DREDGE 11

Dredge Sample Summary Sheet

Sample ID	Bulk CC	Layer CC	Pt & Au	Ree	OC	DPTS/TS	XRD	35mm Photo	Paleo	Archive
D11-1									2X	
D11-2	2X		X X	X	X		2X		X	
3						X	2X			
4									X	
5									X	
6			X		X	X	X			
7			X		X	X	2X			
8			X		X	X	X	(4)		
9	7X		2X 2X	4X		3X	7X	x-section		
10	X		X X	X		X	X			
11					X	X	X			
12			X		X	X	2X			
13			X		X	X	4X			
14						X	X			
15							X			
16										
17										
18			X		X	X	X			
19							X			
20						X	X			
21							X			
22			X		X	X	X			
23										
24										
25										
26			X		X	X	X			
27			X			X	X			
28										
29										
30										
31										

32

X

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): _____ Location: YAP D

Sample Id: D11-1 Weight (kg): _____ Depth (m): 2300-2280

Mn Crust Description

Surface Texture:

No Photo

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:

2 Types of Mud
① Biege Mud
② White nanno-plankton mud taken from largest boulder- D11-3

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D11-1A	Paleo	(Biege Mud)	
D11-1B	Paleo	(White Mud)	

Substrate Description

Rock Type:

Description:

Biology (?):

Described by: gfgp

Subsampled by: gfgp

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 75×30×35 Location: YAP D

Sample Id: D11-2 Weight (kg): 75 Depth (m): 2300 - 2280

USGS D11-2

Mn Crust Description

Surface Texture: Granular on large botryoids (average 3 cm) with deep subdued parts.

Mn Crust Thickness (mm):

Min: <1 Max: 12 Ave: 10

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	<1	12	10	Massive on top, porous on side.
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

· Carbonate mud and sand in subdued part of crust surface

Substrate Description

Rock Type: Pebbly Manganiferous Sandstone

Description: Cruddy layered w/mud lenses

· Clasts: basalt, mudstone

· matrix: basalt sand, clastic mud (yellowish brown) and calcite sand (<5%)

· partially cemented by manganese

Biology (?): Encrusting forams abundant

Su

from Central Top Surface (71.5 gm)

D11-2A CC, Pt, Au, RKE Bulk Crust (0-10 mm)

D11-2B CC (24 gm) Bulk Mn SS from (21 gm) OC, ≈ 26 cm down from Paleo Top surface

only 'IXED for 2B'

35% YORDI

65% USGS

D11-2C ICP, OC 15.3 g

→ least mineralized part of the SS

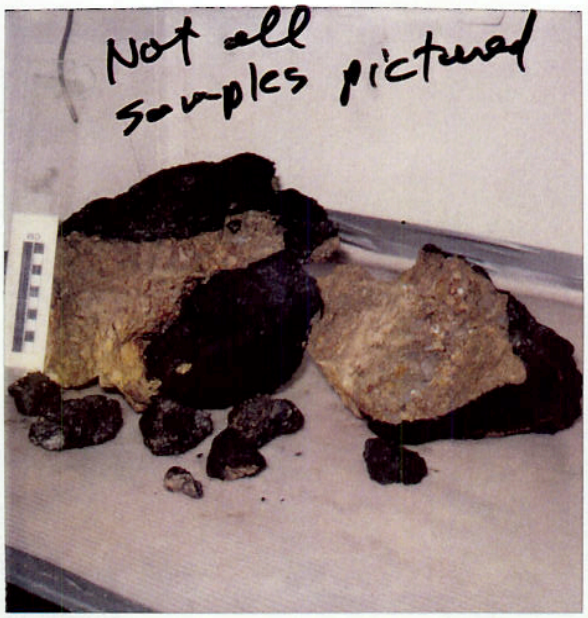
Described by: Yoshi

Subsampled by: HEIN

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 4.7 x 34 x 14 ~7 x 4 x 3 Location: YAP D

Sample Id: D11-3 Weight (kg): 30 Depth (m): 2300-2280



D11-3

Mn Crust Description

Surface Texture: granular and irregular botryoidal

Mn Crust Thickness (mm):

Min: <1 Max: 10 Ave: 5

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	<1	10	5	Porous, black
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

Some pores are filled with Fe-oxide.

