

Superimposed Folding, Mackenzie Mountains, Northwest Canada

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Abstract

Superimposed folding is exposed in Paleozoic sedimentary strata in the Mackenzie Mountains, Northwest and Yukon Territories, Canada. Three types of interference structures may form depending on the geometry of first generation folds, F1, and the convergent angle of later F2 folds as they cross F1 fold axes.

F1 are broad open folds that allow interference patterns to form when the planar F1 fold limbs are cut at 75-90 degrees by later, low amplitude, closely spaced F2 folds. When F2 axes intersect earlier F1 axes at an oblique angle, less than 60 degrees, the resulting fold interference gives rise to hinge migration accompanied by movement along tear faults. When F2 and F1 are coaxial, only a single fold axis direction is observed in outcrop, F1 folds may become F2 folds by hinge migration. Where the two fold axes cross at an oblique angle or are parallel, structural relicts of F1 folds or F1 fold segments may be preserved.

An interpretation, using the concepts of superimposed folding, may identify structures that are F1 folds or are F2 successors to F1 folds which may have been available to trap and hold hydrocarbons generated from Mississippian - Devonian shale source rocks which expelled hydrocarbons during Permian to Jurassic time. F2 folds that postdate Mississippian - Devonian sourced, hydrocarbon migration and do not involve refolds of preexisting F1 folds may have formed too late and in the wrong positions to trap hydrocarbons.