DATE: 11 August 1984 SAMPLE:
CRUISE ID: SO 33 31DK box dredge
LOC: IV
AREA: C

	time (GMT)	LAT (N)	LON (W)	water depth (m)	wire o
ON BOTTOM =	1256	6°16.8527	162°52.6657	1376	1706
OFF BOTTOM =	1338	6°16.7332	162°52.6410	1378	1445
Mean dredge data (corrected):		6°16'54"	162°52'36"	1418 (775 fm)	

time on bottom = 42 min

RECOVERY WEIGHT = total 300 kg crust <1 kg

CRUST THICKNESS = Veneer
1 generation

SUBSTRATE = bright red-brown glassy oxidized material. Unusual color
(Palagonite) (Blasenlava?)

COMMENTS:

* 1 microbio sample
* 1 bio sample

31 DK

31 DK

Gesamtmenge: 300 kg
3 % Krusten

Palagonit - ziegelrotes, basalt. Material mit 1 mm Fe-Krus
oxidiert, grobkörnig, durch und durch alteriert
through and through

Blasenlava - schokoladenbraun, feinkörniger, total alteri
vesicular basalt chocolate-brown fine-grained totally altered

einzelne dichte massige BOB

31 DK 1 Palagonit, ziegelrot, auf Klüften größere Carbonat-kristalle, total alteriert, 0,5 cm große basaltische Bruchstücke
1 mm Fe-Kruste, häufig sehr glatte Oberfläche
parallele Strukturen

31 DK 2 dasselbe Substrat wie 31DK1
mit porösen 1 mm mächtiger Fe-Kruste

31 DK 3 Blasenlava, schokoladenbraun, dicht, teils carbonatisch
1 mm Kruste, glatt, leicht konvoluiert

31 DK 4 dichter, massiger Basalt mit haucherdünner Fe-Kruste

Sample Description

Cruise I.D: SO 33

Sample I.D: Sta: 31 DK

Location: "Bob" Sm

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:

5

Rock Type: Olivine Basalt (AOB(?)) pillow lava

Color: Medium brownish gray (5YR 5/1) to yellowish-brown (10YR 5/2)

Texture: Phyric hyalopilitic (?- intersertal)

Phenocrysts: Olivine, ±10%, ±2 mm dia (single, euhedral)

Groundmass: Glass, Olivine, Plagioclase, Clinopyroxene?, Opaques? — not determined

Vesicles: absent

Alteration: Extensive (smectitization, oxidation, hydration, zeolitization(?)) Olivine pxts & groundmass totally altered to pale green chlorophaeite; groundmass glass totally altered to smectite, etc.

Remarks: 100% pebbles not related to other olivine basalt in the dredge or to the volcanogenic breccia; apparently fragments of a pillow lava, some pieces bearing a ±5 mm-thick palagonite rind; appears to have undergone pre-eruptive, non-oxidizing hydration (olivine, glass) and post eruptive oxidative alteration (palagonitization, oxidation of groundmass glass)

6

AOB(?)

Volcanogenic breccia

Yellowish-gray (5Y 7/2)

Clastic

(Matrix) predominant, AOB(?) rockfragments, ±45%

(Cement) Calcite (calcareous ooze?) Smectite Zeolite(?) } ±55%

(Avge grain size) ±3 mm (fine gravel)

(Sorting) poor

(Grain shape) subangular to subrounded

(Porosity) ±25%

(Permeability) ±20%

(Alteration) Smectitization, zeolitization?

Remarks: rock made of detritus derived from weathering and comminution of basaltic rocks and (perhaps) ash; looks like all rock fragments — perhaps devitrified glass shards as well — not apparent; grains range in size from silt size to pebble or cobble size and show evidence of considerable (subaerial) reworking before final deposition; thin coating (<1) of manganese Mn-oxide on exposed surfaces.