Substrate Description

Rock Type: Breccia (yellowish brown); Sandstone, pebbly SS

Description:

Clasts: basalt and mudstone fragments

Matrix: yellowish-brown sands and muds, and white calcite sands

waxy-sheared patches of some kind of clay(?) = XRD; bedded: SS, pebbly SS, breccia, grain-supported pebble layers.

Biology (?): Encrusting forams

Subsampl

D11-3A XRD waxy sheared clay

D11-3B TS SS below pebble

XRD SS Layer in large sample

60% USGS

40% RORDI

5 cobbles (1 small boulder)

& 4 large pebbles

Described by: Yoon

Subsampled by: HEIN

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 30x21x14 ~5x5x4 Location: YAPD

Sample Id: D11-4 Weight (kg): 35 Depth (m): 2300~2280

D11-4

Mn Crust Description

Surface Texture: Irregular to granular

Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave: Patina

Outer to Inner Layers (mm)

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

Comments and XRD Mineralogy:

Sub

D11-4 paleo - piece w/ shell Frags.

Substrate Description

Rock Type: Breccia (green)

60% USGS
40% HORDI

Description: Angular to subrounded clasts of basalt, metamorphic rock, limestone, hydrothermal, altered clasts, breccia, serpentine are dispersed in greenish mud, white calcite, and basaltic sands, some w/ serpentine round matrix matrix supported, poorly sorted - clasts to 8 cm; rare Qtz veins

2 bags of pebble Frags. - 1 to hor
2 " " " "
with Crusts on them - 1 to HORD

Biology (?): Encrusting forams

Described by: Yoon

Subsampled by: HEIN

D11-4
D11-3
D11-2
Type breccias

SAMPLE DESCRIPTION

Rounded 1" pebbles & cobbles 16.4 x 15.3 x 6

Cruise Id: F11-90-CP Size (cm): 14 x 12.5 x 5 Location: YAP D

Sample Id: D11-5 Weight (kg): 2.8 Depth (m): 2300-2280

Mn Crust Description

Surface Texture: Absent

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:

Subsa

D11-5 Polar

Substrate Description

Rock Type: Foraminiferal Lms - Micrite. Beige - not replaced

Description: Micrite containing forams with lens of sparse angular silica fragments at one surface

Some boring lined w/ Mn oxides

Biology (?): Mn oxides forams

50% USGS
50% HORDL

Described by:

Subsampled by: HEIN

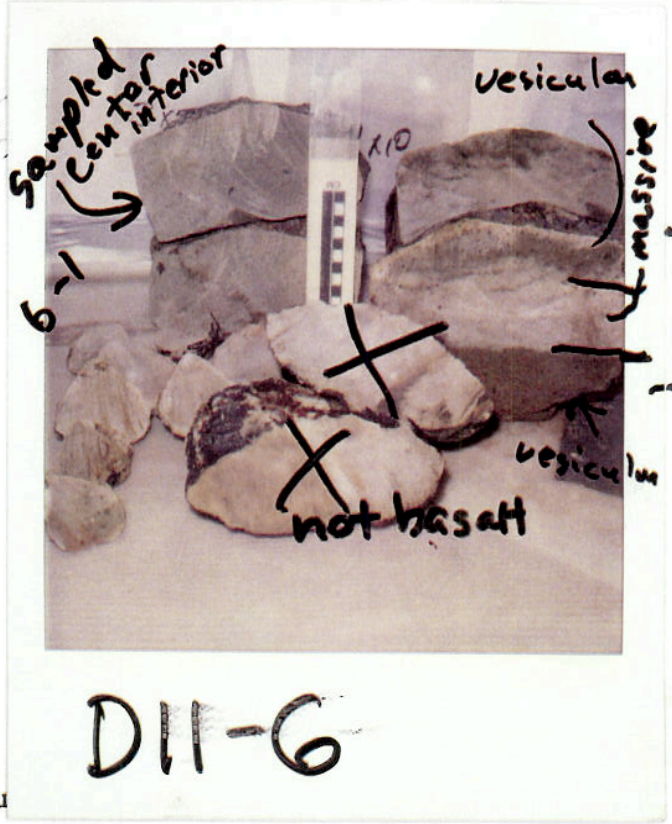
SAMPLE DESCRIPTION

2 bags of uncut pebbles

6 pebbles + 2 cobbles: 23 x 19 x 16

Cruise Id: F11-90-CP Size (cm): 7.5 x 9.5 x 4.5 Location: YAP D

Sample Id: D11-6 Weight (kg): 20 Depth (m): 2300 - 2280



Mn Crust Description

Surface Texture: Smooth (patina) a Granular Cones w/ some crust - Dominantly a Patina

