R/V Kairei KR99-12 Cruise Onboard Cruise Report

1. Introduction

The R/V Kairei KR99-12 cruise was for 21 days, which started at Papeete port of French Polynesia on 3rd January 2000 and ended at Majuro port of Marshall Island on 24th January 2000. The cruise was supported by the "Superplume Project" of the Science and Technology Agency and the "Study on seafloor dynamics" of the Japan Marine Science and Technology Center.

The aim of the cruise was as follows:

(1) to collect rock samples for petrological and geochronological studies of the South Pacific Superplume by dredging;

(2) to obtain sediment cores for paleomagnetic and paleoceanographical studies for last ca. 5 m.y.;

(3) to measure detailed topography, and geomagnetic and gravity anomalies for studying structure of the crust and upper mantle in the superplume province.

We performed dredging at seamounts of the Cook-Austral Islands (Area A) and the Gilbert Islands (Area E), and sediment sampling by a piston corer on the Manihiki Plateau (Area B).

In the following pages, we present

- List of onboard scientists,
- Outline of the cruise (daily schedule),
- Ship's track,

- Bathymetric map of the South Pacific based on the ETOPO-5 gridded data,

- Free-air gravity anomaly map of the South Pacific from satellite altimetry.

The cruise was very successful. We could collect rocks and sediments as planned, which are described in the following chapters.

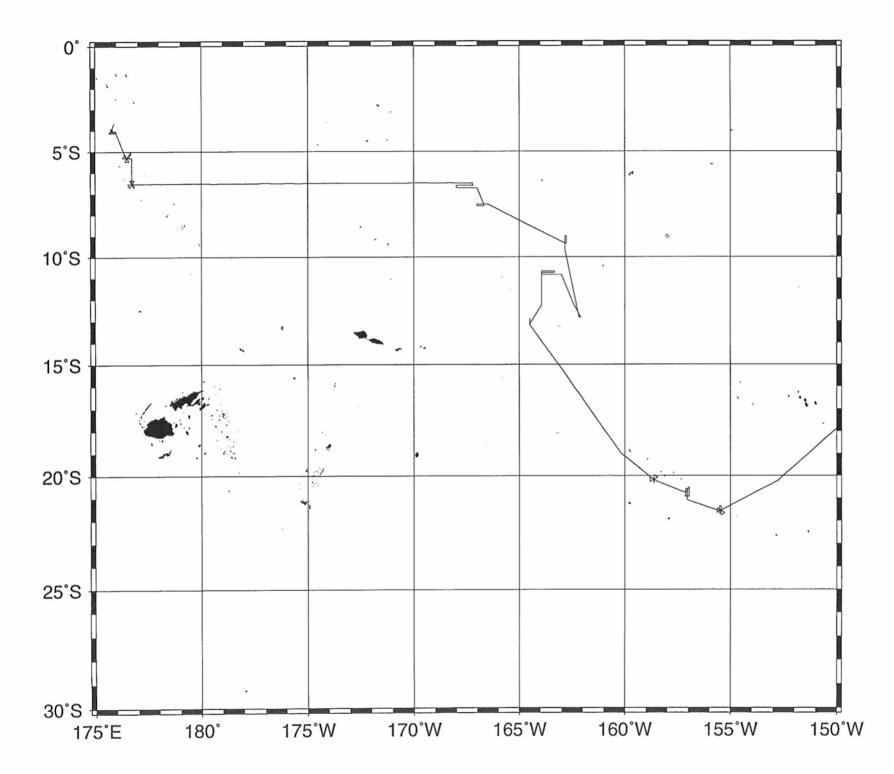
List of onboard scientific team

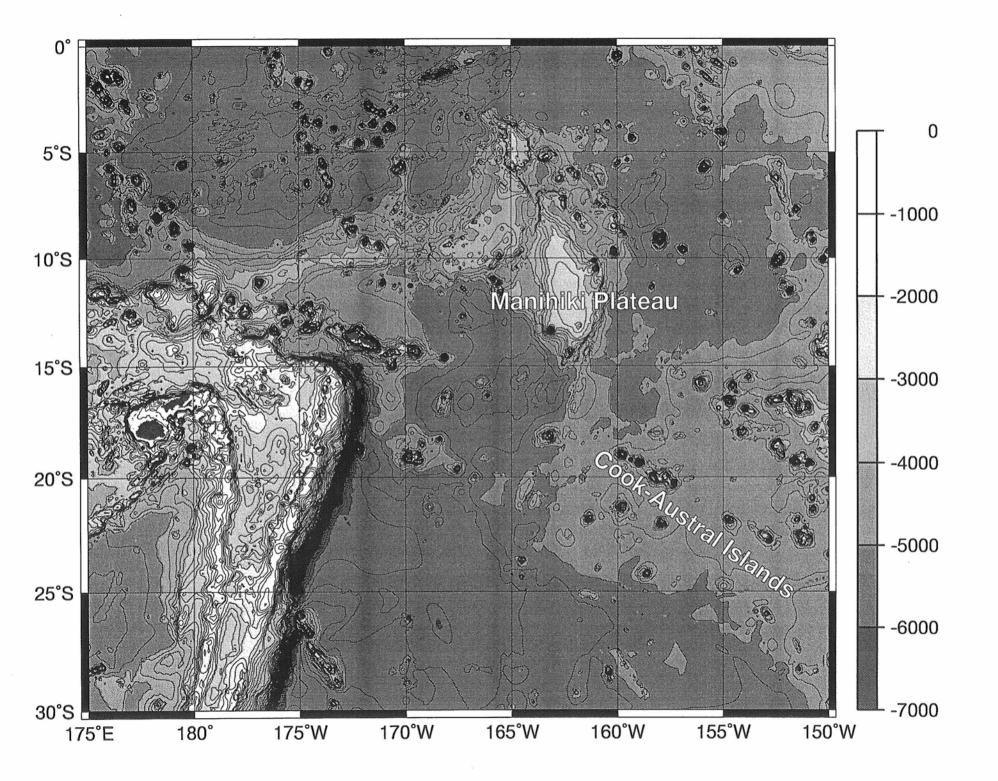
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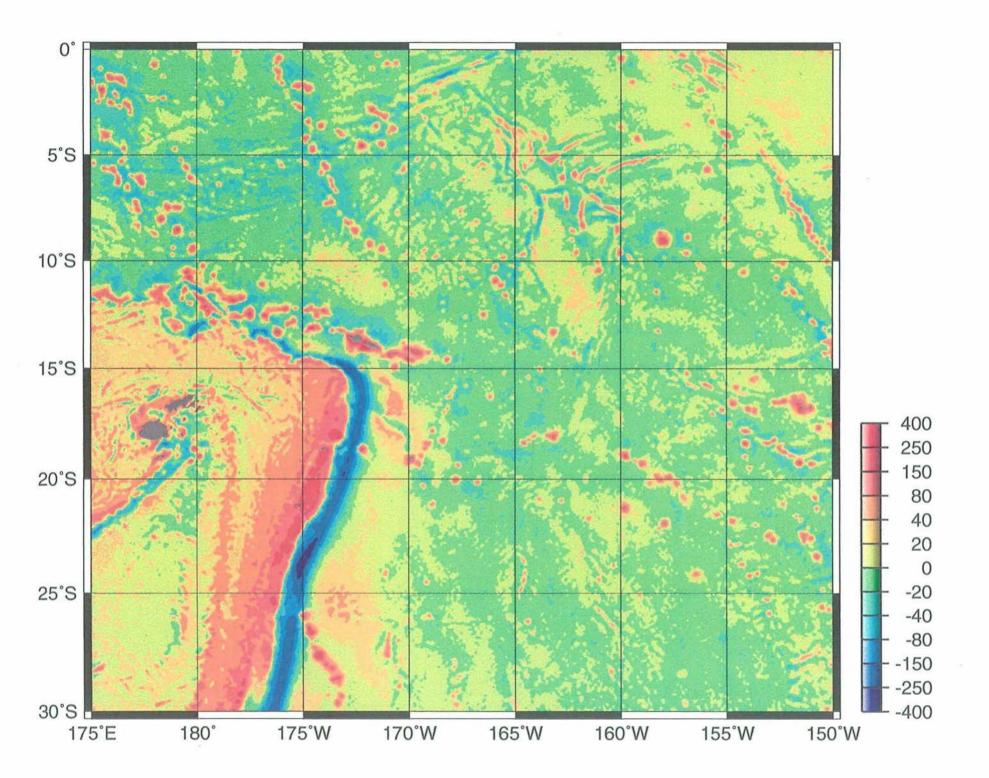
Name		Affiliation		
Toshitsugu Yamazaki	Chief Scientist	Geological Survey of Japan		
Kozo Uto	Scientist	Geological Survey of Japan		
Kazumi Akimoto	Scientist	Kumamoto University		
Hirokuni Oda	Scientist	Geological Survey of Japan		
Osamu Ishizuka	Scientist	Geological Survey of Japan		
Shungo Kawakata	Scientist	Tsukuba University		
Shigeaki Yamada	Student	Kumamoto University		
Toshikatsu Sugawara	Marine Technician	Marine Works Japan		
Motoi Matsuhashi	Marine Technician	Marine Works Japan		
Aya Kato 💡	Marine Technician	Marine Works Japan		
Toru Koizumi	Marine Technician	Marine Works Japan		

Outline of KR99-12 cruise

Date (local)	Area	Operation	Site number			
2000.1.3	Left Papeete	Transit				
1.4		Transit				
1.5	Cook-Austral Islands (Area A)	Dredge	D01, D02, D03			
1.6	Cook-Austral Islands (Area A)	Dredge	D04, D05			
1.7	Cook-Austral Islands (Area A)	Dredge	D06, D07, D08			
1.8		Transit				
1.9	Manihiki Plateau (Area B)	Piston core	PC01			
1.10	Manihiki Plateau (Area B)	Piston core	PC02, PC03			
1.11	Manihiki Plateau (Area B)	Piston core	PC04			
1.12	Manihiki Plateau (Area B)	Piston core	PC05			
1.13	Manihiki Plateau (Area B)	Piston core	PC06, PC07			
1.14	Manihiki Plateau (Area B)	Piston core	PC08			
1.15		Transit				
1.16	(Passed the Date Line)	Transit				
1.18	Gilbert Islands (Area E)	Dredge	D09, D10			
1.19	Gilbert Islands (Area E)	Dredge	D11, D12, D13			
1.20	Gilbert Islands (Area E)	Dredge	D14, D15			
1.21	Gilbert Islands (Area E)	Mapping				
1.22		Transit				
1.23		Transit				
1.24	Arrived at Majuro					







2. Site survey

To determine sites for dredging and piston coring, we performed site survey mainly in night time. Measurement items are;

