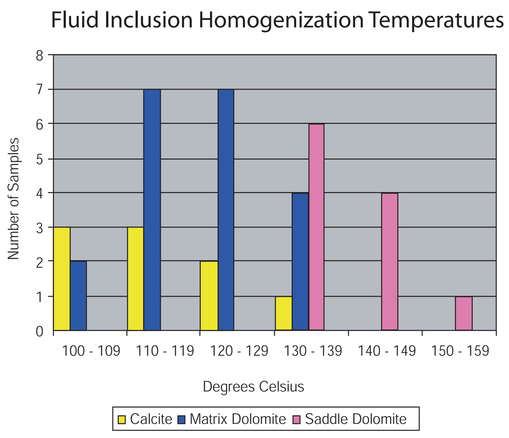
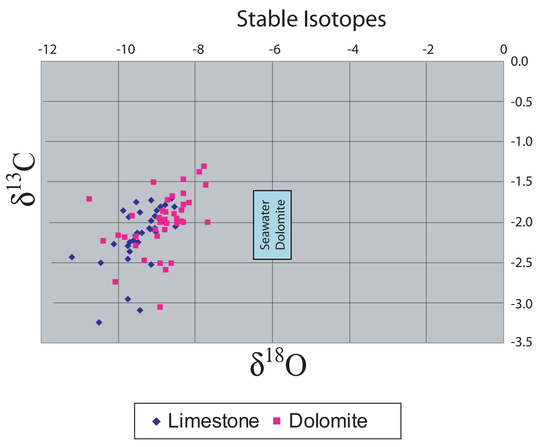
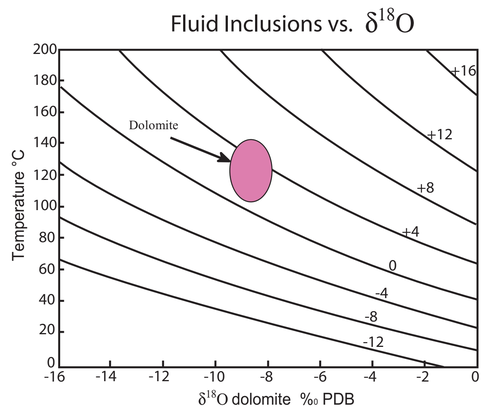
GEOCHEMISTRY



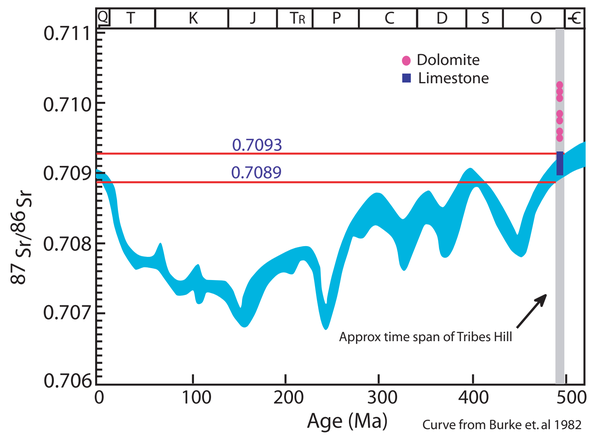
Fluid inclusion analyses performed on 40 samples from various areas of the outcrop yield homogenization temperatures ranging from 103 - 157˚C. Saddle dolomite crystals have significantly hotter inclusions than matrix dolomite and calcite.



Dolomite which has precipitated from the same fluid as a limestone will have $\delta^{18}O$ values approximately 3 parts per mil heavier than that limestone. Data from the quarry show that the dolomite values plot along with the limestone values. This indicates that the dolomite did not precipitate from the same fluid as the limestone.