Mn Crust Thickness (mm):

Min:_____ Max: Patina Ave:_____

Outer to Inner Layers (mm)

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

Comments and XRD Mineralogy:

One basalt broken; the inner outer edge is altered pale green and is peppered w/ Mn

Subsa

D11-6-1 OC, Au basalt (69g

D11-6-1 TS basalt

Substrate Description

Rock Type: Slightly vesicular Basalt, Grey

Description: Aphanitic (fine grain) basalt w/ minor small phenocrysts — altered red brown possiblily olivine and plagioclase (green & white)

Biology (?): <1% Encrusting Forams

End Piece of largest Rx to HORDI, 20%

rest USGS = 80%

1 bag pebbles to HORDI

1 bag pebbles to USGS

Described by: JW

Subsampled by: Hein

largest cobble w/ some Fe staining = 1 flow unit w/ vesicles at top & bottom of flow.

one pebble w/ prehnite(?) in vesicles

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 21x20x15 12x9x6.5 Location: YAP 2

Sample Id: D11-7 Weight (kg): 11.4 Depth (m): 2300-2280

D11-7

7-1

glassy rind

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness (mm):

Min:_____ Max: Patina Ave:_____

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1				Black, to stained
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

Subsan

D11-7-1A	OC, Au	bulk Rx	38gm
D11-7-1B	XRD	glassy rind	
D11-7-1	TS	rind + bulk Rx.	

Substrate Description

Rock Type: Basalt, gray Serpentinized

Description: Phaneritic Basalt w/ possible epidote (green), plagioclase (white), and serpentine (shiny metallic silver)

Glassy rim on one view all serpentine

Biology (?): 1% Encrusting foram

Described by: J.W.

Subsampled by: G.S.

common microfracturing, minor fractures filled with calcite, Rx Fe stained orange yellow some Fe stained fractures

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 16 x 12 x 8 / 6.3 x 5 x 4.5 Location: TAP D

Sample Id: D11-8 Weight (kg): 3 Depth (m): 2300-2280

D11-8

Mn Crust Description

Surface Texture: Granular

Mn Crust Thickness (mm):

Min:_____ Max: Patina Ave:_____

Outer to Inner Layers (mm)

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

Comments and XRD Mineralogy:

Subsa

D11-8-1 OE, Au Bulk Rx. 25g
TS

Substrate Description

Rock Type: Altered Basalt, Grey + Orange yellow - Serpentinized + hydrothermally altered

60% PSGS
40% Korea

Description: Altered Basalt w/ 3 Alteration Rings
center is dark (minor staining) gray, middle is Orange yellow outer is light grey to a submetal. Smallest rock w/ gray only the last 2 rings

different degree of iron staining

Biology (?): 21% encrusting foram

Described by: [signature]

Subsampled by: G.S

Basalt is aphanitic w/ medium sized altered/undistinguished phenocrysts

SAMPLE DESCRIPTION

≈ 70 pebbles + small pebbles

Cruise Id: F11-90-CP Size (cm): 9x8x5, 8x5.5x3.5 ← Largest Pieces Location: YAP D