(1) Topography using a SeaBeam 2112 system,

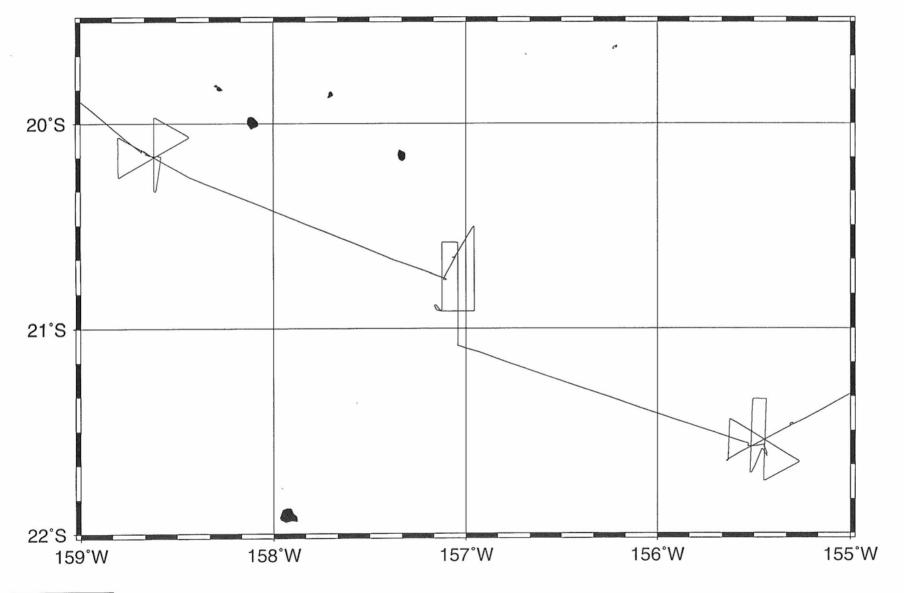
(2) Magnetic anomaly using a proton precession magnetometer (Kawasaki Chishitsu PRT010) and a shipboard three component magnetometer (Tierra Technica SFG1214),

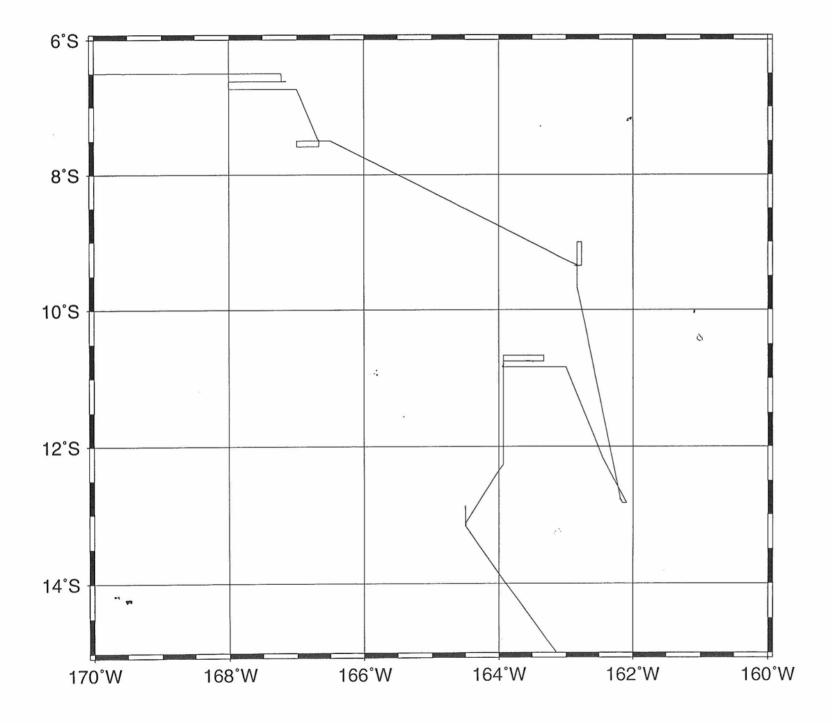
(3) Gravity measurement using shipboard gravimeter (BODENSEEWERK KSS31).

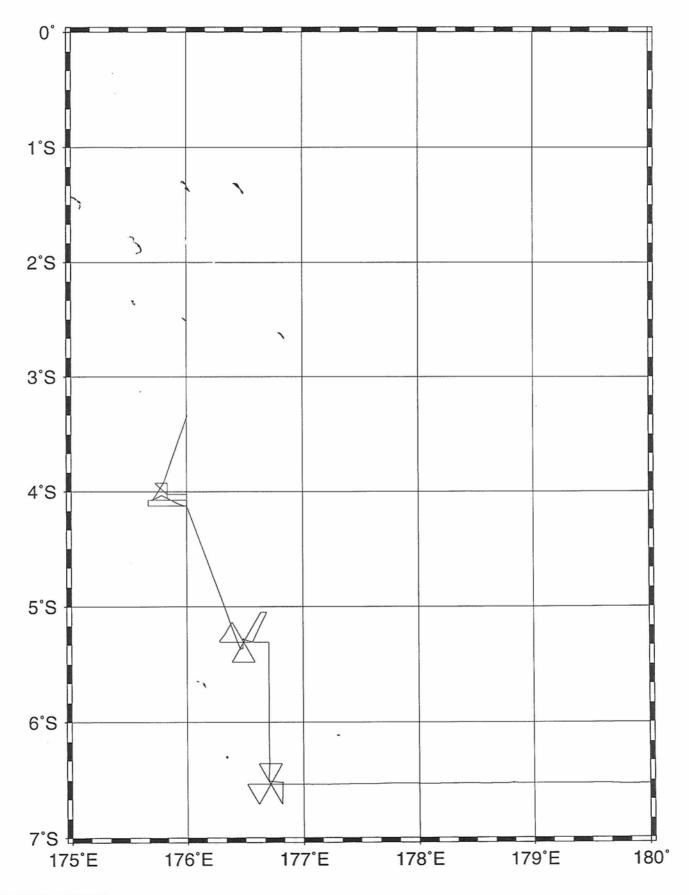
Detailed geological and geophysical studies were not performed before in the most part of the target areas of this cruise, and only bathymetric maps of low resolution such as ETOPO5 were available. Therefore, seamounts for dredging were chosen based mainly on the free-air gravity anomaly map from satellite altimetry.

We carried out XBT measurements at two sites (Areas A and E) to obtain sound velocity profiles in water for correction of bathymetry. Around the sites for piston coring, seismic reflection survey of subsurface sediment layers was conducted using a 3.5kHz subbottom profiler.

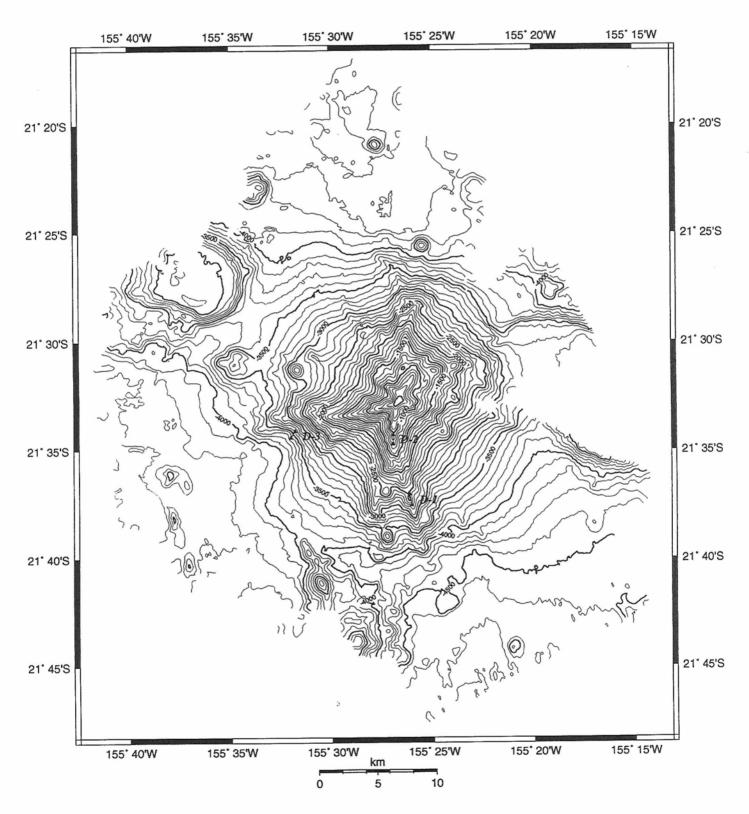
In the following pages, we present (1) survey lines for each survey area (Areas A, B, and E), and (2) topographic map around each sampling site.



