine the geological and spatial characteristics of ferromanganese crusts on seamounts of the Louisville Ridge and their complex interaction with distribution, diversity, and composition of associated biological communities and the local hydrodynamic conditions of the water column. We will integrate across geological, biological and oceanographic disciplines to address the following detailed scientific questions:

### **1. What is the potential of the Louisville Ridge for ferromanganese crust deposits and what are the controlling factors for metal enrichment and distribution?**

Parameters which are decisive for the economic evaluation of ferromanganese deposits include the local slope variability, the existence of loose or tight crusts, the sediment cover, micro-topography, and the type and condition of the substrate rocks. Crust thickness and its variation along a seamount slope are other major parameters required for economic evaluation. Factors controlling the metal accumulation in crusts include geochemical processes in the oceanic water column and the sources and chemical forms (speciation) of metals in seawater.

### **2. How does the structure and distribution of benthic assemblages vary along the different seamounts as well as with the occurrence of ferromanganese crusts and the current regime?**

The distribution and composition of hard substrate communities on seamounts is influenced by a number of environmental parameters that can vary on and between seamounts within the same region. These variables, such as the type of seamount (guyot vs. conical shape), composition of the substrate (e.g., ferromanganese crusts, rocks or sediments), water depth, current speed, distance to source populations, slope and so on need to be accounted for in any study on benthic community structure.

So far, studies on ferromanganese crusts and seamounts in general have mostly focused on megafauna, while few have investigated meio- and macrofaunal organisms. However, it is likely that the influence of seamount type and the occurrence of ferromanganese crusts on the community structure of these smaller-sized organisms is different to that of megafauna, and the potential impact of mining might therefore be different between size-classes and types of organisms. Similarities in benthic communities between seamounts are in part determined by the degree of connectivity enabled by ocean currents that distribute larvae. Understanding the degree of connectivity amongst populations of a range of fauna (with different life-history strategies and/or vulnerabilities to disturbance), and the extent by which current regimes influence this, can indicate the potential of fauna to recolonize areas following local disturbances.

### **3. How does seamount size and shape influence the water current regime, and how does current regime influence the distribution of ferromanganese crusts and the transport or retention of larvae within and between seamounts?**

Oceanographic observations provide a framework for the interpretation of geological and biological observations in this study. The interaction between the physical shape of the seamount, the flow field, and the hydrography is complex and can result in a variety of scenarios that in turn affect the development of ferromanganese crusts and the distribution of biological assemblages. To study this complex interaction, it is necessary to combine in situ observations with numerical modeling. Measurements of temperature and salinity as well as direct current measurements using moored, shipborne, and lowered current profilers will be used to characterize the stratification and the current flow field around seamounts. These observational data will be used to constrain a hydrodynamic ocean model, in which parameterizations can be developed to study larval dispersal patterns.

## Short Cruise Narrative

Cruise SO313 started on 03 June in Auckland with boarding of the scientists, loading containers with scientific equipment and start to prepare the laboratories.

RV Sonne left the port of Auckland (NZ) in the early afternoon of 04 June and reached the northernmost working area on 08 June. The working area stretches over 650 km from Seamount 420 in the north to Burton Seamount in the south along the Louisville Ridge. Station work started with EM122 mapping of the large Seamount 420. The star like seamount stretches 70 km NS and EW with a summit area of ca. 800 km<sup>2</sup>. About half of the seamount was mapped to create a base bathymetric map for station work. Then a current meter mooring was deployed and RV Sonne started her way to the southernmost Burton Seamount. With around 25 x 25 km base area this seamount is significantly smaller and could be mapped within 6 hours. Another current meter mooring was deployed there as well.

Station work on Burton Seamount continued until 17 June with the following stations: 10 L-ADCP/CTD stations for oceanographic investigations, four trace metal-CTD stations to collect water samples through the entire water column, nine TV-multicorer stations to recover meiobenthos, one epibenthos sled and two seamount sled stations to sample different types of macrofauna, five TV-grabs to sample ferromanganese crusts, one HOMESIDE track (18 km long) for high-resolution bathymetry, two STROMER stations for video mapping of the seafloor, two multinet stations to sample plankton through the entire water column and one mini plankton net for surface water sampling.

During 17 and 18 June RV Sonne moved back to Seamount 420 recording EM122 data on the transit. Upon arrival the EM122 mapping of SMt. 420 was resumed when there was an emergency call from a sailing boat about 120 nm north of our position. In accordance with international regulations, we made our way to the sailor's position to help him deal with his situation. Eventually, the sailor was able to continue his journey on his own and RV Sonne returned to the working area to resume EM122 mapping. Due to this incident, the scientific work was suspended for 31 hours.