Sample Id: D11-9 Weight (kg): ~2 Kg Depth (m): 2300-2280

Mn Crust Description

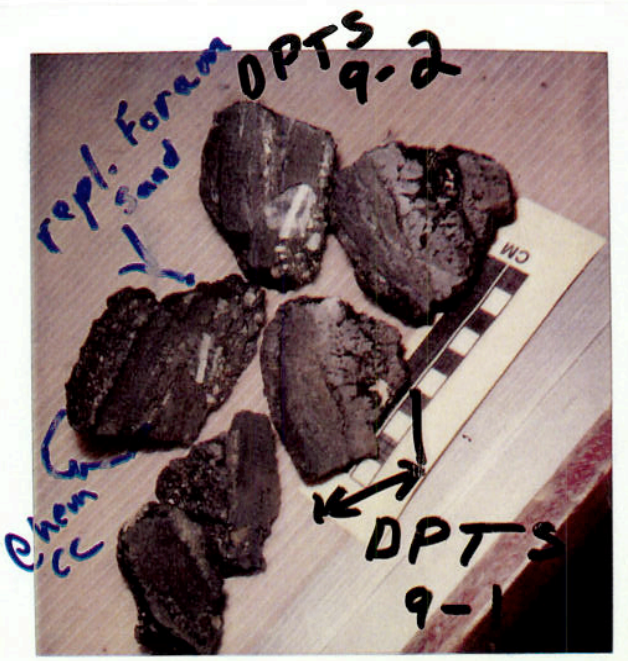
Surface Texture: Rough - Microbotryoidal, to botryoidal

Mn Crust Thickness (mm):

Min: <1 Max: 8 Ave: 5

Outer to Inner Layers (mm)

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



D11-9
F11-90-CP

Comments and XRD Mineralogy:

2 larger pieces have hydrogenetic crust that is dark and more resinous than the hydrothermal Mn.

Substrate Description

Rock Type: Stratabound Manganese Oxides w/ thin crusts of Hydrogenetic Mn

Description: Many small pieces of stratabound Mn many have botryoidal and chaotic layers. large piece [illegible] Some foraminifera (recent) sand in some pieces

Biology (?): [illegible] Foraminifera

Described by:

Subsample No

D11-9-1 DPTS, CC, REE, [illegible] (18 gm) Bulk strata bound Mn

V. Porous ✓ Couldn't remove all mud

D11-9-2 DPTS, CC (14 gm)

D11-9-3 CC, REE, Pt, Au (49 gm) steel grey layer

D11-9-4 CC, REE steel grey (2[illegible]

D11-9-5 CC, " " botryoidal (15[illegible]

D11-9-6 CC, REE, Pt, Au (40gm) layer

D11-9-7 (22gm) CC DPTS - 8 layers - grey-brown

Several pieces of interesting morphology stored in water ?

25mm slab D11-9-1+2 JS

Subsampled by: [illegible] HEIN MISC pieces in water

Continued in back subsamples

All the larger pieces are in part replaced foram sands - foraminifera [illegible]

No hydrogenetic layer, cont. with chemistry

(22 gm) CC, [illegible] Couple to other half of pebble to CC

D11 - 9 - 8 Paleo Mn replaced foram sand

Misc. frag

D11 - 9 - 9 Frag. w/ only one layer Bulk Hydrothermal crust (0 - 6mm) O_2 isotopes + XRD

7.3gm

D11 - 9 - 10 A (0-1 mm) (3.4 gm) Hydrothermal Crust

- 10 B (1-6 mm) (7.3gm)

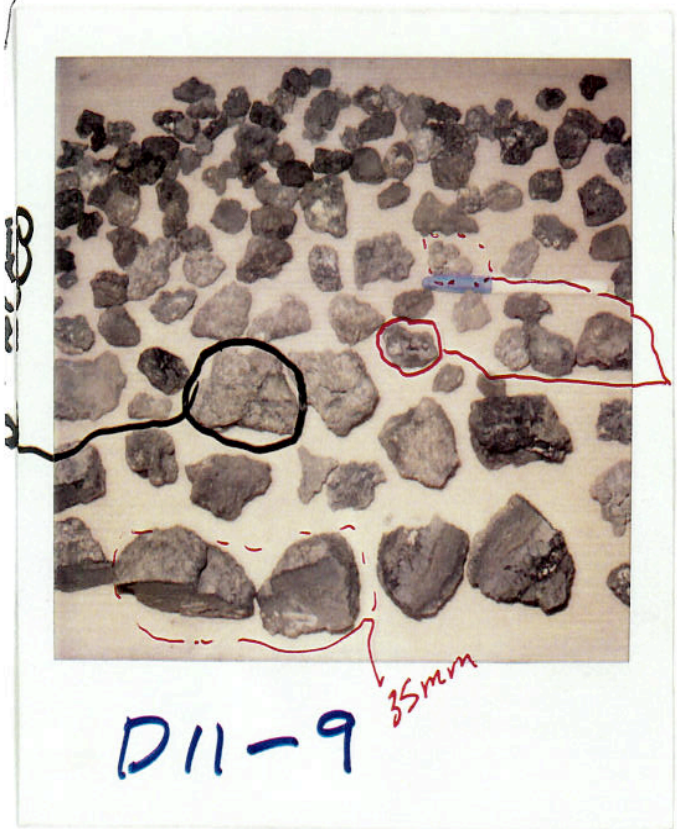
- 10 C (6-17mm) (3.5gm) O_2 isotope + XRD

