DATE: 12 August 1984 SAMPLE: 33 DS Chain bag dredg
CRUISE ID: SO 33
LOC: V
AREA: C

	time (GMT)	LAT (N)	LON (W)	water depth (m)	wire c
ON BOTTOM =	0555	6°15.763	162°57.7982	2887	320
OFF BOTTOM =	0707	6°16.5553	162°57.067	2387	238

RECOVERY WEIGHT = total 50 kg crust < 1 kg
40 kg basalt
5 kg sediment
2 kg chalk

CRUST THICKNESS = Veneer to .5 cm
Avg = veneer
1 generation

SUBSTRATE = pillowed basalt? And 2 hexagonal shaped basalt pieces (columnar basalt?) but no freshly broken surfaces.

COMMENTS:

there is question over the columna type basalts. Not usually found in submarin environment?

33 DS

1 | 2

II

Rock Type: Olivine Basalt (AOB?) I → - do - (may not be pillow lava)
(Pillow lava)

Color: Dark gray (N3) → - do -

Texture: suba-Phyric, hyalopilitic/intersertal → - do -

Phenocrysts: Olivine, ±3%, <1 mm – ±4 mm) (±2 avge)
(Single euhedral – anhedral) → - do - rare augite
~~(some specimens have local phenocryst densities up to 35%)~~ (distinct flow)

Groundmass: Glass, plagioclase → acicular
Olivine?, Clinopyroxene?, Opaques (not determined) → - do -

Vesicles: %: ±12 % (distinct flow) ~~(some specimens have scoriaceous zones 25-30% vesicles)~~
Size: extremely variable <1 mm – ~~±15 mm~~ (avge ±1 mm) ~~(increase w/ depth below glassy rind)~~
Shape: round to ~~irregular~~ (small) (large)
filling: empty

absent (massive, dense)

Alteration: superficial – moderate (smectitization, hydration, oxidation) → - do -
all the olivine appears to be thoroughly iddingsitized; glassy rinds are partially to thoroughly palagonitized – there seems to be quite a bit of fresh glass, though.

different kind of alteration of phenocrysts & groundmass olivine! completely altered to pale green smectite & calcite – probably before eruption

Remarks: pillow lava fragments (some have rounded upper surfaces and wedge-shaped lower profiles) – most show some degree of rounding due to abrasion, though much of the fragile glassy rinds are preserved; ~~some bit of component "layering" from sample to sample (phenocrysts, vesicles) characteristic of pillow lava~~; not much evidence of hydrothermal activity (only calcite, calcareous ooze on fracture faces) thin (±1 mm) nodose-to-cuspate Mn-oxide coating of exposed surfaces.

distinct flow

massive boulder-size blocks of dense basalt – may be fragments of a non-gaseous flow; very thin Mn-oxide coating on exposed surfaces.

Note: several boulder-size sections of polygonal cross-section found in the dredge (made of this material) strong resemblance to columnar-jointed terrestrial basalt — are they sections of submarine columnar-jointed basalt? No!

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Rock Type: Basalt (AOB?) (Scoriaceous) III → -do-, amygdaloidal, not scoriaceous IV

Color: Brownish-black (5YR 2/1) | Grayish-black (N2)

Texture: Aphanitic, subaphyric, hyalopilitic | Phyric, hyalopilitic

Phenocrysts: Olivine <<<1% ±1 mm dia (single, euhedral) → -do-, rare augite, ±20%, ±3 mm (olivine)

Groundmass: Glass, plagioclase (needles), Olivine?, clinopyroxene?, Opaques } ±65% not determined. → -do- ±72%

Vesicles: %: ±35%, 1+ mm dia | ±15%, ±3 mm, round to oval

Shape: round

filling: usually empty or contain (rarely) efflorescences of calcite scalenohedra (±10% maximum) → Smectite?, zeolite?, rare calcite; all non-exposed vesicles seem slightly-filled amygdales

Alteration: fairly superficial ($Fe(OH)_3$? deposits around insides of vesicles, along fractures); groundmass glass may be altered (smectitized, hydrated?); looks fairly fresh; rare olivine phenocrysts completely iddingsitized | moderate (groundmass glass probably heavily smectitized; olivine phenocrysts probably groundmass altered, as in AOB II to chlorophaeite + calcite mixture — these, however are brownish, as though altering to [illegible]

Remarks: Several pieces of phenocryst-poor scoriaceous aphanite found in dredge: one may be a bomb (coated flattened), others are fragments looks like subaerially erupted - thin (±2 mm - thick layer of, nodose Mn-Oxide deposited on exposed surfaces | large (small boulder-size) blocks perhaps related to AOB II, but more vesicular, altered; exposed surfaces have lost vesicle-fillings, leaving numerous pock-marks coated thinly (±1 mm) with Mn-Oxide on exposed surface

4

5

Rock Type: Basalt, AOB(?), massive V

Color: Dark gray, (N3)

Texture: Microphyric, intersertal-inter-granular (?)

