DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

# Pliocene planktic foraminifer census data from Ocean Drilling Program Holes 659A and 667A

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## INTRODUCTION

The U. S. Geological Survey's PRISM Project is investigating the climatic and oceanographic conditions of the Pliocene. One of the major elements of the study involves the use of the quantitative composition of planktic foraminifer assemblages in conjunction with stable isotope analysis of planktic and benthic foraminifers to estimate sea-surface temperatures and identify major oceanographic boundaries and water masses within the North Atlantic Basin. We anticipate analyzing many samples during the project which will result in a large volume of raw census data. In addition, it is likely that all or some of the census data from individual cores will be incorporated into analyses for more than one report over the course of the project. Therefore, the raw census data are being published in a series of open-file reports that will provide basic data for future work. This report includes counting categories (i.e. taxonomic groupings) and raw census data for planktic foraminifer assemblages in 27 samples from ODP Site 659 and 35 samples from ODP Site 667 (Fig. 1).

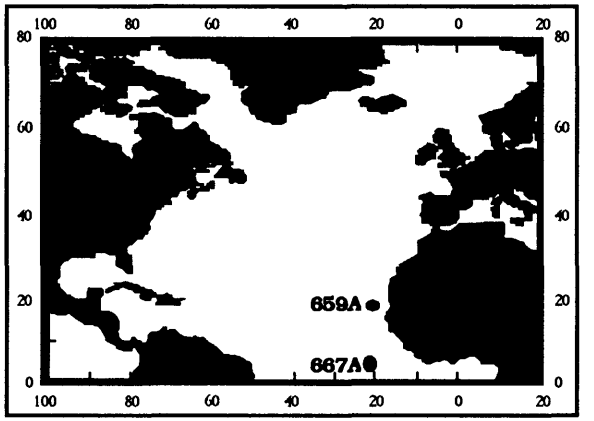


Figure 1 - Location of ODP Sites 659, 667

A variety of statistical techniques are being developed to transform census data of foraminifers in Pliocene deep-sea cores into quantitative estimates of Pliocene sea-surface temperatures. Details of current statistical techniques, taxonomic groupings, and oceanographic interpretations are in Dowsett (1991) and Dowsett and Poore (1990;1991).

Table 1 - Latitude, longitude, and water depth (in corrected meters) for ODP Sites 659 and 667

| Site | Latitude | Longitude | Depth |
|---|---|---|---|
| 659 | 18.00°N | 21.10°W | 3069.8m |
| 667 | 4.55°N | 21.90°W | 3529.3m |

The latitudes, longitudes, and water depths of ODP Sites 659 and 667 are included in Table 1.

## METHODS

The samples used in this study were washed using low temperature (isotope) procedures. Sediment samples were dried in an oven at ≤50°C. The dried bulk sample was disaggregated in a beaker with warm tap water and about 2 ml of dilute calgon solution (5 gm calgon to 1 liter water). The beaker was agitated on a shaker/hot plate without heating. Samples were then washed through a 63μ sieve using a fine spray hose and dried in an oven at ≤50° C. Each sample was washed an average of two cycles.

A split of 300-350 planktic foraminifer specimens was obtained from the ≥149μ size fraction using a Carpco sample splitter. Specimens were identified, sorted, and glued to a standard 60-square micropaleontological slide.

**COUNTING CATEGORIES**

Taxa included in counting categories and codes used for headings of Tables 2-4 are summarized below. In general, our taxonomic concepts follow Parker (1962; 1967), and Blow (1969). Exceptions to their practices are noted below.

In Tables 2-3, ODP sample designations are abbreviated as core-section, depth within section in centimeters (eg. 10-5, 34 = core 10, section 5, 34 cm below top of section 5).

**Code** **Taxon (taxa) comments**

acost *Neogloboquadrina acostaensis* (Blow) and *N. continuosa* (Blow)

aequi *Globigerinella aequilateralis* (Brady)

altis *Globoquadrina altispira* (Cushman and Jarvis)

bform benthic foraminifers

bulls *Globigerina bulloides* (d'Orbigny) and *G. praebulloides* (Blow)

calida *Globigerinella calida* (Parker)

Cande *Candeina*

congl *Globigerinoides conglobatus* (Brady)

congm Globoquadrina conglomerata (Schwager)

crass *Globorotalia crassaformis* (Galloway and Wissler). This category includes *G. ronda* Blow and *G. oceanica* Cushman and Bermudez . Specimens of G. crassiformis with a distinct keel on the entire ultimate whorl are tabulated separately under "kcras".

