

15-6 - EPISODIC LATE EOCENE TO RECENT EXTENSION IN THE VICINITY OF THE RUBY MOUNTAINS AND EAST HUMBOLDT RANGE, ELKO COUNTY, NEVADA

Abstract

The Ruby Mountains, East Humboldt Range and Wood Hills (REHW) of Elko County Nevada, one of the classic metamorphic core complexes of the Cordillera, preserves a protracted and episodic record of both ancient and modern crustal extension that has only recently been unraveled based on its thermochronometrically constrained cooling history. Extension began during the Late Eocene synchronously with a major pulse of intermediate to felsic magmatism preserved locally by plutonic rocks intruded into the REHW and regionally by widespread Late Eocene to early Oligocene volcanism (“the ignimbrite flare-up”). The Eocene-Oligocene event accommodated at least 15 km of extension concentrated in the northern half of the complex and associated with deposition in the Elko Basin to the west, a relatively thin (~1 km), broad sequence of Late Eocene lacustrine and related strata that contrasts with the younger sedimentation patterns represented by the narrower, thicker (up to 4+km), coarse clastics of the Miocene Humboldt Basin. Though locally significant, the Eocene-Oligocene extensional phase appears not to have been associated with broadly distributed regional extension, again contrasting with Miocene and younger events. The initial phase of extension slowed or halted by the mid-Oligocene, after which extension re-accelerated in the latest Oligocene to early Miocene (~25 – 21 Ma), correlative with deposition of a coarse clastic and lacustrine sequence known as the Clover Formation. This extensional phase propagated farther south than the earlier phase along the full length of the REHW. Extension likely slowed again between ~21 Ma and ~17.5 Ma, after which it abruptly re-accelerated through the Middle Miocene to ~10 Ma, synchronous with deposition of the thick, coarse clastics of the Humboldt Formation. Middle Miocene extension likely initiated with crustal-scale heating marking the impingement of the Yellowstone hot spot in NW Nevada. Sometime after 10 Ma, the interior of the core complex was transected by east-dipping normal faults that today define the steep eastern face of the Ruby Mountains and East Humboldt Range; these face west-dipping normal faults along the west flank of the Pequop Mountains and Spruce Mountains. Extension continues today at a rate of ~1 mm/yr as represented by the 2008 M_w 6.0 Wells Earthquake.

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