DATE: 5 August 1984 SAMPLE: 9DK Box dredge
CRUISE ID: SO 33
LOC: II
AREA: B

	time (GMT)	LAT (N)	LON (W)	water depth (m)	wire
ON BOTTOM =	0657	9°41.753	162°10.8600	1927 (1054 fm)	2300
(uncorrected) OFF BOTTOM =	0834	~9°44'	162°10'		1870
mean dredge data (corrected):		9°42'31"	162° 10'40"	1793 (980 fm)	

time on bottom = 1 hr. 37 min

RECOVERY WEIGHT = Total 350 kg Crust 35 kg
basalt + sed = 315 kg

CRUST THICKNESS = 2mm – 2.5 cm
Avg. = 1 cm
Many nodules (4-8 cm) w/ thin crust (up to 1 cm

SUBSTRATE = basalt, hyaloclastite, basaltic brecc
↓ fresh to mod. altered

COMMENTS: many shark's teeth, whale ear bone
shark's teeth within the crust

* 1 microbio sample
* 2 bio sample
* smear slides made

9DK

*** Petrographische Daten Sediment

RV Sonne So 33 Midpac II 29.7 - 29.8.1984

Datum: 4.08.84 Areal: B Lokation: II Station: 9DK

Probennummer: 9DK Sediment bottom contact at

Längengrad, nk: Lat = 9°42.676 → 9°44.961 k: 9°41.75'

Breitengrad, nk: Lon = 162°10.499 → 162°09.900 k: -162° 10.861

Wassertiefe (m): 1908 → 1431 m Bereich (m):

Typ: foraminiferal ooze Farbe: light gray

>63µm (Gew.%): <63 um (Gew.%): $CaCO_3$ = 91.7 %
undissolved residue = 8.3 %

Hpt. Bestd. Teile >63µm.:

Neb. Bestd. Teile >63µm.:

Hpt. Bestd. Teile <63µm.:

Neb. Best. Teile <63µm.:

H_2O-Gehalt (Gew.%):

Bemerkungen: (1-5% of the Forams have orange Fe-staining)

750µ = 45% Globorotalia
35% Globogerina (sacculifer)
17% Pulleniatina
2% → ? Foraminifera
1% Lithic fragments (altered volcanics)
(5%) of the Forams have micronodules in their chambers)

315-500µ = 50% Globorotalia
45% Globogerina (sacculifer)
4% Lithics (altered volcanics + phosphorite) (1 Mn chip)
(5% of the forams contain micronodules)

200-315µ = 40% broken foram fragments
20% Globorotalia, 20% Globogerina (sacculifer), 20% Lithics = Mn chips, Zeolite crystals, altered volcanics, phosphorite

125-200 μ = 40% Broken Foraminifera fragments
40% Globigerina
20% Lithics (Mn chips, phosphorite, altered volcanics, zeolite crystals
1% agglutinated forams?

63-125 μ = 50% Broken foram fragments
50% Lithic fragments (Mn chips, phosphorite, altered volcanic

9 DK

Gesamtmenge 350 kg
35 kg Kruste + Knollen
2 kg Sediment
Rest Basalt. Substrat

- teilweise dickere Krusten mit 2 Generationen auf basalt. Breccie, dazwischen gerade alte Phosphorit-Lage

9DK 1 40 x 40 cm phosphatisiertes Substrat, 5 cm mächtig umkrustet, Oberfläche knotig (0,5 cm); je Generation 1 cm, alte Generat. 4 cm, darunter 3-6 cm Substrat, ehemals Sediment.

9DK 2 6 cm mächtige Kruste auf Alkali-Olivin Basalt, 2 Krustengenerationen; 3 cm junge, 3 cm alte.

9DK 3 Isolierte Mn-Krusten, knotige Oberfläche, oberer Teil der jungen Krustengeneration

9DK 4 20 x 30 cm Stück, ityalobasisches Substrat umkrustet, Kruste knotige Oberfläche, Krustenmächtigkeit 3 cm, durchzogen von biogen gebohrten Löchern

9DK 5 Mn-Knollen, faustgroß, 0,5 cm Kruste, basal Kern

Sample Description

Cruise I.D: SO33 90K Sample I.D: Sta: Location: "Sonne" Sm
162°10'40"W
9°42'31"N
(-) 1793 m.