datca *Neogloboquadrina atlantica* (Berggren) right-coiling

decor *Globigerina decoraperta* (Takayanagi and Saito)

dpach *Neogloboquadrina pachyderma* (Ehrenberg) right-coiling. This category is restricted to specimens with 4 chambers in the ultimate whorl. Right-coiling specimens close to *N. pachyderma* that have more than 4 chambers in the ultimate whorl are tabulated as "dupac."

dupac This category is used for specimens of right-coiling *Neogloboquadrina* with more than four chambers in the ultimate whorl that are transitional between *N. pachyderma* and *N. acostaensis* or *N. atlantica.*

falco *Globigerina falconensis* (Blow)

frags fragments of planktic foraminifers

Gltal This category includes *Globorotalia* that could not be confidently identified to specific level.

gluti *Globigerinita glutinata* (Egger) s.l.

Gnoid *Globigerinoides* spp. Representatives of *Globigerinoides* (usually small) that could not be confidently assigned to *G. ruber, G. obliquus* (s.l.) or *G. conglobatus.*

hexag *Globorotaloides hexagona* (Natland)

hirsu *Globorotalia hirsuta* (d'Orbigny) and *Globorotalia praehirsuta* Blow

humer *Neogloboquadrina humerosa* (Takayanagi and Saito)

incis *Globigerina incisa* (Bronnimann and Resig)

kcras This category includes *G. crassiformis* with fully keeled final whorl.

marga *Globorotalia margaritae* (Bolli and Bermudez)

menar *Globorotalia menardii* (Parker, Jones, and Brady) s.l. This category includes all members of the *G. menardii* lineage such as *G. limbata* (Fornasini) and *G. miocenica* Palmer.

Neogl This category includes *Neogloboquadrina* that were not identified to specific level but generally does not include representatives of *N. atlantica.*

obliq *Globigerinoides obliquus* (Bolli) and *G. extremus* (Bolli and Burmudez)

Orbul *Orbulina universa* (d'Orbigny)

OTHER This category includes unidentified specimens and taxa that are rare within assemblages.

plata
*Globorotalia inflata* (d'Orbigny) and *G. puncticulata* (Deshayes)

praed *Globigerina praedigitata* (Parker)

pseud *Globigerina pseudobesa* (Salvatorini)

Pulle *Pulleniatina*

pumil This category includes small forms with 5-7 chambers in the ultimate whorl that are similar to *Globorotalia pumilio* Parker, *G. praepumilio* (Parker) and *G. pseudopumilio* (Bronnimann and Resig).

ruber *Globigerinoides ruber* (d'Orbigny)

saccu *Globigerinoides sacculifer* (Brady), *G. quadrilobatus* (d'Orbigny) and *G. trilobus* (Reuss)

scitu *Globorotalia scitula* (Brady) s.l. This category includes all members of the *G. scitula* group, for example *G. subscitula* (Conato).

sp. 1 *Globigerina* sp. 1. Taxon resembles *G. falconensis* but has reticulate surface texture similar to *G. woodi* group.

spach *Neogloboquadrina pachyderma* (Ehrenberg) left-coiling.

Sphae *Sphaeroidinella* and *Sphaeroidinellopsis*

PLANK Total number of planktic forams in the counting split.

tumid *Globorotalia tumida* (Brady) s.l. and *G. plesiotumida* (Blow and Banner).

venez *Globoquadrina venezuelana* (Hedberg)

woodi *Globigerina woodi* (Jenkins) and *G. apertura* (Cushman)

