UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMPOSITION AND CORRELATION OF BEDROCK AND SEDIMENT CORES, R/V SEA SOUNDER CRUISE S3-79-SC, MAY 1979, CALIFORNIA CONTINENTAL BORDERLAND

By

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INTRODUCTION

Dart core (drop core) samples taken during a 10-day cruise of the Research Vessel SEA SOUNDER (S3-79-SC) in May, 1979, include basement rocks, Upper Cretaceous to Quaternary sedimentary rocks, and volcanic rocks. The described samples are from core stations spaced at approximately 1-km intervals along tracklines shown in Figure 1.

The descriptions supplement those published in other reports on borderland samples (Vedder and others, 1974, 1976a, b, 1977, 1979). Rock names are based chiefly upon examination by binocular microscope under low magnification. Selected cores of coarse clastic, volcanic, and metamorphic rocks were sectioned and studied petrographically and are prefixed by the letter W in the last column of the accompanying table. Rock colors are coded after Goddard and others (1948) and applied to dried samples. Subsamples for paleontologic study were taken from the bottom 3 to 5 cm of core material except where noted otherwise. Not all samples were examined for all microfossil groups.

R. E. Arnal identified the benthic foraminifers; his correlations are shown in Figure 2, and the zonation and paleobathymetry follow the usage of Kleinpell (1938), Natland (1952), and Arnal (1976). David Bukry identified and correlated the coccoliths and silicoflagellates; his zonation is shown in Figure 3. J. A. Barron identified and correlated the diatoms; his zonation is shown in Figure 4. J. G. Vedder identified mollusks and other large invertebrate fossils. Queried Quaternary age designations are based upon sediment composition, lack of cementation, color, and degree of cohesiveness of the cores rather than on contained fossils. A double hyphen in the Age/Stage/Zone column of the table signifies either an unfossiliferous sample or a sample devoid of age-diagnostic species.

NOTEWORTHY RESULTS

Glaucophane-epidote schist is present in the eastern part of Blake Knolls (core 145), where glaucophane-bearing rocks heretofore have not been reported. Altered and unaltered gabbroic rocks, including saussuritized gabbro, occur as angular to well-rounded pebbles in Quaternary sediments in the central part of Blake Knolls (cores 153 and 155) suggest nearby seafloor outcrops of those rocks. In the same area, granules and pebbles of albite-chlorite-glaucophane-epidote schist (core 157) are embedded in Pliocene or younger sediment that includes inner sublittoral mollusks. These shallow-water mollusks imply sub-sidence of the knoll as well as downslope transport of the sediments. Samples of Miocene age that contain locally derived schist detritus are from southeastern Santa Cruz-Catalina Ridge (cores 215, 219, and 224). Greenstone fragments from the small knob 2 km southwest of Point Bennett on San Miguel Island (core 434a) may represent basement but possibly are pieces of clasts in a Cretaceous conglomerate. Similar clasts are included in hornblende-plagioclase schist (metamorphosed amphibolite) in the central part of Garrett Ridge (cores 293 and 295) possibly are clasts eroded from a Cretaceous conglomerate or are redeposited basement detritus. Some of these schist pebbles retain fragments of sandstone matrix; others are coated with phosphoritic sandstone containing middle Miocene foraminifers. Abundant fragments of argillite, arkosic wacke, chert, and chloritized volcanic rocks denote the presence of Franciscan Complex on the southern part of Albatross Knoll (cores 325 and 332).

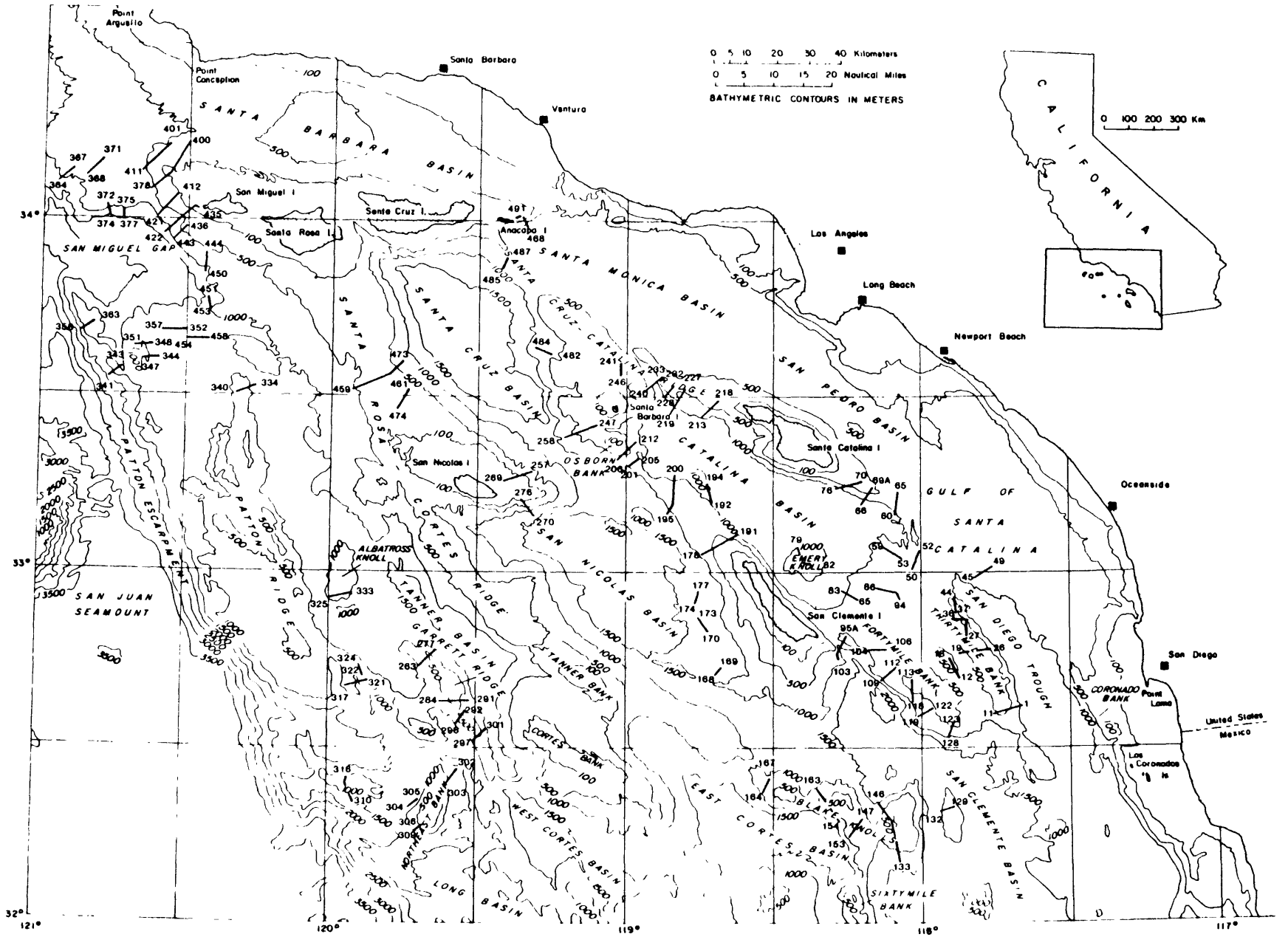

Figure 1. Map of the northern part of the California Continental Borderland showing approximate location of sample track lines for cruise S3-79-SC. Sample-number sequences are indicated at the end of the track line.

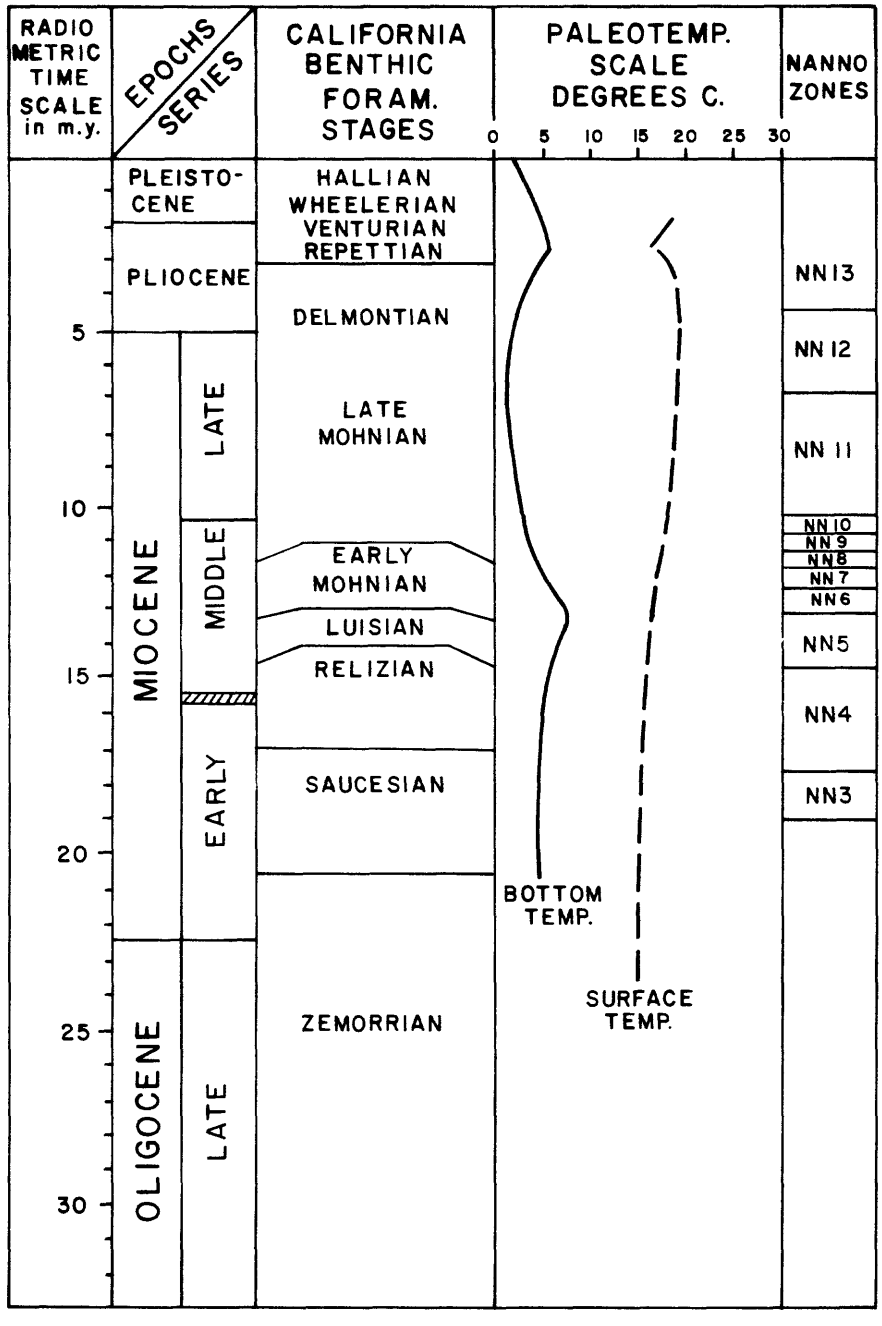

Figure 2. Benthic foraminiferal stages and correlations (Arnal, 1976) used for cruise S3-79-SC.

AGE		COCCOLITH: TROPICAL AND SUBTROPICAL		COCCOLITH: TEMPERATE		SILICOFLAGELLATE
		ZONE	SUBZONE	ZONE		ZONE
Quaternary		*Emiliania huxleyi*				--
		Gephyrocapsa oceanica	*Ceratolithus cristatus*			
			Emiliania ovata			
		Crenalithus doronicoides	*Gephyrocapsa caribbeanica*			
			Emiliania annula			
Pliocene	late	*Discoaster brouweri*	*Cyclococcolithina macintyrei*	--		*Distephanus speculum*
			Discoaster pentaradiatus			
			Discoaster surculus			
			Discoaster tamalis			
	early	*Reticulofenestra pseudoumbilica*	*Discoaster asymmetricus*			
			Sphenolithus neoabies			
		Amaurolithus tricorniculatus	*Ceratolithus rugosus*			
			Ceratolithus acutus			
			Triquetrorhabdulus rugosus			
Miocene	late	*Discoaster quinqueramus*	*Amaurolithus primus*			
			Discoaster berggrenii	*Discoaster mendomobensis*		*Distephanus pseudofibula*
		Discoaster neohamatus	*Discoaster neorectus*			
			Discoaster bellus			
	middle	*Discoaster hamatus*	*Catinaster calyculus*	*Discoaster variabilis*	upper	
			Helicosphaera carteri		lower	--
		Catinaster coalitus				
		Discoaster exilis	*Discoaster kugleri*			
			Coccolithus miopelagicus			
		Sphenolithus heteromorphus				*Corbisema triacantha*
		Helicosphaera ampliaperta				
	early	*Sphenolithus belemnos*				
		Triquetrorhabdulus carinatus	*Discoaster druggii*			
			Discoaster deflandrei			
			Cyclicargolithus abisectus	--		--
Oligocene	late	*Sphenolithus ciperoensis*	*Dictyococcites bisectus*			
			Cyclicargolithus floridanus			
		Sphenolithus distentus				
	early	*Sphenolithus predistentus*				
		Helicosphaera reticulata	*Reticulofenestra hillae*			
			Coccolithus formosus			
			Coccolithus subdistichus			

Figure 3. Zonation of coccoliths and silicoflagellates used for cruise S3-79-SC (Bukry 1973a, b; 1975).

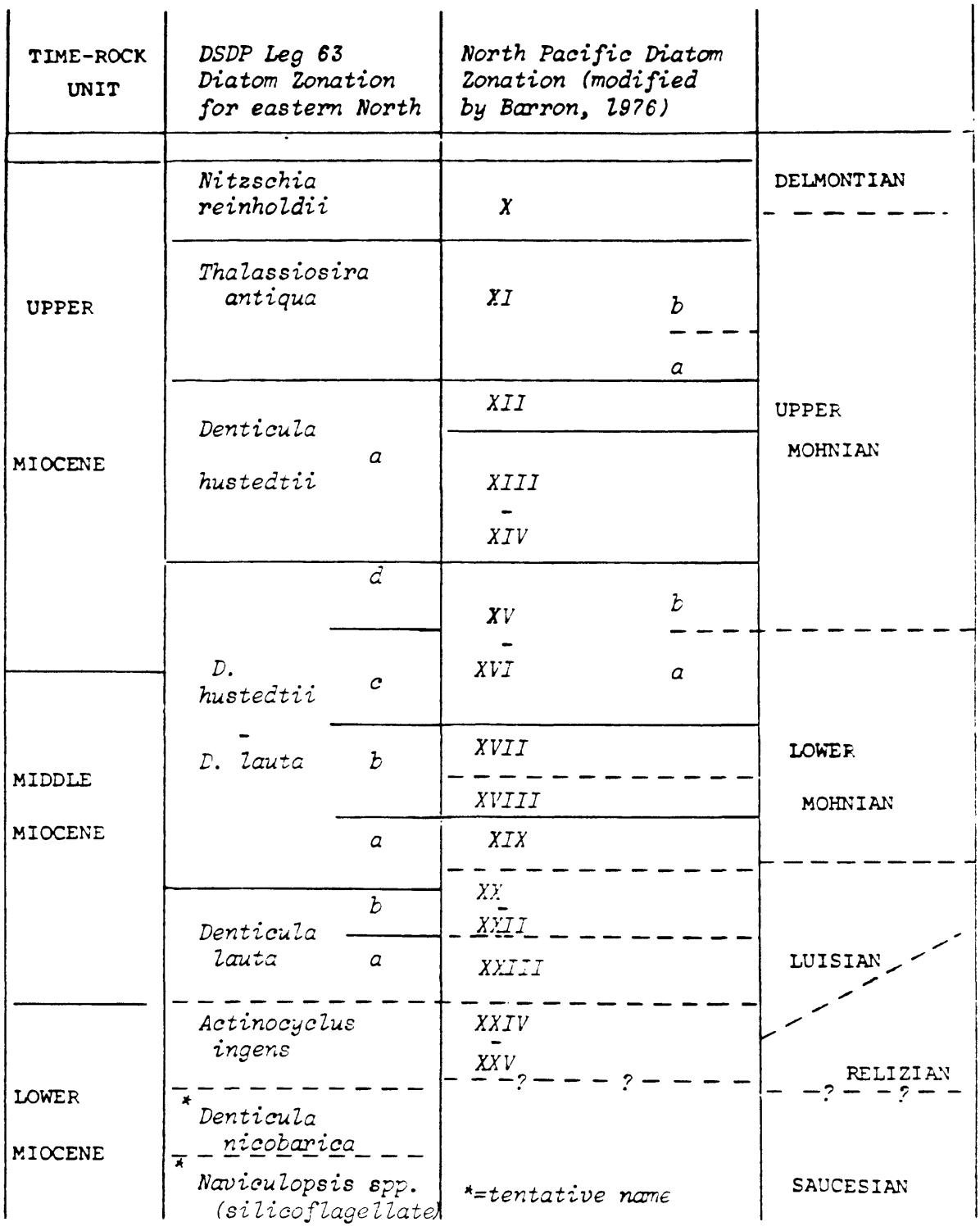

Figure 4. Zonation of diatoms used for cruise S3-79-SC (Barron, 1980).

Volcanic and volcaniclastic rocks of special interest include Zemorrian breccia and early or middle Miocene lapilli tuff in the northwestern part of Patton Ridge (cores 360 and 361). These samples of volcanogenic rocks are remarkably like some middle Miocene cores from DSDP Leg 63 Holes 467, 468, and 469 (Vedder and Crouch, in press). Hyaloclastites form parts of the unnamed small knolls about 10 km northwest and north of David Knoll (cores 364, 365, 366, and 370) and are present on the slope about 5 km east of it (cores 372 and 373). Volcaniclastic rocks from the south flank of the Northeast Bank include one sample (core 308) that contains lower Mohnian foraminifers, indicating Miocene volcanic activity before emplacement of the Pliocene hyaloclastite reported by Hawkins and others (1971).