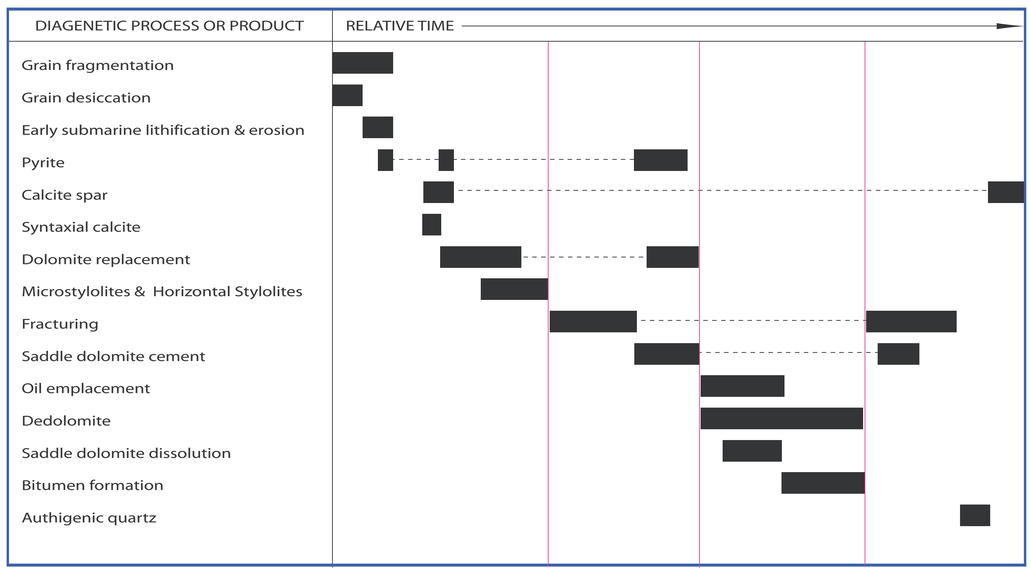


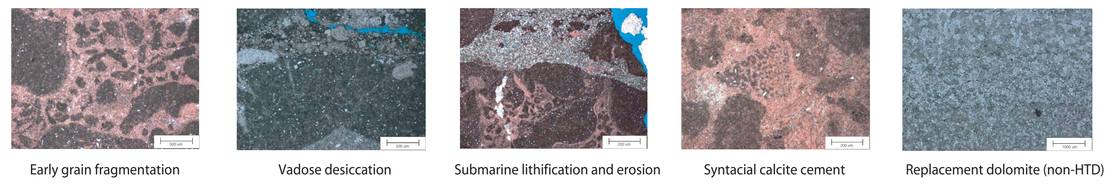
Due to fractionation caused by elevated temperatures, stable isotopes alone can not be used to determine the parent fluid of a dolomite crystal. $\delta^{18}O$ must be plotted against fluid inclusion homogenization temperatures. Although, the dolomites from the quarry yielded oxygen isotope values of around -9 ‰, this graph shows that the fluid from which those crystals precipitated was actually around +3 ‰.

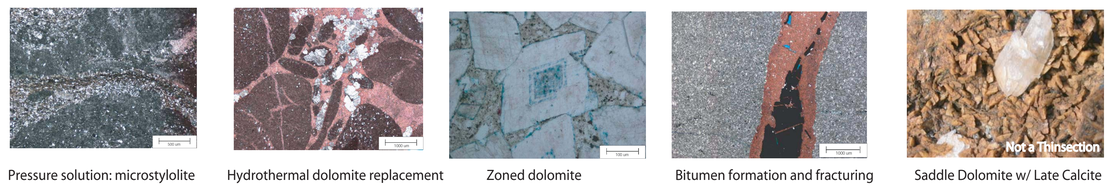


Strontium isotope analyses reveal that limestones samples from the quarry plot within the range of seawater strontium content for the Early Ordovician. The dolomites, however, have an elevated strontium composition. This indicates that the dolomites did not precipitate from the same fluids as the limestones. Elevated strontium may be a sign of prolonged interaction between the dolomitizing fluid and siliciclastic rocks such as the Precambrian basement or Potsdam sandstone.

DIAGENETIC SEQUENCE

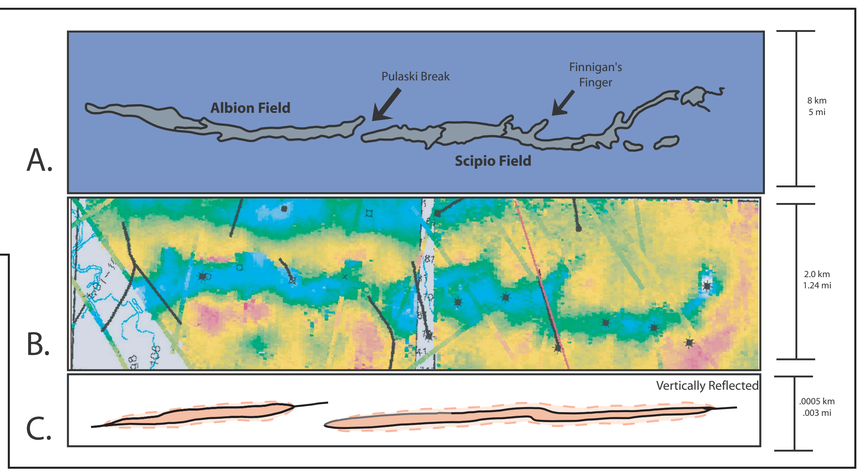




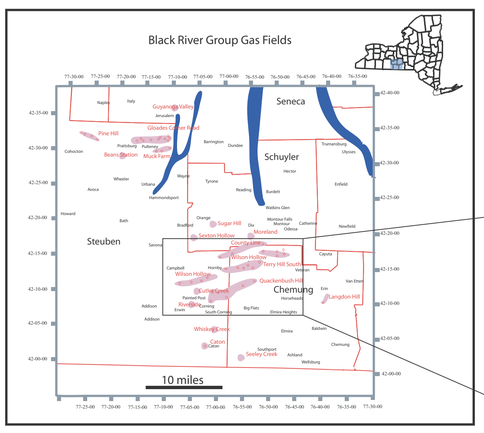


COMPARISON TO PRODUCING FIELDS

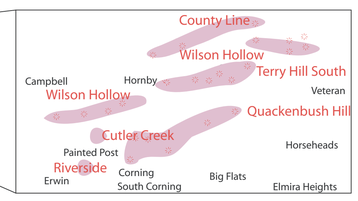
In aerial view, the quarry (C) depicts the same characteristic long, linear, en-echelon bodies as the Albion-Scipio Fields in Michigan (A) and 3-D seismic survey of the Rochester Field in Ontario, Canada (B).