**ACKNOWLEDGEMENTS**

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| SAMPLE | ruber | obliqsaccu | bulls | falco | spachdpach | dupac | acost | humer | gluti | Orbul | Gnoid | pseud | aequi | Pulle | woodi | decor | incis | Neogl | pumil | hexag |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 - 3 , 81 | 22 | 0 | 1 | 31 | 1 | 56 | 10 | 15 | 11 | 50 | 27 | 4 | 0 | 3 | 1 | 0 | 22 | 3 | 1 | 21 | 2 | 8 |
| 8 - 6 , 71 | 29 | 6 | 6 | 45 | 0 | 0 | 0 | 6 | 64 | 64 | 15 | 4 | 1 | 2 | 3 | 0 | 26 | 3 | 1 | 0 | 0 | 11 |
| 9 - 3 , 51 | 29 | 2 | 13 | 46 | 0 | 0 | 20 | 2 | 15 | 38 | 9 | 2 | 1 | 4 | 0 | 0 | 29 | 1 | 0 | 2 | 0 | 33 |
| 9 - 5 , 11 | 28 | 6 | 12 | 29 | 1 | 0 | 1 | 3 | 19 | 84 | 10 | 0 | 3 | 1 | 0 | 0 | 39 | 0 | 2 | 1 | 0 | 5 |
| 10 - 1 , 50 | 15 | 3 | 3 | 21 | 1 | 0 | 0 | 4 | 10 | 72 | 35 | 1 | 0 | 2 | 0 | 0 | 23 | 0 | 0 | 2 | 1 | 0 |
| 10 - 1 , 81 | 16 | 12 | 1 | 44 | 1 | 0 | 0 | 6 | 32 | 56 | 24 | 0 | 0 | 2 | 0 | 0 | 20 | 0 | 3 | 1 | 7 | 2 |
| 10 - 1 , 111 | 10 | 16 | 5 | 15 | 0 | 0 | 0 | 8 | 64 | 89 | 15 | 0 | 0 | 1 | 2 | 0 | 36 | 4 | 3 | 0 | 1 | 1 |
| 10 - 1 , 141 | 15 | 4 | 4 | 25 | 0 | 0 | 0 | 1 | 79 | 50 | 18 | 0 | 0 | 0 | 1 | 0 | 25 | 2 | 0 | 6 | 0 | 2 |
| 10 - 2 , 31 | 18 | 12 | 6 | 28 | 0 | 0 | 0 | 4 | 63 | 40 | 22 | 0 | 0 | 1 | 0 | 0 | 28 | 2 | 0 | 1 | 0 | 0 |
| 10 - 2 , 61 | 12 | 13 | 8 | 28 | 0 | 0 | 0 | 0 | 55 | 38 | 24 | 0 | 2 | 1 | 0 | 0 | 24 | 0 | 0 | 5 | 0 | 1 |
| 10 - 2 , 96 | 19 | 19 | 17 | 16 | 2 | 0 | 0 | 5 | 42 | 38 | 13 | 0 | 6 | 3 | 0 | 0 | 24 | 1 | 0 | 2 | 0 | 8 |
| 10 - 2 , 121 | 32 | 7 | 8 | 9 | 0 | 0 | 0 | 9 | 45 | 39 | 22 | 0 | 2 | 0 | 1 | 0 | 28 | 2 | 1 | 11 | 0 | 8 |
| 10 - 3 , 6 | 30 | 9 | 6 | 14 | 0 | 0 | 0 | 3 | 34 | 42 | 31 | 3 | 5 | 1 | 3 | 0 | 74 | 0 | 0 | 5 | 0 | 1 |
| 10 - 3 , 36 | 31 | 7 | 3 | 22 | 0 | 0 | 1 | 3 | 58 | 42 | 34 | 2 | 0 | 0 | 1 | 0 | 62 | 2 | 0 | 0 | 0 | 7 |
| 10 - 3 , 66 | 28 | 9 | 7 | 34 | 0 | 0 | 0 | 3 | 30 | 28 | 15 | 0 | 1 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 8 |
