DREDGE SAMPLE LOG

			JD	LOCAL
CRUISE	KODOS97-4	DATE	237	8 25 97
STATION	1		GMT	LOCAL
DREDGE	D3	TIME	0205 - 0512	1405 - 1712
DEPTH INTERVAL(m)	3210 - 2480	LATITUDE (N,S)	on bottom 9° 130.86'	off bottom 9° 28.06'
DEPTH(m) CORRECTED	3180 - 3090	LONGITUDE (E,W)	166° 04.66'	166° 03.87'

TOTAL WEIGHT : DREDGE 185 Kg CRUST 40 Kg

%OF ROCK COVERED BY CRUST 20% w/crust 30% patina 50% discontinuous patina

%BROKEN FROM : OUTCROP 50% TALUS 50%

THICKNESS OF CRUST : MAX 30 mm MIN patina AVG 2 mm for all 5 mm for w/crust

DOMINANT SURFACE TEXTURE lizard skin, smooth (2°), minor botryoidal

SUBSTRATE LITHOLOGY Crusts are predominantly on hyaloclastite; patina on light & dark basalt; possible hydrothermally altered red rock including amygdaloidal basalt; hyaloclastite breccia; (0.3 Kg) limestone

~ 35% altered brown basalt, dark colored – very altered
~ 35% altered pale brown basalt
~ 10% breccia + hyaloclastite
~ 15% hydrothermally altered pillow basalt fragments – Red-brown
~ 4% vesicular + amygdaloidal basalts – misc –
~ <1% LMS + phosphorite

NODULES PRESENT ~ 0.5% – Lg nucleus nodules

REMARKS:

D3

KODOS
97-4
D3

Dredge Sample Summary Sheet

Sample ID	Bulk CC	Layer CC	Pt & Au	~~REE~~ CFA (Chem)	CC	DPTS/TS	XRD	35mm Photo	Archive	Paleo
D3-1A				✓	✓		✓			
D3-1B							✓			✓ (2mm)
D3-2A	✓		✓				✓			
D3-2B							✓			
D3-3A	✓		✓				✓			—
D3-3B	✓						✓			
D3-4A	✓		✓				✓			
D3-4B					✓		✓			
D3-5-1A					✓		✓			
D3-8-1A				✓	✓		✓			
D3-10A							✓			
D3-12-1A							✓			✓
D3-12-2A				do if CFA	do if CFA		✓			
D3-19-1A					✓		✓			
D3-14A					✓		✓			
~~D3-21A~~										

powder to KORDI

10g

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 **Size(cm):** 48cm×29cm×11cm **Location:** R1

Sample Id: D3-1 **Weight(kg):** 54lbs 125kg **Depth(m):** 3180-3090

Mn Crust Description

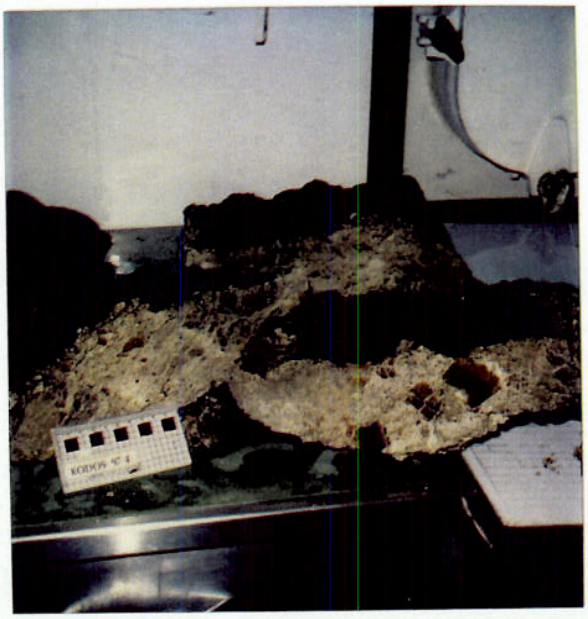
Surface Texture: granular where patina
Lizard skin where there is

Mn Crust Thickness(mm):

Min: patina Max: 20mm Ave: 2mm

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1	patina	20mm	2mm	massive black
2				
3				
4				
5				
6				



