

Application of Plate Tectonic and Strain Class Models to the Tectonic Evolution of Alaska

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ABSTRACT

Plate convergence rates, absolute plate motion, intermediate slab dip and age of the subducted slab control the stress imparted to the overriding plate along subduction zones. Using Present day subduction zones parameters, Jarrard (1986) was able to quantify strain resulting from the stress in the overriding plate into seven strain classes ranging from 1, backarc spreading to 7, very strongly compressional. In this study, Jarrard's strain classification is integrated with the plate motion models from Engebretson et al. (1986) to construct a 200 Ma to Present empirical strain class model for mainland Alaska. The Alaska strain class model is compared to the tectonostratigraphic models for Alaska from Plafker and Berg (1994) for validation. This comparison shows:

1. The Jurassic to Early Cretaceous was dominated by tensional deformation.
2. A compressional setting existed across Alaska in the late Early Cretaceous through Eocene.
3. A tensional strain regime existed through the Oligocene and Miocene.
4. The present strain regime is slightly compressional.

The tectonostratigraphic terrane models provide insight into the pre-Jurassic tectonic evolution of Alaska. Based on these insights, the Alaska strain class model is expanded to include the latest Proterozoic to Jurassic. The expanded Alaska strain class model suggests that the Proterozoic to Early Cretaceous deformation was primarily tensional with short pulses of compressional deformation.