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**MIDDLE DEVONIAN TO LOWER MISSISSIPPIAN  
CLASTIC DEPOSITIONAL CYCLES, UPPER KONGAKUT RIVER,  
NORTHEASTERN BROOKS RANGE, ALASKA**

**PRELIMINARY RESULTS**

by

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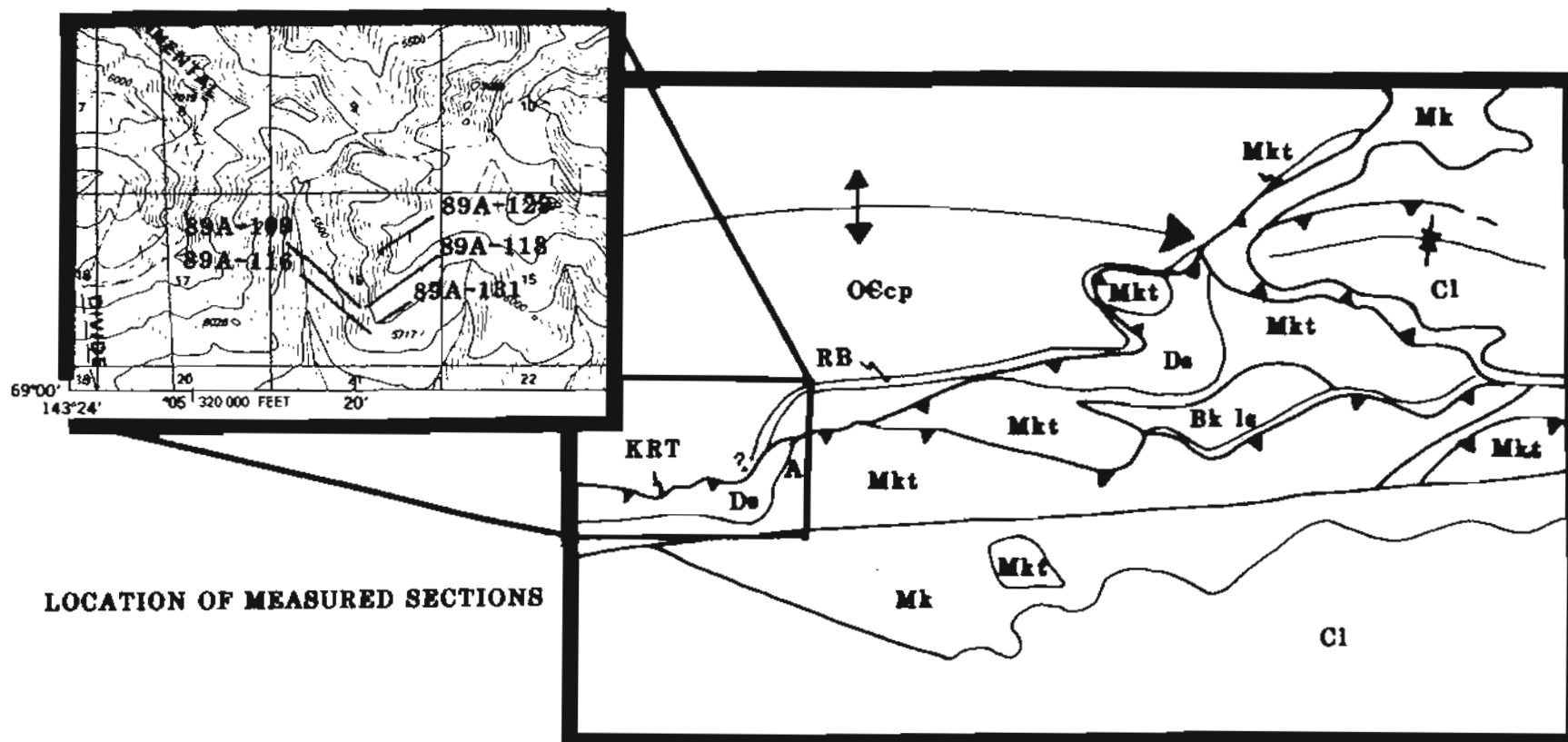
## INTRODUCTION

Two distinct stratigraphic sequences are separated by the Kongakut River thrust, a major fault southwest of Bathtub Ridge in the eastern Brooks Range (Wallace et al. 1988) (figure 1). To the north, the footwall consists of a Cambrian-Ordovician chert and phyllite unit that shows a complex history of multiple deformations prior to truncation beneath a pre-Mississippian unconformity (sheet 1). The unconformity is overlain by the Kékiktuk Conglomerate, a basal chert breccia and conglomerate that fines upward to siltstone that contains abundant plant fossils that are tentatively identified as Early Mississippian (Anderson, 1989). The breccia contains distinctive lavender colored chert clasts and is informally referred to as the raspberry breccia. To the south, the hangingwall of the thrust contains two major clastic depositional cycles which consist of an unnamed Middle Devonian (and younger?) unit and an unconformably overlying unit of Early Mississippian (and older?) terrigenous clastic rocks. Structural imbrication of the Middle Devonian and Early Mississippian clastic rocks in the hangingwall complicates recognition of the stratigraphic sequence with its vertical and lateral variations. Although the Devonian and Mississippian units are separated by an angular unconformity they display a common deformational history that does not include the multiple deformations recorded by the Cambrian-Ordovician cherts in the footwall of the Kongakut River thrust.