The oldest fossiliferous sedimentary rocks cored on Cruise S3-79-SC are Santonian or Campanian claystone and fine-grained sandstone from northern Garrett Ridge (core 179A). Marthasterites sp. cf. M. furcatus occurs in a coccolith assemblage from the claystone. Quartzofeldspathic sandstone (core 457) and hard, fractured micaceous siltstone (cores 346 and 350) from the northern Patton Ridge probably are older than Miocene. Rare foraminifers in one sample (core 350) suggest a Late Cretaceous or early Tertiary age. These rocks are similar to unfossiliferous sandstone and siltstone sampled on an earlier cruise in the same area (Vedder and others, 1976b; cores SCS 425 and 426) and closely resemble upper Eocene and Oligocene rocks at Tanner and Cortes Banks. In addition to the Oligocene volcaniclastic rocks on the northwesternmost part of Patton Ridge (core 360), correlative strata occur 16 km to the southeast on the same part of the ridge, where sandy siltstone (core 342) contains the diatoms Dictyococcites bisectus, Cyclicargolithus sp. aff. C. floridanus together with lower Zemorrian foraminifers. Late Oligocene and/or early Miocene samples include upper Zemorrian or Saucesian claystone from the slope southeast of San Nicolas Island (core 273), upper Saucesian or Relizian siltstone from the platform 8 km west of Richardson Rock (core 383), and probably upper Saucesian or Relizian siltstone from the Santa Cruz-Catalina Ridge 11 km northeast of Santa Barbara Island (core 238).

The uncommonly reported Discoaster mendomobensis Zone, which overlies the Discoaster variabilis Zone, is represented by coccolith assemblages in claystone on the platform 25 km east of Emery Knoll (core 57) and in the saddle of Santa Rosa-Cortes Ridge 37 km northwest of San Nicolas Island (core 467). Silty claystone from the northern end of the low ridge 21 km west of San Clemente Island (core 176) contains coccoliths characteristic of the warm-water Pliocene Discoaster tamalis subzone.

Significant changes in bathymetry are indicated by benthic foraminiferal assemblages from the northern San Clemente Ridge-Osborn Bank area, where middle and late Miocene water depths greater than 2500 m (abyssal range) have decreased to modern depths of 1025 to 230 m (cores 179, 181, 182, 189, 190, 199, 200, 247, 249, 251, and 253). At some of these sites, uplift of as much as 2000 m or more is implied since the end of Miocene time. Uplift followed by subsidence is suggested at Albatross Knoll where foraminifers assigned to the Mohnian Stage reflect inner sublittoral depths (0-60 m) in water that now is 700 m deep (core 327). The relatively flat top of the knoll may represent a Miocene surf-cut platform. Late Pliocene or early Pleistocene foraminifers and Pliocene or Quaternary mollusks from the central part of Blake Knolls include inner sublittoral and intertidal forms (core 157). Subsidence plus downslope transport is thus indicated for this area of the Blake Knolls, which now is mostly deeper than 400 m.

REFERENCES

Arnal, R. E., 1976, Miocene paleobathymetric changes of the Santa Rosa-Cortes Ridge area, California Continental Borderland, in Howell, D. G., ed., Aspects of the geologic history of the California Continental Borderland: American Association of Petroleum Geologists, Pacific Section, Miscellaneous Publication 24, p. 60-79.

Barron, J. A., 1980, Lower Miocene to Quaternary diatom biostratigraphy of DSDP Leg 57, off northeastern Japan: Initial Reports, Deep Sea Drilling Project, n. 56, 57 (part II), p. 641, 685.

_____ 1976, Revised Miocene and Pliocene biostratigraphy of upper Newport Bay, Newport Beach, California: Marine Micropaleontology, no. 1, p. 27-63.

Bukry, J. D., 1973a, Low-latitude coccolith biostratigraphic zonation: Initial Reports, Deep Sea Drilling Project, n. 15, p. 685-703.

_____ 1973b, Coccolith and silicoflagellate stratigraphy, Deep Sea Drilling Project Leg 18, eastern North Pacific: Initial Reports, Deep Sea Drilling Project, v. 18, p. 817-831.

_____ 1975, Coccolith and silicoflagellate stratigraphy, northwestern Pacific Ocean, Deep Sea Drilling Project Leg 32: Initial Reports, Deep Sea Drilling Project, v. 32, p. 677-701.

Goddard, E. N., Chairman, and others, 1948, Rock-color chart: Washington, D.C., National Research Council (republished by Geological Society of America 1951), 6 p.

Hawkins, J. W., Allison, E. C., and MacDonald, D., 1971, Volcanic petrology and geologic history of Northeast Bank, southern California borderland: Geological Society of America Bulletin, v. 82, no. 1, p. 219-228.

Kleinpell, R. M., 1938, Miocene stratigraphy of California: American Association of Petroleum Geologists, Tulsa, Oklahoma, 450 p.

Natland, M. L., 1952, Pleistocene and Pliocene stratigraphy of southern California: California University, Los Angeles, unpublished Ph.D. Thesis, 165 p.

Vedder, J. G., Arnal, R. E., Bukry, David, and Barron, J. A., 1976a, Preliminary descriptions of pre-Quaternary samples, R/V Lee, March 1976, offshore southern California: U.S. Geological Survey Open-file Report 76-629, 15 p.

Vedder, J. G., Arnal, R. E., and Bukry, David, 1976b, Maps showing location of selected pre-Quaternary rock samples from the California Continental Borderland: U.S. Geological Survey Miscellaneous Field Studies Map MF-737, 3 sheets, map scale 1:250,000.

Vedder, J. G, Arnal, R. E., Bukry, David, Barron, J. A., and Lee-Wong, F., 1979, Descriptions of dart core samples, R/V SAMUEL P. LEE Cruise L2-78-SC, May, 1978, California Continental Borderland: U.S. Geological Survey Open-file Report 79-936, 46 p.

Vedder, J. G., Beyer, L. A., Junger, Arne, Moore, G. W., Roberts, A. E., Taylor, J. C., and Wagner, H. C., 1974, Preliminary report on the geology of the continental borderland of southern California: U.S. Geological Survey Miscellaneous Field Studies Map MF-624, 34 p., 9 sheets.

Vedder, J. G., Crouch, J. K., Arnal, R. E., Bukry, David, Barron, J. A., and Lee-Wong, Florence, 1977, Descriptions of pre-Quaternary samples, R/V ELLEN B. SCRIPPS, September 1976, Patton Ridge to Blake Knolls, California Continental Borderland: U.S. Geological Survey Open-file Report 77-474, 19 p.

Vedder, J. G., Crouch, J. K., and Lee-Wong, Florence, Comparative study of rocks from DSDP Holes 467, 468, and 469 and the southern California borderland: Initial Reports, Deep Sea Drilling Project, Leg 63, in press.

TABLE

N Lat	W Long	Uncorrected depth (meters)	Description	Age, Stage, or Zone	Sample Number
32°37.5'	117°41.3'	790	Silt, clayey, micaceous, calcareous, sparsely glauconitic (pelletal); 5Y5/2; rare angular sand-size grains of quartz and volcanic(?) rocks	Quaternary coccoliths; Pliocene to Holocene foraminifers	1
32°36.8'	117°42.7'	513	Phosphorite(?), pulverized pieces; includes grains of quartz, white mica, and indeterminate rock fragments	--	4
32°36.5'	117°42.9'	425	Volcanic rock fragments (andesite?), pulverized, weathered; 10YR7/4	--	5
32°36.2'	117°45.2'	550	Sand, clayey and silty, glauconitic calcareous; 5Y5/2; abundant sand-size lithic fragments, angular to subrounded, chiefly volcanic rocks; sparse pelletal phosphorite	Quaternary(?)	10
32°36.1'	117°45.7'	800	Siltstone, clayey, calcareous, slightly micaceous; N3 and 5Y6/1 in bottom 2 cm; fine- to coarse-grained glauconitic-volcaniclastic sand about 9 cm above bottom of core	Mixed middle or late Miocene and Quaternary coccoliths; upper Mohnian foraminifers	11
32°43.1'	117°53.5'	560	Siltstone, clayey, micaceous; 5Y3/1	Mohnian(?) foraminifers	14
32°44.6'	117°54.5'	490	Phosphorite, pulverized fragments, foraminiferal sand, sparse glauconite pellets, and unidentified rock fragments	--	18
32°45.6'	117°49.8'	350	Siltstone, clayey, tuffaceous; N8, 10YR6/2	Early or middle Miocene coccoliths; Subzone b, Denticula lauta	19

32°45.7'	117°49.3'	325	Mudstone, sandy; 5Y6/4; includes weathered fragments of volcanic rocks and rare blue-green to gray schistose grains as large as 0.5 mm	Probably late Pliocene to Holocene foraminifers	20
32°46.0'	117°48.8'	295	Siltstone, calcareous, micaceous; sugary texture; 10YR4/2; massive, minutely mottled in part; abundant volcanic detritus in Quaternary(?) sand at top of core	--	21
32°46.2'	117°48.4'	290	Sandstone, silty, pebbly, volcaniclastic, calcareous, pumiceous(?); N7 to N8; massive, fractured, subrounded to angular pebbles of basaltic(?) andesite as large as 2.7 cm embedded in weathered volcanic detritus	--	22 W029
32°46.6'	117°47.5'	305	Siltstone, clayey, micaceous, tuffaceous(?) in part; 5Y4/1; fractured, sheared; thin cherty(?) zone (N 1 cm) in lower 4 cm; grains and granules of tuff 13 to 24 cm from bottom; abundant grains and granules of volcanic rocks and schist(?) in Quaternary(?) sand at top	--	24
32°46.7'	117°47.1'	370	Sandstone, very fine to medium grained, silty, sparsely glauconitic; 5Y5/2 to 5Y5/6; common subrounded to angular grains of volcanic and metamorphic rocks as large as 0.6 mm; massive; friable	Late Pliocene to Holocene foraminifers	25
32°49.7'	117°51.0'	400	Sandstone, very fine to medium grained, silty; 5GY7/2; angular to subangular mineral grains and rock fragments probably derived from metamorphic and volcanic(?) rocks	--	28
32°51.6'	117°50.7'	550	Siltstone, sandy, glauconitic (pelletal), foraminiferal; 5Y6/1; subangular rock fragments include greenish-gray schistose rocks as large as 0.5 mm	Quaternary(?)	31

32°51.8'	117°51.2'	360	Talcose(?) phyllite; 5G8/1, silky sheen; largest piece 7.0 mm; fragments scraped from core barrel	--	32
32°51.9'	117°51.7'	470	Quartz-muscovite(?) schist 5Y8/4 to 5Y8/1; granules and pebbles embedded in very coarse-grained schist-fragment sand; other clasts include biotite schist and granitic(?) rocks; possibly represents weathered basement rock	--	33 W0 30
32°52.0'	117°52.1'	500	Quartz-chlorite schist; angular and sub-angular fragments mostly 1.0 to 5.5 cm long; serpentine and knotted albite-chlorite schist; core probably represents weathered basement rock	--	34 W0 31
37°52.1'	117°52.5'	470	Volcanic(?) rock, weathered; pulverized fragments scraped from core barrel	--	35
32°55.1'	117°53.7'	485	Quartz-muscovite(?)-chlorite schist; N5, 5G6/1 to 5B5/1; weathered	--	38
32°55.6'	117°53.7'	560	Siltstone, sandy; clasts include chlorite, muscovite(?), quartz and volcanic or volcaniclastic rock fragments; pulverized pieces scraped from core barrel	--	39
37°56.1'	117°53.9'	700	Siltstone, clayey, micaceous, sparsely glauconitic (pelletal); 5Y6/1; massive, friable	Middle Pliocene to Holocene foraminifers	40
32°56.6'	117°54.2'	570	Rhyolite, devitrified(?); matrix recrystallized and reacting with plagioclase; biotite common	--	41A W0 32 W0 33 W0 34
32°57.0'	117°54.9'	550	Rock fragments embedded in barrel, pale green possibly schistose	--	42

32°57.5'	117°55.2'	555	Muscovite(?) schist, chlorite schist, and quartz schist embedded in limonitic(?) mudstone; schist fragments probably derived from nearby basement outcrops	--	43
32°58.7'	117°55.1'	825	Chlorite-plagioclase schist; angular fragments as large as 4.7 cm also contain epidote, magnetite, and muscovite; embedded in mudstone matrix together with similar schistose rock fragments; probably represents slump deposit	Mudstone matrix contains middle Pliocene to Holocene foraminifers	44 W0 35
32°59.1'	117°49.4'	850	Siltstone, clayey, micaceous, pyritiferous in part; 5GY6/1; massive and bioturbated	Quaternary(?), no Gephyrocapsa; sparse reworked Cretaceous and Eo-Oligocene coccoliths; middle Pliocene to Holocene foraminifers	45
32°59.2'	117°48.8'	800	Siltstone, clayey, micaceous, pyritiferous in part; N8 to 5GY6/1; indistinctly laminated to massive; minute burrows	Quaternary coccoliths; Pliocene foraminifers	46
32°59.5'	117°48.0'	740	Siltstone, clayey, calcareous, micaceous pyritiferous in part; N8; claystone, silty, foraminiferal, micaceous; 5Y5/1; intermixed at bottom of core, massive siltstone above 3.0 cm	Neogene coccoliths; probably early Pliocene foraminifers	47
33°00.0'	117°47.4'	685	Siltstone, clayey, calcareous, micaceous; 5Y8/1 to 5Y4/1; massive to indistinctly color-banded	Quaternary? coccoliths; Pliocene to Holocene, possibly early Pliocene foraminifers	48
33°00.5'	117°46.5'	690	Siltstone, clayey, calcareous, micaceous; 5Y6/1; massive to indistinctly color-banded	Quaternary? and sparse reworked Cretaceous coccoliths; Pliocene to Holocene, possibly early Pliocene foraminifers	49

33°01.3'	118°01.5'	900	Siltstone, sandy, foraminiferal; 5Y6/1, 5GY4/1; semiconsolidated; indistinctly color-banded; sporadic laminae of pelletal glauconite	Quaternary(?)	50
33°01.8'	118°01.2'	900	Sandstone, fine to medium grained, silty, micaceous; N7 to 5Y6/1; abundant flakes of white to brown mica and chlorite; angular grains of quartz and feldspar(?); plant fragments; indurated, fractured	--	51
33°02.3'	118°01.1'	995	Sandstone, very fine to fine grained; and siltstone, sandy, highly micaceous; 5GY7/1; flakes of white and brown mica and chlorite(?); massive	--	52
33°02.2'	118°06.0'	850	Mudstone, foraminiferal glauconitic and phosphoritic (pelletal); 5Y4/1, 5Y6/1; alternating color bands; mud and sand laminae	Quaternary(?)	53
33°02.4'	118°06.4'	830	Phosphorite nodule	--	55
33°02.6'	118°06.7'	880	Mudstone, foraminiferal, glauconitic (pelletal); 5GY6/1 to 5GY4/1; indistinct broad color bands; cohesive	Quaternary(?)	56
33°03.0'	118°07.2'	850	Claystone, silty, micaceous; 5Y2/1, 5Y4/1; 5Y6/1; phosphoritic streaks and blebs; indistinctly laminated; low density	Discoaster mendomobensis; upper Mohnian foraminifers	57
33°03.3'	118°07.9'	750	Phosphorite, nodular, fragments as large as 2.7 cm embedded in phosphorite-glauconite (Pelletal) muddy sand; sparse angular volcanic rock fragments as large as 0.6 cm; rare angular greenish-gray schist fragments as large as 1.0 cm.	--	58

33°03.7'	118°08.1'	850	Siltstone, clayey, micaceous; 5Y3/1; phosphoritic (pelletal) in part	Neogene coccoliths, sparse, includes *Discoaster* sp. cf. *D. variabilis*; upper Mohnian(?) foraminifers	59
33°11.2'	118°05.4'	755	Siltstone, clayey, micaceous, sparsely glauconitic (pelletal), foraminiferal; 5Y6/1	Late Pliocene to Holocene foraminifers	60
33°11.6'	118°05.1'	580	Hyaloclastite, weathered; clasts include vesicular andesitic rocks, perlitic glass, and pumice; matrix altered to green clays	--	61 W036
33°12.0'	118°05.0'	525	Mudstone, sandy, micaceous, foraminiferal; common mineral grains and rock fragments probably derived from volcanic rocks	Quaternary(?)	62
33°12.4'	118°04.9'	525	Hyaloclastite(?), weathered, partly devitrified; clasts include altered volcanic rocks, perlitic glass, and lithic tuff(?); matrix altered to greenish-brown clay	--	63A
33°12.9'	118°04.9'	490	Volcanogenic rock; lithic tuff(?) and volcaniclastic sandy mudstone; weathered; fragments scraped from core barrel	--	64
33°13.2'	118°04.8'	560	Siltstone, clayey to sandy, micaceous; 5Y6/1; clasts include sparse volcanic(?) rocks; scraped from core barrel	Quaternary nannofossils; possibly late Pliocene to Holocene foraminifers	65
33°12.8'	118°11.1'	815	Mudstone, silty, foraminiferal; 5Y4/1; numerous angular reddish-gray to greenish-gray volcanic rock fragments as large as 1.0 mm; probably derived in part from nearby volcanic rocks	Quaternary(?)	66

33°13.2'	118°10.8'	580	Mudstone, sandy, foraminiferal; abundant angular andesite(?) fragments as large as 4.7 cm and sparse pieces of phosphorite nodules	Quaternary(?)	67
33°13.7'	118°10.4'	390	Volcanic or volcaniclastic rock; pulverized fragments scraped from core barrel	--	68
33°14.1'	118°10.2'	335	Volcanic or volcaniclastic rock, weathered; pulverized fragments scraped from smashed core barrel	--	69A
33°15.3'	118°13.0'	260	Siltstone, sandy, micaceous, pumiceous; N6 to N7; minute clay-filled fractures; massive, sheared	--	70
33°15.3'	118°13.5'	260	Sandstone, fine grained foraminiferal, sparse mollusk shells; 5Y6/1 to 5Y8/1; angular to subrounded grains and granules include dioritic and andesitic(?) rocks; massive; friable	Quaternary mollusks	71
33°15.2'	118°14.0'	290	Sandstone, fine grained, foraminiferal, sparse mollusk shells; 5Y6/1; abundant angular rock fragments, largely volcanic(?) rocks; massive; friable	Quaternary mollusks	72
33°15.1'	118°14.7'	315	Sandstone, silty, volcaniclastic, tuffaceous N6; fragments scraped from core barrel	--	73
33°15.1'	118°15.2'	365	Sandstone, very fine to fine grained, silty, foraminiferal, 5GY6/1; abundant subrounded to angular rock fragments, chiefly volcanic rocks, sparse metamorphic rocks; massive; friable	Quaternary(?)	74

