Board 0249: Paleorelief and footwall rotation adjacent to the Wasatch Fault Zone recorded by the Eocene–Oligocene paleosurfaces, Snyderville Basin, Utah, U.S.A.

Wednesday, 14 December 2022

08:00 - 11:30

Poster Hall, Hall A (South, Level 3, McCormick Place)

Abstract

The Wasatch Fault Zone (WFZ) is a north–south striking, west-dipping extensional fault system that bounds the eastern margin of the Basin and Range Province. Fluid inclusion thermobarometry and paleosalinity horizons require 11 km of vertical offset across the WFZ and suggest 15–20º of eastward rotation of the WFZ footwall. A series of Eocene–Oligocene intrusive and volcanic rocks, the Wasatch Intrusive Belt (WIB), crop out in the Wasatch Mountains and Snyderville Basin in a now oblique upper-crustal section where the deepest rocks are adjacent to the WFZ and the Eocene paleosurfaces are located ~35 km east of the WFZ. Paleosurfaces include Keetley and Norwood volcanic deposits (part of the WIB) and Wasatch Fm. conglomerates sitting unconformably on Mesozoic and older rocks. It was unclear how the overall eastward rotation was recorded by the paleosurfaces, both locally and regionally, and how much paleorelief existed during the Eocene–Oligocene. These basal surfaces were digitized and analyzed in ArcGIS and Matlab to determine the magnitude and pattern of rotation recorded by the paleosurfaces and to create and refine a 3D model of exhumation within the Wasatch Mountains. The maximum rotation of an individual surface is 8º, and planar best fit of all surfaces is 2º. This mismatch between the fluid inclusion and

geologic data suggests that distributed deformation, yet-to-be-identified structures, and/or paleorelief likely complicated the geologic record of footwall rotation. A three-dimensional pattern of exhumation suggests north–south variation in the magnitude of exhumation which decreases away from the latitude of the WIB. East–west variation in the rotation magnitude of the paleosurfaces could possibly owe to thermal buoyancy of the exhumed rocks near the WFZ. The pattern of exhumation, surface trace of the WFZ, pattern of modern relief, and emplacement history of the WIB are consistent with increased buoyancy in the central Wasatch Mountains and proximal to the WFZ due to the prolonged elevated geothermal gradient in the vicinity of the WIB. The WIB crops out in a high relief, topographically complex area, which combined with the footwall rotation, makes an exhumation map an invaluable tool for interpreting the thermal history of the magmatic rocks and contextualizing petrochronology data from the WIB.

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