DATE: 1 August
CRUISE ID: SO 33
LOC: I
AREA: A

SAMPLE: 6DK Box Dredge

	time (GMT)	LAT (N)	LON (W)	water depth (m)	wire
ON BOTTOM =	1420	18° 40.9784	158° 18.8480	1047	1260
OFF BOTTOM =	1530	18° 41.1942	158° 18.0048	4816	~52

RECOVERY WEIGHT = Total 300 kg Crust 20 kg?

CRUST THICKNESS = Veneer to 5 cm
Avg.: 1.5 cm
2 generations

SUBSTRATE = Basalt w/ altered olivine, hyaloclastite with smectite. Much rounded rubble w/ Mn ven
Trachyte

COMMENTS: Strange rough surface - Halbach says maybe due to O_2 minimum causing dissolution.

Lots of coral, brittle stars, shark's teeth

* 1 microbio sample
* 2 bio samples (plastic boxes)
* 1 bio sample (plastic bag)

r-nr

	SO33 6DK1	SO33 6DK2
	pillowed,? trap?	breccia
Color:	Dark Gray (N 3) ~~to~~ ~~Dark yellowish brown (10YR 4/2)~~	Light brown (5YR/6) to yellowish-gray (5Y7/2)
Texture:	Aphanitic – subaphyric hyalopilitic/ pilotaxitic /subtrachytic to diktytaxitic trachytic	Aphanitic hyalopilitic/ pilotaxitic/ subtrachytic – trachytic flow structure;
Phenocrysts:	very rare Olivine – <1% ~1mm Pyroxene(?) <<1% 0.75mm plagioclase <1–1% ~1mm	not observed
Groundmass:	tabular feldspar (plagioclase?) (~65%, <0.5mm) glass ~30% Opaquis ~5%	glass 95–99+% (?)
Vesicles:	large flat, lensoid – size: 5–10 cm filling: empty shape	dense to scoriaceous <1mm – ±3m empty round to elongate
Clasts:		
Shape:		subangular – angular
Size:		<1mm — 50+ mm ~1 cm avge
Remarks:	angular – subangular clasts of aphanitic – subaphyric AOB(?) fresh to very altered basalt. ~~possibly erupted subaerially in part~~. texture is highly directed, pilotaxitic ⊥ to top of flow, micaceous ∥ to top of flow more vesicular toward top; phenocrysts rare, but locally abundant in rare pieces, oriented ∥ to direction of flow; alteration is localized, fresh material often immediately adjacent to very altered zones (alteration aureolic along fractures ??); coated generally w/ thin Σ-MnO (~0.5cm) cause often overlying localized grayish orange (10YR 7/4) phosphorite layer frequently deposited in low surface features	highly to completely altered basaltic hyaloclastite [illegible] alteration is in part to nontronite(?) (pale greenish-yellow [illegible] zeolites(?) and in part to brown iron oxide; frequently deposited directly on top of larger basalt clasts; sometimes these are incorporated in the hyaloclastite itself flow structure can easily be observed, hyaloclastite cobbles, pebbles usually covered with ±1 cm thick layer of Σ-MnO cemented w/ pale brown (5YR [illegible]) [illegible]

SO33 6DK3

Rock Type: Trachyte (?) Hyalo-clastite/Breccia

Color: moderate greenish-yellow to pale olive (10Y 7/4) (10Y 6/2)

Texture: Pyroclastic (holohyaline)

Matrix: Trachyte fragments, ±55% pumice

Cement: Phosphorite, (pa. brn 5YR 5/2) ±45%

Avge. Grain Size: ±3mm (gravel size) ≠

Avge. Grain Shape: angular-subangular

Sorting: Very poorly-sorted ≠

Porosity: ±75%

Permeability: ±75%

Alteration: complete? (Smectitization (nontronite?) zeolitization (phillipsite?), lration (matrix); phosphorization (cement)

Remarks: holohyaline, angular fragments of totally (?) altered trachytic (?) pumice (crystals of any kind usually rare, acicular (feldspar only) very rare shiny black, flat, hexagonal crystals (biotite, amphibole?), usually holohyaline, very gassy; individual fragments often show flow structure, directed texture, "accordion" structure, like expanded vermiculite; dredge recovered many sub-rounded clasts (cobble-boulder-size) some bearing thin (±5mm) discontinuous deposits of phosphorite volcanogenic breccia and chalk/volcanogenic breccia (Lithologies 6, 8), coated generally with veneer thickness-to 5-cm-thick deposits of δ-MnO_2, often with 2 generations of crust (dendritic to laminar) separated by thin (± 2mm thick) layer of [illegible] phosphorite

SO33 6DK4

Trachyte / AOB Hyaloclastite

Light brown (5YR 5/6) to Pale greenish-yellow (10Y 8/2)

-do-

-do-, ± 40%, AOB breccia ± 20%

-do-, ± 40%

±

-do-

poorly-sorted

±-do-

±-do-

-do-, oxidation

-do-

Similar to Lithology ±3, & ±2 but with included (usually larger than trachyte frags) AOB breccia (?); some appear to have minute iddingsite rhombs included, otherwise very like the trachyte (less directed texture, no "accordion" structure). Some clasts have ±0.5 mm-thick deposits of δ-MnO_2 (?) coating them (incorporated into the trachyte hyalo clastite/breccia later?); pebble-to-cobble-size rounded to subrounded to subangular clasts coated with veneer of δ-MnO_2, some penetration to 2-3cm with dendritic MnO_2 (remobilized from veneer coating)

SO33 6DK5

Basalt, AOB (?) Subaerially erupted?