33°14.9'	118°15.8'	525	Siltstone, sandy, foraminiferal; 5GY6/1; subrounded lithic fragments, chiefly dark volcanic rocks and minor schistose(?) rocks; mineral grains include quartz, feldspar, brown and white micas; massive	--	76
33°14.9'	118°16.4'	666	Mudstone, sandy to pebbly, volcaniclastic, possibly lapilli tuff; 5GY6/1; angular to subangular clasts as large as 2.9 cm include olivine basalt containing pyroxene and plagioclase phenocrysts in an altered green clay matrix and altered basalt containing An65 phenocrysts and laths, clay-filled vesicles, coarse clots of fresh plagioclase and diopside or augite in a very fine-grained matrix; locally derived	--	76 W0 37 W0 38
33°14.8'	118°17.1'	845	Andesite(?), altered, An40 phenocrysts and calcium poorer laths, some resorbed; rare mafic grains altered to green clay; vesicles clay filled; microcrystalline matrix; angular to subangular monolithologic pieces as large as 4.0 cm embedded in sandy mudstone matrix (N7); probably a slump deposit derived from andesitic flows	--	77 W0 39
33°14.7'	118°17.7'	960	Mudstone, sandy to pebbly foraminiferal; N7 to 5Y4/1; angular to subangular rocks fragments as large as 5.0 cm include andesitic(?) and basaltic rocks, probably derived by slumping from upslope outcrops	Quaternary foraminifers in matrix	78

33°01.9'	118°22.4'	770	Mudstone, sandy to pebbly, foraminiferal, phoshoritic and glauconitic (pelletal); 10YR4/2 to 5YR4/1; abundant angular to subrounded clasts of light-colored volcanic and greenish-gray schistose rocks as large as 3.6 cm; rock fragments include dacite containing rare resorbed quartz and altered plagioclase in a mica-rich and recrystallized, fine-grained matrix and cataclastic granitic rock, some of which is foliated	--	81 W040 W041
33°01.5'	118°22.2'	740	Siltstone, sandy and clayey, phosphoritic (pelletal), foraminiferal; 5YR4/1; sparse mineral grains and rock fragments probably derived from volcanic rock; fragments scraped from core barrel	Late Pliocene(?) to Holocene(?) foraminifers	82
32°57.4'	118°15.7'	1150	Claystone, silty, micaceous; 5GY7/1; and siltstone, sandy, micaceous sparsely glauconitic (pelletal);5GY5/1; angular mineral grains and rock fragments probably derived from volcanic rocks; indistinctly and broadly color-banded	Middle Pliocene to Holocene foraminifers	83
32°57.1'	118°15.1'	1025	Siltstone, sandy, volcaniclastic(?) in part; 5Y6/1 to 10YR7/1; mineral grains and rock fragments probably derived chiefly from volcanic rocks	--	84
32°56.6'	118°14.5'	900	Siltstone, sandy to clayey, glauconitic (pelletal), foraminiferal; 5Y6/1 to 5GY6/1; sporadic rounded to subangular clasts of volcanic rocks as large as 1 mm; broadly color-banded; friable	Quaternary(?)	85
32°57.6'	118°08.6'	870	Siltstone, clayey, foraminiferal, micaceous; 5GY6/1; massive; bioturbated in part; friable	Quaternary(?)	86

32°57.3'	118°08.8'	810	Mudstone, sandy to pebbly, glauconitic (pelletal), foraminiferal; abundant angular to subangular rock fragments as large as 1.9 cm include: vesicular basalt with matrix of blocky plagioclase and microcrystalline interstices; basalt with matrix of slim laths and microcrystalline interstices; basalt, gabbroic texture with coarse cumulate clots of plagioclase; derived from nearby or underlying outcrops	Quaternary(?)	87
32°57.2'	118°07.7'	645	Mudstone, clayey, foraminiferal, glauconitic (pelletal); 5Y6/1; sparsely micaceous; contains mineral grains and rock fragments derived in part from volcanic rocks; fragments scraped from core barrel	Quaternary(?)	88
32°56.9'	118°07.1'	590	Andesite(?), subangular fragment, 5.3 cm long embedded in foraminiferal, glauconitic mudstone containing abundant volcanic rock fragments; probably derived from nearby outcrop	Quaternary(?) (matrix)	89 [FS]
32°56.8'	118°06.6'	585	Sandstone, very fine to coarse grained, silty, foraminiferal, glauconitic (pelletal); 5Y3/2, 5Y7/2; abundant angular to subrounded clasts of volcanic rocks and quartz schist(?) as large as 1.0 mm; massive, cohesive	Middle Pliocene to Holocene foraminifers	90
32°56.6'	118°06.1'	560	Basalt, fragmental fine-grained matrix of plagioclase and mafic minerals, phenocrysts of plagioclase (An50), hypersthene, diopside or augite, rare olivine; largest fragment 3.7 cm long	--	91A W043

32°56.4'	118°05.6	530	Sandstone, fine grained, silty to clayey, glauconitic (pelletal), foraminiferal; 5Y6/1 to 5GY4/1; abundant angular to subrounded clasts of volcanic rocks; massive; bioturbated in part	Quaternary(?)	92
32°55.8'	118°05.3'	555	Sandstone, fine to coarse grained, pebbly, variegated, angular to rounded clasts as large as 1.0 cm include abundant trachytic pyroxene andesite, medium grained, plagioclase An40; glaucophane-albite-epidote schist; spilitized and zeolitized volcanic rock; all in bottom 2.5 cm of core; massive; friable	Quaternary(?) (matrix)	93 W044
32°55.2'	118°05.4'	560	Hornblende andesite, resorbed zoned plagioclase phenocrysts (3 mm), altered mafic mineral; fragmental, includes pieces as large as 4.0 cm.	--	94 W045
32°48.4'	118°15.3'	1000	Claystone, silty, phosphoritic (minute blebs); 5Y4/1 to 5Y2/1; sporadic sand-size clasts chiefly rounded volcanic(?) rocks; fragments scraped from core barrel	Middle Pliocene to Holocene foraminifers	95A
32°48.1'	118°15.6'	930	Tuff, vitric; N7; and claystone, silty, tuffaceous phosphoritic (streaks); 5Y4/1 to 5Y8/1; laminated; low density	Upper Mohnian foraminifers	96
32°47.7'	118°15.8'	928	Claystone, silty, phosphoritic(?) laminae; 5Y4/1 to 5Y6/1; indistinctly laminated to massive; low density	Discoaster variabilis; upper Mohnian foraminifers	97

32°47.3'	118°16.1'	980	Mudstone, sandy, glauconitic (pelletal), phosphoritic (pelletal); 5Y4/1; zone of bentonite(?) (5GY7/2) about 1.0 cm thick and 4.0 cm from bottom; pyritiferous in part; common subrounded to subangular volcanic(?) clasts as large as 2.0 mm about 8.0 cm from bottom	Quaternary(?)	98
32°47.1'	118°16.4'	1125	Tuff(?), lithic, fragmental, altered; 5GY8/1; contains angular quartz grains; pieces embedded in core barrel	--	99
32°46.6'	118°16.4'	850	Claystone, silty, diatomaceous; 5Y4/1 to 5Y6/1; N8; laminated; fractured; very low density	Miocene silicoflagellates; Subzone b, Denticula lauta	100
32°46.2'	118°16.2'	875	Siltstone, clayey, tuffaceous, micaceous, diatomaceous; 5Y4/1 to 5Y8/1; massive to indistinctly laminated; low density	Middle Miocene coccoliths and silicoflagellates; Mohnian or Delmontian deep-water foraminifers	101
32°45.9'	118°16.8'	785	Limestone, clayey, sparsely foraminiferal fragmental; N8 to 5Y8/1; phosphorite nodule with thin ferromanganese coating	--	102
32°45.6'	118°16.9'	850	Sandstone, silty, foraminiferal, glauconitic; 5Y8/1; common rock fragments and mineral grains probably derived from volcanic rocks; massive; friable	Quaternary(?)	103
32°46.1'	118°10.4'	900	Claystone, silty, diatomaceous; 5Y5/1; scraped from core barrel	Subzone a, Denticula hustedtii-D. lauta	104

32°46.3'	118°09.9'	795	Silty claystone fragment, concretionary, dolomitic(?), perforated by boring pelecypods, probably a transported erratic; embedded in foraminiferal, phosphoritic (pelletal) sandy mudstone containing sparse subangular to subrounded granules and pebbles of volcanic rocks as large as 0.5 cm	Quaternary(?) (matrix)	105
32°46.2'	118°09.7'	750	Sandstone, clayey to silty, glauconitic (pellets and granules) phosphoritic (pelletal, nodular); 5Y4/1; sparse angular to subrounded clasts as large as 5.0 mm including pyroxene andesite, basalt, epidote-glaucophane rock, foliated biotite-quartz rock, and cataclastic granitic rock; massive, friable	--	106 W046
32°42.1'	118°08.0'	685	Sandstone, very fine to fine grained, volcaniclastic, angular to subangular, friable; N4; and claystone, silty, diatomaceous; N9 to 5Y8/1; laminated, deformed in part; very low density; Quaternary(?) pebble gravel at top contains angular to well rounded clasts of volcanic and foliated metamorphic rocks as large as 2.3 cm and phosphoritic nodules	Miocene silicoflagellates; Subzone b, Denticula lauta in claystone	109
32°42.3'	118°07.6'	495	Claystone, silty, phosphoritic (?) (blebs and and streaks); 5Y2/1 to 5Y6/1; indistinctly laminated	Neogene coccoliths, sparse, includes Reticulofenestrata pseudoumbilica; lowermost upper Mohnian foraminifers	110
32°42.7'	118.07.1'	515	Claystone, silty, micaceous, phosphoritic in part; N5; laminated; bioturbated	Discoaster variabilis, upper; upper Mohnian foraminifers	111
32°42.7'	118°06.3'	535	Claystone, silty, micaceous; N4 to 5Y4/1; bioturbated; phosphorite blebs, minute clay-filled fractures	Discoaster variabilis, upper; upper Mohnian foraminifers	112A

32°41.3'	118°02.2'	370	Sandstone, fine to medium grained; 5Y7/2; composed chiefly of foraminiferan tests; few mollusk fragments, bryozoans and echinoid spines, sparsely phosphoritic and glauconitic (pelletal); includes scattered grains of green and gray metamorphic and pink volcanic rocks as large as 2 mm; massive; friable	Quaternary(?) mollusks	113
32°40.5'	118°02.1'	260	Claystone, silty, sparsely micaceous, sparsely phosphoritic (pelletal, nodular) in part; 5Y4/1; scraped from inside core barrel	Discoaster neohamatus; upper Mohnian foraminifers	115
32°40.4'	118°02.2'	260	Claystone, silty, micaceous, foraminiferal; 5Y4/1; scraped from inside core barrel	Discoaster hamatus	115A
32°39.9'	118°02.0'	370	Claystone, silty, diatomaceous, micaceous; 5Y6/1; laminated; low density	Discoaster kugleri or Catinaster coalitus based on Coccolithus sp. aff. C. miopelagicus; lower Mohnian foraminifers	116A
32°38.8'	118°02.2'	625	Claystone, silty, highly micaceous; 5Y4/1 to 5Y3/1; laminated to mottled	Discoaster variabilis(?); upper Mohnian foraminifers	117
32°38.3'	118°02.3'	800	Claystone, diatomaceous; 5Y/6/1, 5Y/8/1; thinly laminated; low density	Helicosphaera ampliaperta or Sphenolithus heteromorphus; Subzone b, Denticula lauta	118

32°35.6'	118°00.9'	710	Sandstone, very fine to medium grained, highly micaceous (white mica), unfossiliferous; N6 to N7; abundant angular to subrounded rock fragments and mineral grains derived chiefly from metamorphic rocks; massive; friable; overlying Quaternary(?) mudstone contains abundant schistose rock fragments as large as 3.0 mm including glaucophane schist, quartz schist, talc(?) phyllite and chlorite(?) phyllite	--	119
32°35.8'	118°00.5'	560	Siltstone, clayey, dolomitic, fragmentary; 5Y6/4; sparse angular to subangular mineral grains and lithic fragments	--	120
32°36.2'	117°59.90'	660	Claystone, silty, micaceous, phosphoritic streaks and blebs; 5Y5/2 to 5Y6/3; indistinctly laminated; bioturbated	Discoaster variabilis upper; probably upper Mohnian, possibly lower zone foraminifers	121
32°36.5'	117°59.5'	830	Siltstone, clayey, micaceous; 5Y7/2, 5Y5/3; broadly color-banded, massive to indistinctly bedded	Quaternary coccoliths; Pliocene(?) foraminifers	122
32°34.6'	117°52.7'	435	Siltstone, clayey, micaceous, sparsely foraminiferal; 5Y5/2	Quaternary ? coccoliths (no Gephyrocapsa)	123
32°34.1'	117°53.0'	460	Claystone, silty, micaceous in part; 5Y4/1 to 5Y/6/1; streaked and mottled (phosphoritic?), broadly color-banded	Discoaster variabilis, upper; upper Mohnian foraminifers	124
32°33.1'	117°53.5'	620	Claystone, micaceous; 5Y4/1; thin laminae and streaks of siltstone; indistinctly laminated, mottled in part	Discoaster variabilis, upper; lower Mohnian, Bulimina uvigerinaformis	126

32°32.6'	117°53.7'	860	Mudstone, sandy, glauconitic (pelletal), foraminiferal; 5Y5/3; abundant angular mineral grains and rock fragments derived chiefly from volcanic rocks	Quaternary(?) coccoliths	127
32°32.1'	117°53.7'	1050	Siltstone, sandy, glauconitic (pelletal) phosphoritic (nodular, pelletal), sparsely foraminiferal; 5Y5/3 to 5Y4/1; contains common subangular clasts of schistose and volcanic rocks as large as 2.0 mm and pieces of Miocene(?) diatomaceous silty claystone broadly color-banded; few indistinct laminae	Late Pliocene to Holocene, probably late Pliocene foraminifers	128
32°19.5'	117°53.7'	1120	Siltstone, clayey, chiefly bioclastic, sparsely phosphoritic (pelletal); foraminiferal; 5Y6/3; massive; friable	Quaternary(?)	129
32°19.2'	117°53.9'	1060	Mudstone, sandy, phosphoritic (pelletal, nodular), sparsely glauconitic (pelletal), foraminiferal; 10YR6/3; abundant glass shards and pieces of Miocene(?) tuffaceous silty claystone	Late Pliocene to Holocene possibly late Pliocene foraminifers	130
32°19.0'	117°54.4'	1050	Mudstone, sandy, profusely glauconitic (pelletal, granular), sparsely phosphoritic (pelletal), foraminiferal; 10YR5/2 to 10YR3/2; rare subrounded to well rounded clasts of schistose rocks including albite(?)-muscovite schist and quartz schist(?) as large as 4.0 mm	Quaternary(?)	131
32°18.7'	117°54.9'	1165	Mudstone, sandy, profusely glauconitic (pelletal, granular); 5Y7/2 to 5Y5/2; rare clasts of light-colored volcanic rocks, quartzite(?), and quartz; broadly color-banded	Late Pliocene to Holocene foraminifers	132

32°12.7'	118°05.5'	1085	Mudstone, sandy, tuffaceous (lithic), sparsely phosphoritic (pelletal); 10YR3/2; abundant angular to subangular fragments of light-colored rhyolitic(?) indistinctly laminated; cohesive		133
32°13.0'	118°05.8'	935	Claystone, silty; 10YR3/2; laminated to thinly bedded	Coccolithus miopelagicus; lower Mohnian, Bolivina modeloensis	134
32°13.5'	118°06.0'	830	Claystone, silty, 10YR3/2 to 10YR7/2, thin tuffaceous laminae (N8) near bottom, massive above; low density	Lower Mohnian, Bulimina uvigerinaformis	135
32°13.9'	118°06.2'	710	Claystone, diatomaceous; 5Y6/1 to 5Y5/1; indistinctly laminated and color-banded; low density	Discoaster exilis; lower Mohnian, Bulimina uvigerinaformis; Subzone a, Denticula hustedtii-D.lauta	136
32°14.3'	118°06.0'	650	Claystone, silty, phosphoritic in part; low density; volcaniclastic fine-grained sand higher in the core contains abundant angular clasts of dacitic(?) rocks	Coccolithus miopelagicus lower Mohnian, Bolivina modeloensis and rare redeposited(?) Luisian foraminifers	137
32°14.7'	118°05.9'	630	Quartz-mica schist, angular fragment (1.2 cm) embedded in glauconitic, foraminiferal, phosphoritic mud containing angular to well rounded granules and pebbles of volcanic rocks and altered microgabbro(?) as large as 3 cm; phosphoritic nodules as large as 3.3 cm	--	138
32°15.3'	118°05.9'	605	Mudstone, sandy, phosphoritic (pelletal), sparsely glauconitic,foraminiferal; 5Y4/4; contains subrounded to well rounded grains of volcanic rocks as large as 1.0 mm	Quaternary(?)	139A

