resistant, thick beds of siliceous calcareous shale and porcelanite are interbedded with soft poorly exposed calcareous shale containing sparse silica. Above this basal unit is a sequence dominated by very poorly exposed, organic-rich calcareous shale, mostly containing sparse silica, and in some layers, abundant phosphate. Overlying is a transition unit within which the poorly exposed organic-rich calcareous shale is interbedded with resistant calcareous chert and porcelanite. The upper two units both consist of interbedded porcelanite, siliceous mudstone, and chert; however, the uppermost unit is noncalcareous and has interbedded tuff layers ranging in thickness from 1 cm to more than 30 cm.

The regional pattern of diagenesis was evaluated by determining the diagenetic maturity of a single stratigraphic unit (the transition unit) at each of the seven localities. At Goleta the section is completely diatomaceous (opal-A), whereas preliminary results indicate that diagenetic quartz as well as opal-CT are present in the North Sulphur Mountain area. Although this pattern is complicated by local structural deformation, diagenesis generally increases eastward from Goleta producing a trend opposite to that in the Santa Barbara coastal area, where diagenetic maturity increases westward from Goleta. This regional pattern of diagenesis, influenced mainly by Pliocene depositional trends, is consistent with paleogeographic reconstruction of the post-Miocene breakup of the ancestral Santa Barbara basin.

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Airborne Geophysical Surveying; Don't Forget to Look at the Data

The writer's experiences in airborne geophysical surveying date from the late 1940s to the present. Misconceptions about airborne geophysical surveying, errors in its use, and the digital computer have all affected the attitudes and conclusions made by interpreters.

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Current Technology in Airborne Radioactivity Surveying

Airborne gamma-ray surveying was used during government projects in the ERDA and NURE programs. These programs are now drawing to a close.

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Sedimentologic, Stratigraphic, and Tectonic Significance of Neogene Sedimentary Megabreccias, Western Salton Trough, California

Two massive, very thick (165 ft or 50 m), essentially tabular sedimentary megabreccia beds, exposed in the Vallecito Mountains, Split Mountain, and Fish Creek Mountains, are comprised of very poorly sorted, large boulders up to 33 ft (10 m) in diameter, suspended in a comminuted silty sand matrix. Many boulders can be visually reconstructed, like pieces of a giant jigsaw puzzle. Upper bed boundaries are hummocky, and lower bed contacts are undulatory. Where present, subjacent sedimentary strata are typically disrupted, locally deformed into mega-flaps (-flames) and also locally occur as large rip-up blocks. Each megabreccia bed is thought to represent a catastrophically emplaced, air-cushioned landslide, perhaps triggered by a strong seismic event.

The stratigraphic position, paleotransport data, and provenance suggest that these catastrophic landslides were deposited during mid-Neogene tectonic readjustments in the Salton Trough. The lower megabreccia bed culminates early Miocene nonmarine sedimentation in a Basin-Range(?) rift basin and was derived from the Vallecito Mountains and transported eastward. The upper megabreccia bed occurs within the lower Pliocene basal marine and nonmarine deposits of the Gulf of California, and is thought to have been transported southward from a "phantom-porpoise" structure of the San Jacinto fault zone, indicating a minimum early Pliocene age for the San Jacinto fault.

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Sedimentology of Late Paleocene through Middle Eocene Poway Clast-Bearing Marine Depositional System, Southern California Borderland

Remnants of a late Paleocene through middle Eocene depositional system are preserved in the stratigraphic record on San Miguel and Santa Cruz Islands and in coastal San Diego.

On San Miguel Island, upper Paleocene starved-basin mudstones were deposited on Maestrichtian middle submarine fan sandstones. Lying conformably on the Paleocene deposits is a lower Eocene sequence of starved-basin to fan-fringe mudstones and Poway rhyolite-bearing, middle submarine-fan depositional lobes of conglomerate. These facies are in turn overlain by an upper lower Eocene through lower middle Eocene retrogradational sequence of shale-filled channels, levees, fan-fringe, and starved-basin deposits. The remainder of the middle Eocene strata are braided, middle submarine-fan sandstones and mudstones.