The scientific work on Seamount 420 continued until 30 June with the following stations: nine L-ADCP/CTD stations and two vessel-mounted ADCP profiles for oceanographic investigations, three trace metal-CTD stations to collect water samples through the entire water column, 21 TV-multicorer stations to recover meiobenthos, five epibenthos sled and four seamount sled stations to sample different types of macrofauna, 10 TV-grabs to sample ferromanganese crusts, three HOMESIDE tracks for high-resolution bathymetry, six STROMER stations for video mapping of the seafloor, four multinet stations to sample plankton through the entire water column and six mini plankton nets for surface water sampling. The scientific work was finalized with the successful recovery of the long mooring at this seamount.

On 01 July RV Sonne started her way south to the Louisville Seamount. EM122 data were gathered underway as well as L-ADCP/CTD and trace metal CTD stations were run. On 04 July we recovered the mooring at Burton Seamount and sailed to Louisville Seamount. During the last working days of cruise SO313 a biology sampling program including multicorer, epibenthos sled and seamount sled stations, a geology sampling program with the TV-grab as well as water column studies with L-ADCP and trace metal CTD stations were realized at different areas of this seamount.

In the afternoon of 08 July, after having realized 187 stations during this cruise, RV Sonne started her transit back to Auckland. During this transit RV SONNE mapped a couple of smaller seamounts as part of an underway data project of GEOMAR. RV SONNE moored at the pier in Auckland early morning of 13 July and all scientists disembarked and all scientific gear was unloaded from the vessel during the course of this day. This way cruise SO313 was finished.



*Figure 2: Scientific party of cruise SO313.*

*Front row from left: Tobias Schaaf, Natasha von Horsten, Nicole Gatzemeier, Magdalini Christodoulou, Pedro Martinez, Christoph Gaedicke, Robin Rolland, Jonathan Mette, Maren Walter, Muhammad Bin Hassan.*

*Standing from left: Ralf Freitag, Sebastian Fuchs, Stefanie Kaiser, Marco Bruhn, Fritz Stiller, Annika Hellmann, Gina Dambrowski, Henning Wedemeyer, Lea Fischer, Simone Sturm, Kornelia Dietzel, Andreas Lückge, Thomas Kuhn, Stephan Deike, Egidio Marino, Natalia Mora Mendoza, Housseem Sassi, Adrian Hollister.*

## **Acknowledgements**

The cruise was funded by the German Federal Ministry for Research, Technology and Space under the grant 03G0313A-D. We thank the German Research Fleet Coordination Centre, Institute of Oceanography, University of Hamburg, and BRIESE research for their comprehensive support in logistics and preparation of the cruise. On behalf of the scientific crew, I would like to thank master Oliver Meyer and the ship's crew for their outstanding assistance, support during all station work as well as the friendly atmosphere on board. I also thank the German Weather Service to have sent Tobias Schaaf as a meteorologist to accompany the cruise. He helped a lot to cope with the changing weather conditions in the wintery southern hemisphere.

## Cruise participants

Name	Discipline	Institution
Kuhn, Thomas, Dr.	Marine Geology / Chief Scientist	BGR
Bruhn, Marco	Marine Biology / Technician	DZMB
Christodoulou, Magdalini, Dr.	Marine Biology /Scientist	BZ
Dambrowski, Gina	Marine Biology /Scientist	DZMB
Deike, Stephan	Marine Geology / Technician	BGR
Dietzel, Kornelia	Marine Geology / Technician	BGR
Fischer, Lea	Marine Biology /Scientist	DZMB
Freitag, Ralf, Dr.	Marine Geology / Scientist	BGR
Fuchs, Sebastian, Dr.	Marine Geology / Scientist	BGR
Gatzemeier, Nicole	Marine Biology / Technician	DZMB
Gaedicke, Christoph, Prof. Dr.	Marine Geology / Scientist	UniH
Hassan, Muhammad B., Dr.	Marine Geology / Scientist	UniSP
Hellmann, Annika	Marine Biology / Technician	DZMB
Hollister, Adrian	Marine Geochemistry / Scientist	CUB
Kaiser, Stefanie, Dr.	Marine Biology /Scientist	UniL
Lückge, Andreas, Dr.	Marine Geology / Scientist	BGR
Marino, Egidio, Dr.	Marine Geology / Scientist	IGME
Martinez, Pedro, Prof. Dr.	Marine Biology / Deputy Chief Scientist	DZMB
Mette, Jonathan	Oceanography / Scientist	UniHB
Mora Mendoza,Natalia	Marine Geochemistry / Scientist	CUB
Rolland, Robin, Dr.	Oceanography / Scientist	UniHB
Sassi, Housseem	Marine Geochemistry / Scientist	CUB
Schaaf, Tobias	Meteorology / Scientist	DWD
Schiller, Fritz	Marine Biology /Scientist	DZMB
Sturm, Simone	Marine Geology / Technician	BGR
van Horsten, Natasha, Dr.	Marine Geochemistry / Scientist	CUB
Walter, Maren, Dr.	Oceanography / Scientist	UniHB
Wedemeyer, Henning	Marine Geology / Electronic Engineer	BGR