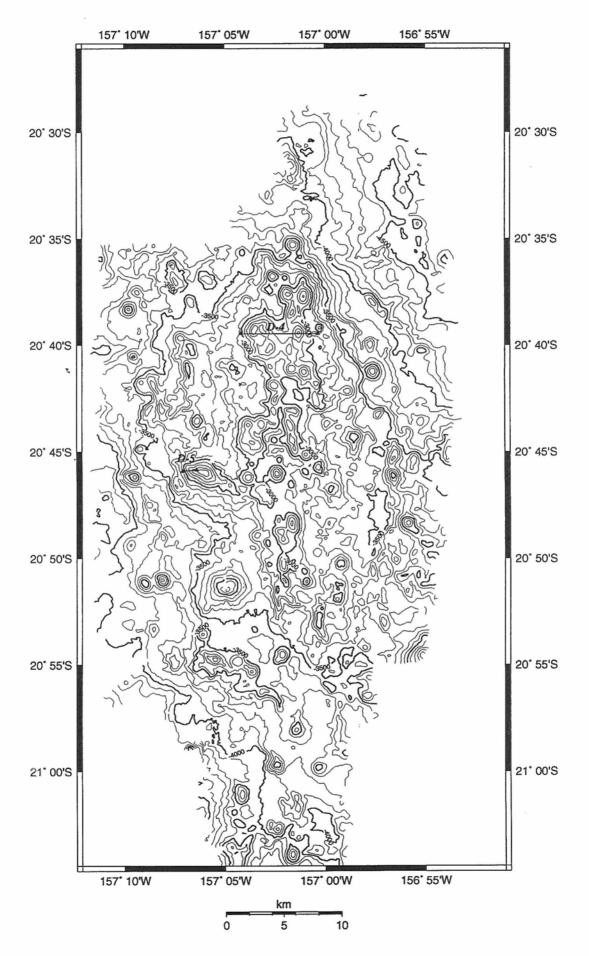




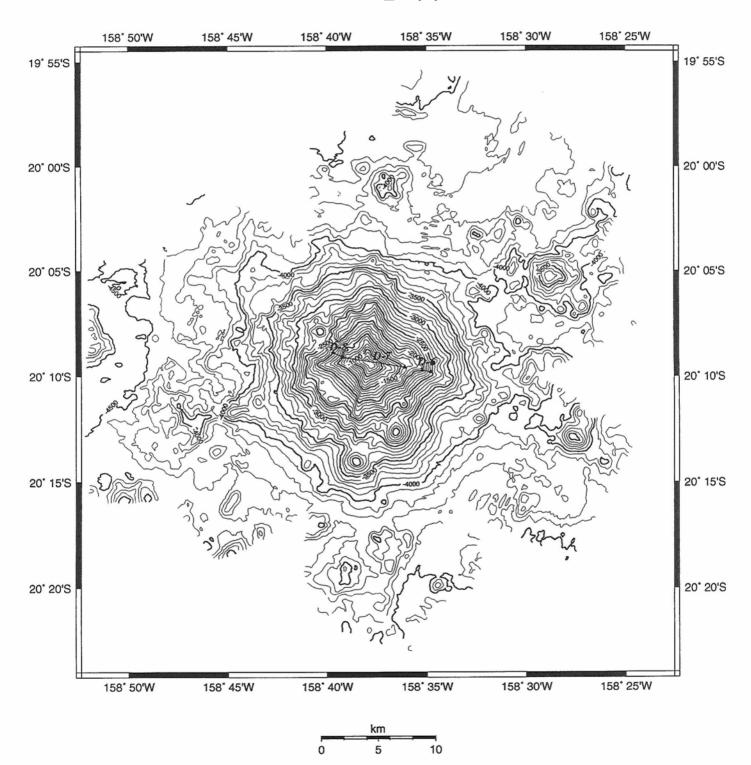
KR9912A_D1,2,3



KR9912A_D4,5

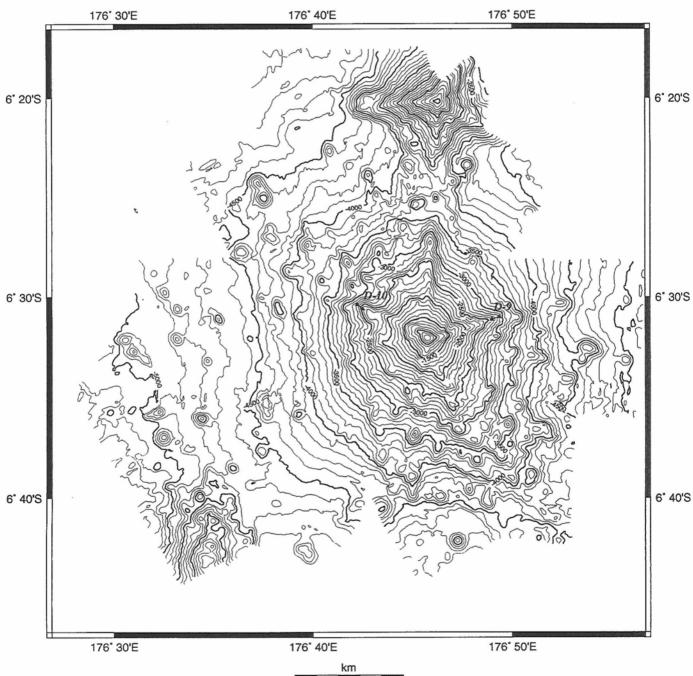


KR9912A_D6,7,8



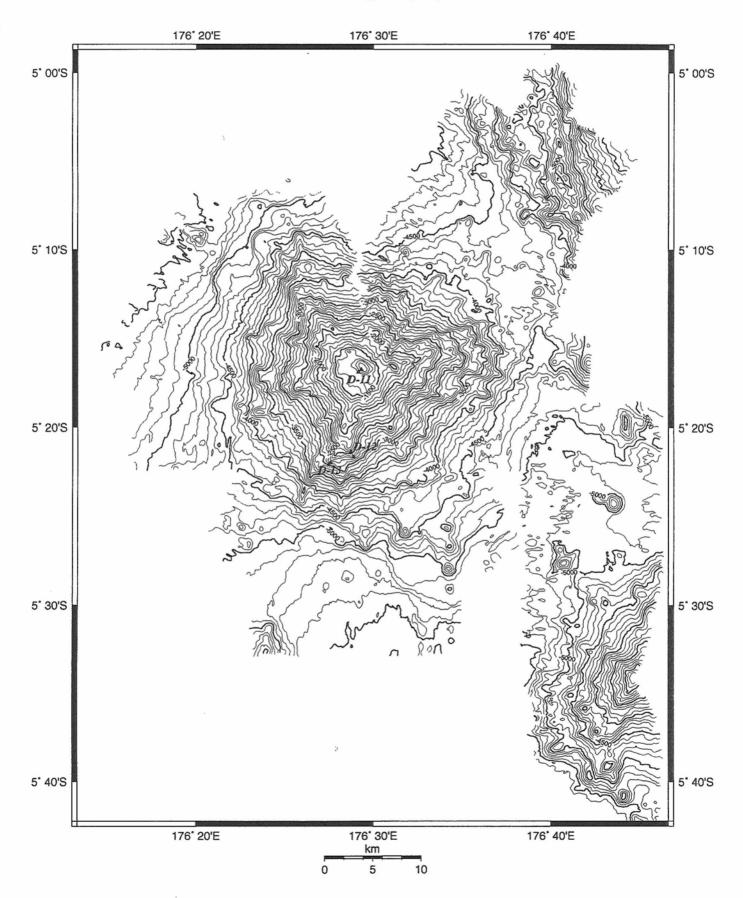
KR9912E_D9,10

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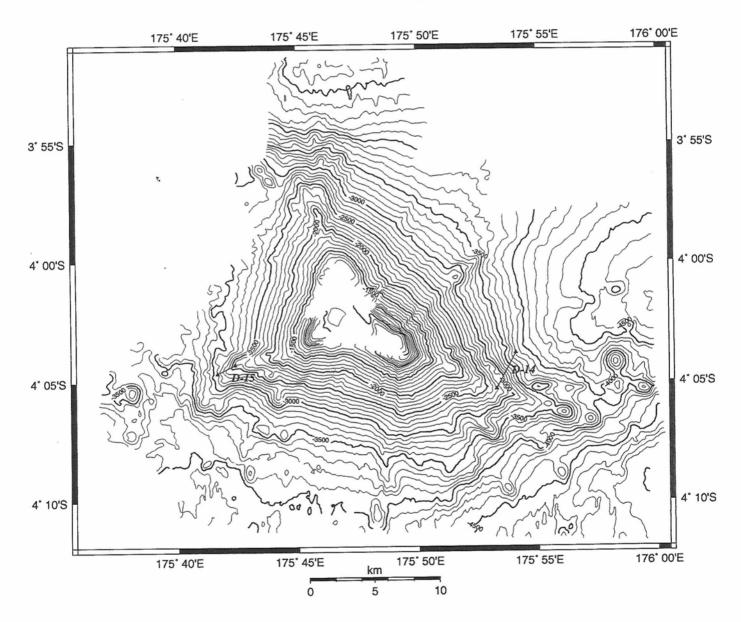


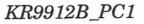
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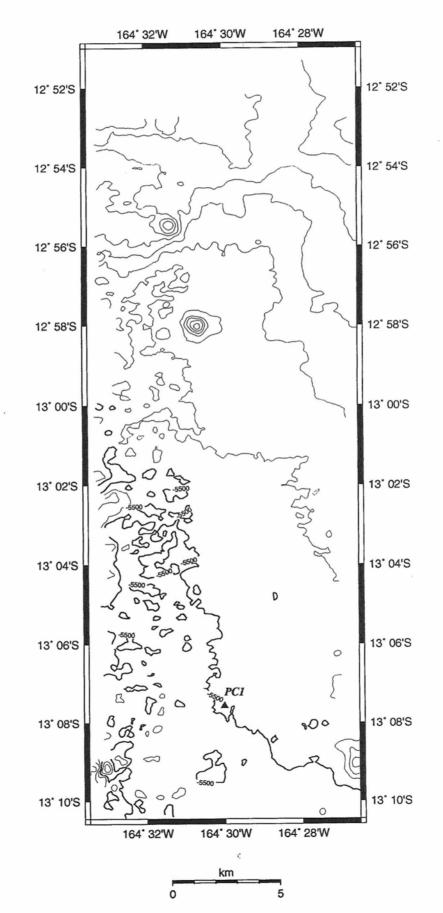
KR9912E_D11,12,13

