NEW DATA FROM THE NORTHERN RANGE, TRINIDAD BEARING ON RECENT MOTIONS ALONG ITS SOUTHERN BOUNDARY

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ABSTRACT

We have studied structures along the southern foot of the Northern Range (NR) that are related directly to recent motions and deformation along its southern boundary. The boundary is not a right-lateral, strike-slip, El Pilar-type fault or fault zone. Rather, the young range front structures are through-going, E-W striking, subvertical, dip-slip faults and shear bands. Such faults occur in complex zones, with observed thickness of up to 0.5 km, in which pervasive shearing and cataclasis of NR schist has produced large volumes of fault rock (cataclasite and protocataclasite). The dominant metamorphic foliation (S_1), so typical in the well-foliated NR schists, is often completely destroyed and replaced with younger cataclastic fabrics. We have studied the young, brittle structures and cataclastic fabrics in such fault zones along the range front at Champs Fleurs, St. Joseph, and Lopinot Canyon, along an E-W strike distance of ~12 km. It is likely that these limited exposures represent part of a larger, range-front, fault system, now mostly buried by Quaternary sediments of the Caroni plain.

Around Port of Spain, steeply south-dipping, brittle-ductile shear bands are the dominant young range front structures. These consistently have normal, down-to-the south (hanging walls displaced downward) offsets. As such, they are kinematically identical to the subvertical faults that we have studied in detail at Champs Fleurs. These faults also consistently have normal senses of motion according to outcrop relations between the orientations of fault planes, fault striae, and secondary shears (P, R, R^1) and fractures (T) in immediate fault footwalls and hanging walls.

Both shear bands and faults increase in frequency toward the southern foot of the range, indicating a footwall strain gradient increasing toward a buried, boundary fault zone. Shear bands become more dominant than faults from east to west in the area that we studied, reflecting the progressive exhumation of rocks that were deformed under more ductile conditions, from lower in the boundary footwall. The distribution of zircon fission track (ft) ages in the NR also supports such an interpretation. Throughout the western NR, zircon ft ages are cooling ages, reset as these schists passed upward through the 235^0 C isotherm (at - 12 Ma). Detrital zircon ft ages are characteristic for rocks in the eastern NR and indicate that, for the most part, these rocks were never heated to $>235^0$ C. This suggests that the magnitude of cumulative slip (and footwall rebound) along the boundary faults increases towards the west.