U.S. Department of the Interior
U.S. Geological Survey

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Los Angeles County Department of Public Works and
the Water Replenishment District of Southern California

Open-File Report 2011–1274
Plate 5 of 18

| Stratigraphic unit | Neogene zonation of Blow (1969) | California margin zonation of Kennett and Kucera (2000) and Kucera and Kennett (2000) | Laboratory numbers | Core | Depth, in meters | *Globogerinella calida* (Parker) | *Globogerinella obesa* (Bolli) | *Globigerinita glutinata* (Egger) | *Globigerina bulloides* d'Orbigny | *Globigerina falconensis* Blow | *Globigerinita uvula* (Ehrenberg) | *Globigerinoides obliquus* Bolli | *Globigerinoides ruber* (d'Orbigny) | *Globigerina quinqueloba* Natland | *Globigerina umbilicata* Orr and Zaitzeff | *Globorotalia anfracta* Parker | *Globorotalia crassaformis* (Galloway and Wissler) | *Globorotalia hirsuta* (d'Orbigny) | *Globorotalia inflata* (d'Orbigny) *s.l.* | *Globorotalia inflata* (d'Orbigny) *s.s.* | *Globorotalia menardii* (Parker, Jones, and Brady) | *Globorotalia puncticulata* (Deshayes) | *Globorotalia scitula* (Brady) | *Globorotalia tosaensis* Takayanagi and Saito | *Globorotalia truncatulinoides* (d'Orbigny) | *Neogloboquadrina dutertrei* (d'Orbigny) | *Neogloboquadrina humerosa praehumerosa* Natori | *Neogloboquadrina kagaensis* (Maiya, Saito, and Sato) | *Neogloboquadrina pachyderma* (Ehrenberg) C (sinistral, compressed) | *Neogloboquadrina pachyderma* (Ehrenberg) B (sinistral, inflated) | *Neogloboquadrina pachyderma* (dextral, compressed) | *Neogloboquadrina pachyderma* (Ehrenberg) A (dextral, inflated) | *Orbulina suturalis* Bronnimann | *Orbulina universa* d'Orbigny | *Pulleniatina obliquiloculata* (Parker and Jones) | *Spharoideinella seminulina* (Schwager) | Total planktic foraminifers | Diversity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bent Spring | | | Mf10333 | 60C | 79.5 | - | - | 1 | 2 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 7 | 1 | - | - | - | - | - | 12 | 5 |
| | | | Mf10334 | 64C | 85.5 | - | 1 | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 | 2 |
| | | | Mf10335 | 66C | 88.4 | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 |
| upper Wilmington | | | Mf10336 | 73C | 98.4 | - | 2 | 4 | 4 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | 14 | 6 |
| | | | Mf10337 | 75C | 100.6 | - | 2 | 2 | 2 | 3 | - | - | - | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 10 | - | - | - | - | - | - | 23 | 6 |
| | | | Mf10338 | 85C | 114.1 | 2 | - | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4 | - | - | - | - | - | - | 11 | 4 |
| | | | Mf10339 | 92C | 124.9 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | 2 | 2 |
| | | | Mf10340 | 96C | 131.5 | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 4 | - | - | - | - | - | 7 | 3 |
| lower Wilmington | | | Mf10341 | 97C | 132.6 | 1 | - | 13 | 59 | 2 | - | - | 1 | 65 | - | - | - | - | - | - | - | - | - | - | - | 5 | - | - | - | 8 | 152 | 50 | - | - | - | - | 356 | 10 |
| | | CM2 | Mf10342 | 98C | 134.8 | - | - | - | 4 | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | 7 | - | - | - | - | 15 | 4 |
| | | | Mf10306 | 99C | 134.4 | 1 | - | 3 | 1 | 6 | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 10 | 4 | - | - | - | - | 27 | 7 |
