Dredge 11

# USGS DREDGE LOG

SHIP/LEG FD-[illegible]

STATION # 15

DREDGE # D11

DEPTH INTERVAL(m) 1870 - 1465

DEPTH(m)corrected 1870 - 1690

DATE JD 262 LOCAL 20 September 1989

TIME GMT 23:48:07 LOCAL _____

LATITUDE 11°36.97 TO 11°39.02' N

LONGITUDE 161°41.06 TO 161°39.24' E

TOTAL WEIGHT: DREDGE 450 CRUST 350

PERCENTAGE OF ROCK COVERED BY CRUST 100

PERCENT BROKEN FROM: OUTCROP 100 TALUS 0

THICKNESS OF MN CRUST: MAXIMUM ~~120~~ 170 MINIMUM 10 AVERAGE ~~100~~ 110

DOMINANT SURFACE TEXTURE Botryoidal

SUBSTRATE LITHOLOGY Volcaniclastic Breccias; phosphorite?, basalt?

NODULES PRESENT 0

REMARKS:

3 fragments 5 large fragments; 4 medium fragments

bunch of small pieces

D11-1, Row of Shark Teeth + other fossils - Igneous breccia - Cut in Palo Alto

Cruise Id: F10-89-CP Size: 80X18X30 (cm) Location: Lamilik

Sample Id: D11-1 Weight: 110 (kg) Depth: 1870-1690 (m)

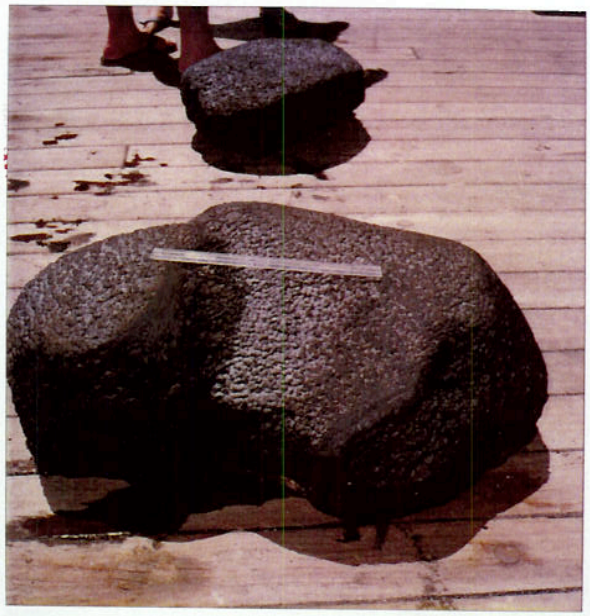
**Mn Crust Description**

Surface Texture: Botyroid surface partially smoothed due to dredging

Mn Crust Thickness (mm):
Min: Max: 180 Ave: 140

Layers (Outer to Inner)(mm):

| Min | Max | Ave | Texture & Color |
|---|---|---|---|
| 1. | | 8 | massive botryoidal |
| 2. | | 20 | vuggy - Fe-oxide stain |
| 3. | | 8 | massive black |
| 4. | | 22 | Vuggy, filled w/ Phosphate $CO_3$ |
| 5. | | 25 | massive black |
| 6. | | 30 | micro pores Fe-stain |
| | | 25 | massive, black, located in phos veins |



D11-1
F10-89-CP

Comments and XRD Mineralogy:
Medium sized and depth botryoids granular on two sides, probal lower granular crust

**Substrate Description**

Rock Type: 1. Volcanic Breccia (2) Cobble nucleus to one side = bedded SS + Mudst

Description:
Number of Shark's Teeth and fossils - Mod. Sorted brown to yellow-green pebbles & granules w/ phosph + ; Apatite lenses & veins - Mn Cement ; (2) graded beds - yellow-green + Carbonate lenses?

Biology ?:

ANALY

| Subsample Number | Analysis | LayerThickness |
|---|---|---|

Described By: Subsampled By:

D11-1
F10-89-CP

Cruise Id: F10-89-CP Size Length 750mm (cm) Location: Lomilik

Sample Id: D11-1 Weight: 110 (kg) Depth: 1870-1680 (m)

