Does the Grenville Front Tectonic Zone Lie West of its Previously Inferred Location in West-Central Ohio?

The Grenville front tectonic zone (GFTZ), or Grenville deformation front, marks the boundary between the Grenville orogenic belt and the Phanerozoic cover. This boundary is significant because it separates higher-grade Grenville metamorphic rocks on the east side from younger, less metamorphosed rocks on the west side. The GFTZ is a key feature in understanding the Grenville orogeny and its subsequent history.

Recent studies have questioned the location of the GFTZ, particularly in West-Central Ohio. The revised position of the GFTZ suggests that it may lie west of its previously inferred location. This has implications for understanding the tectonic evolution of the region, including the subsurface extension of the GFTZ beneath Phanerozoic cover into Michigan, Ohio, and other states.

The new interpretation by comparing deep-well data, seismic reflection data, and earthquake locations indicates that the GFTZ is more complex than previously thought. This new information challenges the traditional understanding of the GFTZ and opens up new avenues for research in tectonic geology.

The revised position of the GFTZ is based on reinterpretation of aeromagnetic data and sparse deep-well control data. This reinterpretation has led to the discovery of a tectonic lineament that separates this part of the U.S. from another. The lineament is thought to have played a significant role in the tectonic evolution of the region.

Further research is needed to fully understand the implications of this new interpretation. This includes further analysis of deep-well data, seismic reflection data, and earthquake locations. Additionally, continued studies of the GFTZ in West-Central Ohio will provide valuable insights into the tectonic evolution of the region.

Table showing index of key wells drilled to the Precambrian for the adjoining map. Modified from Baranoski and others (2009).

Hauser (1993) (see A–D above) is the first to develop a scenario for thrusted Grenville foreland basin and Eastern Granite-Rhyolite west GMF. Hauser (1996) modified his 1993 interpretation more in line with a Keweenawan rifting model similar to Gordon and Hempton (1986). He discussed the relationship of the Grenville deformations with the Midcontinent Rifting and other Grenville-related events.

Lidiak and Hinze (1993) correlate Grenville subprovinces into Ohio based largely on geopotential maps. They point out complexity on either side of GMF in terms of related (structural) and rhyolite clasts. They correlate Grenville subprovinces into Ohio based largely on geopotential maps. They point out complexity on either side of GMF in terms of related (structural) and paucity of metamorphic sediments (abundant rhyolite clasts).

The midcontinent rifting preceeding Grenville orogeny and in part based on the lack of Grenville materials in the "rift sediments." This is contrary to his 1993 interpretation where he correlated the Grenville with the "rift sediments." Hauser (1993) (see A–D above) is the first to develop a scenario for thrusted Grenville foreland basin and Eastern Granite-Rhyolite west GMF. Hauser (1996) modified his 1993 interpretation more in line with a Keweenawan rifting model similar to Gordon and Hempton (1986). He discussed the relationship of the Grenville deformations with the Midcontinent Rifting and other Grenville-related events.