32°15.8'	118°05.8'	545	Volcanic(?) or volcaniclastic(?) rock; pulverized fragments embedded in core barrel	--	140
32°17.7'	118°06.3'	500	Volcanic rock and muscovite-bearing metamorphic rock; pulverized fragments embedded in core barrel	--	141
32°18.2'	118°06.6'	500	Siltstone and sandstone, clayey, phosphoritic (pelletal), sparsely glauconitic; 10YR6/4; contains abundant subangular to subrounded grains of light-colored volcanic rocks and rare schistose rocks; massive; friable	Quaternary(?)	142
32°18.5'	118°06.8'	515	Siltstone and sandstone, clayey, phosphoritic (pelletal), sparsely glauconitic; 10YR6/4; common fragments of weathered volcanic rocks; massive; cohesive	Quaternary(?)	143
32°18.8'	118°07.0'	560	Siltstone and fine-grained sandstone, clayey, volcaniclastic; 10 YR6/2; common angular grains of quartz and pale-red volcanic rocks; massive; cohesive	--	144
32°19.3'	118°07.4'	705	Schistose rock fragments, including foliated plagioclase-epidote-chlorite rock containing hornblende or actinolite, texture intermediate between cataclastic and phyllitic; glaucophane-epidote schist containing sphene; numerous angular fragments as large as 1.6 cm	--	145 W047
32°17.4'	118°12.9'	820	Mudstone, sandy, glauconitic (pelletal); 5Y6/1; includes mineral grains and rock fragments that suggest derivation from volcanic and schistose rocks; massive; cohesive	Quaternary(?)	147
32°16.9'	118°13.4'	850	Tuff, vitric, sparsely micaceous; N8 to 5Y8/1; massive; fractured	--	148

32°16.6'	118°13.6'	876	Sandstone, clayey to silty, foraminiferal, glauconitic and phosphoritic (pelletal); N8 to 5Y6/1; sparse sand-size grains of volcanic rocks; indistinctly color banded, massive; cohesive	Quaternary(?)	149
32°16.2'	118°14.0'	860	Siltstone, clayey, micaceous, sparsely glauconitic (pelletal and granular); 5Y4/1 to 5Y8/1; laminated; low density	Discoaster variabilis; probably Mohnian deep-water foraminifers	150
32°15.9'	118°14.4'	750	Claystone, silty, diatomaceous; 5Y6/1; broadly color-banded to laminated; low density	Sphenolithus heteromorphus, upper; probably Luisian deep-water foraminifers; Subzone b, Denticula lauta	151
32°15.6'	118°14.9'	580	Siltstone, sandy, micaceous (white and green), tuffaceous(?), probably volcaniclastic; 5Y7/2; massive; iron-oxide filled fractures	Neogene coccoliths; upper Saucesian or middle Miocene benthic foraminifers; N7 to N10 planktic foraminifers (R. Poore, written commun., 1980)	152
32°15.0'	118°15.1'	830	Mixed sandy glauconitic mud and pebbles; 5Y4/1, 5Y6/1,10YR5/4; possibly bottomed in pre-Quaternary volcaniclastic sandstone, angular to subangular pebbles as large as 1.5 cm include altered volcanic rock resembling amphibolite, spilite with unaltered diopside or augite and altered plagioclase, hornblende gabbro, altered pyroxene gabbro, and andesite	Quaternary(?)	153 W048

32°19.7'	118°17.5'	830	Mudstone, sandy, micaceous, pebbly in part; 10YR5/4; angular to well rounded pebbles as large as 3.2 cm include saussuritized gabbro veined with lawsonite, unaltered gabbro, spotted albite-mica schist, and muscovite-chlorite phyllite; shallow-water echinoid spines, bryozoans, barnacles, and mollusks suggest downslope transport	Quaternary, probably Pleistocene foraminifers; redeposited echinoid spines possibly as old as late Miocene	155 W049 W050
32°20.2'	118°18.2'	690	Sandstone, fine to very coarse grained, pebbly, calcareous, shelly; 5Y6/1; and mudstone, sandy 10YR6/6; angular to well rounded granules and pebbles as large as 5 cm include albite-glaucophane-epidote schist, plagioclase-chlorite schist, calcite-chlorite-muscovite schist, colorless amphibole(?) (epidote?) grains, granitic rock fragment; inner sublittoral fossils suggest downslope transport	Late Pliocene or early Pleistocene foraminifers; Pliocene or Quaternary mollusks	157 W051
32°20.7'	118°18.7'	580	Siltstone, clayey, glauconitic (pelletal), foraminiferal; 5Y6/1; contans sparse sand-size mineral grains and pale mica flakes; scraped from core barrel	Quaternary nannofossils	158
32°21.0'	118°19.3'	450	Quartz-chlorite-plagioclase schist or phyllite and other schistose rocks; fragments embedded in core barrel	--	159
32°21.7'	118°19.9'	625	Siltstone, clayey, sparsely micaceous, foraminiferal; 5Y6/1; rare grains of quartz and feldspar; scraped from core barrel	Pliocene to Holocene foraminifers	161
32°22.8'	118°20.8'	650	Siltstone, clayey, micaceous, tuffaceous(?); 5Y6/1; fragmentary, recemented(?), sheared, fractured; possibly a pre-Quaternary slump deposit; coarse-grained volcaniclastic sandstone 9-16 cm. from bottom of core	Probably Luisian foraminifers	163

32°23.4'	118°32.7'	870	Claystone, silty, diatomaceous; 5Y8/1 to 5Y6/1; faint color bands 3 to 5 cm thick, thin laminae of volcaniclastic very fine-grained sandstone (N5); fractured, sheared; very low density	Corbisema triacantha, contains Raphidodiscus marylandicus; probably Relizian foraminifers; late early Miocene diatoms, probably Actinocylus ingens Zone	164
32°23.9'	118°32.5'	870	Siltstone, clayey, tuffaceous; N7 to 5Y8/1; abundant glass shards; massive; low density	Subzone a, Denticula lauta	165
32°24.2'	118°32.1'	850	Claystone, silty, micaceous; 5Y6/1; massive; low density	Sphenolithus heteromorphus; mixed Luisian and lower or middle Mohnian foraminifers	166
32°24.7'	118°31.9'	830	Claystone, silty, micaceous, diatomaceous; 5Y6/1; massive; fractured in part; low density	Helicosphaera ampliaperta to Coccolithus miopelagicus; possibly middle Miocene deep-water foraminifers; Subzone a, Denticula lauta	167
32°45.1'	118°42.7'	1020	Mudstone, sandy, foraminiferal, glauconitic (pelletal and granular), phosphoritic (pelletal); 5Y4/1 to 5Y6/1; contains abundant angular quartz and sparse twinned plagioclase grains, common fragments of volcanic and sparse schistose rocks; massive; broadly color banded; cohesive	Middle Pliocene to Holocene foraminifers	168
32°45.4'	118°42.2'	1070	Sandstone, fine grained, silty to clayey, graded in part; 5YR4/1 to 5Y8/1; color banded (2-4 cm); shell-fragment zones as thick as 3.0 cm contain abundant clasts of volcanic rocks mixed with shallow-water fossils suggesting downslope transport; friable, indistinctly bedded	Late Pliocene to Holocene and redeposited(?) lower Mohnian and Luisian foraminifers; probably Quaternary mollusks and echinoids	169

32°51.8'	118°43.9'	1225	Mudstone, sandy, foraminiferal; 5GY6/1; common mineral grains and rock fragments including pumice; generally massive with indistinct color bands 1 to 2 cm wide; cohesive	Late Pliocene to Holocene and redepositied(?) Relizian, Luisian and lower Mohnian foraminifers	170
32°52.5'	118°44.4'	1260	Sandstone, fine grained, shelly; N8; and siltstone, clayey to sandy; 5Y6/1 to 5Y4/1; sandstone contains abundant angular to subrounded mineral grains and rock fragments probably derived from volcanic and/or volcaniclastic rocks; alternating sandy and muddy layers; cohesive to friable	Late Pliocene to Holocene and abundant redeposited Luisian foraminifers	171
32°53.0'	118°44.4'	1275	Siltstone, clayey, foraminiferal; 5Y5/1; common mineral grains and rock fragments possibly derived from volcanic rocks; massive; cohesive	Late Pliocene to Holocene and sparse redeposited middle Miocene foraminifers	172
32°53.6'	118°45.1'	1130	Mudstone, sandy, glauconitic (pelletal and granular), phosphoritic (pelletal), foraminferal; 5Y4/1 to 5Y6/1; common sand-size clasts of volcanic rocks; broadly color-banded; cohesive	Quaternary(?)	173
32°55.4'	118°46.3'	1250	Siltstone, clayey, foraminiferal, sparsely glauconitic (pelletal); 5Y4/1, 5Y6/1; color-banded, generally massive; includes 2 cm of shelly, volcaniclastic sandstone 22 cm from bottom of core	Late Pliocene to Holocene and redeposited upper Mohnian foraminifers	174
32°55.6'	118°45.7'	1105	Mudstone, sandy, glauconitic (pelletal, granular); 5Y4/1 to 5Y6/1; common sand-size grains of volcanic rocks; color bands 2 to 10 cm thick; massive; cohesive	Pleistocene to Holocene and redeposited upper Mohnian and possibly early Pliocene foraminifers	175

32°56.5'	118°46.0'	1060	Claystone, silty, profusely glauconitic (pelletal, granular); 5GY4/1 to 5GY8/1; broadly color-banded; massive; cohesive	Discoaster tamalis; late Miocene or early Pliocene benthic foraminifers; early to late Pliocene planktic foraminifers	176
32°57.3'	118°45.7'	1120	Mudstone, sandy, phosphoritic and glauconitic (pelletal and granular); 5Y4/1, 5Y6/1; abundant volcanic detritus; indistinct color bands 1 to 5 cm thick; generally massive with some clayey layers; cohesive	Probably upper Mohnian foraminifers, some possibly redeposited	177
33°03.9'	118.45.8'	1085	Siltstone, clayey, micaceous; 5Y6/1; massive; cohesive	Quaternary and redeposited Paleocene nannofossils; late Pliocene to Holocene foraminifers	178
33°04.1'	118°45.4'	845	Siltstone, clayey, diatomaceous in part, sparsely micaceous; 5Y6/1; generally massive, broadly color-banded; low density	Coccolithus miopelagicus; lower Mohnian deep-water foraminifers; Subzone b, Denticula hustedtii-D.lauta	179
33°04.4'	118°44.7'	740	Mudstone, sandy, glauconitic (pelletal), phosphoritic (nodular, pelletal), foraminiferal; 5Y4/1 to 5Y6/1; contains common subangular to subrounded granules and pebbles of volcanic rocks and rare chloritic schist(?) fragments in lower part; indistinct color bands, mottled and bioturbated in part; cohesive	Quaternary(?)	180
33°04.6'	118.44.1'	625	Siltstone, clayey, diatomaceous in part, sparsely micaceous; 5Y5/1, 5Y6/1; indistinctly color-banded; low density	Coccolithus miopelagicus; lower Mohnian deep-water foraminifers; Subzone a, Denticula hustedtii-D.lauta	181
33°04.9'	118°43.4'	540	Siltstone, clayey, diatomaceous in part, sparsely micaceous, 5Y4/1; massive; low density	Discoaster variabilis, lower(?); Mohnian deep-water foraminifers; Subzone a, b, or lower c, Denticula hustedtii-D.lauta	182

33°05.3'	118°42.9'	525	Mudstone, glauconitic (pelletal), foraminiferal; 5GY4/1; common mineral grains and rare rock fragments probably derived from volcanic rocks; massive; cohesive	Quaternary(?)	183
33°05.6'	118°42.6'	510	Sandstone, very fine to fine grained, silty, glauconitic (pelletal), foraminiferal; 5Y5/2; sparse mineral grains and rock fragments derived from volcanic rocks; massive; friable	Quaternary(?)	184
33°05.7'	118°42.0'	470	Claystone, silty, diatomaceous, sparsely micaceous; 5Y6/1, 5Y8/1; indistinctly color-banded (2 to 10 cm thick), mottled in part; low density	Discoaster exilis or Catimaster coalitus; Mohnian foraminifers; Subzone a, Denticula hustedtii-D. lauta	185
33°06.1'	118°41.4'	460	Siltstone, clayey, micaceous, sparsely glauconitic; 5Y3/1 to 5Y6/1; thin laminae of very fine-grained volcaniclastic(?) sandstone; indistinctly bedded	Middle Miocene or younger coccoliths; upper Mohnian foraminifers	186
33°06.4'	118°40.9'	460	Sandstone, pebbly, silty, glauconitic (pelletal), phosphoritic (nodular), foraminiferal, shelly; 5Y6/1 to 5GY6/1; abundant angular to subrounded clasts as large as 1.8 cm include spilitized basalt (plagioclase entirely altered and mafic minerals altered to chlorite), hornblende andesite, and recrystallized rhyolite or dacite; massive; friable	Quaternary mollusks	187 W052
33°06.7'	118°40.5'	510	Claystone, silty, calcareous, sparsely micaceous; 5Y6/1; streaks and blebs of calcite(?) (N9); indistinctly color-banded; generally massive	Luisian foraminifers	188

33°07.0'	118°40.1'	665	Siltstone, clayey, glauconitic (pelletal), micaceous; 5Y5/1; massive; cohesive	Amaurolithus primus or A. tricorniculatus; early Pliocene or younger benthic foraminifers; middle Miocene to Holocene diatoms	189
33°07.3'	118°39.2'	810	Siltstone, clayey, micaceous (brown), 5Y4/1 to 5Y6/1; massive; fractured	Middle Miocene to middle Pliocene coccoliths; upper Mohnian(?) or Delmontian (?) foraminifers; late middle Miocene to Holocene diatoms	190
33°07.9'	118°38.5'	1157	Siltstone, sandy to pebbly, sparsely glauconitic; 5GY6/1; includes angular to well rounded granules and pebbles of volcaniclastic(?) siltstone, vitric tuff, pale-brown chert, pumice, diatomite, volcanic rocks, and schistose rocks as large as 8.0 cm; chiefly massive with a few laminae of foraminiferal sand; probably a slump deposit	Middle Pliocene to Holocene foraminifers; probably Thalassiosira antiqua Zone diatoms in siltstone clasts	191
33°13.9'	118°42.9'	1130	Siltstone, clayey, micaceous; 5Y4/1, 5Y6/1; broadly color-banded; minute intersecting recemented fractures	Middle Miocene to middle Pliocene coccoliths; possibly Mohnian or Repettian foraminifers; middle Miocene to Holocene diatoms	192
33°14.6'	118°43.4'	1020	Siltstone, clayey, micaceous; 5Y4/1, 5Y6/1, streaks of 5Y2/1; very thin indistinct laminae	Middle Miocene to middle Pliocene coccoliths; Mohnian or younger foraminifers; late early Miocene to Holocene diatoms	193
33°15.2'	118°43.1'	1180	Siltstone, clayey, micaceous, sparsely glauconitic (pelletal); 5Y6/1; small amounts of vitric tuff at bottom; sparse fecal pellets; massive	Late Pliocene or Quaternary coccoliths; probably Pliocene, possibly late Pliocene foraminifers	194

33°12.0'	118°50.8'	850	Claystone, silty, diatomaceous; 5Y7/1, 5Y4/1; indistinctly laminated to massive; low density	Coccolithus miopelagicus; lower Mohnian foraminifers; Subzone a, Denticula hustedtii-D. lauta	196
33°12.7'	118°50.3'	750	Siltstone, clayey to sandy; sparsely glauconitic (pelletal, granular); 5Y2/1 to 5Y4/1; scraped from core barrel	Coccolithus miopelagicus; late Pliocene to Holocene foraminifers (probably contamination in core)	197
33°14.0'	118°50.7'	680	Siltstone, clayey to sandy, micaceous, sparsely glauconitic (pelletal), pyritiferous in part, sugary texture; 5Y2/1; massive; cohesive; top 14 cm of core contains abundant angular to subrounded granules and pebbles that include metagabbroic(?) rocks, quartz schist, vein(?) quartz, rhyolitic or dacitic rocks, and basaltic rocks as large as 1.5 cm	--	197
33°14.9'	118°50.4'	750	Siltstone, clayey, micaceous, diatomaceous in part; 5Y6/1, 5Y8/1; indistinctly laminated; low density	Middle or late Miocene silicoflagellates; middle Miocene to lower Pliocene deep-water foraminifers; Subzone b, Denticula hustedtii-D. lauta	199
33°15.8'	118°50.2'	1025	Siltstone, clayey, micaceous; 5Y5/1; massive	Coccolithus miopelagicus; lower Mohnian deep-water foraminifers; Subzone b, Denticula lauta	200
33°18.3'	118°59.6'	965	Siltstone, sandy, foraminiferal sparsely glauconitic (pelletal); 5Y5/2; sparse dark-colored grains of igneous(?) rocks and quartz; generally massive, few irregular bands of foraminiferal sand	Late Pliocene to Holocene foraminifers	201

33°18.7'	118°59.2'	895	Siltstone, sandy, glauconitic (pelletal), foraminiferal, pyritiferous in part; 5Y5/1, 5Y6/1; contains sparse rock fragments and mineral grains; generally massive; few irregular bands of foraminiferal sand	Quaternary(?)	202
33°19.0'	118°58.7'	750	Mudstone, sandy, glauconitic (granular, pelletal), phosphoritic (pelletal, nodular), foraminiferal, micaceous; 5Y6/1 to 5GY5/1; common subangular to well rounded fragments of volcanic rocks, metagabbroic(?) rocks, and calcareous siltstone as large as 5.0 mm; mottled, bioturbated	--	203
33°19.4'	118°58.4'	635	Tuff, vitric; N9; and siltstone, clayey, tuffaceous; 5Y4/1; 5Y6/1; laminated	Sphenolithus heteromorphus; Luisian foraminifers; late early Miocene to Holocene diatoms	204
33°19.7'	118°58.2'	610	Claystone, silty, and siltstone, clayey, tuffaceous in part, sparsely diatomaceous; 5Y4/1 to 5Y8/1; thin lamina of vitric tuff about 34 cm from bottom; laminated; minute cemented fractures; low density	Sphenolithus heteromorphus; probably Luisian foraminifers; Subzone a, Denticula lauta	205
33°19.8'	119°02.0'	700	Mudstone, sandy, foraminiferal, shelly; 5Y6/1; contains sparse fragments of volcanic rocks and tuff; friable	Quaternary mollusks	206
33°20.4'	119°01.1'	310	Claystone, silty, tuffaceous in part; 5Y4/1; laminae of vitric tuff (N9] and finely disseminated phosphorite(?) (5Y6/1); laminated; low density	Sphenolithus heteromorphus; Luisian foraminifers; Subzone a, Denticula lauta	208
33°20.7'	119°00.6'	210	Claystone, silty, diatomaceous; 5Y6/1, 5Y8/1; laminated, low density; lapilli tuff bed at top of core	Sphenolithus heteromorphus; Luisian foraminifers, Subzone b, Denticula lauta	209

