Controls on fracture distribution and development with relation to detachment folds within the Lisburne Group, northeastern Brooks Range, AK

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The Lisburne Group carbonates of the northeastern Brooks Range fold-and-thrust belt have been deformed by detachment folding throughout Cenozoic time. Several stages of deformation have been recorded by fractures within the carbonates, before, during, and after detachment fold development. The distribution of fractures and other mesoscopic structures suggests that folding occurred by flexural slip, flexural flow, and homogenous flattening, but the relative timing of these mechanisms is poorly constrained. This study will focus on fracture development with relation to structural position within two individual detachment folds in the northeastern Brooks Range. Mechanical stratigraphy plays a significant role in detachment fold development. Mechanical boundaries within the folds were chosen based on slip horizon location and differences in bed thickness. Thin section analysis of lithology, porosity, microscopic structure, and strain indicators within each layer, and layer thickness will define the mechanical stratigraphy of these individual folds. After identifying the total fracture pattern on these two representative folds, it will be possible to interpret the partial patterns on similar lesser-exposed structures and also those at depth. This information will contribute to (1) improving our understanding of detachment folds kinematics, and (2) determining the structural position, orientation, and character of the fracture set(s) controlling reservoir permeability in the detachment folded Lisburne Group of the northeastern Brooks Range.

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