**Dredge 15** W. Slope of Aean-Kan Guyot.

14°'52.1 N /160° 20.97 'E (2200m)- 14° ' N/ 160° 18.68'E (1430m).

**Summary:**

small dredge with a few kg of basalt, phosphorite, Mn crusts,

**Rock Groups:**

**Group I**

cpx- ol--phyric (3-5%); vesicular (>10%)
samples: 1, 2, 3, 5, 6, 8, 7
TS 1

**Group II**
similar to I but slightly lighter/grey
sample 5 (TS)

**Group III**
pl+cpx (<3%) phyric
samples: 14: palg, phosphorite, save some material for palg separate
all to MP for dating -- possible but not encoraging.

**Group IV**
phosphorite, breccias, Mn crusts

**Work Plan:**

Thin sections: 1, 5 , No TS billets?

Dating: (

Isotopes:

Alteration:

Manganese Crusts:

| Dredge Number | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
|---|---|---|---|---|---|---|---|---|---|
| Sample Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| PETROGRAPHER | KMM | KMM | KMM | KMM | KMM | KMM | KMM | KMM | KMM |
| Approximate Weight <g> | 800 | 60 | 600 | 200 | 700 | 150 | 200 | | 800 |
| Mn crust thickness | <1 | <1 | <1 | 2 | 10 | <1 | 1 | | |
| Palagonite rind thickness | 15 | >10 | 8 | 0 | 10? | 0 | 3 | | |
| ROCK TYPE:(PHENO-ROCK) | ol,cpx b | ol,cpx b | cpx basa | cpx basa | ol?,cpx | basalt | cpx basalt | | |
| STRUCTURAL | porphyry | porphyry | porphyry | porphyry | porphyry | aphyric | microporph. | | |
| Mono-lithological? | y | y | y | y | y | n | n | | |
| Fresh Glass? | N | N | N | N | N | N | N | | |
| Rock Color | brown&g | brown | rust bro | gray-bro | gray-bro | brownish | brown to gray | | |
| Groundmass Texture | microxtl | microxtl | microxtl | microxtl | microxtl | microxtl | microxtln | | |
| Ave Grain Size (m | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | | |
| % alteration | 40 | 80 | 80 | 50-80 | 70-100 | >50 | 20-70 | | |
| Phenocryst Texture/Distr. | 8 | 6 | 4 | 4 | 4 | 4 | 3 | | |
| Clinopyroxene % | 6 | 5 | 4 | 4 | 4 | | 3 | | |
| size (mm) | 0.2-1 | 0.2-2 | 1-4 mm | 0.1-2 | 0.2-3 | | 0.1-0.5 | | |
| shape | eu | eu | eu | eu | eu | ? | eu | | |
| alteration % | 50 | 70+ | 40 | 60 | 30 | 100 | 20 | | |
| alteration phas | ox+zeo | ox+zeo | ox+zeo | ox, zeo, smect | | | | | |
| Olivine % | 2 | 1? | | | <<1? | | | | |
| size (mm) | <0.5 | | | | 1 | ? | | | |
| shape | eu | | | | | ? | | | |
| alteration % | 100 | 100 | | | 100 | 100 | | | |
| alteration phas | oxides | oxides | | | oxides | | | | |
| plagioclase % | | | | | | | | | |
| size (mm) | | | | | | | | | |
| shape | | | | | | | | | |
| alteration % | | | | | | | | | |
| alteration phase | | | | | | | | | |
| amphibole % | | | | | | | | | |
| size (mm) | | | | | | | | | |
| shape | | | | | | | | | |
| alteration % | | | | | | | | | |
| alteration phase | | | | | | | | | |
| other % | | | | | | | | | |
| type | | | | | | | | | |
| size (mm) | | | | | | | | | |
| shape | | | | | | | | | |
| alteration % | | | | | | | | | |
| alteration phase | | | | | | | | | |
| Vesicles % | 0 | 0 | 1 | | | ? | 2 | | |
| type | | | ves | | | vescicles | void | | |
| size (mm) | | | 2 | | | or pheno | 4 | | |
| shape | | | rnd | | | replaced | irreg | | |
| total filling % | | | 100 | | | MnO + sn | 10 | | |
| filling-type | | | smect | | | | zeo | | |
| % | | | | | | | 100 | | |
| filling-type | | | | | | | | | |
| % | | | | | | | | | |
| General appearance | | | | | | | | | |
| and/or other distinguishing | | | | | | | | | |
| characteristics | | | | | | | | | |

**Dredge 16** South Wake

19°'32.7' N /157° 45.5'E (2550m) - 19°'32.5' N /157° 46.2'E (1500m).

**Summary:**

came up upside down, very little material overall, mostly VCL, phosphorite, carbonate.

