

November 15, 2021

News and Notes

Before talking about mountain building, here are some news items that I thought were interesting:

Geo-Scientific Grifters

Regrettably, geoscience is not immune to the current trend for institutions to be taken over by various [grifters](#), con artists and other fraudulent actors, see this story from the [Retraction Watch: Springer Nature geosciences journal retracts 44 articles filled with gibberish](#). Here is the [complete list of retractions](#) that were published in the [Arabian Journal of Geosciences](#).

We can only speculate on the motives for some of the authors for publishing such garbage. Meanwhile, legitimate papers are left gathering dust on some editor's desk.

Volcanoes

- Latest volcano news here: [Worldwide Volcano News and Updates](#).
- From the New York Times: [When Kilauea Erupted, a New Volcanic Playbook Was Written](#).
- [Volcanic eruptions contributed to collapse of China dynasties](#); research paper [here](#).
- On YouTube: [La Palma Volcano Eruption Update; Strong Earthquake, New Lava Delta](#).

Earthquakes

- [M 6.3 - 64 km NNW of Bandar Abbas, Iran](#).

Environment & Climate Change

- From Polar Bear Science: [Conditions were not golden for polar bears in the 1980s despite what activist expert claims](#),
- Melting glaciers": [A Potted History of Glaciers](#).
- [Global temperatures over last 24,000 years show today's warming 'unprecedented'](#).
- Yeah, let tinker with the heat flow of the Earth, that will end well: [In Science magazine, scholars call for more comprehensive research into solar geoengineering](#).
- Review of [Climate Chaos](#) by Brian Fagan & Nadia Durrani, [Winnipeg Free Press](#); the book is probably much better than the review.

Landslides

- From the American Geophysical Union: [A large rock slope collapse from Punta dei Ross, Croda Marcora in the Italian Dolomites](#).

Energy and Mining

- From the U.S. Energy Information Administration: [Crude oil demand returns faster than supply, increasing prices and reducing inventories.](#)
- Coal Research at Penn State: [Coal creation mechanism uncovered](#); research paper [here](#).
- [Greenland Minerals seeks clarity on new legislation to ban uranium mining.](#)
- [China resists COP26 push to end coal as energy security prevails.](#)

Paleontology

- [Baby Bird Fossil Is 'Rarest of the Rare'.](#)

Shiny Rocks

- [Diamond Hauled From Deep Inside Earth Holds Never-Before-Seen Mineral.](#)
- [Zircon \(U-Th\)/He thermochronology of Grand Canyon resolves 1250 Ma unroofing at the Great Unconformity and <20 Ma canyon carving](#); zircons are often the oldest minerals in a rock and often have clues to the geochemistry of the original rock .

2021/22 Hutchison Lecture Schedule

Please email stefanie.brueckner@umanitoba.ca to get the Zoom meeting details to attend any of these talks.

- ~~Lecture #1 – Tuesday, October 26, 2021 at 1pm (NL time), Sending probes into the deep Earth to understand subduction, [abstract](#).~~
 - Lecture #2 – Tuesday, November 16, 2021 at 1pm (CST), Sending probes into the deep Earth to understand subduction, [abstract](#).
 - Lecture #3 – Thursday, November 18, 2021 at 11am (PST), Sending probes into the deep Earth to understand subduction, [abstract](#).
 - Lecture #4 – Tuesday, November 23, 2021 at 12pm (EST), Deciphering the composition of fluids in the Earth, [abstract](#).
 - Lecture #5 – Thursday, November 25, 2021 at 2:30pm (EST), Deciphering the composition of fluids in the Earth, [abstract](#).
 - Lecture #6 – Tuesday, November 30, 2021 at 10:30am (EST), Sending probes into the deep Earth to understand subduction, [abstract](#).
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Mountain Building - Orogeny

One of the ways that geologists have tried to understand the story of the Earth is through grouping the rocks into episodes of mountain building, also called [orogeny](#). So, before going on from the Archean Eon to the Proterozoic Eon, let's look at the major episodes of orogeny in the history of North America.

