

June 6, 2022

Notes

We are on a road trip from May 31 to June 10, so this week's web log entry is just some notes on things we saw on our journey. We left Manitoba for Southwestern Ontario and travelled through Minnesota, Wisconsin and Michigan, re-entering Canada at Sarnia. Here are some things to see if you take that route. As of June 6, we are just leaving Cambridge having attended a family wedding.

Mesabi Iron Range – Minnesota



Figure 1 – Biwabik Iron Formation, roadcut near Chisholm, Minnesota
Credit: [James St. John, Creative Commons Attribution 2.0 Generic license](#)

As you drive through Minnesota on Highway 53 near [Virginia MN](#), you can see some of the [Mesabi Iron Range](#) mines from the road. The Mesabi Iron Range deposits are [banded iron formations](#) deposited in the [Paleoproterozoic Era](#). Currently, most of the production is from the [Biwabik Iron Formation](#).

The Biwabik Iron Formation has a fairly [complex mineralogy](#), however for the purposes of iron extraction it is enough to say that it contains iron silicate minerals that can be processed to produce an iron ore concentrate called [taconite](#).

The Mesabi Iron Range is part of a larger complex of banded iron formations in Minnesota and Michigan called the [Lake Superior Iron Ranges](#). In 2021, [mines in Michigan and Minnesota produced 98% of American iron ore](#) or approximately 41,860 metric tonnes per year.

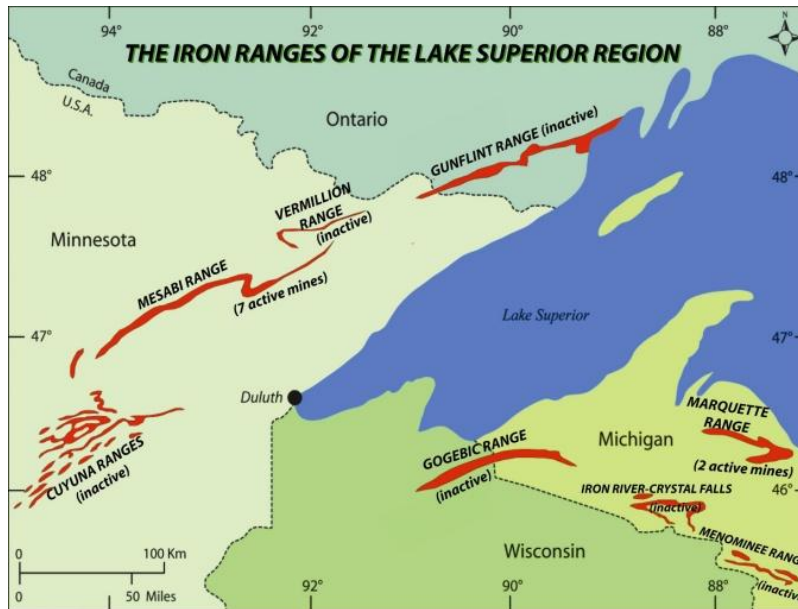


Figure 2 – Lake Superior Iron Ranges
 Credit: W.F. Cannon (USGS), [public domain](#)

Michigan Iron Industry Museum



Figure 3 - Michigan Iron Industry Museum, Negaunee, Michigan

Credit: Andrew Jameson, [Creative Commons Attribution-Share Alike 4.0 International](#) license

We saw more about the Lake Superior Iron Ranges at the [Michigan Iron Industry Museum](#) in [Negaunee, Michigan](#). This museum has a real good overview of the history of the Lake Superior Iron Ranges, especially those parts that are in Michigan. If you like hiking, they have a geology trail at the museum that takes a look at banded iron formation outcrops.

The Michigan Iron Industry Museum is located within the [Marquette Iron Range](#). Like the other iron deposits in the Lake Superior Iron Ranges, the Marquette deposits are Paleoproterozoic banded iron formations. The [geology is complex](#) and interesting. Also, like the other iron deposits in the Lake Superior Iron Ranges, the current production is geared to making taconite from the otherwise low grade iron silicates found in the Marquette Iron Range.

