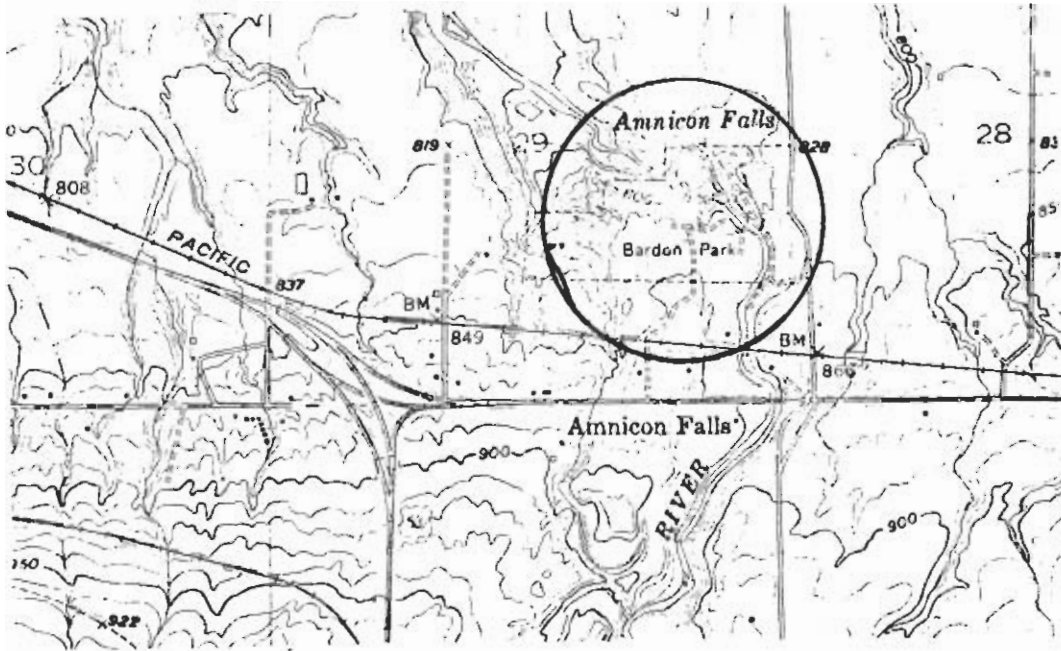


Title: Douglas Fault, Keweenawan Basalts, Bayfield Sandstone

Location: Amnicon Falls State Park, NE $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 29, T.48N., R.12W.
(South Range 7 $\frac{1}{2}$ Minute Quadrangle)



Author: Gene L. LaBerge

Description: Amnicon Falls is formed by the Amnicon River flowing off the south-dipping, resistant Keweenawan basalts onto the soft, flat-lying Bayfield Sandstones. The contact between the basalts and the sandstone is the Douglas Fault, readily visible on the east side of the river, immediately below the Falls. Fault breccia and gouge are present along the south-dipping Douglas thrust fault.

The Keweenawan basalts were erupted from about 1200-1000 million years ago, and intruded by gabbros (visible here in the river valley south of the railroad bridge at the south edge of the park (Mengel, 1970)). The age of the Bayfield Sandstone is uncertain; some workers believe they were deposited in Keweenawan time, 800-1000 million years ago, while others believe they may be lower and/or Middle Cambrian in age (about 500 million years old).

The Douglas Fault is a major thrust fault along which the basalts have been thrust northward over the Bayfield Sandstones, with vertical movement in the neighborhood of 10,000 feet (Craddock, 1972). It has been traced for nearly 100 miles across Wisconsin and Minnesota. The age of the fault is not precisely known. It is clearly post-Bayfield Sandstone in age, but since we don't know the age of the Bayfield, the age of the faulting is unknown.

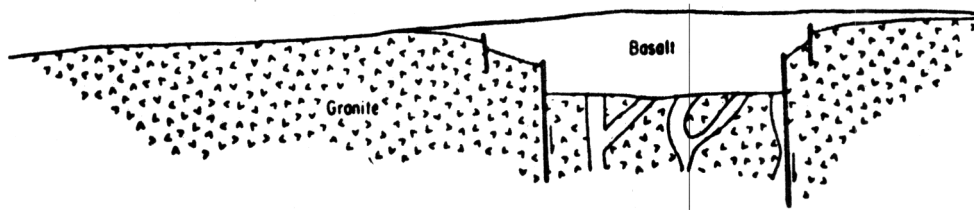
Significance: The major structural feature in the Lake Superior Region is the Lake Superior Syncline, with Keweenaw basalts overlain by sandstones. In the central part of the syncline a large block of volcanics has been uplifted. This block is bounded on the north by the Douglas Fault and on the south by the Lake Owens and Keweenaw Faults, and is referred to as the "central horst." The boundary faults are thrust faults, the Douglas Fault dipping southward and the Lake Owens and Keweenaw Faults dipping northward, indicating compressional movements.

Faulting occurred after deposition of the Bayfield Sandstones, but movements after late Cambrian seas covered the area are negligible. The Minnesota Geological Survey (Morey, 1972, and Craddock, 1972) believes that the major faults are part of the general Keweenaw structure, and therefore of Precambrian age. Thus, if the Douglas Fault is Keweenaw in age, the Bayfield Sandstone must also be Precambrian. On the other hand, if the Bayfield Sandstone is Lower or Middle Cambrian, the Douglas Fault must also be Cambrian in age.

