PROTOCOL DREDGE – auf dem Plateau – [redacted] 52

Cruise No. SO 37	Stat. No. Equipm. 37 DS+DT BR	Location IV	Area E
Date 29.5. 1985	Protocol written by : Weber/Commeau		

Pinger on wire 300 m from dredge

	Time GMT	Latit. N	Longit. W	Water depth	Wire length	Tension (t)	Remarks
begin operation	0906	15°34.48	169°13.38	1638	—	—	
begin lowering	0909	15°34.43	169°13.38	1638	0	.2	
+1. bottom contact	0951	15°33.75	169°13.41	1651	1670	2.2	
	1027	15°33.60	169°13.12	1644	1944	2.5	
	1028	15°33.59	169°13.11	1622	1944	2.6	
	1032	15°33.55	169°13.07	1641	1944	2.4	
	1033	15°33.54	169°13.07	1607	1944	2.8	
	1034	15°33.53	169°13.06	1621	1944	2.8	
	1038	15°33.50	169°13.02	1660	1944	2.6	
	1040	15°33.48	169°12.99	1706	1944	2.7	
	1048	15°33.40	169°12.94	1723	2074	2.5	
	1050	15°33.37	169°12.93	1732	2074	2.6	
	1052	15°33.35	169°12.91	1737	2074	2.5	
	1056	15°33.29	169°12.87	1763	2074	2.6	
	1058	15°33.27	169°12.86	1766	2074	2.7	
	1100	15°33.25	169°12.85	1763	2074	2.8	
	1101	15°33.24	169°12.85	1767	2074	2.6	
begin heaving	1102	15°33.22	169°12.83	1788	2048	3.6	
	1103	15°33.21	169°12.83	1789	2041	5.0	
	1104	15°33.20	169°12.82	1782	2021	2.7	
	1105	15°33.19	169°12.82	1788	2007	3.8	
	1107	15°33.17	169°12.81	1789	1958	2.7	
	1109	15°33.15	169°12.80	1792	1925	2.6	
	1110	15°33.14	169°12.79	1790	1898	2.6	
begin heaving	1102	15°33.23	169°12.84	1765	2074	2.6	
end heaving							
end operation							

+Corrected data 15°33,76'N 169°13,42'W

ship course .080°T..... calcul. mean water depth.....m

total time of bottom contact.....min ship velocity.:8..kts

bottom topography ..... length of dredge section .....m

Result

....kg Total ....kg Substrate

....kg Nodules ....kg Sediment

S03 73 DS Station Data 5-29-85

Pinger on wire 300 m from dredge

	Time (Gmt)	Lat N	Lon W.	Water Depth	Wire Length	Tension
Begin Operation	09:06	15° 34' 48"	169° 13' 38"	1638	—	—
Begin Lowering	09:09	15° 34' 43"	169° 13' 38"	1638	0	0.2
+ Bottom Contact	09:51	15° 33' 75"	169° 13' 41"	1651	1670	2.2
Begin Hearing	11:02	15° 33' 23"	169° 12' 84"	1765	2074	2.6
End Bottom Contact	11:15	15° 33' .08"	169° 12' 76"	1802	1802	2.0

Ship course 080°T
velocity 0.8 kts

Total dredge recovery est.:
total crusts
total nodules 0 %
total substrate

100% crust coverage
100% talus

- generations, oldest the thickest laminar, youngest ± 3 mm dendritic separated by up to 2 m - thickness of phosphorite.

Thickest crust: ± 1.5 cm
Thinnest crust: ± 1 mm } avge: ± 5 mm

Botryoidal surface topography
~1% encrusting forams, organisms

photos ?