Michigan Basin

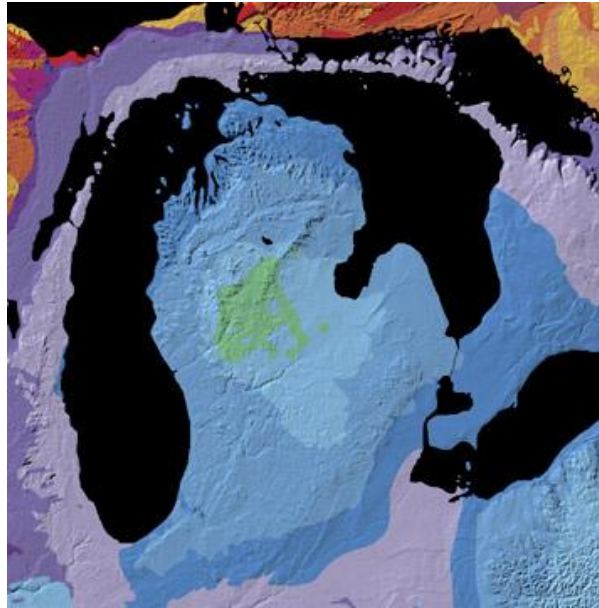


Figure 4 – Michigan Basin

Credit: United States Department of the Interior, [public domain](#)

After leaving the [Michigan Upper Peninsula](#) we crossed the [Mackinac Bridge](#) into the [Lower Peninsula](#) and the [Michigan Basin](#) geological province. The rocks of the Michigan Basin range in age from Cambrian to Jurassic and reflect a near continuous depositional record during those times.

Oil Museum of Canada

Among the resources of the Michigan Basin are [oil and gas](#). In addition to the oil and gas plays in Michigan, there are the oil plays of Southwest Ontario. Canada's first commercial oil well was drilled near [Oil Springs, Ontario](#) in 1858. The story of this early oil play is displayed at the [Oil Museum of Canada](#).

The museum covers the history of the early development of petroleum around Oil Springs and [Petrolia Ontario](#). The displays highlight the people who developed the oil play and the technology that they used. The surrounding area still has producing oil wells and a driving tour

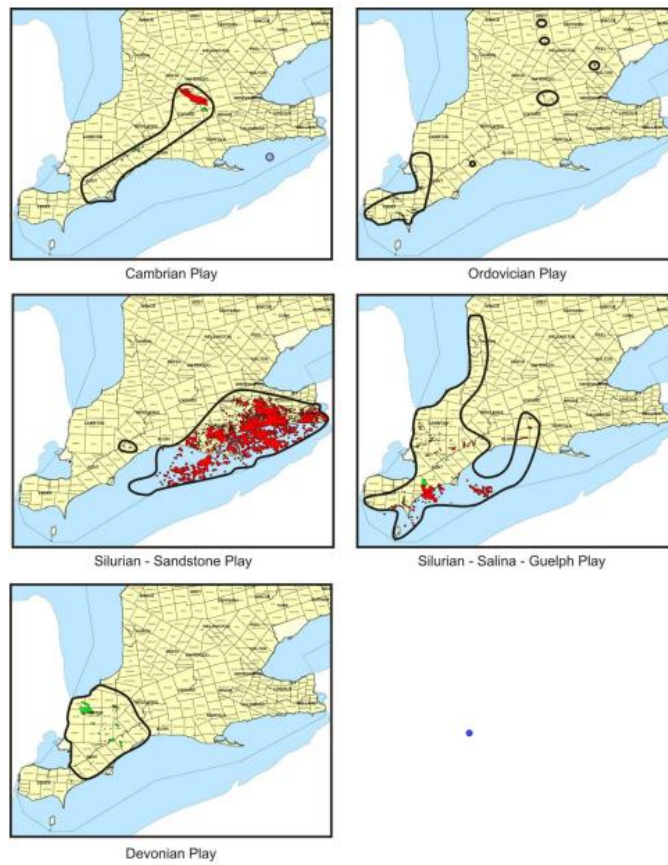
map of those facilities is available at the museum. It's an interesting piece of history, especially for geologists.



Figure 5 – Oil Museum of Canada

Credit: Tlang519, [Creative Commons Attribution-Share Alike 4.0 International](https://creativecommons.org/licenses/by-sa/4.0/) license

Figure 6, below, shows the locations of the various [oil and gas plays in southern Ontario](#).



