SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 20x11x10 (cm) Location: F Seamount

Sample Id: D21-11 Weight: 2 kg (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: Botryoidal to granular

Mn Crust Thickness (mm):

Min: <<1 Max: 3 Ave: 2

Layers (Outer to Inner)(mm):

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

No Photo

Comments and XRD Mineralogy:

- Porous texture
- partially Mn patina
- pores filled with iron oxide

Substrate Description

Rock Type: Pebbly limestone and basalt (gray)

Description:

- Basalt: altered olivine and fresh pyroxene basalt; vesicles filled with calcite; partially encrusted by manganese petina
- Breccia: basalt and Mn clasts in limestone

Biology ?: Encrusting forams

ANALYSES

Subsample Number	Analysis	LayerThickness
D21-11	CC	≤ 1mm (5.29gm) Scraped

Surface along w/ D21-12 - Not sure if recent exposed surfaces?! probably Not!

1/3 To Malcolm - Hawaiite?

1/3 TO HORDI

Rock Taken Ar-Ar, Isotopes Staudigel (see box 1 of 13) that is partially phosphatized

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: ~11x10x6 / 6x6x6 cobbles (cm) Location: F Seamount

Sample Id: D21-12 Weight: ~2.5 (kg) Depth: 2100-1810 (m)

Mn Crust Description

Surface Texture: Botryoidal to granular

Mn Crust Thickness (mm):

Min: 0 Max: 19 Ave: 9

Layers (Outer to Inner)(mm):

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

No Photo

Comments and XRD Mineralogy:

- Massive to porous texture
- Pore filled with phosphorite and iron oxide

6 Cobbles

ANALYSES

Subsample Number	Analysis	LayerThickness
D21-12	OC	Bulk Basalt; chow done on freshest cobble

½ TO 40RDT

Substrate Description

Rock Type: Pebbly limestone, Basalt

Description:

limestone = clasts of altered basalt, phosphorite and Mn in limestone

Basalt: fresh to altered olivine-pyroxene basalt

Biology ?: Forams

Described By: Yoss Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 25x20x12 (cm) Location: F seamount

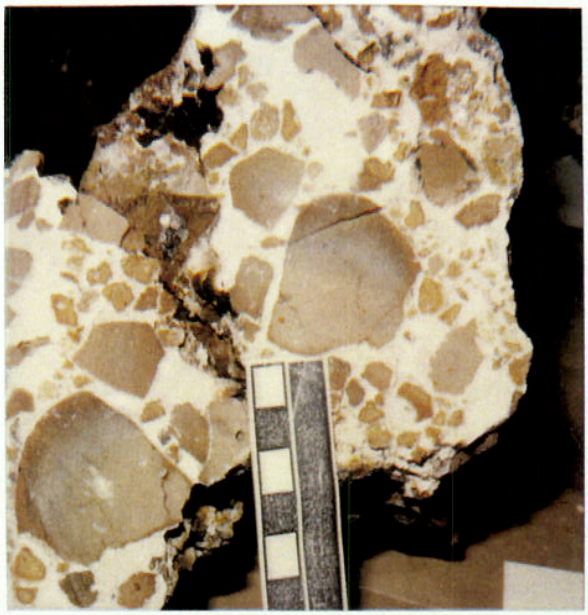
Sample Id: D21-13 Weight: 4.5 (kg) Depth: 240-1850 (m)

Mn Crust Description
Surface Texture: Mn patina

Mn Crust Thickness (mm):
Min: Max: <2 Ave: <1

Layers (Outer to Inner)(mm):

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



Comments and XRD Mineralogy:

ANALYS D21-13; F10-89-CP

Subsample Number	Analysis	Layer Thickness

Substrate Description
Rock Type: Breccia or pebbly Lms

Description: various size of brown altered basalt clasts in a limestone matrix
Mn disseminated in limestone

Biology ?: None

Described By: KADS Subsampled By:

SAMPLE DESCRIPTION

crust cobbles + pebbles

Cruise Id: F10-89-CP Size: 5x5x2/1x2x1 (cm) Location: F seamount

Sample Id: D21-14 Weight: 2.5 (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: granular and botryoidal

Mn Crust Thickness (mm):

Min: <5 Max: 25 Ave: 15

Layers (Outer to Inner)(mm):

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

No photo

Comments and XRD Mineralogy:

Most crusts detached from substrate, probably broken, some fragments have phosphorite substrate and limestone substrate

ANALYSES

Subsample Number	Analysis	LayerThickness

½ TO HORDJ.