Substrates: AoB
AoB Hyaloclastite
AoB Volcanogenic Breccia

Sample No.	37 DS 1	37 DS 4, 5, & 6
Rock Type:	Alkalic Basalt (?)	AOB Hyaloclastite	AOB Volcanogenic Breccia
Color:	Olive gray (5Y 4/1) to	Light brown (5YR 5/6)	Dusky yellowish-brown (10YR 2/2) (matrix) to Very pale orange (10YR 8/2)
Texture:	Intergranular	Pyroclastic	Clastic
Phenocrysts:	Rare black augite (?)	(Framework Grains): AOB Hyaloclasts, ±30%	AOB Hyaloclasts, ±20%, ±5 mm dia. clasts, ±10%, ±5 mm dia. AOB Phosphorite "±20%, ±1, ±5 mm dia. Ferromanganese clasts, ±20%
Ground mass:	not determined (abundant black augite)	(Cement): Phillipsite (?) ± 10%, phosphorite (?) ± 5%, MnO,OH (?) ± 5%	phosphorized chalk (foram.)
Vesicles:	%: ±45%. Size: ±0.5 mm, avge. Shape: round, coalescing. Filling: calcite (?) (~50% of total are filled) & Phillipsite?	(Average grain size): ±4 mm (range: ≤1 mm – ±1 cm)	±5 mm
Great variability		(Average grain shape): subangular	-do-
		(Sorting): poor	moderately poor
Alteration:	extensive (smectitization, zeolitization, oxidation)	(Porosity): Extremely high	low
		(Permeability): low moderate	very low
Remarks:	37 DS 1b: Rounded "bubble" (bomb?) fragment with adhering, very open hyaloclastite, partially cemented with coccolith ooze (apparently derived from the enclosing basalt – gradational and of similar composition) – different from the usual AOB hyaloclastites observed from Keli Ridge; serves as substrate for patinate, dendritic ferromanganese oxide deposit ±1 mm thick	(Alteration): Total (Smectitization, Oxidation, Zeolitization, Phosphorization)	-do-, penultimate, -do-
		Remarks: Our sample is a subrounded cobble-size talus clast encrusted with botryoidal (external), dense dendritic (internal) (±5 mm thick) one-generation ferromanganese oxide; the clast itself is composed of smaller (large pebble-size) subrounded talus clasts of hyaloclastite cemented by foraminiferal chalk;	angular pebble clasts forming, in conjunction with similar-size clasts of 37 DS 5- & 6-lithologies, an "inclusive" breccia of apparently reworked volcaniclastic pre-existing deposits; 37 DS 3 resembles 36 DS 11, also a composite, "inclusive" breccia (perhaps are from the same deposit.), our sample is apparently a talus clast (cobble-size) with a patinated dendritic ferromanganese oxide encrustation.
	37 DS 1a: the "parent" material for the hyaloclastite (?): less vesicular, with irregular vesicles usually lined only with phillipsite (?) probably a pillow lava fragment; displays two glassy, palagonitized rinds, on opposite edges of the clast which constitutes our sample; manganese crust is slightly thicker than in 1b, but in essence, the same	Similar to 36 DS 6 (maybe same material) or unit; appears to composed of light brown hyaloclasts and grayish-orange ash cement at first glance but close examination reveals that the lighter-colored material is "bleached" hyaloclasts; the actual cement is a spiring network of phillipsite (?), phosphorite, and MnO,OH (?)	

...ck Type:	Volcangenic Puddingstone (composite w/ 3,5 & 6)	(composite w/ 3, 4 & 6)	(composite w/ 3, 4, & 5)
...lor:	Grayish-orange (10YR6/4) (Cement) to Brownish-black (5YR2/1) (matrix)	A.O.B Tuffaceous Sandstone	A.O.B Hyaloclastite
...e:	Clastic	Yellowish-gray (5Y 7/2)	Hyellowish-orange (10YR7/6)
...ne:		-do-	Pyroclastic
...ework grains:	Ferromanganese oxide Crust clasts, ± 60%	AOB sand, ± 45%, ± 0.20 mm " Tuff sand, ± 45%, ± 0.15 mm Mn-Micronodules(?), ± 10%, ± 0.10 mm	AOB Hyaloclasts, ± 90%, ± 2 mm dia.
...trix:	AOB hyaloclastite "sand", ± 20%		
...ment:	Phosphorite, ± 20%	Smectite, zeolites(?), (undetermined)	-do- ± 5%
...rage grain size:	enormous variation (range: ± 0.20 mm – 2 cm)	≤ 0.15 mm (range: < 0.01 mm – ± 0.25 mm)	MnO(OH), ± 5% ± 1 mm dia. (range: ≤ 1 mm – ± 5 mm)
...rage grain shape:	angular	subrounded	angular
...rting:	Bimodal (Extremely poor – moderately – to well-sorted)	moderately fair	
...rosity:	very high	extremely high	-do-
...rmeability:	very high	extremely high	-do-
...teration:	Total (Smectitization, oxidation, zeolitization, phosphorization)	Total – penultimate (Smectitization, oxidation, zeolitization(?))	-do-, total