| | | | Mf10343 | 100C | 137.7 | - | - | - | 2 | 3 | - | - | - | 4 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | 4 | 4 | - | - | - | - | 18 | 6 |
| | | | Mf10344 | 104C | 143.3 | - | - | 1 | 25 | 11 | - | - | - | 10 | - | - | - | - | - | - | - | - | - | - | 1 | 5 | - | - | - | 2 | 35 | 17 | - | - | - | - | 107 | 9 |
| | | | Mf10345 | 107C | 147.8 | - | - | 7 | 3 | 20 | - | - | 3 | 7 | - | - | - | - | - | - | - | - | 1 | - | - | 3 | - | - | - | - | 18 | 9 | - | 1 | - | - | 72 | 10 |
| | | | Mf10346 | 109C | 150.8 | 1 | 2 | 12 | 9 | 13 | - | 4 | 6 | 24 | - | - | - | - | - | - | - | - | - | - | 2 | - | 9 | - | - | - | 73 | 13 | 8 | 20 | - | - | 196 | 14 |
| | | | Mf10347 | 110C | 153.2 | - | 3 | 34 | 15 | 5 | - | - | 16 | 71 | - | - | - | - | - | - | - | - | 1 | - | 4 | 6 | - | - | - | 2 | 73 | 15 | 3 | 9 | - | - | 257 | 14 |
| | | | Mf10348 | 116C | 161.6 | - | - | - | 78 | 1 | - | - | 6 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | 2 | 13 | 11 | 6 | 8 | - | - | 126 | 9 |
| | | | Mf10308 | 137C | 183.5 | - | - | 36 | 54 | 13 | - | - | 2 | 47 | - | - | - | 1 | - | - | - | - | - | - | - | 4 | - | - | 12 | - | 6 | 1 | - | 4 | - | - | 180 | 11 |
| | | | Mf10309 | 145C | 186.1 | - | - | - | 13 | 2 | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 8 | - | 4 | 2 | - | 1 | - | - | 45 | 7 |
| | | | Mf10310 | 145C | 197.9 | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - | - | - | - | 4 | 3 |
| upper Long Beach | ~~~~~~~~ | | Mf10311 | 154C | 198.0 | - | - | 3 | 6 | - | - | - | 1 | 22 | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 52 | 2 | 12 | 1 | - | - | - | - | 100 | 9 |
| | | | Mf10307 | 155C | 211.6 | - | - | 20 | 30 | 2 | - | - | - | 13 | - | - | - | - | - | - | - | - | 6 | - | - | - | - | - | 22 | 26 | 10 | 7 | - | - | - | - | 136 | 9 |
| | | | Mf10312 | 156C | 215.1 | - | - | 4 | 7 | - | - | - | - | 5 | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 7 | - | - | - | - | - | - | - | 24 | 5 |
| | | | Mf10349 | 174C | 242.2 | - | - | 4 | 8 | 3 | - | - | - | 9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 17 | - | 2 | - | - | - | - | - | 43 | 6 |
| | | | Mf10313 | 177C | 246.5 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 |
| | | CM3-4 | Mf10314 | 182C | 252.7 | - | - | 3 | 5 | 1 | - | - | - | 3 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | 10 | - | 2 | - | - | - | - | - | 25 | 7 |
| | | | Mf10315 | 182C | 253.7 | - | - | - | 6 | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - | 9 | 3 |
| | ~~~~~~~~ | | Mf10350 | 185C | 258.2 | - | - | - | - | 5 | - | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | - | - | - | 3 | - | 1 | 12 | 6 |
| | | | Mf10351 | 186C | 260.1 | - | - | 28 | 75 | 37 | - | - | 5 | 9 | - | - | - | - | - | 2 | - | - | - | - | - | 2 | 10 | - | - | - | 194 | - | - | 4 | 1 | - | 367 | 11 |
| | | | Mf10352 | 187C | 260.9 | 3 | - | 16 | 61 | 11 | - | - | 3 | 5 | - | - | - | - | - | - | - | - | - | - | - | 2 | 8 | - | 19 | - | 241 | - | - | 3 | - | - | 372 | 11 |
| | | | Mf10353 | 188C | 261.3 | - | - | 16 | 16 | 17 | - | - | 2 | 7 | - | - | - | - | - | - | - | - | - | - | - | 4 | - | - | 1 | - | 105 | - | - | 1 | - | - | 173 | 9 |
| | | | Mf10354 | 189C | 262.9 | 1 | - | - | 7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 6 | - | - | 1 | - | 30 | - | - | 5 | - | - | 50 | 6 |
| | | | Mf10355 | 190C | 265.8 | - | - | 8 | 11 | 2 | - | - | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 | - | 187 | - | - | - | - | - | 223 | 10 |
