The Timing of Neogene Extension in the Southern Rio Grande Rift and Southeastern Basin and Range Province Using Apatite (U/Th)-He Thermochronometry

Michelle M. Gavel¹, Jeffrey M. Amato¹ and Jason W. Ricketts²

¹Dept. Geological Sciences, New Mexico State University, gavel@nmsu.edu
²Dept. of Geological Sciences, University of Texas at El Paso

The Rio Grande Rift and Basin and Range are two of the most widely studied extensional provinces in the world, yet thermochronologic data allowing for the temporal constraint of their evolution remains sparse in southern New Mexico where the two provinces physiographically blend. Apatite (U-Th)/He thermochronologic (AHe) methods were applied to 24 apatite grains from six samples from footwalls of fault-block uplifts across southern New Mexico (the Burro Mountains, Cookes Range, Caballo Mountains, and the San Andres Mountains) in order to investigate possible differences in timing of extension between the Basin and Range and Rio Grande Rift. AHe ages range from 6.2 ± 0.4 Ma to 31.8 ± 1.1 Ma across all sample locations. Five out of six samples have standard deviation of <20% for all crystals from each sample. Effective uranium concentration (eU)-age correlations are observed in samples from the San Andres and Burro Mountains but are not detected in Cookes or Caballo samples. Thermal history models were generated for each sample in the program HeFTy that combine existing apatite fission-track and U-Pb ages where possible, as well as new AHe ages. This will allow for the evaluation of cooling trends and timing of active faulting across the southern Rift and easternmost Basin and Range. Future work will include generating additional AHe data and zircon (U-Th/He) data to better refine time-temperature models for additional locations across southern New Mexico.

Keywords:
apatite, low temperature thermochronometry, Rio Grande Rift, HeFTy modelling


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