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NEW INSIGHTS INTO THE TIME-TRANSGRESSIVE EXTENSIONAL EXHUMATION HISTORY OF THE RUBY MOUNTAINS-EAST HUMBOLDT RANGE METAMORPHIC CORE COMPLEX, NEVADA

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Despite decades of study, the onset and early evolution of extension in the Ruby Mountains and East Humboldt Range metamorphic core complex in northeastern Nevada continues to be controversial. Integration of new $^{40}Ar/^{39}Ar$ and U-Th/He thermochronometry with previously published results yields new insights that partially resolve this problem while also posing new questions. A variety of thermochronometers ($^{40}Ar/^{39}Ar$ mica and K-feldpar, and U-Th/He zircon) record Late Eocene cooling and partial exhumation of the highest structural levels in the footwall of the detachment fault (i.e., the southern East Humboldt Range and Wood Hills). This early extensional episode, here termed the “Wood Hills phase," appears to have stalled by ~35 Ma, and extension did not resume until after ~26 Ma. In the meantime, new K-feldspar multi-diffusion domain results strongly suggest that a heating event with an amplitude up to 100^{o}C affected deeper structural levels beginning at ~29 Ma and continuing until rejuvenated extension triggered time-transgressive cooling after ~26 Ma. Extension and cooling associated with this younger extensional phase propagated WNW-ward until the structurally deepest levels on the western fringe of the range cooled through U-Th/He apatite closure at ~12 Ma -- in excellent agreement with fault gouge dates from Secret Creek Gorge (Haines and van der Pluijm, 2010).
Meanwhile, new $^{40}Ar/^{39}Ar$ K-feldspar and U-Th/He zircon and titanite results from the Harrison Pass area in the southern Ruby Mountains confirm previous interpretations of little to no Late Eocene extension (Colgan et al., 2010). Thus, the older Wood Hills extensional phase was restricted to the northern half of the core complex, helping to explain its deeper structural exhumation. Not until the late Oligocene did southward propagation of the younger, Ruby-East Humboldt extensional system unite the Harrison Pass domain with the more deeply exhumed footwall farther north. However, these same data also record a significantly earlier onset to extension than favored by some workers – significantly predating the 17-Ma arrival of the Yellowstone hotspot. Thus, the hot spot could not have been the trigger. Could the late Oligocene heating event, or alternatively the birth and propagation of the San Andreas transform have played a role?
Session No. 2

T1. Cordilleran Tectonics from the Basin and Range to Alaska and the Arctic I: A Celebration of Elizabeth Miller’s Career (2018 GSA Structure and Tectonics Division Career Contribution Award)
Wednesday, 15 May 2019: 8:00 AM-12:00 PM
Room B117-119 (Oregon Convention Center)
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