| 10 - 3 , 96 | 20 | 18 | 9 | 30 | 3 | 0 | 0 | 3 | 60 | 17 | 25 | 0 | 2 | 0 | 1 | 0 | 52 | 1 | 0 | 0 | 0 | 3 |
| 10 - 4 , 31 | 12 | 18 | 5 | 26 | 0 | 0 | 0 | 3 | 24 | 22 | 21 | 1 | 1 | 0 | 1 | 0 | 55 | 0 | 0 | 0 | 0 | 6 |
| 10 - 4 , 61 | 13 | 12 | 5 | 22 | 0 | 0 | 0 | 5 | 27 | 14 | 10 | 0 | 1 | 1 | 1 | 0 | 51 | 0 | 0 | 0 | 0 | 4 |
| 10 - 4 , 91 | 15 | 22 | 4 | 15 | 0 | 0 | 0 | 1 | 23 | 16 | 18 | 1 | 0 | 5 | 1 | 0 | 42 | 1 | 0 | 0 | 0 | 6 |
| 10 - 4 , 119 | 11 | 7 | 8 | 26 | 0 | 0 | 0 | 1 | 74 | 15 | 13 | 0 | 1 | 2 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 9 |
| 10 - 5 , 61 | 23 | 13 | 13 | 23 | 1 | 0 | 0 | 3 | 59 | 14 | 11 | 0 | 0 | 3 | 1 | 0 | 50 | 0 | 0 | 0 | 0 | 4 |
| 10 - 5 , 146 | 16 | 9 | 16 | 22 | 0 | 0 | 0 | 6 | 65 | 28 | 8 | 1 | 0 | 1 | 1 | 0 | 56 | 0 | 0 | 2 | 0 | 4 |
| 10 - 6 , 91 | 14 | 13 | 6 | 28 | 0 | 0 | 0 | 9 | 75 | 34 | 9 | 1 | 3 | 5 | 1 | 0 | 45 | 0 | 0 | 4 | 3 | 9 |
| 11 - 1 , 49 | 23 | 14 | 9 | 29 | 1 | 0 | 2 | 7 | 68 | 39 | 29 | 2 | 0 | 2 | 3 | 0 | 46 | 0 | 1 | 2 | 0 | 7 |
| 11 - 1 , 131 | 7 | 19 | 7 | 48 | 0 | 0 | 2 | 11 | 31 | 57 | 30 |  | 0 | 0 | 2 | 0 | 52 | 0 | 0 | 4 | 0 | 6 |
| 11 - 2 , 71 | 22 | 26 | 7 | 12 | 0 | 0 | 1 | 3 | 47 | 54 | 32 | 2 | 0 | 2 | 1 | 11 | 32 | 0 | 1 | 10 | 0 | 7 |
| 11 - 3 , 21 | 17 | 9 | 5 | 24 | 1 | 0 | 0 | 6 | 57 | 51 | 28 | 5 | 2 | 0 | 2 | 0 | 52 | 0 | 1 | 14 | 0 | 5 |
| 11 - 3 , 111 | 20 | 23 | 8 | 12 | 0 | 0 | 0 | 6 | 45 | 53 | 53 | 0 | 1 | 2 | 1 | 0 | 36 | 4 | 1 | 17 | 0 | 6 |
| 11 - 4 , 49 | 28 | 46 | 19 | 23 | 0 | 0 | 1 | 4 | 31 | 39 | 28 | 1 | 5 | 2 | 5 | 0 | 30 | 0 | 0 | 8 | 0 | 3 |
| 11 - 4 , 143 | 7 | 23 | 8 | 25 | 1 | 0 | 1 | 7 | 49 | 42 | 24 | 1 | 2 | 0 | 4 | 0 | 55 | 2 | 1 | 10 | 1 | 3 |
| 11 - 5 , 81 | 5 | 34 | 22 | 23 | 1 | 0 | 0 | 6 | 45 | 29 | 21 | 0 | 1 | 0 | 2 | 0 | 65 | 0 | 1 | 8 | 1 | 3 |
| 11 - 6 , 21 | 6 | 4 | 17 | 32 | 0 | 0 | 0 | 0 | 36 | 22 | 22 | 2 | 1 | 0 | 0 | 26 | 41 | 0 | 0 | 5 | 0 | 8 |
| 12 - 1 , 61 | 8 | 40 | 10 | 35 | 1 | 0 | 0 | 3 | 52 | 40 | 15 | 0 | 3 | 1 | 1 | 0 | 31 | 0 | 0 | 0 | 0 | 6 |