33°21.1'	118°59.9'	340	Tuff, vitric; N9 to N8; and siltstone, clayey, sparsely micaceous, diatomaceous in part; 5Y4/1 to 5Y6/1; laminated; low density	Sphenolithus heteromorphus; Luisian foraminifers (4 to 8 cm from bottom); Subzone a, Denticula lauta	211
33°21.4'	118°59.5'	640	Claystone, silty; 5Y4/1; siltstone, volcaniclastic, tuffaceous; and tuff, vitric; N9, N7; phosphoritic(?) streaks and blebs; 5Y6/1; laminated	Sphenolithus heteromorphus; middle Miocene, possibly upper Relizian or lower Luisian foraminifers middle Miocene to Holocene diatoms	212
33°26.3'	118°44.2'	910	Chlorite schist containing sparse clasts of plagioclase, augite, and epidote in bottom 6.0 cm of core; 5G6/2 to 10GY5/2; overlying sandy mudstone contains abundant chlorite schist fragments and pebbles of basalt enclosed in micritic matrix	--	213 W053
33°26.6'	118.43.7'	785	Sandstone, silty, glauconitic (pelletal), foraminiferal; 5Y5/2 to 5Y6/1; abundant subangular to subrounded clasts of chlorite schist as large as 4 mm and sparse volcanic clasts as large as 2 mm; massive to indistinctly bedded; semicohesive	Quaternary(?)	214
33°26.8'	118°43.4'	840	Sandstone, very fine to fine grained, silty; 5Y6/2; abundant angular fragments of schistose tose rocks, including quartz schist or phyllite as large as 1.2 mm; massive; top 8 cm of core contains abundant angular to rounded fragments of schistose rocks as large as 2.2 cm and volcanic rocks as large as 1.5 cm in matrix of glauconitic foraminiferal mudstone	Mohnian, possibly lower Mohnian foraminifers; top 8 cm probably Quaternary	215

33°27.2'	118°43.1'	830	Sandstone, fine to coarse grained, silty, shelly; 5Y4/1 to 5Y6/1; abundant angular to well rounded pebbles and granules of volcanic rocks as large as 3.0 cm, lithic tuff as large as 1.6 cm, and various schistose rocks as large as 0.4 cm; massive to indistinctly layered; friable	Late Pliocene to Holocene foraminifers; Quaternary mollusks	216
33°28.0'	118°42.4'	400	Lapilli tuff, fine to very coarse grained, silty; 5Y7/2; thin section shows fragments of hornblende andesite containing medium-grained phenocrysts of zoned plagioclase and oxyhornblende in a matrix of microcrystalline plagioclase laths and other microcrystalline material; massive; fractured	--	217 W054
33°28.4'	118°50.4'	1000	Siltstone, sandy, micaceous; 5Y4/1; abundant angular rock fragments and mineral grains probably derived from schistose and volcanic rocks; massive; fractured; top 8 to 10 cm of core contains angular fragments of tuffaceous siltstone as large as 1.5 cm and volcanic rocks, schistose rocks, and chert as large as 1.0 cm embedded in sandy mudstone	Subzone a, Denticula hustedtii and redeposited middle Miocene diatoms	219
33°28.7'	118°50.2'	785	Mudstone, sandy, micaceous, sparsely glauconitic (pelletal); 5Y5/2; abundant rock fragments including volcaniclastic siltstone, volcanic rocks and schistose rocks; indistinctly laminated; cohesive	Pleistocene to Holocene foraminifers	220
33°29.1'	118°50.0'	660	Mudstone, sandy, foraminiferal, glauconitic (pelletal); 5Y7/2 to 5Y5/2; common rounded grains of volcanic and schistose rocks; large pieces of fine-grained volcaniclastic sandstone 5 to 7 cm from bottom; massive; indistinctly color-banded	Quaternary(?)	221

33°29.5'	118°49.9'	480	Sandstone, very fine to fine grained, silty; N6 to 5Y6/1; angular to subrounded mineral grains and rock fragments derived from schistose, volcanic and volcaniclastic rocks; massive; friable; a 3.5 cm clast from bottom 8 cm is fine-grained volcaniclastic sandstone containing basaltic rock fragments, quartz, chert, plagioclase, augite, and epidote in a micrite matrix	--	222 W055
33°30.0'	118°49.7'	425	Volcaniclastic sandstone, fine to coarse grained, pebbly, clayey, tuffaceous(?); N8 to 5GY6/1; contains angular, nearly monolithologic clasts of dacitic(?) volcanic rocks as large as 1.8 cm; cohesive	--	223
33°30.4'	118°49.4'	530	Sandstone, very fine to fine grained, chiefly volcaniclastic; N6; contains sparse clasts of schistose rocks; interbedded with siltstone, clayey, micaceous, diatomaceous; 5Y6/1; laminated; sandstone friable	Probably upper Mohnian foraminifers; Subzone a, Denticula hustedtii	224
33°31.0'	118°49.2'	530	Mudstone, sandy to pebbly, phosphoritic and glauconitic (pelletal); 5YR4/1 to 5Y4/1; abundant angular to well rounded granules and pebbles of volcaniclastic, volcanic, and schistose rocks as large as 2.7 cm; massive; indistinctly color-banded	Quaternary(?)	225
33°31.5'	118°49.0'	345	Siltstone, sandy, calcareous, volcaniclastic (?); 5Y8/1; fragments embedded in core barrel	--	226
33°30.9'	118°53.0'	900	Mudstone, sandy, foraminiferal, volcaniclastic (?) in part; 5Y4/1; cohesive	Quaternary(?)	228

33°31.2'	118°52.5'	510	Breccia, pebble and granule, volcaniclastic; N7 to N8, 5Y8/1; angular clasts of hornblende andesite, dacite, and lapilli tuff as large as 3.2 cm embedded in sandy mudstone matrix; rare rounded schistose rock fragments as large as 2.0 mm; massive; friable	--	229 W056
33°31.5'	118°52.0'	410	Conglomerate, pebble and granule, volcaniclastic; 5Y5/2; common subrounded to angular clasts of andesite, basalt, and lapilli tuff as large as 2.0 cm embedded in sandy mudstone matrix; rare fragments of schistose rocks	Mixed lower Mohnian(?) and early Pliocene to Holocene foraminifers in matrix	230 W057
33°31.7'	118°51.4'	430	Volcanic rock, brecciated; 5GY6/1; fragmental basalt, intergranular texture, clinopyroxene and olivine granules, tachylite interstices	--	231
33°32.0'	118°51.0'	475	Conglomerate and breccia, pebble and granule, volcaniclastic; 5Y5/2 to 10 YR6/6; abundant angular to well rounded clasts of basaltic(?) volcanic rocks as large as 4.5 cm embedded in a tuffaceous mudstone matrix; sparse clasts of schistose rocks	--	232
33°34.1'	118°52.1'	450	Tuff, vitric, biotitic, silty; 5Y6/1, N8; sparse fish bones and scales, phosphorite blebs, fecal pellets; thin streaks of nearly pure glass shards; bioturbated; fractured	--	233
33°33.8'	118°52.7'	375	Basalt, vesicular, oxidized, intersertal texture, plagioclase-lath framework, olivine and pyroxene altered to clay minerals, interstices filled by iron oxides and microcrystalline material; freshly broken fragments; angular pieces as large as 5.0 cm	--	234 W059

33°33.4'	118°53.0'	360	Basalt, glassy, devitrified in part, highly vesicular, fragmentary; 5YR6/4 to 10YR6/2; includes pieces in which thin plagioclase laths are arranged in sprays and the interstices are filled by anisotropic iron-oxide (?) blebs; vesicles lined with clay minerals	--	235 W060
33°33.1'	118°53.4'	494	Sandstone, very fine grained, silty, micaceous; N5; angular to subrounded clasts derived from volcanic rocks; massive; bioturbated in part; cohesive	Late Pliocene to Holocene foraminifers (possibly contamination by bioturbation)	236
33°33.0'	118°54.0'	630	Mudstone, pebbly, foraminiferal, sparsely glauconitic; 5GY5/1; subrounded to well rounded clasts of volcanic rocks as large as 2.6 cm	Quaternary(?)	237
33°32.1'	118°54.9'	910	Siltstone, sandy, micaceous, sparsely glauconitic (pelletal); 5Y5/1; sparse sand-size clasts of schistose and volcanic rocks; massive to indistinctly laminated, bioturbated in part	Quaternary coccoliths, contains Emiliania ovata possibly contaminated split) probably upper Saucesian or Relizian foraminifers	238
33°31.6'	118°55.6'	670	Claystone, silty, sparsely micaceous; 5Y4/1 to 5Y6/1; laminated, bioturbated in part; low density	Relizian or Luisian, probably Luisian foraminifers; Subzone b, Denticula lauta	239
33°31.3'	118°56.1'	645	Claystone and shale; silty, micaceous in part; 5Y2/1 to 5Y6/1; laminated; low density	Corbisema triacantha; middle or late Pliocene mixed with possibly redeposited middle Miocene foraminifers; Subzone b, Denticula lauta	240

33°36.1'	119°01.2'	165	Sandstone, fine grained, shelly, foraminiferal, sparsely glauconitic; 5GY6/1; common subangular to subrounded grains of volcanic rocks as large as 1.0 mm; massive; friable	Quaternary mollusks	241A
33°34.6'	119°01.2'	125	Basalt, oxidized, calcite veins and amygdules, fresh clinopyroxene, olivine altered to clay minerals	--	244 W077
33°34.3'	119°01.1'	140	Mudstone, sandy, calcareous; 5Y8/1; common shell debris, echinoid spines, and volcanic rock detritus; scraped from core barrel	Late Pliocene to Holocene and reworked Miocene shallow-water foraminifers	245A
33°34.0'	119°01.1'	150	Mudstone, sandy, calcareous; N8 to 5Y8/1; common shell debris, sparse volcanic rock detritus; scraped from core barrel	Late Pliocene to Holocene and reworked Miocene shallow-water foraminifers	246A
33°25.2'	119°07.6'	350	Claystone, silty, diatomaceous, tuffaceous; N9 to 5Y8/1; indistinctly laminated to massive; minute fractures; low density	Discoaster exilis or Catinaster coalitus; late Miocene or early Pliocene deep-water foraminifers; Subzone a, Denticula hustedtii-D. lauta	247
33°25.1'	119°07.9'	380	Siltstone, clayey, micaceous, sparsely diatomaceous; N7, 5Y6/1; generally massive; indistinct color bands; burrowed; low density	Middle or late Miocene deep-water foraminifers; Subzone b, Denticula lauta	248
33°24.9'	119°08.5'	230	Claystone, silty, diatomaceous; N8, 5Y6/1; indistinctly laminated; minute clay-filled fractures; low density; well rounded to subangular granules and pebbles of volcanic and schistose rocks and nodular phosphorite in glauconitic sand in top 5 cm of core	Middle Miocene coccoliths; middle or upper Mohnian foraminifers; Subzone b Denticula hustedtii-D. lauta	249A

33°24.8'	119°08.9'	260	Siltstone, calcareous, sugary texture; 5Y5/2; chiefly massive; indistinct broad color bands, fractured in part; top 6 cm of core contains granules and pebbles of volcanic rocks, siltstone, schistose rocks, and phosphorite	Middle Miocene to Holocene diatoms	250
33°24.6'	119°09.5'	330	Claystone, silty, diatomaceous in part, sparsely micaceous; 5Y5/1, 5Y7/1; indistinctly laminated to massive; fractured; low density	Spenolithus heteromorphus; middle or late Miocene foraminifers; Subzone a, Denticula hustedtii-D. lauta	251
33°24.5'	119°10.0'	340	Tuff, vitric, biotitic; N7, N8; and claystone silty, diatomaceous; N8, 5Y6/1; laminated; minute clay-filled fractures	Coccolithus miopelagicus (?); probably middle Miocene, possibly Luisian foraminifers; Subzone b, Denticula lauta	252
33°24.3'	119°10.6'	450	Claystone, silty, micaceous; 5Y4/1 to 5Y8/1; indistinctly laminated to massive, minutely mottled in part; clay-filled fractures	Cenozoic coccoliths; upper Mohnian deep-water foraminifers; probably Subzone b, Denticula hustedtii-D. lauta	253
33°24.0'	119°11.2'	480	Claystone, silty, micaceous, sparsely diatomaceous; 5Y6/1; massive, indistinct broad color bands; minute clay-filled fractures; low density	Middle Miocene to middle Pliocene coccoliths; Subzone d, Denticula hustedtii-D.lauta	254
33°23.7'	119°12.2'	690	Sandstone, very fine to fine grained, angular, friable; 5Y6/1; and mudstone, glauconitic and and phosphoritic (pelletal); 5Y4/1 to 5Y8/1; indistinctly laminated	Late Cenozoic silicoflagellates; Subzone b, Denticula lauta or younger	255

33°23.3'	119°13.1'	900	Sandstone, clayey to silty; glauconitic (pelletal), foraminiferal; 5Y5/1; abundant subangular to well rounded mineral grains and rock fragments probably derived largely from volcanic rocks; massive; friable	Quaternary(?)	256
33°17.6'	119°19.1'	440	Siltstone, clayey, micaceous, sparsely diatomaceous; 5Y4/1, 5Y6/1	Coccolithus miopelagicus (?); Subzone a, Denticula lauta	257
33°17.4'	119°19.6'	315	Sandstone, very fine to fine grained, quartzofeldspathic, shelly; N7 to 5Y6/1; probably derived from Eocene sandstone on San Nicolas Island platform; massive, friable	Quaternary mollusks	258
33°17.3'	119°20.3'	260	Claystone, diatomaceous, foraminiferal; 5Y6/2; thinly laminated; bioturbated in part	Sphenolithus heteromorphus,upper, or Coccolithus miopelagicus, lower; Luisian, foraminifers; Subzone b, Denticula lauta	259
33°17.0'	119°21.0'	235	Claystone, silty, calcareous; fragments scraped from core barrel	Discoaster hamatus or D. neohamatus on the basis of D. bellus (?)	260A
33°16.8'	119°21.4'	190	Sandstone, very fine to fine grained; clayey foraminiferal, micaceous; 56Y6/2; abundant mollusk shell fragments and angular to subangular grains of quartz and feldspar; massive; friable; probably derived from Eocene sandstone on San Nicolas Island platform	Quaternary mollusks	261A
33°16.6'	119°21.8'	90	Sandstone, fine grained, quartzofeldspathic, shelly, foraminiferal; 5Y5/2; massive; friable; derived from Eocene sandstone on San Nicolas Island platform	Quaternary mollusks	262

33°16.5'	119°22.4'	75	Sandstone, fine grained, silty, foraminiferal; 5GY6/2; abundant mollusk shell fragments and angular grains of quartz and feldspar; massive; probably derived from Eocene sandstone on San Nicolas Island platform	Quaternary mollusks	263
33°16.2'	119°23.3'	60	Sandstone, quartzofeldspathic, fine grained, micaceous, foraminiferal, sparsely glauconitic and phosphoritic; 5G6/1; abundant mollusk shell fragments; massive; friable; probably derived Eocene sandstone on San Nicolas Island platform	Quaternary mollusks	266
33°16.1'	119°23.6'	60	Sandstone, quartzofeldspathic, fine to medium grained, micaceous, sparsely glauconitic; 5Y7/2; massive; friable; probably derived from Eocene sandstone on San Nicolas Island platform	Quaternary mollusks	267
33°15.8'	119°24.0'	50	Sandstone, quartzofeldspathic, fine to medium grained, micaceous, calcareous; N7 to 5Y8/1; well sorted; probably derived from nearby outcrops of Eocene sandstone	Quaternary mollusks	269B
33°10.5'	119°17.9'	1235	Siltstone, clayey, micaceous; 5GY6/1; massive; cohesive	Quaternary and sparse reworked Eocene coccoliths; Pliocene, probably late Pliocene foraminifers	270
33°10.8'	119°18.4'	830	Mudstone, sandy, sparsely micaceous, foraminiferal; 5Y6/2; abundant mineral grains and rock fragments derived in part from volcanic or volcaniclastic rocks, greenish-gray claystone clasts, shallow-water shell fragments; massive	Pliocene to Holocene and possibly reworked shallow-water Miocene foraminifers	271

33°11.3'	119°18.8'	510	Mudstone, sandy, tuffaceous, sparsely micaceous; 5Y5/1 to 5Y8/1; abundant devitrified pumice fragments and altered fine-grained tuff; common angular to subangular grains of volcanic (?) rocks; massive; fractured in part	Luisian foraminifers	272
33°11.5'	119°19.3'	380	Claystone, micaceous; 5Y6/1; tuffaceous(?); indurated; massive; minutely mottled in part	Cenozoic coccoliths; upper Zemorrian or Saucesian foraminifers	273
33°11.8'	119°19.6'	175	Sandstone, quartzofeldspathic, fine to medium grained, well sorted, sparsely micaceous, foraminiferal; 5Y6/2; abundant mollusk shell fragments; massive; friable; probably derived from Eocene sandstone on San Nicolas Island platform	Quaternary mollusks	274
33°12.2'	119°20.0'	95	Sandstone, quartzofeldspathic, fine grained, sparsely foraminiferal; 10Y6/2; massive; friable	Quaternary mollusks	275
32°45.7'	119°38.6'	430	Sandstone (lithic wacke), very fine to fine grained, silty; 5Y5/1; abundant angular to subangular clasts of quartz, feldspar, basalt, chert, clinopyroxene, mica, and carbonaceous material; fractured; massive; grades up into silty claystone (N5)	Santonian or Coniacian coccoliths, includes <u>Marthasterites</u> sp. of. <u>M. furcatus</u>; Upper Cretaceous or Paleogene foraminifers; contained in silty claystone	279A W061
32°45.5'	119°39.0'	453	Basalt, vesicular, fragmentary; pieces as large as 5 cm embedded in mudstone, sandy, glauconitic, foraminiferal; 5Y4/1; includes abundant fragments of silty claystone and sparse clasts of metamorphic rocks; all probably derived from upslope outcrops	Upper Mohnian foraminifers from silty claystone fragments	280