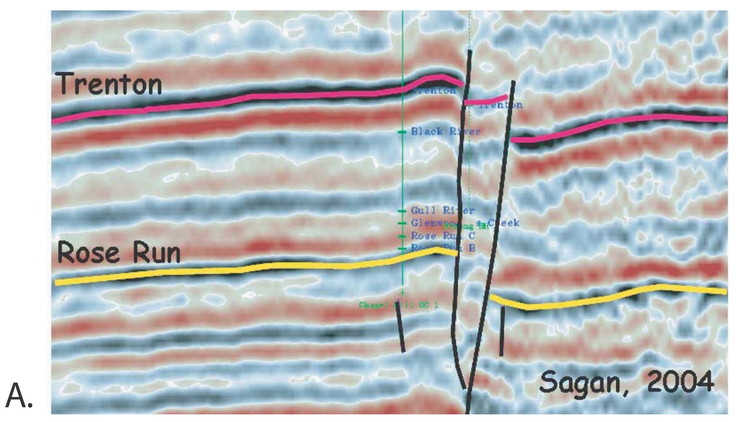


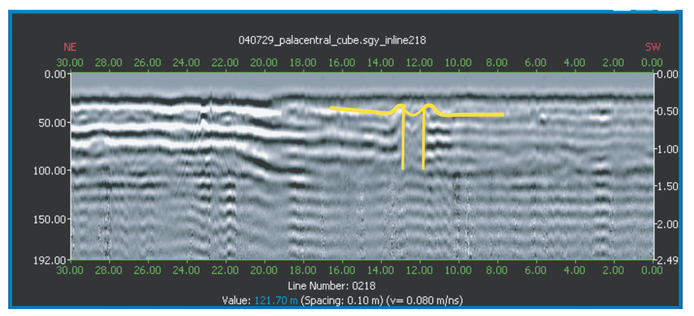
Geochemical Comparison	
NY Fields	Quarry Outcrop
1. Fluid Inclusion T_H's range from 100 - 160˚C	1. Fluid Inclusion T_H's range from 100 - 160˚C
2. Elevated or radiogenic $^{87}Sr/^{86}Sr$ (0.7085 - 0.709)	2. Elevated or radiogenic $^{87}Sr/^{86}Sr$ (0.7089 - 0.710)
3. "Light" or negative $\delta^{18}O$ values (-8 to -12‰)	3. "Light" or negative $\delta^{18}O$ values (-8 to -10.4‰)
4. High salinities (13 - 17% NaCl)	4. High salinities (26 - 30% NaCl)
5. Mineral Assemblage: Matrix Dolomite, Saddle Dolomite, Calcite, Quartz, Bitumen, Pyrite (From Smith, 2006)	5. Mineral Assemblage: Matrix Dolomite, Saddle Dolomite, Calcite, Quartz, Bitumen, Pyrite

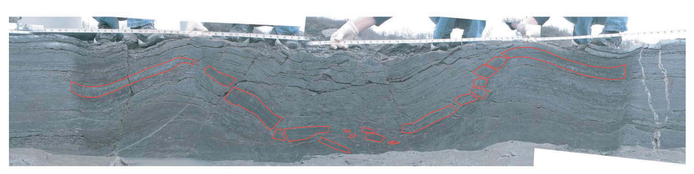


The Trenton / Black River Fields of south central New York also exhibits the same long, linear bodies which may prove to be en-echelon as more discoveries are made.









In profile view, GPR slices (B) and trench walls (C) from the quarry depict the same characteristic anticline flanked sags as hydrothermal dolomite reservoirs such as this seismic line from the York Field in NE Ohio (A).

IMPLICATIONS

1. Although the homogenization temperatures from fluid inclusion are not greater than the maximum burial temperatures for the Mohawk Valley, core descriptions and diagenetic sequencing indicate that faulting and mineralization occurred at shallow depth when the dolomitizing fluids were hotter than ambient rock temperature.

2. Although their scales are much different, the quarry outcrop shares every other physical and chemical characteristic with its larger, producing, counterparts.

CONCLUSIONS

1. Field relations show that the quarry exposure is a good analog for Trenton / Black River Hydrothermal Dolomite Fields. Much can be learned here that will be of value for geoscientists inters in better understanding these complex reservoirs.

2. Our early work suggests that the outcrop may have formed due to oblique slip at a dilational jog. Analysis of the quarry has led to a reevaluation of our models for Trenton / Black River Fields.

FUTURE WORK

1. We would like to shoot some shallow seismic in the area to image the basement and better understand the fault architecture.

2. There is a second exposure of dolomite in another area of the quarry and we are currently working to uncover that body as well.

3. We would like to do some sandbox modeling to better understand the stress regime from which these structures originated.

4. We plan to drill a deeper core that will reach the basement so we can establish a full stratigraphic column for the fluid flow path.