Sample Description

Cruise I.D: S033

Sample I.D: Sta: 31 DK

Location: "Bo Lo" Sm

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:

Sample No:	SO 55 SI DR 1	SO 55 SI DR 2
Rock Type:	Basalt (AOB?) I	Basalt (AOB(?) II
Color:	Medium Brownish-gray (pyrpish) (5YR 5/1)	Dark gray (N 3)
Texture:	Subaphyric - phyric, hyalopilitic - intersertal	-do-
Phenocrysts:	Olivine <1 - ±5% (generally single phenocrysts) euhedral	-do-
Groundmass:	Olivine - Plagioclase - Pyrixene? - Glass - } not determined	-do-
Vesicles:	Size: extremely variable (<<1mm - 8+mm)	<1 mm
	Shape: irregular	round
	%: extremely variable (<1% - 50±%)	<<1%
	Filling: empty - (usually) partial filling (lining) with calcite, zeolites, smectite?)	smectite
Alteration:	extensive (Oxidation [hematite], smectitization, zeolitization, hydration) Olivine pxts completely altered to iddingsite	Interstitial glass? looks fairly fresh
Remarks:	Olivine basalt of diverse vesiculation and phenocryst. density and distribution, but probably related to one flow unit, probably coupled subaerially and related to basaltic vent breccia II as the rocks bear many similarities, exposed surfaces bear thin (±1mm) Mn-Oxide coatings, couple in protected areas, highly polished by water currents(?) on exposed surfaces.	Olivine basalt of considerably fresher aspect than Basalt I and much more dense, though appearance of groundmass and phenocrysts is much similar; probably a younger, less volatile-rich flow unit; exposed surfaces coated with thin (±1mm) nodose Mn-oxide crust.

Sample Description

Cruise I.D: S033

Sample I.D: Sta: 310K

Location: "Bodo Sm."

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?) III 3	Basalt (AOB?) IV 4
Color: Medium dark gray (N4)	Brownish-gray (5YR 3/1)
Texture: Subaphyric - intersertal	- do - perhaps hyalopilitic
Phenocrysts: Olivine - < 1%, ± 1 mm (single, euhedral)	≠ ±5%. ± 1 mm dia single euhedra
Groundmass: Plagioclase? Olivine? Clinopyroxene? Glass? Opaques? } not determined	perhaps much more glass in matrix
Vesicles: %: ±5%. Size: ± 1 mm. Shape: irregular. Filling: calcite (50-75% amygdules)	— absent —
Alteration: moderate - extensive. Olivine, both phenocrysts & groundmass are completely iddingsitized; interstitial glass altered to smectite? much evidence for penetration by fluids along fractures (smectitization)	extensive. - do - appears to be much more glass totally altered to brown smectite - in the matrix
Remarks: Olivine basalt of similar aspect to Basalt II, but apparently more altered - may be the same flow unit; exposed surfaces coated first with thin $Fe(OH_3)$ coating, then thin Mn-Oxide coating which has been polished by watercurrents(?) apparently pebble-cobble-size components of a volcanogenic breccia traces of which adhere to surfaces of the clasts	- do - even more altered. *probably the same unit as 31 DK2

Sample Description

Cruise I.D: 5033

Sample I.D: Sta: 31 DK

Location: "Bolo" Sm

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:

Sample Description

Cruise I.D: S033

Sample I.D: Sta: 310K

Location:

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:

Color: Bro

Texture: Sub

Phenocrysts: O

Groundmass:

Vesicles: Size

Shape

%:

Filling

Alteration: ex

Remarks: O

ves

dem

rel

Coa

hard

ex

Rock Type: Basalt (AOB?) III	Basalt (AOB?) IV
Color: Medium dark gray (N4)	Brownish-gray (5YR 3/1)
Texture: Subaphyric - intersertal	→ - do - perhaps hyalopilitic
Phenocrysts: Olivine - < 1%, ± 1 mm (single, euhedral)	- ≠ - ±5%. ± 1 mm dia single euhedra
Groundmass: Plagioclase? Olivine? Clinopyroxene? Glass? Opaques? } not determined	→ perhaps much more glass in matrix
Vesicles: %: ±5%. Size: ± 1 mm. Shape: irregular. Filling: calcite (50-75% amygdules)	— absent —
Alteration: moderate - extensive. Olivine, both phenocryst & groundmass, are completely iddingsitized; interstitial glass altered to smectite? much evidence for penetration by fluids along fractures (smectitization)	extensive → - do - appears to be much more glass [illegible] altered to brown smectite - [illegible]
Remarks: Olivine basalt of similar aspect to Basalt II, but apparently more altered - may be the same flow unit; exposed surfaces coated first with thin coating (OH_3?) then thin Mn-Oxide coating which has been polished by watercurrents(?). apparently pebble-cobble-size components of a volcanogenic breccia traces of which adhere to surfaces of the clasts	→ - do - even more altered. *probably the same unit as 31 DK2