32°44.8'	119°39.7'	580	Claystone, silty, foraminiferal; 5Y5/2 to 5Y7/2; indistinctly laminated	Discoaster variabilis; Relizian foraminifers; Subzone b, Denticula lauta or younger	282
32°44.4'	119°40.0'	750	Sandstone, volcaniclastic, clayey to silty, very fine to medium grained; 5GY5/1; predominantly angular and subangular grains of quartz, feldspar, and volcanic rock fragments; indistinctly bedded; friable	Helicosphaera ampliaperta and sparse reworked Paleogene coccoliths; lower Mohnian, Bulimina uvigerinaformis	283A
32°38.0'	119°37.0'	600	Volcanic (basaltic?) rock; vesicular, altered; 5YR4/4; weathered pieces include devitrified glass(?) fragments	--	284
32°38.2'	119°36.3'	555	Sandstone, volcaniclastic, fine to medium grained, clayey, calcareous; 5Y7/3; angular to subrounded clasts include abundant volcanic rock fragments and common albite-epidote rock in a zeolite(?)-cemented matrix; massive; friable	Middle Miocene to Holocene foraminifers	285 W062
32°38.2'	119°35.6'	570	Sandstone(?), clayey; 5YR5/4; contains weathered volcanic(?) rock fragments; scraped from core barrel; rock probably similar to sample 285	--	286
32°37.9'	119°34.8'	465	Mudstone, silty, micaceous, foraminiferal; 5Y/5/2; massive; includes laminated vitric tuff 47 cm from bottom of core	Luisian foraminifers	287
32°37.8'	119°34.3'	320	Claystone, silty, micaceous, diatomaceous; 5Y3/2, 5Y5/2 and 5Y7/2; broadly to indistinctly laminated; includes two vitric tuff layers in upper part of core; low density	Middle Miocene silicoflagellates; Subzone b, Denticula lauta	288

32°37.8'	119°33.0'	535	Claystone, silty; 5Y6/1; abundant sponge spicules; laminated in bottom half of core, massive in upper half; low density	Discoaster bellus; upper Mohnian foraminifers	290
32°38.0'	119°32.4'	615	Siltstone, clayey, foraminiferal, glauconitic (pelletal); 5Y4/4; sparse angular volcanic(?) detritus; massive; cohesive	Quaternary(?)	291
32°35.8'	119°32.3'	570	Sandstone, clayey to silty, foraminiferal, glauconitic, common sponge spicules; 5Y6/3; rare rock fragments; massive; friable	Quaternary(?)	292
32°35.4'	119°32.5'	390	Sandstone, very coarse grained, clayey; 5B7/1; subangular to well rounded rock fragments, chiefly schistose amphibolite (green hornblende-plagioclase schist), embedded in damaged core barrel	--	293 W082
32°34.9'	119°32.9'	595	Claystone, silty, diatomaceous; 5Y6/2; faintly laminated to massive	Coccolithus miopelagicus; Luisian foraminifers	294
32°34.7'	119°33.3'	740	Gravel, pebbly, phosphoritic; 5Y4/1; abundant angular to well rounded pebbles of altered gabbro (clinopyroxene reacting to hornblende) and metamorphosed amphibolite (hornblende-plagioclase schist) as large as 5.4 cm; sparse granules and pebbles of basaltic volcanic and foliated rocks; sandy matrix preserved on some clasts, others embedded in phosphorite; common fragments of fine-grained lithic(?) wacke; probably locally derived from pebble-cobble conglomerate	Middle Miocene, possibly Luisian foraminifers in in phosphoritic sandstone matrix	295 W063 W064

32°34.2'	119°33.7'	1040	Sandstone, clayey, very fine grained, sugary texture, calcareous, tuffaceous(?); 5Y7/2 to 10YR5/2; abundant angular to subangular rock fragments and mineral grains derived in part from metamorphic rocks; massive; friable to cohesive	--	296
32°31.6'	119°30.4'	955	Mudstone, phosphoritic, (nodular, pelletal) sparsely glauconitic (pelletal, granular), foraminiferal; 5Y6/1; abundant subangular to well-rounded pebbles and granules of gabbroic (?) and amphibolitic(?) rocks, some embedded in phosphorite	Quaternary(?)	297
32°31.8'	119°30.0'	620	Claystone, silty, foraminiferal, diatomaceous; 5Y4/1; abundant sponge spicules; laminated; low density	Coccolithus miopelagicus (?); Relizian or Luisian, likely Luisian foraminifers	298
32°32.1'	119°29.4'	445	Sandstone (lithic wacke), fine grained; 5B6/1; massive, friable; abundant angular rock fragments and claystone, silty, foraminiferal, diatomaceous; 5Y5/1; laminated; abundant angular rock fragments in sandstone include basaltic rocks, chert, and fine-grained sedimentary rocks, micaceous in part	Helicosphaera ampliaperta or Sphenolithus heteromorphus; upper Relizian or lower Luisian foraminifers (24 to 30 cm from bottom); Actinocyclus ingens	299 W065
32°32.4'	119°30.0'	480	Claystone, silty, diatomaceous; 5Y5/1; indistinctly laminated; includes thin layer of fine-grained sandstone (N4) containing angular mineral grains and rock fragments	Corbisema triacantha; middle Miocene, possibly upper Relizian or lower Luisian foraminifers; Actinocyclus ingens	300
32°25.6'	119°35.6'	1,100	Sandstone, foraminiferal, glauconitic (granular, pelletal), sparsely phosphoritic (pelletal); 5Y7/3; sparse subangular to subrounded clasts of volcanic and metamorphic(?) rocks; massive; friable	Quaternary(?)	302

32°25.0'	119°36.2'	990	Hyaloclastite, altered; 5GY2/1 and 5YR5/6; includes glass spherules and pumice (N8) fragments	--	303
32°21.0'	119°42.6'	1,010	Sandstone, fine-to very coarse-grained phosphoritic, glauconitic (pelletal) foraminiferal; 10YR3/2; abundant angular to well rounded clasts of volcanic rocks including vesicular basalt as large as 3.2 cm; massive; indistinct color bands	Quaternary(?)	305
32°17.2'	119°40.1'	435	Sandstone, volcaniclastic, medium-to very coarse-grained; 10YR6/2 to 0YR6/4; angular to subrounded, nearly monolithologic clasts of volcanic rocks; massive	Probably pre-Quaternary echinoid spines	306
32°16.7'	119°40.6'	500	Claystone, silty, tuffaceous(?); N8; scraped from core barrel	--	307
32°16.4'	119°41.3'	770	Sandstone, volcaniclastic, tuffaceous, fine-to medium-grained, silty in part; grains angular, well sorted; 5Y7/2 and 5Y6/4; massive	Lower Mohnian foraminifers in silty part	308
32°16.2'	119°41.6'	900	Claystone, silty, tuffaceous(?); N8 to 5YR6/1; scraped from core barrel	--	309
32°22.1'	119°55.4'	990	Claystone, silty, tuffaceous(?); 5YR6/1 to 5Y7/2; mixed with foraminiferal glauconitic siltstone; scraped from core barrel	Helicosphaera ampliaperta or Spenolithus heteromorphus; admixed Gephyrocopsa probably contaminants in sample	311
32°22.4'	119°55.7'	1030	Mudstone (bottom 7 cm), glauconitic (pebbles), pyritiferous; 5Y5/2, 10GY5/2; and claystone, silty, sparsely micaceous, phosphoritic (blebs and streaks); sparsely glauconitic (pelletal); 5Y4/1 to 5Y8/1; laminated above bottom 7 cm, numerous laminae of foraminiferan tests; low density	Coccolithus miopelagicus; mixed Relizian and Luisian foraminifers (7-12 cm from bottom)	312

32°23.1'	119°56.2'	1030	Tuff (bottom 2-3 cm), vitric, pyritiferous in part; N6 to N7; and claystone, silty, sparsely micaceous, phosphoritic (streaks, blebs); 5Y4/1 to 5Y8/1; laminated; dolomitic(?) lamina 2 mm thick	Sphenolithus heteromorphus or Coccolithus miopelagicus, sparse reworked Cretaceous coccoliths; upper Relizian or lower Liusian foraminifers	313
32°24.4'	119°56.0'	820	Hyaloclastite, devitritrified, clayey; 5Y5/2 to 5Y6/2; typical texture and structure preserved	--	315
32°24.9'	119°55.8'	890	Claystone, silty; N6, N7; laminated in part, crushed shells of Delectopecten sp.; low density; 1.2 mm lamina of biotitic vitric tuff about 34 cm above bottom of core	Discoaster neohamatus; upper Mohnian foraminifers	316
32°40.6'	119°56.1'	950	Mudstone, glauconitic (pelletal), foraminiferal; 10YR4/2; common mineral grains and rock fragments derived from volcanic or volcaniclastic rocks; scraped from core barrel	Quaternary(?)	317
32°40.6'	119°55.3'	975	Claystone, silty, sparsely micaceous; 5Y4/1 to 5Y8/1; laminated, thin laminae of foraminiferan tests; low density; rounded brown chert, sandstone, basaltic pebbles and nodular phosphorite embedded in glauconitic mudstone 18-32 cm from bottom	Sphenolithus heteromorphus ?; Luisian foraminifers	318
32°40.9'	119°53.9'	1025	Sandstone, very fine to fine grained, glauconitic, foraminiferal; 5Y6/1; massive; broadly color-banded	Quaternary(?)	320
32°40.8'	119°52.5'	865	Mudstone, silty, calcareous, sugary texture; 5Y6/1 to 5Y8/1; fractured; hard; veinlets of carbonate (N9); above 7 cm: claystone, silty 5Y6/1, 5Y8/1; minute clay-filled fractures	Helicosphaera ampliaperta or Sphenolithus heteromorphus (17-21 cm from bottom); Relizian or Luisian foraminifers	321

32°41.3'	119°52.0'	700	Siltstone, clayey diatomaceous; 5Y6/1; massive, minute clay-filled fractures; low density	Helicosphaera ampliaperta or Sphenolithus heteromorphus; Luisian foraminifers; Subzone a, Denticula lauta	322
32°42.7'	119°52.7'	600	Sandstone, very fine to fine grained, volcaniclastic(?), angular grains; 5Y6/4 to 5Y5/2; massive; burrowed	Saucesian, Relizian, or Luisian foraminifers, poorly preserved	323
32°42.9'	119°52.3'	800	Siltstone, clayey, sparsely micaceous, diatomaceous in part; 5Y6/1, 5Y8/1; laminated, minute clay-filled fractures; low density	Helicosphaera ampliaperta or Sphenolithus heteromorphus; upper Relizian or lower Luisian foraminifers Subzone a, Denticula lauta	324
32°55.6'	120°00.0'	1090	Mudstone, pebbly, sandy, glauconitic (pelletal, granular); 5Y4/1 to 5Y6/1; angular to well-rounded pebbles as large as 1.6 cm include argillite, arkosic wacke, cherty sandstone, and sparse volcanic rocks; zone of angular pebbles of arkosic wacke, argillite, and cherty sandstone as large as 4.0 cm 35 to 40 cm from bottom	Late Pliocene to Holocene and redeposited Miocene foraminifers	325 W066 W067
32°55.8'	119°59.6'	780	Sandstone, muddy, medium to very coarse grained, 5Y5/2; common well rounded to angular clasts of hard lithic(?) sandstone, argillite, and chert; one angular fragment (4.0 x 2.5 x 2.5 cm) of lithic tuff or volcaniclastic sandstone; massive; cohesive	Late Pliocene to Holocene foraminifers	326

32°55.9'	119°59.0'	700	Sandstone, fine to medium grained, in part granular to pebbly, silty; 5Y5/2 to 5Y6/4; common angular to well-rounded rock fragments; coarser in top 9 cm of core where granules and pebbles as large as 2.0 cm include siliceous metavolcanic rocks, hard lithic(?) sandstone, and red chert	Mohnian, probably lower Mohnian inner sublittoral foraminifers; shallow-water pre-Quaternary echinoid, brachiopod and mollusk fragments	327
32°56.1'	119°58.3'	615	Phosphorite nodule(?); pulverized fragments embedded in core barrel	--	328
32°56.3'	119°57.6'	570	Chert sandstone and breccia, fragmentary, pieces as large as 5.0 cm; 5Y6/1 to 10YR5/4; angular to subrounded clasts 0.1 to 2.5 mm some of which are cataclastic, broken and recemented by iron oxide; hard; probably represents bedrock; overlying Quaternary(?) sand includes rounded granules and pebbles of argillite, lithic wacke (?), radiolarian chert, and chert breccia as large as 1.2 cm	--	329 W068
32°56.5'	119°57.0'	620	Sandstone (arkosic wacke), fine to very coarse grained, pebbly, fragmentary, angular pieces as large as 3.0 cm; 5GY5/2 to 5GY3/2, 10GY5/2; angular to well-rounded clasts include plagioclase, potassium feldspar, quartz, volcanic rocks, chert, and radiolarian argillite; hard; overlying Quaternary(?) detritus includes angular pieces of argillite as large as 3.7 cm	--	330 W069

32°56.8'	119°55.9'	690	Argillite (N3) and sandstone (arkosic wacke), fine to coarse grained, fragmentary, angular pieces as large as 4.0 cm; 5GY5/1 to 10 GY5/2; chiefly angular clasts include quartz, plagioclase, potassium feldspar, volcanic rocks, chert, biotite, magnetite, and epidote; and volcanic rock, glassy, chloritized, pieces as large as 3.2 cm; 5G5/2; all three rock types probably represent local bedrock; overlying Quaternary(?) detritus includes sheared sandstone-argillite breccia fragments as large as 6.0 x 5.0 x 3.5 cm	--	332 W070 W071
32°56.9'	119°55.3'	970	Sandstone, fine grained, silty, glauconitic (pelletal, granular) foraminiferal; 5Y6/1 to 5Y5/2; common angular to well-rounded clasts include hard sandstone, argillite and serpentine(?) as large as 7.0 mm; indistinctly layered to massive; burrowed	Quaternary(?)	333
33°32.0'	120°15.4'	1239	Mudstone glauconitic (pelletal, granular), foraminiferal; 5Y5/2 to 5Y7/2; rare subangular clasts of hard, greenish-gray fine-grained sandstone	Quaternary(?)	334
33°31.8'	120°16.0'	1050	Mudstone, glauconitic (pelletal, granular), foraminiferal; 5Y5/2 to 5Y7/2; common angular to subrounded clasts of hard greenish-gray sandstone and dark-gray siltstone and unidentified metamorphic rocks; poorly defined color streaks; massive; cohesive	Quaternary(?)	335

33°31.6'	120°16.7'	900	Mudstone, sandy to pebbly, glauconitic (pelletal, granular), foraminiferal; 5Y4/4 to 5GY4/1; abundant angular to subrounded clasts as large as 2.8 cm include arkosic wacke(?), argillite, volcanic rocks, red, green, and brown chert, dolomitic(?) siltstone, and rare schistose rocks; massive; friable	Quaternary(?)	336
33°31.3'	120°17.5'	825	Mudstone, sandy to sparsely pebbly, glauconitic (pelletal), phosphoritic (nodular, pelletal); 5Y6/1 to 10 YR3/2; abundant angular to subrounded clasts as large as 1.3 cm include arkosic wacke(?), argillite, red chert, serpentine(?), and tuff(?); massive; friable	Late Pliocene to Holocene foraminifers	337
33°30.9'	120°18.2'	825	Sandstone, silty to pebbly, phosphoritic (pelletal, nodular), glauconitic (pelletal); 5Y6/1 to 5Y3/2; angular to well rounded clasts include altered sandstone, gabbroic(?) rocks, diabase, dolomitic(?) siltstone and chert as large as 4.2 cm; indistinctly color banded; massive; friable	Quaternary(?)	338
33°33.2'	120°44.8'	1500	Siltstone, clayey, tuffaceous; 5GY6/1; fragments embedded in mudstone, glauconitic (granules, pebbles, pellets); 5Y3/2; poorly sorted; friable	--	341
33°33.5'	120°44.5'	1370	Siltstone, sandy in part, micaceous; 5Y7/1; massive to indistinctly bedded; minute cemented fractures; hard	Oligocene(?) coccoliths, sparse Dictyococcites bisectus and abundant small Cyclicargolithus sp. aff. C. floridanus; lower Zemorrian foraminifers	342
33°33.8'	120°44.0'	1340	Lithic tuff or volcaniclastic sandstone, fine grained, silty, weathered; 5YR3/4; fragments scraped from core barrel	--	343