**Rock Groups:**

**Group I**

aphyric dense (< 10%)
sample: 1,

**Group II**

VCL in carbonate and phosphorite matrix

**Group III**

sparsely cpx phyric
sample 2, 3 (TS)

**Group IV**

picrite
sample 4 (very small, useless)

**Work Plans:**

Thin sections: ? NO billets?

Dating: )

Isotopes: Sample

Alteration:

Manganese Crusts:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Dredge Number** | 16 | 16 | 16 | | | | |
| **Sample Number** | 2 | 3 | 4 | | | | |
| PETROGRAPHER | KMM | KMM | KMM | | | | |
| Approximate Weight <g> | 25 | 10 | 30 | | | | |
| Mn crust thickness | <<1 | 0 | 7 | | | | |
| Palagonite rind thickness | 0 | 0 | 0 | | | | |
| ROCK TYPE:(PHENO-ROCK) | cpx basalt | cpx basalt | altered basalt | | | | |
| STRUCTURAL | porphyry | porphyry | aphanitic | | | | |
| Mono-lithological? | y | n (hycl) | n | | | | |
| Fresh Glass? | n | n | n | | | | |
| Rock Color | gray | gray | green-gray | | | | |
| Groundmass Texture | aphanitic | aphanitic | aphanitic | | | | |
| Ave Grain Size (m | <<0.01 | <0.01 | - | | | | |
| % alteration | 10 | 80-90 | 100 | | | | |
| Phenocryst Texture/Distr. | 2 | 1 | | | | | |
| Clinopyroxene % | 2 | 1 | | | | | |
| size (mm) | 0.1-2 | ~1 | | | | | |
| shape | sub-euh | euh | | | | | |
| alteration % | 10 | 100 | | | | | |
| alteration phase | oxides | oxide | smectites | | | | |
| Olivine % | | | celadonite | | | | |
| size (mm) | | | and ¿cc? | | | | |
| shape | | | | | | | |
| alteration % | | | possibly | | | | |
| alteration phase | | | picritic | | | | |
| plagioclase % | | | | | | | |
| size (mm) | | | | | | | |
| shape | | | | | | | |
| alteration % | | | | | | | |
| alteration phase | | | | | | | |
| amphibole % | | | | | | | |
| size (mm) | | | | | | | |
| shape | | | | | | | |
| alteration % | | | | | | | |
| alteration phase | | | | | | | |
| other % | | | | | | | |
| type | | | | | | | |
| size (mm) | | | | | | | |
| shape | | | | | | | |
| alteration % | | | | | | | |
| alteration phase | | | | | | | |
| Vesicles % | | | | | | | |
| type | | | | | | | |
| size (mm) | | | | | | | |
| shape | | | | | | | |
| total filling % | | | | | | | |
| filling-type | | | | | | | |
| % | | | | | | | |
| filling-type | | | | | | | |
| % | | | | | | | |
| General appearance | | | | | | | |
| and/or other distinguishing | | | | | | | |
| characteristics | | | | | | | |
| | | | | | | hyaloclastite under | |
| | | | | | | the Mn rind | |

**Dredge 17 South Wake**

19°'35' N /157° 47'E (3150m) - 19°'35' N /157° 49'E (1500m).

**Summary:**

Mn - phosphorite crusts, some with shallow water (reef-) limestone

pelagic chalks, total of five bags

**Rock Groups:**

**Group I**
Well indurated pelagic foram-packstone (chalk), largely in the form of 20 cm thick Mn-encrusted slabs. Some samples taken by R. van Waasbergen for thin sectioning.

**Group II**
Thick (15-20 cm) crusts of Manganese oxide, commonly layered an containing thin (mm-size) white sediment-rich laminae. One sample taken by R. van Waasbergen for Jim Hein.

**Group III**
Thick (15-20 cm) slabs consisting of (from top to bottom) manganese oxide, pelagic chalk, phosphatized pelagic chalk, phosphatized lime sandstone, and thin coats of poorly preserved molluscan lime-sandstone. Identifiable fossils in the sanstone include large (up to 3 cm) echinoid clubspines of type Sideroidea, also clumps of coral, at least two different species, and very poorly preserved mollusc shell debris. One piece, D17-3, contains a large round fossil which may be a rudist, but may also be a large coral colony.
Tentative age: CRETACEOUS

**Work Plans:**

Thin sections: D17-2, 3, 4A, 4C, 5, 6, 8 (no TS billets)
Dating: Look for identifiable microfossils in thin sections
Examine possible rudist in D17-3.