Paleo #8

G.S. + JW

D11 - 9 - 11
XRD for pyrolusite

D11 - 9 - 12
XRD, DPTS
is pyrolusite



SAMPLE DESCRIPTION

+ 2 bags [illegible]

Cruise Id: F11-90-CP Size (cm): 9 Cobble sized pieces Location: YAP D

Sample Id: D11-10 Weight (kg): 4 Depth (m): 2300-2280

Mn Crust Description

Surface Texture: Botryoidal to granular

D11-10

Mn Crust Thickness (mm):

Min: 2 Max: 10 Ave: 8

ON one of the 9 pieces

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	2	10	8	Black, porous with Fe stain. Thicker To one side
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

Botryoids are max of 10mm Averaging 5mm. The Mn crust is patchy possibly due to current or orientation on the sea floor

Su

Substrate Description

Rock Type: Manganiferous Breccias

D11-10A DPTS - Bulk Mn SS

D11-10A CC, Pt, Au, REE, XRD Bulk Mn SS

Description:

Color varies from black to grey

Clasts: Basalts, Foram Limestones, Serpentinized Breccias

Matrix: Manganese impregnated fine to medium grain rock fragment - all samples are matrix supported.

40% KORDI

60% USGS

2 small bags of Frags - pebbles of D11-10 & D11-2

1 To KORDI

1 To USGS

Biology (?): Encrusting forams

Described by:

Subsampled by: HEIN

GS

95% Angular to subangular 5%

Voids - vugs filled w/ botryoidal hydrothermal Mn also in some layers

Nice one in Bag

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 17 x 14 x 10 Location: YAP D

Sample Id: D11-11 Weight (kg): 8.7 Depth (m): 2300-2380

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness (mm):

Min: _____ Max: Patina Ave: _____

Outer to Inner Layers (mm)

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

Comments and XRD Mineralogy:

Subsa

D11-11 TS Bulk Rx 35g

OC

XRD

Substrate Description

Rock Type: meta-volcanic

Description: Highly altered Volcanic rock, fine grained uniform texture with probably black pyroxene crystals, some fractures

Biology (?): <1% encrusting forams

70% USGS

30% HORDI

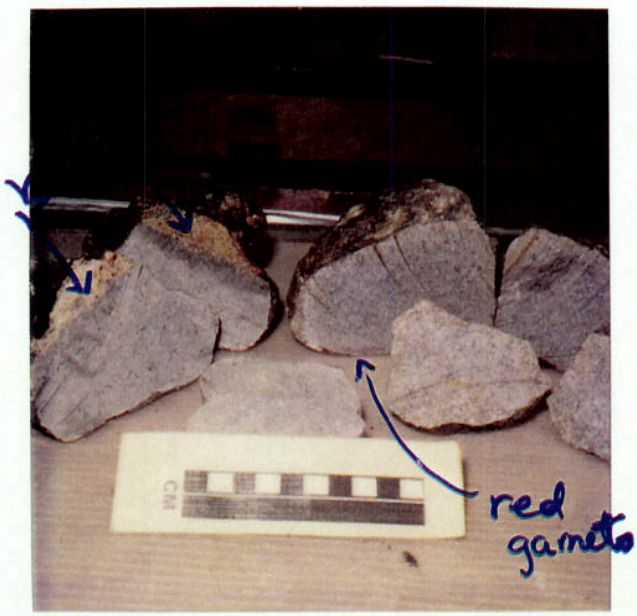
Described by: JH

Subsampled by: GS

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 6x11x7.5 / 1.5x5x3.3 Location: YAP 2