## DEPOSITIONAL SEQUENCES

The angular unconformity separating the unnamed Devonian clastic unit from the overlying Lower Mississippian clastic unit in the hangingwall of the thrust is exposed on a steep west-facing canyon wall at location A (figure 1). This location is directly east of fossil location 16 of Reiser et al. (1980). A series of stratigraphic sections were measured along this slope in order to characterize changes across the Devonian-Mississippian unconformity (sheet 2). The unnamed Devonian clastic rocks comprise an upward-coarsening marine to nonmarine sequence of shale, sandstone, and conglomerate (Anderson, 1989). Marine fossils date the lower part of the section as Middle Devonian (Reiser et al., 1980; R.B. Blodgett, personal communication, 1988); the upper part of the section is undated. The abundant marine fossils indicate a shallow-marine to intertidal environment of deposition. Where preserved, the upper part of the unit consists of a series of fining-upward cycles in an overall coarsening-upward sequence. In each cycle, the chert-quartz pebble conglomerate to litharenite fines upward to a red or green-gray mottled siltstone. The coarse grained clastic beds have erosional bases and thin laterally. Plant fossils and mudcracks are associated with the fine-grained deposits. The depositional base of the Devonian unit is not seen because its lower contact is the Kongakut River thrust. The erosional nature of the top of the Devonian section is shown by the absence of the nonmarine rocks at location B and the northern most exposure at A and by abrupt changes in thickness throughout the field area.

# GENERALIZED GEOLOGIC MAP SOUTHWEST OF BATHTUB SYNCLINE



LOCATION OF MEASURED SECTIONS

## KEY

- Thrust Fault
- Contact
- Fault
- Anticlinorium
- Syncline
- Location referenced in text

89A-118 Location of measured sections

- Cl Lisburne Group, Carboniferous
- Mk Kayak Shale, Early Mississippian
- Mkt Kekiktuk Conglomerate, Early Mississippian  
(includes RB, Raspberry Breccia)
- Ds Unnamed clastic unit, Middle Devonian & younger(?)
- OGcp Unnamed chert & phyllite, Ordovician - Cambrian
- Bk ls Black limestone

KRT Kongkut River Thrust

Figure 1

The basal coarse-grained clastic tongue of the overlying Kekiktuk Conglomerate depositional cycle was deposited on the erosional topography of the Devonian unit. The amount of time represented by this unconformity is unknown because there is no age control on the upper part of the Devonian unit and the lower part of the Kekiktuk Conglomerate in this area. At location A, a 40 meter thick interval of fining-upward cycles in an overall fining-upward sequence overlies the unconformity. The interval abruptly fines upward from massive conglomerate to interbedded medium-grained quartzite and shale. The quartz and chert conglomerate includes white, gray, lavender and less common black chert pebbles and cobbles up to 17 cm in size. The matrix is light gray to lavender-gray, becoming light gray to white quartzite near the top of the interval. The sharp upper surface of this clastic interval, marked by abundant plant fossils and bed-parallel worm burrows, is overlain by a thick interval of black silty shale. Based upon lithologic similarity, the clastic interval with the distinctive lavender-colored chert clasts is correlated with the "raspberry breccia" in the footwall of the Kongakut River thrust.

### SUMMARY

Detailed mapping and measurement of stratigraphic sections suggests the following preliminary conclusions:

1. Based on lithologic similarity, the Lower Mississippian(?) clastic interval in the hangingwall, with its distinctive raspberry colored pebbles, is correlated with the raspberry breccia in the footwall

2. Lithologic similarity and stratigraphic position below the Kayak Shale suggest correlation of the hangingwall Lower Mississippian clastic interval and the footwall raspberry breccia with the Kekiktuk Conglomerate to the north.
3. The multiple generations of complex structures in the Cambrian-Ordovician chert and phyllite unit are absent in the Middle Devonian and younger strata indicating that major Paleozoic deformation was pre-Middle Devonian.

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## KEY TO LITHOLOGIC SYMBOLS



**Limestone**



**Siltstone**



**Conglomerate**



**Shale**



**Breccia**



**Covered**



**Sandstone**



**Chert**

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