## Participating Institutes

BGR: Federal Institute for Geosciences and Natural Resources, Hannover  
CUB: Constructor University Bremen  
Uni HB: University Bremen, MARUM  
DZMB: German Center for Marine Biodiversity Research Wilhelmshaven,  
Senckenberg Society for Nature Research  
UniL: University of Lodz  
IGME: Geological Survey of Spain, Madrid  
BZ: Biology Center Linz  
UniH: University Hannover, Institute for Geology  
UniSP: University of San Paulo  
DWD: German Weather Service

## Station list

Station No.		Date	Gear	Time	Latitude	Longitude	Water Depth	Remarks/Recovery
SONNE	Science	2025	DSHIP	[UTC]	[°S]	[°W]	[m]	
SO313/1_001	SO313_001CTD	07.06.	CTD	19:55	27° 56.5'	174° 14.9'	4611	CTD profile for sound velocity
SO313/1_002	SO313_002MPN	07.06.	APNET	22:11	27° 56.505'	174° 14.901'	4609	Bio sampling
SO313/1_003	SO313_003BATHY	07.06.	E122	23:35	27° 53.85'	174° 18.631'	4745	EM 122 mapping
SO313/1_004	SO313_004CTD	08.06.	CTD	22:28	27° 42.95'	174° 21.68'	3511	L-ADCP/CTD measurement
SO313/1_005	SO313_005MOOR	09.06.	MOOR	1:23	27° 42.89'	174° 18.54'	2614	Deployment mooring
SO313/1_006	SO313_006BATHY	09.06.	EM122	6:16	27° 44.58'	174° 20.52'	3330	EM 12 mapping
SO313/1_007	SO313_007CTD	10.06.	CTD	14:45	32° 7.46'	172° 4.36'	4727	L-ADCP/CTD measurement
SO313/1_008	SO313_008BATHY	10.06.	EM122	17:57	32° 7.9'	172° 4.44'	4775	EM 122 mapping
SO313/1_009	SO313_009MN	11.06.	MN	3:33	32° 4.89'	171° 41.398'	4794	Bio sampling
SO313/1_010	SO313_010HMS	11.06.	MB	10:43	32° 5.33'	171° 52.51'	4141	Bathy mapping
SO313/1_011	SO313_011CTD	11.06.	CTD	22:23	32° 4.497'	171° 41.389'	4796	L-ADCP/CTD measurement, water sampling
SO313/1_012	SO313_012TM-CTD	12.06.	CTD	03:02	32° 4.874'	171° 41.272'	4807	L-ADCP/CTD measurement, water sampling
SO313/1_013	SO313_013STR	12.06.	UWV	07:16	32° 5.32'	171° 52.604'	4146	Video mapping
SO313/1_014	SO313_014CTD	12.06.	CTD	20:08	32° 11.457'	171° 51.219'	1973	L-ADCP/CTD measurement
SO313/1_015	SO313_015MPN	12.06.	APNET	20:55	32° 11.457'	171° 51.221'	1971	Bio sampling
SO313/1_016	SO313_016MOOR	12.06.	MOOR	21:57	32° 11.476'	171° 49.414'	2587	Deployment mooring
SO313/1_017	SO313_017MN	13.06.	MSN	01:04	32° 13.069'	171° 53.516'	1513	Bio sampling
SO313/1_018	SO313_018TM-CTD	13.06.	CTD	03:25	32° 13.08'	171° 53.527'	1514	Water sampling
SO313/1_019	SO313_019TM-CTD	13.06.	CTD	04:22	32° 13.087'	171° 53.522'	1515	Water sampling
SO313/1_020	SO313_020STR	13.06.	STR	06:47	32° 10.382'	171° 52.992'	2358	Video mapping
SO313/1_021	SO313_021SMS	13.06.	DRG	20:52	32° 12.684'	171° 52.596'	1508	Bio sampling
SO313/1_022	SO313_022TVG	13.06.	GRAB	23:24	32° 12.252'	171° 52.513'	1367	Fe-Mn crust sampling
SO313/1_023	SO313_023TVG	14.06.	GRAB	02:00	32° 13.407'	171° 52.524'	1550	Fe-Mn crust sampling
SO313/1_024	SO313_024SMS	14.06.	DRG	04:07	32° 12.36'	171° 52.166'	1494	Bio sampling
SO313/1_025	SO313_025CTD	14.06.	CTD	08:05	32° 13.097'	171° 53.526'	1518	L-ADCP/CTD measurement
SO313/1_026	SO313_026CTD	14.06.	CTD	10:24	32° 17.57'	171° 51.29'	2992	L-ADCP/CTD measurement
SO313/1_027	SO313_027CTD	14.06.	CTD	13:03	32° 20.29'	171° 49.885'	3775	L-ADCP/CTD measurement
SO313/1_028	SO313_028CTD	14.06.	CTD	16:53	32° 15.77'	171° 56.77'	2998	L-ADCP/CTD measurement
SO313/1_029	SO313_029TM-CTD	14.06.	CTD	19:22	32° 15.76'	171° 56.77'	3010	Water sampling