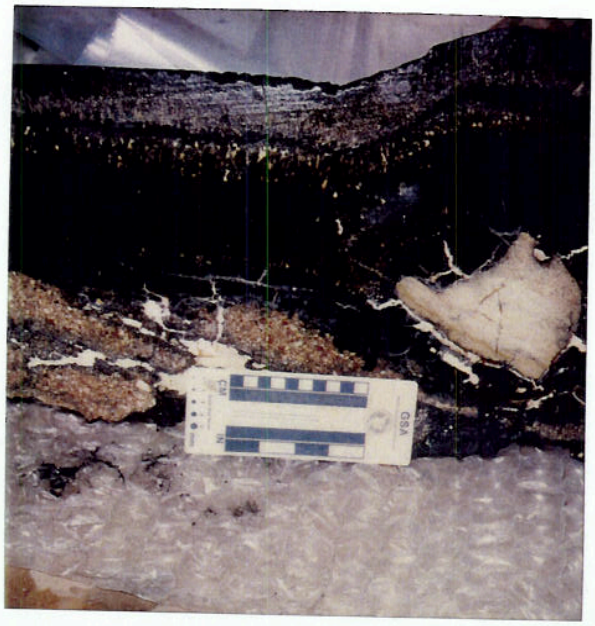
**Mn Crust Description**

Surface Texture: Botryoidal to Smoothed botryoidal granulare on sides

Mn Crust Thickness (mm):
Min: 13.5 Max: 190 Ave: 140

Layers (Outer to Inner)(mm): (Starting from Top)

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 0-14M 1. | 4mm | 14mm | 7mm | Black dense layer with oxidized veins |
| 14-46 2. | 18mm | 32mm | 25mm | Blackish Red Porous Dentritic veins |
| 46-54 3. | 3mm | 8mm | 5mm | Black dense layer with thin veins |
| 54-79 4. | 5mm | 25mm | 19mm | Black pourous layer with Abundant Dendritic Oxdyes |
| 79-109 5. | 7mm | 30mm | 24mm | Black dense layer with Few Columnar vie |
| 109-151 6. | 16mm | on corners 42mm | 32mm | Black pourous layer with oxidized Dendritic Veins Possible minor layer from cu |
| 151-202 7. | 21mm | 51mm | 30mm | Black dense layer w/ Phosphate Vien |



F10-89-CP
D11-1

Comments and XRD Mineralogy:
Large Sample cut in 3 pieces; 1/2 Vacuum for archive. Possible Phosphate in Substrate.

**Substrate Description**

Rock Type: Main substrate - Med grained Breccia

Description: - Possibly 3 separate layers
(1) Brownish yellow volcanic clastic Possibly phosphatyid
(2) Greenish Yellow siltstone (possibly volcanic) Graded bedding

Biology ?: Encrusting Forams Sharks teeth on Bottom - for phosph. study

Described By: Ginny Smith, Juliet Wong

Subsampled By:

**ANALY**

Subsamp

| | | |
|---|---|---|
| D11-1A | CC | 0-160mm |
| D11-1A | DPTS | |
| D11-1B | CC, REE, Pt | 0-9 mm 15. |
| D11-1C | Not all Carbonate removed | 9-35 mm 33. |
| D11-1D | | 35-43 mm 13.8 |
| D11-1E | | 43-65 mm 48. |
| D11-1F | | 65-95 mm 53. |
| D11-1G | | 95-135 mm 79. |
| D11-1H | | 135-180 mm 78 |
| D11-1B - D11-1H | XRD | |
| D11-1 | Paleo & Shark Teeth for Phosphate Study | |

1 Slab, Be, Nd, Pb, U isotopes → Keith O'Nions

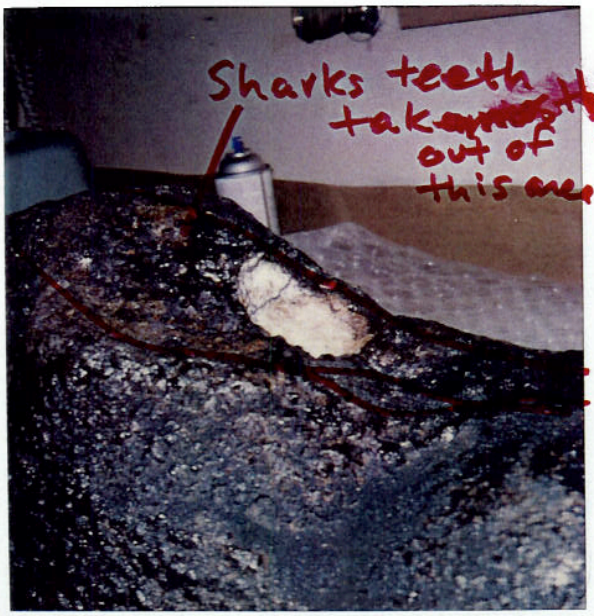
Powders of Layers + Surface → Os isotopes, Rachel Oxburgh

1 Slab, Sr, Pb isotopes

See notes for intervals > He

*Sent pc to Russian Grad student May 98

Aug '99 - received XRAL data - cc for all D11-1 A-H




F10-89-CD Archive Sample
D11-1 the back side

F10-89-CD
D11-1

~~F10-89-CD~~ F10-89-CP
D11-1

F10-89-CP
D11-1

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: ~~40~~ 40x40x20 (cm) Location: D Seamount

