STRUCTURAL HISTORY OF THE BUFFALO FORK FAULT AND THE ANCESTRAL WASHAKIE RANGE, WYOMING

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Objectives

The Buffalo Fork fault is an east-dipping, north-trending reverse\thrust fault which lies along the west side of the Washakie Range in northwestern Wyoming (Love, 1975). This fault was active during the Laramide Orogeny (60-55 million years ago), during which time it uplifted the Ancestral Washakie Range. The purpose of this on-going research project is to determine the displacement vector of the Buffalo Fork fault and to relate this to the regional kinematic pattern of Laramide deformation in northwestern Wyoming.

Previous field work by the author (Lageson, 1987) has shown that other Laramide faults in northwestern Wyoming experienced significant components of oblique-slip, depending on their orientation. If a regional pattern of displacement can be determined from several faults, then it may be possible to reconstruct the crustal stress field during the Laramide Orogeny. This study of the Buffalo Fork fault is one step toward this greater goal.

Results

The angle of dip and slip on the Buffalo Fork thrust was investigated at its south end along the Buffalo Fork River, south of Terrace Mountain. Here, the fault strikes almost due north-south and dips steeply to the east. The Buffalo Fork River has dissected a deep canyon through Paleozoic sedimentary strata and Precambrian basement rocks in the hanging wall, the former of which dip steeply west. The Precambrian basement rocks in proximity to the fault are composed of well-foliated and lineated hornblende-biotite-phlogopite gneiss, schist, and concordant white aplitic (?) sills up to 1 m in thickness. In general, the foliation strikes N 70 E and dips 55 SE.

The angle of dip of the Buffalo Fork thrust was determined by the 3-point method where the fault trace crosses drainages. Although the fault may be non-planar at depth, near surface estimates of dip range from 25 degrees east to 50 degrees east. Widely scattered slickenside lineations suggest predominantly dip-slip displacement.

In addition, the displacement along the Buffalo Fork thrust becomes

clear when considered in a regional context. The Washakie Range lies at the west end of the Owl Creek Uplift, which trends approximately east-west along the northern margin of the Wind River Basin. The Owl Creek Uplift is composed of several en echelon, northwest-trending basement uplifts and intervening synclines. This structural pattern suggests that the Owl Creek Uplift formed by left-lateral, oblique-slip to form a series of basement "pop-ups," similar to wrench fault uplifts in California (Sylvester, 1988). If this interpretation is correct, then the north-trending Washakie Range was the dip-slip termination of the Owl Creek wrench zone.

Conclusions

Preliminary field work, to determine the actual displacement vector of the Buffalo Fork thrust fault bordering the west end of the Washakie Range, reveals that dip-slip predominates. This supports a regional theory that the Washakie Range formed the dip-slip termination of the Owl Creek zone of left-lateral, oblique-slip displacement.

More field work needs to be conducted along the trace of the Buffalo Fork thrust fault. The summer of 1988 was unsuccessful in this regard due to the enormous wildfires in the field area. This work will be continued over the next 2 years to gather more data and formulate a better idea of displacement vectors and, ultimately, the azimuth of Laramide compression.

Literature Cited

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