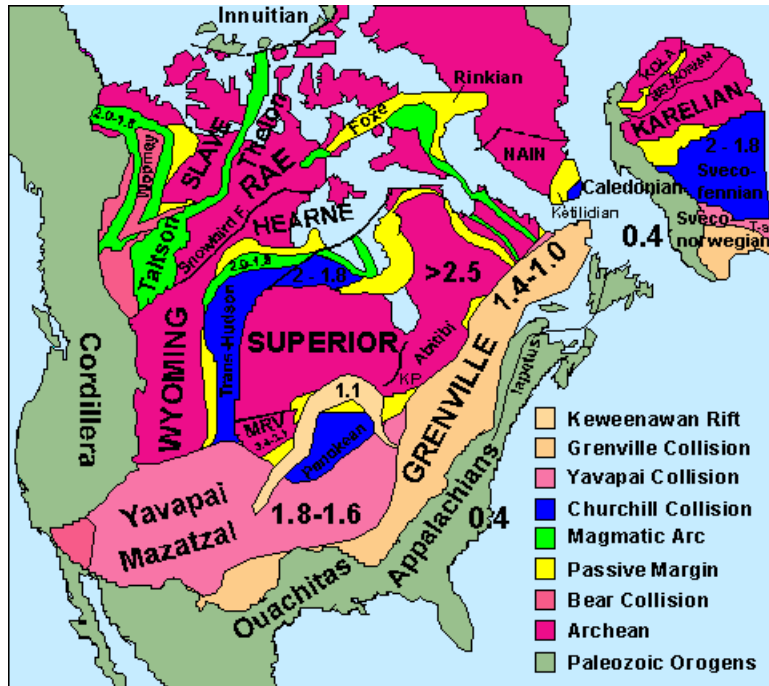


Figure 1 - North America Basement Rocks

Credit: [United States Geological Survey](#), public domain

Algoman Orogeny

Also known as Kenoran orogeny, the [Algoman orogeny](#) was a Late Archean (2.7 to 2.5 Ga) episode of mountain building that built the core of the North America Craton. The orogeny is found in the rocks of the [Superior Craton](#) which are found from South Dakota to northern Quebec.

Wopmay Orogeny

The [Wopmay orogeny](#) was a mountain building event along western edge of [Canadian shield](#) in northern Canada that occurred in the [Proterozoic Eon](#), 2.1 to 1.9 Ga. The orogeny formed during the collision between the Hottah terrane (north of the Hottah Lake), a continental magmatic arc, and the Archean [Slave Craton](#). Although it sounds like an indigenous name, the Wopmay Orogeny is named after a famous bush pilot, [Wilfrid Reid "Wop" May](#).

Trans-Hudson Orogeny

Also known as Hudsonian orogeny, the [Trans-Hudson orogeny](#) occurred in the [Proterozoic Eon](#) (2.0 to 1.8 Ga). The rocks of the Trans-Hudson orogeny extend from [Hudson Bay](#) west into [Saskatchewan](#) then south through to the western [Dakotas](#) and [Nebraska](#). The orogeny was the result of the collision of the [Superior Craton](#) with the [Hearne Craton](#) and the [Wyoming Craton](#).

Nagssugtoqidian Orogeny

The rocks of the [Nagssugtoqidian orogeny](#) are found in Greenland. The orogeny occurred during the Late Paleoproterozoic (1.91 to 1.77 Ga). The rocks of this orogeny were accreted onto the northern part of the mainly Archean [North Atlantic Craton](#).

Ketilidian Orogeny

Also occurring in the late [Paleoproterozoic Era](#), the [Ketilidian orogeny](#) was formed by a collision at the southern margin of the [North Atlantic Craton](#), 1.85 to 1.72 Ga. Rocks of this orogeny are found in southern Greenland.

Penokean Orogeny

Found in rocks in Wisconsin, Minnesota, Michigan, and southern Ontario, the [Penokean orogeny](#) occurred during the [Paleoproterozoic Era](#), 1.85 to 1.84 Ga.

Great Falls Orogeny

The [Great Falls orogeny](#), also known as the Big Sky orogeny, was formed by a Proterozoic (1.77 Ga) collision between the [Hearne craton](#) and the [Wyoming craton](#) in what is now southwest [Montana](#).

Ivanpah and Yavapai Orogenies

[Ivanpah orogeny](#) and [Yavapai orogeny](#) occurred 1.71 to 1.68 Ga in the southwestern United States. The Ivanpah orogeny is found in the rocks of the Ivanpah Mountains in the [Mojave](#) region. The closely related Yavapai orogeny, was a collision between the Yavapai island arc terrane with the proto-North American continent.