Paleogene sedimentation on Santa Cruz Island began in the late Paleocene and continued uninterrupted through the entire Eocene Epoch. Upper Paleocene strata are composed of detritus washed from paralic environments to the east-northeast. These inner shelf deposits form a sequence of sublittoral sheet sandstones which coarsen upward into an interval of Poway rhyolite-bearing channelized conglomerate. Lower Eocene outer shelf mudstones overlie the conglomerate and the remainder of the depositional facies record sedimentation under progressively deepening marine conditions. These environments include passive slope, fan-fringe, and inner submarine-fan channels containing Poway rhyolite-bearing conglomerate.

In San Diego, the Mount Soledad Formation is composed of six sedimentary facies: (1) paralic (upper estuarine), (2) deltaic, (3) alluvial fan and fluvial channels, (4) submarine canyon head, (5) inner fan channel, and (6) slope. Poway rhyolite clasts are found in facies 2 through 5.

Based primarily on lithostratigraphic correlations, deltaic facies of the Mount Soledad Formation are proximal equivalents to the sublittoral sand sheet facies on Santa Cruz Island. Alluvial fan, fluvial channel, submarine canyon head, and inner submarine-fan conglomerate portions of the Mount Soledad sequence are equivalent to lower Eocene middle submarine-fan conglomerates on San Miguel Island.

The Paleogene sequence of facies on San Miguel and Santa Cruz Islands are equated lithostratigraphically to equivalent facies of the Mount Soledad Formation. Comparison of the changes in depths of deposition of the vertical sequence of facies with Tertiary eustatic changes suggests that the succession of marine facies at all these localities developed synchronously in response to changes in global sea level.

KOURSE, LAURALEE D., Exxon Co., U.S.A., Midland, TX

Silicoflagellate Biostratigraphy of Upper Monterey and Lower Sisquoc Formations, Lompoc, California

Fifty-three samples of a late Miocene marine diatomite were processed for silicoflagellates. Four genera and 13 species: *Cannopilus schulzi, Dictyocha aspera, Dictyocha fibula, Dictyocha pentagona, Dictyocha pseudofibula, Distephanus boliviensis, Distephanus quinquangellus, Distephanus speculum, Mesocena diodon, Mesocena elliptica,* and *Mesocena polyactus* were found. Counts were made of the species present and relative and total abundances were calculated. Two biostratigraphic zones (in ascending order), *Dictyocha pseudofibula* Acme-Zone and *Distephanus speculum* Acme-Zone were recognized. These zones appear to correlate to Bukry's *Dictyocha pseudofibula* Zone and *Distephanus speculum* Zone from DSDP Leg 18, Site 173, in the northeast Pacific. These zones overlap Barron's *Nitzchia fossilis* Partial-Range-Zone, *Rhaphoneis amphiceros* var. *elongata* Partial-Range-Zone, and *Nitzchia reinholdii* Concurrent-Range-Zone.

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Neogene Lacustrine Diatom Biostratigraphy of Western Snake River Basin, Idaho and Oregon

The western Snake River basin of Idaho and Oregon contains a thick sequence of continental sediments that range in age from at least middle Miocene to Holocene. Some of these sediments are diatomaceous and contain distinctive forms that are biostratigraphically useful. The Sucker Creek Formation (Barstovian-middle Miocene) can be characterized by the occurrence of *Coscinodiscus(?) miocaenicus.* The Poison Creek Formation of Barstovian(?)-Clarendonian age (middle to early late Miocene) contains *Coscinodiscus(?)* sp. cf. *C. gorbunovii* v. *gorbunovii.* The upper Miocene (Hemphillian) Chalk Hills Formation is highly diatomaceous and is characterized by the presence of primitive forms of *Stephanodiscus* at its base and by extinct forms of *Cyclotella* in its upper part. Ash correlations within the Chalk Hills Formation demonstrate that fossil freshwater diatoms can be used to time-correlate lacustrine sediments. The Glenns Ferry Formation of Pliocene (Blancan) age is dominated at its base by species of *Cyclotella* and *Stephanodiscus.* Benthic and epiphytic diatoms are most common in the upper Glenns Ferry Formation. The lower to middle Pleistocene (Irvingtonian) Bruneau Formation contains modern species of *Stephanodiscus, Cyclotella,* and *Melosira.* Careful morphologic comparisons of these and other diatoms of the western Snake River basin with similar forms in other regions may shed light on the feasibility of a model of worldwide Neogene lacustrine diatom biochronology.