Isotopes: N/A

Alteration: Cut slabs to study phosphatization history: distinct "stratigraphy" in these slabs.
Manganese Crusts: D17-1

**D 18 South Wake**

19°'30.7' N /157° 44.7'E (2700m)
19°'30.5' N /157° 45'E (2200m).

**Summary:**

Mostly volcaniclastics but some basalts. Mn - phosphorite crusts

**Rock Groups:**

**Group I**

volcaniclastics: Phosphorites (5, 14, 15
HC (3,4, 13)

**Group II**

amph. bearing ((2-3%) hawaiite?) (#7)

**Group III**

cpx phyric (1, 6, 8)

**Group IV**

slightly cpx phyric, flow lineations, includes fragments against which flow lineated material is quenched.

**Group V**

**Work Plans:**

Thin sections: took 1 + 7
Dating: 7

Isotopes:7

Alteration: 6 for alter. vesicles /amygdules

Manganese Crusts:

| Dredge Number | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
|---|---|---|---|---|---|---|---|
| Sample Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| PETROGRAPHER | KMM | KMM | KMM | KMM | KMM | KMM | BML |
| Approximate Weight <g> | 700 | 1000 | 150 | 2000 | 1000 | 700 | 1500 |
| Mn crust thickness | ≤400 mm | ≤250 mm | 5-10 mm | 10 | 10 | 8 | 1-15 mm |
| Palagonite rind thickness | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROCK TYPE:(PHENO-ROCK) | cpx | hyaloclastite | cpx phyric | breccia | laminated | amphibole | cpx (hb ?) |
| STRUCTURAL | porph | breccia | clastic brecci | hyaloclast | carb. breccia | porphyry | porphyry |
| Mono-lithological? | y | n | n | n | n | y | y |
| Fresh Glass? | n | n | n | n | n | n | n |
| Rock Color | br. gray | bl/wh/gr | grn,brn,gry | yellow | rose beige | dk. gray | gray-brown |
| Groundmass Texture | microxln | aph | microxln | microxln | microxln | aph | inter. |
| Ave Grain Size (m | 0.02 | <<0.01 | <0.02 | 0.03 | a few | <0.01 | 0.01 |
| % alteration | 50 | 100 | 70 | 90 | small aphanit | 50 | 60 |
| Phenocryst Texture/Distr. | 2 | 0 | 1 | <1 | vescl'r B clas | 2 | 3 |
| Clinopyroxene % | 2 | there is a | 1 | some ¿yes? | <<1 | 2 | |
| size (mm) | 0.2-2 | small clast | 0.1-4 | ≤3 | <1 | 0.5-<2 | |
| shape | euhedral | of aphanitic | euhedral | euhedral | euhedral | euhedral | |
| alteration % | 70 | basalt | 30 | 10-100 | 50-100 | 40 | |
| alteration phase | zeo | which has | zeo | zeo | cc, zeo | zeo? | |
| Olivine % | | its own | | | | | |
| size (mm) | | 10 mm Mn | | | | | |
| shape | | coating. | | | | | |
| alteration % | | | | | | | |
| alteration phase | | | | | | | |
| plagioclase % | may | | | ¿yes? | <<1 | | |
| size (mm) | be some | | | 2 | <1 | | |
| shape | biggish | | | euhedral | euhedral | | |
| alteration % | ones in | | | 40 | 50-100 | | |
| alteration phase | groundmass | | | cc? Zeo? | clay, cc,zeo? | | |
| amphibole % | | | | | | | 2- 3 |
| size (mm) | | | | | | | <5 |
| shape | | | | | | | euhedral |
| alteration % | | | | | | | <20 |
| alteration phase | | | | | | | |
| other % | | | | | | | |
| type | | | | | | | |
| size (mm) | | | | | | | |
| shape | | | | | | | |
| alteration % | | | | | | | |
| alteration phase | | | | | | | |
| Vesicles % | 5 | cc, smectite | 3 | 5 | | 8 | 7 |
| type | flow | celadonite | ves | ves | | ves & voids | |
| size (mm) | elongate | and traces of | 0.5-4 | ≤2 | | 0.2-8+ | 0.5-10 |
| shape | 50 | zeolites | rnd-irr | rnd - elongate | | rnd, irr | rnd |
| total filling % | zeo | along with | 50 | 10 | | ≤10 | 70 |
| filling-type | 100 | abundant | zeo | zeo | | zeo | zeo |
| % | | MnO ppt. | 60 | 80-100 | | 100 | 100 |
| filling-type | | | smect | smect | | | |
| % | | | 30 | 20? | | | |
| General appearance | | | cc 10% | | | has 1 v. large | |
| and/or other distinguishing | | | | | | zeo amygdule | |
| characteristics | | | | | | and some | |
| | | | | | | hyaloclastite under | |
| | | | | | | the Mn rind | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| BML | BML | BML | BML | BML | PEJ | PEJ | PEJ | PEJ |
| 1000 | 3000 | 500 | 700 | 2000 | 3000 | 2000 | 1000 | 1000 |
| 5-200 | 0-10 | 0-10 | 0-10 | 0-10 | ~10 | 10 - 20 | 5 - 15 | 0-10 |
| 0-10 | 0 | 0 | 0 | 0 | | | | |
| cpx | cpx flow bslt. | cpx flow bslt. | cpx flow bslt. | cpx flow bslt. | hyaloclastite | hyaloclastite | hyaloclastite | hyaloclastite |
| porphyry | porphyry | porphyry | porphyry | porphyry | aphyric | aphyric | aphyric brecc | aphyric brecc |
| y | n | n | n | n | n | n | n | n |
| n | n | n | n | n | n | n | n | n |
| gray | yellow-gray | yellow-gray | yellow-gray | yellow-gray | pink to gray | pink/brown | tan/green | tan/green |
| inter. | inter. | inter. | inter. | inter. | aphanitic bas | aphanitic bas | aphanitic bas | aphanitic bas |
| 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | | | | |
| 75 | 85 | 85 | 85 | 85 | | >80 | | |
| <1 | 1 | 1 | 1 | 1 | | 0 | 0 | 0 |
| <1 | 1 | 1 | 1 | 1 | Matrix: | Matrix: | Matrix: | Matrix: |
| <1.0 | 1 | 1 | 1 | 1 | CaCo3 | phosphorite | CaCo3 | CaCo3 |
| subhedral | 0.5 | 0.5 | 0.5 | 0.5 | phosphorite | CaCo3 | smectites | smectites |
| 70 | subhedral | subhedral | subhedral | subhedral | clays | | | |
| ? | 20 | 20 | 20 | 20 | | | | |
| | ? | ? | ? | ? | | | | |
| 3 | 1 | 1 | 1 | 1 | | | | 3 |
| | | | | | | | | v |
| 0.1-10 | 0.5-3 | 0.5-3 | 0.5-3 | 0.5-3 | | | | 1 |
| elongate | elongate | elongate | elongate | elongate | | | | rnd |
| 50 | 40 | 40 | 40 | 40 | | | | 30 |
| zeo | zeo | zeo | zeo | zeo | | | | cc &/or zeo |
| 100 | 100 | 100 | 100 | 100 | | | | 100 |