Mazatzal Orogeny

Also found among rocks in the southwestern United States, the [Mazatzal orogeny](#) – occurred 1.675 to 1.650 Ga. It was another collision of an island arc terrane with the proto-North American continent.

Picuris Orogeny

Found among rocks of the Picuris Mountains in the southwestern United States, the [Picuris orogeny](#) occurred 1.43 to 1.3 Ga and was the result of suturing a Granite-Rhyolite terrane onto the proto-North American continent.

Grenville Orogeny

This was a big one. The [Grenville orogeny](#) occurred worldwide during the Mesoproterozoic, 1.30 to 1.00 Ga. During the Grenville orogeny, most of the world's continents assembled into the supercontinent [Rodinia](#). In North America, rocks of the Grenville orogeny are found in a folded mountain belt from Newfoundland to North Carolina.

Caledonian Orogeny

Another major mountain building event, [Caledonian orogeny](#) was caused by the collision of [Laurentia](#), [Baltica](#) and [Avalonia](#). Major divisions of the Caledonian orogeny include:

- The [East Greenland Orogen](#) that lasted from the [Cryogenian](#) to [Devonian](#) Periods.
- The [Taconic phase](#) of mountain-building period that affected most of the northeastern U.S. and Canada, during the [Ordovician Period](#).
- The [Acadian phase](#) occurred in the eastern United States during the [Silurian](#) and [Devonian](#) Periods,

Appalachian Orogeny

Closely related to the Caledonian orogeny, the [Appalachian orogeny](#) is usually seen as the same as the [Variscan orogeny](#) in Europe. Major subdivisions include:

- The [Appalachian Mountains](#) is a well studied orogenic belt resulting from a late [Paleozoic](#) collision between [North America](#) and [Africa](#).
- The [Taconic orogeny](#), a mountain-building period that affected most of New England.
- The [Acadian orogeny](#).
- The [Alleghanian orogeny](#).

Ouachita Orogeny

Found in the rocks of the [Ouachita Mountains](#) of [Arkansas](#) and [Oklahoma](#), the [Ouachita orogeny](#) dates from the late [Paleozoic Era](#). The Ouachita Mountains are most likely a continuation of the [Appalachian orogeny](#) west across the [Mississippi Embayment](#) and [Reelfoot Rift](#) zone.

Antler Orogeny

Found in the rocks of the [Sierra Nevada](#) Mountains, the [Antler orogeny](#) occurred from late [Devonian](#) Period to early [Mississippian age](#)

Innuitian Orogeny

Also known as Ellesmerian orogeny, the [Innuitian orogeny](#) was a major tectonic episode in the Canadian Arctic and Northernmost Greenland 345 [Ma](#) during the Mississippian. Rocks of this orogeny are found in the [Innuitian Mountains](#) in the Canadian Arctic that extend from [Ellesmere Island](#) to [Melville Island](#).

Nevadan Orogeny

The [Nevadan orogeny](#) occurred along the western margin of North America during the Middle [Jurassic](#) to Early [Cretaceous](#) time which 155 Ma to 145 Ma. Fairly complicated, it included deposition of volcanic rocks in an [Andean type continental magmatic arc](#) and the accretion of island arc terranes.

Orogenies of the Rocky Mountains

The Rocky Mountains of the Western Cordillera formed in three major orogenies:

- The [Sonoma orogeny](#) that occurred 270–240 Ma during the [Permian / Triassic transition](#). Found among rocks in northwest Nevada, the Sonoma orogeny appears to be the result of a sequence of accretionary events along the Cordilleran margin.
- The [Sevier orogeny](#) was a mountain-building episode that occurred 140–50 Ma. Rocks of the Sevier orogeny are found from northern Canada to Mexico. The Sevier orogeny was the result of convergent boundary tectonic activity.
- [Laramide orogeny](#) was a period of mountain building that started in the Late Cretaceous 40–70 Ma. Rocks of this orogeny are found from Canada to northern Mexico, with the easternmost extent of the mountain-building found in the Black Hills of South Dakota. The orogeny is named after the Laramie Mountains of eastern Wyoming.

Pasadena Orogeny

Beginning in the [Pleistocene Epoch](#) and continuing to present day, the [Pasadena orogeny](#) is found among the [Transverse Ranges](#) of California.

Wrapping Up

Mountain building is an ongoing process, an intricate part of the process of [Plate Tectonics](#). As you can see from the list above, this process has put together the continents as we know them

today.

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 subject of this posting, follow up with some of the links provided here. 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.