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THE LOW-ANGLE BREAKAWAY SYSTEM FOR THE NORTHERN SNAKE RANGE DÉCOLLEMENT IN THE SCHELL CREEK AND DUCK CREEK RANGES, EASTERN NEVADA, USA: IMPLICATIONS FOR THE STRUCTURAL EVOLUTION OF THE SNAKE RANGE CORE COMPLEX

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Documenting the geometry and kinematics of detachment faults can provide important insights into how the lithosphere evolves during high-magnitude extension. Although it has been investigated for 70 years, the magnitude of top-down-to-ESE displacement on the Northern Snake Range décollement (NSRD) in eastern Nevada remains vigorously debated, with published estimates ranging between <10 and 60 km. To constrain displacement on the NSRD, we present retro-deformed cross-sections across the west-adjacent Schell Creek and Duck Creek Ranges, which expose a system of low-angle faults that have previously been mapped as thrust faults. We re-interpret this fault system as the extensional Schell Creek Range detachment system (SCRDS), which is a stacked series of top-down-to-ESE brittle normal faults with 5-10° stratigraphic cutoff-angles that carry 0.1-0.5 km thick sheets that are up to 8-13 km long. The western portion of the SCRDS accomplished ~5 km of structural attenuation and is folded across an antiformal culmination that progressively grew during extension. Restoration using an Eocene unconformity as a paleo-horizontal marker indicates that SCRDS faults were active at ~5-10°E dips. The SCRDS accommodated 36 km of displacement via repeated excision, which is bracketed between ~36.5-26.1 Ma by published geochronology. Based on their spatial proximity, compatible displacement sense, overlapping deformation timing, and the similar stratigraphic levels that they root to, we propose that the SCRDS represents the western breakaway system for the NSRD. Debates over the pre-extensional geometry of the NSRD hinder an accurate cumulative extension estimate, but our reconstruction shows that the SRCDS fed at least 36 km of displacement eastward into the NSRD. The linked SCRDS-NSRD system was the dominant fault system within a domain of high-magnitude Paleogene extension in eastern Nevada. Extension along low-angle detachment systems was the dominant style further to the south in this domain, but to the north the style transitioned to high-angle, domino-style normal faults. Our study supports the existence of extensive (>50 km map length), low dip angle (~10°), shallow-crustal (1-7 km depths), brittle detachment faults, and that portions of their hanging wall can remain structurally intact during displacement.

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T39. New Insights into the Evolution and Geodynamics of Metamorphic Core Complexes in North America and Around the World
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Back to: T39. New Insights into the Evolution and Geodynamics of Metamorphic Core Complexes in North America and Around the World

<< Previous Abstract | Next Abstract >>