**Dredge 19** unnamed seamount SE of Batiza/Marcus-Wake group

19°'43' N /156° 45.5'E (2800m) - 19°'45.75' N /156° 45.75'E (23250m).

**Summary:**
Small but diverse dredge, basalts + VCLs

**Rock Groups:**

**Group I**
cpx (>10%) ol (>5%) basalt
A: #s 1, 2, 3, (many individ. spls) TS ! chem 1,2
B: #'s: 4 (smaller cpx; micro vesicular)

**Group II**
ol>cpx phyric basalt: 9both 5-10%)
A: massive ol up to 5x8mm, cpx to 2 x 5 mm #14
B: vesicular ( about 10%), ol 5% cpx 5% # 13 A 13B

**Group III**
sparsely Hbl phyric
5, 8A (rest of 5, 8 A all to MP)

**Group IV**
moderately cpx (3-10%) phyric (°±hblde)
6A and 6B phenos < 1mm
7phenos < 2mm
all cobbles 1.5-3" in diameter.

**Group V**
highly cpx (+amph?) phyric basalts < 2% ol
9, 11, 12, 15
11 is largest

**Group VI**
aphyric to sparsely phyric massive to microvesicular basalt
8B, 10, 16, 17A, 17B, (1-3" cobbles) all 8B to MP

**Clastics:**
phosphorite, HC , Mn pel ooze phosphaate , Phosphorite + HC

**Work Plans:**

Thin sections: took: 1, 5, 11, 14
Dating: 5, 8A, 6A,B, 7, 8B, 9, 12, 15, all to MP
Isotopes:
Alteration:
Manganese Crusts:

| Dredge Number | 19 | 19 | 19 | 19 | 19 | 19 |
|---|---|---|---|---|---|---|
| Sample Number | 1 | 2 | 3 | 4 | 5 | 6 |
| PETROGRAPHER | BML | BML | BML | BML | BML | BML |
| Approximate Weight <g> | 3000 | | | 2000 | 1500 | 500 |
| Mn crust thickness | 0-1 | | | 0-1 | 4-Jan | 0-2 |
| Palagonite rind thickness | 0 | 1 | 0 | 0 | 0 | 0 |
| ROCK TYPE:(PHENO-ROCK) | CPX/OL | SAME AS #1 | Same as 1 &2 | cpx-ol | cpx/hb/ol | cpx/ol |
| STRUCTURAL | phyric | SAME AS #1 | Same as 1 &2 | phyric | phyric | phyric |
| Mono-lithological? | y | SAME AS #1 | Same as 1 &2 | y | y | y |
| Fresh Glass? | n | SAME AS #1 | Same as 1 &2 | n | n | n |
| Rock Color | d. grey | SAME AS #1 | Same as 1 &2 | d gray | gray | gray |
| Groundmass Texture | intersertal | SAME AS #1 | Same as 1 &2 | intersertal | intersertal | intersertal |
| Ave Grain Size (m | 0.01 | SAME AS #1 | Same as 1 &2 | 0.05 | 0.1 | 0.01 |
| % alteration | 40 | SAME AS #1 | Same as 1 &2 | 40 | 70 | 80 |
| Phenocryst Texture/Distr. | 15 | SAME AS #1 | Same as 1 &2 | 20 | 2 | 7 |
| Clinopyroxene % | 10 | SAME AS #1 | Same as 1 &2 | 15 | 1.5 | 6 |
| size (mm) | .5-2 | SAME AS #1 | Same as 1 &2 | 1-3 mm | 0.3 | 0.5-1.0 |
| shape | sub | SAME AS #1 | Same as 1 &2 | sub | sub | sub |
| alteration % | 20 | SAME AS #1 | Same as 1 &2 | 20 | 20 | 20 |
| alteration phase | ? | SAME AS #1 | Same as 1 &2 | ? | ? | ? |
| Olivine % | 5 | SAME AS #1 | Same as 1 &2 | 5 | tr | 1 |
| size (mm) | 0.5-3 | SAME AS #1 | Same as 1 &2 | 3-Jan | 0.5 | 0.5 |
| shape | sub | SAME AS #1 | Same as 1 &2 | subhedral | subhedral | subhedral |
| alteration % | | SAME AS #1 | Same as 1 &2 | | | |
| alteration phase | ? | SAME AS #1 | Same as 1 &2 | ? | ? | ? |
| plagioclase % | 0 | SAME AS #1 | Same as 1 &2 | 0 | 0 | 0 |
| size (mm) | | SAME AS #1 | Same as 1 &2 | | | |
| shape | | SAME AS #1 | Same as 1 &2 | | | |
| alteration % | | SAME AS #1 | Same as 1 &2 | | | |
| alteration phase | | SAME AS #1 | Same as 1 &2 | | | |
| amphibole % | 0? | SAME AS #1 | Same as 1 &2 | 0 | 0.5 | 0 |
| size (mm) | | SAME AS #1 | Same as 1 &2 | | 1 | |
| shape | | SAME AS #1 | Same as 1 &2 | | eu | |
| alteration % | | SAME AS #1 | Same as 1 &2 | | 20 | |
| alteration phase | | SAME AS #1 | Same as 1 &2 | | ? | |
| other % | | SAME AS #1 | Same as 1 &2 | | | |
| type | | SAME AS #1 | Same as 1 &2 | | | |
| size (mm) | | SAME AS #1 | Same as 1 &2 | | | |
| shape | | SAME AS #1 | Same as 1 &2 | | | |
| alteration % | | SAME AS #1 | Same as 1 &2 | | | |
| alteration phase | | SAME AS #1 | Same as 1 &2 | | | |
| Vesicles % | 7 | SAME AS #1 | Same as 1 &2 | 10 | <1 | 7 |
| type | | SAME AS #1 | Same as 1 &2 | | | |
| size (mm) | 0.3-1 | SAME AS #1 | Same as 1 &2 | 0.3-1 | 0.2-1 | 0.5 |
| shape | rnd | SAME AS #1 | Same as 1 &2 | rnd | rnd | rnd |
| total filling % | 10 | SAME AS #1 | Same as 1 &2 | 5 | 5 | 10 |
| filling-type | cc/zeo | SAME AS #1 | Same as 1 &2 | zeolites | zeolites | zeolites |
| % | 100 | SAME AS #1 | Same as 1 &2 | 100 | 100 | 100 |
| filling-type | | SAME AS #1 | Same as 1 &2 | | | |
| % | | SAME AS #1 | Same as 1 &2 | | | |
| General appearance | | | | | | |
| and/or other distinguishing | | | | | | |