Substrate Description

Rock Type: basalt / phosphorite

Description: minor

Biology ?: None

Described By: KADS Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 26×17×13 (cm) Location: F Seamount

Sample Id: D21-15 Weight: 3.5 (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: Mn patina w/ granular

Mn Crust Thickness (mm):

Min: Max: <2 Ave: <1

Layers (Outer to Inner)(mm):

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

D21-15; F10-89-CP

Comments and XRD Mineralogy:

Recent Mn crust - younger part.

ANALYS

Subsample Number	Analysis	Layer Thickness

To HORDI

Substrate Description

Rock Type: breccia

Description: Relatively large volcanic clasts cemented by phosphorite + minor calcite. One large clasts show flow banding (A). Structure including volcanic glass.

Biology ?: None

Described By: KAIG Subsampled By:

SAMPLE DESCRIPTION

Pebbles + cobbles 17 x 15 x 7 (largest)

Cruise Id: F10-89-CP Size: ~3x2.5x1.5 (cm) Location: F Seamount

Sample Id: D21-16 Weight: 1.5 kg (kg) Depth: 2100~1850 (m)

Mn Crust Description

Surface Texture: Granular to botryoidal;

Mn Crust Thickness (mm):
Min: 0 Max: 2 Ave: 1

Layers (Outer to Inner)(mm):

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

NO PHOTO

Comments and XRD Mineralogy:
Patina Mn

ANALYSES

Subsample Number	Analysis	LayerThickness
1/4 To Sy Schlanger		
1/4 To KORDI		

Substrate Description

Rock Type: Limestone

Description:
small (<1cm) basalt and manganese fragments included; lime-mud semi-lithified; in part pebbly limestone

Biology ?:

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 16 x 13 x 6 (cm) Location: F Seamount

Sample Id: D21-17 Weight: ~1 kg (kg) Depth: 2100-1850 (m)

Mn Crust Description
Surface Texture: Granular, partial patina

Mn Crust Thickness (mm):
Min: 0 Max: 1 Ave: <1

Layers (Outer to Inner)(mm):

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

NO Photo

Comments and XRD Mineralogy:
Mn patina

ANALYSES

Subsample Number	Analysis	LayerThickness

TO HORDI

Substrate Description
Rock Type: Breccia or pebbly Lms.

Description:
altered basalt with thin Mn crust (<2mm thick) in limestone matrix; minor phosphorite clasts w/ Mn patina
Mn crust covering basalt fragment show dendritic structure intruding limestone

Biology ?: Forams

Described By: Yeon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 18 x 14 x 10 (cm) Location: F Seamount

Sample Id: D21-18 Weight: ~1.5 kg (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: Granular, partial patina

Mn Crust Thickness (mm):

Min: 0 Max: 2 Ave: <1

Layers (Outer to Inner)(mm):

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

Comments and XRD Mineralogy:

Mn patina

ANALYSI D21-18; F10-89-CP

Subsample Number Analysis Layer Thickness

Substrate Description

Rock Type: Pebbly Limestone

Description:

- Basalt and phosphorite with thin Mn crusts (max. 5 cm) and manganese fragments in a limestone matrix
- Mn dendrite in basalt-covering crusts
- Surface of rock very irregular

Biology ?: Forams

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: breccia cobbles + pebbles 35x35x7 / 18x12x10 (cm) Location: F Seamount

Sample Id: D21-19 Weight: 12 (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: Mostly without crusts some w/ irregular Texture or granular

Mn Crust Thickness (mm):
Min: <1 Max: 15 Ave: <1

Layers (Outer to Inner)(mm):

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

No Photo

Comments and XRD Mineralogy:
Dense and massive, granular

ANALYSES

Subsample Number	Analysis	LayerThickness
D21-19-1	OC	Bulk breccia Typical of D21 Type

Thin Section

½ To HORDI

Substrate Description

Rock Type: breccia

Description:
Coarse-sand to medium pebble-size brown to gray volcanic clasts (basalt) are primarily cemented by phosphorite and secondarily cemented by ~~calcite~~ phillipsite - Pebbly Lms attached to some; much is very dense compact phosphorite

Biology ?: None

Described By: KANB Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: >100 pieces (cm) Location: SEAMOUNT F
BOULDER TO PEBBLE

Sample Id: D21-20 Weight: 28.5 (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: Thin crust - patina granules

Mn Crust Thickness (mm):
Min: 0 Max: 1 Ave: <1

No Photo

Layers (Outer to Inner)(mm):