D3-1
KODOS 97-4

Comments and XRD Mineralogy:

single layer

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D3-1A	CFA, OC	Bulk substrate to matrix	15g
	XRD	Substrate - bulk matrix	
D3-1B	Palaeo	Limestone	5g
	XRD		

Substrate Description

RockType: Phosphorite Breccia

2/3 KORDI
1/3 USGS

Description: Yellow w/ red → brown clasts of hydrothermally altered basalt frags — angular & grey to brownish to differentially phosphatized matrix w/ white Lms lens & vein fill

ology: few encrusting forams

Described by: Leanne Roberts

Subsampled by: Hein

D3-1
KODOS 97-4

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 **Size(cm):** 40cm x 15cm x 9cm **Location:** R1
Sample Id: D3-2 **Weight(kg):** 25lbs | 11.4kg **Depth(m):** 3180-3090

Mn Crust Description

Surface Texture: Smooth → botryoidal → granular

Mn Crust Thickness(mm):

Min: 1 Max: 15mm Ave: 14mm

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1	1	15	14	massive black
2				
3				
4				
5				
6				

D3-2
KODOS 97-4

Comments and XRD Mineralogy:

single layer

Substrate Description

RockType: Phosphorite Breccia

Description: differentially phosphatized matrix w/ hydrothermally altered basalt clasts

Biology: encrusting forams on surface

Described by: Leanne Roberts

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D3-2A	XRD, CC, PGE	Bulk Crust 0-14mm	40g
D3-2B	XRD	Bulk Substrate	10g

2/3 HORDI

1/3 USGS

Subsampled by: Hein

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 Size(cm): 15cm x 14cm x 11cm Location: R1

Sample Id: D3-3 Weight(kg): 2.1 kg Depth(m): 3180 - 3090

Mn Crust Description

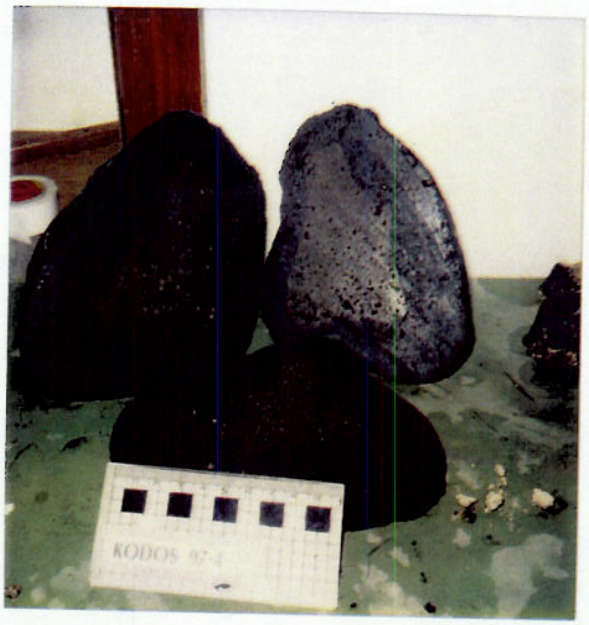
Surface Texture: granular to smooth (predominantly smooth)

Mn Crust Thickness(mm):

Min: 15 Max: 35 Ave: 25

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1	0	5	1	porous black
2	10	15	12	massive
3	5	20	12	porous black
4				
5				
6				



D3-3
KODOS 97-4

Comments and XRD Mineralogy:

Nodule
3 indistinct layers

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D3-3A	CC, PGE XRD	Bulk Top Crust 0-30mm	55g
D3-3B	CC XRD	Bulk Underside Crust 0-12mm	50g

60% USGS
40% NORDI

10 gm of D3-3A powder to NORDI

Substrate Description

RockType: Basalt, Vesicular

Description: altered olivine

ology: few encrusting forams

Described by: Leanne Roberts

Subsampled by: Hein

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 Size(cm): 14cm x 10cm x 8 1/2cm Location: R1

Sample Id: D3-4 Weight(kg): 1.3 kg Depth(m): 3180-3090

Mn Crust Description

Surface Texture: granular to micro-botryoidal to smooth

Mn Crust Thickness(mm):

Min: 5 Max: 10 Ave: 7

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1	5	10	7	very porous / black
2				
3				
4				
5				
6				