| characteristics | | | | | | |
| | | | | | | hyaloclastite |
| | | | | | | the Mn rind |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13a, 13b | 14 |
| BML | BML | BML | BML | BML | BML | BML | BML |
| 1000 | 900 | 500 | 200 | 200 | 500 | 600, 200 | 1000 |
| 0-2 | 0-2 | 0-0.5 | 2 - 3 | 7 | 0-0.1 | 0-0.1 | 0 - 1 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cpx/ol | hb | cpx/hb/ol | ol cpx | cpx?hbl | cpx ol | cpx ol | ol cpx |
| phyric | phyric | phyric | phyric | phyric | phyric | phyric | phyric |
| y | y | y | y | y | y | y | y |
| n | n | n | n | n | n | n | n |
| gray-brown | gray | gray-tan | gray | dk gray | green gray | dk gray | brown gray |
| intersertal | intersertal | intersertal | intersertal | intersertal | intersertal | intersertal | intersertal |
| 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 90 | 70 | 85 | 70 | 60+ | 85+ | 90 | 80 |
| 10 | <1 | 15 | 2 | 10 | 10 | 3 | 10 |
| 8 | 0 | 8 | 0.5 | 6 | 9 | 1 | 5 |
| 0.3-1.5 | | 0.5-1 | 1 | 1 | 1 - 2 | 1 - 3 | 1 - 5 |
| sub | sub | sub | euhedral | subhedral | subhedral | subhedral | euhedral |
| 30 | | 40 | 30 | 60 | 80 | 70 | 60 |
| ? | ? | ? | ? | ? | ? | ? | ? |
| 1 | 0 | 7 | 1.5 | 0-3 | 1 | 1 | 5 |
| 1 | | 0.5-1 | 0.5 | 0.5-2 | 1 - 2 | 1 - 2 | 1 - 6 |
| subhedral | | subhedral | subhedral | subhedral | subhedral | subhedral | subhedral |
| | | | 100 | 100 | 100 | 100 | 100 |
| ? | | ? | ? | clay | ? | ? | ? |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 1 | <1 | 1 | 0 | ? | | | |
| 0.1 | 0.5-2 | 1 | | 3-Jan | | | |
| eu | | eu | | euhedral | | | |
| 20 | | 40 | | 40 | | | |
| ? | | ? | | ? | | | |
| 0 | | 0 | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 4 | 2 | <1 | 2 | 7 | 2 | 35 | 7 |
| | | | | | | | |
| | | | 0.5-1 | 0.5-2 | 0.5-1 | 0.5-1 | 0.5-1 |
| rnd | rnd | rnd | round | various | round | rpund | round |
| 80 | 5 | 2 | 90 | 20 | 80 | 5 | 90 |
| zeolites | zeolites | zeolites | zeolites | clay | zeolites | zeolites | zeolite |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
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|---|---|---|---|
| 19 | 19 | 19 | 19 |
| 15 | 16 | 17a | 17b |
| PEJ | PEJ | PEJ | MSP |
| 100 | <100 | 100 | 100 |
| 3 - 8 | 0- 1 | 0-10 | 0 |
| 0 | 0 | 0 | 0 |
| cpx/hbl? | plag, ol | plag | basalt |
| plg phyric | porphyry | microporphyr | aphyric |
| y | y | y | y |
| n | n | n | n |
| brown | brown gray | gray | gray |
| microxln | microxln | microxln | |
| <0.01 | <0.01 | <0.01 | |
| 40 - 90 | 30-70 | 30-90 | |
| 10 | <1 | 1 | |
| 10 | tr? | tr? | tr? |
| 0.5-2 | <1 | <1 | <1 |
| euhedral | | | |
| <20 | | | |
| | | | |
| 0 | <1 | | |
| | <1 | | |
| | euhedral | | |
| | 100 | | |
| | oxides | | |
| trace? | <1 | 1 | tr? |
| <2 | <2 | ~~0.5 | <1 |
| euhedral | euhedral | sub-euhedral | |
| 30-60 | 50-90 | ~~90 | |
| ? | ? | ? | |
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| | | | |
| 16 | 5 | 1 | |
| bubbles | | | |
| 0.1-2 | 1- 10 | <1 | |
| rnd, irr | rnd, elongate | rnd, elongate | |
| 70 | 70 | 30 | |
| calcite | calcite | calcite | |
| | | | |
| zeolites | zeolites | zeolites | |
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**Dredge 20 empty**