Dark Gray (N3)

Texture: intersertal

Phenos: Plagioclase ±5%, ±3mm; Olivine <1%, ±2mm

Groundmass: Olivine, Plagioclase } not detec.

Vesicles: ±40% of total rx round-oval shape ±025 mm dia. calcite, zeolites, smectite filling, ±20% of total vesicles

Alteration: Superficial (?) (zeolitization?) (iddingsitization of olivine)

Remarks: large cobble-size rounded-to-subrounded clasts encrusted to ±5mm with chalk/phosphorite coated generally with thin veneer of δ-MnO_2 concentric development of vesicles, crystals in x-section of cobbles (originally volcanic bombs erupted subaerially?); Olivine glomero-phyric with itself, plagioclase generally single crystals, often displaying resorption.

SO33 6DK6

Phosphorite / Phosphorite Volcanogenic Bre[illegible]

Pale brown (5YR 5[illegible]) Clastic/Pyroclastic granular

(Matrix) Basalt (?)/trachyte altered aphanitic ch[illegible] (hyaloclastite

(Cement) Phosphorite (originally chalk)

(Avg. gz) ±.01 mm (grain shape) sub rounded

extremely poorly-so[illegible]

complete (smectiti[illegible] zeolitization, hydrati[illegible] of hyaloclastite f[illegible] phosphorization of or[illegible] chalk cement.

subangular to subrounded large pebbles & cobbles of (probably) slope talus (often coate[illegible] with veneer-to-seve[illegible] cm-thick deposits o[illegible] δ-MnO_2 (?) & totoro[illegible] birnessite (?) [dendrit[illegible] growth patterns most frequent]; probably de[illegible] loped as foraminife[illegible] ooze on terraces which received "rain[illegible] volcaniclastic mate[illegible] subsequently phosph[illegible] (volcaniclastic mate[illegible] often coated with [illegible] thick layers of shin[illegible] dark brown, glassy phosphorite (phosph[illegible] nodules?); hyalo[illegible] fragments are com[illegible] altered to smectite, zeolites; as terraces collapsed or otherwise disturbed, clasts of phosphorite rolled [illegible] slope.

SO33 6DK7

SO33 6DK8

SO33 6DK9

Rock Type: Trachyte,

Color: Pale brown (5YR 5/2) → Grayish-orange (10YR 7/4) to very pale orange (10YR 8/2)

Texture: Aphanitic, subtrachytic (micaceous on surfaces ∥ to top of flow) → granular, arenaceous

Phenocrysts: absent.

Groundmass: Sanidine ± 0.10 mm; Titanomagnetite(?) ± 2%, ± 0.05

Vesicles: absent — 35-40% (scoriaceous variety)

Alteration: moderate-extensive (smectitization, zeolitization, hydration [feldspar]; oxidation [opaques])

Remarks. Rare subangular pebble-to-cobble-size clasts set in volcaniclastic, volcanogenic conglomerate; some varieties are dense, some are vesicular, all aphanitic (rare sanidine microphenocrysts and titanomagnetite microphenocrysts; brown color (oxidation) probably due to alteration of fine-grained titanomagnetite).

Chalk

(Matrix): Globigerina(?) calcareous foraminiferal tests, ± 0.25 mm, ± 95%

(Cement): calcite, phosphorite(?) ± 5%

(Avge G2): ± 0.25 mm

(" G Shape): rounded

(Sorting): well-sorted

(Porosity): ± 80%

(Permeability): ± 80%

(Alteration): incipient/superficial phosphorization (recrystallization of calcite)

→ apparently foraminiferal ooze that has been lithified, is in form of pebble-size angular clasts forming the capping layer of other detrital rocks. Incipient phosphorization (heaviest near contact with fragmented tuff(?)). Stained variously in shades of pale orange by remobilized $Fe(OH)_3$(?) various fractures dusted or lined with dendritic todorokite(?)

Ferromanganese Nodular

→ Brownish-black 5YR 2/1

→ dendritic, warty, caspate (internal), (external)

Microlaminae of todorokite(?)/birnessite(?) developed in arborescent growths around central nucleus (usually angular - subangular fragments of volcaniclastic material (tuff, hyaloclastite, volcanogenic breccia); thickness varies from ± 1 cm - ± 7 cm, usually with two generations separated by thin (± 1 mm) phosphorite layer. Surface texture warty to caspate; high porosity; fragile; probably terrace nodules developed around volcaniclasts