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Gypsum Deposits of Fish Creek Mountains, Imperial and San Diego Counties, California

The largest deposit of gypsum in California occurs in the Miocene Split Mountain Formation. It is located at the north end of the Fish Creek Mountains, in Imperial and San Diego Counties, about 70 mi (113 km) east of San Diego. The deposit consists of up to 200 ft (65 m) of massive rock gypsum, lying at the top of the Split Mountain Formation. Selenite and celestite occur in scattered pockets. Anhydrite is present as erratic lenses in the gypsum, and interbedded clay occurs near the top and bottom contacts of the deposit. Minor impurities in the gypsum include varying concentrations of chloride salts and fine-grained, opaque manganese and iron oxides. The deposit is underlain by nonmarine gray conglomeratic sandstone, and in complete sections is overlain by marine shale and poorly consolidated sandstone of the Miocene Imperial Formation. Both contacts appear conformable and gradational.

The gypsum outcrops as erosional remnants, which have been preserved in a shallow synclinal basin 3 mi (4.8 km) long and 1 mi (1.6 km) wide. The general dip is 15 to 30° toward the synclinal axis, with sharp local contortions. The overlying Imperial Formation has been eroded away making estimates of the original thickness impossible. Overburden is nonexistent and the gypsum forms smoothly rounded hills, capped by a thin layer of gypsite.

The origin of this deposit appears to fit the "modified bar hypothesis," which suggests that calcium sulfate was precipitated in seacoast lagoons where evaporation took place rapidly, and periodic influx of seawater across shallow bars added new increments of salts. Gradual sinking of the lagoon allowed accumulations of great thicknesses.

The rock is mined in a side-hill bench quarry, crushed at the quarry site, and then shipped by private narrow-gauge railway to a calcining and wallboard plant at Plaster City, 25 mi (40 km) to the south.

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Miocene Geologic History of Southern Salinian Block, California—Perspectives from a Stratigraphic Study of Monterey Formation

A better understanding of the Miocene geologic history of the southern Salinian block is aided by a stratigraphic and paleoenvironmental study of the Monterey Formation. Extensive subsurface and surface data enable construction of isopach, paleobathymetric, age-relationship, and paleogeographic maps that document the depositional history of the Monterey Formation. Isopach maps show that the formation ranges up to 1,400 m (4,500 ft) thick beneath Cuyama valley. Other areas of maximum accumulation occur in the northwest Caliente Range and the Indian Creek area. Offset of isopachs north of Barrett Ridge suggests approximately 15 km (9 mi) of post-middle Miocene right slip on the San Juan fault.

Age-relationship maps of the upper and lower contacts of the Monterey Formation for the area from Cuyama Valley to the northern La Panza Range indicate that both the top and base of the formation become younger toward the northwest—the base ranging from Saucesian to Relizian and the top from Relizian to Mohnian. Paleobathymetric maps, based on the distribution of benthic Foraminifera, are plotted on four time slices: late Saucesian, Relizian, Luisian, and early Mohnian. These maps also indicate that the Cuyama basin filled from the southeast to the northwest, and they reflect the migration of maximum subsidence in that direction during the Miocene.

The relationship of general stratigraphy to structural features in the Cuyama basin shows that certain faults and anticlines were active during the deposition of the Monterey Formation. Specifically, the Cox fault zone and South Cuyama