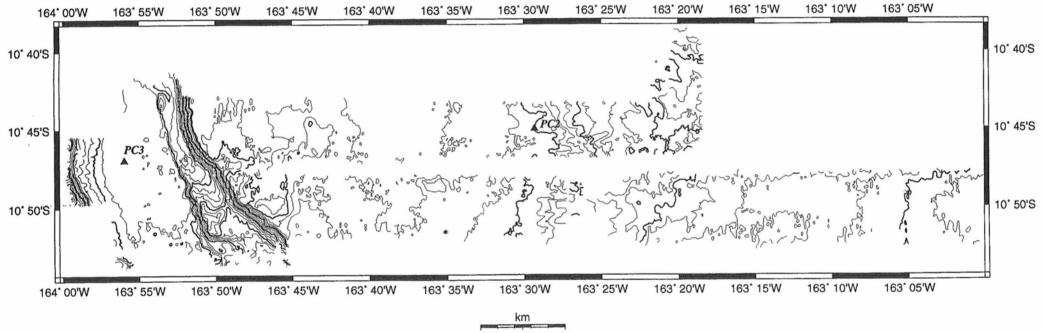


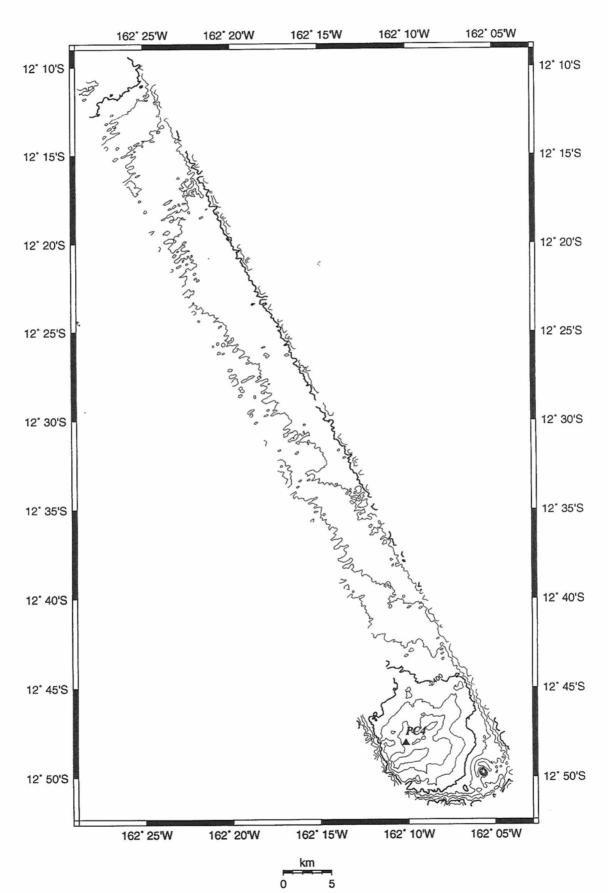
KR9912E_D14,15

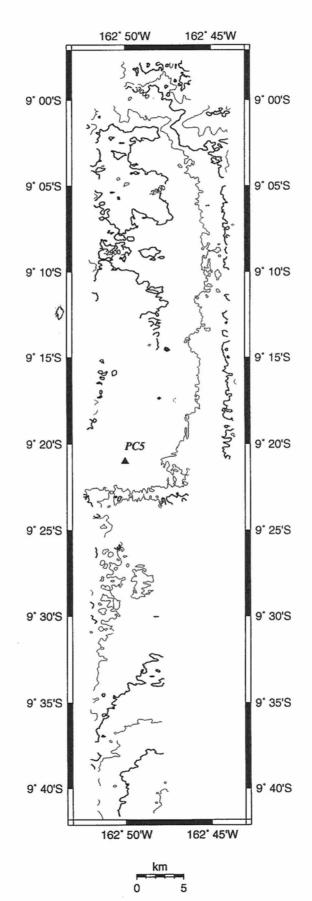


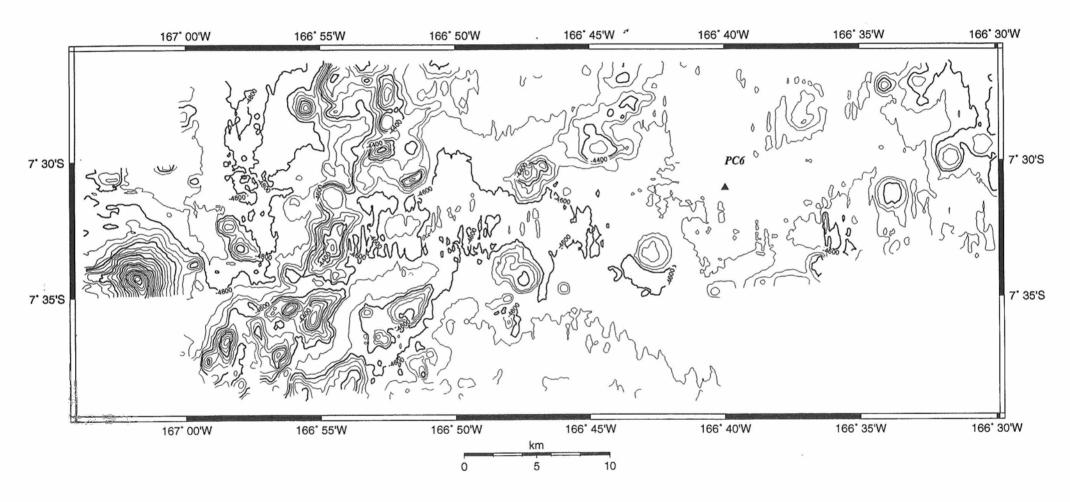


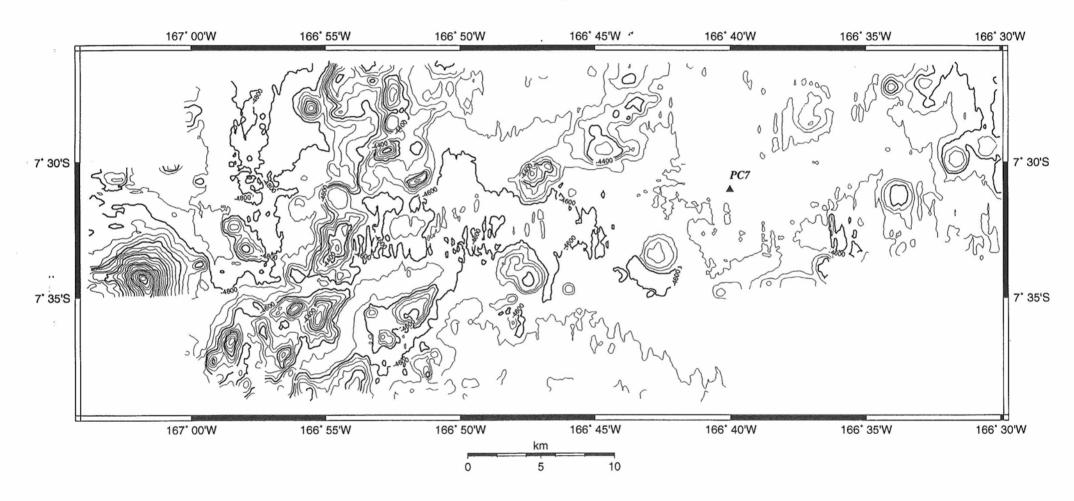


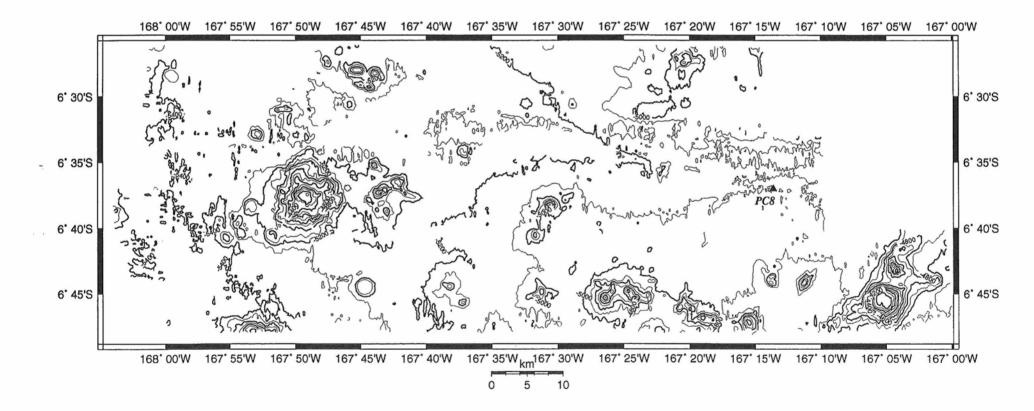












3. Dredge

Total 19 dredge hauls were performed on seamounts of the Cook-Austral Islands and the Gilbert Islands. Because no bathymetry was available beforehand for the seamounts, we performed site survey in the night time, made bathymetric maps, and determined two or three dredging sites on each seamounts. The sites were mainly on small ridges on the seamounts.

We presents table of summary and sample description for each site.

KR99-12 Dredge Summary (1)

Area	Dredge	Latitude	Longitude	Water	Location	Number	Dredge Haul with sample numbers in parentheses.
procession in the second	No.			depth (m)		of samples	
Α	D-01	21'37.5516'S	155°26.0129'W	2671	Maria W Seamount	2	Mn-oxides-coated vesiculated cpx-bearing basalt (1) and aphyric basalt (2).
		21°37.0463'S	155°26.1235'W	2518			
A	D-02	21°34.7220'S	155 ' 26.9256'W	1173	Maria W Seamount	>13	vesiculated olivine-bearing (1,4-6) or aphyric (2,3,5) basalt lava blocks, scoriaceous vitric tuff(7) and volcanic conglomerate (8).
		21°34.2950'S	155 ' 26.9140'W	983			
А	D-03	21°34.4163'S 21°34.1227'S	155°31.9801'W 155°31.7754'W	3551 3362	Maria W Seamount	0	No sample recovered.
A	D-04	20°39.4538'S	157°04.1801'W	3004	Mauke SE Seamount	>100	Vesiculated cpx-ol (1,3,4,8,22,28) or ol (2,5-7,10-15,23-27,29-34) basalt lava blocks. Minor amount of lapilli stone (16),volcanic conglomerate(17,20,35) an sandstone (21), and calcareous silt(18,19)
		20'39.4545'S	157°03.5265'W	2579			
A	D-05	20°45.9147'S	157 ° 07.0955'W	3077	Mauke SE Seamount	16	Three large Mn-oxides crusts (14-16) and five smaller crusts (9-13). Substrat of these crusts are volcaniclastics(basalt lava fragments and volcanic sand). Eight vesiculated of basalt lava block(1-8). Some of the lavas are very rich in olivine phenocryst (up to 20%).
		20°45.8513'S	157 ° 06.4000'W	2680			
A	D-06	20°09.7870'S	158 ° 34.7974'W	2426	Aitu SW Smt.	21	Slightly vesiculated pl-cpx-amp trachyte lava (1-10)and volcanic conglomerat (11). About 25 Mn-oxides nodules were collected by small dredger. Core of the nodules are trachyte lava fragment.
		20°09.7163'S	158°35.2240'W	2017			the noutles are tracifyte lava fragment.
А	D-07	20°09.5727'S	158°36.1032'W	1633	Aitu SW Smt.	0	Dredger lost.
		20°09.0945'S	158°39.2440'W	1430			
А	D-08	20'08.9051'S	158 ° 39.6815'W	1959	Aitu SW Smt.	7	Calcareous conglomerate containing pl-bearing hawaiite lava fragment (1-5), and foraminiferal sandstone (6).
		20'09.1073'S	158'39.1946'W	1480			

Positions mean "hit bottom" (upper) and "left bottom" (lower).

Area	Dredge	Latitude	Longitude	Water	Location	Number	Dredge Haul with sample numbers in parentheses.
	No.			depth (m)	alations	of samples	
Е	D-09	6'31.0021'S	176°49.3407'E	2893	Nanumanga SE Smt.	>19	Vesiculated pictite (1) and ol basalt (2-16) and minor amount of irregular- shaped calcareous rocks (17-19).
		6'31.1186'S	176°48.9775'E	2629			
Е	D-10	6'30.3742'S	176°42.2230'E	2717	Nanumanga SE Smt.	3	Three vesiculated picritic to ol basalt block (1-3)
		6'30.6041'S	176°42.5058'E	2442			
Е	D-11			1231			Recrystallized and very hard limestone (1-6). Some samples contain Mollusca
-	D-11	5 16.8986'S	176°29.1837'E		Nanumea NE Smt.	9	Fossill. (Main dredger was lost. Small dredger collected limestone.)
		5'16.7504'S	176°29.3320'E	1085			
Е	D-12	5°21.6233'S	176°28.9020"E	2684	Nanumea NE Smt.	0	No sample was recovered.
		5°21.3227'S	176°28.7455"E	2439			
							Colorroup conclements (1.4) and condutons (5.6). Conclements complete
Е	D-13	5°22.0358'S	176'27.4987'E	2960	Nanumea NE Smt.	>6	Calcareous conglomerate (1-4) and sandstone (5,6). Conglomerate samples contain vesiculated
		5°21.9495'S	176'27.6004'E	2846			
Е	D-14	4'05.6091'S	175 * 54.0718' E	3041	Tamana S Smt.	11	Basalt fragments embedded in calcareous sand (4,5,7,8), calcareous sandstone (9,10) and Mn-oxides crust. (1,2,3,6,11)
		4°05.3069'S	175 53.2701.'E	2707			
							Brown-colored lapilli tuff (2,5,6,10) and calcareous sandstone with lithics of
Е	D-15	4'04.6312'S	175°41.6458' E	2941			limestone (11-13,15). were mainly collected. Lapilli tuff contain ol-cpx basalt
		1 01.0012 0			Tamana S Smt.	>15	lava block(4) and aphyric basalt lava (3). Mn-oxides crust were also collected(1,8,9,14).
		4°04.2697'S	175 42.3747' E	2398			

Positions mean "hit bottom" (upper) and "left bottom" (lower).