...marks:

as angular pebbles comprising ~ 25% of an inclusive "Volcanogenic breccia compositing lithologies 3 → 6 of 37 DS: it consists of phosphorite-veined rounded small pebble-size clasts of ferromanganese crust set in a fairly well-sorted "Sand" of AOB hyaloclasts, which are well-cemented by dense phosphorite; perhaps the hyaloclastite portion was sorted and comingled with calcareous ooze and subsequently contaminated with an influx of manganese crust fragments (or nodules?) prior to induration by phosphorization.

material As with 37 DS 3, 4 & 6, #5 is material occurring as subangular-to-subrounded pebbles in a host composed of the other (at least) 3 volcanogenic rock types; the lithology of clasts 37 DS 5 appears to be a volcanogenic sandstone in which the grains have experienced some degree of sorting and rounding prior to induration. displays fairly well-developed bedding and the larger grains may have perhaps been worked as a beach sand prior to induration.

As with the previous 3 lithologies, #6 is material occurring as angular pebbles in a host composed of the other (at least) 3 volcanogenic rock types; 37 DS 6 is similar to (and may be the same as) 37 DS 2, although in this hyaloclastite displays a more even and generally smaller grain size and has (apparently) no phosphorite cement component

Rock Type: AOB Volcanogenic Breccia	AOB Hyaloclastite	AOB Volcaniclast/Hyaloclast/Phosphorite Breccia
Color: (matrix) Dark grayish brown (Cement) White (N9)	Dark yellowish-orange (10YR 5/6) (matrix) to very pale orange (10YR 8/2) (cement)	Moderate yellowish-brown (10YR 5/4) (matrix) to pale grayish-orange (10YR 8/4)
Texture: Clastic	pyroclastic	Clastic
Framework Grains: AOB clasts, ±20%	-do- but ±70%, ±2 mm	(Framework Grains): AOB Hyaloclasts, ±90%, ±5 mm
" Hyaloclasts, ±20%	-do- (~10% are fairly unaltered glass)	Fe/Mn-oxide micro nodules, ±<1%; Phosphorite clasts, ±5%, ±1 cm; AOB volcaniclasts, ±5%, ±3 cm dia
Cement: Chalk (phosphorized?) ±60%	±30% zeolites, smectite (phillipsite?) (nontronite?)	phosphorized foram chalk ±80%
Average Grain Size (matrix) ±5 mm (range: ±1 mm – ±1.5 cm)	±2 mm (range: ≤1 mm – ±5 mm)	±5 mm dia (range: ±1 mm – ±13 mm)
Average grain shape: angular	subangular	-do-
Sorting: very poorly-sorted	-do-	extremely poor
Porosity: High	very high	moderately low
Permeability: Moderately low	moderate	very low
Alteration: moderate (oxidation, smectitization, zeolitization of matrix clasts, phosphorization of cement(?), penetration deposition of cement w/ todorokite(?) dendrites	≥90%, (zeolitization, smectitization, oxidation, penetration (superficial) by (MnO,OH) dendrites)	penultimate (Smectitization, Oxidation, zeolitization, phosphorization of cement)
Remarks: cobble-size, oblate clasts of loose talus material encrusted in ±3 mm-thick botryoidal ferromanganese (dendritic internal structure); many of the clasts are nuclei for incipient ferromanganese nodules; dendrites of remobilized (MnO,OH) penetrate the cement from rimming ferromanganese encrustation; (very similar to, may be same as 37DS3)	(May be the same as 37DS2 & 6) -do- ; ≤1 mm-thick, dendritic (internal) finely nodose, (external) structures -do-	very angular small cobble size clasts displaying very uneven distribution of matrix: cement -do-
	interesting presence of relatively unaltered AOB hyaloclasts – fairly fresh glass component. –	has a <1 mm-thick dendritic (internal), cuspate (external) ferromanganese or patina coating the cobble size clasts; [illegible]

* This material was not available for sampling!