Sample Id: D11-12 Weight (kg): 5.9 Depth (m): 8300-2280



D11-12

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness (mm):

Min:_____ Max: Patina Ave:_____

Outer to Inner Layers (mm)

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

Comments and XRD Mineralogy:

Sub

D11-12-1A TS, Dc, Au, XRD 23
Bulk Rx
freshest

D11-12-1B XRD red rim

60% USGS
40% HORDI

possibly w/ nepheline

Substrate Description

Rock Type: Meta-Basalts, bluish grey

Description: Highly altered fine grained Basalt w/ small dark grey, high blue recrystallized grains Outer edge - to stained (red to yellow) Rare fracture filled w/ calcite

Biology (?): <1% encrusting forams

Described by:

JH

one basalt w/ a volcanic breccia layer (Rale pr
pebble to sand sized subangular clasts
all except one in some tiny to small gas or Fe oxide
rimming the rock

Subsampled by: G.S.

in place

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 14 x 13.5 x 12.5 / 9.5 x 6 x 3.5 Location: XARD

Sample Id: D11-13 Weight (kg): 7.3 Depth (m): 2300-2280

D11-13

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness (mm):

Min:_____ Max: Patina Ave:_____

Outer to Inner Layers (mm)

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

Comments and XRD Mineralogy:

Subs

D11-13-1 Oc, Au, Ts, XRD Bulk Rx
Freshest 54gm

D11-13-2A XRD outer green-white rim
-2B XRD next red-white rim
-2C XRD main Rx

50% KORDI
50% USGS

all grains fractured + laced w/ magnetite

Substrate Description

Rock Type: Blue gneiss
Greyish blue - Metamorphosed Ig. Rock

Description: Crude gneissic texture, medium to coarse grained. Probably a highly altered mafic igneous rock, minor iron staining

Biology (?): <1% Encrusting Forams

Described by: J.W.

Subsampled by: G.S.

largest cobble contains red, tiny gr... (2-3%) rimming the edge
Few rocks have a distinctive rim with slightly larger smaller grains, a lighter color shade than the centered rock, and some white minerals, zeolite (?) or prehnite (?) along the outer edge. Some with a thin brown volcanic breccia layer on top or surrounding the meta Ign. Rx

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 9 Cobble sized pieces Location: YAP D

Sample Id: D11-14 Weight (kg): 5 Depth (m): 2300 - 2280

Mn Crust Description

Surface Texture: [illegible] to granular [illegible] Some places smooth [illegible] between pieces

Mn Crust Thickness (mm):

Min: _____ Max: Patina to 1mm Ave: Patina

Outer to Inner Layers (mm)

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

14-1

D11-14

Comments and XRD Mineralogy:

Botryoids present are <1mm

Sub

D11-14-1 TS, XRD Bulk Breccia

Paleo

60% USGS

40% HORDI

Substrate Description

Rock Type: Breccia

Description: Clasts: High Fe content hydrothermally altered to serpentized basalts, gabbros (?) diorites? serpentinite } clasts of The previous Rx. Types

Matrix: grey to white to pale yellow fine grained, calcite

the pale yellow matrix contains flecks of black manganese (?)

Slightly magnetic

Biology (?): Encrusting Foram

Described by: GS

Subsampled by: G.S.

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 4x4.5x7 Location: YAP D

Sample Id: D11-15 Weight (kg): 0.15 Depth (m): 2300-2280

D11-15

Mn Crust Description

Surface Texture: Smooth and granular

Patina

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:

· sample is partly encrusted by a thin Mn-layer.

S

D11-15 XRD Bulb RX

Substrate Description

Rock Type: Metamorphosed Diorite(?) 50% HORDI

pervasively serpentinized 50% USGS

Description:

incomplete. · fine grained garnet (0-5%) (unknown?) 1-2% 97% Pale + peppered with light dull minerals. Darker minerals are mostly green serpentine? pendolite ? olivine(?))

Biology (?): White minerals are Hydrogen carbonate

A Fe stained fracture cuts the rock.

Described by: Ahn & G.S.

Subsampled by: G.S.