

Miocene Uplift and Unconformities at Wheeler Ridge, Kern County, CA

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A stratigraphic and structural study from the late Miocene to the present at Wheeler Ridge oil field, Kern County, CA gives new insight into the formation of the Wheeler Ridge anticline and refines previous interpretations. Well log correlations of the lower Fruitvale, upper Fruitvale, and Santa Margarita formations show evidence of at least two late Miocene compressional events. Both of these late Miocene events are associated with unconformities and folding within the lower and upper Fruitvale and suggest southwest to northeast shortening. The lower Santa Margarita sands terminate near the edge of the late Miocene Wheeler Ridge anticline. The upper Santa Margarita sands and Etchegoin, San Joaquin, Tulare (undifferentiated) sands overtop the late Miocene Wheeler Ridge anticline and are continuous throughout the study area, thus suggesting no uplift during the Pliocene.

Quaternary uplift resulted in the currently observed Wheeler Ridge thrust fault and Wheeler Ridge anticline. The Wheeler Ridge thrust fault accommodates north to south shortening, strikes roughly east to west, dips to the south at approximately 30 degrees, is approximately 30,000 feet in length, and has a maximum of 1,300 feet of throw.

A model of the late Miocene to recent uplift, deposition, and erosion is put forward to explain stratigraphic thickness variation observed in the lower Fruitvale, upper Fruitvale, and Santa Margarita formations. The model explains the erosion patterns observed in the lower Fruitvale and upper Fruitvale formations. The model also explains why the lower Santa Margarita sands are not continuous throughout the area, due to the late Miocene Wheeler Ridge anticline. This new model does not require a wedge thrust or back thrust solution, used in previous interpretations, to explain the faulting and folding in the Wheeler Ridge area.