**Plate Tectonic History of the North Pacific Ocean**

Shows the plate tectonic evolution of the North Pacific Ocean, including the Cretaceous mid-ocean triple junction and showing how the Pacific plate drifted northwestward while growing on three edges by seafloor spreading. Finally, it shows how the parts of the Farallon plate were completely subducted, allowing the formation of the Pacific-North American plate boundary and the San Andreas fault.

The narrative below was written to accompany a thorough examination of the animation (each represents one play-through of the animation clip).

***Present Situation*** (last frame of movie). At present the Pacific Plate fills most of the north Pacific Ocean basin. The various shades of blue show the ages of the sea floor, as deduced from marine magnetic anomalies. The Pacific plate is moving northwest toward the subduction zones of the Aleutians and the western Pacific island arcs. Along the rim of North America, it has captured some slivers of the continental edge and is carrying them northwestward toward Alaska. Thus, the present Pacific-North America plate boundary lies within the continent, the San Andreas and Queen Charlotte fault systems. This was not always the case.....

***Late Cretaceous Situation, 80 million years ago*** (first frame of movie). In the late Cretaceous, 85 million years ago, there were several oceanic plates within the Pacific basin: the Pacific plate was a smallish southern plate with the Aluk, Farallon, and Kula plates spreading away from it.

***Oceanic Plate Evolution.*** Coming forward in time, the Pacific plate grew and grew and drifted north until it came to fill most of the north Pacific.

***East Pacific Rise Migration.*** Now watch the eastern edge of the Pacific plate. It moved steadily northeastward as new sea floor was accreted onto the edge by sea floor spreading between the Pacific and Farallon plates.

***Farallon Plate Disintegration.*** Now watch the demise of the mighty Farallon plate. It subducted beneath the Americas faster than it was being formed. As its surface area decreased, it broke into smaller plates then some of those subducted entirely, allowing a new boundary, the San Andreas, to form between the Pacific and North American plates.

***Pacific Plate Motion.*** This time watch the motion of the Pacific plate, itself. It drifted northward or northwestward the whole time, toward the subduction zones of Japan and the Aleutian Islands. When its edge came in contact with North America it broke off continental slivers and carried them away to the northwest.

***Massive Subduction.*** This time watch and be impressed by the subduction; an astonishingly huge area of oceanic plate was subducted beneath North America. The Mesozoic and Cenozoic rocks of western North America are primarily a record of plate convergence in all its forms. The San Andreas fault is a very late complication superimposed on this rich history of subduction.

Drawn using Photoshop and animated using Morph and Final Cut by Tanya Atwater. Thanks to Steve Cande and the POMP project for the original images and reconstructions. The work was partially supportedby grants from the U.C.S.B. Office of Instructional Development.

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