Sample Id: D11-2 Weight: 55 (kg) Depth: 1870-1690 (m)

**Mn Crust Description**

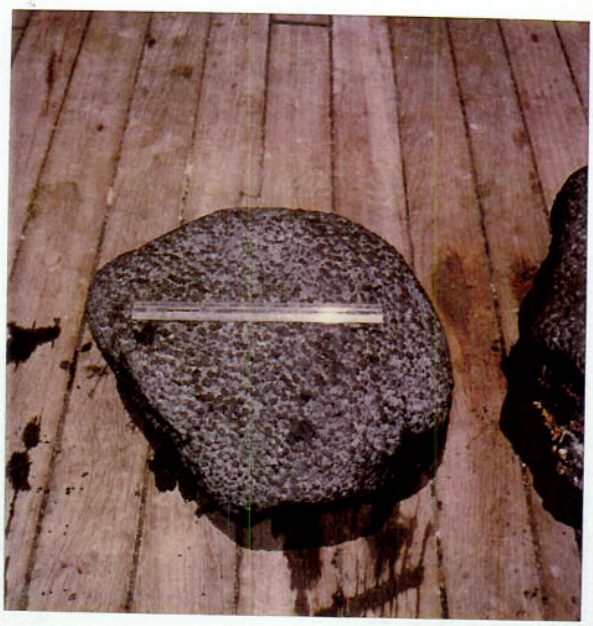
Surface Texture: Botryoidal

Mn Crust Thickness (mm):
Min: _____ Max: 100 ? Ave: _____

Layers (Outer to Inner)(mm):

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

see next page



D11-2
F10-89-CP

Comments and XRD Mineralogy:

smooth to granular on sides

ANALYS

| Subsample Number | Analysis | LayerThickness |
|---|---|---|
| | | |

**Substrate Description**

Rock Type: Basalt or volcanic breccia

Description:

Biology ?: encrusting foram

ALL TO KORDI

Described By: RO & team

Subsampled By:

Cruise Id: F10-89-CP Size: 44 x 40 x 20 (cm) Location: Seamount D

Sample Id: D11-2 Weight: 55 kg (kg) Depth: 1870-1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal (0.5–1 cm in diameter)

Mn Crust Thickness (mm):
Min: 90 Max: 106 Ave: 100

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 1 | 8 | 5 | Massive and dense; base of the botryoids |
| 2. | 23 | 30 | 28 | Porous with dendrites |
| 3. | 4 | 8 | 6 | Laminated. |
| 4. | 15 | 19 | 17 | Porous with dendrites |
| 5. | 23 | 25 | 24 | Massive and dense; compact |
| 6. | 25 | 30 | 28 | Slightly Porous |

Comments and XRD Mineralogy:

- Pores are filled with creamy colored phosphorite and reddish iron-oxide
- Layer boundaries are relatively gradational

**ANALYSES**

| Subsample Number | Analysis | LayerThickness |
|---|---|---|
| | | |

**Substrate Description**

Rock Type: Breccia

Description:

- Highly altered basalt fragments (reddish, granule size) are cemented by phosphorite and manganese.

Entire Sample to HORDI

Biology ?: Encrusting foram

Described By: Yoon Subsampled By:

Cruise Id: F10-89-CP Size: 56 x 43 x 16 (cm) Location: Seamount D

Sample Id: D11-3 Weight: 60 (kg) Depth: 1870-1690 (m)

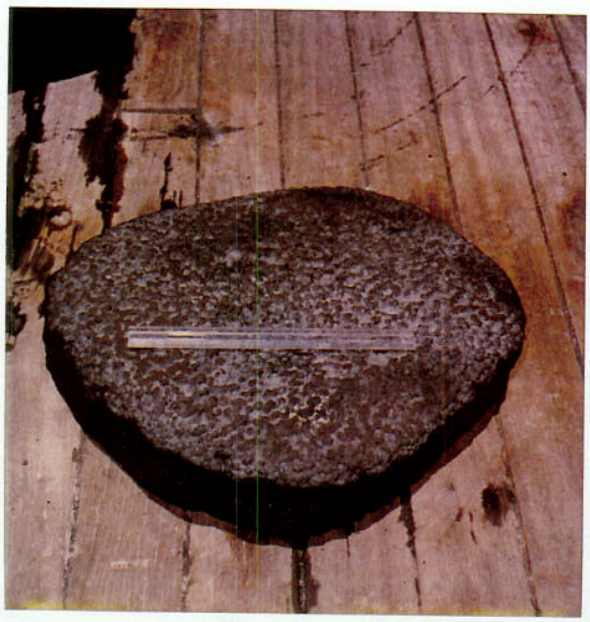
**Mn Crust Description**

Surface Texture: Botyroidal - somewhat smooth due dredging

Mn Crust Thickness (mm):
Min: 70 Max: 80 Ave: 75

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 24 | 30 | 26 | Porous at base grading up to Sl. porous, dendritic, Fe stained |
| 2. | 18 | 22 | 20 | porous; large pores in lower part/granular texture inside pore, Fe stained |
| 3. | 25 | 34 | 30 | black, massive, w/ minute cracks in lower part stained yellowish-brown |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |



D11-3
F10-89-CP

Comments and XRD Mineralogy:
Medium sized & depth - botyr
Granular sides & smooth

**Substrate Description**

Rock Type: Volcanic clast SS - mostly glassy hyaloclastite - ash laminae

Description:
Many layered (almost varve-like) coarse grained to mud sequences; one horizontal crack infilled with phosphorite, Mn staining in bottom layer.

Biology ?:

ANALY

| Subsample Number | Analysis | LayerThickness |
|---|---|---|
| D11-3A; | BULK CC, PE; XRD (0-78mm) REE (17.2g) | (90.2 |
| D11-3B; | CC, XRD (0-25mm) REE (7.7g) | (35.1g |
| D11-3C; | CC, XRD (25-45mm) REE (6.0g) | (26.2g) |
| D11-3D; | CC, XRD (45-79mm) REE (11.2g) | (56.5g) |
| D11-3E; | OC; XRD | (83.1g) |
| ✓D11-3F; | Paleo Foram Ooze, XRD | |
| D11-3G; | Paleo; substrate mud, XRD ✓ | |
| ✓D11-3H; | XRD; substrate coarse sand | |
| ✓D11-3T; | XRD; substrate fine sand | |

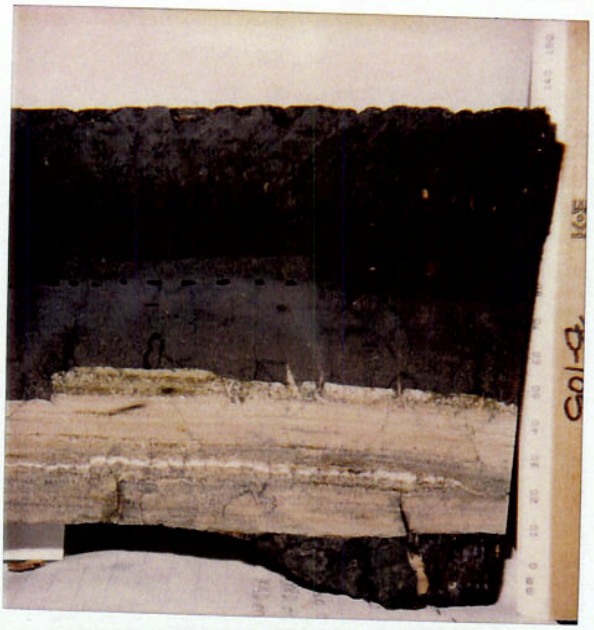
Slab to O'Nions for Be, Pb, Nd, U isotopes

Sampled for Sr + Pb isotopes - Hein

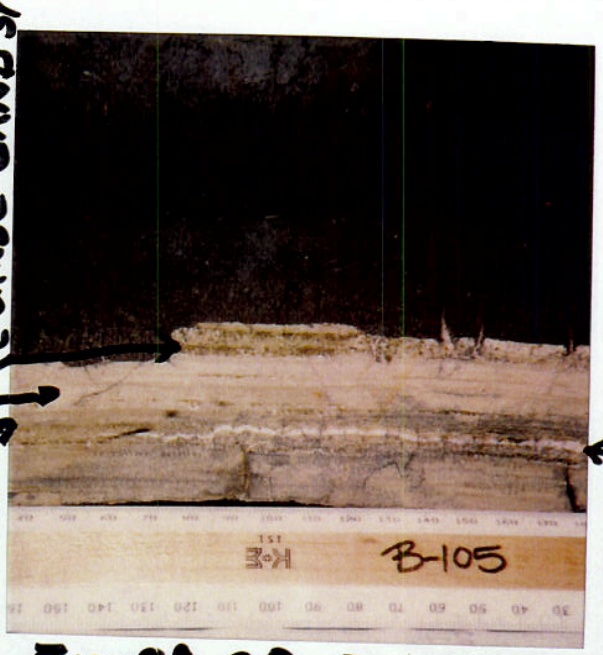
Described By: RO Hein

Subsampled By: R.O.

