Biostratigraphic Analysis of Core 75NY-11 in the Mohawk Valley, NY, USA

Erin Richley and Charles Mitchell
State University of New York at Buffalo: Department of Geology

Introduction and Methods

In the Ordovician Period, the Mohawk Valley of New York State contained a large basin in which the black shales of the Utica Group formed. Multiple cores drilled by NL Industries through these rocks contain abundant graptolite fossils. These fossils can be used to expand our understanding of widespread orogenic events as well as local effects such as basin depth, flow rate, and other environmental effects.

Biostratigraphic analysis of core 75NY-11 near Ballston Spa, NY has been performed in order to identify biozone facies as they shift over time. I split the core into increments of about one inch in thickness and examined these sections for graptolite fossils, which I identified by species. Previously, similar analysis has been done on core 75NY-2. By comparing these data sets, a better understanding of changing conditions within the basin can be made.

Figure 3. *Rectograptus intermedius*. 3-D preserved specimen dissolved from limestones in the Viola Springs Formation in Oklahoma. Scale bar is 1mm.

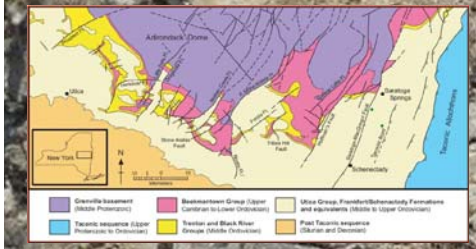

Figure 1. Map showing the surface geology of the Mohawk Valley and core locations. Core 75NY-11 lies to the east of Hoffmans fault and more southerly than core 75NY-2. 75NY-2 lies more northerly and farther to the east closer to the Saratoga-McGregor Fault.

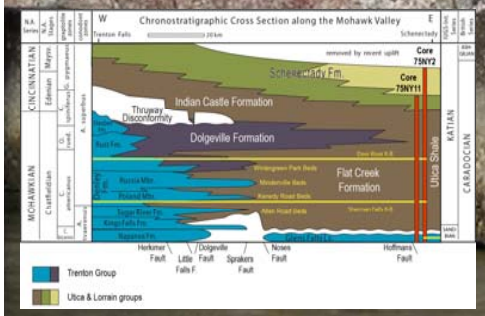

Figure 2. East-West facing cross section of the Mohawk Valley showing time-equivalent facies deposition. Both cores lie to the east of Hoffamans Fault. Core 75NY-11 is significantly shorter than 75-NY-2 due to surface erosion. Figure modified from Roloson (2011).

Figure 4. *Normalograptus mohawkensis*. 2-D specimen photographed in Utica Shale collected near Neuville, Quebec. Scale bar is 1mm.

Results

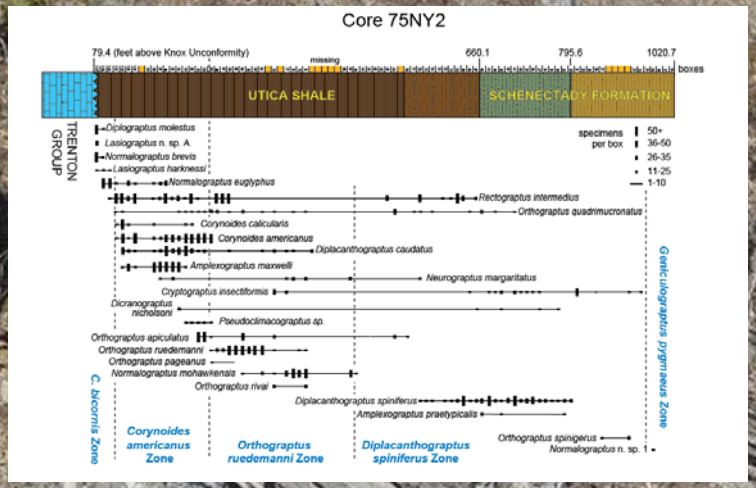

Figure 5. Range chart of graptolite biozones in Core 75NY-2. Includes abundance information and stratigraphic unit. Based on data from Roloson (2011).

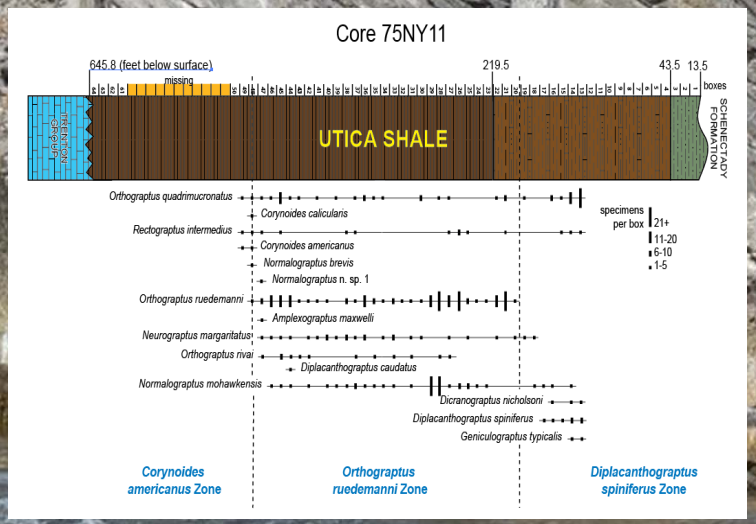

Figure 6. Range chart of graptolite biozones in Core 75NY-11. Includes abundance information and stratigraphic unit.

Discussion

Comparison of these two relatively closely spaced cores provides local-scale data on changing conditions within the basin. Both cores reside on the downthrown block of Hoffamn's Fault, but show differences in both taxa identity and abundances. Core 75NY-11 contains 6 species that significantly span the *Orthograptus* ruedemanni zone, while 9 species span the same interval in 75NY-2. This decreased number of taxa may suggest that closer interactions with the fault caused a higher energy environment. A high energy level may have been unsuitable for graptolite inhabitation, leading to decreased population sizes, and subsequently less deposition and fossilization.

Core 75NY-2 contains about 600 feet of Utica Shale while 75NY-11 only contains about 400 feet, with the interbedded silty to fine sandy facies taking up a higher proportion of the Utica Shale unit. There is a large difference in the abundances of samples between the two cores, with 75NY-11 showing consistently fewer specimens per box. This difference further supports the interpretation that there was less deposition taking place closer to the fault.

Conclusion

Although both of these cores lie on the downthrown fault block of Hoffman's Fault, they exhibit different properties. Changing energy dynamics across the floor of the basin may have contributed to differences in depositional environments. This can be confirmed through the use of geochemical data as well as higher resolution abundance data.

Future work includes the comparison of the biozones in these cores to the geochemical data and to trace fossil analysis. 17 other cores also exist inside the Mohawk Valley that can be studied. Comparison the cores on the other side of Hoffman's fault as well as those further away may provide insight into the changing depositional environment across the basin.

Literature Cited

[1] Roloson, M., 2011, Biostratigraphic Analysis of Core 75NY-2 North near Ballston Spa, New York: State University of New York at Buffalo: Department of Geology, p. 1-78.
[2] Elles, G.L., Wood, E.M.R., 1901-1918, A monograph of British Graptolites. Paleontography Society Monograph 11 parts, 539 p.
[3]Ruedemann, R, 1912, The Lower Siluric shales of the Mohawk Valley: New York State Museum Bulletin 162: p. 1-151.