Table 2 - ODP Hole 659A

| congl | sp.1 | altis | praed | plata | crass | kcras | datca | Sphae | Cande | congmvenez | scitu | hirsu | Gital | tumid | menar | other | PLANK | frags | bform | SAMPLE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 32 | 8 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 6 | 5 | 343 | 0 | 3 | 8 - 3 , 81 |
| 1 | 0 | 0 | 1 | 73 | 6 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 19 | 1 | 390 | 0 | 4 | 8 - 6 , 71 |
| 1 | 0 | 0 | 0 | 46 | 20 | 1 | 0 | 0 | 0 | 0 | 6 | 3 | 0 | 0 | 21 | 0 | 344 | 0 | 12 | 9 - 3 , 51 |
| 0 | 0 | 0 | 0 | 43 | 15 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 18 | 2 | 322 | 0 | 3 | 9 - 5 , 11 |
| 1 | 0 | 15 | 0 | 90 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 4 | 1 | 309 | 140 | 1 | 10 - 1 , 50 |
| 1 | 1 | 8 | 0 | 71 | 4 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 8 | 2 | 324 | 0 | 15 | 10 - 1 , 81 |
| 1 | 0 | 14 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 8 | 0 | 1 | 309 | 125 | 1 | 10 - 1 , 111 |
| 0 | 0 | 7 | 0 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 0 | 1 | 3 | 2 | 294 | 0 | 7 | 10 - 1 , 141 |
| 0 | 0 | 12 | 2 | 70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 5 | 2 | 316 | 115 | 1 | 10 - 2 , 31 |
| 1 | 0 | 6 | 1 | 75 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 20 | 2 | 321 | 0 | 1 | 10 - 2 , 61 |
| 0 | 0 | 0 | 8 | 44 | 5 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 45 | 2 | 320 | 63 | 0 | 10 - 2 , 96 |
| 0 | 0 | 2 | 1 | 71 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 1 | 10 | 2 | 317 | 200 | 5 | 10 - 2 , 121 |
| 0 | 0 | 10 | 0 | 61 | 8 | 0 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 6 | 2 | 350 | 230 | 2 | 10 - 3 , 6 |
| 1 | 0 | 5 | 0 | 54 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 7 | 0 | 345 | 155 | 0 | 10 - 3 , 36 |
| 0 | 0 | 8 | 0 | 132 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 9 | 1 | 348 | 180 | 3 | 10 - 3 , 66 |
| 0 | 0 | 13 | 0 | 62 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 7 | 3 | 330 | 73 | 3 | 10 - 3 , 96 |
| 5 | 0 | 24 | 0 | 93 | 12 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 3 | 336 | 87 | 0 | 10 - 4 , 31 |
| 2 | 0 | 2 | 1 | 116 | 16 | 0 | 0 | 0 | 1 | 4 | 0 | 3 | 0 | 0 | 1 | 22 | 0 | 334 | 130 | 6 |
| 10 - 4 , 61 |
| 1 | 0 | 12 | 0 | 127 | 13 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 12 | 2 | 336 | 70 | 2 |
| 10 - 4 , 91 |
| 1 | 0 | 4 | 0 | 109 | 5 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 11 | 1 | 319 | 130 | 2 |
| 10 - 4 , 119 |
| 1 | 0 | 7 | 0 | 77 | 6 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 12 | 1 | 328 | 40 | 1 |
| 10 - 5 , 61 |
| 4 | 0 | 5 | 0 | 72 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 21 | 2 | 342 | 100 | 0 |
| 10 - 5 , 146 |
| 1 | 0 | 6 | 0 | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 2 | 13 | 3 | 332 | 54 | 1 |
| 10 - 6 , 91 |
| 2 | 0 | 1 | 0 | 18 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 8 | 0 | 0 | 21 | 2 | 339 | 126 | 4 |
| 11 - 1 , 49 |
| 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 1 | 0 | 0 | 1 | 292 | 128 | 1 |
| 11 - 1 , 131 |
| 0 | 0 | 20 | 1 | 4 | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 2 | 2 | 0 | 9 | 21 | 1 | 334 | 180 | 2 |
| 11 - 2 , 71 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 6 | 1 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 20 | 1 | 312 | 205 | 2 |
| 11 - 3 , 21 |
| 0 | 0 | 14 | 0 | 27 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 3 | 1 | 6 | 0 | 25 | 2 | 368 | 215 | 5 |
| 11 - 3 , 111 |
| 4 | 0 | 16 | 0 | 29 | 1 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 1 | 2 | 0 | 19 | 4 | 349 | 52 | 0 |
| 11 - 4 , 49 |
| 1 | 0 | 6 | 0 | 1 | 4 | 7 | 2 | 2 | 0 | 1 | 0 | 2 | 0 | 3 | 0 | 24 | 2 | 319 | 155 | 3 |
| 11 - 4 , 143 |
| 0 | 0 | 17 | 0 | 40 | 10 | 0 | 0 | 8 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 2 | 345 | 65 | 1 |
| 11 - 5 , 81 |
| 0 | 0 | 5 | 2 | 95 | 14 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 7 | 2 | 347 | 245 | 4 |
| 11 - 6 , 21 |
| 0 | 0 | 15 | 1 | 44 | 6 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 16 | 1 | 334 | 120 | 2 |
| 12 - 1 , 61 |

Table 2 - ODP Hole 659A

| SAMPLE | DEPTH | ruber | obliq | saccu | bulls | falco | dupac | acost | humer | gluti | Orbul | calida | Gnoid | aequi | woodi | decor | incis | Neogl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 - 1 , 21 | 30.01 | 125 | 8 | 94 | 8 | 1 | 0 | 16 | 35 | 15 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 5 - 2 , 31 | 31.61 | 41 | 6 | 62 | 14 | 0 | 3 | 53 | 55 | 14 | 5 | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| 5 - 3 , 21 | 33.01 | 42 | 2 | 122 | 3 | 0 | 0 | 24 | 67 | 18 | 5 | 0 | 0 | 0 | 12 | 0 | 4 | 0 |
| 5 - 4 , 119 | 35.49 | 37 | 5 | 7 | 17 | 0 | 2 | 29 | 91 | 23 | 12 | 0 | 1 | 3 | 25 | 0 | 0 | 4 |
| 5 - 5 , 46 | 36.26 | 50 | 17 | 68 | 17 | 0 | 0 | 22 | 50 | 11 | 1 | 0 | 5 | 2 | 11 | 0 | 0 | 1 |
| 6 - 1 , 51 | 39.81 | 26 | 26 | 27 | 18 | 0 | 0 | 20 | 39 | 23 | 4 | 0 | 1 | 4 | 43 | 1 | 2 | 3 |
| 6 - 1 , 103 | 40.33 | 39 | 29 | 35 | 25 | 0 | 0 | 11 | 53 | 9 | 4 | 0 | 1 | 3 | 32 | 3 | 2 | 0 |
| 6 - 1 , 116 | 40.46 | 46 | 20 | 33 | 8 | 0 | 0 | 9 | 68 | 10 | 2 | 2 | 0 | 2 | 14 | 0 | 1 | 0 |
| 6 - 1 , 131 | 40.61 | 41 | 31 | 80 | 12 | 0 | 0 | 2 | 54 | 8 | 9 | 1 | 2 | 1 | 15 | 1 | 0 | 0 |
| 6 - 1 , 146 | 40.76 | 67 | 27 | 29 | 5 | 0 | 0 | 0 | 43 | 11 | 9 | 6 | 0 | 10 | 24 | 5 | 0 | 0 |
| 6 - 2 , 11 | 40.91 | 38 | 22 | 31 | 20 | 0 | 0 | 6 | 65 | 10 | 4 |  | 1 | 3 | 15 | 4 | 0 | 0 |
| 6 - 2 , 26 | 41.06 | 56 | 25 | 71 | 17 | 0 | 0 | 4 | 41 | 13 | 5 | 1 | 5 | 1 | 4 | 1 | 3 | 0 |
| 6 - 2 , 41 | 41.21 | 69 | 54 | 47 | 21 | 3 | 0 | 3 | 34 | 11 | 1 | 1 | 8 | 2 | 4 | 3 | 2 | 2 |
| 6 - 2 , 56 | 41.36 | 47 | 30 | 34 | 32 | 3 | 0 | 4 | 50 | 10 | 4 | 6 | 2 | 3 | 9 | 10 | 1 | 0 |
| 6 - 2 , 71 | 41.51 | 48 | 43 | 30 | 20 | 0 | 0 | 7 | 61 | 19 | 5 | 3 | 2 | 3 | 5 | 5 | 0 | 0 |
| 6 - 2 , 86 | 41.66 | 58 | 36 | 41 | 25 | 0 | 0 | 5 | 37 | 11 | 5 | 1 | 3 | 3 | 5 | 9 | 0 | 0 |