slab to Collier LA-ICP-MS



F10-89-CP
D11-3




F10-89-CP D11-3
SUBSTRATE

VIEW 2 ⊥ to 1
F10-89-CP D11-3

VIEW 1 D11-3
F10-89-CP

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 32 x 19 x 10 (cm) Location: Seamount D

Sample Id: D11-4 Weight: ~2.5 (kg) Depth: 1870-~~1700~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal (0.5~1.5 cm) (positive parts of botryoid smooth but basal parts granular)

Some of the older part removed (Manual)

Mn Crust Thickness (mm):

Min: 50 Max: 85 Ave: 67

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 20 | 25 | 23 | Massive; partially porous; lower part dendritic |
| 2. | 7 | 13 | 10 | Highly porous |
| 3. | 7 | 16 | 12 | Massive and dense/ crudely laminated |
| 4. | 8 | 12 | 10 | Highly porous |
| 5. | lower part cut off | | 22 | Massive and dense |
| 6. | | | | |

F10-89-CP
D11-4

Comments and XRD Mineralogy:

- Layer 1: pores abundant below the subdued surface; pores filled with iron oxide
- Layer 2: pores filled with iron oxide and phosphorite
- Layer 3: upper and lower boundaries relatively sharp
- Layer 4: tiny pores filled with iron oxide

Smoothed + polished due to current action

**Substrate Description**

Rock Type: Absent

Description:

Biology ?: encrusting forams

ANALYSI

| Subsample Number | Analysis | LayerThickness |
|---|---|---|
| | | |

All TO KORDI

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 22×12×7 (cm) Location: Seamount D

Sample Id: D11-5 Weight: ~1.0 (kg) Depth: 1870-~~1700~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal (0.3~1.0 cm)
part of (older part of crust is removed)
Dense massive layer

Mn Crust Thickness (mm):
Min: 45 Max: 72 Ave: 58

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 7 | 13 | 10 | Massive |
| 2. | 12 | 14 | 13 | porous |
| 3. | 8 | 12 | 10 | Highly porous |
| 4. | 7 | 9 | 8 | Massive or crudely laminated |
| 5. | Lower part cut off | | 15 | Highly porous |
| 6. | | | | |

F10-89-CP
D11-5

Comments and XRD Mineralogy:
Layer 2: dendritic pore arrangement
Layer 3: lower boundary sharp but upper one gradational; pores filled with iron oxide and phosphorite
Layer 4: crude lamination accentuated by laterally discontinuous porous laminae; lower boundary gradational
Layer 5: tiny pores filled with iron oxide

**Substrate Description**

Rock Type: Absent

Description:

Biology ?: forams and worm tubes

ANALY

| Subsample Number | Analysis | LayerThickness |
|---|---|---|

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 11 x 10 x 5 (cm) Location: Seamount D

Sample Id: D11-6 Weight: 0.7 (kg) Depth: ~~1870-1700~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal (Colder part of crust removed)

Mn Crust Thickness (mm):
Min: 45 Max: 55 Ave: 50

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 8 | 12 | 10 | Massive |
| 2 | 10 | 13 | 11 | porous |
| 3 | 9 | 12 | 10 | Highly porous |
| 4 | 9 | 11 | 10 | Massive and crudely laminated |
| 5 | lower part cut off | | 10 | Highly porous |
| 6. | | | | |

F10-89-CP
D11-6

Comments and XRD Mineralogy:

Layer 2: dendritic pore arrangement

Layer 3: pores filled with cream-colored phosphorite and brownish iron oxide

ANALYS

| Subsample Number | Analysis | LayerThickness |
|---|---|---|

**Substrate Description**

Rock Type: Absent

Description:

Biology ?: foram's and tiny trails of worm

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

[illegible]: F10-89-CP Size: 18x6x6 (cm) Location: Seamount D

Sample Id: D11-7 Weight: ~0.5 (kg) Depth: 1870-~~1700~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal
(older part of crust removed)
dense-massive

Mn Crust Thickness (mm):
Min: 55 Max: 60 Ave: 58

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 9 | 11 | 10 | Massive and slightly porous |
| 2. | 10 | 13 | 12 | Porous |
| 3. | 10 | 12 | 11 | Highly porous |
| 4. | 8 | 12 | 10 | Massive and partially porous |
| 5. | lower part cut off | | 5 | Highly porous |
| 6. | | | | |

F10-89-CP
D11-7

Comments and XRD Mineralogy:

Layer 1: tiny pores filled with iron oxide
Layer 2: dendritic pore arrangement
Layer 3: pores filled with phosphorite and iron oxide
Layer 5: pores filled with iron oxide