SO313/1_030	SO313_030EBS	15.06.	EBS	02:24	32° 10.091'	171° 52.637'	2520	Bio sampling
SO313/1_031	SO313_031TVG	15.06.	GRAB	06:43	32° 5.62'	171° 52.595'	4071	Fe-Mn crust sampling
SO313/1_032	SO313_032TVG	15.06.	GRAB	12:01	32° 10.553'	171° 52.657'	2225	Fe-Mn crust sampling
SO313/1_033	SO313_033TVG	15.06.	GRAB	14:46	32° 13.299'	171° 52.473'	1562	Fe-Mn crust sampling
SO313/1_034	SO313_034TV-MUC	15.06.	TVMUC	17:48	32° 10.998'	171° 50.283'	2425	Bio sampling
SO313/1_035	SO313_035TV-MUC	15.06.	TVMUC	18:32	32° 11.003'	171° 50.231'	2456	Bio sampling
SO313/1_036	SO313_036TV-MUC	15.06.	TVMUC	23:05	32° 10.735'	171° 52.592'	2122	Bio sampling
SO313/1_037	SO313_037TV-MUC	15.06.	TVMUC	23:28	32° 10.74'	171° 52.592'	2110	Bio sampling
SO313/1_038	SO313_038TV-MUC	16.06.	TVMUC	02:17	32° 9.761'	171° 52.539'	2675	Bio sampling
SO313/1_039	SO313_039TV-MUC	16.06.	TVMUC	05:59	32° 4.866'	171° 41.36'	4805	Bio sampling
SO313/1_040	SO313_040TV-MUC	16.06.	TVMUC	06:09	32° 4.867'	171° 41.361'	4803	Bio sampling
SO313/1_041	SO313_041TV-MUC	16.06.	TVMUC	06:18	32° 4.867'	171° 41.36'	4801	Bio sampling
SO313/1_042	SO313_042TV-MUC	16.06.	TVMUC	06:24	32° 4.86'	171° 41.357'	4806	Bio sampling
SO313/1_043	SO313_043TM-CTD	16.06.	CTD	07:24	32° 4.9'	171° 41.37'	4802	Water sampling
SO313/1_044	SO313_044CTD	16.06.	CTD	12:40	32° 9.631'	171° 55.818'	2970	L-ADCP/CTD measurement
SO313/1_045	SO313_045CTD	16.06.	CTD	15:25	32° 6.378'	171° 56.891'	3936	L-ADCP/CTD measurement
SO313/1_046	SO313_046BATHY	16.06.	EM122	19:00	32° 5.975'	171° 57.251'	4049	EM 122 mapping
SO313/1_047	SO313_047MN	18.06.	MSN	01:54	27° 40.505'	173° 51.283'	4573	Bio sampling
SO313/1_048	SO313_048MPN	18.06.	APNET	03:50	27° 40.48'	173° 51.28'	4564	Bio sampling
SO313/1_049	SO313_049BATHY	18.06.	EM122	07:29	27° 40.56'	173° 51.349'	4633	EM 122 mapping
SO313/1_050	SO313_050BATHY	19.06.	EM122	17:29	27° 20.278'	174° 8.52'	4771	EM 122 mapping
SO313/1_051	SO313_051STR	20.06.	UWV	08:24	27° 30.766'	174° 13.956'	1683	Video mapping
SO313/1_052	SO313_052EBS	20.06.	EBS	16:58	27° 31.159'	174° 16.329'	1470	Bio sampling
SO313/1_053	SO313_053TV-MUC	20.06.	TV-MUC	19:53	27° 30.978'	174° 16.037'	1467	Bio sampling
SO313/1_054	SO313_054TV-MUC	20.06.	TV-MUC	21:20	27° 30.98'	174° 16.049'	1467	Bio sampling
SO313/1_055	SO313_055TV-MUC	20.06.	TV-MUC	22:59	27° 30.974'	174° 16.041'	1467	Bio sampling
SO313/1_056	SO313_056MPN	20.06.	APNET	23:09	27° 30.977'	174° 16.045'	1468	Bio sampling
SO313/1_057	SO313_057SMS	21.06.	DRG	01:09	27° 31.499'	174° 14.177'	1383	Bio sampling
SO313/1_058	SO313_058STR	21.06.	UWV	04:18	27° 31.841'	174° 14.092'	1334	Video mapping
SO313/1_059	SO313_059STR	21.06.	UWV	08:09	27° 29.862'	174° 13.422'	2253	Video mapping
SO313/1_060	SO313_060CTD	21.06.	CTD	11:56	27° 29.67'	174° 10.04'	2896	L-ADCP/CTD measurement
SO313/1_061	SO313_061TM-CTD	21.06.	CTD	14:57	27° 29.54'	174° 10.024'	2963	Water sampling