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

Comments and XRD Mineralogy:
Fragments of sedimentary breccia with some patina and thin crust covering approx 25% of the fragments

Very Friable

ANALYSES

Subsample Number	Analysis	LayerThickness

½ TO HORDI

Substrate Description

Rock Type: Sedimentary breccia

Description:
Composed of altered volcanic clasts; grey to rust red; sand to medium pebble sized; angular to sub-rounded; poorly sorted; grain supported; calcite rim

~~Biology~~ ?: Cement and/or carbonate mud matrix - Some phosphatization

Described By: RD Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: few small cobbles ~100 medium-large pebble sized (cm) Location: Seamount F

Sample Id: D21-21 Weight: 16 (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: Thin crusts - patina granules

Mn Crust Thickness (mm):
Min: <1 Max: 2 Ave: <1

Layers (Outer to Inner)(mm):

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

NO photo

Comments and XRD Mineralogy:
Crust and patina cover 35% of the fragments

ANALYSES

Subsample Number	Analysis	LayerThickness

½ To HORDI

Substrate Description

Rock Type: Sedimentary Breccia or pebbly limestone

Description:
composed of volcanic clasts and fragments of sedimentary breccia (phosphorite cemented); sand - large pebble sized; angular to subrounded; matrix supported; in a carbonate mud matrix (white & porous)

~~Biology~~ ?:

Described By: RD Subsampled By:

SAMPLE DESCRIPTION

4 pieces 9 x 6 x 4 (B)

Cruise Id: F10-89-CP Size: 13 x 10 x 4.5 (A) 6 x 5.5 x 3.5 (B) (cm) Location: SEAMOUNT F

Sample Id: D21-22 Weight: 1 (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: Patina

Mn Crust Thickness (mm):

Min: <1 Max: Ave: <1

Layers (Outer to Inner)(mm):

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

NO Photo

Comments and XRD Mineralogy:

Patina over 35% of samples

Misc. breccia types

ANALYSES

Subsample Number	Analysis	LayerThickness

Substrate Description

Rock Type: SAMPLE A: Sedimentary Breccia

Description:

Composed of volcanic clasts, and altered volcanic-derived sandstone fragments: medium pebble to coarse sand sized; angular - subrounded; poorly sorted; grain supported; milky calcite rim cement; remainder of pore space filled by translucent sparry calcite. → good for C & O isotopes

~~Biology~~?:

SAMPLE B: Sedimentary breccia composed of altered volcanic clasts; medium pebble to coarse sand sized; angular to sub-rounded; poorly sorted; grain supported; iron-oxide like mud cement (non-calcareous)

Described By: RO Subsampled By:

SAMPLE DESCRIPTION

4 cobbles

Cruise Id: F10-89-CP Size: 12x8x7 / 9x4x4 (cm) Location: F Seamount

Sample Id: D21 — 23 Weight: 1.5 (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: one sample has thin crust w/ botryoidal, others have none

Mn Crust Thickness (mm):

Min: Max: <2 Ave: <1

Layers (Outer to Inner)(mm):

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

NO Photo

Comments and XRD Mineralogy:

ANALYSES

Subsample Number	Analysis	LayerThickness

Substrate Description

Rock Type: breccia

Description: altered and various size volcanic clasts of basalt are cemented by manganese + phosphorite. Pebbly Lms attached to one sample

Biology ?: None

Described By: KARG Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: Pebbles to Large Cobbles (cm) Location: F Seamount Complex

Sample Id: D21-24 Weight: 75 (kg) Depth: 2100-1850 (m)

Mn Crust Description

Surface Texture: granular to smooth patines

Mn Crust Thickness (mm):
Min: <1 Max: 5 Ave: <1

Layers (Outer to Inner)(mm):

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

No photo

Comments and XRD Mineralogy:

ANALYSES

Subsample Number	Analysis	LayerThickness
D21-24-1	XRD	samples of hydrothermally altered basalts
D21-24-2	XRD	
D21-24-3	XRD	
D21-24-4 thru 27	24 to KORDI	
D21-24-28 → unnumbered cobbles packaged w/ samples 1, 2 + 3	to M Pringle	
D21-24-1	Rock Thin Ar-Ar Isotopes Studied	
D21-24-2		
D21-24-3		

Substrate Description

Rock Type: assorted massive, moderately to highly altered, basalt

Description: atleast 5 lithologies, aphyric to sparsely plagioclase, pyroxene & altered olivine phyric basalts

Biology ?:

Described By: Malcolm

Subsampled By: