

STRUCTURES OF CONTINENTAL MARGINS
IN THE GULF OF ALASKA

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The tectonic framework of the continental margins along the eastern and western Gulf of Alaska is fundamentally different. The eastern margin is narrow, and the transition from continental to oceanic crust is abrupt. Mildly deformed unmetamorphosed pre-Pleistocene sedimentary rocks occur in a narrow band along the outer shelf. Near shore it is probably composed of the lithified rocks seen on land. The continental slope begins at a trend now covered by fans of presumed glacial debris. It is strongly influenced in the south by a longitudinal fault zone that gradually crosses the margin and joins with the Fairweather fault zone in the north.

Along the wide western margin the transition from oceanic to continental crust is gradual. A broad fault zone near shore separates the uplifted Kodiak insular block from a deep basin on the shelf. Seaward the basin is flanked by a structural arch at the shelf edge. Across the rugged slope is the Aleutian Trench containing sediments no older than about 0.6 million years, underlain by abyssal plain sediments.

The structure of these margins fits well with that expected from the generally accepted north Pacific plate tectonic model in which the plates converge along the western margin and have a transcurrent motion on the eastern margin. However, geologic evidence suggests slower rates of motion than those deduced from magnetic anomalies. The model is helpful in evaluating hydrocarbon resource potential by suggesting the direction of regional stress fields forming major structural traps, and in constraining the possible tectonic histories of each margin.