**Dredge 21** Batiza Guyot.

20°'10.5' N /156° 40.9'E (2700m) - 20°'9.975' N /156° 40.64'E (2200m).

**Summary:**

volcaniclastics and diverse basalts
some very well rounded beach cobbles: clearly subaerial (# 7)

**Rock Groups:**

**Group I**
Picrites (>10% ol)
1,5,24

**Group II**
cpx, ol basalt (2-6%)
a, 2, 3, 10, 14, 16, 17, 18, 22, 23, 26, 32
b, 10, 16, 17, 14, 26, 33 (very dense, very altered)

**Group III**
sparsely cpx, ol phyric
4, 6, 7, 8, 9, 15, 21 (fresh glass?TS), 35,

**Group IV**
aphyric

11, 20, 13

**Volcabiclastics:**
Pillow breccia with multiply quenched margin, very vesicular
21 HC small aph.
22 nice HC for Rodey
27 breccia rel. frsh concentric alteration haloes

**Work Plans:**

Thin sections: 1, 2, 4, 12, 17? took 1, 4, 12, 17
Dating: 18 PL?
Isotopes:
Alteration: 24 clays in picrite.
Manganese Crusts:

| Dredge Number | 21 | 21 | 21 | 21 | 21 | 21 | 21 |
|---|---|---|---|---|---|---|---|
| Sample Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| PETROGRAPHER | BML | BML | BML | BML | BML | BML | BML |
| Approximate Weight <g> | 2000 | 2500 | 3500 | 3000 | 800 | 12000 | 900 |
| Mn crust thickness | 0-.5 | 3 | 4 | 3 | 0 - 1 | 0 - 4 | 0 |
| Palagonite rind thickness | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROCK TYPE:(PHENO-ROCK) | ol-cpx | cpx-ol | cpx-ol | cpx-ol | ol cpx | ol | ol pl cpx |
| STRUCTURAL | phyric | phyric | phyric | phyric | phyric | phyric | phyric |
| Mono-lithological? | y | y | y | y | y | y | y |
| Fresh Glass? | n | n | n | n | n | n | n |
| Rock Color | gray | gray | dk gray | gray | dk gray | gray | gray |
| Groundmass Texture | inter | inter | inter | inter | inter? | inter | inter |
| Ave Grain Size (m | 0.1 | 0.05 | 0.05 | 0.01 | <0.01 | 0.01 | 0.05 |
| % alteration | 60 | 70 | 60 | 65 | 75 | 70 | 80 |
| Phenocryst Texture/Distr. | 10 | 5 | 10 | 1 | 15 | 1 | 3 |
| Clinopyroxene % | 1 | 3 | 6 | 1 | 1 | tr | tr |
| size (mm) | 0.5-3 | 3-Jan | 1 - 4 | 0.5-3 | 1 | 0.5 | 1 |
| shape | sub | sub | sub | sub | sub | sub | sub |
| alteration % | 30 | 60+ | 20 | 20 | 60 | 55 | 50 |
| alteration phase | | | ? | ? | ? | ? | ? |
| Olivine % | 9 | 2 | 4 | tr | 14 | 1 | 2 |
| size (mm) | 1.5-7 | 7-Feb | 0.5-10 | 1 - 2 | 1 - 4 | 1 - 2 | 0.5 - 1 |
| shape | euh | sub | sub | sub | anh-sub | sub | sub |
| alteration % | 100 | 100 | 100 | 100? | 100 | 100 | 50 |
| alteration phase | | | | ? | ? | ? | ? |
| plagioclase % | | | | | | | tr |
| size (mm) | | | | | | | 0.5-1 |
| shape | | | | | | | sub |
| alteration % | | | | | | | 100 |
| alteration phase | | | | | | | ? |
| amphibole % | | | | | | | |
| size (mm) | | | | | | | |
| shape | | | | | | | |
| alteration % | | | | | | | |
| alteration phase | | | | | | | |
| other % | | | | | | | |
| type | | | | | | | |
| size (mm) | | | | | | | |
| shape | | | | | | | |
| alteration % | | | | | | | |
| alteration phase | | | | | | | |
| Vesicles % | tr | 0 | 1 | tr | tr | tr | 0 |
| type | | | | | | | |
| size (mm) | 0.5 | | 0.5-3 | 0.5- 1 | 1 | 0.3 | |
| shape | rnd | | var | rnd | rnd | rnd | |
| total filling % | 5 | | 1 | 5 | 5 | 0 | |
| filling-type | zeo? | | zeol | zeolites | zeo | | |
| % | 100 | | 100 | 100 | 100 | | |
| filling-type | | | | | | | |
| % | | | | | | | |
| General appearance | relatively | | | | extremely | | |
| and/or other distinguishing | fresh | | | | altered | | |