33°36.5'	120°36.4'	1215	Siltstone, sandy, glauconitic (pelletal), foraminiferal; 5GY6/1, 10Y4/2; abundant angular mineral grains probably derived from volcanic or volcaniclastic rocks; massive	Late Pliocene to Holocene foraminifers	344
33°36.6'	120°37.0'	1090	Sandstone, foraminiferal, glauconitic (pelletal, granular); 5Y7/2; sparse rounded mineral grains and rock fragments derived from indurated quartzofeldspathic sandstone and siltstone and volcanic or volcaniclastic rocks; similar coarse detritus abundant 20-27 cm from bottom; massive; indistinctly color banded; bioturbated	Quaternary(?)	345
33°36.6'	120°37.6'	940	Siltstone, highly micaceous, clayey; 5GY6/1; massive; fractured; hard; possibly older than Miocene		346
33°36.6'	120°38.3'	1045	Mudstone, glauconitic (pelletal), phosphoritic (pelletal); 10YR4/2; embedded fragments of pre-Quaternary(?) calcareous siltstone; 5GY7/2	Quaternary(?)	347
33°38.0'	120°37.0'	1215 (?)	Mudstone, glauconitic (pelletal, granular), phosphoritic (blebs, pellets), devitrified tuff fragments, bottom 3-4 cm; 10YR2/2 to 5Y2/1; overlain by claystone and siltstone; 5Y4/1, 5Y6/1; laminated	Sphenolithus heteromorphus; Luisian(?) and possibly redeposited Relizian foraminifers in bottom 3-4 cm; Relizian and upper Luisian foraminifers 5-7 cm from bottom	348
33°38.2'	120°37.6'	1130	Mudstone, sandy to pebbly, glauconitic (pelletal), foraminiferal; 10Y4/2 to 5Y5/2; abundant angular fragments of porphyritic basalt as large as 1.0 cm	Late Pliocene to Holocene foraminifers	349
33°37.6'	120°39.5'	1125	Siltstone, clayey, micaceous, pyritiferous in part; N7 to N6; minutely mottled in places; fractured; sheared; hard; probably older than Miocene	Rare fragmentary foraminifers suggest an age range of Late Cetaceous? to Oligocene	350

33°37.1'	120°41.4'	1135	Serpentine; 5GY7/2 to 10GY7/2; fractured, brecciated in part	--	351
33°42.1'	120°29.4'	1145	Sandstone, pebbly, glauconitic (pelletal), phosphoritic (nodular, pelletal); 5Y2/1; common angular to well-rounded granules and pebbles include serpentine and light-colored volcanic rocks; massive; friable	Upper Mohnian foraminifers	352
33°42.3'	120°30.6'	1100	Claystone, silty; 5Y4/1, 5Y6/1; laminated; minute clay-filled fractures	Sphenolithus heteromorphus; middle Miocene, probably Luisian foraminifers	353
33°42.9'	120°33.1'	1190	Sandstone, silty, glauconitic (pelletal), foraminiferal; 5GY2/1 to 5Y6/1; sparse angular to well-rounded granules of volcanic rocks including lapilli tuff; mottled to indistinctly color banded; bioturbated; cohesive	Quaternary(?)	354
33°42.2'	120°34.3'	1180	Mudstone, glauconitic (pelletal), foraminiferal; 5YR3/1; abundant angular mineral grains and rock fragments derived from volcanic or volcaniclastic rocks; massive; cohesive	Quaternary(?)	355
33°42.3'	120°35.2'	1180	Mudstone, sandy to pebbly, glauconitic (pelletal, granular), phosphoritic (nodular),foraminiferal; 10YR2/2 to 5Y4/1; common angular to subrounded granules and pebbles include devitrified pumice, porphyritic basalt, and hyaloclastite(?) as large as 1.5 cm; mottled and streaked; friable	Quaternary(?)	356
33°42.3'	120°35.9'	1135	Mudstone, sandy, glauconitic (pelletal, granular), foraminiferal; 5GY4/1 to 5Y6/1; sparse mineral grains and rock fragments derived from volcanic or volcaniclastic rocks; mottled, color streaked; bioturbated(?); friable	Quaternary(?)	357

33°40.4'	120°50.5'	1320	Mudstone, sandy, glauconitic (pelletal, granular); 5Y3/2 to 10Y4/2; abundant detritus derived from basaltic rocks and sparse pieces of serpentine; irregular color streaks; bioturbated(?); friable	Quaternary(?)	358
33°40.6'	120°50.1'	1130	Siltstone, clayey, micaceous; 5Y6/1; and sandstone, very fine-grained, silty, angular, volcaniclastic(?); N6; massive to indistinctly laminated; fractured in part	Early Miocene coccoliths; mixed Luisian and lower Mohnian deep-water foraminifers	359
33°40.8'	120°49.8'	1070	Breccia, granule-pebble volcaniclastic; matrix clayey, tuffaceous(?); possibly a devitrified hyaloclastite; N5 to N7; grades up into siltstone, clayey, micaceous; N7 to 5Y6/1; massive to indistinctly laminated; hard	Lower(?) Zemorrian foraminifers 5-11 cm from bottom of core	360
33°41.1'	120°49.6'	1125	Siltstone, clayey, micaceous; 5Y4/1 to 5Y6/1; minutely mottled; laminated; hard; overlain by devitrified pumiceous lapilli tuff; N6 to N8; massive; fractured	Helicosphaera ampliaperta or Sphenolithus heteromorphus (2 cm from bottom)	361
33°41.2'	120°49.3'	1170	Hyaloclastite (possibly lithic tuff), weathered; N4; glass altered to clays; zeolites fill vesicles and intestices; fractured and fragmented	--	362 W073
33°41.4'	120°49.0'	1260	Sandstone, silty to pebbly, glauconitic (pelletal); 5Y6/1 to 5Y3/2; abundant angular pieces of hyaloclastite, porphyritic basalt, and volcaniclastic siltstone as large as 2.8 cm derived from nearby outcrop; massive; friable	Pliocene to Holocene foraminifers	363
34°06.7'	120°56.4'	1060 (?)	Lapilli tuff(?), fine grained; 5Y5/2 to 10YR4/2; consists largely of angular fragments of brown, partly devitrified glass, probably water laid; indistinctly laminated; friable	--	364

34°06.9'	120°56.0'	1000	Hyaloclastite and lapilli tuff, partly devitrified; 10YR5/4; includes altered pumice fragments; probably palagonitic	--	365
34°07.2'	120°55.4'	955	Mudstone, silty to sandy, volcaniclastic, weathered; 5YR4/4; angular grains include hyaloclastite and volcanic glass; fragments scraped from core barrel	--	366
34°07.4'	120°54.9'	900	Sandstone , very fine to fine grained, quartzofeldspathic, sparsely micaceous, angular to subrounded, well sorted; 5GY6/1 to 5Y8/1; massive; friable	Late Pliocene to Holocene foraminifers	367
34°07.0'	120°51.5'	915	Sandstone, muddy, glauconitic (pelletal), foraminiferal; 5GY4/1 to 5Y6/1; rare rounded mineral grains and rock fragments; indistinct broad color bands and streaks; massive; friable	Quaternary(?)	368
34°07.2'	120°51.2'	875	Sandstone, silty, glauconitic (pelletal), sparsely foraminiferal; 5Y2/1 to 5Y8/1; sparse mineral grains and rock fragments probably derived from volcanic or volcaniclasic rocks mottled and streaked to indistinctly bedded; bioturbated; friable	Quaternary(?)	369
34°07.5'	120°50.7'	800	Sandstone, volcaniclastic, fine to very coarse grained, calcareous; 5GY4/1 to 10Y6/2; coarse grains and granules derived largely from hyaloclastite; massive; hard	Late Miocene(?) to Holocene(?) echinoids and bryozoans	370 W074
34°07.9'	120°50.3'	730	Mudstone, volcaniclastic(?), glauconitic (pelletal); 10YR4/2; fragments scraped from core barrel	--	371

34°02.4'	120°46.4'	890	Hyaloclastite or volcaniclastic sandstone, partly altered, zeolite and iron oxide matrix; 10YR16 to 10YR4/2; weathered; fractured; friable	--	372 W075
34°01.7'	120°46.0'	940	Hyaloclastite, partly devitrified; 10YR6/6 to 10YR2/2; weathered; fractured; overlain by phosphorite nodule	--	373
34°01.1'	120°45.8'	1250	Sandstone, silty, glauconitic (pelletal), foraminiferal; 10Y6/2; indistinct broad color bands; massive; friable	Quaternary(?)	374
34°01.3'	120°43.0'	1045	Sandstone, silty, glauconitic (pelletal), foraminiferal; 10Y6/2; sparse grains of quartz and feldspar; indistinct color streaks; massive; friable	Quaternary(?)	375
34°00.9'	120°42.9'	1130	Sandstone, silty, glauconitic (pelletal, granular), foraminiferal; 10Y6/2 to 5Y5/2; sparse grains of quartz and feldspar; indistinct color streaks; bioturbated; massive; friable	Quaternary(?)	376
34°00.4'	120°43.1'	1290	Siltstone, clayey to sandy, sparsely glauconitic (pelletal); foraminiferal; 10YR6/2; massive; cohesive	Quaternary(?)	377
34°05.5'	120°37.9'	680	Tuff, vitric; N8 to 5Y8/1; and siltstone, clayey, tuffaceous, diatomaceous; 5Y4/1 to 5Y8/1; laminated; minute clay-filled fractures; low density	Discoaster variabilis; lower Mohnian, probably Bulimina uvigerinaformis; Subzone b or c, Denticula hustedtii-D. lauta	378
34°05.7'	120°37.5'	600	Claystone, silty, phosphoritic (blebs, fish bones); 5Y2/1 to 5Y6/1; indistinctly laminated, thin lamina of tuff at base; N9 to N7; phosphorite nodule above claystone	Middle Miocene to middle Pliocene coccoliths; late Miocene diatoms	379

34°06.1'	120°37.1'	430	Siltstone, clayey, sparsely micaceous, diatomaceous in part; 5Y4/1; indistinctly laminated to massive; low density	Lower Mohnian foraminifers; Miocene(?) Delectopecten sp. 16 cm from bottom; Subzone b, Denticula lauta or younger	380
34°06.5'	120°36.8'	370	Sandstone, very fine to fine grained, silty; 5GY8/1; abundant shallow-water shell fragments; common well-rounded rock fragments; massive; friable	Quaternary mollusks	381
34°07.0'	120°36.3'	160	Sandstone, very fine grained, silty, quartzofeldspathic; 5Y6/1 to 5Y8/1; fragments scraped from bent core barrel; contaminated with Quaternary(?) sand	--	382A
34°07.3'	120°35.8'	120	Siltstone, clayey, micaceous; 5G6/1 to 5Y4/1; indistinctly laminated to massive; fractured; hard	Cenozoic coccoliths; upper Saucesian or Relizian foraminifers	383
340°08.0'	120°35.0'	65	Sandstone, clayey to silty, volcanogenic(?); N6; hard; fragments scraped from bent core barrel	--	385
34°08.5'	120°34.4'	99	Sandstone, calcareous, volcanogenic(?); N8 to 5Y8/1; fragments scraped from bent core barrel; contaminated with Holocene shell sand	--	386
34°08.8'	120°34.1'	100	Siltstone, clayey, sparsely micaceous, calcareous; 5Y6/1 to 10YR7/4; massive; fractured; hard	--	387A
34°09.3'	120°33.8'	110	Siltstone, clayey, micaceous, pyritiferous in in part, calcareous in part; N5 to 5Y6/1; indistinctly laminated; fractured	Early or middle Miocene coccoliths; lower(?) Luisian foraminifers in top 5 cm	388

34°09.8'	120°33.5'	125	Siltstone, clayey, diatomaceous, tuffaceous(?) in part; 5Y6/1 to 5Y8/1; indistinctly laminated	Middle Miocene coccoliths; upper Luisian or lower Mohnian, probably lower Mohnian foraminifers; Subzone a, Denticula hustedtii-D. lauta	389
34°10.2'	120°33.2'	130	Claystone, silty, diatomaceous; 5Y6/1 to 5Y8/1; indistinctly laminated to massive; low density	Discoaster variabilis, lower(?); lower Mohnian, Bulimina uvigerinaformis; Subzone c, Denticula hustedtii-D. lauta	390
34°10.6'	120°32.9'	140	Diatomite; N9; and shale, silty, diatomaceous; 5Y6/1 to 5Y8/1; laminated; fractured; low density	Early Miocene to middle Pliocene coccoliths; Mohnian, probably lower Mohnian, Bulimina uvigerinaformis; Subzone b, Denticula hustedtii-D. lauta	391
34°11.0'	120°32.7'	150	Siltstone, clayey, sparsely diatomaceous and micaceous; 5Y6/1; indistinctly laminated to massive	Coccolithus miopelagicus with abundant C. pelagicus; middle Miocene, probably Luisian foraminifers; Subzone b, Denticula lauta	392
34°11.6'	120°32.4'	160	Shale and claystone, silty, cherty in part; 5Y8/1; fractured; hard	Neogene, possibly middle Miocene on the basis of sparse Discoaster sp. aff. D. sanmiguelensis; upper(?) Luisian foraminifers	393
34°11.9'	120°32.1'	170	Shale and claystone, silty, micaceous cherty; 10YR4/2 to 5GY6/1 and 10YR6/2; fractured; hard; fissile in part	Middle or late Miocene foraminifers	394A

34°12.5'	120°31.8'	220	Sandstone, silty, pebbly, glauconitic (pelletal), foraminiferal; 10Y5/2; angular to well-rounded granules and pebbles probably redeposited from older conglomerate; brown chert fragments as large as 4.2 cm; massive; friable	Quaternary mollusks	395
34°12.8'	120°31.5'	250	Siltstone, clayey, diatomaceous; 5Y4/1 to 5Y8/1; and tuff, vitric; N6 to N8; indistinctly laminated; fractured; low density	Middle Miocene(?) silicoflegillates; Subzone b, Denticula lauta?	396
34°13.3'	120°31.3'	330	Claystone, silty, diatomaceous; 5Y4/1 to 5Y6/1; indistinctly laminated; low density	Cenozoic coccoliths; lower Mohnian, Bulimina uvigerinaformis; Subzone c, Denticula hustedtii-D. lauta	397
34°13.7'	120°31.0'	420	Sandstone, silty to clayey, glauconitic (pelletal), foraminiferal; 10Y5/2; abundant echinoid spines and mollusk shells; sparse volcanic(?) rock fragments; massive; friable	Quaternary mollusks	398
34°14.2'	120°30 7'	355	Claystone, silty, diatomaceous, tuffaceous; 5Y4/1 to 5Y8/1; thin lamina of vitric tuff (N8) at base; laminated; low density	Lower Mohnian, Bolivina uvigerinaformis Zone; Subzone b, Denticula lauta or younger	399
34°14.6'	120°30.4'	465	Phosphorite-glauconite mudstone and conglomerate, possibly representing a slump deposit; nodules of phosphorite as large as 2.5 cm	Quaternary(?)	400
34°12.3'	120°33.9'	410	Sandstone, clayey to silty, glauconitic (pelletal); 5Y5/2; common rounded mineral grains and rock fragments; massive; friable	Quaternary mollusks	401
34°12.0'	120°34.4'	475	Sandstone, fine grained, clayey to silty, sparsely glauconitic (pelletal); 5Y5/2; common angular mineral grains and rock fragments; massive; friable	Quaternary mollusks	402

34°11.8'	120°34.8'	375	Sandstone, silty, glauconitic (pelletal), foraminiferal; 5Y5/2; common mineral grains and rock fragments derived in part from volcanic rocks; massive; friable	Quaternary mollusks	403
34°11.4'	120°35.4'	305	Claystone, silty, diatomaceous; 5Y6/1 to 5Y8/1; laminated, low density	Discoaster variabilis; lower Mohnian, Bulimina uvigerinaformis; Subzone c, Denticula hustedtii-D. lauta	404
34°11.0'	120°35.7'	335	Sandstone, pebbly, foraminiferal, sparsely glauconitic; 5Y5/2; angular fragments of dolomitic(?) siltstone as large as 6.0 cm and rounded granules and pebbles derived from conglomerate and volcanic(?) rocks	Late Pliocene to Holocene and redeposited late Miocene or Pliocene foraminifers	405A
34°10.8'	120°36.3'	370(?)	Claystone, silty, tuffaceous, diatomaceous; 5Y4/1 to 5Y6/1; and tuff, vitric, foraminiferal; N6; phosphoritic streaks and blebs; indistinctly laminated to massive	Mohnian, possibly lower Mohnian foraminifers; late middle Miocene to Holocene diatoms	406
34°10.5'	120°36.8'	265	Siltstone, clayey, diatomaceous, tuffaceous; N9 to 5Y8/1; low density	Sphenolithus heteromorphus or Coccolithus miopelagicus; Subzone b, Denticula lauta	407
34°10.3'	120°37.2'	250	Sandstone, very fine to fine grained, pebbly, shelly, foraminiferal; 5GY7/2; common rounded granules and pebbles probably derived from conglomerate and volcanic rocks; mollusks include shallow-water species suggesting downslope transport	Quaternary mollusks	408
34°09.9'	120°37.7'	275	Sandstone, fine grained, silty, foraminiferal, shelly; 10Y6/2; common subangular to well rounded granules include hard quartzofeldspathic sandstone; massive; cohesive	Quaternary mollusks	409

34°09.5'	120°38.1'	330	Shale, silty, diatomaceous; and siltstone, tuffaceous, clayey; 5Y6/1 to N8; laminated, low density	Corbisema triacantha; Subzone b, Denticula lauta	410
34°09.2'	120°38.8'	440	Siltstone, clayey, tuffaceous (glass shards), phosphoritic(?) streaks, diatomaceous in part; 5Y4/1 to 5Y6/1; fragments scraped from core barrel	Late Pliocene to Holocene foraminifers; middle Miocene to Holocene diatoms	411
34°04.6'	120°33.0'	110	Siltstone, clayey, diatomaceous, tuffaceous; 5Y4/1 to 5Y6/1; indistinctly laminated, streaked and mottled; clay-filled fractures; low density	Miocene silicoflagellates; Mohnian, possibly lower, mixed with Pleistocene foraminifers (top 5 cm)	412
34°04.0'	120°33.5'	135	Mudstone, sandy, calcareous, volcaniclastic in part; 5Y6/1; fragments scraped from core barrel	--	413A
34°03.7'	120°33.9'	155	Sandstone, very fine to coarse grained, silty, foraminiferal, shelly; 5Y7/2; abundant subangular to well-rounded mineral grains and rock fragments derived in large part from volcanic and sedimentary rocks on San Miguel Island platform; massive; friable	Quaternary mollusks	414
34°03.3'	120°34.3'	315	Sandstone, fine grained, silty, foraminiferal; 5Y6/1 to 5GY6/1; common angular mineral grains and rock fragments; massive; friable	Quaternary mollusks	415
34°02.7'	120°34.9'	388	Claystone, foraminiferal, pumiceous(?); 5Y5/2; upper part of core color banded; low density	Discoaster variabilis, lower Mohnian foraminifers; late Miocene or younger and redeposited middle Miocene diatoms	416
34°01.8'	120°35.6'	475	Phosphorite (nodular); mudstone, sandy, volcaniclastic in part; fragments scraped from core barrel	--	418