ANALY[SES]

| Subsample Number | Analysis | Layer Thickness |
|---|---|---|
| All to KORDI | | |

**Substrate Description**

Rock Type: Absent

Description:

Biology ?: encrusting forams

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 20x15x6 (cm) Location: Seamount D

Sample Id: D11-8 Weight: ~1 kg (kg) Depth: ~~1870-1740~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal (5~12mm)
(older part cut off)
dense-massive layer

Mn Crust Thickness (mm):
Min:_____ Max: 60 Ave:_____

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 5 | 11 | 8 | Massive (black) |
| 2. | 10 | 12 | 11 | Porous (black) |
| 3. | 10 | 12 | 11 | Highly porous (brownish) |
| 4. | 8 | 10 | 9 | Massive or crudely laminated |
| 5. | lower part removed | 17 | | Porous (brownish) |
| 6. | | | | |

F10-89-CP
D11-8

Comments and XRD Mineralogy:
- Layer boundaries relatively gradational
- pores of layer 3 and 5 filled with iron oxide and phosphorite

ANALYS

| Subsample Number | Analysis | LayerThickness |
|---|---|---|
| | | |

All to HORDI

**Substrate Description**

Rock Type: Absent

Description:

Biology ?: foraminifera and worm trails

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 11 x 9 x 7 (cm) Location: Seamount D

Sample Id: D11-9 Weight: ~0.5 (kg) Depth: 1870~~1900~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal (3~12 mm)

Part of the (older part of crust is probably cut off)

Mn Crust Thickness (mm):
Min:_____ Max: 70 Ave:_____

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 7 | 9 | 8 | Massive and dense |
| 2. | 10 | 14 | 12 | Porous (dendritic) |
| 3. | 14 | 16 | 15 | Highly porous (brownish) |
| 4. | 18 | 20 | 19 | Porous (dendritic) |
| 5. | cut off layer | | 18 | Massive and dense |
| 6. | | | | |

F10-89-CP
D11-9

Comments and XRD Mineralogy:

- Pores in layers 2 and 4 show dendritic arrangement
- pore in layer 3 filled with cream-colored phosphorite and iron oxide
- phosphorite columns in layer 5

ANALYS

| Subsample Number | Analysis | LayerThickness |
|---|---|---|

**Substrate Description**

Rock Type: Absent

Description:

Biology ?: forms and worm trails

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 17x10x7 (cm) Location: Seamount D

Sample Id: D11-10 Weight: ~10 (kg) Depth: 1870 ~ ~~1700~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal and granular
most of the older part of crust is probably removed
(dense - massive)

Mn Crust Thickness (mm):
Min:_____ Max: 80 Ave:_____

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 8 | 10 | 9 | Massive / black |
| 2. | 11 | 12 | 11.5 | Porous / black |
| 3. | 12 | 14 | 13 | Highly porous (brownish) |
| 4. | 10 | 12 | 11 | Porous / black |
| 5. | 18 | 20 | 19 | Porous / brownish |
| 6. | 8 | 10 | 9 | Massive and dense / black |

F10-89-CP
D11-10

Comments and XRD Mineralogy:

- Pores in layer 3 : filled with iron oxide and phosphorite
- Pores in layer 5 filled with reddish iron oxide
- dendritic pore arrangement in layers 2 and 5

ANALY

| Subsample Number | Analysis | LayerThickness |
|---|---|---|
| | | |

**Substrate Description**

Rock Type: Absent

Description:

ALL TO XRDI

Biology ?: forams and worm trails

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 9 x 7 x 5.5 (cm) Location: Seamount D

Sample Id: D11-11 Weight: ~0.5 (kg) Depth: 1870-~~1760~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal and smooth (older crust probably removed)
dense-massive

Mn Crust Thickness (mm):
Min: Max: 55 Ave:

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 7 | 11 | 9 | Massive and dense/black |
| 2. | 15 | 17 | 16 | Porous (dendritic)/black |
| 3. | 8 | 11 | 10 | Highly porous/brownish |
| 4. | 8 | 12 | 10 | Massive & dense/black |
| 5. | lower part cut off | | 5 | Porous/brownish |
| 6. | | | | |

F10-89-CP
D11-11

Comments and XRD Mineralogy:
- layer boundaries gradational
- pores in layer 3 filled with iron oxide and phosphorite

ANALYSES

| Subsample Number | Analysis | LayerThickness |
|---|---|---|

**Substrate Description**

Rock Type: Absent

Description:

Biology ?: foram and worm tubes

Described By: Yuan Subsampled By:

Cruise Id: F10-89-CP Size: 13 x 13 x 7 (cm) Location: Seamount D

Sample Id: D11-12 Weight: ~1.5 (kg) Depth: 1870-~~1700~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal (with low relief) and granular

most of (lower part removed)