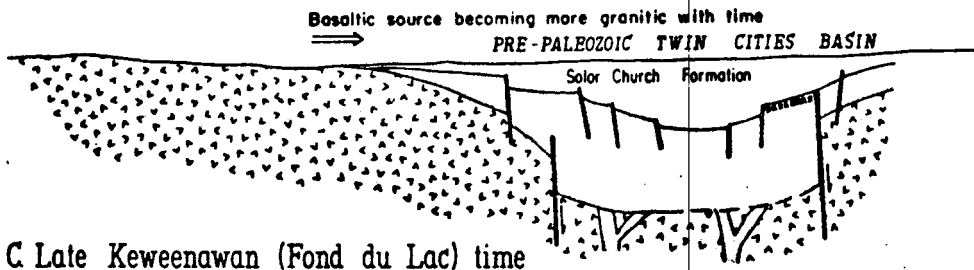
References:

- Craddock, C., 1972, Late Precambrian: Regional Geologic Setting: in Geology of Minnesota: A Centennial Volume edited by Sims and Morey, Minn. Geol. Survey, pp. 281-291.
- Mengel, J. T. Jr., 1970, Geology of the Western Lake Superior Region; Geology Dept., UW-Superior.
- Morey, G. B., 1972, Petrology of Keweenaw Sandstones in the subsurface of Southeastern Minnesota: in Geology of Minnesota: A Centennial Volume edited by Sims and Morey, Minn. Geol. Survey, pp. 436-449.

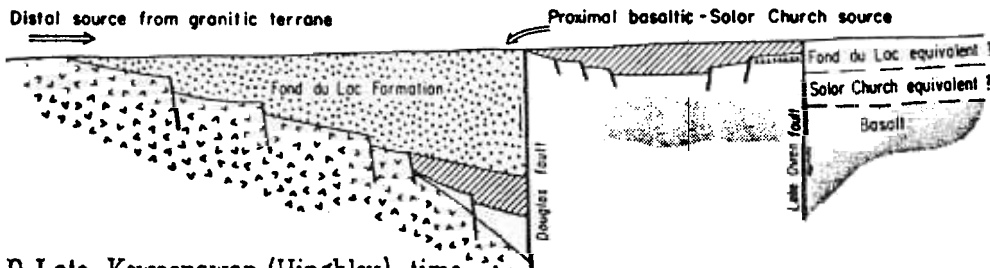
A. Middle Keweenaw time



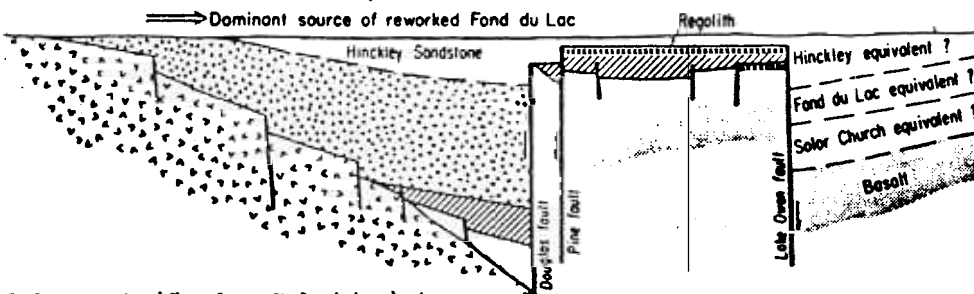
B. Late Keweenaw (Solor Church) time



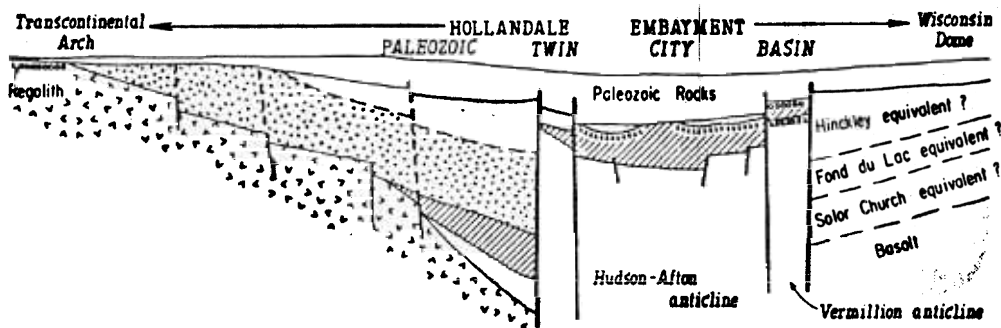
C. Late Keweenaw (Fond du Lac) time



D. Late Keweenaw (Hinckley) time



E. Paleozoic (Cambro-Ordovician) time



Schematic east-west cross-sections showing the inferred evolution of the St. Croix horst from Middle Keweenaw (?) to approximately Middle Ordovician time. A, Middle Keweenaw time; B, Solor Church time; C, Fond du Lac time; D, Hinckley time; and E, Early Paleozoic time.

From Morey, 1972.