34°01.3'	120°36.0'	670	Claystone, silty, diatomaceous, sparsely micaceous, tuffaceous(?); 5Y6/1 and N8; laminated; low density; thin, silty, very fine-grained sandstone layers in middle of core	Early or middle Miocene silicoflagellates; Subzone b, Denticula lauta	419
34°01.0'	120°36.4'	945	Siltstone, clayey to sandy, sparsely micaceous pebbly; 5Y4/2; common well-rounded to subangular volcanic (andesitic?) and metamorphic rock fragments as large as 1.0 cm; presumably derived largely from volcanic and sedimentary rocks on San Miguel Island platform; massive; friable	Late Pliocene to Holocene foraminifers	420
34°00.6'	120°36.7'	1160	Siltstone, clayey to sandy, foraminiferal, sparsely micaceous; 10Y5/2; massive, cohesive	Late Pliocene to Holocene foraminifers	421
33°59.1'	120°33.3'	890	Claystone, silty; 10YR4/2; pieces scraped from core barrel		423
33°59.5'	120°32.9'	730	Sandstone, very fine to fine grained, silty, foraminiferal; 10Y6/2; abundant shell fragments; angular to well-rounded mineral grains and rock fragments; massive; friable	Quaternary mollusks	424
33°59.7'	120°32.6'	690	Sandstone, medium to very coarse grained, silty, pebbly in part; 10Y5/2; abundant mollusk shells and angular to well-rounded granules and pebbles of volcanic rocks and rounded rock fragments derived from sedimentary rocks on San Miguel Island platform; massive; friable	Quaternary mollusks	425
34°00.1'	120°31.8'	520	Sandstone, very fine grained, silty, foraminiferal; 5Y5/2; massive; friable	Quaternary(?)	427
34°00.5'	120°31.5'	420	Mudstone, silty, highly micaceous; 5Y5/2; massive; cohesive; low density	Miocene to Holocene, probably early Pliocene or possibly late Miocene foraminifers	428

34°00.8'	120°30.9'	310	Claystone, silty, diatomaceous; 5Y6/1; indistinctly laminated; low density	Discoaster variabilis; upper Mohnian foraminifers; Subzone a, Denticula hustedtii	429
34°01.1'	120°30.5'	180	Sandstone, fine to coarse grained, pebbly, shelly, foraminiferal; 10Y6/2; abundant subangular to well-rounded rock fragments, probably clasts derived from sedimentary rocks on San Miguel Island platform; massive; friable	Quaternary mollusks	430
34°01.4'	120°30.2'	100	Sandstone, fine to coarse grained; pebbly, shelly, foraminiferal; 10Y6/2; abundant subangular to well-rounded rock fragments, probably clasts derived from sedimentary rocks on San Miguel Island platform; massive; friable	Quaternary mollusks	431
34°01.7'	120°29.5'	100	Claystone and siltstone, sandy, calcareous; N7; hard; fragments scraped from core barrel		432
34°01.7'	120°29.4'	100	Sandstone, silty, very hard; Holocene sand at top of core (core lost; description from logbook)	--	432A
34°02.0'	120°29.0'	70	Sandstone, medium to coarse grained, bioclastic; 5Y8/1; chiefly mollusk shell fragments, echinoid spines and bryozoans; massive; friable	Holocene mollusks and echinoid spines	433
34°01.5'	120°28.4'	40	Greenstone (volcanic rock altered to albite-epidote-calcite-quartz rock, no schistosity), monolithologic freshly-broken fragments embedded in smashed core barrel; rounded pieces of similar rock in calcareous silt matrix presumably represent locally derived detritus	--	434A W085
34°01.3'	120°28.0'	20	Sandtone(?), silty, calcareous; small fragments embedded in core barrel resemble rocks in sample 434A	--	435

33°58.8'	120°29.3'	275	Sandstone, fine grained, silty, sparsely micaceous; 5Y6/1; massive; friable	Quaternary mollusks	436
33°58.4'	120°30.0'	350	Sandstone, fine grained, silty, sparsely micaceous 5Y6/1; massive; friable	Quaternary mollusks	437
33°57.9'	120°30.2'	390	Sandstone, fine grained, silty, sparsely micaceaous 5Y6/1; massive; friable	Quaternary mollusks	438
33°57.6'	120°30.6'	465	Sandstone, fine grained, silty, shelly, sparsely glauconitic and micaceous; 5Y6/2; sparse rock fragments; massive; friable	Quaternary mollusks	439
33°57.0'	120°30.9'	600	Sandstone, very fine to fine grained, silty, foraminiferal, sparsely glauconitic; 5Y6/2; contains mollusk shell fragments; massive; friable	Quaternary(?)	440
33°56.7'	120°31.3'	750	Sandstone, very fine grained, silty, foraminferal, sparsely glauconitic; 5Y5/2; contains sponge spicules and sparse shell fragments; massive; friable	Quaternary(?)	441
33°56.3'	120°31.8'	860	Sandstone, very fine grained, silty, foraminiferal, sparsely glauconitic; 5Y5/2; massive; cohesive	Quaternary(?)	442
33°55.7'	120°31.7'	970	Siltstone, clayey to sandy, sparsely micaceous; 5Y5/2; massive, bioturbated in part; cohesive	Late Pliocene to Holocene foraminifers	443
33°53.9'	120°25.7'	610	Siltstone and very fine grained sandstone; 5Y5/2; indistinct broad color bands; massive; cohesive	Pliocene to Holocene, probably early or middle Pliocene foraminifers	444
33°53.4'	120°25.8'	700	Sandstone, very fine grained, silty, foraminiferal; 5Y5/2; massive; semifriable	Quaternary(?)	445

33°53.0'	120°25.9'	710	Siltstone and sandstone, very fine grained, silty, foraminiferal; 5Y6/2; rare mollusk shell fragments; massive; bioturbated in part; friable	Quaternary(?)	446
33°52.5'	120°26.0'	800	Sandstone, muddy, glauconitic (pelletal), foraminiferal; 5Y5/2; common rounded mineral grains and rock fragments including serpentine(?); massive; friable	Quaternary(?)	447
33°52.0'	120°26.0'	830	Sandstone, volcaniclastic, fine to medium grained, angular to well-rounded mineral grains and rock fragments include volcanic rocks, chert, quartz, plagioclase, potassium feldspar and epidote; N6 to N7; massive; friable	--	448 W076
33°51.5'	120°26.1'	890	Siltstone and very fine grained sandstone, foraminiferal, sparsely glauconitic, micaceous; 5GY6/2; massive; friable	Pliocene foraminifers	449
33°50.9'	120°26.2'	1290	Sandstone, very fine to medium grained, silty, foraminiferal, shelly; 5Y6/1; rounded mineral grains and rock fragments, some of which are foliated; shallow-water fossils suggest downslope transport; fragments scraped from core barrel	Quaternary(?) mollusks and echinoid spines	450
33°46.0'	120°25.0'	1210	Mudstone, sandy, glauconitic (pelletal, granular), foraminiferal; 5GY6/2; common angular to well-rounded mineral grains and rock fragments include altered volcanic rocks and serpentine, broadly color-banded; massive; friable	Quaternary(?)	451

33°45.0'	120°24.5'	1020	Mudstone, sandy, glauconitic (pelletal, granular); 5GY4/1; abundant angular clasts include altered(?) volcanic rocks, sepentine(?) and schistose rocks, probably locally derived; fragments scraped from core barrel	Quaternary(?)	454
33°44.6'	120°24.7'	1025	Mudstone, sandy, sparsely glauconitic (pelletal), sparsely micaceous; 5Y6/1 to 5GY5/2; angular to well-rounded mineral grains and rock fragments include sparse foliated rocks; indistinctly layered; minute clay-filled fractures	Coccolithus miopelagicus; lower Mohnian and reworked Luisian foraminifers; Subzone a, Denticula hustedtii-D. lauta	453
33°40.9'	120°29.1'	1000	Claystone, silty, tuffaceous in part, sparsely micaceous; 5Y4/1 to 5Y8/1, N9; indistinctly laminated	Early or early middle Miocene coccoliths; upper Relizian or lower Luisian foraminifers	454
33°40.8'	120°28.4'	1160	Sandstone, muddy, glauconitic (pelletal), foraminiferal; 5GY5/2; sparse subangular to well-rounded mineral grains and rock fragments; friable; broad color streaks and mottling; burrowed	Quaternary(?)	455
33°40.7'	120°27.9'	1085	Sandstone, very fine to fine grained, silty to clayey, glauconitic (pelletal), foraminiferal; 5GY5/2; sparse angular to well-rounded mineral grains and rock fragments; indistinct color streaks; massive; friable	Quaternary(?)	456
33°40.7'	120°27.2'	1160	Sandstone, fine to medium grained, quartzo-feldspathic, micaceous (brown); 5B7/1 to N6; angular to subangular grains include abundant dark-gray rock fragments; massive; friable	--	457
33°40.6'	120°26.1'	1180	Mudstone, sandy, glauconitic (pelletal), foraminiferal; 5GY5/2; sparse mineral grains and rock fragments; massive; cohesive	Quaternary(?)	458

33°31.8'	119°55.5'	420	Siltstone, clayey, tuffaceous (abundant glass shards); 5YR2/1; sparse phosphoritic(?) blebs and streaks, 5Y6/1; massive	Miocene(?) silicoflagellates; uppermost Luisian or lowermost Mohnian foraminifers; middle Miocene to Holocene diatoms	459
33°31.9'	119°55.1'	405	Claystone, silty; 5Y6/1 to 5Y8/1; laminated; minute clay-filled fractures	Discoaster variabilis; upper Mohnian foraminifers; middle Miocene to Holocene diatoms	460
33°32.0'	119°54.6'	385	Mudstone, glauconitic (pelletal), sparsely phosphoritic; 10Y4/2 to 5YR4/1; scraped from core barrel	Quaternary(?)	461
33°32.0'	119°53.8'	380	Siltstone and claystone, phosphoritic (pellets, blebs), glauconitic (pelletal); 5Y2/1 to 5Y6/1; dolomitic(?) cement in part; irregular color streaks; chiefly massive; possibly represents a slump deposit	Mohnian, probably lower Mohnian foraminifers	462
33°33.0'	119°51.1'	300	Claystone, silty, sparsely micaceous; 5Y4/1 to 5Y6/1; indistinctly laminated to massive; low density	Helicosphaera ampliaperta; upper Relizian foraminifers; Actinocyclus ingens	463
33°33.3'	119°50.1'	322	Claystone, silty, sparsely micaceous; 5Y4/1 to 5Y6/1; low density; fragments scraped from core barrel	Helicosphaera ampliaperta or Sphenoithus heteromorphus, contains redeposited Oligocene H. recta; Relizian foraminifers	464
33°33.6'	119°49.2'	350	Claystone, silty; 5Y4/1 to 5Y6/1; and tuff, silty, micaceous; N8; 2.0 cm from bottom and 1.5 cm thick; laminated in lower part, indistinctly laminated in upper part	Early Miocene(?) coccoliths; upper Relizian foraminifers	465

33°33.9'	119°48.5'	390	Siltstone, clayey, tuffaceous in part; 5Y4/1; thin streaks (0.2 to 0.5 cm) phosphoritic(?) claystone; 5Y6/1; indistinctly laminated	Discoaster neohamatus or higher; upper Mohnian foraminifers; Miocene to Holocene diatoms	466
33°34.1'	119°48.1'	410	Claystone, silty, micaceous; 5Y2/1 to 5Y4/1; phosphoritic(?) claystone streaks and blebs; 5Y6/1; indistinctly laminated to massive	Discoaster mendomobensis (?); upper Mohnian and probably reworked middle Miocene foraminifers	467
33°34.5'	119°47.5'	435	Claystone, silty, micaceous; 5Y2/1 to 5Y4/1; phosphoritic(?) claystone streaks and blebs; 5Y6/1; indistinctly laminated	Discoaster variabilis; upper Mohnian foraminifers	468
33°34.7'	119°46.9'	470	Claystone, silty, micaceous; 5Y4/1 to 5Y6/1; indistinctly laminated	Upper Mohnian foraminifers	469
33°34.9'	119°46.6'	550	Siltstone, clayey, phosphoritic (streaks, blebs, pellets), sparsely glauconitic (pelletal) pyritiferous in part; 5Y2/1, 5Y6/1; generally massive with thin yellowish-brown streaks	--	470
33°35.2'	119°46.3'	600	Siltstone, clayey, micaceous, sparsely diatomaceous, sparsely glauconitic; phosphoritic (pelletal) in part; 5Y4/1; massive	Middle(?) Miocene silicoflagellates; (Subzone b, Denticula lauta	471
33°35.8'	119°46.0'	670	Diatomite and diatomaceous claystone, silty; N8; 5Y6/1 to 5Y8/1; indistinctly laminated to massive; low density	Sphenolithus heteromorphus(?); upper Relizian or lower Luisian foraminifers; Subzone b, Denticula lauta	472
33°28.6'	119°46.7'	120	Claystone, silty, diatomaceous, tuffaceous(?) 5Y6/1 to 5Y8/1; laminated; low density; vitric tuff (N8) 1.2 cm thick 8.5 cm from bottom of core	Corbisema triacantha and ?Helicosphaera ampliaperta; upper Relizian or lower Luisian foraminifers; Subzone a, Denticula lauta	474

33°29.0'	119°46.5'	120	Claystone, silty, micaceous, tuffaceous, diatomaceous; 5Y4/1 to 5Y6/1; laminated to indistinctly laminated; low density	Sphenolithus heteromorphus; Luisian, probably lower, foraminifers; Subzone a Denticula lauta	475
33°29.5'	119°46.2'	125	Claystone, silty; and siltstone, clayey, diatomaceous; micaceous, phosphoritic (streaks, blebs); 5Y6/1 to 5Y8/1; laminated to indistinctly laminated; low density	Discoaster exilis or Catinaster coalitus; upper Luisian or lower Mohnian, Bolivina modeloensis; Subzone c, Denticula hustedtii-D. lauta	476
33°29.9'	119°45.9'	130	Claystone, silty and siltstone, clayey, micaceous, tuffaceous in part; 5Y4/1 to 5Y8/1; laminated; low density; 0.5 cm laminae of vitric tuff at bottom of core(N8) and 12 to 14 cm from bottom of core	Coccolithus miopelagicus; upper Luisian or lower Mohnian, Bolivina modeloensis; late middle Miocene to Holocene diatoms	477
33°30.7'	119°45.4'	140	Siltstone, clayey, tuffaceous, diatomaceous, phosphoritic (blebs, streaks); 5Y2/1 to 5Y6/1; laminated, low density; 0.9 cm lamina of vitric tuff at bottom of core(N8 to N6)	Discoaster variabilis, upper(?); upper Mohnian foraminifers; middle Miocene to Holocene diatoms	478
33°31.2'	119°44.9'	202	Mudstone, silty, sparsely glauconitic and phosphoritic(?), diatomaceous; 5Y4/1; fragments scraped from bent core barrel	--	479A
33°31.7'	119°44.5'	260	Siltstone, clayey, sparsely micaceous, phosphoritic pellets and streaks; 5Y4/1 to 5Y6/1; fragments scraped from core barrel	Eocene or younger coccoliths; upper Mohnian foraminifers	480A
33°32.0'	119°44.3'	360	Sandstone, fine to medium grained, clayey, foraminiferal, shelly; 5Y5/1; sparse phosphoritic pellets and nodules; rare glauconite pellets; rare mineral grains and rock fragments; massive; friable; shallow-water mollusks and echinoids suggests downslope transport	Quaternary mollusks	481

33°37.3'	119°15.6'	610	Sandstone, silty to pebbly; 5Y4/1 to N6; abundant angular to subrounded granules and pebbles of volcanic rocks (tuff and andesite?) and calcareous siltstone; massive; friable	Pliocene or Holocene foraminifers	482
33°37.4'	119°16.1'	570	Siltstone, clayey, diatomaceous, micaceous, tuffaceous in part; 5Y4/1 to 5Y6/1; low density; fragments scraped from core barrel	Middle Miocene to middle Pliocene calcareous nannofossils; Luisian or Mohnian foraminifers; late Miocene to Holocene diatoms	483
33°37.6'	119°16.4'	750	Mudstone, sandy, glauconitic; abundant mineral grains and rock fragments derived from volcanic rocks; fragments scraped from core barrel	Quaternary(?)	484
33°52.7'	119°25.8'	750	Mudstone, sandy, glauconitic (pelletal), foraminiferal; 5GY5/2; contains pieces of unfossiliferous volcaniclastic(?) mudstone; 10YR4/2; fragments scraped from core barrel	Quaternary(?)	485
33°53.1'	119°25.3'	645	Mudstone, sandy to pebbly, glauconitic (pelletal), phosphoritic (pelletal,nodular); angular to well-rounded pebbles and granules of porphyritic andesite(?), dacite(?), quartz schist, glaucophane schist, other schistose rocks, and sparse dioritic rocks as large as 2.5 cm; massive; cohesive	--	486
33°59.7'	119°20.3'	408	Sandstone, fine to medium grained, clayey, foraminiferal, shelly; 5GY6/1; rare fragments of volcanic and schistose rocks; massive; friable; shallow-water mollusks suggest downslope transport	Quaternary mollusks	488

34°00.2'	119°20.5'	85	Sandstone, fine to coarse grained, silty, volcaniclastic, shelly; 5GY4/1; predominantly angular fragments of basaltic(?) and andesitic (?) rocks; massive; friable	Quaternary mollusks	489
34°00.5'	119°20.7'	75	Sandstone, fine to medium grained, silty, volcaniclastic; N6; massive; friable	Quaternary mollusks, echinoids	490