D3-4
KODOS 97-4

Comments and XRD Mineralogy:

crust is very porous - Columnar growth

Substrate Description

RockType: Basalt

Description: Olivine is completely altered

Biology: few encrusting forams

Described by: Leanne Roberts

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D3-4A	CC, PGE, XRD	Bulk Crust	0-7 mm 45g
D3-4B	DC, XRD	Bulk Substrate	40g

50% KORDI
50% USGS - All crust sampled for chem as well as part of substrate

Subsampled by: Hein

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 Size(cm): 4 rocks range in size from: 16x15x10 – 9x8x6 Location: R1

Sample Id: D3-5 Weight(kg): 2.4kg → 0.2kg Depth(m): 3180-3090

D3-5
KODOS 97-4

Mn Crust Description

Surface Texture: smooth → granular
group of 4 rocks

Mn Crust Thickness(mm):

Min: patina Max: 9mm Ave: 5mm

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

4 rocks with same substrate
crust is black massive on all

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D3-5-1A	XRD, OC	Bulk substrate	15g

45% USGS
55% KORDI

Substrate Description

RockType: hydrothermally altered Basalt → fresh basalt (on 3)
Rel.

Description: Basalt is altered on 1 (D3-5-1) and is grading to fresher on 2, 3, 4.

Biology: few encrusting forams

Described by: Leanne Roberts

Subsampled by: KY | T.Z

SAMPLE DESCRIPTION

3 rocks ranging in size from:

Cruse Id: KODOS97-4 Size(cm): 11x10x7 - 21½x 11 x9½ Location: R1

Sample Id: D3-6 Weight(kg): 3.1 - 0.9 Depth(m): 3180-3090

Mn Crust Description

Surface Texture: Lizard skin → granular

Mn Crust Thickness(mm):

Min: 0 Max: 15 Ave: 10

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

D3-6
KODOS 97-4

Comments and XRD Mineralogy:

3 rocks w/ crusts that are predominately massive and black

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
	40% USGS		
	60% KORDI		

Substrate Description

RockType: Basalt

Description: Brown basalt w/ vesicles some vesicles filled in w/ ? calcite & zeolite

Biology: few encrusting forams

Described by: Leanne Roberts.

Subsampled by:

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 Size(cm): 3 rocks ranging in size from 14×8×4 – 16×10×8 Location: R1

Sample Id: D3-7 Weight(kg): 0.4-1.5 kg Depth(m): 3180-3096

D3-7
KODOS 97-4

Mn Crust Description

Surface Texture: lizard skin → subdued botryoidal → granular

Mn Crust Thickness(mm):

Min: 2 Max: 20 Ave: 13

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

3 rocks w/ black massive crusts

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
—			
	30 % USGS		
	70 % KORDI		

Substrate Description

RockType: Phosphorite Breccia

Description: substrate differentially phosphatized giving brecciated appearance red-brown clasts might be hydrothermally altered Basalt, few yellow lenses of CFA.

Biology: few encrusting forams

Described by: Leanne Roberts

Subsampled by:

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 Size(cm): 3 rocks ranging in size from: 10x8x6 — 16x11x10 Location: R1

Sample Id: D3-8 Weight(kg): 1.3 - .35 Kg. Depth(m): 3180-3090

Mn Crust Description

Surface Texture: granular → micro botryoidal → botryoidal → lizard skin

Mn Crust Thickness(mm):

Min: patina Max: 30mm Ave: 15mm

Outer to Inner Layers(mm)

		Min	Max	Ave	Texture & Color
RX	1				
RX	2				
RX	3				
	4				
	5				
	6				

D3-8
KODOS 97-4

Comments and XRD Mineralogy:

3 rocks w/ crust from porous to massive

Substrate Description

RockType: Breccia

Description: Brown to grayish Basalt clasts in a CFA cement (2 samples including D3-8-1)
Brown Basalt & altered Basalt (vugs filled w/ calcite) in a Mn-oxide cement

Biology: few encrusting forams on surface

Described by: Leanne Roberts

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D3-8-1A	OC, CFA Chem XRD	CFA layer	12g

75% KORDI
25% USGS

Subsampled by: Hein

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 Size(cm): 6 rocks ranging in size from: 4x6x5 - 11x9x8 Location: R1

Sample Id: D3-9 Weight(kg): 0.2-0.8 kg Depth(m): 3180-3090

Mn Crust Description

Surface Texture: granular → microbotryoidal → botryoidal → lizard skin

Mn Crust Thickness(mm):

Min: 0 Max: 10 Ave: 6

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

D3-9
KODOS 97-4

Comments and XRD Mineralogy:

6 rocks w/ crusts from porous to massive

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)

5/6 To HORDI

1/6 To USGS

Substrate Description

RockType: Basalt

Description: Brown Basalt w/ some vesicles filled w/ zeolites

ology: few encrusting forams.