Size: _____ Weight: _____

Mn crust thickness:

Total: min: _____ max: _____ ave: _____

Inner crust: min: _____ max: _____ ave: _____

Outer crust: min: _____ max: _____ ave: _____

Surface texture: _____

Internal structure: _____

layered: _____
laminated: _____
massive: _____
porous: _____
dendritic: _____
other: _____

Mineralogy (XRD): _____

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: _____

Description: _____

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

Rock Type:	Basalt (AOB?) 9DK1	Basalt (AOB?) Breccia 9DK2	Basalt, Pyroclastite (AOB?)
	massive (pillowed?)		
Color:	light olive gray (5Y 5/2) to pale brown (5YR 7/2)	Moderate Brown 5YR 4/4	
Texture:	subaphyric hyalopilitic subtrachytic	clastic (some holohyaline pieces)	
Cement:		grayish-yellow phosphorite 5Y 9/4 phosphorized calcite(?)	
Phenocrysts:	plagioclase ±3%, ±1 mm olivine ±1%, ±1 mm	(fewer)	absent
Groundmass:	glass plagioclase? olivine? opaques? clinopyroxene(?) } not determined	-do-	
Vesicles:	absent (deep) to ±50% near upper contact (sub scoriaceous) size: ±3 mm filling: calcite?; chalcedony? amygdales 0 - ±25% shape: round to irregular	(smaller) -do-	(see next page)
Alteration:	smectitization (nontronite?) oxidation (especially near upper contact)	(more intense) smectitization, oxidation, zeolitization?, phosphorization?!	
Remarks:	large cobble-size clasts, may be pillow lava fragments Coated with ±5 mm layer of cuspate warty MnO, spotty very pale orange (10YR 8/2) phosphorite, andraolic?! oxidation surrounding fractures (hydrothermal fluids?) no glassy limbs observed at upper contact.	coarse sand (±1 mm) to large pebble size pieces of highly oxidized hyaline basalt set in phosphorized calcite or calcareous sediment. Sorting very poor, fragments subangular to subrounded. found in some specimens overlying basalt; in others, overlain by Mn-Oxide (usual case) this surface is very irregular and rough — transmits this aspect to the overlying manganese deposit. probably not pyroclastic origin.	

Porosity
Permeability

Sample Description

Cruise I.D: So 33 9DK Sample I.D: Sta: Location: "So nne" Smt
122°10'40"
9°42'31"
(-) 1793 m.

Size: _____ Weight: _____

Mn crust thickness:

Total: min: _____ max: _____ ave: _____

Inner crust: min: _____ max: _____ ave: _____

Outer crust: min: _____ max: _____ ave: _____

Surface texture: _____

Internal structure: _____

layered: _____
laminated: _____
massive: _____
porous: _____
dendritic: _____
other: _____

Mineralogy (XRD): _____

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: _____

Description: _____

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

	9DK3	9DK4
Rock Type	Basalt (AOB?) Hyaloclastite	Phosphorite / Chalk
Color:	Grayish-orange (10YR 7/4)	very pale orange (10YR 8/2) to pale yellowish-orange (10YR 8/6) to medium light gray (N6)
Texture:	Clastic (pyro?)	
Matrix:	foraminiferal tests(?) – ± 5%, ± 0.5 mm basaltic glass shards – ± 70%, ± 0.5 mm " rock fragments – ± 20%, ± 2 mm manganese micronodules – ± 5%, ± 0.5 mm	foraminiferal tests – ± 90%, 0.5 mm basaltic glass shards – ± 0%, 0.5 mm " " rock fragments – ± 4%, 0.5 mm micro manganese nodules – < 1%, 1 mm Large grainsize: ± 0.5 mm
Large Grainsize:	± 1 mm	
Cement:	phosphorite(?) 10%? Smectite(?) 80%? Zeolites(?) – 5%? $Fe(OH)_3$(?) < 1% ? Calcite(?) (5%)?	cement – calcite: ± 90% apatite ± 25% $Fe(OH_3)$: < 1% Smectite ± 5% } ?
Sorting:	moderately sorted	moderately sorted
Alteration:	Smectitization, phosphorization highly weathered & reworked Zeolitization? oxidation	
Remarks:	probably of pyroclastic origin, probably reworked and sorted by water currents. Presence of manganese micronodules probably indicates mild sediment mobility prior to diagenesis. coated with 1-2 cm-thick layer of warty δ-MnO_2(?) deposits; heavy $Fe(OH)_3$(?) staining immediately beneath MnO_2 layer and diffusing downward into the substrate.	biogenic origin some pyroclastic and auto- and allochemical; probably globigerina-globorotalia ooze deposited on basalt/basalt breccia, basalt hyaloclastic substrate, infiltrated and replaced by PO in seawater; distinctly banded (chemical influx), with Mn-nodules & fragments of crust incorporated within the layers; capped with thin layer (2-3 mm) of δ-MnO_2.
Porosity:	± 50% (?)	± 50% (?)
Permeability:	± 50% (?)	± 50% (?)

Sample No.
S0339DK5

Rock Type: Ferromanganese, nodule

Texture: grossly Reniform; finely, nodose surface; dendritic internally(?)

Color: Brownish-black (5YR 2/1)

Remarks: probably dendritic growth around igneous or volcanogenic sedimentary rock fragments (pe[illegible] (not sawed open to see); subspherical to favoid in shape.