SO313/1_062	SO313_062CTD	21.06.	CTD	19:04	27° 25.938'	174° 9.107'	3985	L-ADCP/CTD measurement, water sampling
SO313/1_063	SO313_063STR	21.06.	UWV	23:29	27° 37.814'	174° 12.81'	1130	Video mapping
SO313/1_064	SO313_064V-ADCP	22.06.	ADCP	05:44	27° 31.846'	173° 54.565'	4303	V-ADCP mapping
SO313/1_065	SO313_065TVG	22.06.	GRAB	22:57	27° 37.992'	174° 15.24'	1064	Fe-Mn crust sampling
SO313/1_066	SO313_066TVG	23.06.	GRAB	00:23	27° 37.992'	174° 15.207'	1056	Fe-Mn crust sampling
SO313/1_067	SO313_067TVG	23.06.	GRAB	02:22	27° 37.913'	174° 14.471'	1113	Fe-Mn crust sampling
SO313/1_068	SO313_068TVG	23.06.	GRAB	04:54	27° 31.835'	174° 13.946'	1328	Fe-Mn crust sampling
SO313/1_069	SO313_069DR	23.06.	DRG	07:04	27° 29.918'	174° 13.449'	2197	Rock sampling
SO313/1_070	SO313_070EBS	23.06.	EBS	11:06	27° 40.637'	174° 11.102'	1251	Bio sampling
SO313/1_071	SO313_071TV-MUC	23.06.	TVMUC	13:52	27° 39.802'	174° 12.131'	1219	Bio sampling
SO313/1_072	SO313_072TV-MUC	23.06.	TVMUC	15:10	27° 39.822'	174° 12.099'	1220	Bio sampling
SO313/1_073	SO313_073TV-MUC	23.06.	TVMUC	16:20	27° 39.827'	174° 12.095'	1224	Bio sampling
SO313/1_074	SO313_074TV-MUC	23.06.	TVMUC	17:34	27° 39.83'	174° 12.102'	1222	Bio sampling
SO313/1_075	SO313_075MN	23.06.	MSN	19:32	27° 37.999'	174° 15.211'	1057	Bio sampling
SO313/1_076	SO313_076MPN	23.06.	APNET	20:17	27° 37.999'	174° 15.207'	1058	Bio sampling
SO313/1_077	SO313_077CTD	23.06.	CTD	21:18	27° 37.99'	174° 15.21'	1056	L-ADCP/CTD measurement, water sampling
SO313/1_078	SO313_078TM-CTD	24.06.	CTD	00:09	27° 37.987'	174° 15.212'	1060	Water sampling
SO313/1_079	SO313_079SMS	24.06.	DRG	02:27	27° 42.82'	174° 15.875'	1633	Bio sampling
SO313/1_080	SO313_080TVG	24.06.	GRAB	05:24	27° 44.174	174° 15.782'	2272	Fe-Mn crust sampling
SO313/1_081	SO313_081TVG	24.06.	GRAB	08:53	27° 46.666	174° 16.085'	3590	Fe-Mn crust sampling
SO313/1_082	SO313_082EBS	24.06.	EBS	13:35	27° 36.082	174° 7.328'	1245	Bio sampling
SO313/1_083	SO313_083TV-MUC	24.06.	TVMUC	16:04	27° 36.053	174° 7.356'	1250	Bio sampling
SO313/1_084	SO313_084TV-MUC	24.06.	TVMUC	17:24	27° 36.047	174° 7.344'	1241	Bio sampling
SO313/1_085	SO313_085TV-MUC	24.06.	TVMUC	18:33	27° 36.039	174° 7.344'	1244	Bio sampling
SO313/1_086	SO313_086TV-MUC	24.06.	TVMUC	19:48	27° 36.038'	174° 7.355'	1244	Bio sampling
SO313/1_087	SO313_087DR	24.06.	DRG	23:36	27° 32.029'	174° 30.06'	4647	Rock sampling
SO313/1_088	SO313_088HMS	25.06.	MB	04:39	27° 33.328'	174° 24.437'	3422	Bathy mapping
SO313/1_089	SO313_089HMS	25.06.	MB	09:54	27° 32.404'	174° 16.344'	1344	Bathy mapping
SO313/1_090	SO313_090HMS	25.06.	MB	15:24	27° 37.539'	174° 16.135'	1201	Bathy mapping
SO313/1_091	SO313_091STR	25.06.	UWV	22:30	27° 33.268'	174° 24.451'	3439	Video mapping
SO313/1_092	SO313_092CTD	26.06.	CTD	07:52	27° 33.82'	174° 22.82'	2992	L-ADCP/CTD measurement

SO313/1_093	SO313_093CTD	26.06.	CTD	10:43	27° 32.97'	174° 26.8'	4021	L-ADCP/CTD measurement
SO313/1_094	SO313_094CTD	26.06.	CTD	15:47	27° 31.94'	174° 14.408'	1330	L-ADCP/CTD measurement
SO313/1_095	SO313_095CTD	26.06.	CTD	18:18	27° 42.29'	174° 10.916'	1320	L-ADCP/CTD measurement
SO313/1_096	SO313_096CTD	26.06.	CTD	20:27	27° 49.52'	174° 9.05'	2146	L-ADCP/CTD measurement
SO313/1_097	SO313_097TM-CTD	26.06.	CTD	23:07	27° 49.516'	174° 9.045'	2146	Water sampling
SO313/1_098	SO313_098MPN	27.06.	APNET	00:22	27° 49.514'	174° 9.043'	2146	Bio sampling
SO313/1_099	SO313_099STR	27.06.	UWV	03:16	27° 37.545'	174° 16.102'	1199	Video mapping
SO313/1_100	SO313_100DR	27.06.	DRG	14:53	27° 33.748'	174° 23.091'	3072	Rock sampling
SO313/1_101	SO313_101DR	27.06.	DRG	18:29	27° 34.041'	174° 22.081'	2613	Rock sampling
SO313/1_102	SO313_102TV-MUC	27.06.	TVMUC	22:51	27° 38.095'	174° 18.061'	1348	Bio sampling
SO313/1_103	SO313_103TV-MUC	28.06.	TVMUC	00:08	27° 38.11'	174° 18.035'	1346	Bio sampling
SO313/1_104	SO313_104TV-MUC	28.06.	TVMUC	01:21	27° 38.108'	174° 18.034'	1345	Bio sampling
SO313/1_105	SO313_105TV-MUC	28.06.	TVMUC	02:35	27° 38.1'	174° 18.031'	1345	Bio sampling
SO313/1_106	SO313_106EBS	28.06.	EBS	04:21	27° 36.794'	174° 20.367'	1418	Bio sampling
SO313/1_107	SO313_107TV-MUC	28.06.	TVMUC	08:04	27° 33.587'	174° 23.676'	3223	Bio sampling
SO313/1_108	SO313_108TV-MUC	28.06.	TVMUC	09:06	27° 33.588'	174° 23.655'	3222	Bio sampling
SO313/1_109	SO313_109TV-MUC	28.06.	TVMUC	11:25	27° 33.588'	174° 23.662'	3219	Bio sampling
SO313/1_110	SO313_110TV-MUC	28.06.	TVMUC	13:56	27° 33.59'	174° 23.66'	3217	Bio sampling
SO313/1_111	SO313_111TV-MUC	28.06.	TVMUC	14:07	27° 33.598'	174° 23.661'	3217	Bio sampling
SO313/1_112	SO313_112TV-MUC	28.06.	TVMUC	16:48	27° 33.587'	174° 23.659'	3220	Bio sampling
SO313/1_113	SO313_113EBS	28.06.	EBS	19:35	27° 33.53'	174° 23.869'	3266	Bio sampling
SO313/1_114	SO313_114SMS	29.06.	DRG	00:42	27° 33.408'	174° 22.216'	3367	Bio sampling
SO313/1_115	SO313_115SMS	29.06.	DRG	06:53	27° 36.9'	174° 19.95'	1399	Bio sampling
SO313/1_116	SO313_116MN	29.06.	MSN	11:38	27° 36.045'	174° 8.814'	1182	Bio sampling
SO313/1_117	SO313_117TVG	29.06.	GRAB	13:22	27° 36.044'	174° 8.818'	1191	Fe-Mn crust sampling
SO313/1_118	SO313_118TVG	29.06.	GRAB	14:40	27° 36.047'	174° 8.815'	1191	Fe-Mn crust sampling
SO313/1_119	SO313_119TVG	29.06.	GRAB	15:25	27° 36.048'	174° 8.817'	1193	Fe-Mn crust sampling
SO313/1_120	SO313_120TVG	29.06.	GRAB	17:35	27° 41.433'	174° 15.258'	1278	Fe-Mn crust sampling
SO313/1_121	SO313_121MOOR	29.06.	MOOR	20:00	27° 42.82'	174° 21.614'	3425	Recovery mooring
SO313/1_122	SO313_122MN	30.06.	MSN	02:09	27° 43.009'	174° 21.718'	3490	Bio sampling
SO313/1_123	SO313_123MPN	30.06.	APNET	02:19	27° 43.009'	174° 21.727'	3478	Bio sampling
SO313/1_124	SO313_124CTD	30.06.	CTD	08:35	27° 55.136'	174° 6.244'	4195	Bio sampling
SO313/1_125	SO313_125MPN	30.06.	APNET	08:50	27° 55.98'	174° 6.21'	4198	Bio sampling

SO313/1_126	SO313_126BATHY	30.06.	EM122	13:05	27° 56.699'	173° 49.303'	3057	EM 122 mapping
SO313/1_127	SO313_127CTD	01.07.	CTD	00:01	29° 7.886'	173° 35.708'	5627	L-ADCP/CTD measurement, water sampling
SO313/1_128	SO313_128MPN	01.07.	APNET	01:48	29° 7.891'	173° 35.703'	5629	Bio sampling
SO313/1_129	SO313_129TM-CTD	01.07.	CTD	05:46	29° 7.891'	173° 35.707'	5792	Water sampling
SO313/1_130	SO313_130BATHY	01.07.	EM122	09:22	29° 8.133'	173° 35.669'	5633	EM 122 mapping
SO313/1_131	SO313_131TM-CTD	01.07.	CTD	16:23	30° 12.924'	173° 21.455'	3040	Water sampling
SO313/1_132	SO313_132CTD	02.07.	CTD	20:47	30° 12'	173° 21.463'	3050	L-ADCP/CTD measurement
SO313/1_133	SO313_133MPN	01.07.	APNET	22:07	30° 12.928'	173° 21.45'	3025	Bio sampling
SO313/1_134	SO313_134MN	01.07.	MSN	22:57	30° 12.931'	173° 21.456'	3037	Bio sampling
SO313/1_135	SO313_135MN	02.07.	MSN	03:11	30° 9.865'	173° 18.346'	1640	Bio sampling
SO313/1_136	SO313_136CTD	02.07.	CTD	05:18	30° 9.977'	173° 18.345'	1645	L-ADCP/CTD measurement
SO313/1_137	SO313_137MPN	02.07.	APNET	05:51	30° 9.822'	173° 18.344'	1640	Bio sampling
SO313/1_138	SO313_138TM-CTD	02.07.	CTD	07:36	30° 9.827'	173° 18.352'	1642	Water sampling
SO313/1_139	SO313_139TM-CTD	02.07.	CTD	11:29	30° 5.629'	173° 16.101'	3066	Water sampling
SO313/1_140	SO313_140CTD	02.07.	CTD	15:36	30° 5.633'	173° 16.096'	3067	L-ADCP/CTD measurement
SO313/1_141	SO313_141MPN	02.07.	APNET	16:48	30° 5.629'	173° 16.096'	3073	Bio sampling
SO313/1_142	SO313_142BATHY	02.07.	EM122	17:44	30° 5.631'	173° 16.092'	3063	EM 122 mapping
SO313/1_143	SO313_143CTD	03.07.	CTD	10:40	32° 21.015'	172° 5.097'	4698	L-ADCP/CTD measurement
SO313/1_144	SO313_144TVG	03.07.	GRAB	14:45	32° 13.871'	171° 57.04'	2241	Fe-Mn crust sampling
SO313/1_145	SO313_145TVG	03.07.	GRAB	17:44	32° 13.699'	171° 55.72'	1945	Fe-Mn crust sampling
SO313/1_146	SO313_146MOOR	03.07.	MOOR	20:00	32° 11.583'	171° 51.568'	1920	Recovery mooring
SO313/1_147	SO313_147BATHY	03.07.	EM122	22:50	32° 10.447'	171° 50.76'	2463	EM 122 mapping
SO313/1_148	SO313_148BATHY	04.07.	EM122	07:09	31° 16.418'	172° 27.177'	2031	EM 122 mapping
SO313/1_149	SO313_149TV-MUC	04.07.	TVMUC	09:55	31° 26.411'	172° 16.254'	1197	Bio sampling
SO313/1_150	SO313_150TV-MUC	04.07.	TVMUC	11:01	31° 26.409'	172° 16.259'	1198	Bio sampling
SO313/1_151	SO313_151TV-MUC	04.07.	TVMUC	12:09	31° 26.413'	172° 16.258'	1200	Bio sampling
SO313/1_152	SO313_152TV-MUC	04.07.	TVMUC	13:16	31° 26.405'	172° 16.259'	1199	Bio sampling
SO313/1_153	SO313_153EBS	04.07.	EBS	14:37	31° 26.55'	172° 16.341'	1205	Bio sampling
SO313/1_154	SO313_154SMS	04.07.	DRG	17:07	31° 26.943'	172° 16.33'	1204	Bio sampling
SO313/1_155	SO313_155CTD	04.07.	CTD	20:10	31° 22.591'	172° 16.009'	1144	L-ADCP/CTD measurement
SO313/1_156	SO313_156MPN	04.07.	APNET	20:45	31° 22.575'	172° 16.01'	1145	Bio sampling
SO313/1_157	SO313_157MN	04.07.	MSN	21:26	31° 22.574'	172° 16.01'	1146	Bio sampling
SO313/1_158	SO313_158TM-CTD	05.07.	CTD	00:07	31° 22.593'	172° 16.013'	1147	Water sampling
SO313/1_159	SO313_159TM-CTD	05.07.	CTD	01:39	31° 22.584'	173° 16.015'	1143	Water sampling