Described by: Leanne Roberts.

Subsampled by:

SAMPLE DESCRIPTION

4 nodules ranging in size from

Cruse Id: KODOS97-4 **Size(cm):** 9x6x6 – 10x6½x8 **Location:** R1

Sample Id: D3-10 **Weight(kg):** 0.5 – 0.3 kg **Depth(m):** 3180-3090

D3-10
KODOS 97-4

Mn Crust Description

Surface Texture: granular → microbotryoidal → botryoidal → smooth

Mn Crust Thickness(mm):

Min: 7 Max: 25 Ave: 20

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

4 nodules each with 2 crustal layers, 1st (outer layer) is black & massive while inner layer is red-black & porous.
1st layer ~10-15 mm
2nd layer ~0 – 10 mm

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
—			
D3-10A	XRD	Substrate	5g

50% USGS
50% HORDI

Substrate Description

RockType:
Basalt

Description: Brown basalt w/ vesicles
few vesicles filled w/ zeolites

Completely altered to clays w/ relict basalt texture

ology: few encrusting forams

Described by: Leanne Roberts

Subsampled by: Hein

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 Size(cm): 3 rocks ranging in size from: 9½x7x5½–9x9x8 Location: R1

Sample Id: 3-11 Weight(kg): 0.9 – 0.5 kg Depth(m): 3180 – 3090

D3-11
KODOS 97-4

Mn Crust Description

Surface Texture: granular → microbotryoidal → lizard skin

Mn Crust Thickness(mm):

Min: patina Max: 10 Ave: 7

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

each rock (3) has a single layer of black massive crust

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
—			

50% todorokite
50% vernadite

Substrate Description

RockType: Basalt

Description: basalt w/ some alteration to clay minerals (1), complete in places

ology: encrusting forams on surface

Described by: Leanne Roberts

Subsampled by:

SAMPLE DESCRIPTION

8 rocks ranging in size from:

Cruse Id: KODOS97-4 **Size(cm):** 7×5½×4 - 4×2×2 **Location:** R1

Sample Id: D3-12 **Weight(kg):** 0.15 - 0.03 kg **Depth(m):** 3180 - 3090

D3-12
KODOS 97-4

Mn Crust Description

Surface Texture: NONE

Mn Crust Thickness(mm):

Min: 0 Max: patina Ave: _____

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

—

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D3-12-1A	paleo, XRD	Carbonate	5g
D3-12-2A	XRD	Pale Brown	5g

60% KORDS
only all of D3-12-2A to USGS ≈ 40%

Do OC if 2A is CFA

Substrate Description

RockType: 1 sample limestone (D3-12-1)
7 samples of phosphatized limestone (D3-12-2) w/ thin crusts.

Description:

ology: NONE

Described by: Leanne Roberts.

Subsampled by:

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 **Size(cm):** 7x5x4.5 to 11x8x4 **Location:** R1

Sample Id: D 3-13 **Weight(kg):** 1.3 kg **Depth(m):** 3180-3090

Mn Crust Description

Surface Texture: granular patina on some

Mn Crust Thickness(mm):

Min: <1mm Max: <1mm Ave: <1mm

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

Substrate Description

RockType:

(hydrothermally-altered)

Description: 7 pieces of highly-altered basalt (reddish-brown to yellow)
vesicles <1mm
CFA in veins
minor zeolites in some vesicles
One sample has vesicles up to 11mm lined with calcite or filled w/ zeolite

ology:

Described by:

Susie Zielinski

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)

half of each piece taken by USGS

Subsampled by:

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 **Size(cm):** 12x12x6 to 24 x 19 x 12 **Location:** R1