| | | | Mf10356 | 191C | 266.7 | - | - | 37 | 42 | - | - | - | 1 | 14 | - | - | - | - | - | - | - | - | - | - | - | - | 5 | - | 3 | - | 201 | - | - | 3 | - | - | 306 | 8 |
| | | | Mf10357 | 191C | 268.4 | 7 | 1 | 28 | 20 | 11 | - | - | 1 | 18 | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | 12 | - | - | 1 | - | - | 101 | 10 |
| | | | Mf10358 | 193C | 270.2 | - | 3 | 28 | 11 | 17 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 5 | - | - | 3 | - | 51 | - | - | - | - | - | 119 | 8 |
| | | | Mf10359 | 194C | 271.6 | - | - | 20 | 28 | 1 | - | - | 1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | 11 | - | 53 | - | 2 | 3 | - | - | 124 | 10 |
| | | | Mf10360 | 195C | 273.2 | 1 | - | 54 | 59 | - | 2 | - | 15 | 58 | 1 | - | 1 | - | - | 6 | - | 2 | - | - | - | 12 | 6 | 5 | 6 | - | 176 | - | 3 | 9 | - | - | 416 | 17 |
| | | | Mf10361 | 196C | 274.7 | - | 15 | 110 | 149 | - | - | - | 16 | 125 | - | - | - | 1 | - | 4 | - | 1 | 1 | - | - | 26 | 15 | - | 26 | - | 188 | - | 4 | 8 | - | - | 689 | 15 |
| | | | Mf10362 | 197C | 276.1 | - | 6 | 100 | 167 | - | 3 | - | 4 | 167 | - | - | - | - | - | 7 | - | 1 | 1 | - | - | - | - | - | 220 | - | 10 | - | - | 2 | - | - | 688 | 12 |
| | | | Mf10363 | 199C | 279.0 | - | - | 39 | 58 | - | - | - | 2 | 129 | | - | - | - | - | 7 | - | - | - | - | - | - | - | | 240 | - | 17 | - | 1 | 7 | - | - | 500 | 9 |
| | | | Mf10364 | 199C | 279.1 | - | - | 58 | 88 | 2 | - | - | - | 176 | 1 | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | 117 | - | 7 | - | - | - | - | - | 451 | 9 |
| | | | Mf10365 | 200C | 280.7 | - | 1 | 19 | 23 | - | - | - | - | 74 | - | - | 2 | - | - | 3 | - | - | 1 | - | - | - | - | | 100 | - | 7 | - | 2 | 10 | - | - | 242 | 11 |
| | | | Mf10366 | 201C | 281.9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 367* | |
| | | | Mf10367 | 202C | 283.5 | - | 4 | 50 | 71 | 3 | - | - | | 144 | 2 | - | - | - | - | 1 | - | - | - | - | - | - | - | | 111 | - | 1 | - | 5 | 7 | - | - | 399 | 11 |
| | | | Mf10368 | 203C | 285.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 271* | 0 |
| | | | Mf10369 | 204C | 287.1 | - | - | 27 | 122 | 1 | - | - | 3 | 22 | 1 | - | - | - | - | 3 | - | - | 1 | - | - | - | - | - | 37 | - | 5 | - | 4 | - | - | - | 226 | 11 |
| | | | Mf10370 | 205C | 288.2 | - | 3 | 103 | 68 | - | - | - | 3 | 232 | - | - | - | - | - | 5 | - | - | - | - | - | - | - | 1 | 214 | - | 6 | - | 1 | 2 | - | - | 638 | 11 |
| | | | Mf10371 | 205C | 288.9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 554* | 0 |
| | | | Mf10372 | 206C | 289.7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 726* | 1 |
| middle Long Beach | PLlestocene (N21) | CM5 | Mf10373 | 207C | 291.6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 617* | 1 |
| | | | Mf10374 | 208C | 293.6 | - | - | 58 | 72 | - | - | - | - | 69 | 3 | - | 2 | - | - | 4 | - | - | 1 | - | - | - | 1 | - | 168 | - | 29 | - | - | 11 | - | - | 418 | 11 |
| | | | Mf10375 | 210C | 296.6 | - | - | 58 | 60 | - | - | - | 2 | 46 | - | - | - | - | - | 5 | - | 3 | 2 | - | - | - | 1 | 1 | 103 | - | 21 | - | 3 | 9 | - | - | 314 | 13 |
| | | | Mf10376 | 211C | 297.4 | - | 1 | 110 | 75 | - | - | - | 4 | 93 | - | - | - | - | - | 1 | - | 1 | 1 | 1 | - | 2 | 1 | - | 198 | - | 20 | - | - | 1 | - | - | 509 | 14 |
| | | | Mf10378 | 216C | 303.6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 8 | - | 2 | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | 564* | 3 |
| | | | Mf10479 | 217C | 304.6 | - | 3 | 100 | 115 | 8 | 1 | - | 16 | 32 | - | - | 20 | - | - | 4 | - | 2 | 6 | - | - | 9 | - | - | 302 | - | 123 | - | 1 | 6 | - | - | 748 | 16 |
| | | | Mf10480 | 218 | 306.9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 311* | |
| | | | Mf10481 | 219C | 307.8 | - | - | 27 | 70 | - | - | - | 1 | 64 | - | - | 3 | - | - | - | - | - | 1 | - | - | - | 1 | - | 56 | - | 13 | - | - | 1 | - | - | 237 | 10 |
| | | | Mf10379 | 220C | 311.3 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 90* | |
| | | | Mf10482 | 220C | 311.9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 | - | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | 221* | |
| | | | Mf10483 | 221C | 313.9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 135* | |
| | | | Mf10380 | 221C-2 | 314.3 | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | 5 | - | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 99* | |
| | | | Mf10484 | 223C-1 | 329.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 182* | |
| | | | Mf10485 | 223C-2 | 331.5 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 220* | |
| | | | Mf10486 | 224C-2 | 333.2 | - | 1 | 8 | 16 | 14 | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 50 | - | 3 | - | - | - | - | - | 97 | 7 |
| | | | Mf10487 | 225C | 335.9 | - | - | 3 | 23 | - | - | - | - | 4 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 25 | - | - | - | - | - | - | - | 56* | 5 |
| | | | Mf10488 | 225C | 337.2 | - | - | 4 | 18 | - | - | - | - | 16 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 32 | - | - | - | - | - | - | - | 70 | 4 |
| | | | Mf10489 | 227C-1 | 348.3 | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2* | 1 |
| | | | Mf10490 | 227C-2 | 348.8 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 153* | |
| | | | Mf10491 | 228C-1 | 357.5 | - | - | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | 13 | - | - | - | 1 | - | - | - | 21* | 6 |
| | | | Mf10492 | 228C-2 | 358.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 64* | |
| | | | Mf10493 | 232C-1 | 361.0 | - | - | 12 | 16 | 1 | - | - | - | 2 | - | 3 | - | - | - | - | - | - | - | - | - | 1 | - | - | 82 | - | 1 | - | - | - | - | - | 33* | 8 |
| | | | Mf10494 | 232C | 375.3 | - | - | 13 | 14 | 1 | 1 | - | - | 6 | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | 57 | - | - | - | - | - | - | - | 7 | 7 |
| | | | Mf10381 | 232C | 375.6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 7 | 0 |
| | | | Mf10495 | 232C-2 | 375.8 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 7* | 0 |
| | | | Mf10496 | 233C-1 | 398.9 | - | 11 | 28 | 187 | - | - | - | 2 | 33 | 8 | - | - | - | 1 | - | - | - | - | - | - | - | 9 | - | 95 | - | 8 | - | - | - | - | - | 227* | 10 |
| | Pliocene (N21?) | CM6 | Mf10497 | 234C-2 | 420.5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 532* | |

[Abundances are the actual number of specimens examined or absent (-); samples were scanned only for diagnostic specoes (*).]

# Distribution of Planktic Foraminifers in the Long Beach Pier C Core Site and Monitoring Well, Long Beach, California

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2012

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