Sample Description

Cruise I.D: 5033

Sample I.D: Sta: 31 DK

Location: "Bodo" Smt

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:

5

Rock Type: Olivine Basalt (AOB(?)) pillow lava

Color: Medium brownish gray (5YR 5/1) to yellowish-brown (10YR 5/2)

Texture: Phyric hyalopilitic (?- intersertal)

Phenocrysts: Olivine, ±10%, ±2 mm dia
Single, euhedral

Groundmass: Glass
Olivine
Plagioclase
Clinopyroxene?
Opaques?
} not determined

Vesicles: absent

Alteration: Extensive (smectitization, oxidation, hydration, zeolitization(?))
Olivine pxts & groundmass totally altered to pale green chlorophaeite; groundmass glass totally altered to smectite, etc.

Remarks: loose pebbles not related to other olivine basalt in the dredge or to the volcanogenic breccia; apparently fragments of a pillow lava, some pieces bearing a ±5 mm-thick palagonite rind; appears to have undergone pre-eruptive, non-oxidizing hydration (olivine, glass) and post eruptive oxidative alteration (palagonitization, oxidation of groundmass glass)

6

AOB(?)
Volcanogenic breccia

Yellowish-gray (5Y 7/2)

Clastic

(Matrix) predominantly AOB(?) rockfragments, ±45%
(Cement) Calcite (calcareous ooze?)
Smectite
Zeolite(?)
} ±55%

(Avge grain size) ±3 mm (fine gravel)

(Sorting) poor

(Grain shape) subangular to subrounded

(Porosity) ±25%

(permeability) ±20%

(Alteration) Smectitization, zeolitization?

Remarks: rock made of detritus derived from weathering and comminution of basaltic rocks and (perhaps) ash; looks like all rock fragments – perhaps devitrified glass shards as well – not apparent; grains range in size from silt size to pebble or cobble size and show evidence of considerable (subaerial) reworking before final deposition; thin coating (<1) of manganese Mn-oxide on exposed surfaces.

Sample Description

Cruise I.D: SO 33

Sample I.D: Sta: 31 DK

Location: "Bob" [illegible]

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:

7 | 8

Rock Type: Basaltic Vent Breccia I | Basaltic Vent Breccia II

Color: Moderate reddish-brown (10R 4/6) to Grayish-Red (5R 4/2) to Dark Grayish-red (5R 3/2) | **Color:** Grayish-red (5R 4/2) to dark grayish-red (5R 3/2)

Texture: Volcaniclastic, subaphyric → more phyric (not much)
subholohyaline, scoriaceous ↔ - do -

Phenocrysts: olivine, ≪1%, ±1mm ↔ ±1%, ±2 mm dia

Groundmass: Glass ±99% ↔ - do -

Vesicles: (extremely variable with distribution of flow lines) (also in size, shape) (≪1mm — ±5mm dia) ↔ - do -

Alteration: complete - nearly complete (Oxidation, smectitization, hydration) ↔ - do -

Remarks: Looks like a vent agglomerate breccia in which early hyaloclastic material piled up around a vent or vents, was incorporated in a later "Aa"-like flow of semi-liquid to semi-solid consistency; perhaps the rusty brown color of the scoriaceous cementing glass can be explained by subsequent low-temperature hydrothermal alteration — especially since the rusty color is not completely homogeneous (in some areas it is light brown). much of the incorporated breccia pieces and blocks are also highly scoriaceous and are oxidized to grayish-red indicating oxidation at higher temperature — perhaps before being erupted — These blocks and pieces frequently bear large iddingsitized olivine phenocrysts; large clasts of the breccia display definite flow structure; the incorporated breccia pieces and blocks often display

posed surfaces
oated with
hin (± 1mm)
yer of very
ning black
cuspate MnO_2
deposit

subaerially erupted probably

↔ similar to sample at left, but lacking reddish-brown glass "cement". in this case, far more clastic material is present and is more loosely bound together (more of an "Aa"-like flow, perhaps), both these breccias were probably erupted subaerially, possibly later altered by hydrothermal fluids subsequent to final deposition.