Sample Id: D3-14 **Weight(kg):** 35.5 kg **Depth(m):** 3180-3090

Mn Crust Description

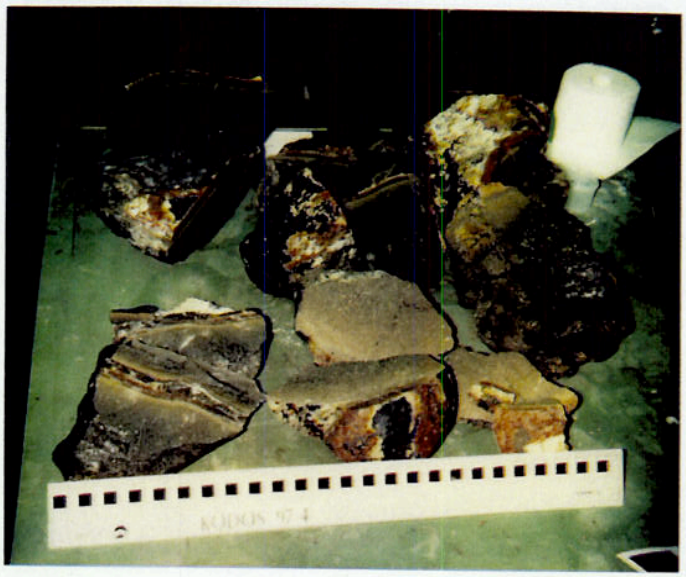
Surface Texture: granular patina

Mn Crust Thickness(mm):

Min: <1mm Max: 2mm Ave: 1mm

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				



D3-14

Comments and XRD Mineralogy:

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
2 pieces taken by USGS			
20% USGS 80% KORDI			
D3-14A	OC	Substrate hydrothermally altered rind 0-20mm	~25g
(D3-14A 2nd Piece		0-20mm	~30g)

Substrate Description

RockType: 8 pieces of altered vesicular basalt (hydrothermally altered) Pillow fragments

Description: basalt altered to clay. Samples show distinct alteration layers dark brown at base → light brown → reddish brown just below Red altered glassy rind. Vesicles <1mm to 2mm, some filled with zeolite. Veins are more common near surface & subparallel, filled with CFA

~~Biology~~:

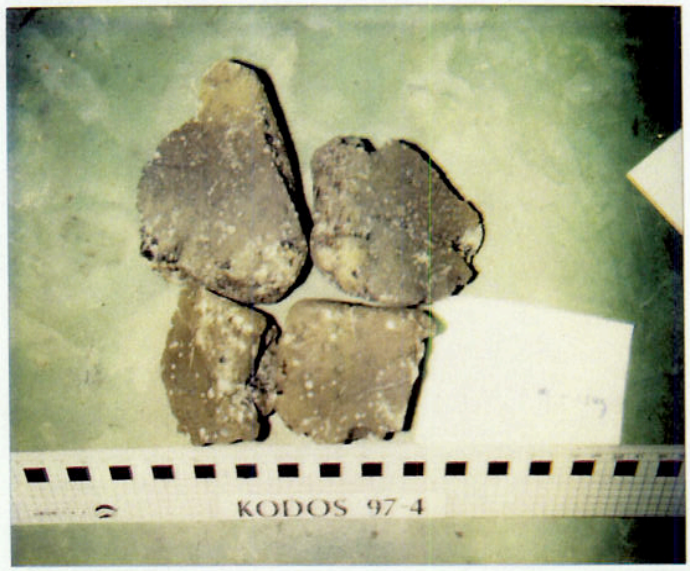
Described by: Susie Zielinski

Subsampled by:

SAMPLE DESCRIPTION

Cruse Id: KODOS97-4 **Size(cm):** 10×8×8 11×7×6 **Location:** R1

Sample Id: D3-15 **Weight(kg):** 1.3 kg **Depth(m):** 3180 - 3090



D3-15

Mn Crust Description

Surface Texture: no crust

Mn Crust Thickness(mm):

Min: _____ Max: _____ Ave: _____

Outer to Inner Layers(mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)

All to NORDI

Substrate Description

RockType: altered basalt

Description: 2 pieces vesicular basalt altered to clay minerals
some CFA in veins
vesicles lined with calcite in one, filled with zeolite in the other
- one vesicle filled with quartz(?) or phillipsite(?)

ology:

Described by: Susan Zielinski

Subsampled by: