

Joint 120th Annual Cordilleran/74th Annual Rocky Mountain Section Meeting - 2024

Paper No. 11-15

Presentation Time: 9:00 AM-5:30 PM

CENOZOIC COOLING AND EXHUMATION OF THE EASTERN ESCARPMENT OF THE SOUTHERN SIERRA NEVADA, CA, FROM APATITE FISSION TRACK ANALYSES

BLYTHE, Ann, Dept. of Geology, Occidental College, Los Angeles, WA 90041, **LEE, Jeffrey**, Colorado School of MinesGeophysics. Green Center Rm 283, 924 16th St, Golden, CO 80401-1868 and **STOCKLI, Daniel F.**, Jackson School of Geosciences, The University of Texas at Austin, 2305 Speedway Stop C1160, Austin, TX 78712

New apatite fission track (FT) analyses have been completed from three vertical transects in the footwall of the Sierra Nevada normal fault (SNFF) on the eastern flank of the Southern Sierra Nevada Mountains, California. Lee et al. (2023) published apatite (U-Th)/He analyses from these three vertical transects (from north to south, at Round Valley, Mt. Williamson, and Muah Mountain, RV, MW, and MU, respect.) and interpreted them to indicate the initiation of normal faulting on the SNFF at ca. 28-27 Ma, followed by a second phase of normal faulting at ca. 17- 13 Ma; the SNFF is still active today (Lee et al., 2007). The addition of FT analyses to the He analyses from these three transects allows for a more complete understanding of the cooling and exhumation history of the SN batholith prior to formation of the SNFF. Apatite FT analyses were completed on 26 samples: 8 from RV, which spanned 620 m of elevation, 10 samples from MW, spanning >1000 m of elevation, and 8 samples from the MU transect, spanning >900 m of elevation. FT ages from RV ranged from 64 to 42 Ma, with younger ages generally at lower elevations, but with some scatter of ages in the middle of the transect (a similar pattern was seen in the much younger He ages). FT ages from MW decreased with decreasing elevation from 81 to 42 Ma. The MU transect yielded a significantly different pattern, with the 7 samples from the lower 800 m of the transect producing the same age (51 Ma) within error, and the highest elevation sample (at 2200 m) yielding a significantly older age of 71 Ma. The MU data can be interpreted to indicate a relatively rapid phase of cooling and exhumation at ca. 51 Ma, the same age as rapid cooling and exhumation record by He ages across the Inyo Mountains (Lee et al., 2009). In general, these new FT data are consistent with previously obtained apatite fission track analyses from other locations further to the north in the Sierra Nevada and east in the Inyo Mountains. Thermal modelling is underway to better constrain the cooling and exhumation history of these data from the southern Sierra Nevada.

Session No. 11--Booth# 49

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