SO313/1_160	SO313_160TVG	05.07.	GRAB	03:48	31° 24.733'	172° 13.745'	1170	Fe-Mn crust sampling
SO313/1_161	SO313_161TVG	05.07.	GRAB	07:30	31° 30.764'	172° 6.827'	1362	Fe-Mn crust sampling
SO313/1_162	SO313_162TV-MUC	05.07.	TVMUC	10:01	31° 29.886'	172° 9.565'	1148	Bio sampling
SO313/1_163	SO313_163TV-MUC	05.07.	TVMUC	11:13	31° 29.83'	172° 9.578'	1147	Bio sampling
SO313/1_164	SO313_164TV-MUC	05.07.	TVMUC	12:22	31° 29.829'	172° 9.575'	1146	Bio sampling
SO313/1_165	SO313_165TV-MUC	05.07.	TVMUC	13:20	31° 29.826'	172° 9.578'	1147	Bio sampling
SO313/1_166	SO313_166EBS	05.07.	EBS	14:32	31° 30.05'	172° 9.096'	1147	Bio sampling
SO313/1_167	SO313_167SMS	05.07.	DRG	17:04	31° 30.113'	172° 9.572'	1148	Bio sampling
SO313/1_168	SO313_168TM-CTD	05.07.	CTD	20:34	31° 35.234'	172° 2.482'	3087	L-ADCP/CTD measurement
SO313/1_169	SO313_169CTD	06.07.	CTD	01:06	31° 35.158'	172° 2.487'	3045	L-ADCP/CTD measurement
SO313/1_170	SO313_170MN	06.07.	MSN	03:49	31° 36.61'	172° .706'	4036	Bio sampling
SO313/1_171	SO313_171MPN	06.07.	APNET	04:10	31° 36.592'	172° .679'	4044	Bio sampling
SO313/1_172	SO313_172TV-MUC	06.07.	TVMUC	10:47	31° 21.461'	172° 13.048'	1172	Bio sampling
SO313/1_173	SO313_173TV-MUC	06.07.	TVMUC	11:48	31° 21.4'	172° 12.985'	1172	Bio sampling
SO313/1_174	SO313_174TV-MUC	06.07.	TVMUC	12:53	31° 21.4'	172° 12.986'	1177	Bio sampling
SO313/1_175	SO313_175TV-MUC	06.07.	TVMUC	13:48	31° 21.399'	172° 12.988'	1172	Bio sampling
SO313/1_176	SO313_176EBS	06.07.	EBS	15:13	31° 21.189'	172° 12.985'	1178	Bio sampling
SO313/1_177	SO313_177SMS	06.07.	DRG	17:21	31° 21.726'	172° 13.21'	1165	Bio sampling
SO313/1_178	SO313_178TVG	06.07.	GRAB	20:18	31° 21.648'	172° 11.761'	1205	Fe-Mn crust sampling
SO313/1_179	SO313_179TVG	06.07.	GRAB	23:43	31° 16.808'	172° 21.6'	1325	Fe-Mn crust sampling
SO313/1_180	SO313_180TV-MUC	07.07.	TVMUC	01:49	31° 16.271'	172° 23.088'	1403	Bio sampling
SO313/1_181	SO313_181TV-MUC	07.07.	TVMUC	03:16	31° 16.281'	172° 23.085'	1402	Bio sampling
SO313/1_182	SO313_182TV-MUC	07.07.	TVMUC	04:28	31° 16.286'	172° 23.086'	1401	Bio sampling
SO313/1_183	SO313_183TV-MUC	07.07.	TVMUC	05:42	31° 16.28'	172° 23.085'	1404	Bio sampling
SO313/1_184	SO313_184EBS	07.07.	EBS	07:02	31° 15.986'	172° 23.064'	1421	Bio sampling
SO313/1_185	SO313_185SMS	07.07.	DRG	09:50	31° 16.043'	172° 22.927'	1411	Bio sampling
SO313/1_186	SO313_186CTD	07.07.	CTD	13:12	31° 13.666'	172° 29.164'	3004	L-ADCP/CTD measurement, water sampling
SO313/1_187	SO313_187BATHY	07.07.	EM122	22:48	31° 10.76'	172° 17.91'	3831	EM 122 mapping