Phenocrysts: Olivine, ±5%, ±0.5 mm dia. (single, euhedral)

Groundmass: Plagioclase, Olivine, Clinopyroxene?, glass?, opaques } not determined (± 95% total)

Vesicles: absent

Alteration: Superficial (smectitization, hydration) Olivine is partially iddingsitized, (some are totally converted, some are unaltered) interstitial glass may be partially altered

Remarks: Small, angular clasts (pebble to cobble size) found loose in the dredge material; very fresh, crystalline aspect - not like other species recovered in the dredge haul Fe(OH)? and calcite along fractures, no Mn-Oxide deposits.

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Basalt hyaloclastite (Melaphyric); varying shades of yellow-brown (10YR 7/6 - 5YR 4/4)

Pyroclastic / Vitrophyric

Olivine, Plagioclase, Augite } euhedra { ±25%, ±15%, ±5%

glass, glass shards ±20%

Rock fragments (vitrophyric) ±15%

± 10% irregular - widely variable size

Olivine is completely iddingsitized - both as phenocrysts and as microlites; plagioclase is completely altered to zeolites; only augite remains unaltered; much calcite, zeolite deposits in vesicles

large (cobble to boulder-size) clast of punky, friable altered rock - resembles greatly an ash-flow (ignimbrite) tuff - may represent the basaltic equivalent; serves as a substrate for thin (<1 mm) Mn-oxide nodose crust

Sample No: SO 33 33 DS 6

Rock Type: Basalt, AOB, pillowed, scoriaceous

Color: Dark gray N3 (brownish tinge)

Texture: Hyalopilitic - intersertal

Phenocrysts: Olivine, ±5% - 35% ±2 mm dia. (single euhedra and glomerophyric w/ other olivine) (varies w/ depth below glassy margin - component layering - most abund. ±10 cm below. Augite(?) ±1 mm dia. ± 2% (varies w/ depth below glassy margin - component layering - " " in 1st cm of pa... zone) (single, very euhedral phenocrysts)

Groundmass: Plagioclase, olivine, pyroxene, glass, opaques } (not determined)

Vesicles: % varies greatly (long pavement - very layered) ±12 - ±35%. Shape: round - irregular (usual shape) Size: ±2 mm (large) ±0.20 - ±5 mm (range)

Alteration: moderate - complete (olivine complete iddingsitized, pyroxenes unaltered, groundmass phases probably extensively altered - oxidation, hydration, argillitization

Remarks: cobble-size subrounded clasts apparently not derived from a volcanogenic breccia but loose debris from a shallow-water eruption. the glassy rind is probably thoroughly palagonitized, quite gassy and rich in augite(?) euhedra, very strongly-resembling the hyaloclastite of 33 DS (not both the same source); coated on most surfaces w/ a thin veneer of finely-nodose - to botryoidal ferromanganese oxide.

8	9
Volcanogenic marl	
Rock Type: Calcareous Tuff	Chalk - Phosphorite ?
Color: Pale yellowish-brown (10YR 6/2)	very pale orange (10YR 8/2)
Texture: Clastic / granular →	granular, less clastic
Material: foraminiferal tests ? ± 70 % ? (Calcareous ooze) ↔	- do -
rock fragments ± 15 % ?	
(siddingsite, augite) crystal fragments ? ± 3 % ?	probably < 5 % of these components present here
glass shards ? ± 12 % ?	
Cement: not cemented / (calcite ?)	calcite, apatite ? (seems better cemented than the tuffaceous sediment
Average grain size: fine sand - silt (0.15 mm)	± 0.20 ? mm
Sorting: moderately well sorted ↔	- do -
Porosity ± 50 % ↔	- do -
Permeability ± 50 % ↔	- do -
Alteration: Smectitization, zeolitization of glass shards; phosphorization of calcareous components	more indurated than the tuffaceous sediment, may be phosphorized
Remarks: Cobble to boulder-size clasts of loosely consolidated volcaniclastic and calcareous planktonic microfossil-rich sediment, very fine-grained, displays some variation in concentration and distribution of components indicating reworking of the sediment by water currents, serves as substrate for thin - to thick (up to 1.5 cm) crusts to warty Mn-Oxide const. (also Mn-Oxide micronodules present)	Cobble-size clasts of loosely consolidated (light cemented?) calcareous ooze composed of foraminiferal tests and small amount of volcanic material; material is apparently subjected to resolution along fractures (subaerial exposure) at one point deposits of SiO2 & Mn-Oxide along the solution cavities; ferromanganese crusts as in the tuffaceous sediment samples, developed on exposed surfaces, to depths of ± 0.5 cm.