(massive-dense)

Mn Crust Thickness (mm):

Min: _____ Max: 68 Ave: _____

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 10 | 13 | 12 | Massive / black |
| 2. | 12 | 15 | 14 | Porous (dendritic) / black |
| 3. | 8 | 10 | 9 | Highly porous / brownish |
| 4. | 8 | 12 | 10 | Massive and dense / black |
| 5. | 5 | 9 | 7 | porous / brownish |
| 6. | lower part cut off | | 9 | Massive and dense / black |

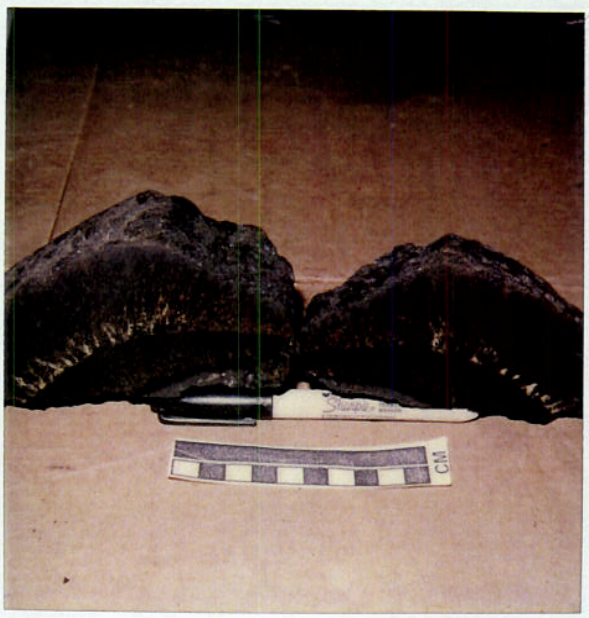
F10-89-CP
D11-12

Comments and XRD Mineralogy:

- lower boundary of layer 3 sharp
- pores of layer 3 filled with phosphorite and iron oxide
- tiny pores of layer 5 filled with iron oxide

ANALYS

Subsample Number Analysis LayerThickness



**Substrate Description**

Rock Type: Absent (removed)

Description:

Biology ?: forams

Described By: Yoon Subsampled By:

All To HORDI

Cruise Id: F10-89-CP Size: 25x22x22 (cm) Location: D South Seamount

Sample Id: D11-13 Weight: 17 kg (kg) Depth: 1870-~~1700~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Subdued botryoidal

Mn Crust Thickness (mm):
Min: 80 Max: 120 Ave: 100

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | 12 | 20 | 18 | black, massive |
| 2. | 15 | 20 | 18 | Black, very porous, clay infilling pores |
| 3. | 12 | 25 | 15 | Black, porous, sl Fe stain, lrg pore filled w/ phosp. |
| 4. | 23 | 30 | 25 | Black, massive, dendrites small vesicles of phosphate |
| 5. | 22 | 30 | 25 | Black massive, sl Fe staining |
| 6. | | | | See back photo |

F10-89-CP
D11-13

Comments and XRD Mineralogy:

**Substrate Description**

Rock Type: Breccia

Description: Reddish - yellow-brown typical - Altered basalt fragments in Fe-rich matrix of altered glassy(?) material? Phosphorite. Mn staining in matrix

Biology ?: Encrusting foram s

ANAL

| Subsample Number | Analysis | LayerThickness | |
|---|---|---|---|
| D11-13A: | Bulk CC, Fe, REE | XRD | 0-103mm (46.5 (64. |
| D11-13B: | CC, REE | XRD | 0-18 (18.8g (6.0g |
| D11-13C: | CC REE | XRD | 18-38 (27.8g (5.1g |
| D11-13D: | CC, REE | XRD | 38-53 (20.9g (5.6g |
| D11-13E: | CC, REE | XRD | 53-78 (39.5g (6.5g |
| D11-13F: | CC, REE | XRD | 78-104 (34.5g (7.8g |
| D11-13G: | OC, | XRD | (39.8g |

D11-13A DPTS 110

Described By:

Subsampled By: R.D.