| characteristics | Thin-section! | | | | | | |
| | | | | | | hyaloclastite | under |
| | | | | | | the Mn rind | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 a & b | 16 |
| BML | BML | PEJ | PEJ | PEJ | PEJ | BML | BML | BML |
| 1500 | 1200 | 150 | 300 | 1000 | 200 | 1200 | 1000 | 1500 |
| 0-0.5 | 0 - 0.5 | 0-0.5 | 0 - 1 | 0-1 | 0 - 0.5 | 0 | 0 | 0 |
| 0 | 0 | | 0 | | | 0 | 0 | 0 |
| cpx ol | cpx ol | ol(?) cpx | basalt | plg cpx | plg/cpx | cpx ol | cpx | cpx ol |
| phyric | phyric | porphyry | aphyric | porphyry | porphyry | phyric | phyric | phyric |
| y | y | y | y | y | no, chill ma | y | y | y |
| n | n | n | n | n | n | n | n | n |
| gray | gray | dk brown | dk gray | dk green gra | tan-gray | dk brown | dk brown | dk gray |
| inter | inter | aphanitic | intersertal | intersertal | intersertal | intersertal | ? | intersertal |
| 0.1 | 0.05 | <<0.01 | 0.05-0.1 | <0.01 | 0.1 | 0.05 | | 0.05 |
| 65 | 70 | >95 | ~50 | 20-70 | 60 | 90+ | 95 | 95 |
| 2 | 1 | 5 | | 10 | 2 | 5 | 10 | 7 |
| 1 | 1 | 1 | | 3 | tr | tr | 1 | 1 |
| 0.5-1 | 1 - 3 | 0.5-2 | | 1 - 8 | 0.5-1 | 0.5 - 1.0 | 1 - 3 | 3 - 6 |
| sub | sub | eu | | eu | sub | sub | euh | euh |
| 50 | 40 | >10 | | 20 | 60 | 40 | 10 | 30 |
| ? | ? | | | ? | ? | ? | ? | ? |
| 1 | tr | 4 | | | 0 | 5 | 9? | 6 |
| 1 - 2 | 1 - 2 | 1 - 4 | | | | 5 - 2 | 0.5 - 3 | 2 - 4 |
| sub | euh | eu/sub | | | | sub | sub | sub |
| 100 | 100 | 100 | | | | 100 | 100 | 100 |
| ? | eroded | ? | | | | smectite | smectites | smectites |
| | 0 | | in grndmass | 7 | 2 | | | |
| | | | | 1 - 3 | 0.5-1 | | | |
| | | | | eu | sub | | | |
| | | | | >90 | 70 | | | |
| 1 | 3 | 0 | 25 | 0 | 0 | 2 | tr | 3 |
| | | | bubb | | | | | |
| 0.5 | 0.5-3+ | | 0.1-2 | | | 1 - 2 | 0.5-2 | 1 |
| rnd | var | | rnd/irr | | | rnd | var | rnd |
| 5 | 5 | | 70 | | | 90 | 50 | 70 |
| clay? | clay? | | zeo/cc | | | | zeol | zeol |
| 100 | 100 | | 30 | | | | 100 | 100 |
| | | | clay | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 21 | 21 | 21 | 21 | 21 | 21 | |
| 17 | 18 | 19 | 20 | 21 | 22 | |
| BML | BML | BML | BML | BML | BML | |
| 5000 | 1500 | 1000 | 7000 | 500 | 5000 | |
| 0-0.5 | 0 | 0 | 0 -0.5 | 0 | 0 | |
| 0 | 0 | 0 | 0? | 0 | 0 | |
| ol cpx | cpx pl ol | cpx | cpx | ol | cpx ol | |
| phyric | phyric | phyric | phyric | hyaloclasti | hyaloclastite | |
| y | y | y | n | n | n | |
| n | n | n | n | n | n | |
| dk gray | gray | gray | brown gray | orange | dk gray | |
| intersertal | intersertal | intersertal | intersertal | pillow breccia | | |
| 0.05 | 0.01 | 0.01 | 0.1 | lots of 2nd | | |
| 90 | 70 | 50 | 70 | phases | | |
| 7 | 4 | 1 | tr | tr | 5 | |
| 1 | tr | 1 | tr | tr | 1 | |
| 1 - 3 | 1 - 2 | 0.3 - 1 | 1 | 0.5 | 0.5-1 | |
| euh | euh | euh | | sub | sub | |
| 25 | 20 | 20 | | 30 | 20 | |
| ? | ? | ? | | | | |
| 6 | 3 | | | | 4 | |
| 2 - 5 | 1 - 2 | | | | 1 - 2 | |
| sub | sub | | | | sub | |
| 100 | 100 | | | | 100 | |
| smectites | smectites | | | | | |
| | 1 | | | | | |
| | 1 - 3 | | | | | |
| | sub | | | | | |
| | 30 | | | | | |
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| 1 | 2 | tr | 20 | | | |
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| 1 - 2 | 1 - 2 | 5 | 1 - 2 | | | |
| var | var | oblong | rnd | | | |
| 75 | 100 | 1 | 100 | | | |
| zeo | zeo | zeol | cc | | | |
| 100 | 100 | 100 | | | | |
| | | | zeo | | | |
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