| 6 - 2 , 103 | 41.83 | 52 | 37 | 40 | 4 | 0 | 0 | 2 | 42 | 17 | 3 | 3 | 2 | 1 | 30 | 10 | 0 | 0 |
| 6 - 2 , 116 | 41.96 | 49 | 16 | 52 | 33 | 0 | 0 | 3 | 40 | 15 | 4 | 1 |  | 1 | 3 | 10 | 1 | 0 |
| 6 - 2 , 134 | 42.14 | 41 | 39 | 39 | 13 | 0 | 0 | 5 | 33 | 15 | 3 | 4 | 3 | 6 | 5 | 12 | 1 | 0 |
| 6 - 2 , 146 | 42.26 | 47 | 29 | 42 | 31 | 0 | 1 | 4 | 43 | 23 | 3 | 4 | 2 | 4 | 13 | 11 | 0 | 1 |
| 6 - 3 , 31 | 42.61 | 31 | 42 | 61 | 13 | 2 | 1 | 5 | 51 | 5 | 4 | 0 | 1 | 1 | 9 | 0 | 1 | 0 |
| 6 - 3 , 61 | 42.91 | 17 | 41 | 54 | 9 | 1 | 1 | 5 | 47 | 12 | 0 | 2 | 0 | 3 | 2 | 0 | 3 | 2 |
| 6 - 3 , 91 | 43.21 | 27 | 30 | 31 | 10 | 3 | 0 | 9 | 55 | 22 | 4 | 0 | 2 | 2 | 8 | 0 | 1 | 0 |
| 6 - 3 , 123 | 43.53 | 30 | 61 | 48 | 11 | 0 | 0 | 6 | 22 | 11 | 1 | 0 | 1 | 3 | 4 | 0 | 1 | 2 |
| 6 - 3 , 146 | 43.76 | 16 | 36 | 43 | 6 | 2 | 1 | 10 | 82 | 4 | 1 | 2 | 0 | 5 | 5 | 0 | 0 | 2 |
| 6 - 5 , 51 | 45.81 | 24 | 22 | 49 | 8 | 5 | 1 | 2 | 37 | 11 | 7 | 5 | 2 | 4 | 0 | 0 | 0 | 1 |
| 6 - 5 , 81 | 46.11 | 14 | 31 | 53 | 15 | 0 | 0 | 2 | 30 | 6 | 6 | 0 | 4 | 8 | 7 | 0 | 4 | 2 |
| 6 - 5 , 111 | 46.41 | 13 | 63 | 39 | 11 | 0 | 0 | 6 | 23 | 10 | 1 | 3 | 0 | 0 | 2 | 0 | 2 | 0 |
| 6 - 6 , 13 | 46.93 | 12 | 43 | 48 | 0 | 7 | 0 | 8 | 38 | 11 | 0 | 0 | 0 | 5 | 6 | 0 | 0 | 1 |
| 6 - 6 , 44 | 47.24 | 7 | 35 | 58 | 19 | 5 | 0 | 3 | 48 | 13 | 6 | 1 | 2 | 1 | 7 | 0 | 1 | 0 |
| 6 - 6 , 71 | 47.51 | 14 | 25 | 60 | 23 | 3 | 0 | 4 | 59 | 17 | 4 | 2 | 0 | 6 | 0 | 0 | 4 | 0 |
| 6 - 6 , 99 | 47.79 | 6 | 47 | 35 | 22 | 1 | 2 | 1 | 55 | 13 | 3 | 3 | 0 | 11 | 6 | 2 | 2 | 6 |
| 7 - 1 , 41 | 49.21 | 2 | 53 | 61 | 7 | 0 | 2 | 6 | 46 | 2 | 3 | 0 | 0 | 6 | 6 | 1 | 4 | 5 |
| 7 - 1 , 131 | 50.11 | 3 | 44 | 35 | 8 | 0 | 0 | 5 | 38 | 8 | 3 | 0 | 0 | 9 | 0 | 0 | 2 | 8 |
| 7 - 4 , 23 | 53.53 | 0 | 47 | 45 | 13 | 0 | 2 | 6 | 68 | 9 | 2 | 1 | 0 | 10 | 9 | 0 | 6 | 13 |