Approximate boundaries of principal oil and gas producing areas (past and current) in southwestern Ontario, with counties shown for reference.

Figure 6 – Oil and Gas Plays in SW Ontario

Credit: Figure 1 in [The Oil and Gas Plays of Ontario, 2008](#)

There are five principal types of oil and gas plays in Southwest Ontario:

- Structural and stratigraphic traps in Cambrian sandstones and sandy dolomites;
- Hydrothermal dolomite reservoirs in middle Ordovician limestones;
- Stratigraphic traps in lower Silurian sandstones;
- Reefs and structural traps in middle Silurian Salina Group carbonates; and
- Structural traps in Devonian fractured, dolomitic carbonates and sandstones.

The Devonian plays were the first to be developed, starting in 1858 and some wells continue to produce oil today. The development of the Devonian play was closely followed by the development of the Ordovician play. The Cambrian plays have produced oil and natural gas since 1928. Discovery and development of the Silurian sandstone play began in the 1960's and produce natural gas. The Silurian Salina Group carbonates were also developed beginning in the 1960's and continue to produce oil and gas to this day. Figure 7, below, shows the general geological column for southwest Ontario.

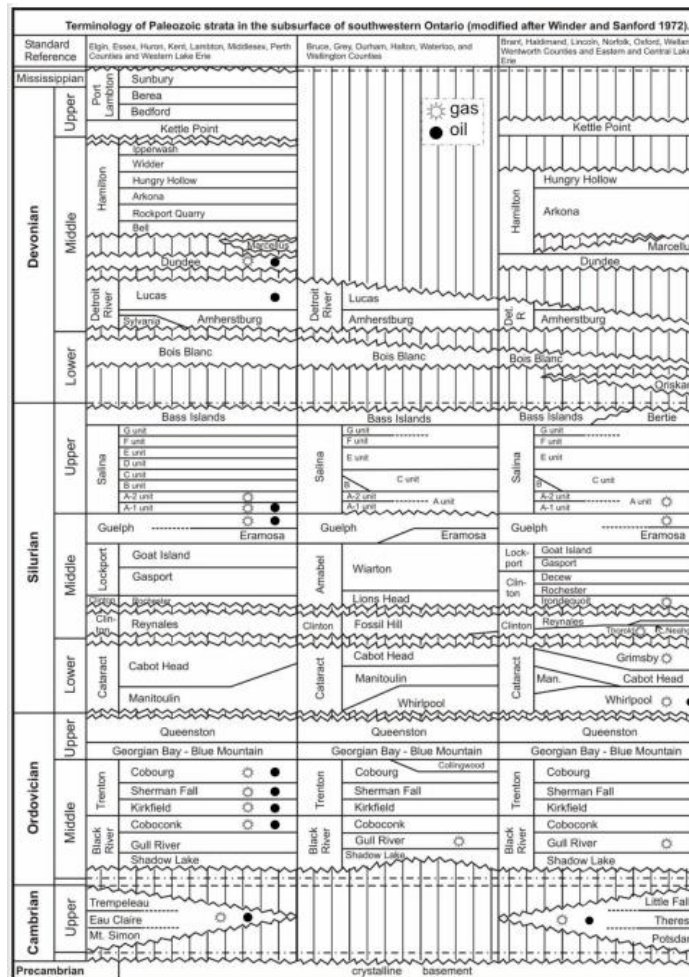


Figure 7 – Oil and Gas Plays in SW Ontario

Credit: Figure 2 in [The Oil and Gas Plays of Ontario, 2008](#)

That kind of wraps it up for now. We'll be returning back to Manitoba before June 10th and I'll return to my discussion of the Jurassic next week.

Standard Caveat

The purpose of my weblog postings is to spark people's curiosity in geology. Don't entirely believe me until you've done your own research and checked the evidence. If I have sparked your curiosity in the subjects posted on this website, follow up with some of the links provided in the postings. If you want to, go out into the field and examine some rocks on your own with the help of a good field guide. Follow the evidence and make up your own mind.

In science, the only authority is the evidence!