CRUISE & LEG NO. ST	ATION NO. LOCALLI	Y DAY	MONTH	YEAR	NO.
KR99-12 D-0	1 Maria W	Smt. 5	Jan	2000	1

Sample	Size of rock sample			Weight	Round-	Mn-	Comment	
No.	a (c	:m) ¦	b (cm)	c (cm)	(g)	ness	coating	
1		15	11	10	1000	А	6mm	highly vesiculated cpx basalt
2	2 16 8 5		400	SA	4mm	highly vesiculated aphyric basalt		
		1						

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-02	Maria W Smt.	5	Jan	2000	1

Sample	Size	of rock sa	ample	Weight	Round-	Mn-	Comment
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating	
1	25	18	13		R	2mm	vesiculated ol basalt
2	29	21	7		SR	film	vesiculated aphyric basalt
3	16	11	5		SA	film	vesiculated aphyric basalt
4	18	12	11		SA	2mm	altered vesiculated ol basalt
5	13	12	5		SA	film	vesiculated aphyric basalt
6	10	8	4		SA	film	altered vesiculated ol basalt
7	22	22	10		SR	film	angular black-colored scoriaceous vitric tuff
8	47	27	20		SR	film	>40cm block of altered volcanic breccia
		1					

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-03	Maria W Smt.	5	Jan	2000	1

Sample				Weight	Round-	Mn-	Comment
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating	
							No sample

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-04	Mauke SW smt.	6	Jan	2000	1

Sample	Size o	of rock sa	mple	Weight	Round-	Mn-	Comment
No.		b (cm)		(g)	ness	coating	
1	14	10	10		SR	6mm	vesiculated cpx-ol basalt lava
2	16	11	9		SR	3mm	highly vesiculated of basalt lava
3	20	16	8		SR	10mm	vesiculated cpx-ol basalt lava
4	13	11	8		SR	2mm	vesiculated cpx-ol basalt lava
5	14	14	8		SR	2mm	vesiculated ol basalt lava
6	15	12	7		SR	10mm	vesiculated ol basalt lava
7	13	8	7		SR	2mm	vesiculated ol basalt lava
8	14	11	7		SR	5mm	vesiculated cpx(?)-ol basalt lava
9	11	7	6		SR	2mm	vesiculated cpx(?)-ol basalt lava
10	9	6	6		SR	1mm	vesiculated ol basalt lava
11	10	7	5		SR	5mm	vesiculated ol basalt lava
12	9	7	5		SR	film	vesiculated ol basalt lava
13	10	8	4		SR	1mm	vesiculated ol basalt lava
14	6	4	4		R	film	slightly vesiculated ol basalt
15	6	5	5		R	1mm	vesiculated ol-rich basalt lava
							stratified lapilli stone. Lithic: vesiculated basalt(\phi1-5mm, A-SA). Matrix: pale yellow calcareous
16	17	14	4		SA	film	material. volcanic conglomerate. Matrix:
17	18	15	13		SR	2mm	reddish yellow calcareous silt. Conglomerate: subrounded vesiculated lava (\u03663-5cm)
18	33	23	13		SR		Conglomerate (calcareous silt matrix and SR to SA pebble)
19	18	16	6				calcareous siltstone (upper) and volcanic sandstone (lower).
20	20	13	5			7mm	volcanic conglomerate.
21	11	9				3mm	volcanic sandstone with pebbles.(\u00fc1-2cm)
22	25	20	20		SA	3mm	vesiculated cpx-bearing ol basalt
23	25	12	12		SA	3mm	vesiculated ol basalt
24	15	9	8		SA	3mm	vesiculated ol-rich basalt lava
25	14	9	8		SR	9mm	vesiculated ol-bearing aphyric basa lava
26	18	13	7		SA	8mm	vesiculated ol-basalt lava
27	17	11	10		SA	5mm	vesiculated ol-rich basalt lava
28	11	10	8		SA	1mm	vesiculated cpx-ol basalt lava
29	11	10	8		SR	3mm	vesiculated ol-rich basalt lava
30	13	9	7		SA	2mm	vesiculated ol-rich basalt lava
31	10	8	8		SR	8mm	vesiculated ol-rich basalt lava
32	12	9	9		SR	2mm	vesiculated ol-rich basalt lava
33	11	7	7		SR	1mm	vesiculated ol basalt lava
34	7	6	6		SR	2mm	vesiculated ol-rich basalt lava
	18	15	13		SR	4mm	volcanic conglomerate cemented by Mn-oxides and calcareous silt.

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-05	Mauke SW smt.	6	Jan	2000	1

Sample	Size of rock sample		Weight	Round-	Mn-	Comment	
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating	
1	23	18	9		SA	9mm	vesiculated ol basalt lava
2	26	16	8		SA	10mm	vesiculated ol basalt lava
3	19	16	14		SA	3mm	finely vesiculated ol-rich basalt
4	18	14	14		SA	5mm	finely vesiculated ol-rich basalt
5	14	13	10		SR	8mm	finely vesiculated ol-rich basalt
6	13	10	9		SA	6mm	finely vesiculated ol-rich basalt
7	8	7	6		SR	7mm	finely vesiculated ol-basalt lava
8	7	5	5		SR	8mm	finely vesiculated ol-basalt lava
9	29	20	7		platy	10mm	hydrothermal Mn-oxides containing volcaniclastic material.
10	18	14	6		platy	10mm	hydrothermal Mn-oxides containing volcaniclastic material.
11	16	8	5		SA	10mm	hydrothermal Mn-oxides containing volcaniclastic material.
12	11	7	6		SR	7mm	hydrothermal Mn-oxides containing volcaniclastic material (basalt block- rich).
13	12	11	5		platy	9mm	hydrothermal Mn-oxides containing volcaniclastic material (basalt blockø4cm)
14	41	24	8		slab	7mm	hydrothermal Mn-oxides containing volcaniclastic material.
15	52	44	8		slab	21mm	hydrothermal Mn-oxides containing volcaniclastic material.
16	34	32	13		slab	8mm	hydrothermal Mn-oxides containing volcaniclastic material.

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-06	Atiu SW smt.	7	Jan	2000	1

Sample	Size o	of rock sa	ample	Weight	Round-	Mn-	Comment
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating	
1	23	16	16		SA	4mm	slightly vesiculated cpx-bearing amp trachyte
2	27	15	10		SA	10mm	slightly vesiculated pl-cpx-amp trachyte
3	10	8	7	-	SA	2mm	slightly vesiculated amp-pl-cpx trachyte coated with calcareous material (Max 20mm) and Mn- oxides.
4	7	7	7		SA	1mm	slightly vesiculated pl-cpx-amp trachyte coated with thin calcareous material.
5	. 8	6	6		SA	10mm	slightly vesiculated amp-rich trachyte
6	8	7	5		SA	10mm	slightly vesiculated pl-cpx-amp trachyte
7	8	7	5		SA	1mm	slightly vesiculated pl-cpx-amp trachyte
8	8	6	4		SR	2mm	slightly vesiculated pl-cpx-amp trachyte
9	7	6	4		SR	6mm	slightly vesiculated pl-cpx-amp trachyte
10	7	5	4		SR	6mm	slightly vesiculated pl-cpx-amp trachyte
11	51	40	33		A		Volcanic breccia(?) (uncutted)
		э					10 small pieces with no sample No.(ø3-5cm)
small dredge	9						about 25 Mn-nodules (\u00f62-4cm) which have cores of trachyte.
			l]			

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-07	Atiu SW smt.	7	Jan	2000	1

Size o	of rock sa	ample	Weight	Round-	Mn-	Comment
a (cm)	b (cm)	c (cm)	(g)	ness	coating	
						Chain bag lost.
						a (cm) b (cm) c (cm) (g) ness coating

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-08	Atiu SW smt.	7	Jan	2000	1

Sample		Size o	of rock sa	mple	Weight	Round-	Mn-	Comment
No.	a	(cm)	b (cm)	c (cm)	(g)	ness	coating	
1		13	12	10		SR	film	finely vesiculated pl-bearing aphyric hawaiite(?).(\0.5-3cm) Constituent of conglomerate with calcareous matrix.
2		8	8	4		SA	film	conglomerate containing hawaiite fragments (0.2-3cm) . Matrix: foraminiferal sand.
3		12	6	6		A	film	conglomerate containing hawaiite fragments (0.2-3cm) . Matrix: foraminiferal sand.
4		10	8	4		SR	film	conglomerate containing hawaiite fragments (0.2-3cm) . Matrix: foraminiferal sand.
5		11	10	7	-	SR	film	conglomerate containing hawaiite fragments. Fragments are much smaller than those in D8-4 (less than 1cm).
6		26	17	7		platy	film	semiconsolidated foraminifera sandstone.
								volcanic sand (black glass and
small dr	ed	ge						foraminifera)

CRU	ISE & LEC	NO.	STATI	ON NO.	LOCALLIT	Y	DAY MONTH YEAR NO.
KR99-12	2		D-9		Nanumang	a SE Smt	18 Jan 2000 1
	Cine	f and also		G	1.5		······
Sample No		of rock s b (cm)		Weight	Round- ness	Mn- coating	Comment
							modereatly to severely altered non vesicular picrite
							lava, phenocryst contents change variously from more
1	60	56	45			50	than 50 vol.% to about 20 vol.%
2	18	17	15		SR		altered vesiculated ol basalt lava
3	19	14	11		SA	4	slightly altered vesiculated ol basalt lava
4	18	14	13		SR		moderately to severely altered vesiculated ol basalt
	10	14	13		SR		lava
5	15	10	10		SR	4	scoriaceous volcanic breccia., altered
6	17	13	11		SA	film	altered vesiculated ol basalt lava
7	15	11	8		SA	2	moderately altered, slightly vesiculated of basalt lava
8	18	11	8		SA	1	altered vesiculated ol basalt lava
9	15	10	7		SR	4	altered ol basalt lava with large vesicules
10	16	12	9		SR	2	altered vesiculated ol basalt lava
11	13	,10	7		SR	film	altered vesiculated ol basalt lava
12	11	8	8		SR	2	moderately altered vesiculated ol basalt lava
13	8	8	5		SR	none	altered vesiculated ol basalt lava
14	12	11	4		SR	none	altered vesiculated ol basalt lava
15	12	8	6		SR	3	altered vesiculated ol basalt lava
16	27	22	20		SR	not measured	altered vesiculated ol basalt lava, elongated pillow lava like morphology (radial joints, concentric vescicles)
17	11	7	3		SR	film	irregular shaped calcareous rock
18	14	6	6		SR	film	irregular shaped calcareous rock
19	8	4	3		SR	film	irregular shaped calcareous rock

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-10	Nanumanga SE Smt.	18	Jan	2000	1

Sample	Size of rock sample			Weight	Round-	Mn-	Comment
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating	
1	17	16	8		SA	4	moderately altered and vesiculated picrite lava
2	7	6	5		SR	4	highly altered ol basalt lava
3	12	6	3		SR	4	altered slightly vesciculated ol-rich basalt lava

CRU	JISE & LEG	NO.	STATI	ON NO.	LOCALLIT	Y	DAY	MONTH	YEAR	NO.	
KR99-12			D-11		Nanumea I	NE Smt.	19	Jan	2000	1]
					1	I	1			Comment	uta 1
Sample		e of rock sar		Weight	Round-	Mn-				Comment	
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating					
1	12	8	6		SR	0	limestone	with mol	lusca (?)		
2	12	8	7		irregular	0	limestone	9			
3	8	7	5		SA	film	limestone				
4	10	7	5		SR	0	limestone	1			
5	10	7	2		platy	0	limestone				
6	5	3	3		SA	0	limestone	ł			
All the sa	mple were	e collected	l by small	dredge. I	Main dredg	ger was lo	st.)				

CRU	JISE & LEG	NO.	STATI	ON NO.	LOCALLIT	Y	DAY	MONTH	YEAR	NO.	
KR99-12			D-12		Nanumea	NE Smt.	19	Jan	2000	1	
Sample	Size	e of rock sar	mole	Weight	Round-	Mn-				Comment	-
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating					
							No samp	le was rec	covered.		
	2										

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-13	Nanumea NE Sr	19	Jan	2000	1

Sample	Size	of rock sa	ample	Weight	Round-	Mn-	Comment
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating	
1	10) 6	5		SA	4mm	calcareous conglomerate. basalt (1- 5mm),limestone(3cm)
2	10) 7	5		SA	5mm	calcareous conglomerate. basalt highly vesiculated ol basalt
3	ç	6	2		platy	2mm	calcareous conglomerate. Altered basalt (<1cm)
4	ę	6	3		SA	2mm	calcareous conglomerate. Altered vesiculated ol basalt
5	ę	н 6	3		platy	2.5mm	calcareous sandstone. Altered basalt (<1mm)
6		5	3		SA	5mm	calcareous sandstone

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-14	Tamana S Smt.	20	Jan	2000	1

Sample	Size	of rock sa	ample	Weight	Round-	Mn-	Comment
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating	
1	31	21	9		SR		Mn crust and thinly (~5 mm) attached calcareous sand
2	22	18	9		SR		Mn crust
3	14	9	6		SR		Mn crust
4	14	9	6		SR	2	Round shaped vesiculated basalt lava blocks (f=2-5 cm) embedded in calcareous sand
5	15	11	7		SA	3	angular blocks of basalt lavas (f=0.3-3 cm) embedded in calcareous sand
6	9	7	4		SR		Mn crust
7	8	6	5		SR	7	slightly vesiculated basalt lava blocks covered by Mn and calcareous sand
8	8	6	3		SR	none	angular blocks of basalt lavas (f=0.3-3 cm) embedded in calcareous sand
9	7	6	2		SR	5	Calcareous sandstone
10	6	6	2.5		SR	5	Calcareous sandstone
11	4	4	1.5		SA		Mn crust
					•		

CRUISE & LEG NO.	STATION NO.	LOCALLITY	DAY	MONTH	YEAR	NO.
KR99-12	D-15	Tamana S Smt.	20	Jan	2000	1

Sample	Size o	of rock sa	mple	Weight	Round-	Mn-	Comment
No.	a (cm)	b (cm)	c (cm)	(g)	ness	coating	
1	44	34	10		platy		Mn-oxides crust
2	43	28	12		platy	55	brown-colored lapilli tuff with thick Mn-oxides crust
3	35	15	10		platy	75	light-brown aphyric lava thinly attached to thick Mn-oxides crust
4	37	26	23		SR	50	rounded shaped lava block with Mn- oxides crust.
5	26	. 21	12		SA	?	lapilli tuff with thick Mn-oxides crust
6	28	18	11		SA	50	brown-colored lapilli tuff with thick Mn-oxides crust
7	18	· 12	10		SR	58	brown-colored lapilli tuff with thick Mn-oxides crust
8	15	9	6		SR		Mn-oxides crust
9	10	8	4		SA		Mn-oxides crust
10	17	8	4		SA	film	lapilli tuff
11	10	7	6		SA	0	calcareous sand with lithics of limestone and volcanics (\$<5cm)
12	9	5	5		A	film	calcareous sand with lithics of limestone and volcanics (\$<5cm)
13	7	6	5		A	0	calcareous sand with lithics of limestone and volcanics (\u00f61-3cm)
14	8	6	6		SR		Mn-oxides crust
15	6	6	1 1 1 1 4		SR	film	calcareous sand with lithics of limestone and volcanics (ϕ 1–3cm)
		1	1 { !				

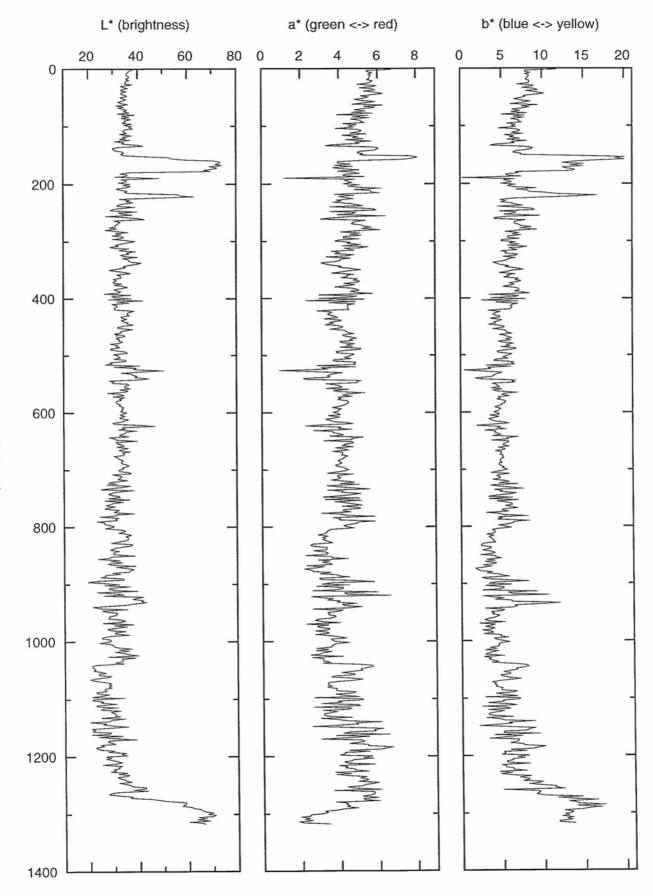
4. Piston core

Eight piston cores were obtained from Manihiki Plateau. Water depths of the sites range from 2300 to 5500m. Piston corer of 15m or 20m in length was used, and almost full of sediments was recovered each time. After core recovery, sediment cores were cut at 1m intervals, and split into two halves lengthwise. One half was used for color reflectance measurements and paleo- and rock magnetic sampling by u-channels (PC02, PC03, PC04, PC07, and PC08) and 7cc discrete cubes (PC01 and PC05). After that, this half was stored as archive. Another half of the core was first photographed. Then visual description and sampling for micropaleontological studies and oxygen isotope analysis were performed.

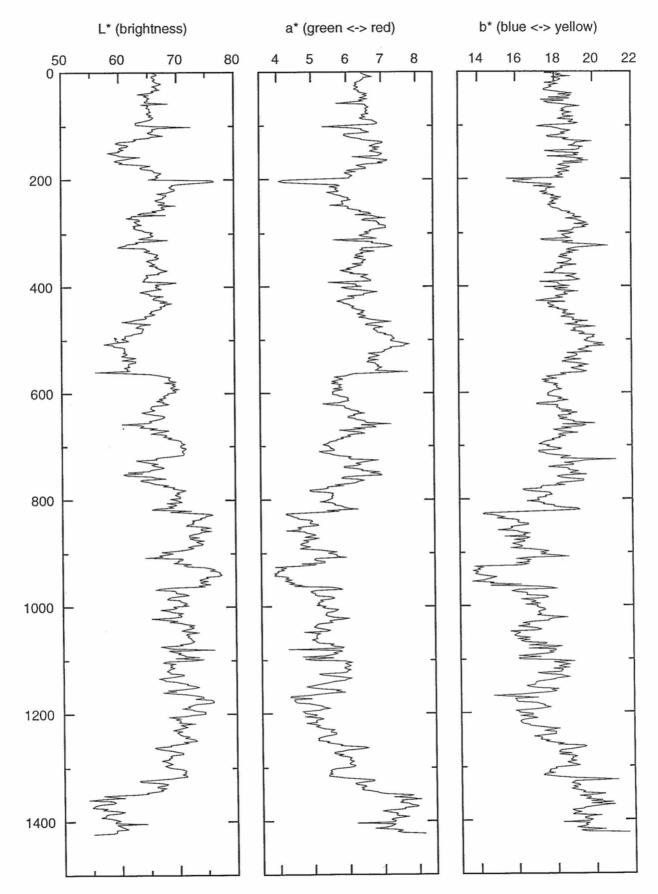
We present a table of core summary, and results of color reflectance measurements in the following pages. Color reflectance was measured at 2cm intervals using a Minolta spectrophotometer CM-2002. Before obtaining measurements from each core, the spectrophotometer was calibrated by attaching a white calibration cap. The data are presented as total reflectance and the 650/450 nm red-to-blue ratios.

Summary of piston cores

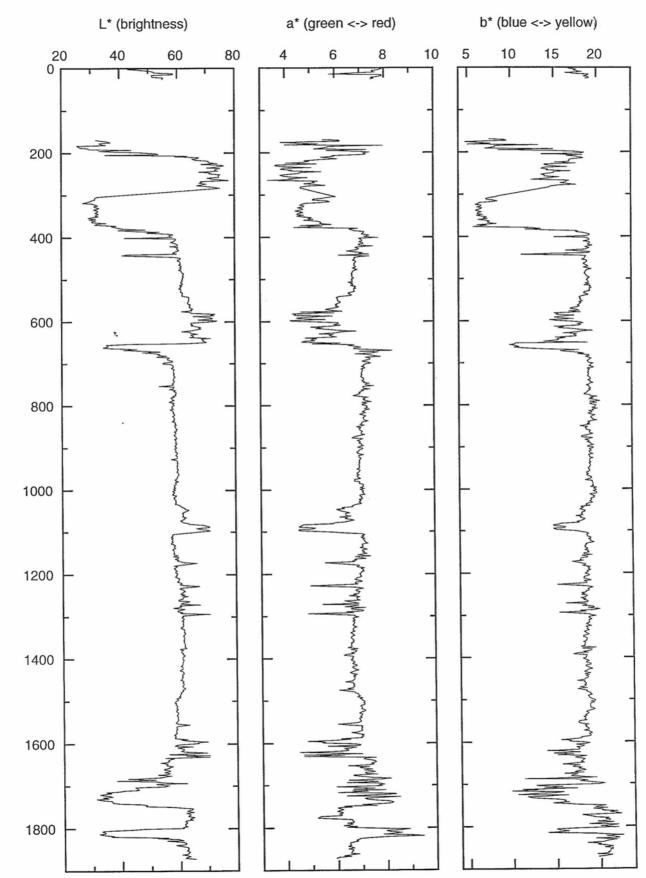
Date	Core	Latitude (S)	Longitude (W)	Water depth (m)	Core length (cm)	Location	Description
09-Jan-2000	PC01	13-07.57	164-30.01	5496	1350	Southwestern foot of Manihiki Plateau	Mainly dark reddish brown homogeneous pelagic clay. A turbidite layer of pale yellowish white calcareous ooze is intercalated in the deeper part. Bioturbed in the deeper part. Calcareous ooze with cross laminae at the bottom.
10-Jan-2000	PC02	10-45.00	163-29.30	3383	1442	Southwestern slope of Manihiki Plateau	Yellowish brown calcareous ooze in the upper part, and homogeneous pale yellowish white calcareous turbidites with planktonic foraminifer in the middle and lower part.
10-Jan-2000	PC03	10-46.99	163-55.95	4467	1913	Southwestern slope of Manihiki Plateau	Mainly yellowish brown silty calcareous ooze. Dark reddish brown homogeneous pelagic clay with bioturbation is intercalated in the upper part. Pale yellowish white homogeneous calcareous turbidites with foraminiferal tests are in the lower part.
11-Jan-2000	PC04	12-48.08	162-10.13	2326	1416	Top of the southern Manihiki Plateau	Mainly pale yellowish white homogeneous calcareous ooze with foraminiferal tests.
12-Jan-2000	PC05	09-21.01	162-50.03	2933	1734	Top of the northern Manihiki Plateau	Mainly pale yellowish white homogeneous calcareous ooze with foraminiferal tests.
13-Jan-2000	PC06	07-31.00	166-39.96	4539	471	Northwestern slope of Manihiki Plateau	Disturbed. Mulfanction of trigger of piston corer.
13-Jan-2000	PC07	07-31.02	166-40.00	4542	2015	Northwestern slope of Manihiki Plateau	Mainly dark reddish to yellowish brown pelagic clay with intense bioturbation. Pale yellowish white homogeneous turbidites with foraminiferal tests are intercalated.
14-Jan-2000	PC08	06-37.01	167-13.60	5098	1965	Northwestern foot of ManihikiPlateau	Mainly dark reddish homogeneous pelagic clay. Pale yellowish white turbidites with foraminiferal tests are intercalated in the lower part. Bioturbed in the lower part.



