was filled by peripheral fluvial sands which wedge out into marine silts and clays closer to the slough's ocean entrance. Sequential air photographs (1928 to present) reveal alluvial fans advancing into the slough from the adjacent Santa Ynez Mountains during the late stages of infilling. Living and relic foraminiferal faunas suggest that these fans reduced an open, well-flushed coastal lagoon to a system of narrow subtidal channels leading from a restricted ocean inlet, frequently closed by longshore sedimentation.

Five paleoenvironments associated with lagoon and salt-marsh settings were recognized in shallow cores collected from the slough: (1) subtidal ponds and channels, (2) intertidal flat, (3) intertidal salt marsh, (4) marsh creeks, and (5) alluvial fans. The subtidal lagoon sediments contain a diverse stenohaline (fossil) foraminiferal assemblage that has been replaced in the present slough interior by a single living euryhaline species (*Ammonia becarri*). Open coast foraminifera are presently found only near the slough's ocean entrance, where conditions approximate a lagoonal environment. The occurrence of marsh sediments in cores collected beyond the present slough boundary indicates a reduction in the extent of the fringing salt marsh. The present marsh vegetation lacks the zonation typical of areas subject to regular tidal flooding. These faunal and floral changes indicate that a steady decline in marine influence has accompanied infilling and closure of the Goleta Slough.

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Subsurface Interface Between Zeolitized and Overlying Less-Altered Rocks, Southern San Joaquin Valley, California—Configuration and Implications for Petroleum Entrapment

Diagenetic laumontite has been identified in samples of Cenozoic clastic rocks from 25 wells drilled in the southern end of the San Joaquin Valley. These occurrences, and data from 50 other wells that encountered no laumontite, define a sharp interface between zeolitized strata and overlying less altered beds. Contours on the interface have been mapped in the depth range between 2.1 and 6.1 km for an area of 2,300 sq km extending from the Bakersfield arch south to the San Emigdio Mountains. Companion maps depict generalized structure at the base of the Pliocene sedimentary section and at the basement floor.

Generalizations derived from data of other regions indicate that pore-filling laumontite crystallizes from interstitial water of mineralogically immature sandstone when (1) geothermal gradients equal or exceed the range set by 59°C at 1,100 m to 180°C at 4,150 m; (2) fluid pressure gradients are near 113 bar/km (0.5 psi per ft); and (3) the solutions have exceptionally low salinities and are depleted in dissolved carbonate species. Laumontite in the map area is mostly a product of conditions prevailing during Miocene to Pleistocene time, and is thus a relic.

Laumontite pore-filling in petroleum reservoir sandstones lowers porosity, drastically reduces permeability, and seriously limits the possibility of commercial production. Laumontite-bearing rocks are poor prospects for petroleum production unless there is evidence that mineralogically mature sandstone may be abundantly interbedded or that pore-fluid composition may be locally conducive to high carbonate activity.

The discordant diagenetic boundary in the map area is inferred to be the product of both lateral variation in geothermal gradients during crystallization and post-diagenetic faults and folds. Entrapment of petroleum may occur where a sloping diagenetic front steeply crosses gently plunging folds. Hydrocarbon traps that are in part diagenetic have been discovered mainly by accident. Other possible diagenetic entrapment geometries that are yet to be tested and are not associated with structural closures can be delineated from our maps.

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Twentieth-Century History of Gulf of Alaska Coastline, Cape Suckling to Cape Spencer

The 500 km of Gulf of Alaska coastline between Cape Suckling and Cape Spencer contains several segments that may be the most actively changing and dynamic on the earth's surface. Included in the changes during the twentieth century are the filling of two bays, the formation of a third bay, and the erosion and retreat of more than 250 km of coastline, some by more than 2 km.

Baseline information for this study consists of 1893-1920 maps prepared by the U.S.-Canadian Boundary Survey, pre-1920 U.S. Geological Survey investigations, later maps from many sources, and photographs made since 1895. Field observations to refine and confirm map interpretations were conducted between 1975 and 1979.

Tsivat and Kaliakh Bays, both mapped on 1913 USGS topographic maps, filled in with glacially derived sediment before 1940. Icy Bay, a 40-km-long fiord, has formed since 1906 following the retreat of Guyot glacier. The coastline east of Icy Bay has retreated 1.3 km since 1940 and probably twice that amount since 1906.

This stretch of coast also includes Lituya Bay, the site of at least two earthquake-generated giant waves in this century alone, and Malaspina glacier, where 66 sq km of new coastal land formed between 1895 and 1941. In the past four decades the new Malaspina coastline has undergone erosion and retreat.

Many other smaller changes have occurred, most of which can be well documented. Despite the remoteness of the study area, it may prove to be one of the best observation areas for studying the dynamics of actively changing coastlines.

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Quaternary Sedimentary Facies on Continental Shelf, Northeast Gulf of Alaska

The complex Quaternary history of the northeast Gulf of Alaska has resulted in a variety of sedimentary deposits ranging from glacially derived marine silt and clay to coarse glacial ice-contact moraines and tills. Four major sedimentary units crop out on the continen-