Table 3 - ODP Hole 667A

| hexag | congl | altis | Pulle | praed | plata | crass | Sphae | Cande | marga | scitu | hirsu | Gltal | tumid | menar | Other | PLANK | frags | bform | SAMPLE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 3 | 0 | 0 | 1 | 0 | 0 | 5 | 0 | 0 | 1 | 0 | 1 | 0 | 26 | 2 | 344 | 159 | 0 | 5 - 1 , 21 |
| 0 | 1 | 0 | 6 | 0 | 12 | 1 | 18 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 6 | 306 | 580 | 18 | 5 - 2 , 31 |
| 6 | 1 | 0 | 0 | 0 | 2 | 2 | 7 | 0 | 0 | 8 | 3 | 1 | 0 | 14 | 0 | 343 | 178 | 2 | 5 - 3 , 21 |
| 0 | 1 | 0 | 0 | 0 | 3 | 0 | 7 | 0 | 0 | 0 | 4 | 2 | 0 | 39 | 3 | 315 | 157 | 2 | 5 - 4 , 119 |
| 4 | 0 | 0 | 0 | 0 | 3 | 9 | 1 | 0 | 0 | 0 | 2 | 6 | 0 | 23 | 4 | 307 | 265 | 0 | 5 - 5 , 46 |
| 5 | 2 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 8 | 0 | 73 | 3 | 332 | 94 | 3 | 6 - 1 , 51 |
| 0 | 1 | 2 | 0 | 0 | 3 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 68 | 3 | 328 | 128 | 1 | 6 - 1 , 103 |
| 1 | 5 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 0 | 76 | 2 | 310 | 154 | 3 | 6 - 1 , 116 |
| 0 | 0 | 0 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 61 | 1 | 326 | 100 | 2 | 6 - 1 , 131 |
| 0 | 2 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 55 | 2 | 308 | 76 | 0 | 6 - 1 , 146 |
| 0 | 4 | 0 | 0 | 0 | 9 | 4 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 75 | 4 | 320 | 116 | 0 | 6 - 2 , 11 |
| 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 0 | 68 | 2 | 326 | 96 | 0 | 6 - 2 , 26 |
| 0 | 9 | 0 | 0 | 0 | 8 | 2 | 0 | 1 | 0 | 0 | 2 | 3 | 0 | 59 | 0 | 349 | 69 | 1 | 6 - 2 , 41 |
| 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 0 | 0 | 5 | 2 | 0 | 63 | 2 | 323 | 87 | 1 | 6 - 2 , 56 |
| 2 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | 3 | 5 | 0 | 60 | 1 | 331 | 100 | 0 | 6 - 2 , 71 |
| 0 | 2 | 0 | 0 | 0 | 9 | 2 | 7 | 1 | 0 | 0 | 3 | 1 | 0 | 63 | 1 | 328 | 77 | 1 | 6 - 2 , 86 |
| 1 | 4 | 0 | 0 | 0 | 7 | 3 | 2 | 0 | 0 | 1 | 2 | 2 | 0 | 60 | 3 | 328 | 76 | 0 | 6 - 2 , 103 |
| 0 | 0 | 0 | 0 | 0 | 6 | 9 | 6 | 0 | 0 | 0 | 1 | 1 | 0 | 62 | 1 | 314 | 72 | 1 | 6 - 2 , 116 |
| 2 | 3 | 2 | 0 | 0 | 3 | 3 | 5 | 1 | 0 | 0 | 3 | 1 | 0 | 86 | 4 | 332 | 99 | 1 | 6 - 2 , 134 |
| 0 | 1 | 0 | 0 | 0 | 4 | 0 | 3 | 0 | 0 | 0 | 0 | 4 | 0 | 71 | 1 | 342 | 65 | 1 | 6 - 2 , 146 |
| 3 | 4 | 37 | 0 | 0 | 1 | 1 | 14 | 0 | 0 | 3 | 4 | 3 | 0 | 55 | 0 | 352 | 122 | 3 | 6 - 3 , 31 |
| 0 | 0 | 49 | 0 | 0 | 0 | 5 | 16 | 0 | 0 | 0 | 0 | 3 | 0 | 74 | 3 | 349 | 57 | 1 | 6 - 3 , 61 |
| 3 | 2 | 63 | 0 | 0 | 4 | 0 | 28 | 0 | 0 | 0 | 1 | 4 | 0 | 34 | 3 | 346 | 68 | 0 | 6 - 3 , 91 |
| 2 | 0 | 36 | 0 | 0 | 4 | 1 | 24 | 0 | 0 | 0 | 0 | 4 | 0 | 40 | 2 | 314 | 84 | 0 | 6 - 3 , 123 |
| 0 | 2 | 51 | 0 | 0 | 6 | 4 | 10 | 0 | 0 | 0 | 1 | 4 | 0 | 39 | 2 | 334 | 161 | 1 | 6 - 3 , 146 |
| 0 | 8 | 52 | 0 | 0 | 9 | 6 | 13 | 0 | 0 | 0 | 0 | 3 | 0 | 39 | 3 | 311 | 85 | 2 | 6 - 5 , 51 |
| 6 | 0 | 52 | 0 | 0 | 8 | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 58 | 2 | 314 | 63 | 2 | 6 - 5 , 81 |
| 5 | 12 | 43 | 0 | 0 | 8 | 1 | 13 | 0 | 0 | 0 | 1 | 4 | 0 | 63 | 3 | 326 | 79 | 2 | 6 - 5 , 111 |
| 9 | 11 | 45 | 0 | 0 | 14 | 4 | 18 | 3 | 0 | 1 | 1 | 7 | 0 | 13 | 4 | 309 | 49 | 0 | 6 - 6 , 13 |
| 0 | 12 | 79 | 0 | 0 | 5 | 1 | 16 | 0 | 0 | 0 | 0 | 1 | 0 | 10 | 1 | 331 | 71 | 3 | 6 - 6 , 44 |
| 5 | 3 | 24 | 20 | 0 | 2 | 2 | 6 | 2 | 0 | 1 | 1 | 1 | 0 | 46 | 6 | 340 | 113 | 2 | 6 - 6 , 71 |
| 2 | 4 | 38 | 0 | 0 | 5 | 5 | 5 | 2 | 0 | 0 | 0 | 6 | 0 | 45 | 7 | 334 | 105 | 2 | 6 - 6 , 99 |
| 4 | 7 | 41 | 0 | 0 | 1 | 11 | 18 | 0 | 0 | 0 | 1 | 9 | 0 | 36 | 2 | 334 | 99 | 0 | 7 - 1 , 41 |
| 4 | 3 | 68 | 0 | 0 | 0 | 7 | 7 | 0 | 0 | 0 | 0 | 6 | 0 | 56 | 4 | 318 | 91 | 0 | 7 - 1 , 131 |
| 5 | 0 | 53 | 0 | 0 | 0 | 11 | 7 | 1 | 1 | 3 | 1 | 0 | 0 | 17 | 3 | 333 | 178 | 4 | 7 - 4 , 23 |