

## MESOZOIC GEOTECTONIC SETTING OF THE WESTERN CANADA SEDIMENTARY BASIN

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The Mesozoic record of subsidence, sedimentation and deformation in the western Canada sedimentary basin reflects the plate tectonic processes that were shaping the various margins of the North American continent. It comprises an initial passive margin stage, and a final foreland basin stage.

During Triassic and Early and Middle Jurassic time a northeasterly tapering wedge of mainly clastic sediment of North American cratonic provenance accumulated along the stable Cordilleran margin of the North American craton while rifting and lithospheric stretching were modifying the northern (Sverdrup Basin), southeastern (proto-Atlantic basin) and southern (Gulf of Mexico) margins. This 'passive margin' sequence overlapped the late Paleozoic continental terrace, and was prograded southwestward. Small Triassic-Jurassic granitic intrusions that were scarce but widespread in the continental terrace wedge may indicate that a Cordilleran magmatic arc was nearby to the west, and that the 'passive margin' sequence was prograded into an intervening marginal sea or back-arc basin.

The collapse of intervening oceanic (?) lithosphere led to a mid-Jurassic to Early Cretaceous collision with a composite mass of oceanic magmatic arc and ocean floor rocks. During the collision the outboard part of the continental terrace wedge was first overlapped by the accreted mass and then was compressed, thickened, and displaced toward the continent. Isostatic flexure of the lithosphere under the weight of the resulting tectonic welt produced a

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moat, the Cordilleran foreland basin, in which detrital outwash from the welt was trapped. There is a sensitive cause and effect relationship among tectonic convergence, crustal thickening, and isostatic subsidence. Thus, the foreland basin sequence preserves, in exquisite detail, the record of the collision and of the way it varied from place to place along the Cordillera. Another major collision occurred in Late Cretaceous and Paleocene time when a second composite mass of oceanic magmatic arc and ocean floor rocks was driven into the Cordilleran tectonic collage, further compressing the continental terrace wedge and displacing it over the margin of the craton. This produced another major episode of foreland basin subsidence, during which the basin axis migrated north-eastward in front of the thrusting and folding, and a flood of Cordilleran detrital outwash was prograded over much of the interior of the continent.