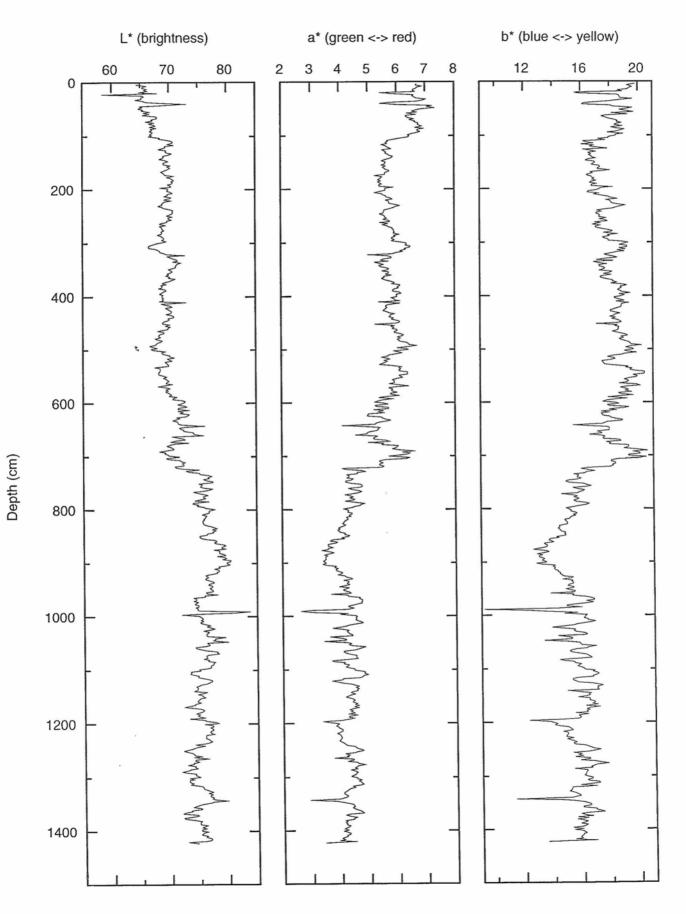
PC1: color



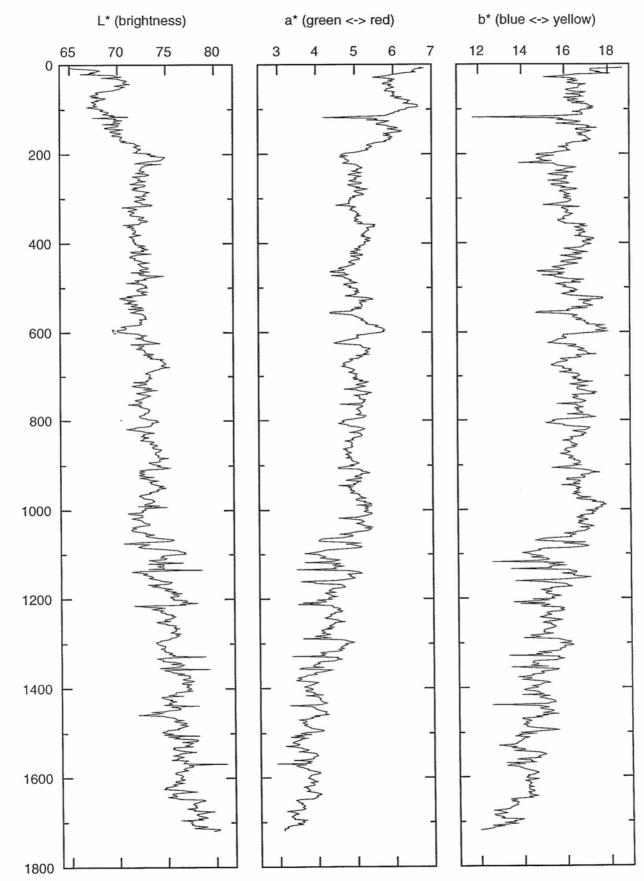
PC2: color



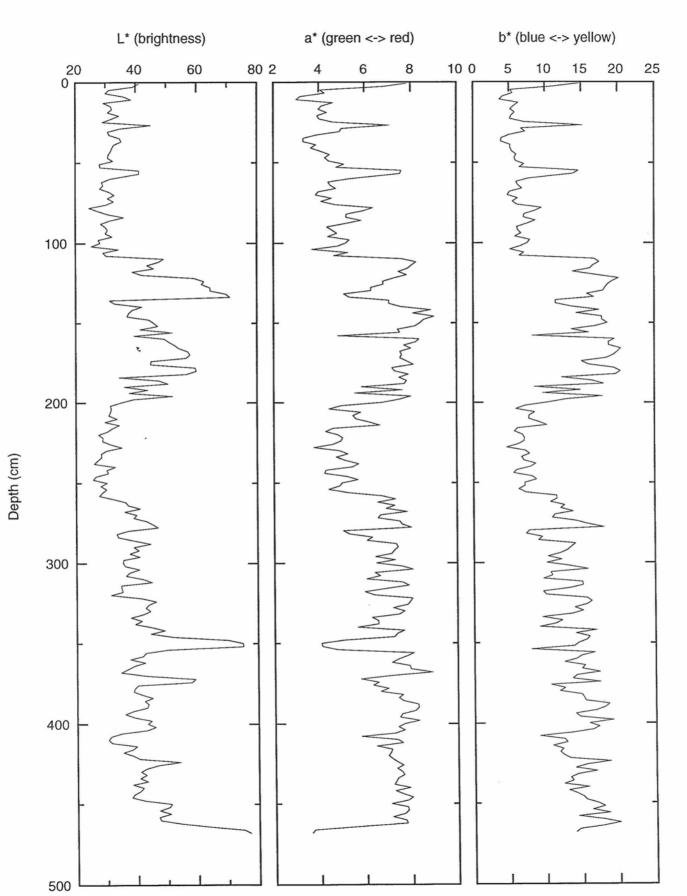
PC3: color



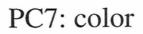
PC4: color

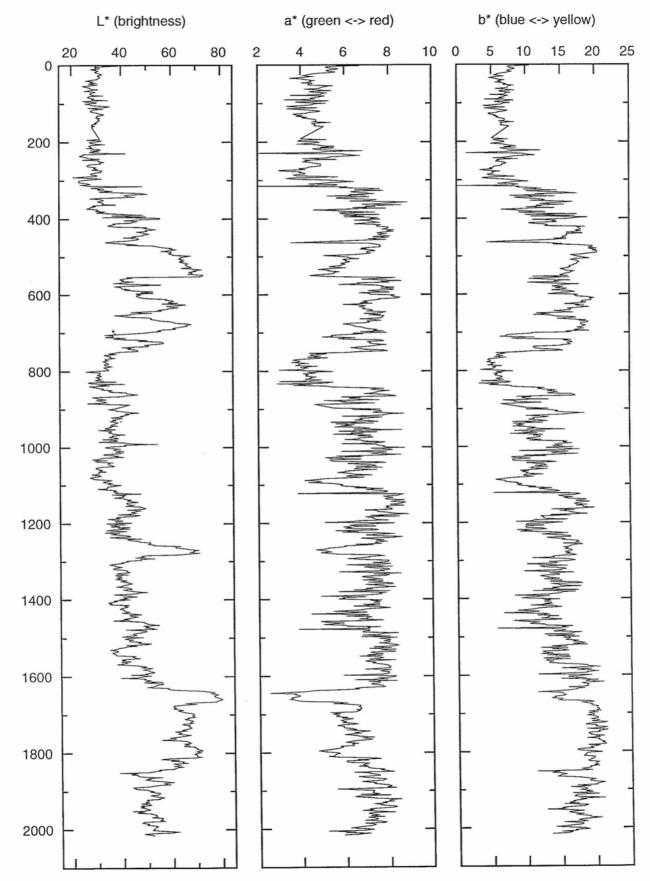


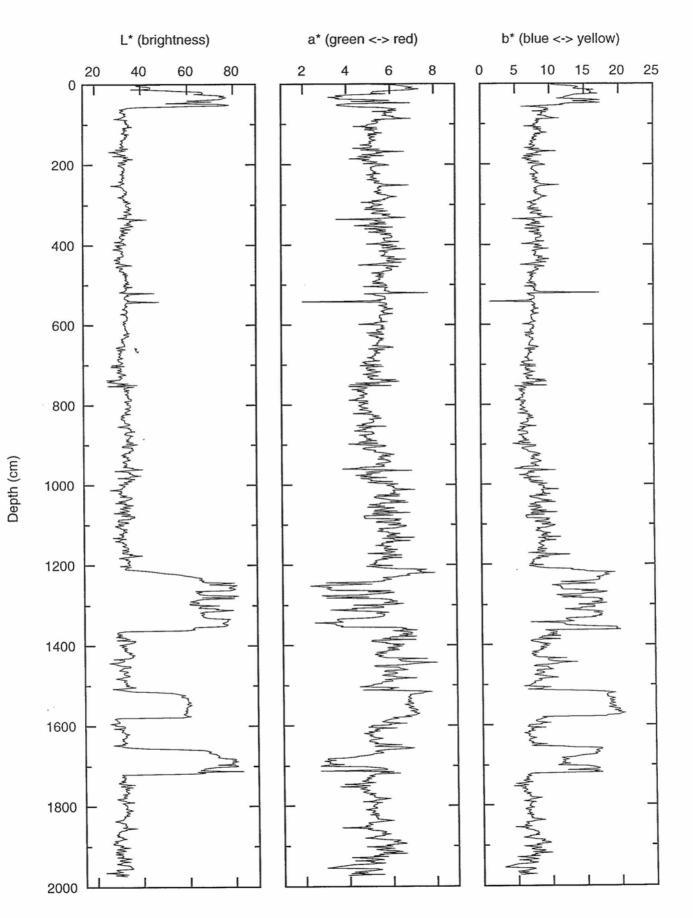
PC5: color



PC6: color

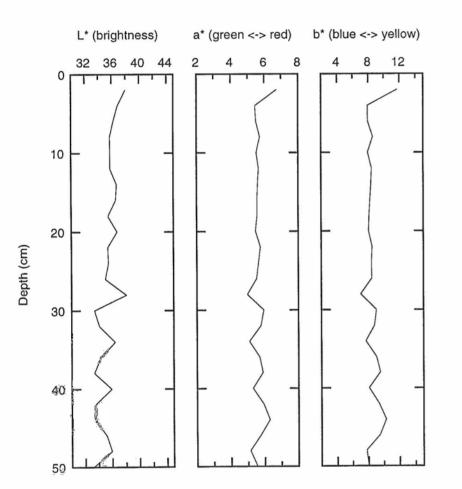


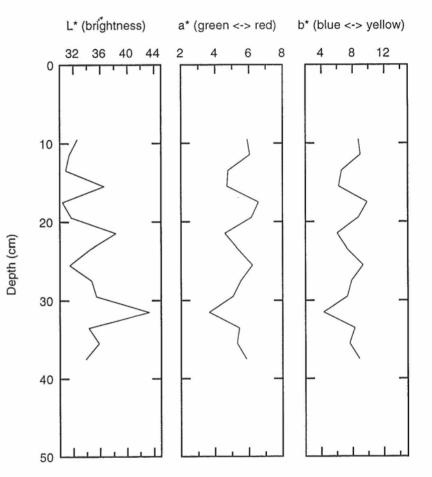




PC8: color





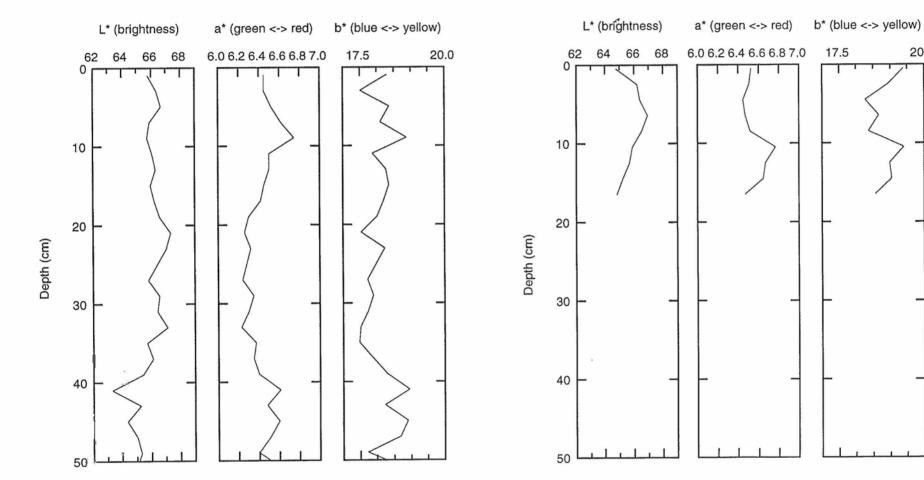


PC2: color

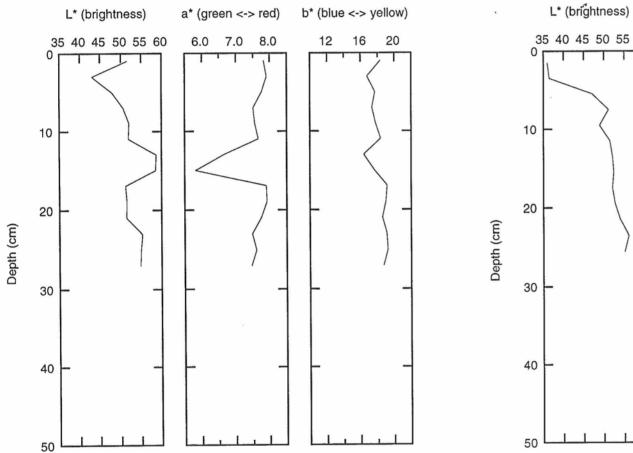
Piston Core

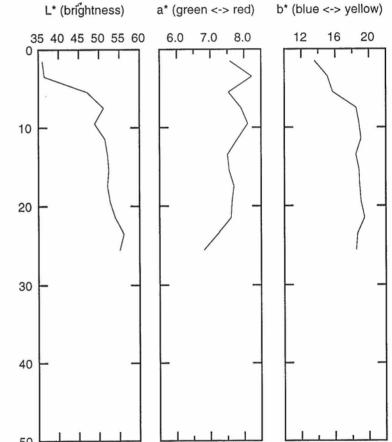


20.0

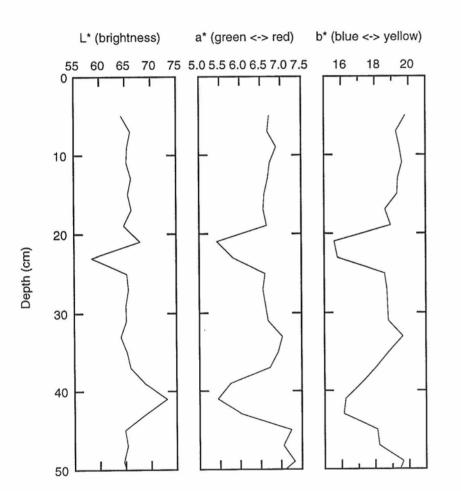


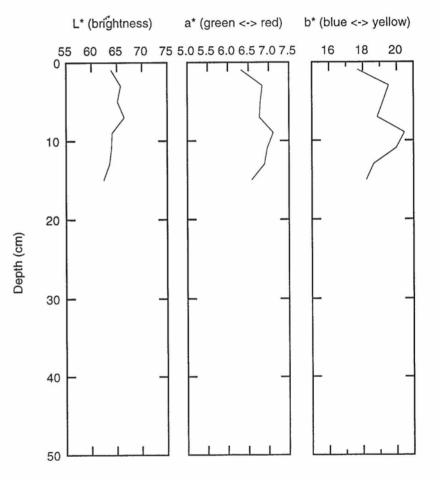
Pilot Core



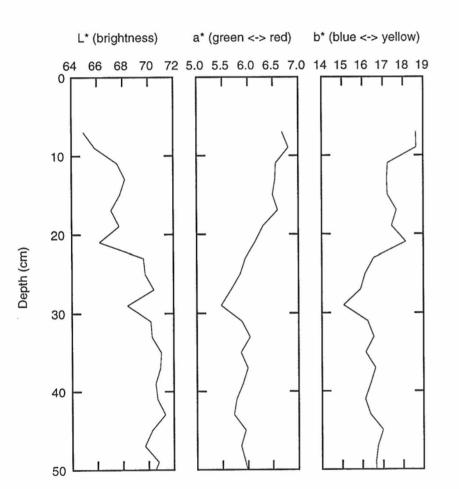


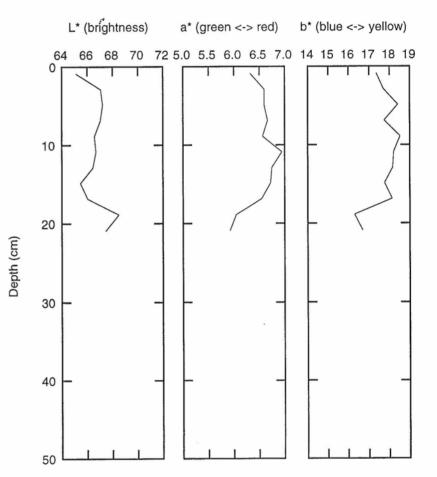
Pilot Core



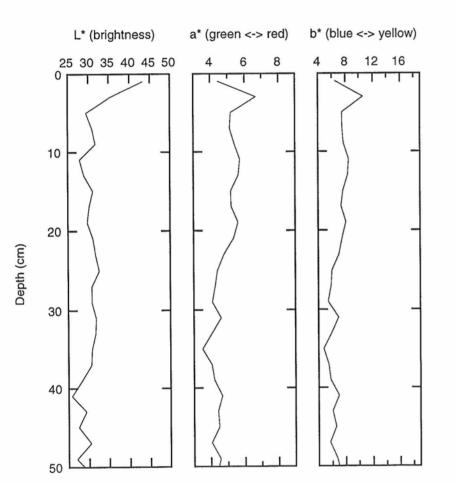


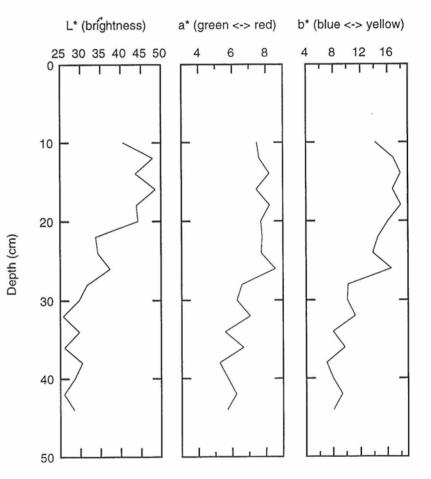
Pilot Core



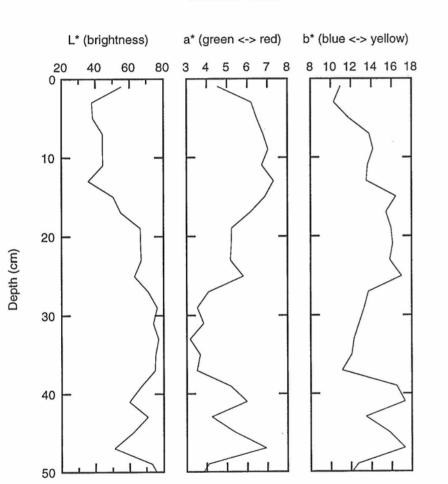








PC8: color



Piston Core

Pilot Core