F10-89-CP
D11-13

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 36x30x13 (cm) Location: D south Seamount

Sample Id: D11-14 Weight: 15 kg (kg) Depth: 1870-1700 1690 (m)

**Mn Crust Description**

Surface Texture: Medium botryoidal
smooth to granular on side

Mn Crust Thickness (mm):
Min: 103 Max: 115 Ave: 108

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | gradational | | 10 | Massive; porous at the base |
| 2. | | sharp | 28 | V. porous – mesos at base w/ yellow mud |
| 3. | | sharp | 20 | laminated w holes fractures & fine porosity |
| 4. | | | 46 | Dense, massive black |
| 5. | | | | w/ one 5 mm thick layer that is fractured |
| 6. | | | | & stained yellow-brown lamina of phosphorite blebs |

F10-89-CP
D11-14

Comments and XRD Mineralogy:
thin phosphorite laminae in lowest layer

**ANALYSI**

Subsample Number Analysis Layer Thickness

All to FORDI

**Substrate Description**

Rock Type: Breccia

Description: reddish-brown altered volcanic Rock fragments in phosphorite? + Mn cement

Biology ?: Encrusting Forams

Described By: HEIN

Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 32 x 23 x 14 (cm) Location: D South Seamount

Sample Id: D11-15 Weight: 10 kg (kg) Depth: 1870 - ~~1700~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Medium botryoidal

Mn Crust Thickness (mm):
Min: 120 Max: 140 Ave: 125

Minimum because top is broken off

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | Gradational | | 25 | Massive more porous toward bottom |
| 2. | gradational | | 18 | V. Porous - mud Large Vugs |
| 3. | gradational | | 30 | laminated more massive Porous, Empty vugs |
| 4. | | | 57 | V. Dense, massive, black |
| 5. | | | | w/ minute cracks in lower Part stained |
| 6. | | | | yellow-brown |

F10-89-CP
D11-15

Comments and XRD Mineralogy:

**Substrate Description**

Rock Type: NONE

Description:

Biology ?: Encrusting forams

**ANALYSES**

| Subsample Number | Analysis | Layer | Thickness |
|---|---|---|---|
| D11-15A | CC, DU, REE | Bulk | 0-140mm |
| D11-15B | CC & REE | Layer 1 | 0-20 mm |
| D11-15C | CC, REE | Layer 2 | 20-35 mm |
| D11-15D | CC, REE | Layer 3 | 35-70 mm |
| D11-15E | CC, REE | Layer 4 | 70-138 mm |

DPTS

Layer 2 - lots of light brown clay; tried to clean out

Layer 4 phosphorite submillimeter part of crust

Layer 3 has old encrusting forams in the vugs; no clay left in the forams

Described By: HEIN

Subsampled By:

Cruise Id: F10-89-CP Size: 30x23x15 (cm) Location: D South Seamount

Sample Id: D11-16 Weight: 10 kg (kg) Depth: 1870-~~1700~~ 1690 (m) May 1998 15x30x10 cm left

**Mn Crust Description**

Surface Texture: Medium botryoidal granula to smooth on sides.

Some massive lower layer missing

minimum since no substrate

Mn Crust Thickness (mm):
Min: 130 Max: 140 Ave: 135

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | gradational | | 10 | massive, porous |
| 2. | sharp | | 30 | V. Porous, Vugs, mud, iron stained |
| 3. | Sharp | | 12 | massive, porous |
| 4. | Sharp | | 11 | V. Porous, Vugs, |
| 5. | | | 30 | dense, massive, phosph. blebs, black |
| 6. | | | 30 | Massive, Cracked - Filled w/ phosphorite & iron stained |
| 7. | | | 20 | massive, dense, black |

F10-89-CP

D11-16

Comments and XRD Mineralogy:

minor phosphorite veins & laminae in lowest massive layer

**ANALY**

| Subsample Number | Analysis | Layer Thickness |
|---|---|---|
| | | |

SeWon Chang took subsample

Sent pc to Alex Halliday May 1998

**Substrate Description**

Rock Type: NONE

Description:

Biology ?: Encrusting forams

Described By: HEIN

Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: mostly Pebbles; few Cobbles (cm) Location: D South Seamount

Sample Id: D11-17 Weight: 10 kg (kg) Depth: 1870-~~1700~~ 1690 (m)

**Mn Crust Description**

Surface Texture: Botryoidal; Smooth; granular

Mn Crust Thickness (mm):
Min: 5 Max: 60 Ave: 20

Layers (Outer to Inner)(mm):

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1. | Varies some whole, some | | | |
| 2. | only outer layers or inner | | | |
| 3. | layers | | | |
| 4. | Thicker ones have 3-4 layers | | | |
| 5. | | | | |
| 6. | | | | |

F10-89-CP
D11-17
½ TO KORDT

Comments and XRD Mineralogy:

all uncut pieces

**ANALYS**

| Subsample Number | Analysis | Layer Thickness |
|---|---|---|
| D11-17-1 | CC | 0-≤0.5 mm |
| | | Several pieces 8 grms |
| | | Scraped |
| | | ½ TO KORDT |

**Substrate Description**

Rock Type: Trace of volcanic breccia

Description:

Biology ?: Encrusting Forams

Described By: AEIN

Subsampled By: JOH